

Diatoms from Honaunau Bay Hawaii Island



Collection site on Hawaii Island

Introduction	2
Methods	2
Discussion	2
List of Species	3
Radial Centric	4
Polar Centric	16
Araphid	42
Symmetric Biraphid	54
Monoraphid	74
Asymmetric Biraphid	78
Nitzschioid	86
Surirelloid	96
Acknowledgements	106
References	106

Introduction

This report presents diatoms from the marine littoral habitat of Honaunau Bay on Hawaii Island in the Pacific Ocean.

Methods

Three samples were collected (in 2009, 2015, and 2022) from the marine littoral habitat of Honaunau Bay (latitude 19.423709, longitude -155.912125). Improvised plankton nets were towed from a wetsuit to collect the samples while swimming. The two earlier nets were simply nylon stockings fitted with a wire rim. The latest net added a plastic bottle at the end of the stocking. This last sample proved to be very rich in diatoms despite spilling much of the sample while getting out of the water.

Samples were cleaned with hydrogen peroxide, rinsed in distilled water, dried on cover slips, and mounted on slides using Zrax.

Images were taken with digital cameras using bright field (BF), oblique lighting (OL), or circular oblique lighting (COL) and then edited (PhotoScape 2022). Metadata such as tags and comments were added to images (Microsoft 2018), then extracted (Harvey 2022) and imported into a database (Microsoft 2020) to provide species lists and caption text.

Discussion

Diatom images for this report were chosen for their interesting shapes and larger sizes that were easier to see in the light microscope. The choices were also limited by those valves that survived cleaning in hydrogen peroxide.

Images are arranged by morphological groups adapted from Spaulding et al. (2021). No eunotioid diatoms were found in these marine collections. Over 300 images of 90 species are included, often with the same specimen in different focal planes. (A species here is defined as a cleaned valve that can be distinguished mostly by morphometrics from other valves.) Forms that could not be assigned a species name are given numbered epithets such as sp1, sp2, et cetera. These epithets are recorded in keys in an effort to differentiate forms. The author of this report assumes responsibility for the many errors that undoubtedly are in the identifications. Many forms that were found in these planktonic collections live attached to rocks or seaweed. These may have washed in from the edges of the bay by actions of swimmers, waves, or grazing turtles.

Several recent works were very helpful. Lee (2021) provided a useful webinar about keeled diatoms with the surirelloid group discussed in the second half. It also clarified the many changes of names in that group. The excellent illustrations in Lobban et al. (2012) was used for names of many species. The very recent paper by Lobban et al. (2022) was valuable for the revision of several species of araphid diatoms.

When reading this report in Adobe Acrobat Reader, images can be expanded for more detail. File names in the comments refer to images in the image collection.

This report was started by Rob Kimmich on 15 May 2022 and last revised on 9 Oct 2022.

List of Species

Radial Centric

Actinocyclus octonarius
Actinocyclus sp1
Actinocyclus tenuissimus
Aulacodiscus orientalis
Aulacodiscus sp1
Coscinodiscus sp1
Endictya sp1
Hyalodiscus sp1
Hyalodiscus sp2
Melosira nummuloides
Paralia longispina
Podosira baldjickiana
Podosira sp1
Stictocyclus stictodiscus

Polar Centric

Biddulphia sp1
Biddulphiopsis
 membranacea
Lampriscus
 shadboltianum
Odontella aurita
Pseudotriceratium sp1
Toxarium hennedyanum
Toxarium undulatum
Triceratium dubium
Triceratium favus
Triceratium pentacrinus
Triceratium sp1
Trigonium arcticum cf
 var pentagonalis
Trigonium arcticum var
 californicum
Trigonium arcticum var.
 kerquelense
Trigonium caelatum
Trigonium formosum
Trigonium sp

Araphid

Ardissonea formosa
Climacosphenia elongata
Grammatophora sp1
Hyalosynedra laevigata
Licmophora cf colosalis
Licmophora ehrenbergii
Licmophora sp1
Podocystis adriatica
Podocystis spathulata
Rhabdonema punctatum
Rhabdonema sp
Rhabdonema sp2
Synedrosphenia
 crystallina
Synedrosphenia fulgens
Tabularia sp1

Symmetric Biraphid

Diploneis chersonensis
Diploneis crabro
Diploneis didyma
Diploneis graeffii
Diploneis ovalis f angusta
Diploneis smithii
Diploneis sp1
Donkinia sp2
Haslea sp1
Lyrella hennedyi
Mastogloia citrus
Mastogloia fimbriata
Mastogloia horvathiana
Mastogloia neoborneensis
Mastogloia paradoxa
Mastogloia sp1
Navicula longa
Plagiotropis lepidoptera
Pleurosigma
 intermedium
Pleurosigma rigidum

Pleurosigma sp
Trachyneis aspera

Monoraphid

Achnanthes citronella
Achnanthes sp1
Achnanthes sp2
Anorthoneis sp1
Cocconeis convexa
Cocconeis heteroidea
Cocconeis scutellum
Cocconeis sp
Cocconeis sp5

Asymmetric

Biraphid

Climaconeis riddleae
Halamphora coffeiformis
Tetramphora decussata
Undatella quadrata

Epithemioid

Rhopalodia gibberula

Nitzschioid

Nitzschia angularis
Nitzschia coarctata
Nitzschia longissima
Nitzschia sigma
Nitzschia sp2
Nitzschia ventricosa
Nitzschia vidovichii

Surirelloid

Campylodiscus collare
Campylodiscus comis
Campylodiscus fastuosa
Campylodiscus sp1
Campylodiscus sp7
Coronia decorus
Coronia samoensis
Hydrosilicon mitra
Plagiodiscus nervatus

**Radial Centric
Radial Symmetry Without Poles**

Plate 1

Actinocyclus octonarius.

Scale bars = 10 μ m. From Al-Yamani & Suburova (2019) pl 6-8.

- 1 100x. (IMG_1249_1.JPG)
- 2 100x. (IMG_1253_1.jpg)
- 3 60x. Internal view. Focus on center. Good example of marginal pseudonodulus. (IMG_6237_1.jpg)
- 4 60x. Internal view. Focus on pseudonodulus. Good example of marginal pseudonodulus. (IMG_6238_1.jpg)
- 5 100x. High focus on pseudonodulus. (IMG_6283_1.JPG)
- 6 100x. Low focus on center. (IMG_6284_1.JPG)

Plate1

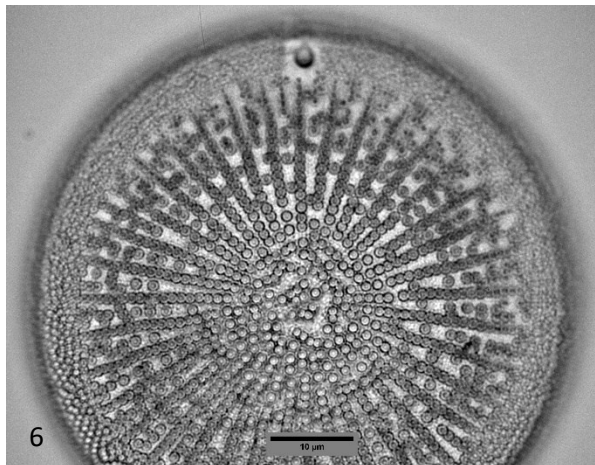
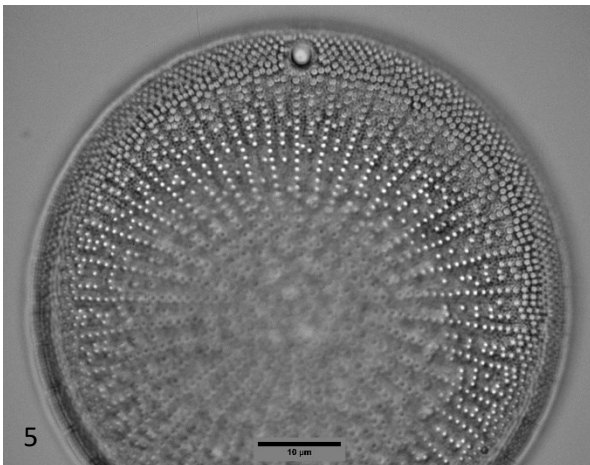
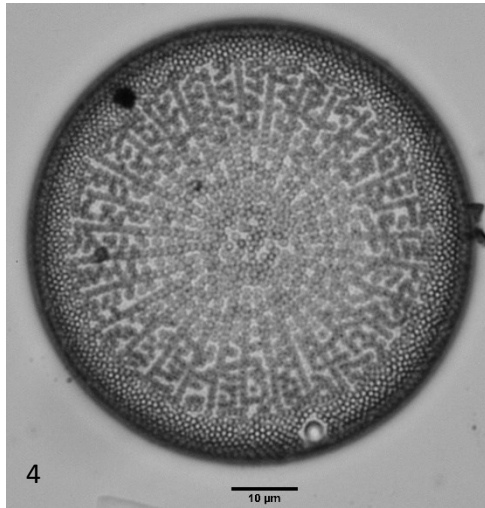
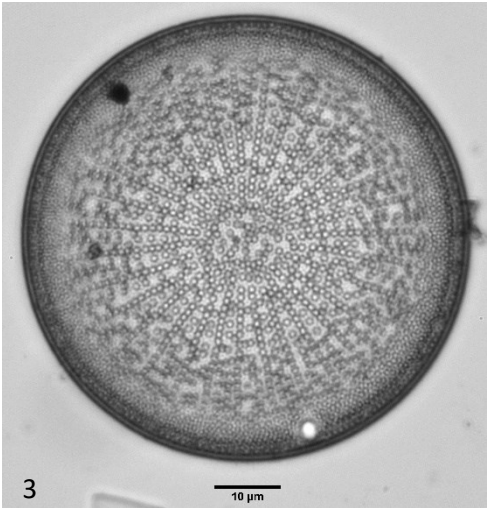
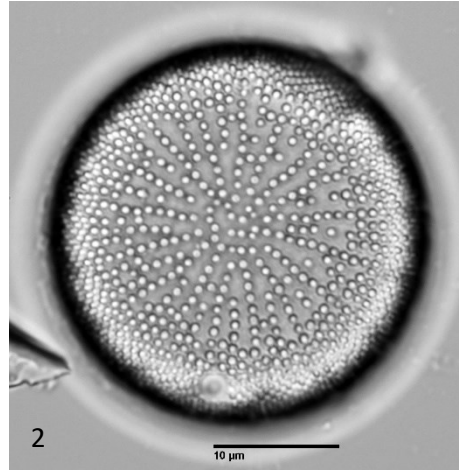
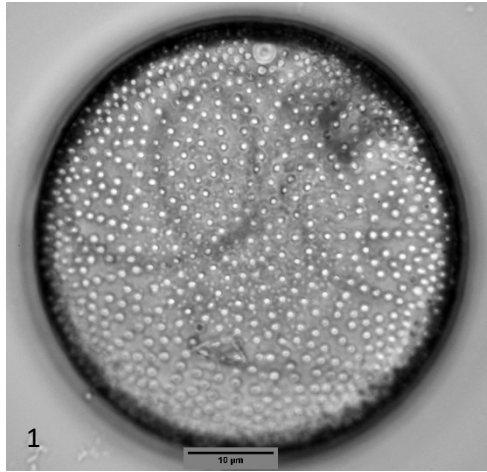


Plate 2

- 1 Actinocyclus octonarius. 60x. Scale bar 10 μm . Internal view. Low focus on center and pseudonodulus. From Al-Yamani & Suburova (2019) pl 6-8. (IMG_8362-1.JPG)
- 2 Actinocyclus octonarius. 60x. Scale bar 10 μm . External view. High focus on center and pseudonodulus. From Al-Yamani & Suburova (2019) pl 6-8. (IMG_8363-1.JPG)
- 3 Actinocyclus sp1. 60x, OL, NA070. Alveolae 10 in 10 μm . Valve perhaps dissolving. From Round et al. (1990). (IMG_6255_1.JPG)
- 4 Actinocyclus tenuissimus. 100x, BF, NA080. Near focus on center. Areolae 18 in 10 μm . From Lobban et al. (2012) pl 5: 1-2 (IMG_4779_1.jpg)
- 5 Actinocyclus tenuissimus. 100x, BF, NA080. Far focus on pseudonodulus and rim processes at 10:00 and rim marks at 1:00. Areolae 18 in 10 μm . From Lobban et al. (2012) pl 5: 1-2 (IMG_4780_1.jpg)
- 6 Actinocyclus tenuissimus. 60x. Scale bar 10 μm . (IMG_8469-1.JPG)

Plate 2

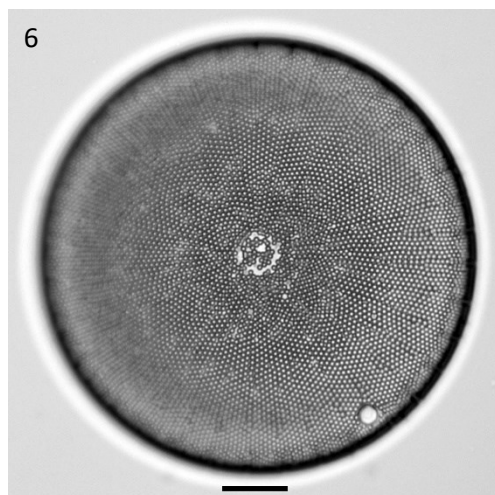
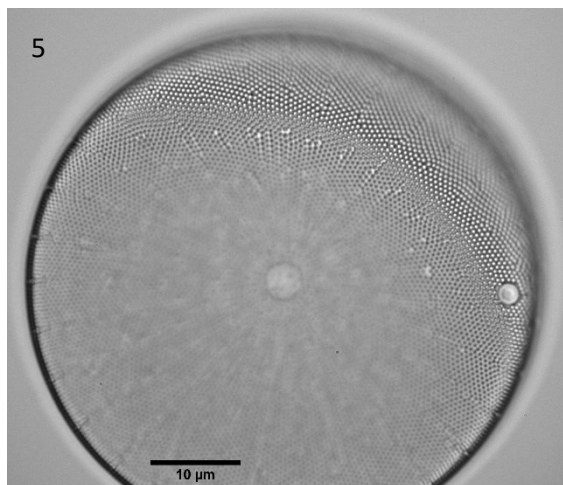
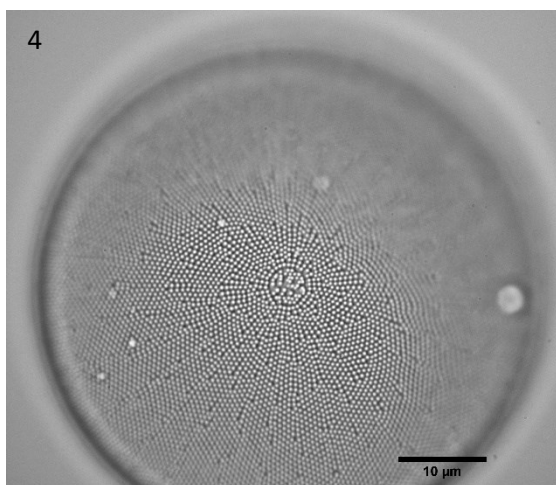
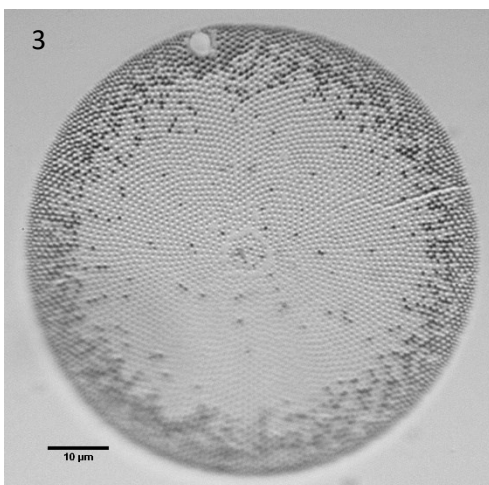
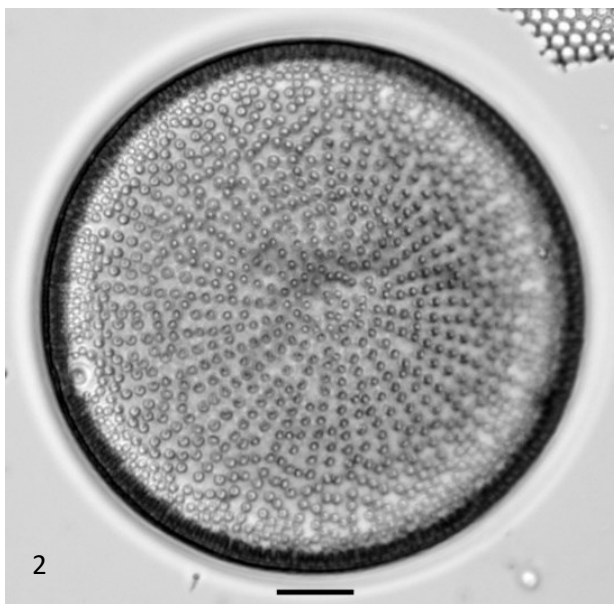
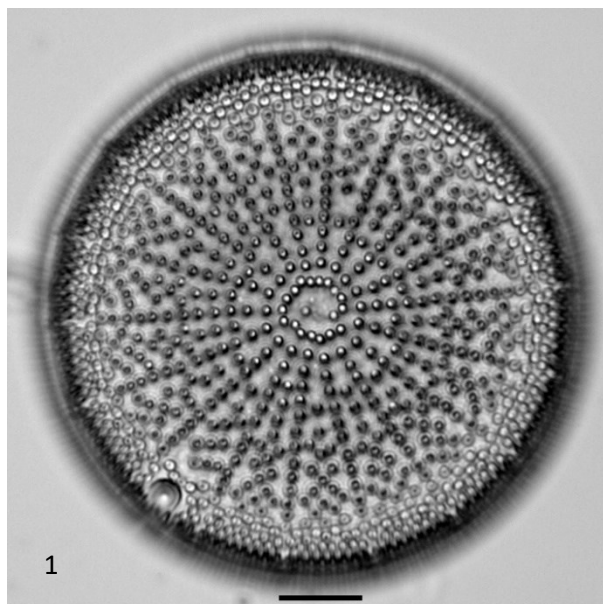


Plate 3

- 1 *Aulacodiscus orientalis*. 40x. Dia 145 μm . Scale bar = 10 μm . Wet mount slip supported by coverslip fragments. From Schmidt (1874-1959) pl 34: 1-2 and Round et al. (1990) p 188. (IMG_1362_1.jpg)
- 2 *Aulacodiscus* sp1. High focus on a split ring girdle band. Marginal processes with rimoportulae extend above valve face. From Round et al. (1990) p 188. (IMG_1374-1.jpg)
- 3 *Coscinodiscus* sp1. 60x, OL. Whole valve. From Round et al. (1990). (IMG_5416_1.jpg)
- 4 *Coscinodiscus* sp1. 100x. BF, NA100. High focus on valve face. Shows faint detail of areolae. From Round et al. (1990). (IMG_5447-1.JPG)
- 5 *Coscinodiscus* sp1. 100x. BF, NA100. Mid focus on internal openings. From Round et al. (1990). (IMG_5448-1.JPG)
- 6 *Coscinodiscus* sp1. 100x. BF, NA100. Low focus on marginal points at 10:00. From Round et al. (1990). (IMG_5449-1.JPG)
- 7 *Endictya* sp1. 100x. High focus on center and margin. From Round et al. (1990) p 160. (IMG_4785_1.JPG)
- 8 *Endictya* sp1. 100x. Low focus on center and lower margin. From Round et al. (1990) p 160. (IMG_4786_1.JPG)

Plate 3

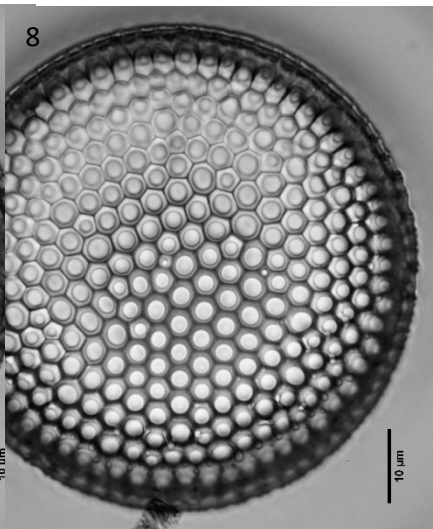
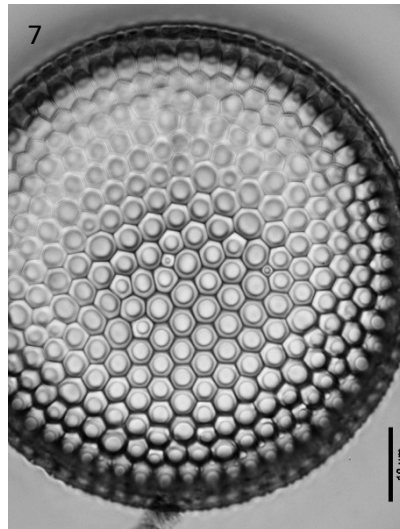
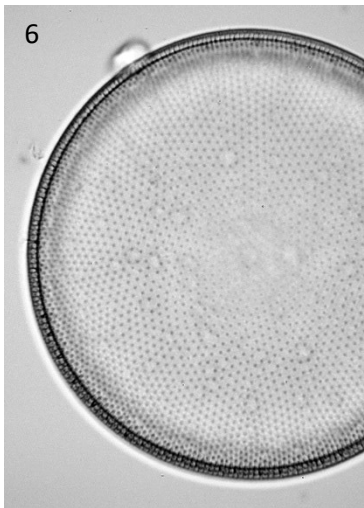
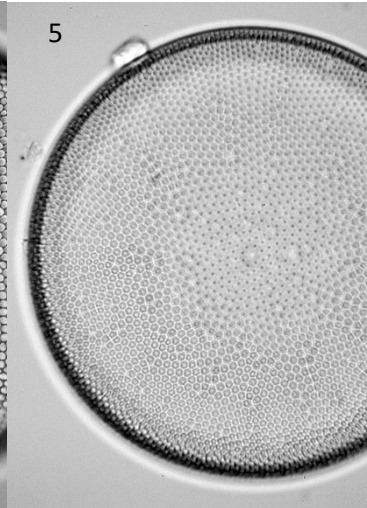
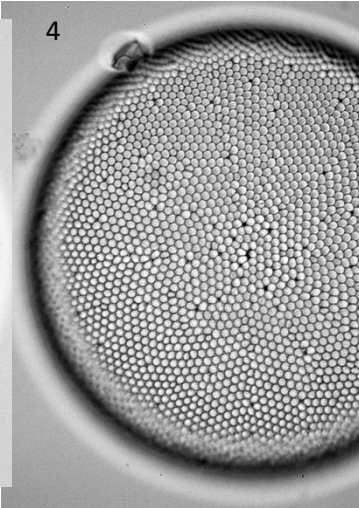
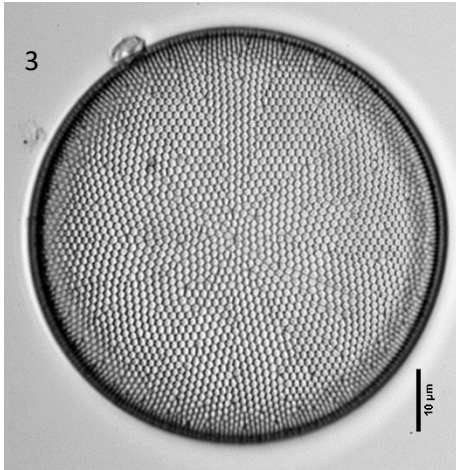
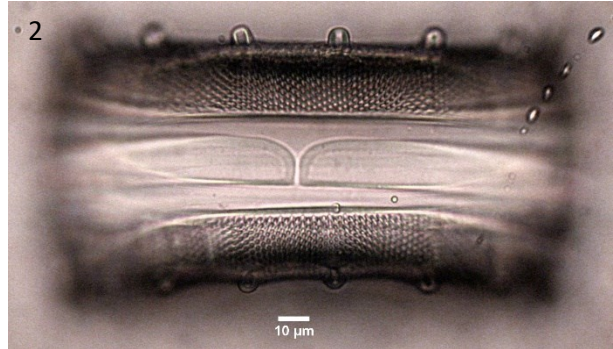
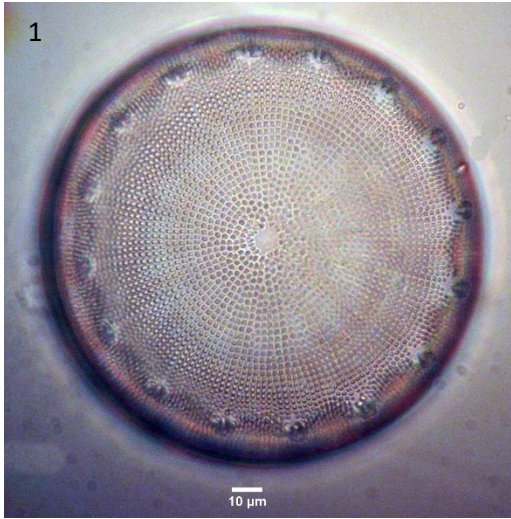


Plate 4

- 1 10x, OL. Scale bar 100 μm . Reflected illumination, with light shining in from the side of the slide, showing the glassiness of the diatoms. Larger diatoms are *Hyalodiscus* sp1, *Podosira* sp1, *Nitzschia sigma*, and *Trigonium* sp1. From Sims (ed.) (1996) pl 190 fig 1 for *N. sigma*. (IMG_0930_1.JPG)
- 2 *Hyalodiscus* sp2. 60x. From Round et al. (1990) p 162. (IMG_6234_1.jpg)
- 3 *Hyalodiscus* sp1. 100x, COL, NA080. Internal view. Diameter 40 μm . Highest focus F1 on valve outline. From Round et al. (1990) p 162. (IMG_4814_1.JPG)
- 4 *Hyalodiscus* sp1. 100x, COL, NA080. Internal view. Diameter 40 μm . Focus F2 on areolae. From Round et al. (1990) p 162. (IMG_4815_1.JPG)
- 5 *Hyalodiscus* sp1. 100x, COL, NA080. Internal view. Diameter 40 μm . Focus F3 on central areolae. From Round et al. (1990) p 162. (IMG_4816_1.JPG)
- 6 *Hyalodiscus* sp1. 100x, COL, NA080. Internal view. Diameter 40 μm . Lowest focus F4 on central rim. From Round et al. (1990) p 162. (IMG_4817_1.JPG)
- 7 *Hyalodiscus* sp1. 60x, BF. Scale bar 10 μm . Focus on inner valve face. From Round et al. (1990) p 162. (IMG_6235-1.JPG)
- 8 *Hyalodiscus* sp1. 100x. Scale bar 10 μm . Focus white spot to show radial striae in central area. Applied HDR. In binder is # 17. From Round et al. (1990). (IMG_8255-1.JPG)

Plate 4

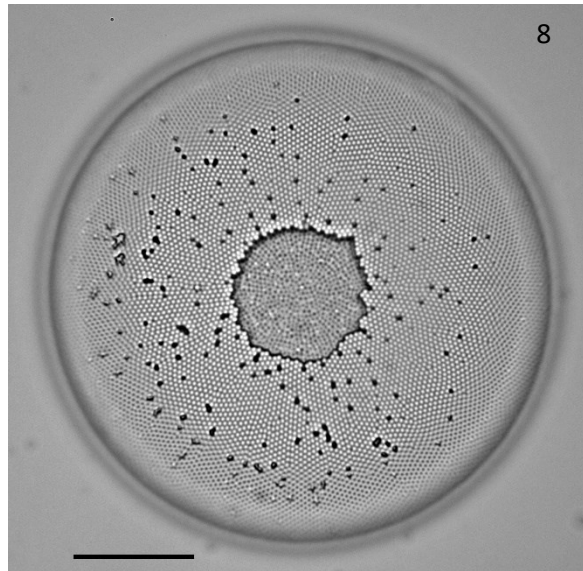
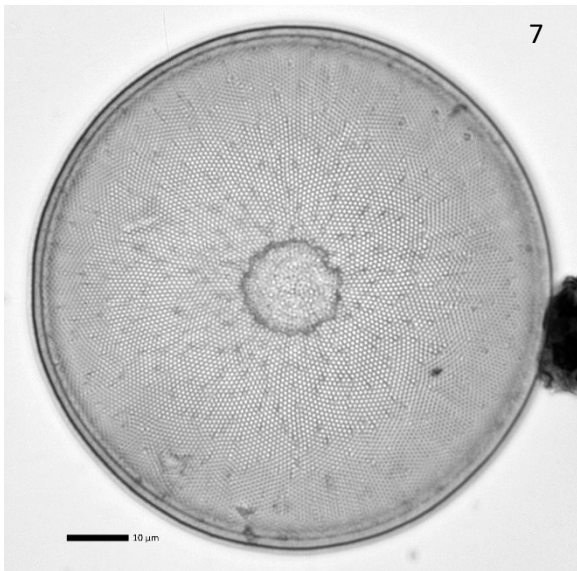
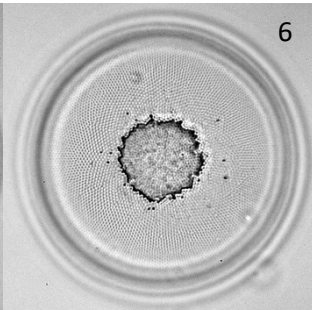
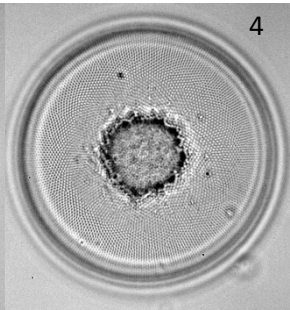
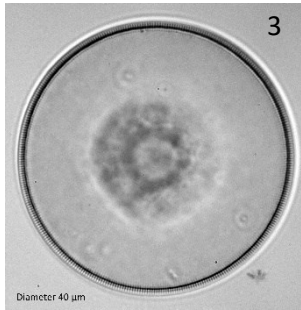
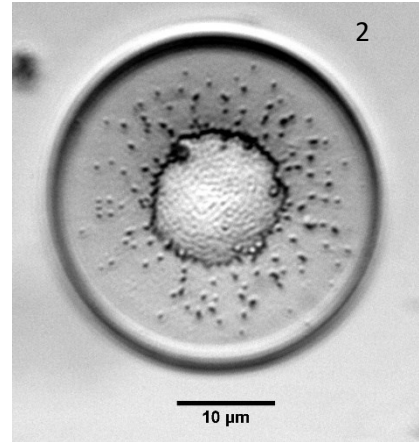
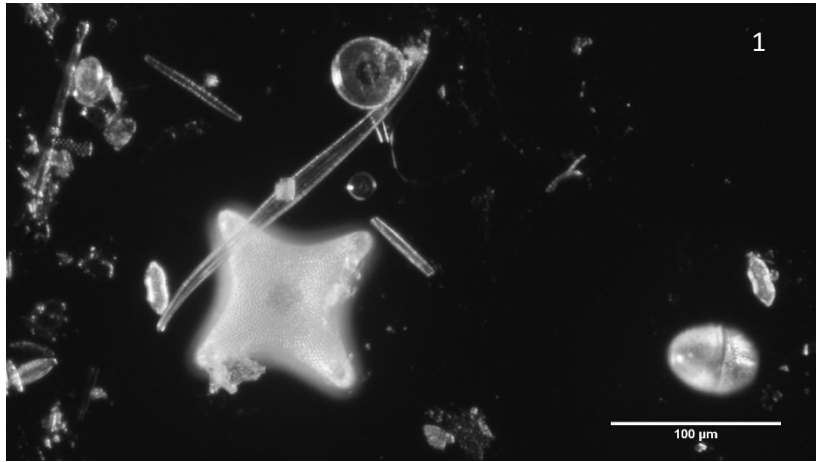


Plate 5

- 1 *Melosira nummuloides*. 40x. High focus on girdle bands. Wet mount. From Cupp (1943) fig 1. (IMG_1287_1_1.jpg)
- 2 *Melosira nummuloides*. 40x. Low focus on outline and girdle bands. Wet mount. From Cupp (1943) fig 1. (IMG_1288_1_1.jpg)
- 3 *Paralia longispina*. 100x. Scale bar 10 μm . High focus. From Lobban et al. (2012) pl 4: 3-5 (beautiful SEM). (IMG_1195_1.jpg)
- 4 *Paralia longispina*. 100x. Scale bar 10 μm . Low focus. From Lobban et al. (2012) pl 4: 3-5 (beautiful SEM). (IMG_1196_1.jpg)
- 5 *Podosira baldjickiana*. 100x. *Podosira*-*Cocconeis* stack. From Schmidt (1972 reprint) pl 130 fig 40. (IMG_0296-2-1.jpg)
- 6 *Podosira baldjickiana*. 100x. Scale bar 10 μm . Low focus on outline. From Lobban et al. (2012) pl 3 fig 3-5. (IMG_8478-1.JPG)
- 7 *Podosira baldjickiana*. 100x. Scale bar 10 μm . Mid focus on mid radius. Rosettes visible around rimoportulae. From Lobban et al. (2012) pl 3 fig 3-5. (IMG_8480-1.JPG)
- 8 *Podosira baldjickiana*. 100x. Scale bar 10 μm . High focus on valve center. From Lobban et al. (2012) pl 3 fig 3-5. (IMG_8481-1.JPG)
- 9 *Podosira baldjickiana*. 100x. Girdle view. Low focus on outline. Scale bar 10 μm . (IMG_8491-1.JPG)
- 10 *Podosira baldjickiana*. 100x. Scale bar 10 μm . High focus on mantles showing areolae and rosettes around rimoportulae. From Lobban et al. (2012) pl 3 fig 3-5. (IMG_8494-1.JPG)

Plate 5

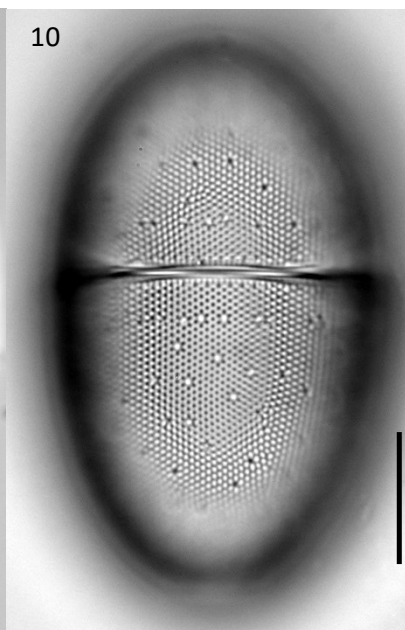
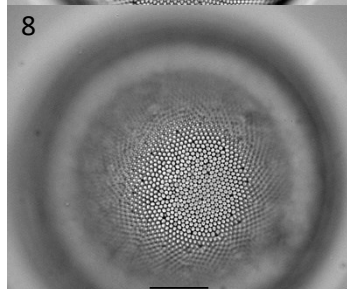
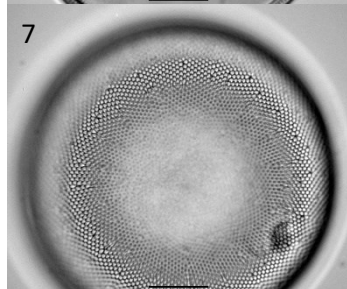
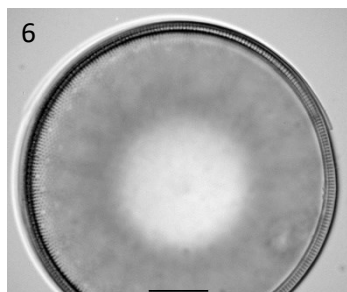
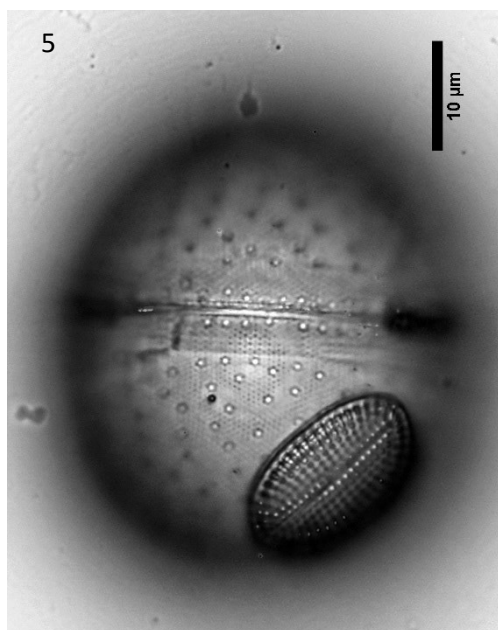
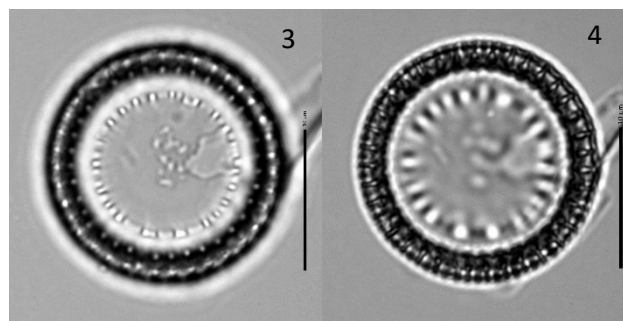
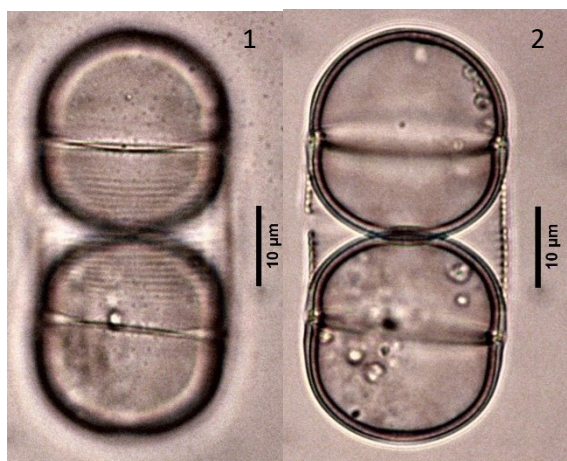
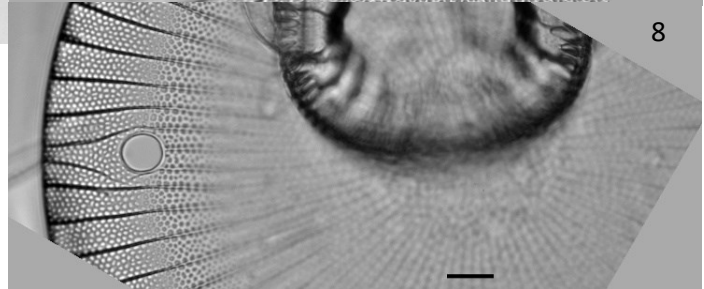
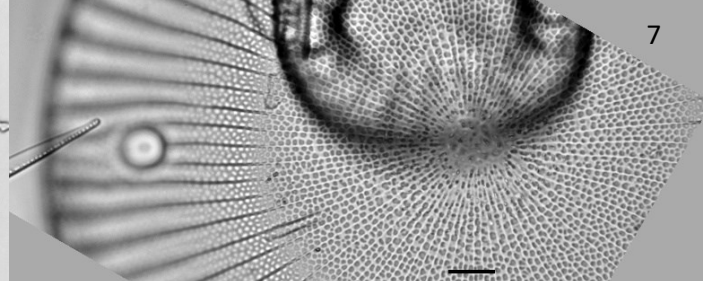
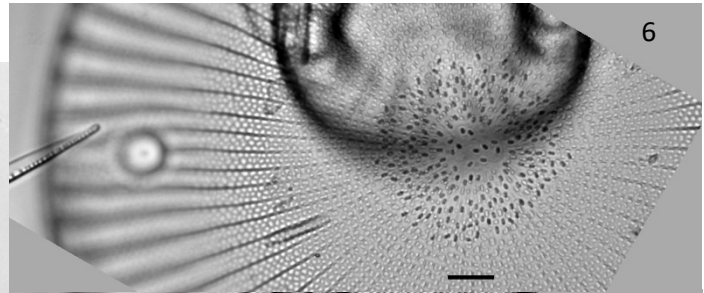
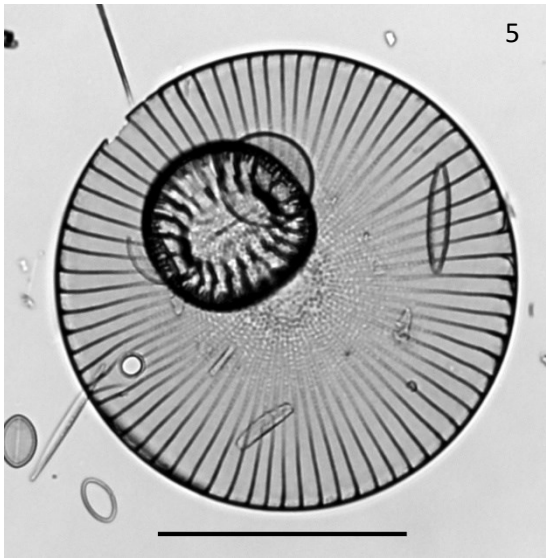
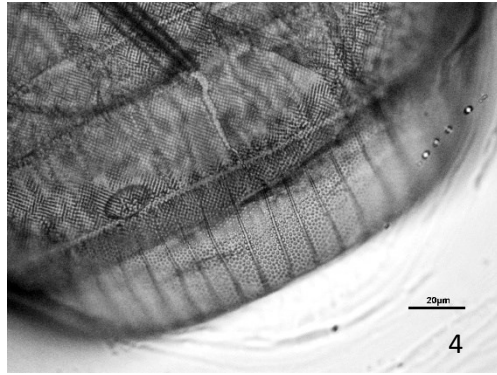
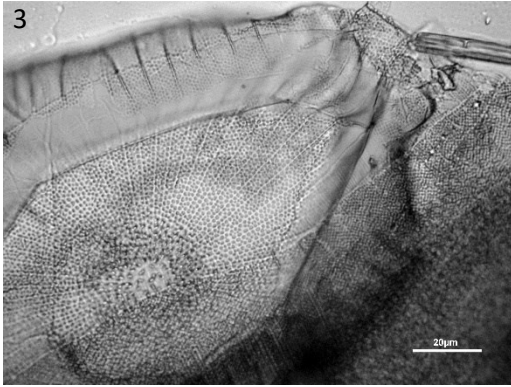
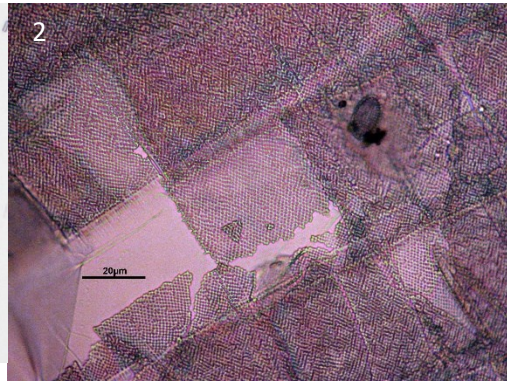


Plate 6

- 1 *Stictocyclus stictodiscus*. 10x. Scale bar 100 μm . L 400 μm . Crushed by coverslip. From Round et al. (1990) p 208; AlgaeBase.org. (IMG_1278_1_1.jpg)
- 2 *Stictocyclus stictodiscus*. 40x. Scale bar 20 μm . Crushed by coverslip. Girdle section. From Round et al. (1990) p 208; AlgaeBase.org. (IMG_1505_1_1.jpg)
- 3 *Stictocyclus stictodiscus*. 40x. Scale bar 20 μm . Crushed by coverslip. Rim of open end. From Round et al. (1990) p 208; AlgaeBase.org. (IMG_1511_1_1.jpg)
- 4 *Stictocyclus stictodiscus*. 40x. Scale bar 20 μm . Crushed by coverslip. Rim of folded end. From Round et al. (1990) p 208; AlgaeBase.org. (IMG_1506_1_1.jpg)
- 5 *Stictocyclus stictodiscus*. 10x. Scale bar 100 μm . Valve dia 186 μm , pseudonodulus dia 7.6 μm . From Round et al. (1990); AlgaeBase.org. (IMG_8379-1.JPG)
- 6 *Stictocyclus stictodiscus*. 60x. Scale bar 10 μm . High focus F1 on central, scattered rimoportulae in black spot. From Round et al. (1990); AlgaeBase.org. (IMG_8380-1.JPG)
- 7 *Stictocyclus stictodiscus*. 60x. Scale bar 10 μm . Focus F2 on areolae around center. From Round et al. (1990); AlgaeBase.org. (IMG_8381-1.JPG)
- 8 *Stictocyclus stictodiscus*. 60x. Scale bar 10 μm . Focus F3 on pseudonodulus. From Round et al. (1990); AlgaeBase.org. (IMG_8382-1.JPG)

Plate 6



**Polar Centric
Radial Symmetry With Poles**

Plate 7

- 1 *Biddulphia* sp1. 40x. Scale bar 10 μ m. (IMG_1450_1.jpg)
- 2 *Biddulphia* sp1. 100x. Scale bar 10 μ m. (IMG_8205-1.JPG)
- 3 *Biddulphiopsis membranacea*. 10x. Scale bar 50 μ m. Wet mount. Whole frustule in girdle view. Bipolar, the two indistinct poles visible on bottom valve. From Stidolph et al. (2012) pl 21 fig 7; Navarro & Lobban (2009) fig 6-7 and good discussion of ecology; Round et al. (1990) genus description. (IMG_1382-1.JPG)
- 4 *Biddulphiopsis membranacea*. 40x. Scale bar 20 μ m. Wet mount. Whole frustule in girdle view. From Stidolph et al. (2012) pl 21 fig 7; Navarro & Lobban (2009) fig 6-7 and good discussion of ecology; Round et al. (1990) genus description. (IMG_1384-1.JPG)
- 5 *Biddulphiopsis membranacea*. 40x. Scale bar 50 μ m. Wet mount after cleaning. Girdle and valve views. Two poles on valves visible, indistinct. From Stidolph et al. (2012) pl 21 fig 7; Navarro & Lobban (2009) fig 6-7 and good discussion of ecology; Round et al. (1990) genus description. (IMG_1641.jpg)
- 6 *Biddulphiopsis membranacea*. 40x. Scale bar 20 μ m. Wet mount after cleaning. Valve view. From Stidolph et al. (2012) pl 21 fig 7; Navarro & Lobban (2009) fig 6-7 and good discussion of ecology; Round et al. (1990) genus description. (IMG_1643-1.JPG)

Plate 7

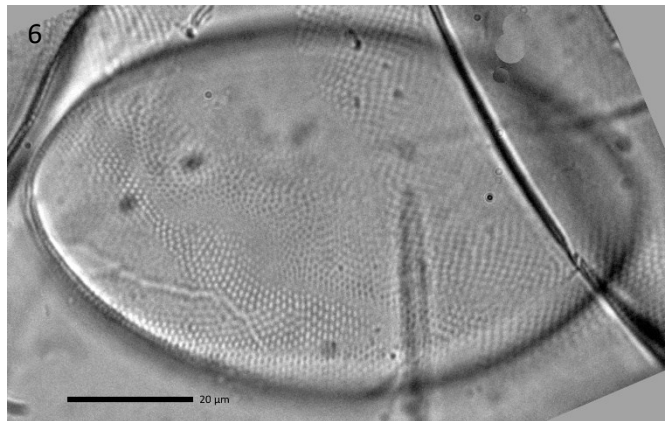
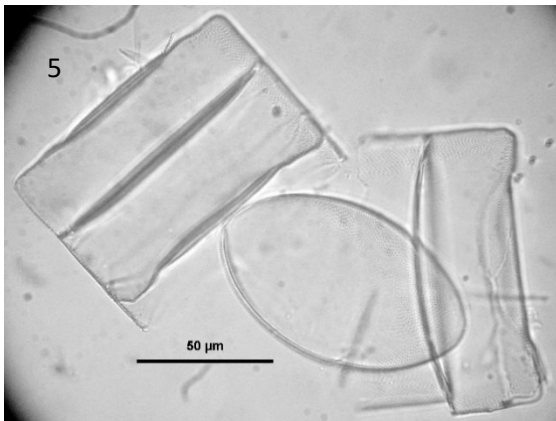
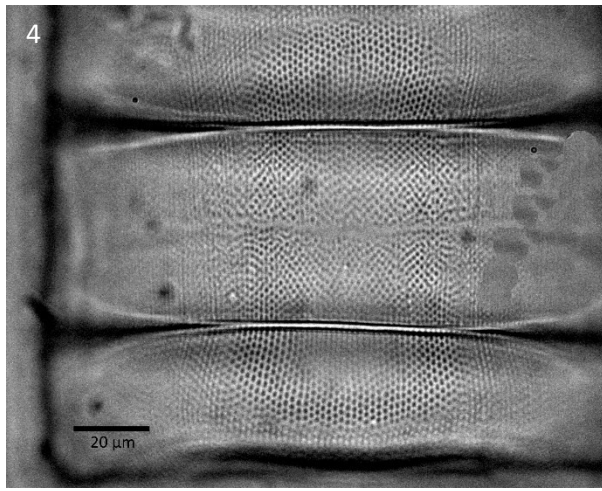
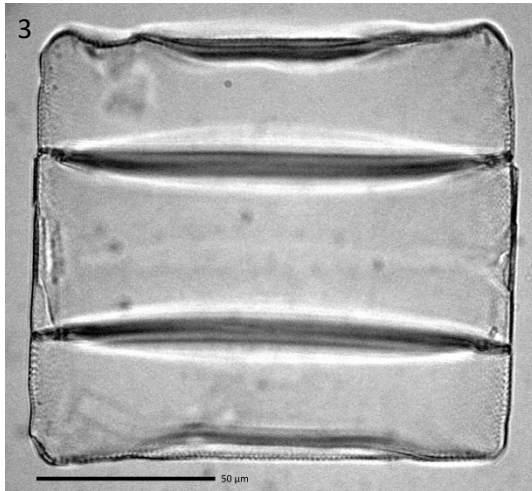
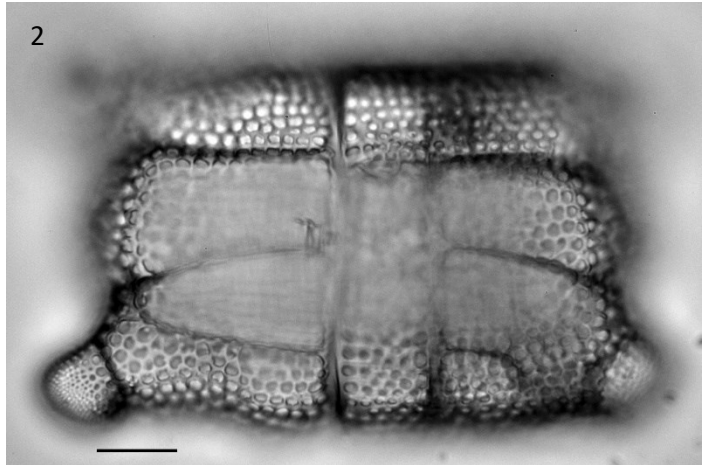
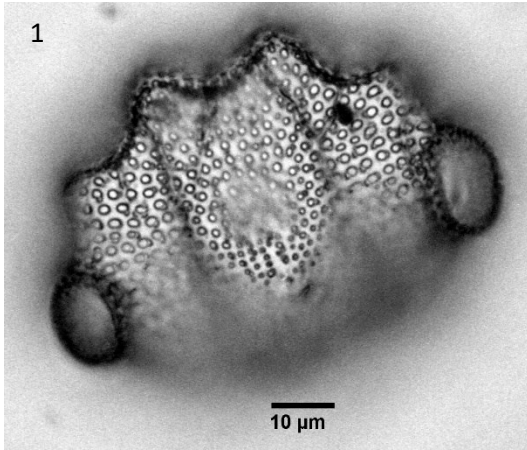


Plate 8

- 1 *Lampriscus shadboltianum*. 60x, BF, NA045. Internal view of five-pole valve. High focus on crenulated outline. See # 6313 ff for valve face. From Navarro & Lobban (2009) fig 25-26. (IMG_6295_1.JPG)
- 2 *Lampriscus shadboltianum*. 60x, BF, NA050. Internal view of five-pole valve. Mid focus on valve center. See # 6295 for outline. From Navarro & Lobban (2009) fig 25-26. (IMG_6313_1.JPG)
- 3 *Lampriscus shadboltianum*. 60x, BF, NA050. Internal view of five-pole valve. Low focus on inside of pseudocelli. See # 6295 for outline. From Navarro & Lobban (2009) fig 25-26. (IMG_6315_1.JPG)
- 4 *Lampriscus shadboltianum*. 60x, BF, NA050. Focus on pseudocelli. From Navarro & Lobban (2009) fig 25-26. (IMG_6316_1.JPG)
- 5 *Lampriscus shadboltianum*. 60x, BF, NA050. Mid focus on center of valve. From Navarro & Lobban (2009) fig 25-26. (IMG_6317_1.JPG)
- 6 *Lampriscus shadboltianum*. 60x, BF, NA050. Low focus on outline. From Navarro & Lobban (2009) fig 25-26. (IMG_6318_1.JPG)
- 7 *Lampriscus shadboltianum*. 100x. Scale bar 10 μ m. From Navarro & Lobban (2009) fig 25-26. (IMG_8332-1.JPG)
- 8 *Lampriscus shadboltianum*. 60x. Scale bar 10 μ m. From Navarro & Lobban (2009) fig 25-26. (IMG_8313-1.JPG)
- 9 *Lampriscus shadboltianum*. 60x. Scale bar 10 μ m. High focus on connecting copulae. From Navarro & Lobban (2009). (IMG_8357-1.JPG)
- 10 *Lampriscus shadboltianum*. 60x. Scale bar 10 μ m. Low focus on spines. From Navarro & Lobban (2009). (IMG_8358-1.JPG)
- 11 *Lampriscus shadboltianum*. 60x. Scale bar 10 μ m. Diameter 83 μ m. Only three pseudocelli. High focus on pseudocelli. From Navarro & Lobban (2009). (IMG_8392-1.JPG)
- 12 *Lampriscus shadboltianum*. 60x. Scale bar 10 μ m. Diameter 83 μ m. Low focus on valve outline. From Navarro & Lobban (2009). (IMG_8393-1.JPG)

Plate 8

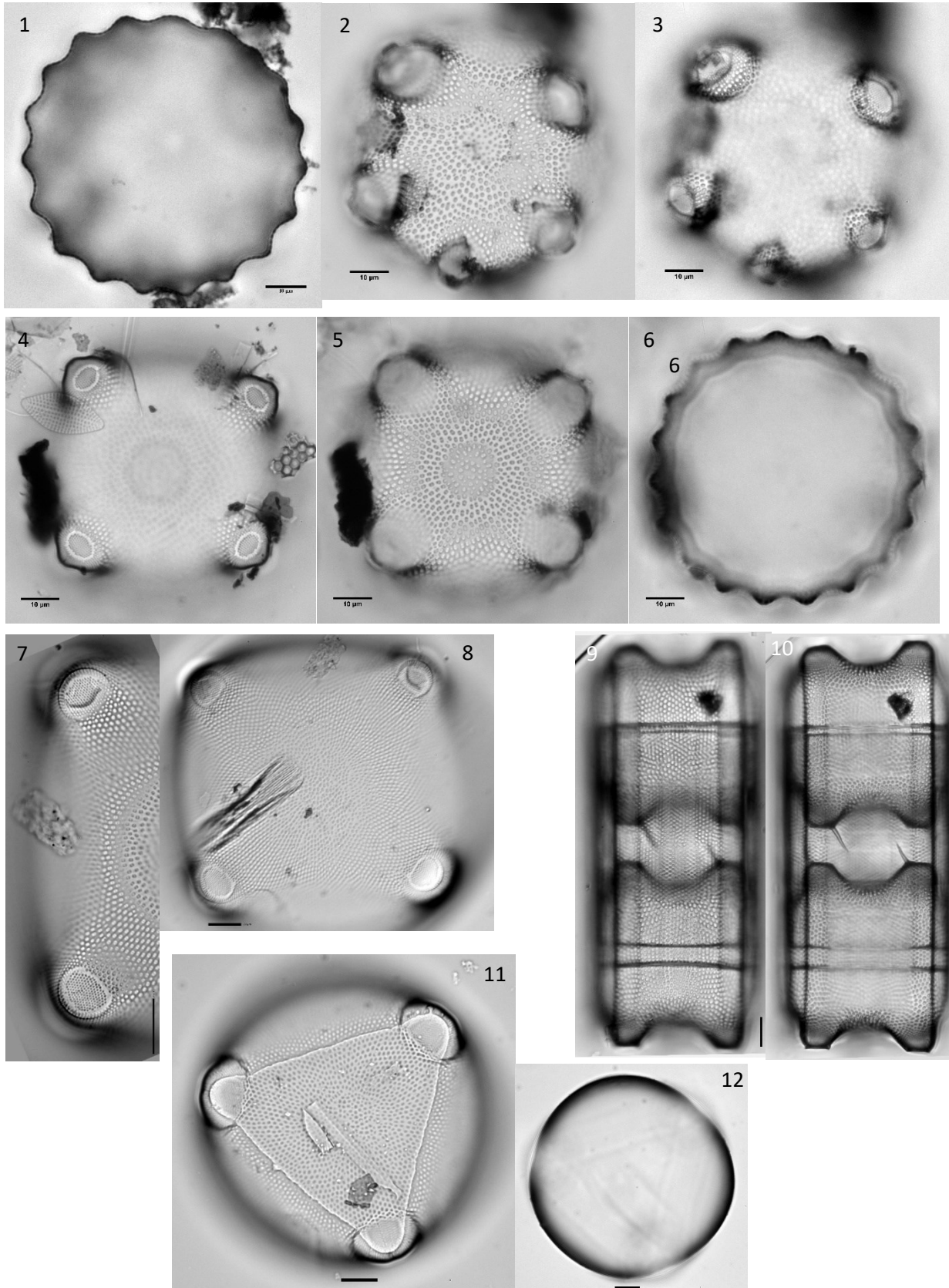


Plate 9

- 1 *Odontella aurita*. 60x, OL, NA070. Scale bar 10 μm . Focus on lower outline. Lobban et al. (2012) pl 6 fig 1-2 (a good SEM). (IMG_6244_1.jpg)
- 2 *Odontella aurita*. 60x, OL, NA070. Scale bar 10 μm . Focus on upper girdle joint. Lobban et al. (2012) pl 6 fig 1-2 (a good SEM). (IMG_6245_1.jpg)
- 3 *Odontella aurita*. 100x. From Sims (ed.) (1996) pl 195 fig 1-2; Round et al. (1990) p230. (IMG_8206-1.JPG)
- 4 *Odontella aurita*. 100x. Scale bar 10 μm . From Sims (ed.) (1996) pl 195 fig 1-2; Round et al. (1990) p230. (IMG_8207-1.JPG)
- 5 *Odontella aurita*. 100x. Internal view. High focus F1 on outline. From Sims (ed.) (1996) pl 195 fig 1-2; Round et al. (1990) p230. Scale bar 10 μm . (IMG_8208-1.JPG)
- 6 *Odontella aurita*. 100x. Focus F2 in series to F1-F5. From Sims (ed.) (1996) pl 195 fig 1-2; Round et al. (1990) p230. Scale bar 10 μm . (IMG_8225-1.JPG)
- 7 *Odontella aurita*. 100x. Internal view. Scale bar 10 μm . Focus F3 in series. From Sims (ed.) (1996) pl 195 fig 1-2; Round et al. (1990) p230. (IMG_8209-1.JPG)
- 8 *Odontella aurita*. 100x. Internal view. Scale bar 10 μm . Focus F4 in series. From Sims (ed.) (1996) pl 195 fig 1-2; Round et al. (1990) p230. (IMG_8210-1.JPG)
- 9 *Odontella aurita*. 100x. Internal view. Scale bar 10 μm . Lowest focus F5 in series. From Sims (ed.) (1996) pl 195 fig 1-2; Round et al. (1990) p230. (IMG_8211-1.JPG)
- 10 *Pseudotriceratium* sp1. 60x. Whole frustule. Upper valve. Scale bar 10 μm . Upper focus on central rimoportulae. From Round et al. (1990). Compared Stidolph et al. (2012) p 149 fig 40 *Stictodiscus parallelus* but in this specimen distinct network is not visible and it does seem to have central and perhaps small marginal rimoportulae. (IMG_8305-1.JPG)
- 11 *Pseudotriceratium* sp1. 100x, BF. Whole frustule. Upper valve. External view. Scale bar 10 μm . Focus on center. From Round et al. (1990). (IMG_8325-1.JPG)
- 12 *Pseudotriceratium* sp1. 60x. Whole frustule. Lower valve. Internal view. Scale bar 10 μm . Focus on angles, central rimoportulae, and edge in white spot. From Round et al. (1990). (IMG_8306-1.JPG)
- 13 *Pseudotriceratium* sp1. 60x. Whole frustule. Lower valve. Internal view. Scale bar 10 μm . Focus on outline in black spot. From Round et al. (1990). (IMG_8307-1.JPG)

Pseudotriceratium lacks pseudocelli. Dots between some of the rows of areolae near the margin are interpreted here as rimoportulae. This cell appears to have several rimoportulae in center of both valves in this frustule, though Round et al. (1990) says there should be only one rimoportula.

This frustule lacks a distinct network which distinguishes it from genus *Stictodiscus*. (Round et al. 1990 page 216; Stidolph 2012 p149 fig 40).

Plate 9

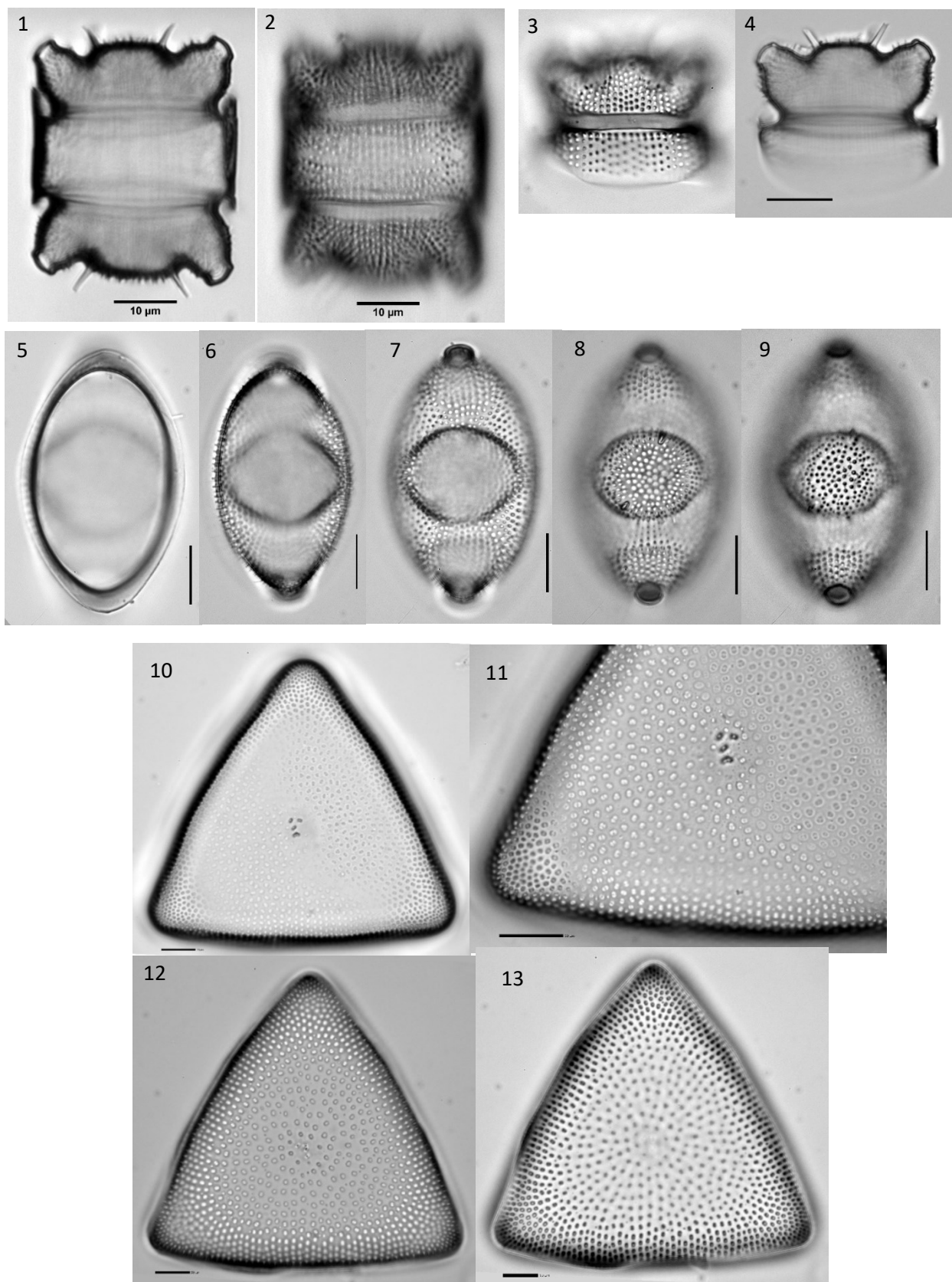


Plate 10

- 1 *Toxarium hennedyanum*. 60x. Scale bar 10 μm . From Lobban et al. (2012) pl 17 figs 1-5. (IMG_8418-1.JPG)
- 2 *Toxarium hennedyanum*. Whole valve at 40x. Length 204, width 7 μm . Scale bar 10 μm . Sections at 100x. Scale bars 10 μm . From Kooistra et al. (2003); Lobban et al. (2012) pl 17 figs 1-5. (IMG_4833_1.JPG), (IMG_4829_1_1.jpg)
- 3 *Toxarium hennedyanum*. Whole valve at 10x. Scale bar 20 μm . L 329 μm , W 8 μm . Sections (# 8341-8344) at 60x. Scale bars 10 μm . (IMG_8370-1-combo.JPG)

Plate 10

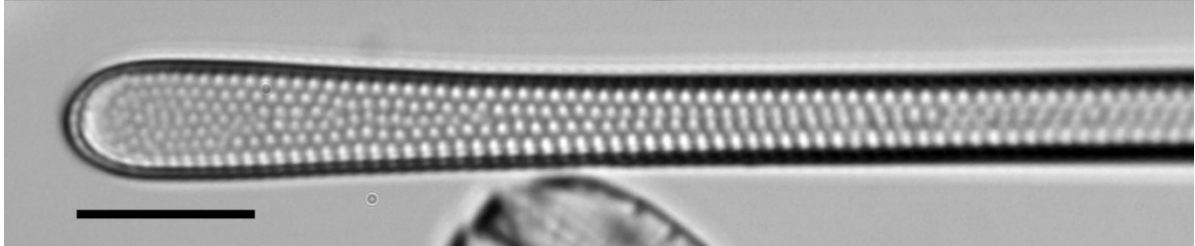
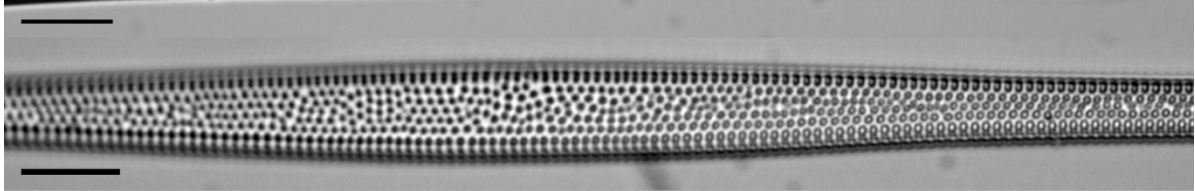
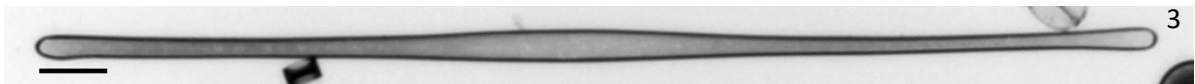
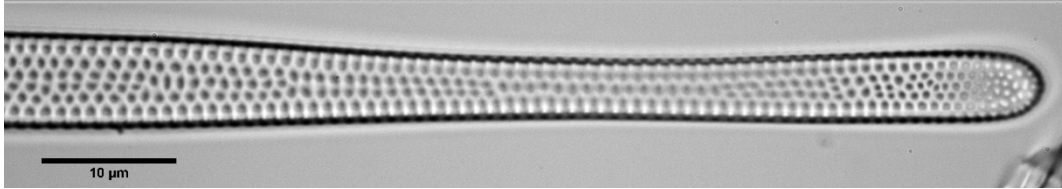
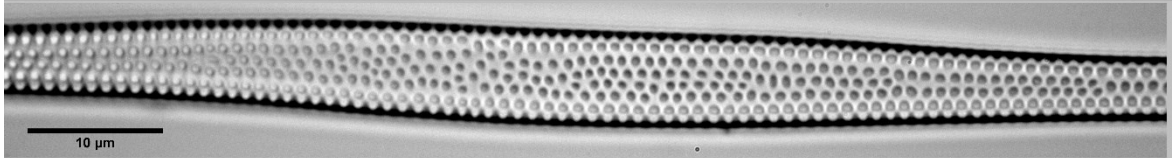
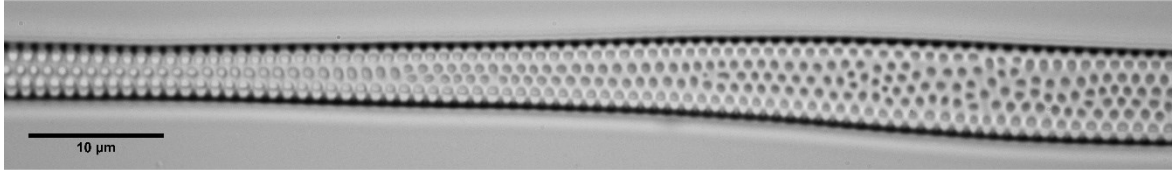
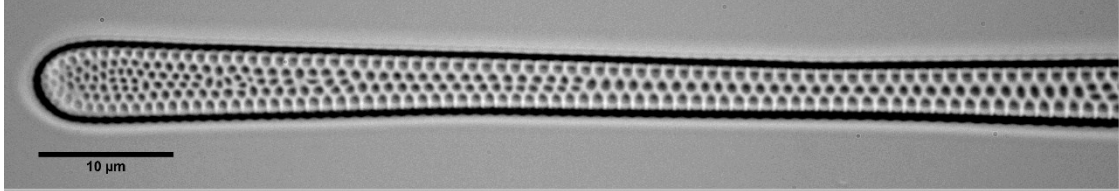
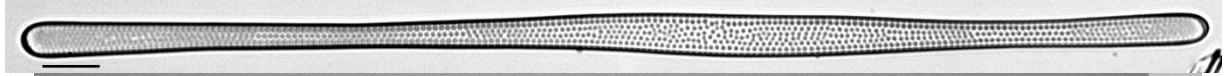
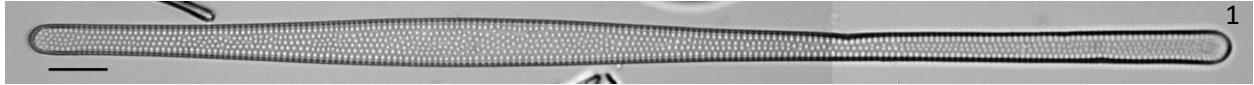


Plate 11

- 1 *Toxarium undulatum*. 60x. Scale bar 100 μm . L 705, W 14 μm . Stitched with PhotoScape. From Stidolph et al. (2012) pl 16 fig 49; Lobban et al. (2012) pl 17 fig 6–8. (IMG_8394-1.jpg)
- 2 *Toxarium undulatum*. Complete valve 10x. Length along arch 760 μm . Width at center 9 μm . Scale bar 100 μm . Color fill overlay black. Valve sections 60x. Scale bars 10 μm . (IMG_8347-1-1-combo.JPG)

Plate 11

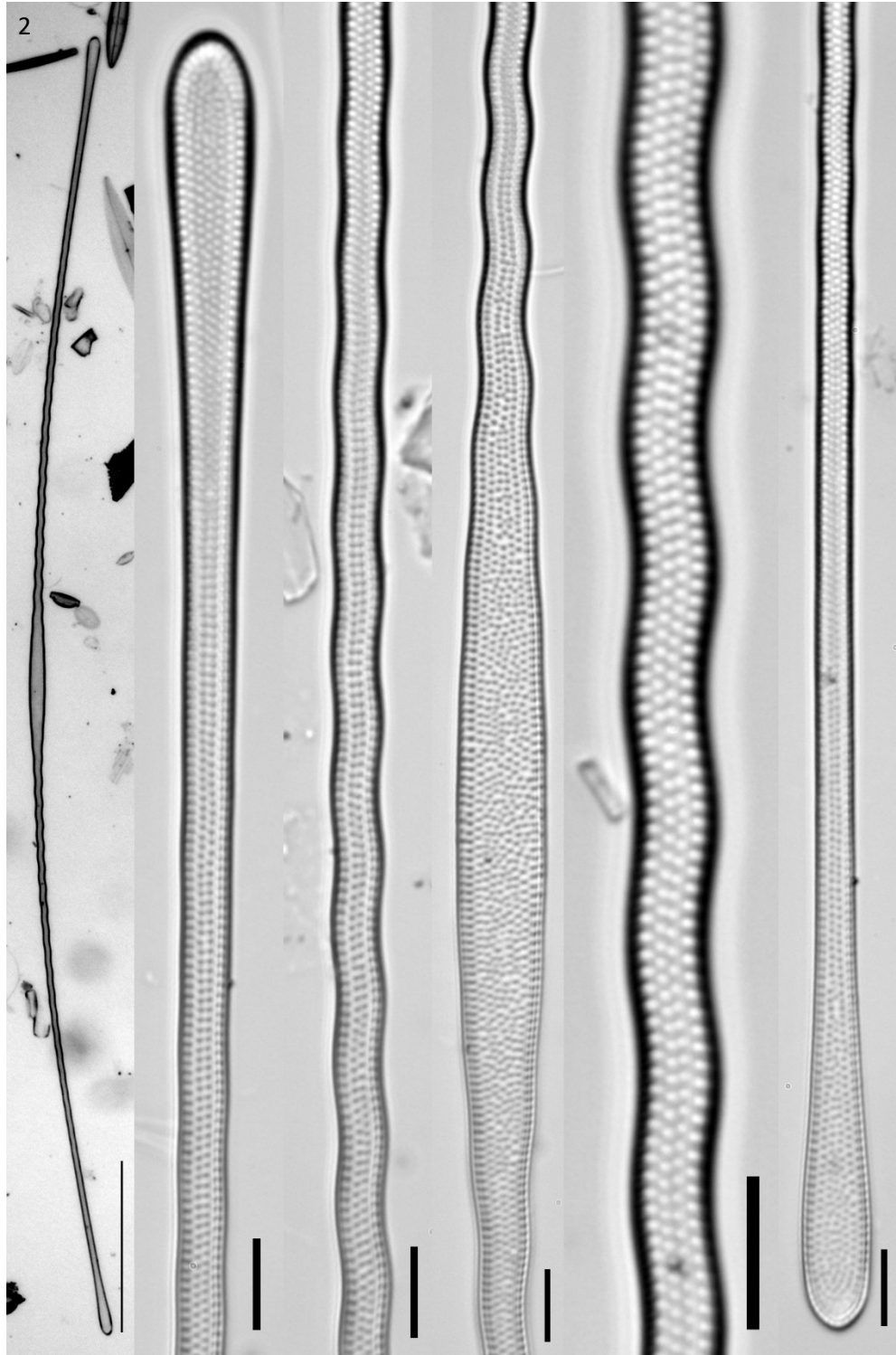
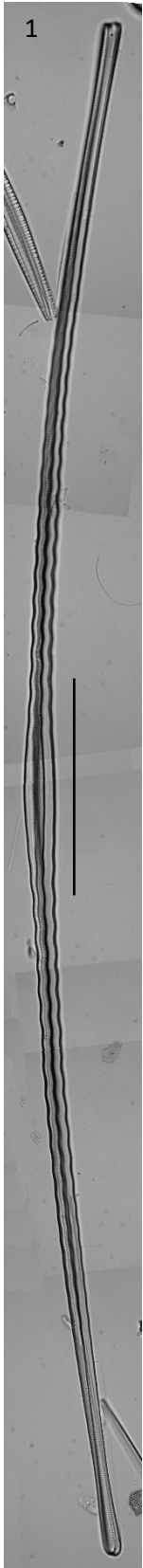


Plate 12

- 1 *Triceratium pentacrinus*. 60x. External view. Scale bar = 10 μ m. Highest focus F1. From Schmidt (1874-1959) pl 98 fig 7; Stidolph et al. (2012) pl 48 fig 24. (IMG_8336-1.JPG)
- 2 *Triceratium pentacrinus*. 60x. External view. Scale bar = 10 μ m. Focus F2 on ocelli edges. From Schmidt (1874-1959) pl 98 fig 7; Stidolph et al. (2012) pl 48 fig 24. (IMG_8337-1.JPG)
- 3 *Triceratium pentacrinus*. 60x. External view. Scale bar = 10 μ m. Focus F3. From Schmidt (1874-1959) pl 98 fig 7; Stidolph et al. (2012) pl 48 fig 24. (IMG_8338-1.JPG)
- 4 *Triceratium pentacrinus*. 60x. External view. Scale bar = 10 μ m. Focus F4 on pseudoseptum. From Schmidt (1874-1959) pl 98 fig 7; Stidolph et al. (2012) pl 48 fig 24. (IMG_8339-1.JPG)
- 5 *Triceratium favus*. 40x, BF, NA040. Approximately 155 μ m on a side. From Schmidt (1874-1959) pl 82 figs 1,3,4; Sims (ed.) (1996) pl 290 fig 1. (IMG_4794_1.jpg)
- 6 *Triceratium favus*. 60x, BF. Focus on outline. From Schmidt (1874-1959) pl 82 figs 1,3,4; Sims (ed.) (1996) pl 290 fig 1. (IMG_4762_1.jpg)
- 7 *Triceratium favus*. 60x, BF. Focus on ocellus. From Schmidt (1874-1959) pl 82 figs 1,3,4; Sims (ed.) (1996) pl 290 fig 1. (IMG_4763_1.jpg)
- 8 *Triceratium dubium*. 100x, OL, NA090. Lower focus center in black spot. From Navarro & Lobban (2009) fig 22. (IMG_4699_1.JPG)
- 9 *Triceratium dubium*. 100x, OL, NA090. Low focus on inner outline. From Navarro & Lobban (2009) fig 23. (IMG_4701_1.JPG)
- 10 *Triceratium* sp1. 60x, OL, NA060. Focus on center showing spines on valve face. (IMG_6250_1.jpg)

Plate 12

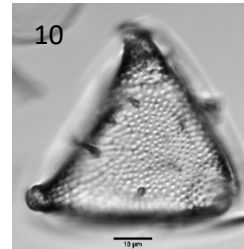
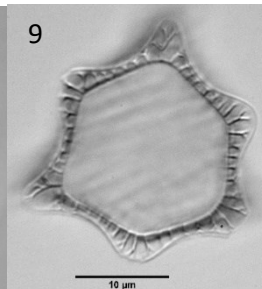
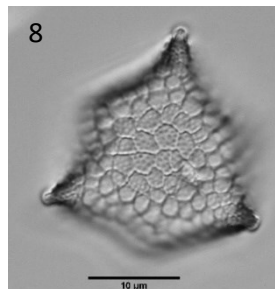
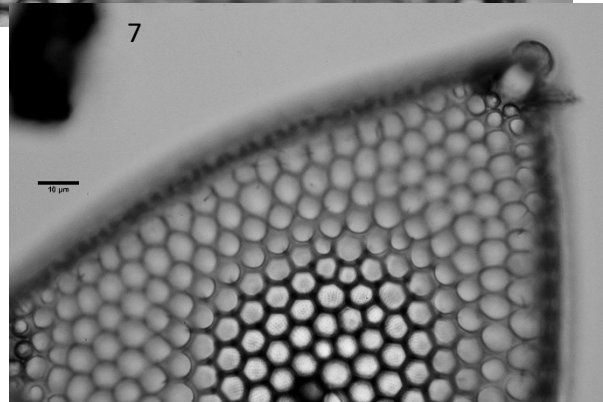
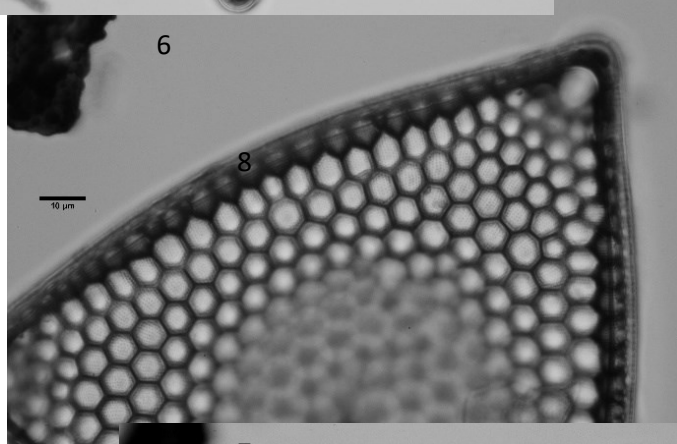
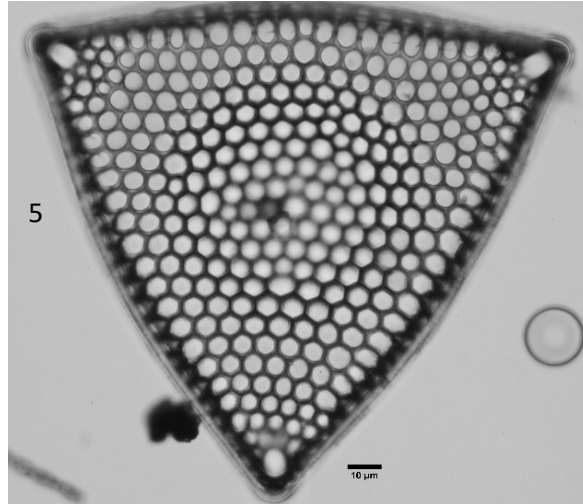
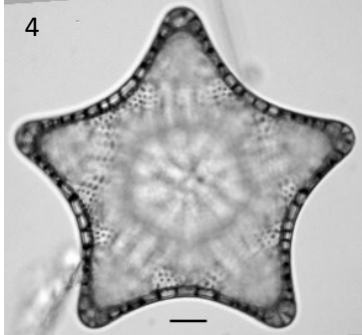
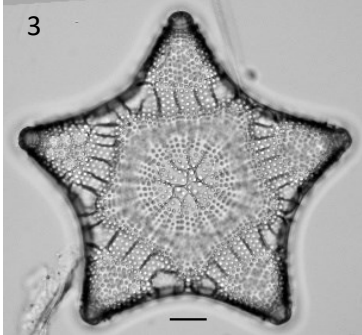
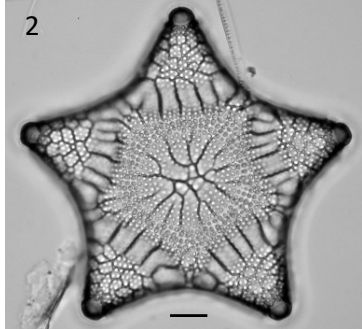
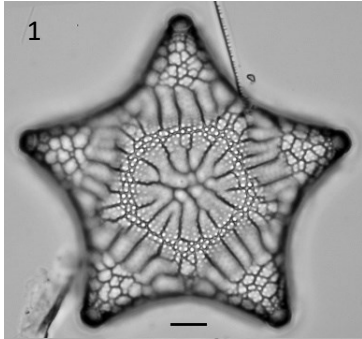


Plate 13

- 1 *Trigonium arcticum* cf var *pentagonalis*. 40x, BF, NA035. Focus on pore fields. From Schmidt pl 79 fig 4 (but see *Trigonium graeffeanum* in Stidolph pl 27 fig 119 and pl 37 fig 1). (IMG_2994_1.jpg)
- 2 *Trigonium arcticum* cf var *pentagonalis*. 60x. Focus on network around center. From Schmidt pl 79 fig 4 (but see *Trigonium graeffeanum* in Stidolph pl 27 fig 119 and pl 37 fig 1). (IMG_8186-1.JPG)
- 3 *Trigonium arcticum* cf var *pentagonalis*. 60x. Focus on pole. From Schmidt pl 79 fig 4 (but see *Trigonium graeffeanum* in Stidolph pl 27 fig 119 and pl 37 fig 1). (IMG_8187-1.JPG)
- 4 *Trigonium arcticum* cf var *pentagonalis*. 60x. Scale bar 10 μm . High focus on pseudocelli. From Schmidt pl 79 fig 4. (IMG_8460-1.JPG)
- 5 *Trigonium arcticum* cf var *pentagonalis*. 60x. Scale bar 10 μm . Mid focus on valve face. From Schmidt pl 79 fig 4. (IMG_8464-1.JPG)
- 6 *Trigonium arcticum* cf var *pentagonalis*. 60x. Scale bar 10 μm . Low focus on center. From Schmidt pl 79 fig 4. (IMG_8466-1.JPG)

Plate 13

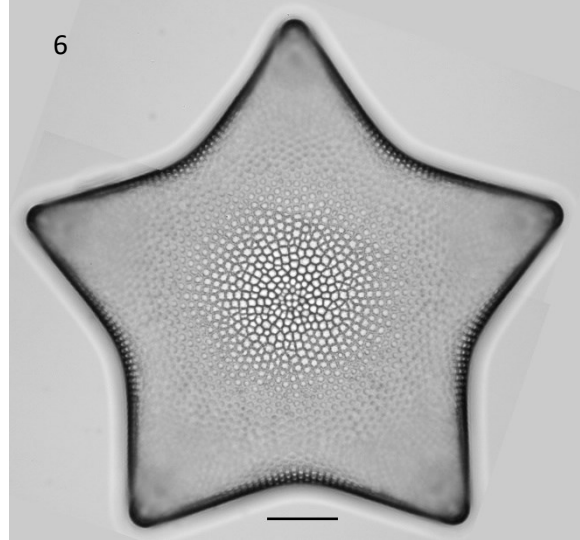
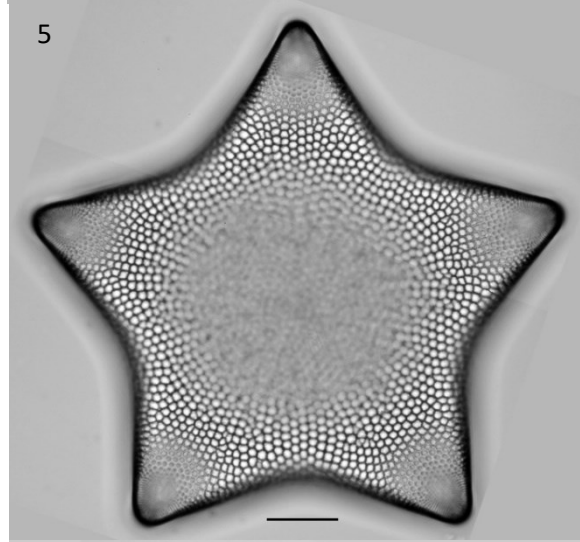
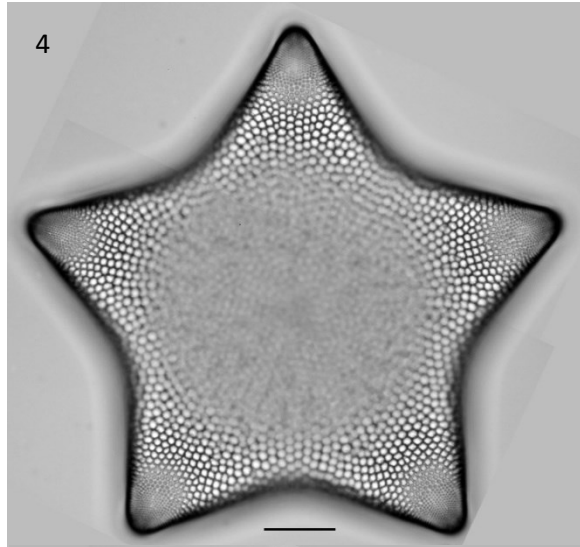
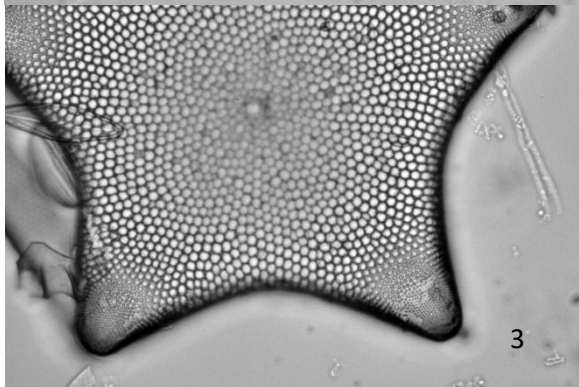
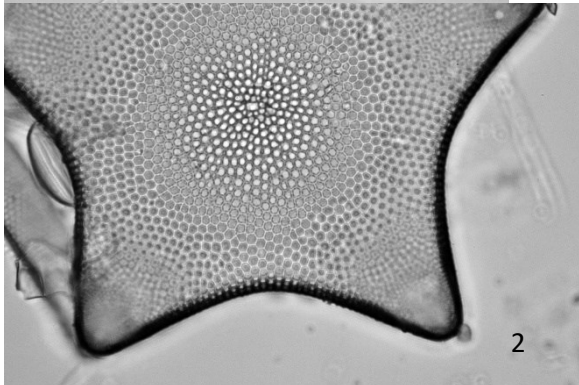
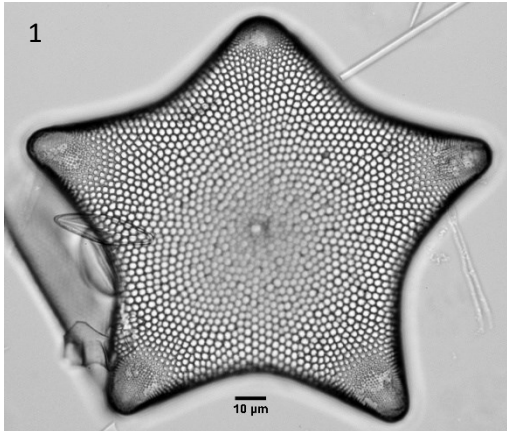
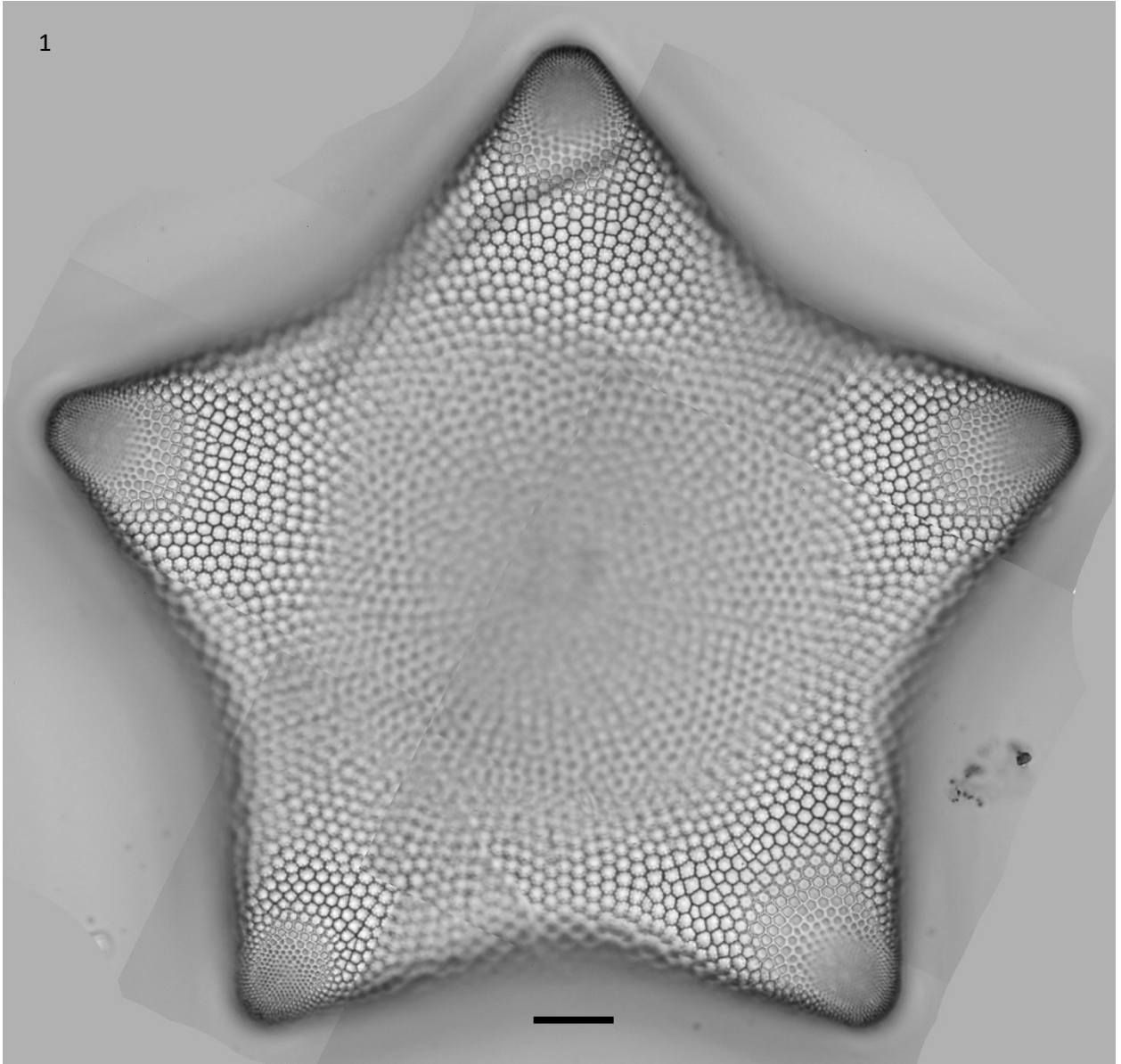


Plate 14

- 1 *Trigonium arcticum* cf var *pentagonalis*. 100x, BF. Scale bar 10 μm . Length between horizontal angles 128 μm . Focus on external openings of areolae forming rings. Compilation with PhotoScape. From Schmidt pl 79 fig 4 but see *T. graeffeanum* in Stidolph pl 27 fig 119 and pl 37 fig 1. (IMG_8439-1.jpg)
- 2 *Trigonium* sp. 10x, OL. Scale bar 100 μm . Reflected illumination, with light shining in from the side of the slide, showing the glassiness of the diatoms. Larger diatoms are *Hyalodiscus* sp1, *Podosira* sp1, *Nitzschia sigma*, and *Trigonium* sp. From Sims (ed.) (1996) pl 190 fig 1 for *N. sigma*. (IMG_0930_1.JPG)

Plate 14

1



2

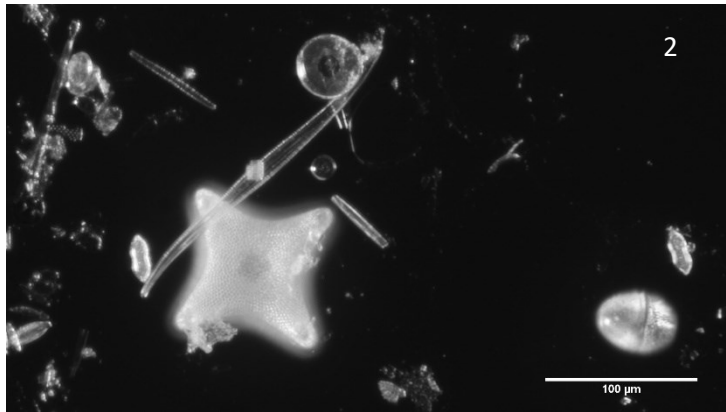


Plate 15

- 1 *Trigonium arcticum* var *californicum*. 60x, BF. Inside view. Low focus on one pole. Poles broadly rounded. From Schmidt pl 79 fig 5. (IMG_4696_1.JPG)
- 2 *Trigonium arcticum* var *californicum*. 100x, OL, NA090. Inside view. Perhaps a rimoportula in center of valve. From Schmidt pl 79 fig 5. (IMG_4697_1.JPG)
- 3 *Trigonium arcticum* var *californicum*. 60x, COL, NA085. High focus on pore fields. From Schmidt pl 79 fig 3 presumed (Schmidt pl 166 fig 6-8 T. radians has small areolae near edge of valve face). (IMG_6296_1.JPG)
- 4 *Trigonium arcticum* var *californicum*. 60x, COL, NA085. Low focus on center. From Schmidt pl 79 fig 3 presumed (Schmidt pl 166 fig 6-8 T. radians has small areolae near edge of valve face). (IMG_6297_1.JPG)
- 5 *Trigonium arcticum* var *californicum*. 60x, BF, NA050. High focus on one pole. Poles broadly rounded. From Schmidt pl 79 fig 5. (IMG_6303_1.JPG)
- 6 *Trigonium arcticum* var *californicum*. 40x, BF, NA040. Poles broadly rounded. From Schmidt pl 79 fig 5. (IMG_6304_1.JPG)

Plate 15

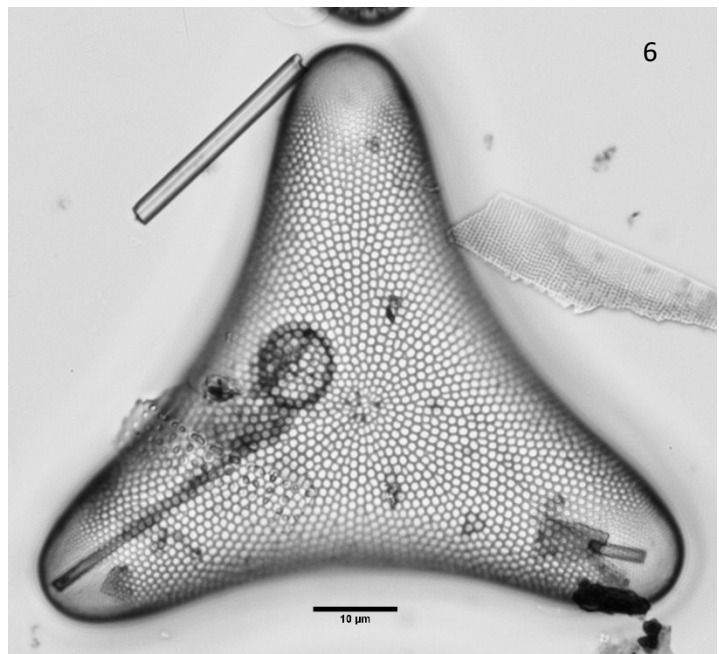
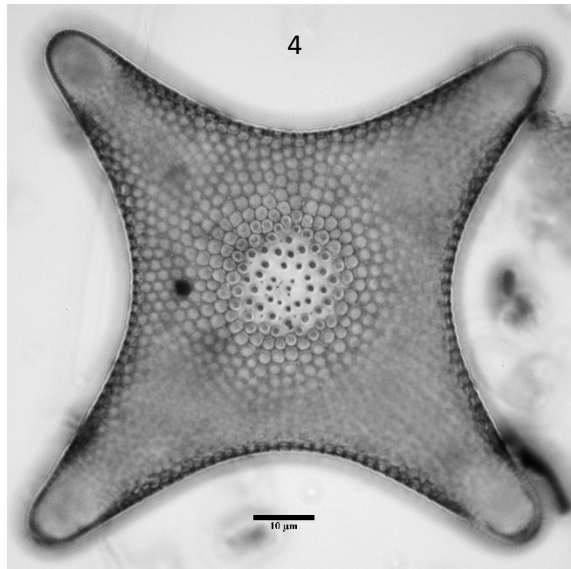
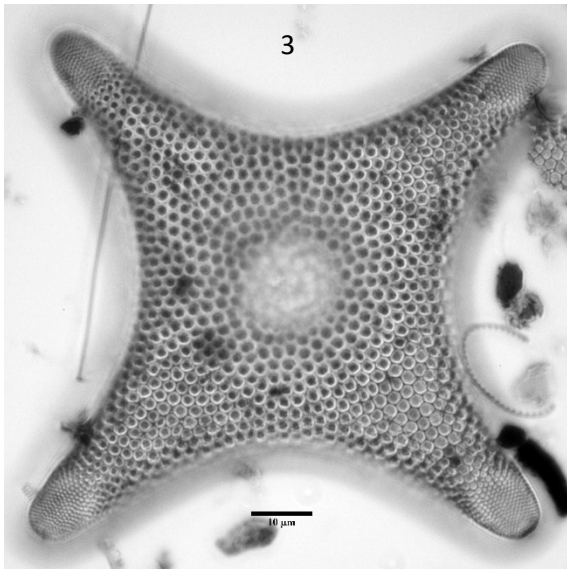
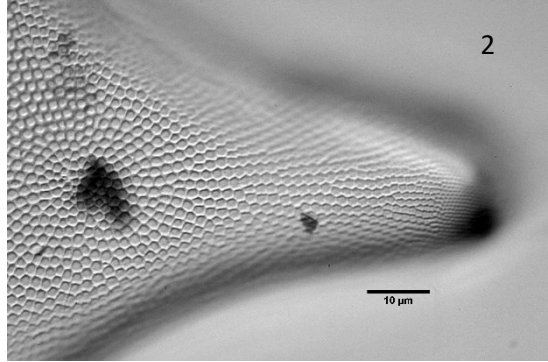
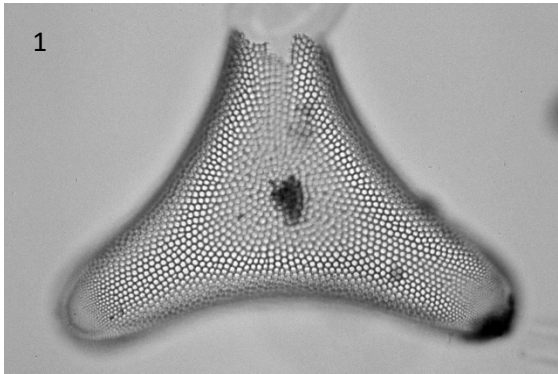


Plate 16

- 1 *Trigonium arcticum* var. *kerguelense*. 60x. High focus on poles. Two image stitch. From Stidolph et al. (2012) p 113 fig 2. (IMG_8317-1.JPG)
- 2 *Trigonium arcticum* var. *kerguelense*. 60x. Low focus on center. Two image stitch. From Stidolph et al. (2012) p 113 fig 2. (IMG_8319-1.JPG)
- 3 *Trigonium arcticum* var. *kerguelense*. 100x. Lower focus on areolae around center showing white dots on edges of areolae which are pores. Inset is high focus on a pseudocellus. From Stidolph et al. (2012) p 113 fig 2. (IMG_8335-1.JPG)
- 4 *Trigonium caelatum*. 100x, BF, NA090. High focus on poles. Straight margins, large areolae. From Schmidt pl 81 fig 19 (pl 166 fig 5 T. radians has small areolae near edge of valve face). (IMG_6324_1.JPG)
- 5 *Trigonium caelatum*. 100x, BF, NA090. Mid focus on valve face. Straight margins, large areolae. From Schmidt pl 81 fig 19 (pl 166 fig 5 T. radians has small areolae near edge of valve face). (IMG_6325_1.JPG)
- 6 *Trigonium caelatum*. 100x, BF, NA090. Low focus on center. Straight margins, large areolae. From Schmidt pl 81 fig 19 (pl 166 fig 5 T. radians has small areolae near edge of valve face). (IMG_6326_1.JPG)

Plate 16

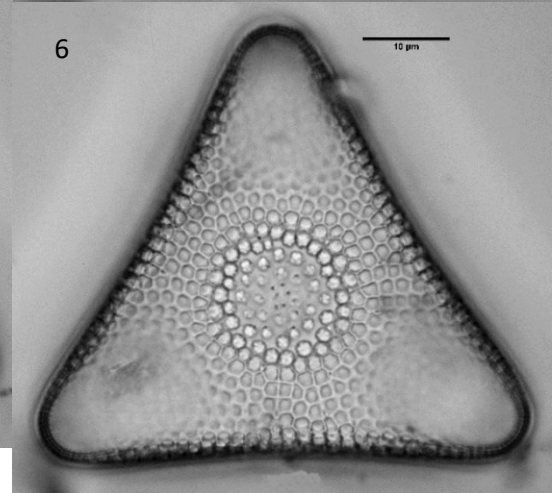
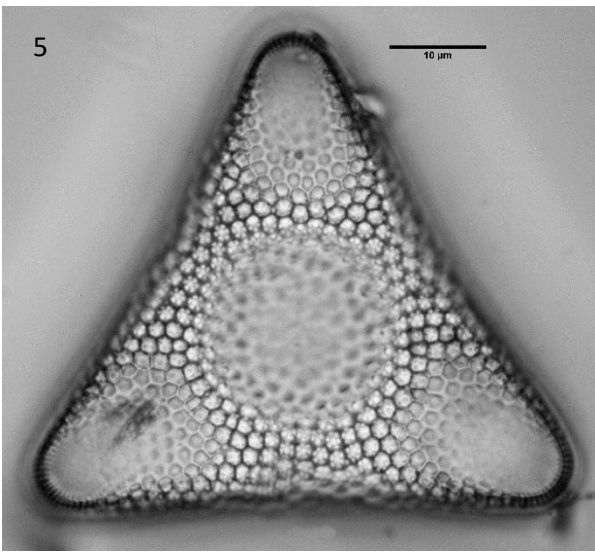
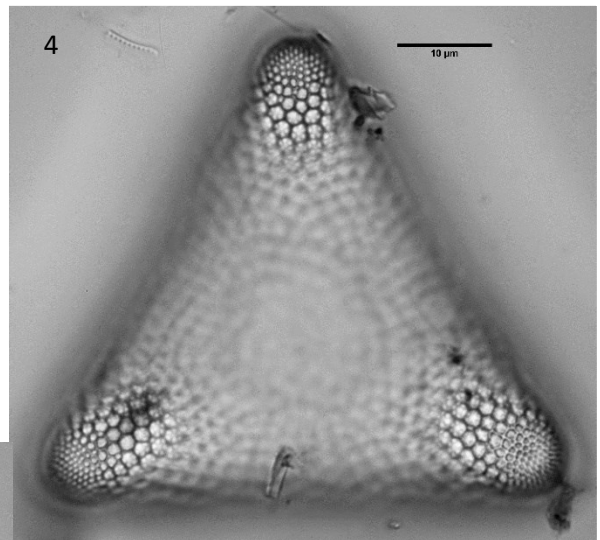
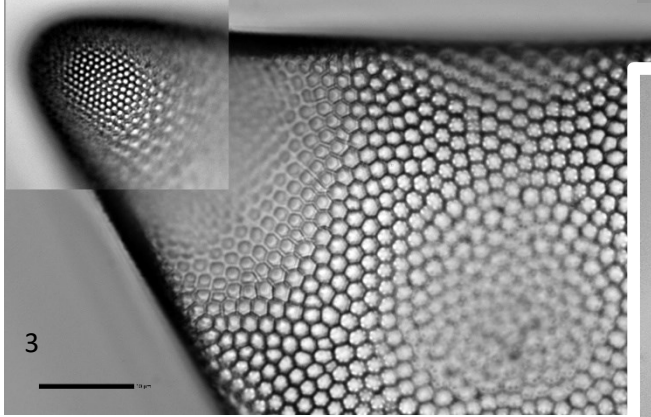
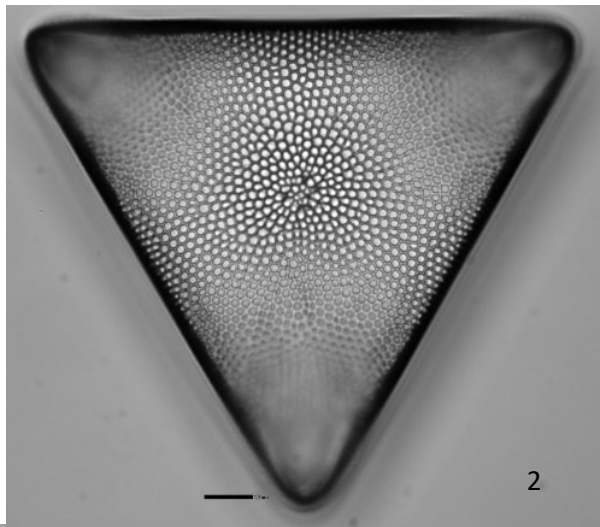
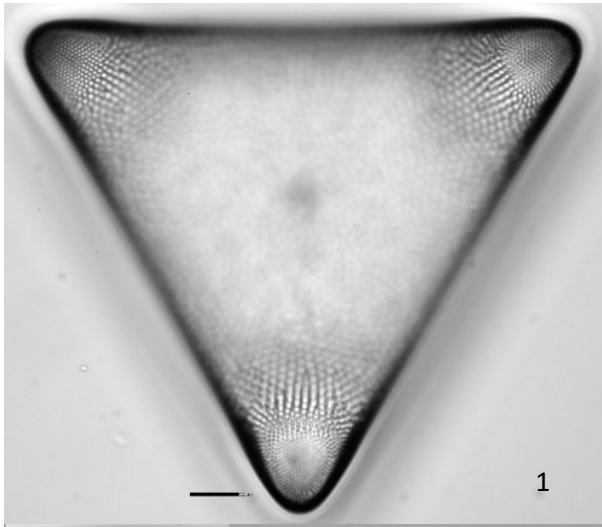


Plate 17

- 1 Trigonium formosum. 40x, COL, Abbe condenser. Scale bar = 10 μ m. Focus on valve face. From Schmidt pl 79 fig 3 (pl 166 fig 6-8 T. radians has small areolae near edge of valve face). (IMG_1183_1.jpg)
- 2 Trigonium formosum. 40x, COL, Abbe condenser. Focus on valve center. From Schmidt pl 79 fig 3 (pl 166 fig 6-8 T. radians has small areolae near edge of valve face). (IMG_1185_1.jpg)
- 3 Trigonium formosum. 100x, COL, NA100. Detail of 5452. Inside view of valve. Mid focus on locules. From Schmidt pl 79 fig 2 (IMG_5428_1.JPG)
- 4 Trigonium formosum. 100x, COL, NA100. Detail of 5452. Inside view. High focus on pseudoseptum and perhaps locules on edge. From Schmidt pl 79 fig 2 (IMG_5429_1.JPG)
- 5 Trigonium formosum. 40x, BF, NA040. Inside view. Low focus on valve center and pore fields. Distance between tips of lower two poles = 122 μ m. See # 5427-5428 for detail of a pole. Used for body plan for 2017 Straub talk. From Schmidt pl 79 fig 2. (IMG_5452_1.JPG)
- 6 Trigonium formosum. 60x, OL, NA070, N382-893. Girdle view. Focus on poles. (IMG_6239_1.jpg)

Plate 17

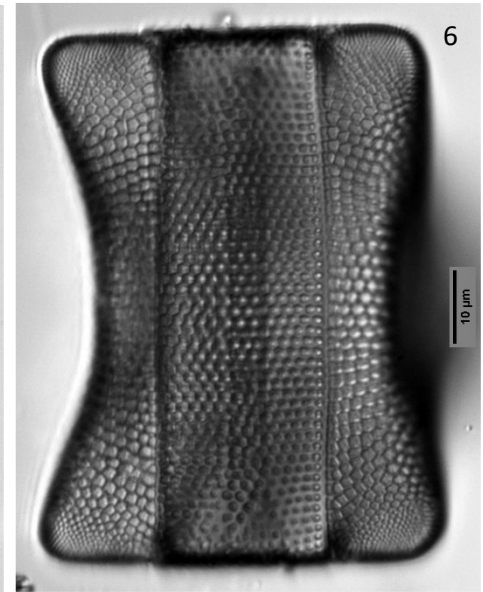
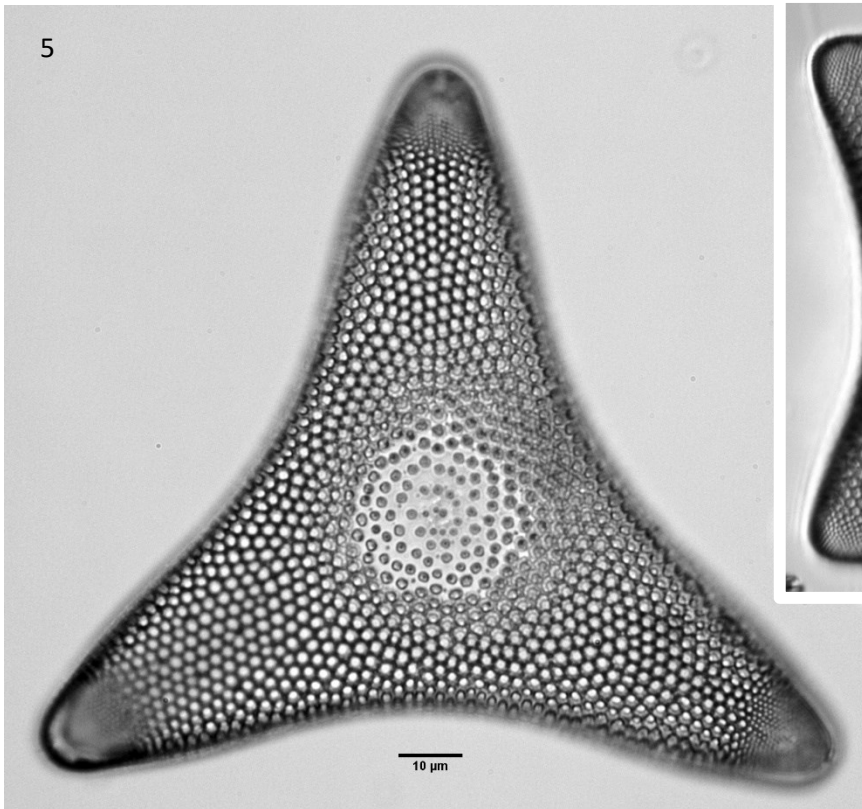
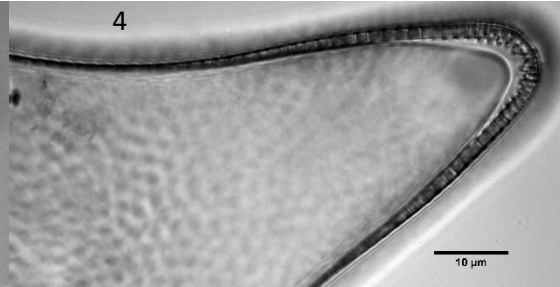
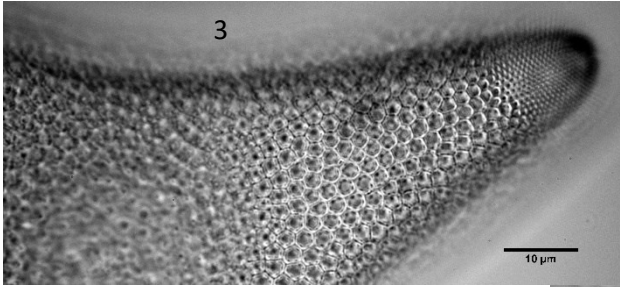
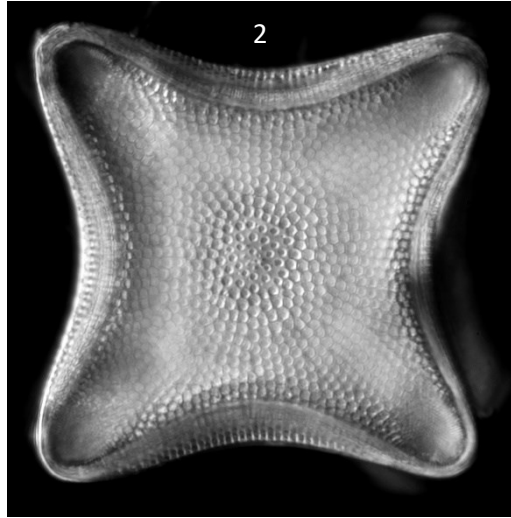
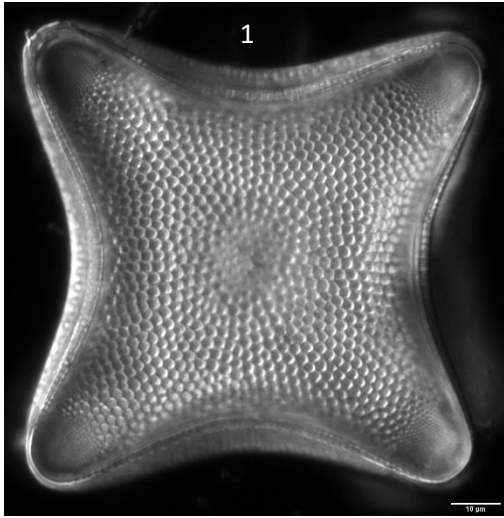


Plate 18

- 1 *Trigonium formosum*. 60x, BF, NA045. Focus on center. From Schmidt pl 79 fig 2. (IMG_6249_1.jpg)
- 2 *Trigonium formosum*. 60x, BF, NA045. Scale bar = 10 μm . Stitched # 7385-7386 with MS-ICE. From Schmidt pl 79 fig 3 (pl 166 fig 6-8 T. radians has small areolae near edge of valve face). (IMG_7385-1_stitch-1.jpg)
- 3 *Trigonium formosum*. 40x, OL, NA090. Scale bar = 10 μm . High focus on apices. From Schmidt pl 79 fig 3 (pl 166 fig 6-8 T. radians has small areolae near edge of valve face). (IMG_7390-1.JPG)
- 4 *Trigonium formosum*. 60x, OL, NA090. Stitched with MS-ICE from # 7394 and 7395. Focus low on center. From Schmidt pl 79 fig 3 (pl 166 fig 6-8 T. radians has small areolae near edge of valve face). (IMG_7394_stitch.jpg)
- 5 *Trigonium formosum*. 100x. Scale bar 100 μm . 5-image stitch with PhotoScape. From Schmidt pl 79 fig 3 (pl 166 fig 6-8 T. radians has small areolae near edge of valve face). (IMG_8266-stitch-1.JPG)

Plate 18

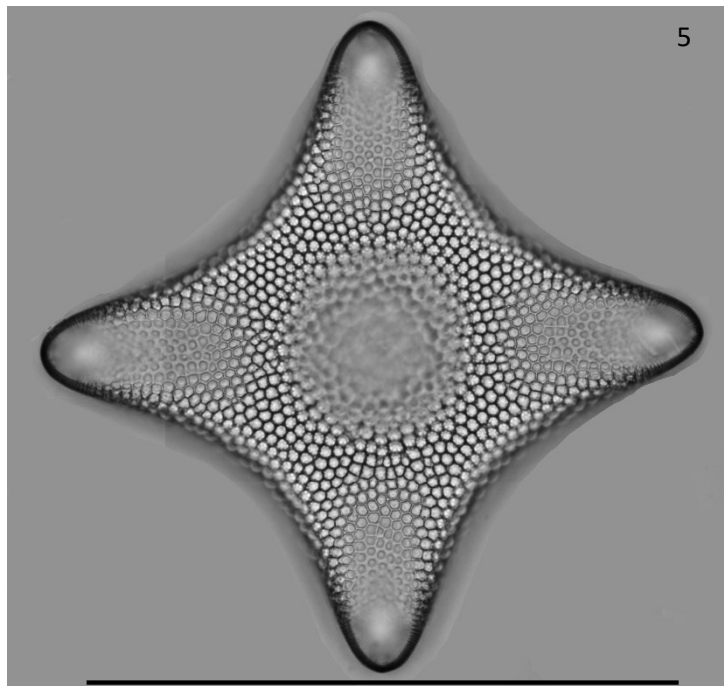
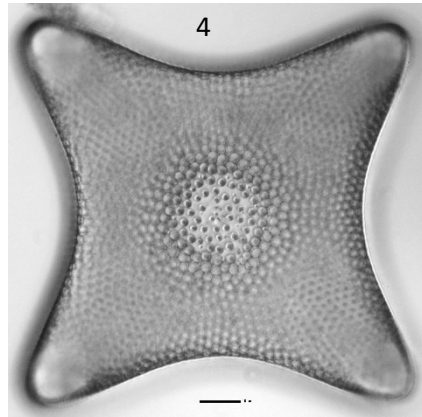
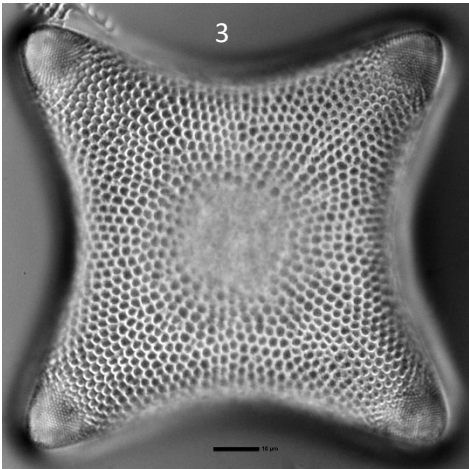
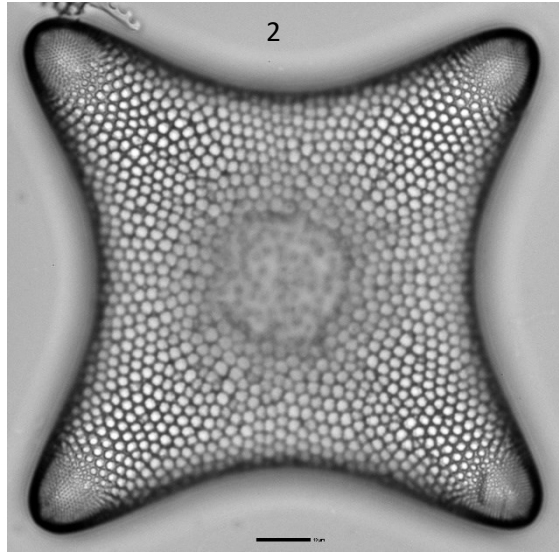
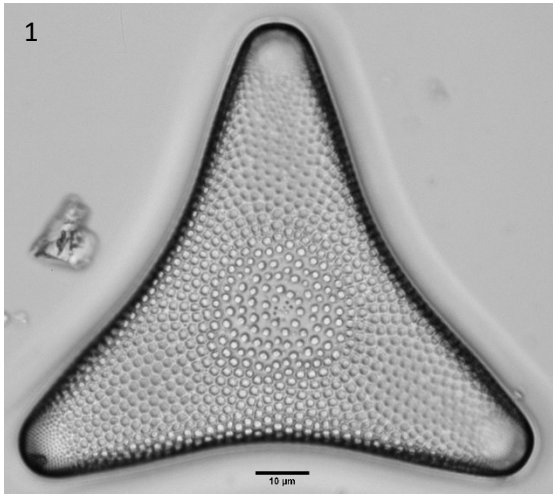
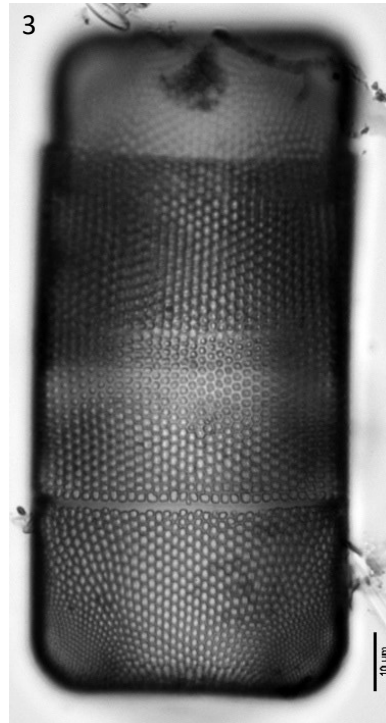
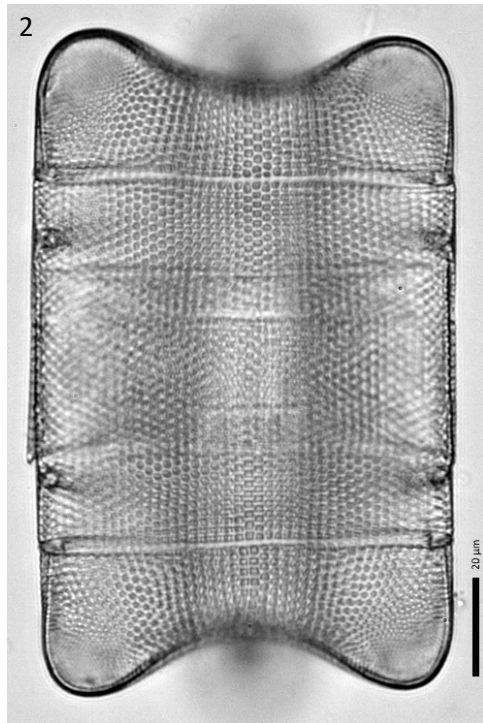
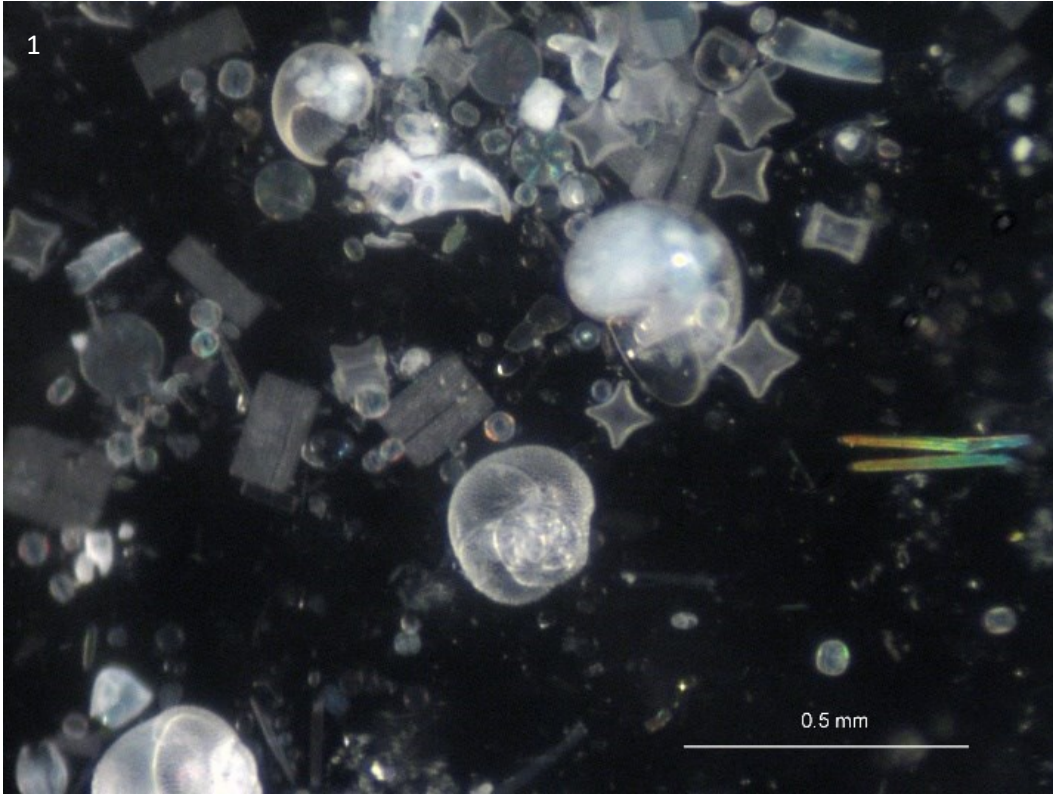


Plate 19

- 1 Trigonium sp. Scale bar 0.5 mm. A bit of the collection from plankton tow with improvised net. (IMG_1273_1.jpg)
- 2 Trigonium sp. 40x. Water mount. Low focus on two poles resting on slide. Third pole out of focus in higher plane. (IMG_4671-2.JPG)
- 3 Trigonium sp. 60x, BF, NA050. Girdle view of Trigonium with straight sides. High focus on hyaline band on girdle. (IMG_6310_1.jpg)

Plate 19



Araphid
Bilateral symmetry. No raphe.

Plate 20

- 1 *Synedrosphenia crystallina*. 100x, BF, NA080. Scale bar 10 μm . Length 230 μm . External view. From Lobban et al. (2012) pl 15 fig 1–3; Lobban et al. (2022) fig 3; Round et al. (1990) p 380. (IMG_4825-stitch-1.JPG)
- 2 *Ardissonea formosa*. 40x, BF, NA035. Scale bar 10 μm . Whole valve.
- 3 *Ardissonea formosa*. 100x. Apex detail. Scale bar 10 μm . From Lobban et al. (2012) pl 1 fig 1-2 live cells; 15 fig 4-5; pl 16 fig 1-2. (IMG_2992_1-combo.jpg)
- 4 *Synedrosphenia fulgens*. 100x, BF, NA070. Scale bar 10 μm . Length 424 μm . Width 5 μm at center. Striae 10 in 10 μm . From Lobban et al. (2012) pl 16 fig 3-5; Lobban et al. (2022) reassignment. (IMG_4703_1-combo.JPG)
- 5 *Synedrosphenia fulgens*. 40x. Scale bar 10 μm . Length 425 μm . From Lobban et al. (2012) pl 16 fig 3-5; Lobban et al. (2022) reassignment. (IMG_5458-1-stitch-1.JPG)

Plate 20

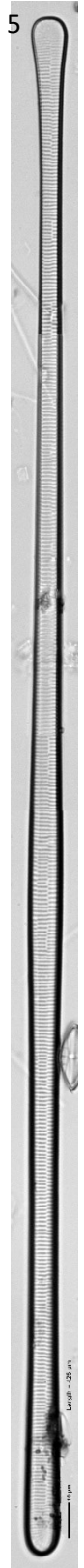
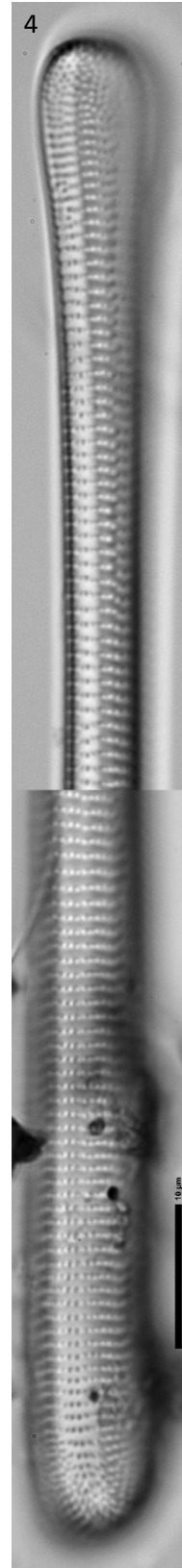
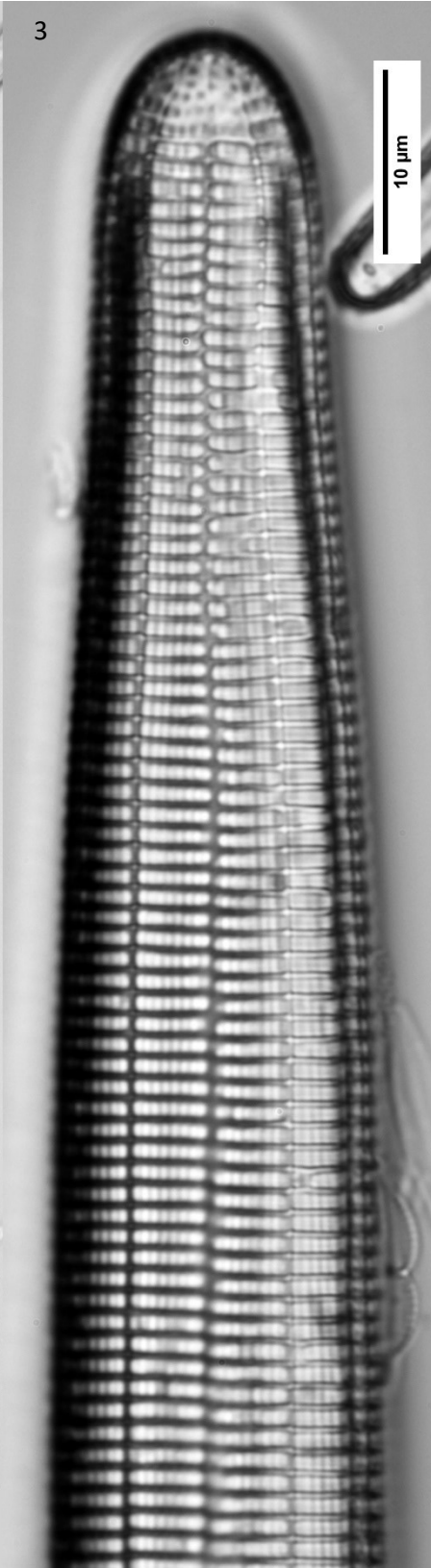
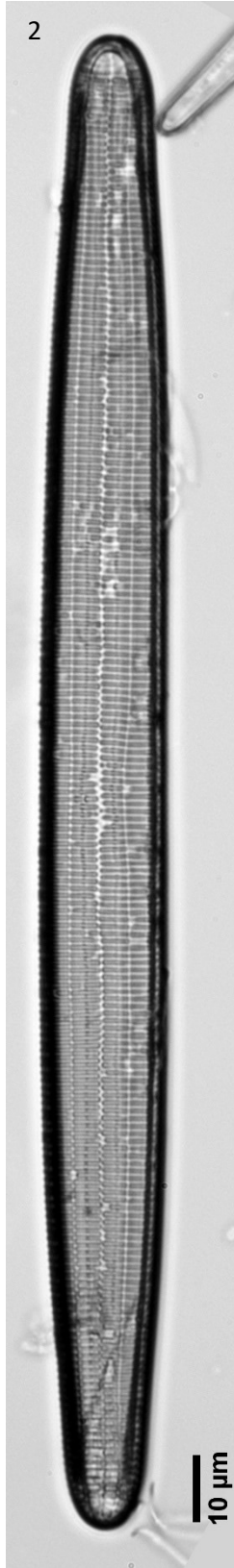
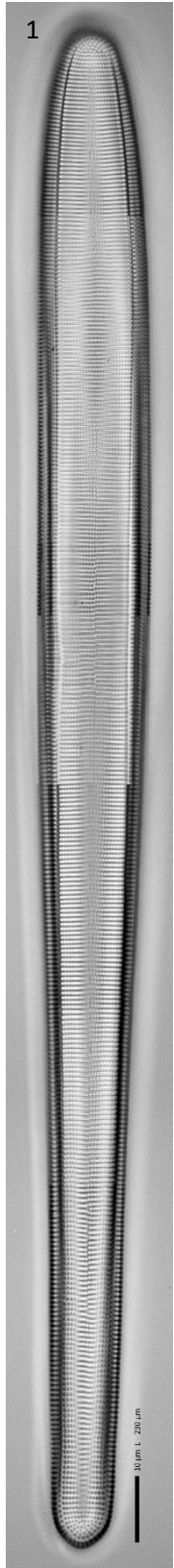


Plate 21

- 1 *Climacosphenia elongata*. 10x. Scale bar 100 μm . Wet mount of cleaned material. From Al-Handal et al. (2016). (IMG_1640-1.JPG)
- 2 *Climacosphenia elongata*. 40x, COL, NA100. Scale bar 10 μm . Length 209 μm . Width near headpole 18 μm . Bright center by dropping condenser. Focus on footpole. From Al-Handal et al. (2016). (IMG_5409_1.JPG)
- 3 *Climacosphenia elongata*. 10x, BF, NA020. Scale bar 100 μm . Length 303 μm . Details of headpole and footpole in following images. From Al-Handal et al. (2016). (IMG_5418_1.jpg)
- 4 *Climacosphenia elongata*. 100x, BF, NA100. Scale bar 10 μm . Focus on headpole with spines visible! From Al-Handal et al. (2016). (IMG_5419_1.JPG)
- 5 *Climacosphenia elongata*. 100x, BF, NA100. Scale bar 10 μm . Focus in blackspot on footpole. From Al-Handal et al. (2016). (IMG_5420_1.JPG)

Plate 21

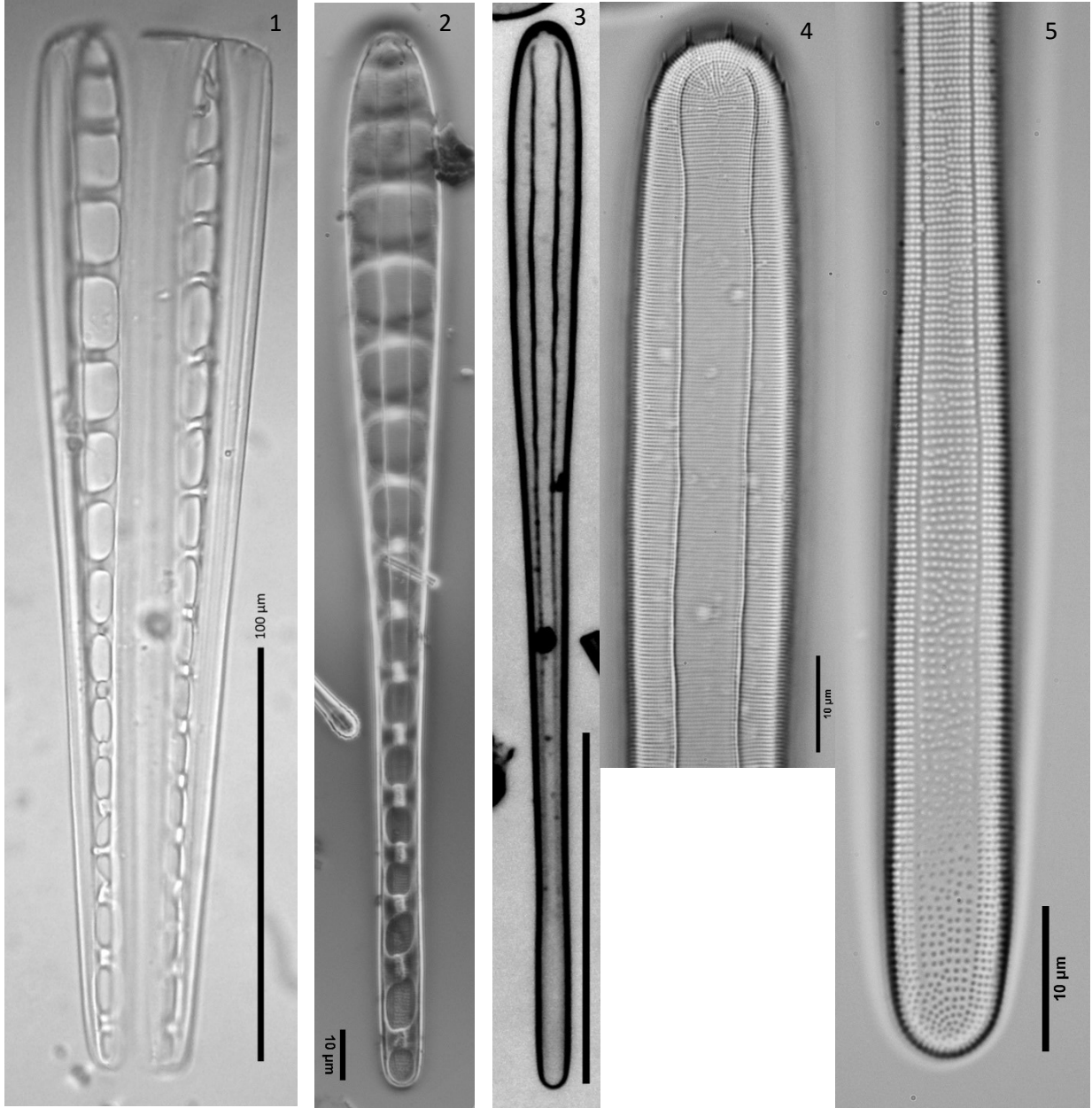


Plate 22

- 1 *Grammatophora* sp1. 100x. Scale bar 10 μm . Internal view. High focus on outline. From Round et al. (1990). (IMG_1212_1.jpg)
- 2 *Grammatophora* sp1. 100x. Scale bar 10 μm . Internal view. Low focus on inside of valve face. From Round et al. (1990). (IMG_1215_1.jpg)
- 3 *Hyalosynedra laevigata*. 100x. Scale bar 10 μm . Length = 190 μm . From Round et al. (1990) p 380 and corroborated by Michael Sullivan in email of 2 Apr 2015. (IMG_4686_stitch_1.jpg)
- 4 *Licmophora* cf *colosalis*. 40x, OL. Scale bar 10 μm . L 212, W 12 μm . Focus on headpole. From Belando et al. (2016). (IMG_8378-1.JPG)
- 5 *Licmophora* cf *colosalis*. 100x, OL. Scale bar 10 μm . L 212, W 12 μm . Focus on headpole, on footpole. From Belando et al. (2016). (IMG_8452-1.JPG)
- 6 *Licmophora ehrenbergii*. 40x. From Stidolph et al. (2012) pl 24 fig 63. (IMG_0337-1.JPG)

Plate 22

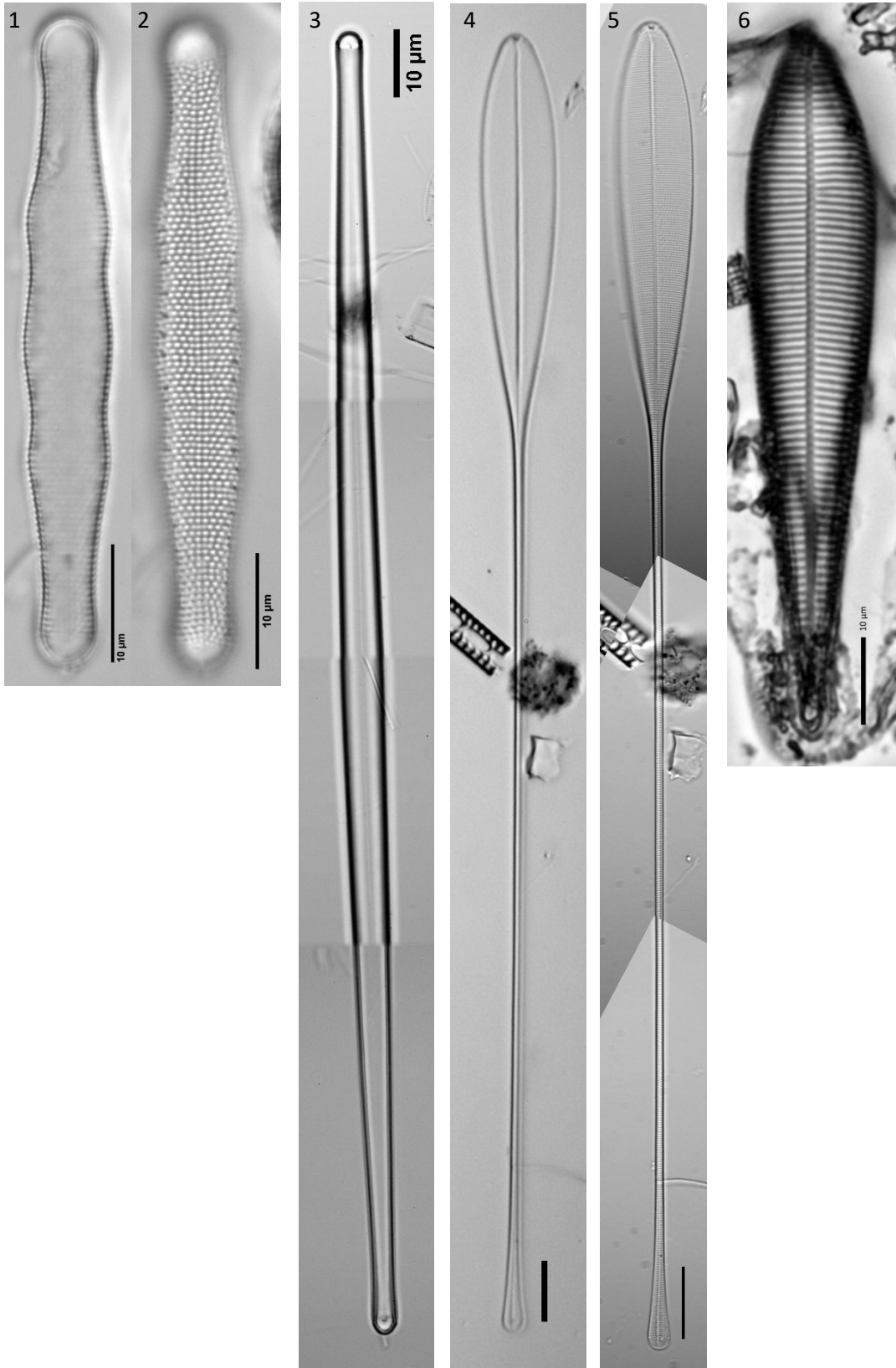


Plate 23

- 1 *Licmophora* sp1. 60x. Scale bar 10 μ m. High focus on footpole rimoportula. From Round et al. (1990); Kimmich, Araphid key. (IMG_8376-1.JPG)
- 2 *Licmophora* sp1. 60x. Scale bar 10 μ m. Low focus on headpole. From Round et al. (1990); Kimmich, Araphid key. (IMG_8377-1.JPG)
- 3 *Licmophora* sp1. 100x. Scale bar 10 μ m. Headpole high focus on outside of tiny rimoportula near the apex. From Round et al. (1990). (IMG_8427-1.JPG)
- 4 *Licmophora* sp1. 100x. Scale bar 10 μ m. Headpole low focus on inside of tiny rimoportula near the apex. From Round et al. (1990). (IMG_8429-1.JPG)
- 5 *Licmophora* sp1. 100x. Scale bar 10 μ m. Footpole high focus on outer side of rimoportula. From Round et al. (1990). (IMG_8424-1.JPG)
- 6 *Licmophora* sp1. 100x. Scale bar 10 μ m. Footpole low focus on end striae and inner rimoportula. From Round et al. (1990). (IMG_8423-1.JPG)

Plate 23

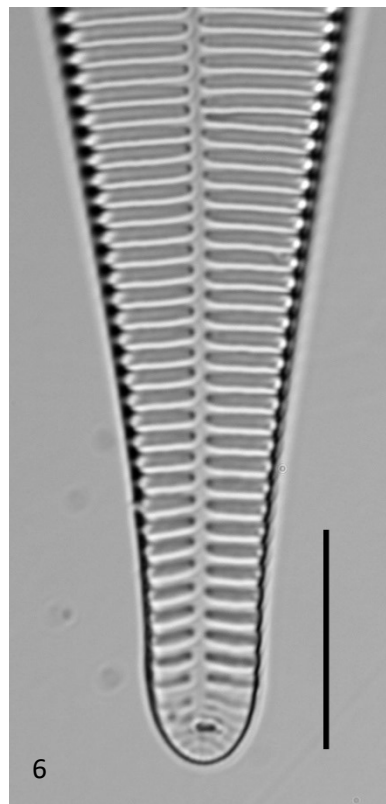
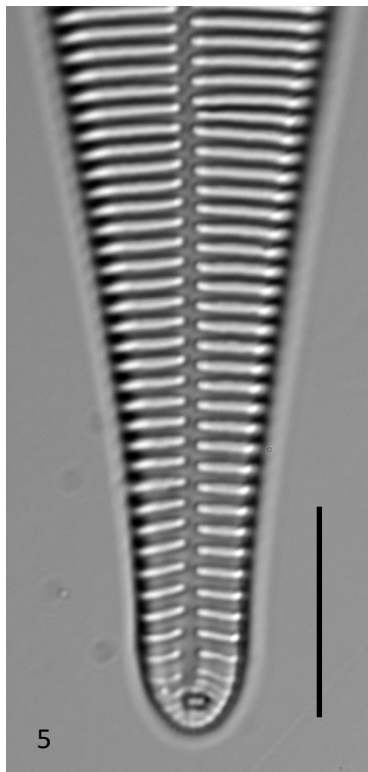
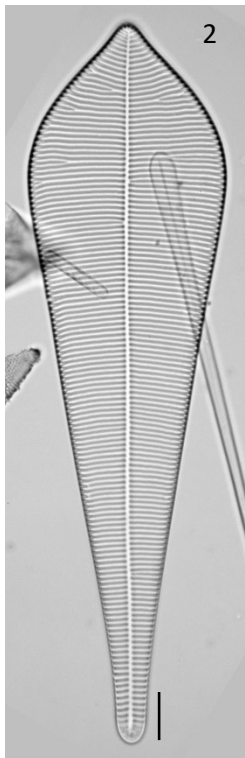
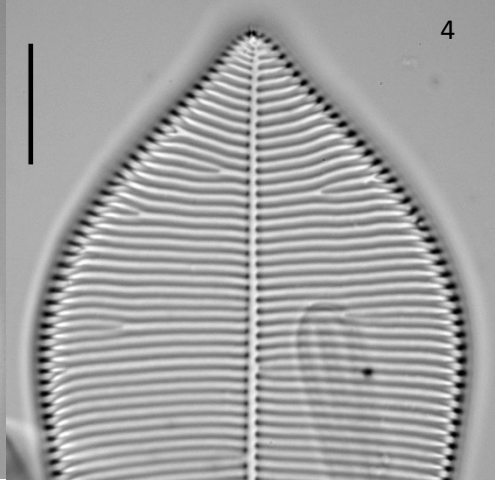
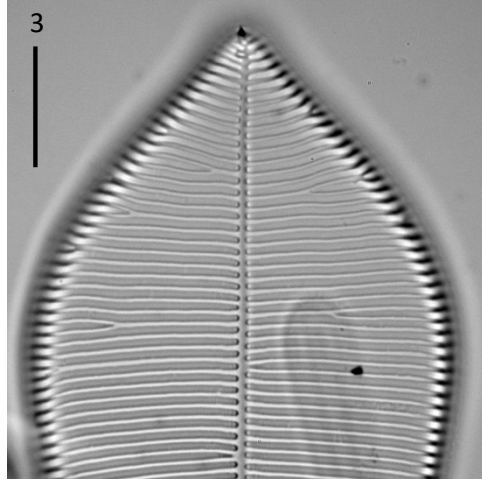
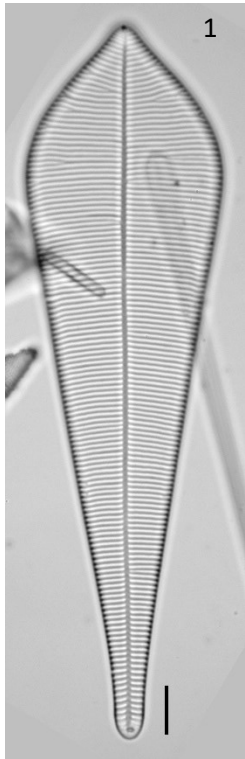


Plate 24

- 1 *Podocystis adriatica*. 100x. Scale bar 10 μ m. Focus on footpole in black spot. From Lobban et al. (2012) pl 12 fig 2-3; Stidolph et al. (2012) pl 26 fig 114. (IMG_6277_1.jpg)
- 2 *Podocystis spathulata*. 100x. Scale bar 10 μ m. From Lobban et al. (2012) pl 12 fig 4-6; Stidolph et al. (2012) pl 50 fig 47. (IMG_8324-1.JPG)
- 3 *Podocystis spathulata*. 100x. Scale bar 10 μ m. High focus F1 on areolae in white spot. From Lobban et al. (2012) pl 12 fig 4-6; Stidolph et al. (2012) pl 50 fig 47. (IMG_8328-1.JPG)
- 4 *Podocystis spathulata*. 100x. Scale bar 10 μ m. Focus F2 on footpole. From Lobban et al. (2012) pl 12 fig 4-6; Stidolph et al. (2012) pl 50 fig 47. (IMG_8327-1.jpg)
- 5 *Podocystis spathulata*. 100x. Scale bar 10 μ m. Low focus F3 on headpole. From Lobban et al. (2012) pl 12 fig 4-6; Stidolph et al. (2012) pl 50 fig 47. (IMG_8329-1.JPG)
- 6 *Rhabdonema* sp2. 60x, OL, NA070. Scale bar 10 μ m. A girdle band in valve view. From Round et al. (1990). (IMG_6252_1.JPG)

Plate 24

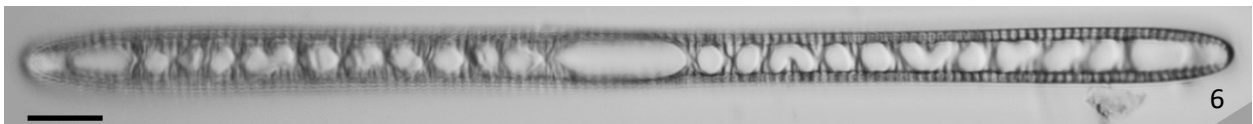
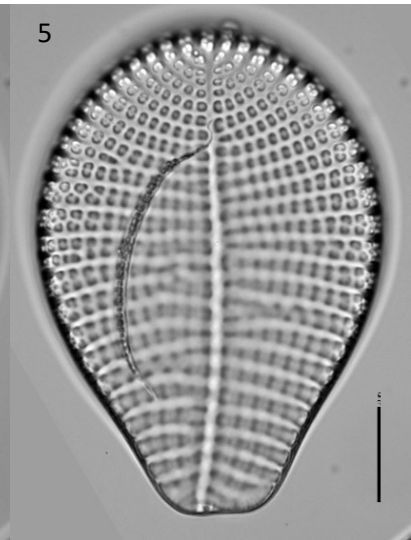
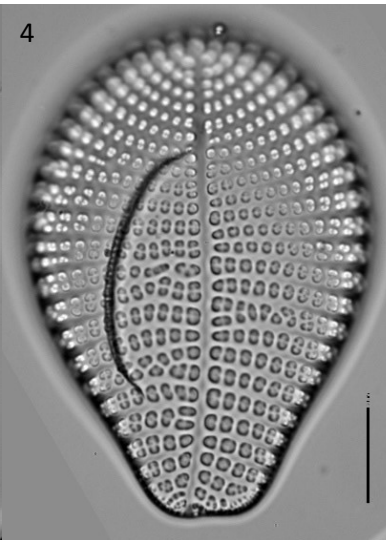
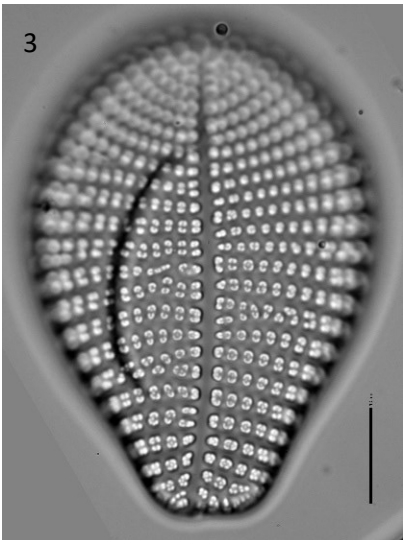
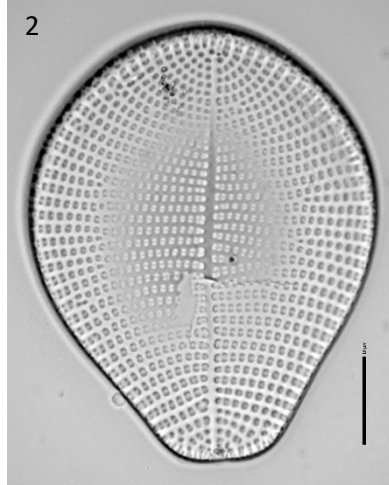
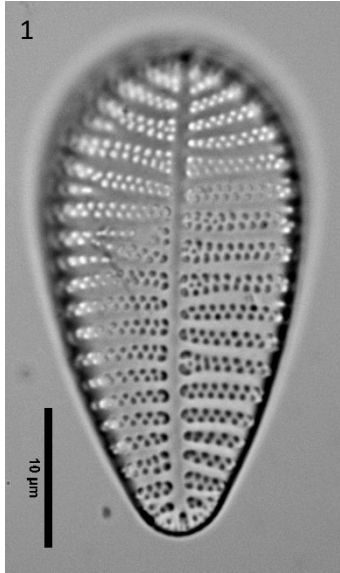
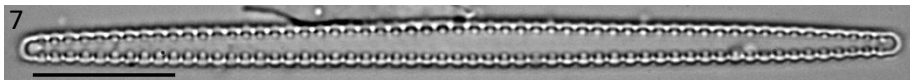
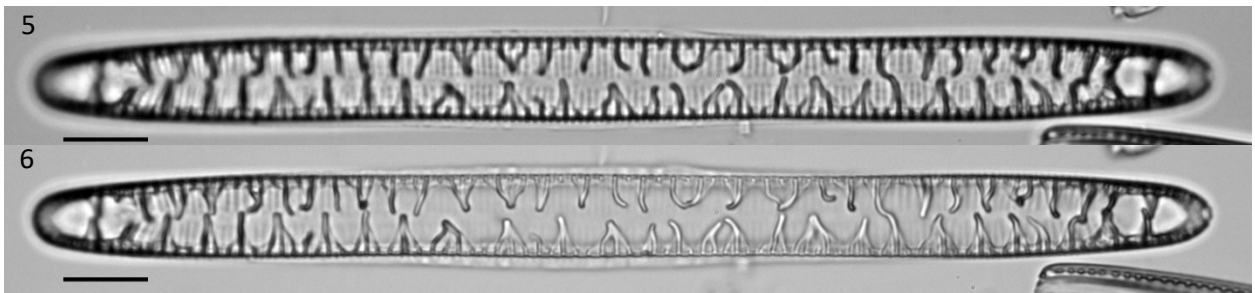
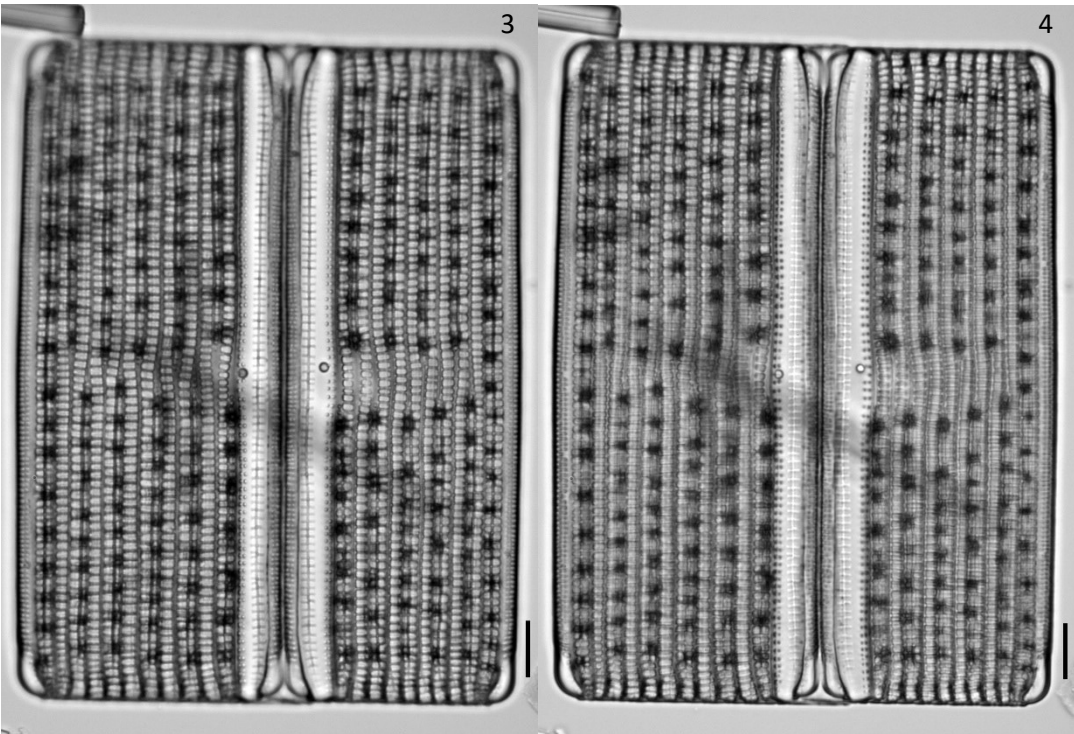
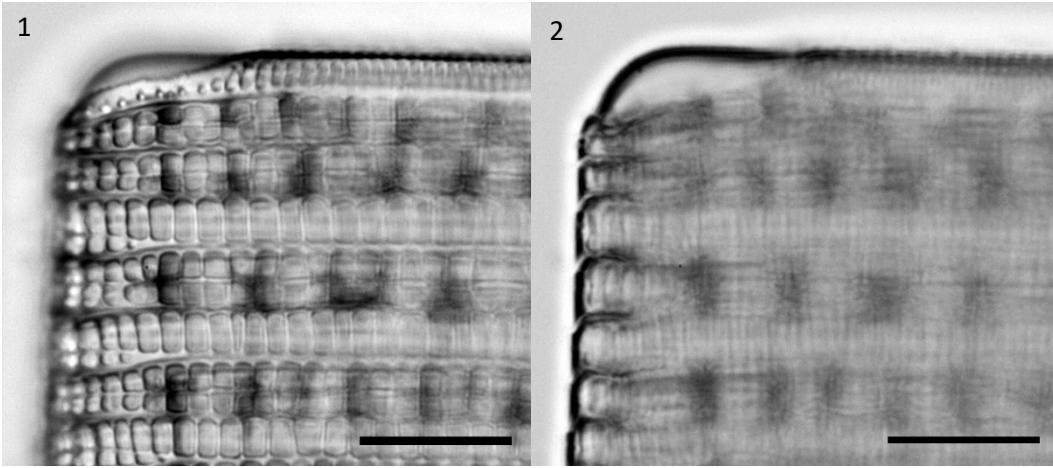


Plate 25

- 1 Rhabdonema punctatum. 100x. Scale bar 10 μm . Girdle view. Focus on end pore field of valve. From Stidolph et al. (2012) pl 28 fig 5. (IMG_6293_1.JPG)
- 2 Rhabdonema punctatum. 100x. Scale bar 10 μm . Low focus on overlapping girdle band edges. From Stidolph et al. (2012) pl 28 fig 5. (IMG_6294_1.JPG)
- 3 Rhabdonema punctatum. 60x. Scale bar 10 μm . High focus F1 on center of old and new valves, new valvocopula with framework in black and with double row of areolae prominent along distal edge. Two central circles are suspected artifacts. From Stidolph et al. (2012) pl 28 fig 5. (IMG_8373-1.JPG)
- 4 Rhabdonema punctatum. 60x. Scale bar 10 μm . Focus F2 with valvocopula framework in white and double row of areolae in white spot. Two central circles are suspected artifacts. From Stidolph et al. (2012) pl 28 fig 5. (IMG_8374-1.JPG)
- 5 Rhabdonema sp. 60x. Scale bar 10 μm . High focus on central striae. From Round et al. (1990). (IMG_8403-1.JPG)
- 6 Rhabdonema sp. 60x. Scale bar 10 μm . Low focus on valvocopula septa. (IMG_8405-1.JPG)
- 7 Tabularia sp1. 100x. Scale bar 10 μm . From Round et al. (1990). (IMG_1245_1.jpg)

Plate 25



Symmetric Biraphid
Bilateral symmetry. Raphe on both valves.

Plate 26

- 1 *Diploneis chersonensis*. 100x, COL, NA100. Scale bar 10 μm . High focus on areolae along canal parallel to raphe. From Lobban et al. (2012) pl 44 fig 1-4. (IMG_5430_1.jpg)
- 2 *Diploneis chersonensis*. 100x, COL, NA100. Scale bar 10 μm . Mid focus on proximal raphe ends. From Lobban et al. (2012) pl 44 fig 1-4. (IMG_5431_1.jpg)
- 3 *Diploneis chersonensis*. 100x, COL, NA100. Scale bar 10 μm . Low focus on outline. From Lobban et al. (2012) pl 44 fig 1-4. (IMG_5432_1.jpg)
- 4 *Diploneis* sp1. 100x. Scale bar 10 μm . (IMG_0298_1.jpg)
- 5 *Diploneis crabro*. 100x. Scale bar 10 μm . High focus on distal raphe and ridge. From Lobban et al. (2012) pl 44 fig 5, pl 45 fig 1-2; Sullivan (23 Oct 2021). (IMG_6269_1.JPG)
- 6 *Diploneis crabro*. 100x. Scale bar 10 μm . Focus on proximal raphe ends. From Lobban et al. (2012) pl 44 fig 5, pl 45 fig 1-2; Sullivan (email 23-Oct-2021): too hard to tell var *pandura* from nominate. Striae separated from longitudinal canal. (IMG_6270_1.JPG)
- 7 *Diploneis crabro*. 100x. Scale bar 10 μm . Focus on central area. From Lobban et al. (2012) pl 44 fig 5, pl 45 fig 1-2; Sullivan (email 23-Oct-2021): too hard to tell var *pandura* from nominate. Striae separated from longitudinal canal. (IMG_6271_1.JPG)
- 8 *Diploneis crabro*. 100x. Scale bar 10 μm . Focus on outline. L 71, W 19 μm . Striae 5.5 in 10 μm . From Lobban et al. (2012) pl 44 fig 5, pl 45 fig 1-2; Sullivan (email 23-Oct-2021): too hard to tell var *pandura* from nominate. Striae separated from longitudinal canal. (IMG_6272_1.JPG)

Plate 26

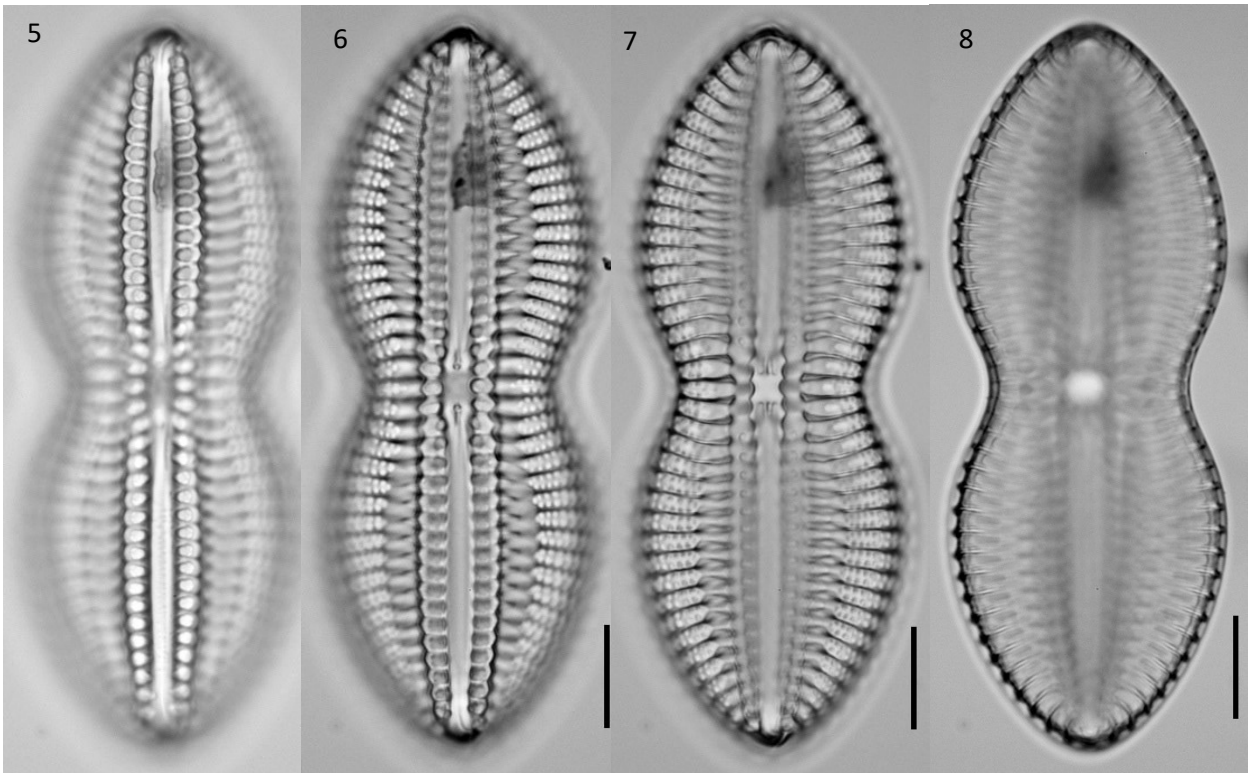
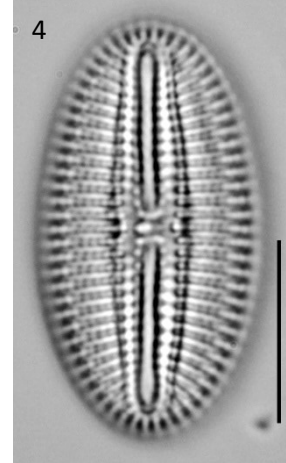
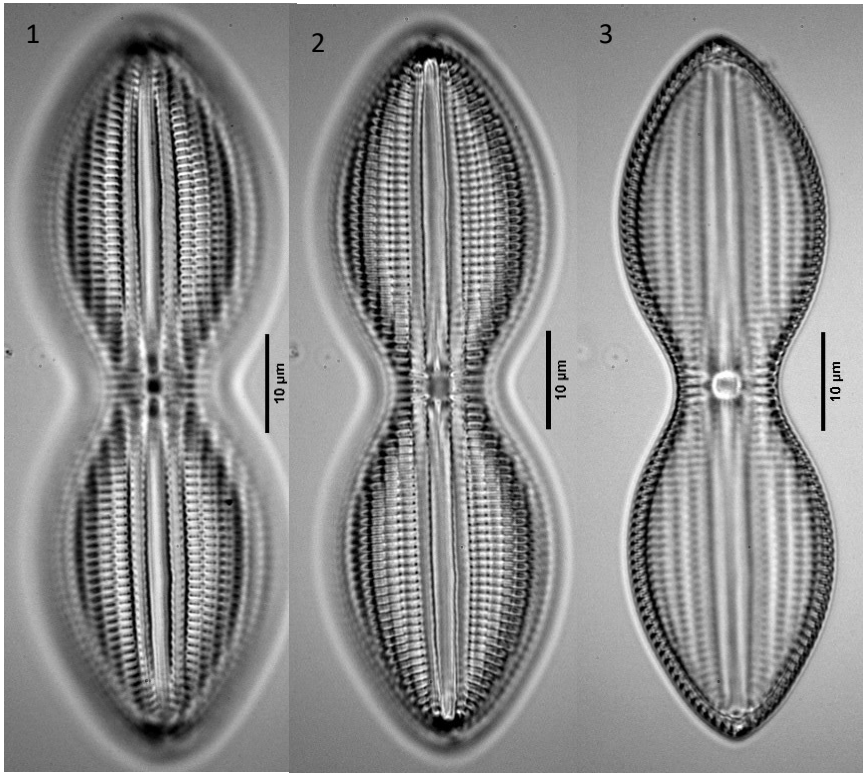


Plate 27

- 1 *Diploneis crabro*. 100x. L 70 μm , W 19 μm , scale bar 10 μm . High focus F1 (0 μm) on outside of pores in external wall of the longitudinal canal. 1 of 5. From Lobban et al. (2012) pl 44 fig 5, pl 45 fig 1-2; Sims (ed.) (1996 pl 78 fig 6, pl 79 fig 1-7). (IMG_8212-1.JPG)
- 2 *Diploneis crabro*. 100x. L 70 μm , W 19 μm , scale bar 10 μm . F2. 1 μm . White spot focus on proximal and distal raphe ends. Distal raphe ends curve toward the secondary side of valve. 2 of 5. From Lobban et al. (2012) pl 44 fig 5, pl 45 fig 1-2; Sims (ed.) (1996 pl 78 fig 6, pl 79 fig 1-7). (IMG_8213-1.JPG)
- 3 *Diploneis crabro*. 100x. Scale bar 10 μm . L 70 μm , W 19 μm . Focus F3 (2 μm) white spot on areolae of striae. 3 of 5. From Lobban et al. (2012) pl 44 fig 5, pl 45 fig 1-2; Sims (ed.) (1996 pl 78 fig 6, pl 79 fig 1-7). (IMG_8214-1.JPG)
- 4 *Diploneis crabro*. 100x. L 70 μm , W 19 μm , scale bar 10 μm . Focus F4 (3 μm) black spot on areolae of striae. 4 of 5. From Lobban et al. (2012) pl 44 fig 5, pl 45 fig 1-2; Sims (ed.) (1996 pl 78 fig 6, pl 79 fig 1-7). (IMG_8215-1.JPG)
- 5 *Diploneis crabro*. 100x. L 70 μm , W 19 μm , scale bar 10 μm . Focus F5 (5.5 μm) on distal ends of ribs between striae. 5 of 5. From Lobban et al. (2012) pl 44 fig 5, pl 45 fig 1-2; Sims (ed.) (1996 pl 78 fig 6, pl 79 fig 1-7). (IMG_8216-1.JPG)
- 6 *Diploneis crabro*. 100x. Scale bar 10 μm . Low focus on outline. L 121, W 31 μm . From Lobban et al. (2012) pl 44 fig 5, pl 45 fig 1-2. (IMG_8218-stitch-1.JPG)
- 7 *Diploneis crabro*. 100x. Scale bar 10 μm . High focus on curled proximal raphe ends. L 121, W 31 μm . From Lobban et al. (2012) pl 44 fig 5, pl 45 fig 1-2. (IMG_8220-stitch-1.JPG)

Plate 27

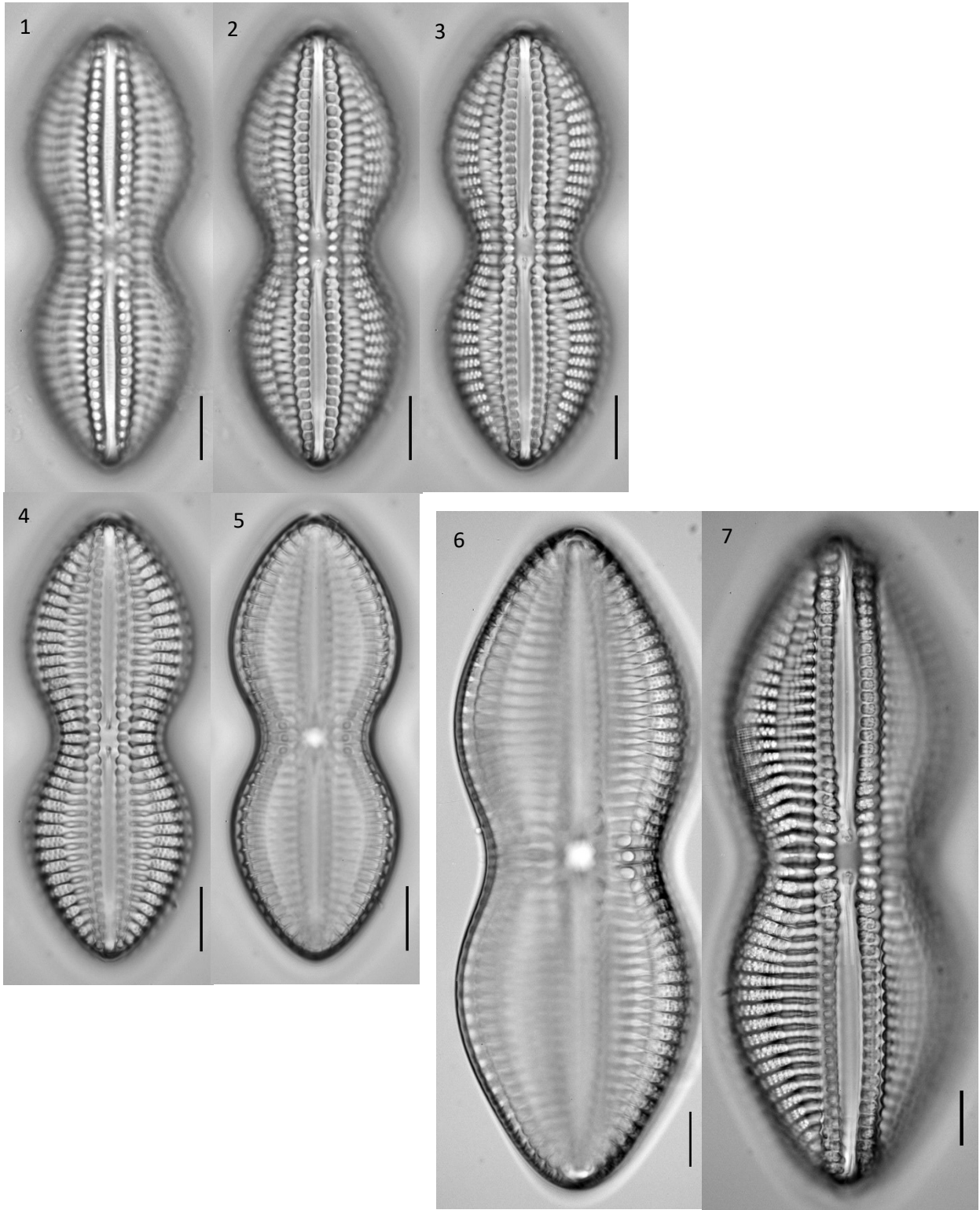


Plate 28

- 1 *Diploneis didyma*. 100x. Scale bar 10 μ m. High focus on proximal raphe ends. From Sims (ed.) (1996) pl 80 fig 1. (IMG_8506-1.JPG)
- 2 *Diploneis didyma*. 100x. Scale bar 10 μ m. Low focus on outline. From Sims (ed.) (1996) pl 80 fig 1. (IMG_8507-1.JPG)
- 3 *Diploneis graeffii*. 100x, BF, NA070, N345-982. Scale bar 10 μ m. Focus on proximal raphe. Unknown dots on the canal next to raphe. Marginal striae with double rows of areolae. From Stidolph pl 3 fig 71, 84 and Schmidt pl 7 fig 6. (IMG_4801_2.jpg)
- 4 *Diploneis ovalis f angusta*. 100x. Scale bar 10 μ m. From Schmidt Atlas pl 7 fig 36. (IMG_1243_1.jpg)
- 5 *Diploneis smithii*. 100x. Scale bar 10 μ m. High focus areolae in white spot. From Sims (ed.) (1996) pl 86 fig 6. (IMG_8496-1.JPG)
- 6 *Diploneis smithii*. 100x. Scale bar 10 μ m. Mid focus on longitudinal canal. From Sims (ed.) (1996) pl 86 fig 6. (IMG_8497-1.JPG)
- 7 *Diploneis smithii*. 100x. Scale bar 10 μ m. Low focus on outline. From Sims (ed.) (1996) pl 86 fig 6. (IMG_8498-1.JPG)

Plate 28

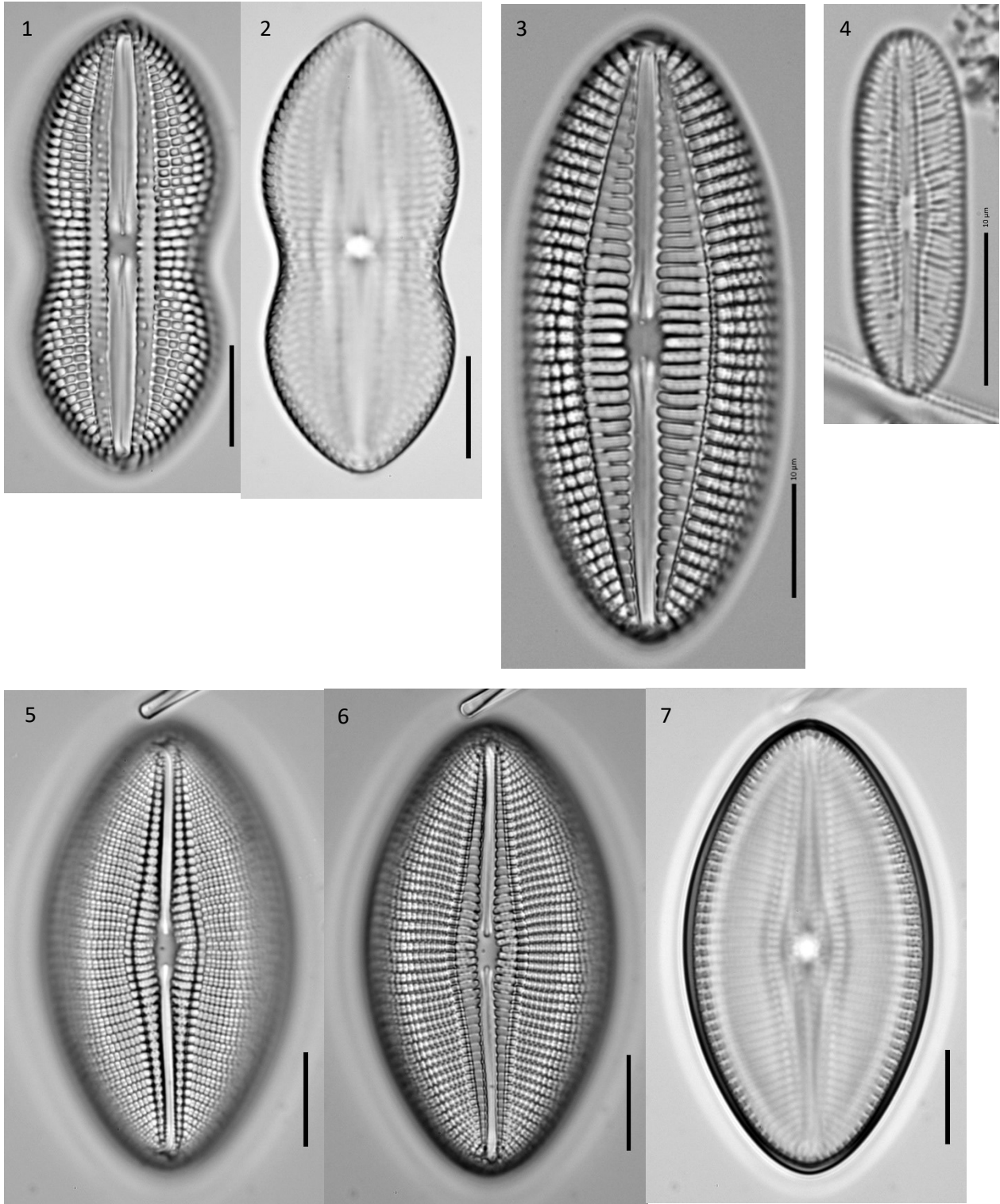


Plate 29

- 1 Donkinia sp2. 100x. Scale bar 10 μm . High focus on central ring. Separated from Pleurosigma on the strongly sigmoid raphe. From Round et al. (1990). (IMG_4773_1.JPG)
- 2 Donkinia sp2. 100x, BF, NA080. Scale bar 10 μm . Low focus on proximal raphe ends and areolae around central area. Separated from Pleurosigma on the strongly sigmoid raphe. From Round et al. (1990). (IMG_4774_1.JPG)
- 3 Donkinia sp2. 60x. Scale bar 10 μm . Length 134 μm . Focus on central ring. Separated from Pleurosigma on the strongly sigmoid raphe. From Round et al. (1990). (IMG_4797_1.JPG)
- 4 Donkinia sp2. 100x. Scale bar 10 μm . Detail of # 4797. Focus on central ring. Separated from Pleurosigma on the strongly sigmoid raphe. From Round et al. (1990). (IMG_4799_1.JPG)

Plate 29

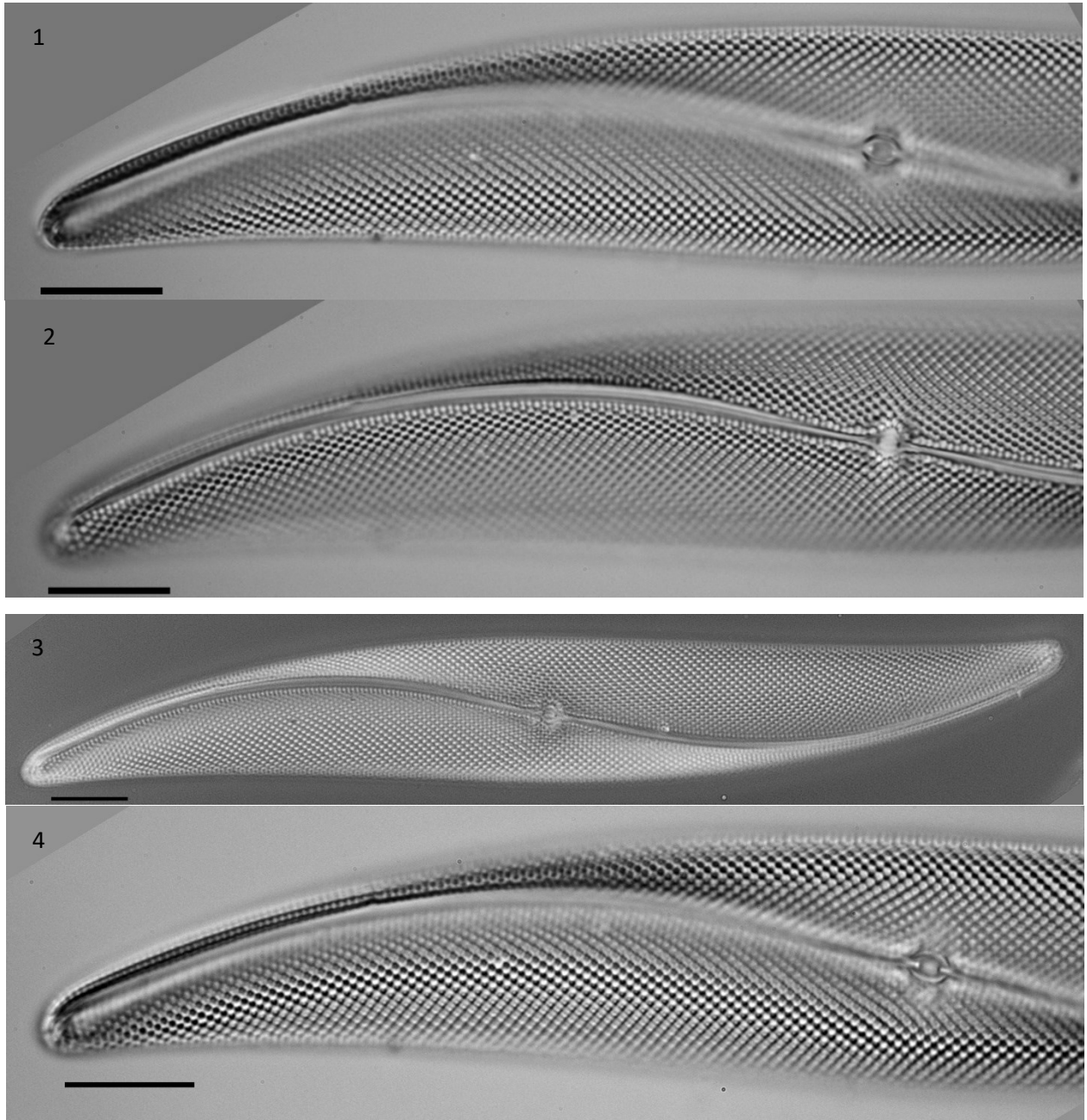


Plate 30

- 1 *Haslea* sp1. 100x. Scale bar 10 μ m. (IMG_0403_1.JPG)
- 2 *Lyrella hennedyi*. 100x, BF. Scale bar 10 μ m. High focus on distal raphe end. Whole frustule. Lobban et al. (2012) pl 20 fig 6-8. (IMG_4782_1.JPG)
- 3 *Lyrella hennedyi*. 100x, BF. Scale bar 10 μ m. Low focus on proximal raphe end. Whole frustule. Lobban et al. (2012) pl 20 fig 6-8. (IMG_4783_1.JPG)
- 4 *Mastogloia citrus*. 100x, COL, NA100. Black spot focus on areolae. From Lobban et al. (2012) pl 25 fig 4-5. (IMG_5436_1.JPG)
- 5 *Mastogloia citrus*. 100x, COL, NA100. Focus on a distal raphe end. From Lobban et al. (2012) pl 25 fig 4-5. (IMG_5437_1.JPG)
- 6 *Mastogloia fimbriata*. 100, BF. High focus on valve face. From Lobban et al. (2012) pl 28 fig 8-9. (IMG_6280_1.JPG)
- 7 *Mastogloia fimbriata*. 100x, BF. Mid focus on valve face in black spot. From Lobban et al. (2012) pl 28 fig 8-9. (IMG_6281_1.JPG)
- 8 *Mastogloia fimbriata*. 100x, BF. Low focus on partecta. From Lobban et al. (2012) pl 28 fig 8-9. (IMG_6282_1.JPG)

Plate 30

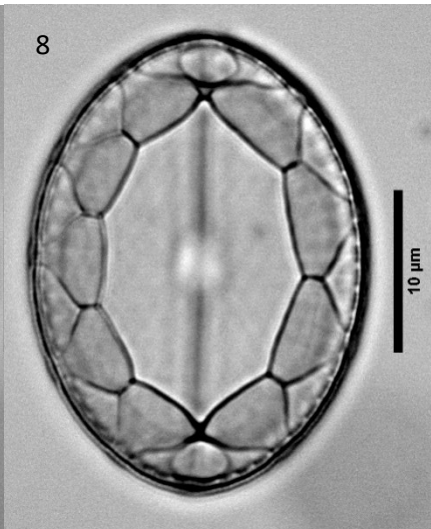
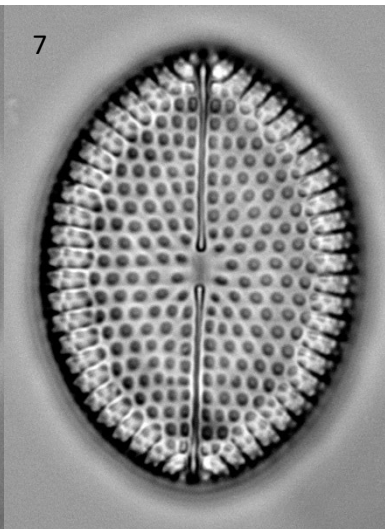
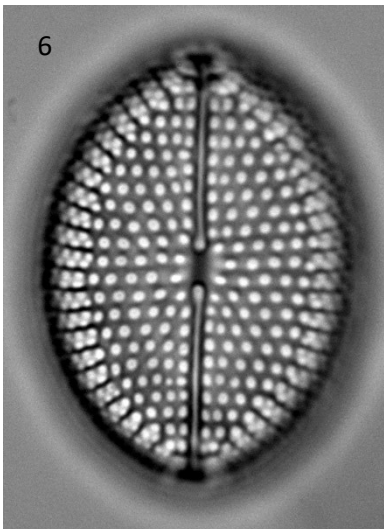
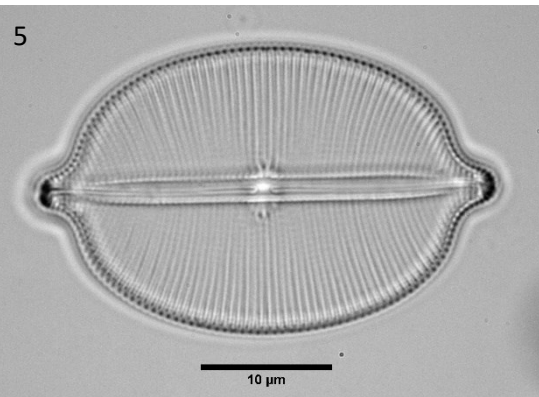
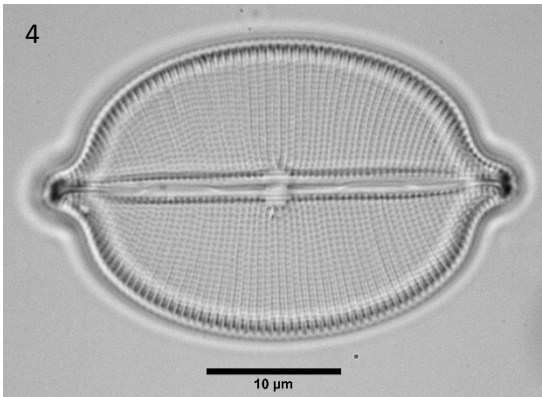
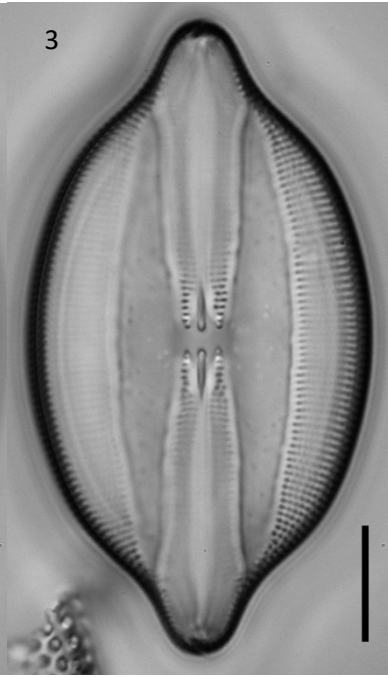
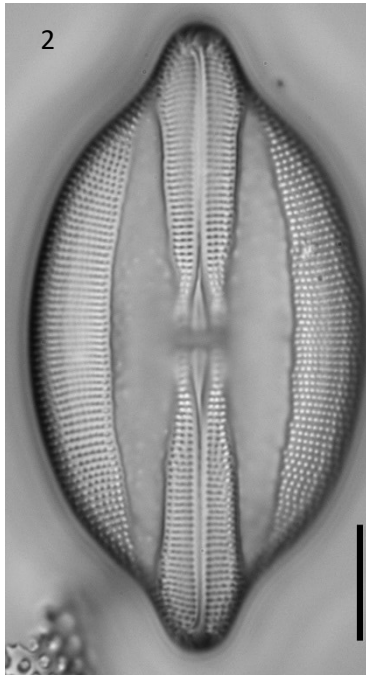
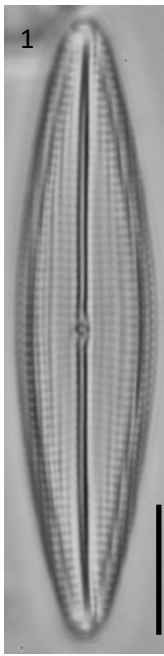


Plate 31

- 1 *Mastogloia horvathiana*. 100x. Scale bar 10 μ m. Focus on valve face. From Lobban et al. (2012) pl 29: 1-2; Stidolph et al. (2012) pl 34, 35, 36. (IMG_6290_1.JPG)
- 2 *Mastogloia horvathiana*. 100x. Scale bar 10 μ m. Focus on partecta. From Lobban et al. (2012) pl 29: 1-2; Stidolph et al. (2012) pl 34, 35, 36. (IMG_6291_1.JPG)
- 3 *Mastogloia neoborneensis*. 100x, BF. Scale bar 10 μ m. Internal view. High focus on partecta. From Lobban et al. (2012) pl 33 fig 3. (IMG_6273_1.JPG)
- 4 *Mastogloia neoborneensis*. 100x, BF. Scale bar 10 μ m. Internal view. Low focus on proximal raphe ends and dark lines of bases of pseudoconoepa. From Lobban et al. (2012) pl 33 fig 3. (IMG_6274_1.JPG)
- 5 *Mastogloia paradoxa*. 100x. Honaunau-K # 18. Scale bar 10 μ m. From Lobban et al. (2012) p. 280, pl 34 fig 3-5. (IMG_8256-1.JPG)
- 6 *Mastogloia paradoxa*. 100x. Honaunau-K # 18. Scale bar 10 μ m. From Lobban et al. (2012) p. 280, pl 34 fig 3-5. (IMG_8257-1.JPG)
- 7 *Mastogloia paradoxa*. 100x. Honaunau-K # 18. Scale bar 10 μ m. From Lobban et al. (2012) p. 280, pl 34 fig 3-5. (IMG_8258-1.JPG)
- 8 *Mastogloia* sp1. 100x. Scale bar 10 μ m. (IMG_1221-1.JPG)

Plate 31

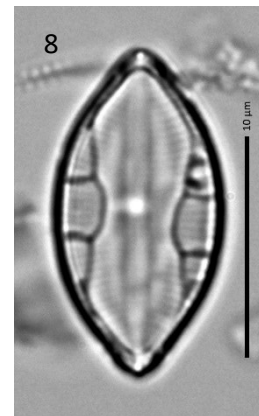
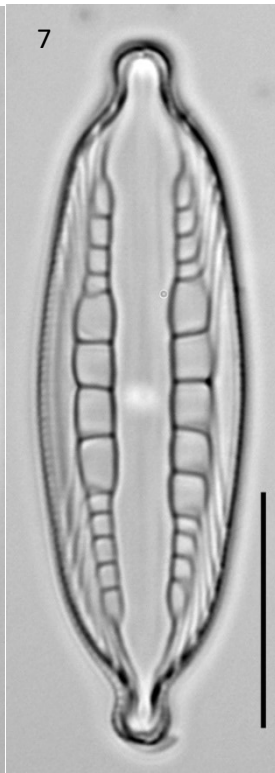
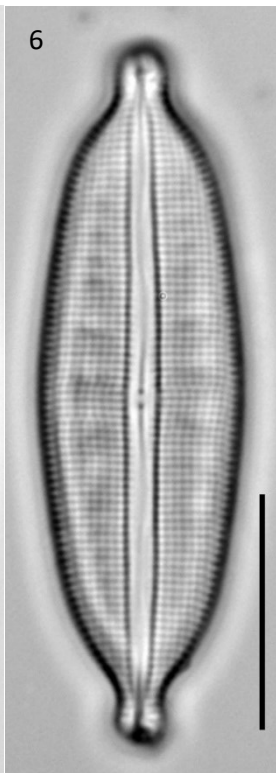
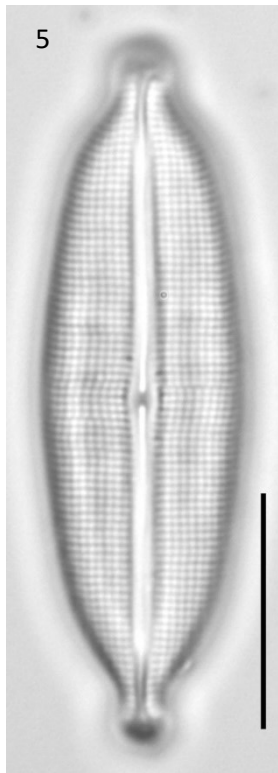
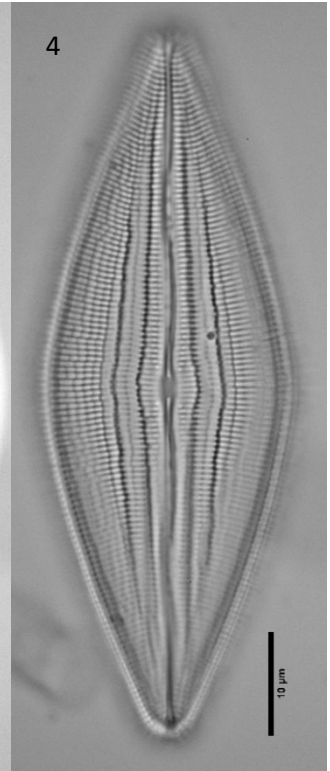
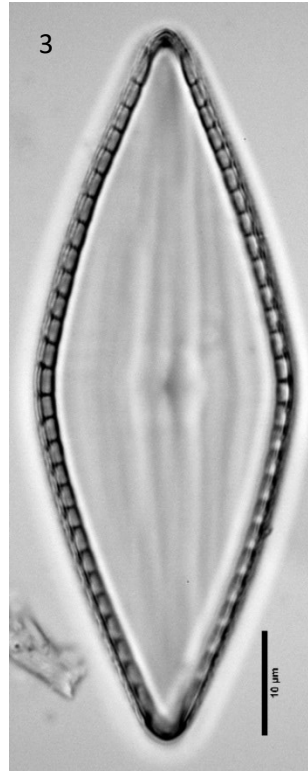
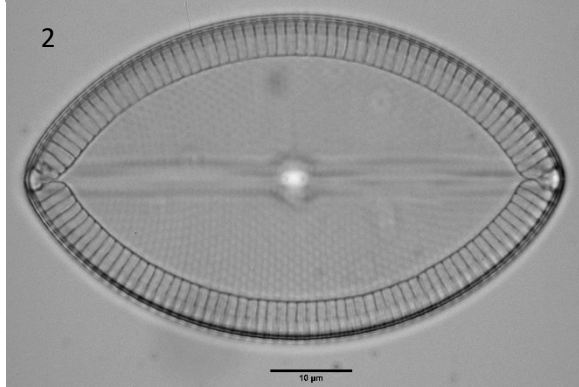
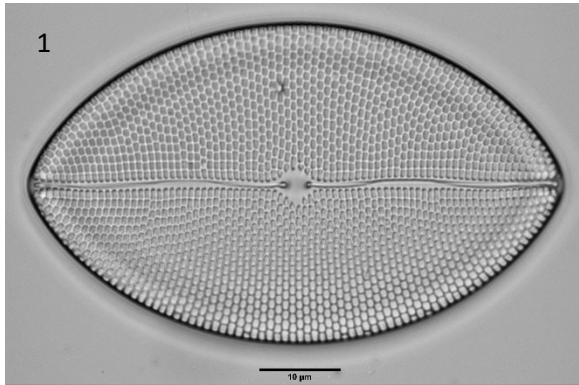


Plate 32

- 1 *Navicula longa*. 100x. Scale bar 10 μm . From Schmidt (1874-1959) pl 47: 1-4, 6, 8-10; Stidolph et al. (2012) pl 3: 86-87. (IMG_1220_1.jpg)
- 2 *Navicula longa*. 100x, BF, NA090. Scale bar 10 μm . Internal view. High focus on outline. From Schmidt (1874-1959) pl 47: 1-4, 6, 8-10; Stidolph et al. (2012) pl 3: 86-87. (IMG_8172-1.JPG)
- 3 *Navicula longa*. 100x, BF, NA090. Scale bar 10 μm . Internal view. Low focus on central area. From Schmidt (1874-1959) pl 47: 1-4, 6, 8-10; Stidolph et al. (2012) pl 3: 86-87. (IMG_8173-1.JPG)
- 4 *Navicula longa*. 100x. Scale bar 10 μm . (IMG_8509-1.JPG)
- 5 *Plagiotropis lepidoptera*. 60x, OL using folded foil under a slide placed on field filter, NA090. Scale bar 10 μm . High focus on central valve face. From Sims (ed.) (1996) pl 243 fig 12; Round et al. (1990). (IMG_5414_1.jpg)
- 6 *Plagiotropis lepidoptera*. 60x, OL using folded foil under a slide placed on field filter, NA090. Scale bar 10 μm . Low focus on distal helictoglossa. From Sims (ed.) (1996) pl 243 fig 12; Round et al. (1990). (IMG_5415_1.jpg)

Plate 32

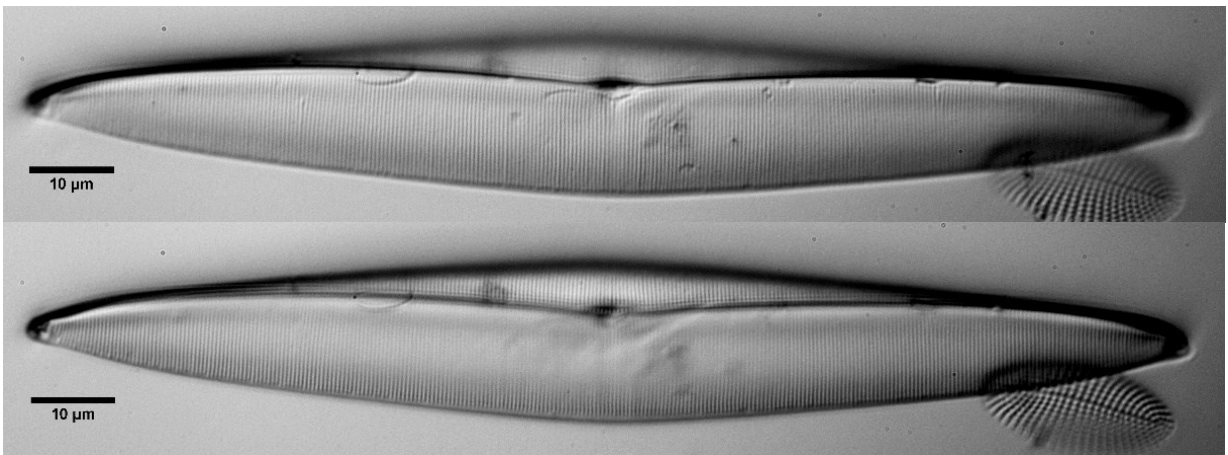
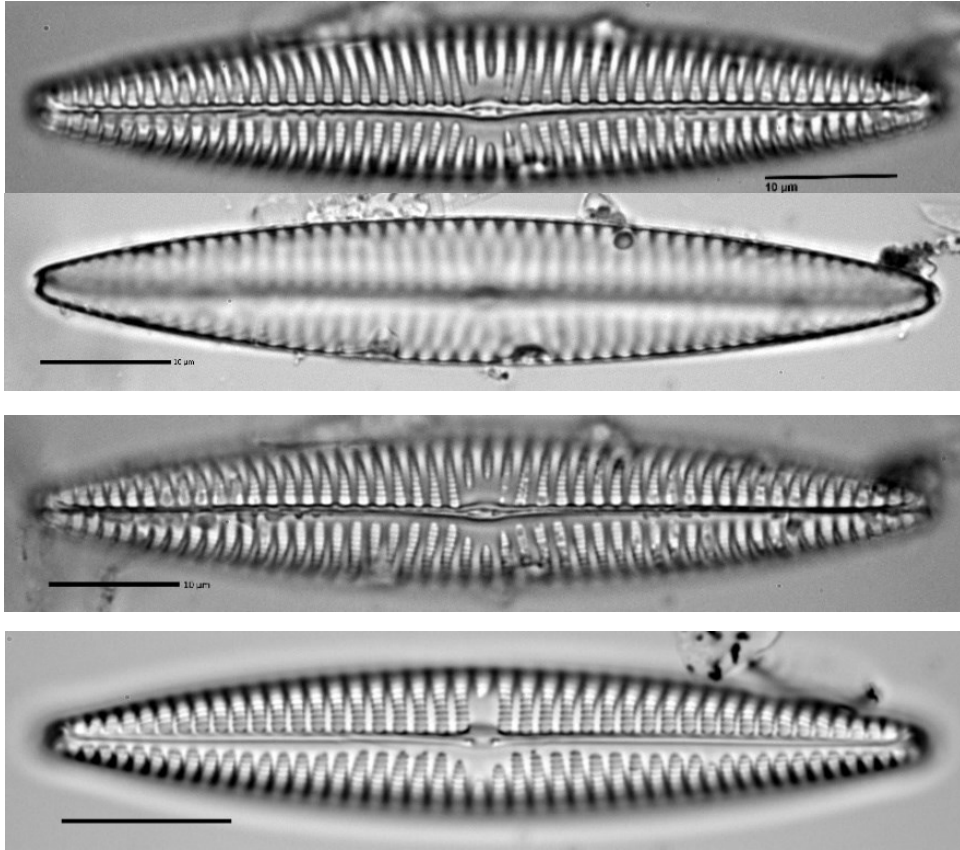


Plate 33

- 1 *Plagiotropis lepidoptera*. 100x, BF, NA080. Scale bar 10 μ m. Detail of # 5414. Focus on central striae. From Sims (ed.) (1996) pl 243 fig 12; Round et al. (1990). (IMG_4791_1.JPG)
- 2 *Plagiotropis lepidoptera*. 100x, COL, NA100. Scale bar 10 μ m. High focus on edge of central nodule. See images 5414 - 5415 for full valve. From Sims (ed.) (1996) pl 243 fig 12; Round et al. (1990). (IMG_5433_1.JPG)
- 3 *Plagiotropis lepidoptera*. 100x, COL, NA100. Scale bar 10 μ m. Low focus on proximal raphe ends. See images 5414-5415 for full valve. From Sims (ed.) (1996) pl 243 fig 12; Round et al. (1990). (IMG_5434_1.JPG)
- 4 *Plagiotropis lepidoptera*. 60x. Scale bar 10 μ m. High focus on edge of mantle. From Sims (ed.) (1996) pl 243 fig 12; Round et al. (1990). (IMG_8308-1.JPG)
- 5 *Plagiotropis lepidoptera*. 60x. Scale bar 10 μ m. Low focus on central dip in the keel and on a helictoglossae at one apex. From Sims (ed.) (1996) pl 243 fig 12; Round et al. (1990). (IMG_8309-1.JPG)
- 6 *Plagiotropis lepidoptera*. 100x. Scale bar 10 μ m. Girdle view. Focus on apices of valves. From Sims (ed.) (1996) pl 243 fig 12; Round et al. (1990). (IMG_8326-1.JPG)

Plate 33

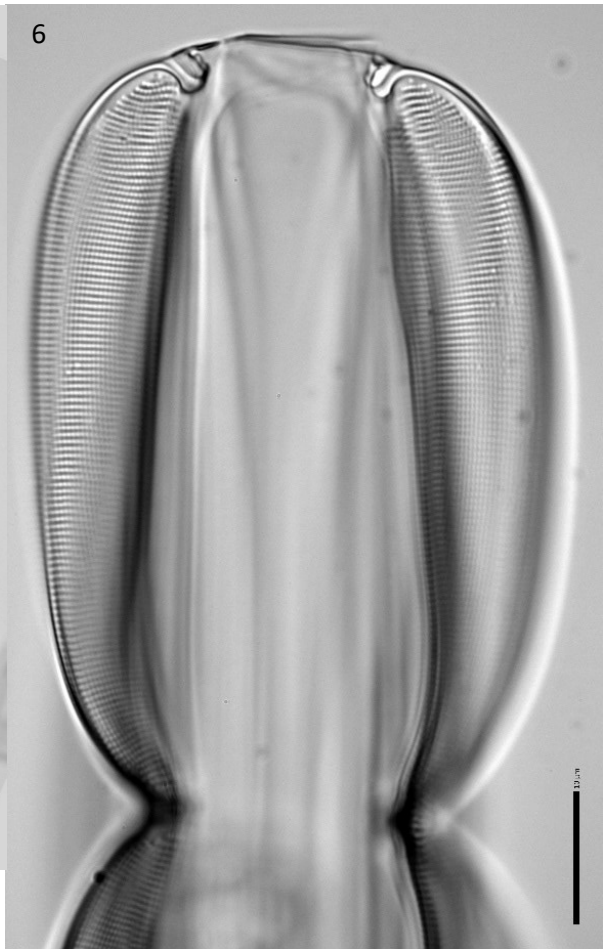
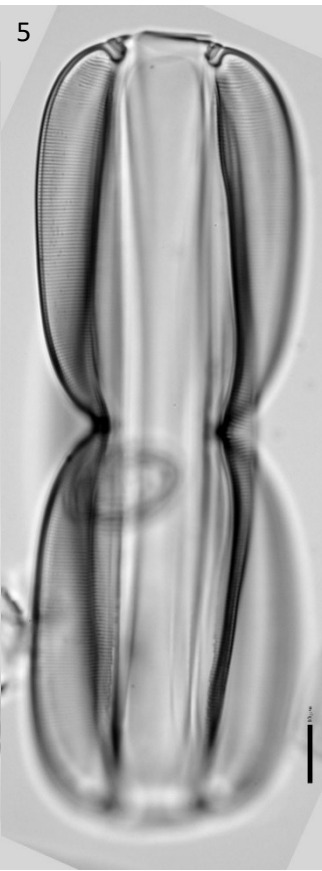
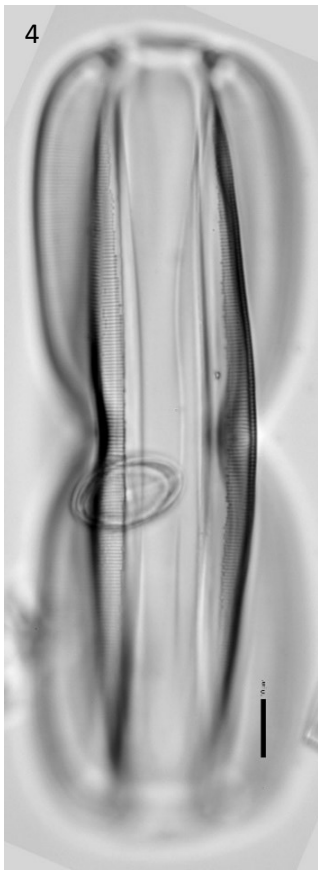
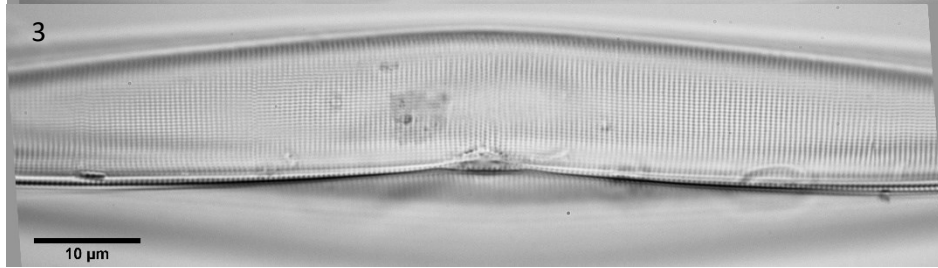
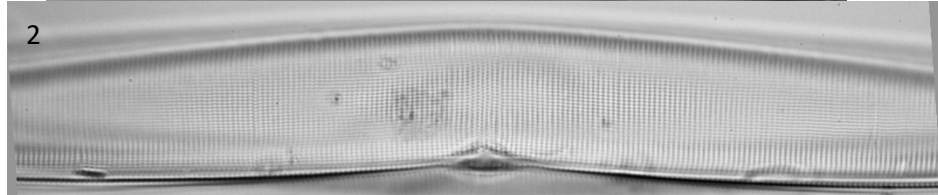
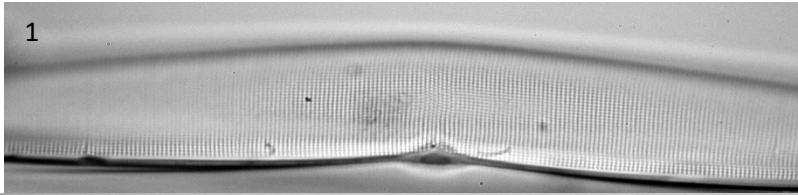


Plate 34

- 1 Pleurosigma intermedium. 100x. From Lobban et al. (2012) pl 51: 2-4. (IMG_0274_1.jpg)
- 2 Pleurosigma intermedium. 100x. Scale bar 10 μ m. From Lobban et al. (2012) pl 51: 2-4. (IMG_0275_1.JPG)
- 3 Pleurosigma intermedium. 60x. Scale bar 10 μ m. From Lobban et al. (2012) pl 51: 2-4. (IMG_8406-1.JPG)
- 4 Pleurosigma rigidum. 100x. Focus on distal raphe end. From Sims (ed.) (1996) pl 247 fig 1 and Frithjof Sterrenburg (Michael Sullivan pers comm). (IMG_4705_1.JPG)
- 5 Pleurosigma rigidum. 100x. Focus on proximal raphe end. From Sims (ed.) (1996) pl 247 fig 1 and Frithjof Sterrenburg (Michael Sullivan pers comm). (IMG_4706_1.JPG)
- 6 Pleurosigma rigidum. 60x. Scale bar 10 μ m. From Sims (ed.) (1996) pl 247 fig 1 and Frithjof Sterrenburg (Michael Sullivan pers comm). (IMG_4715-1.JPG)

Plate 34

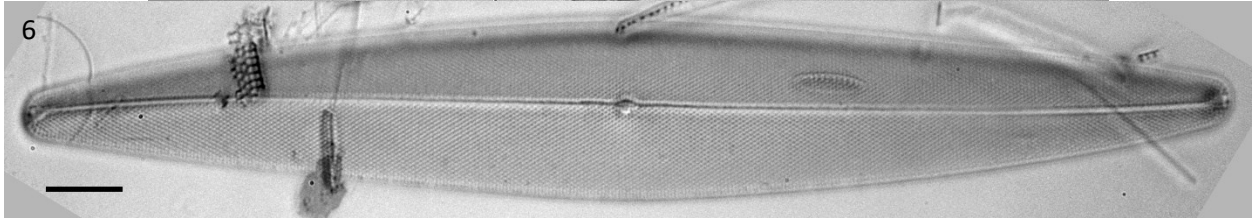
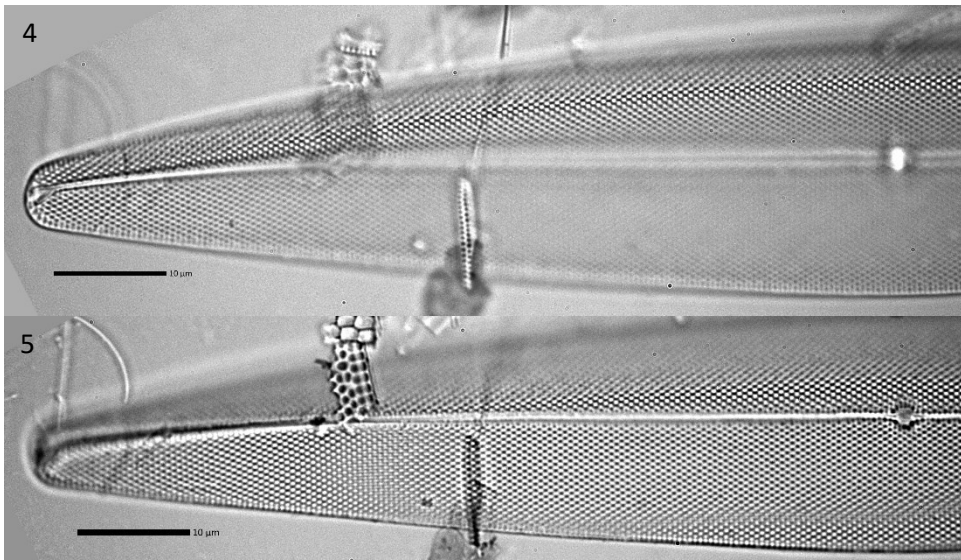
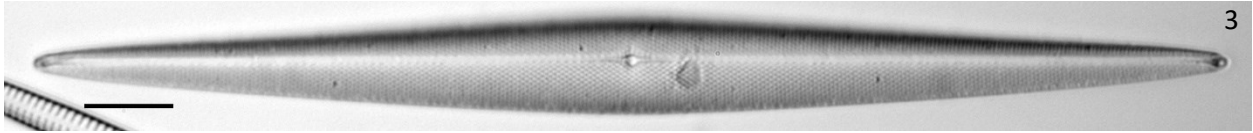
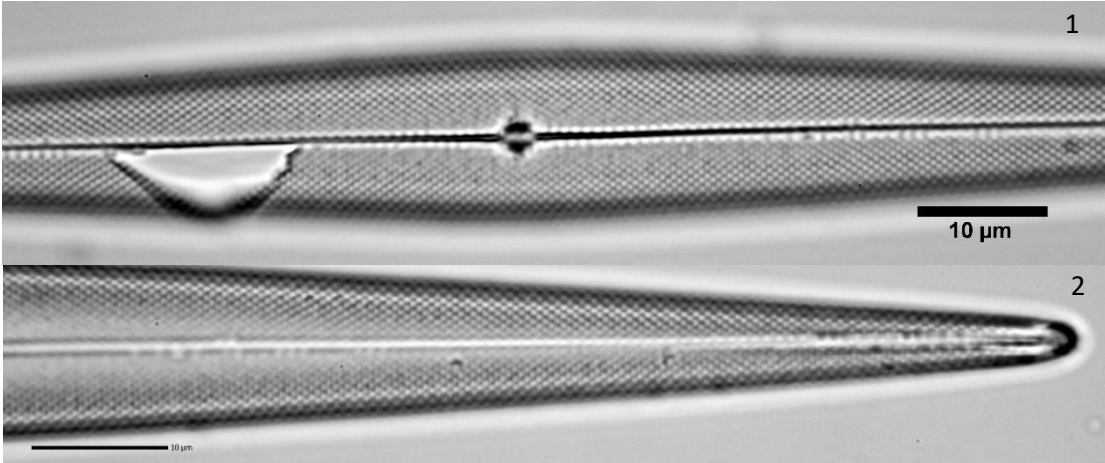
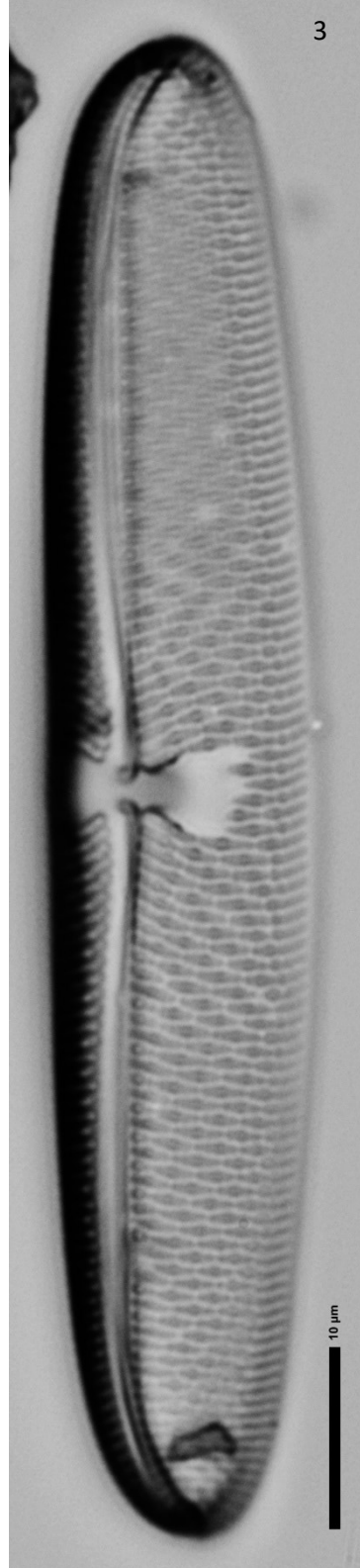
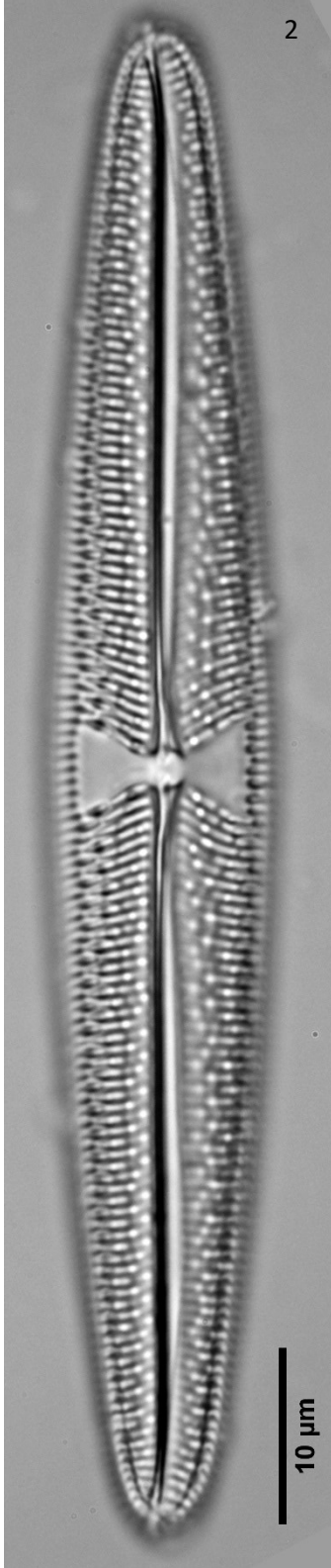
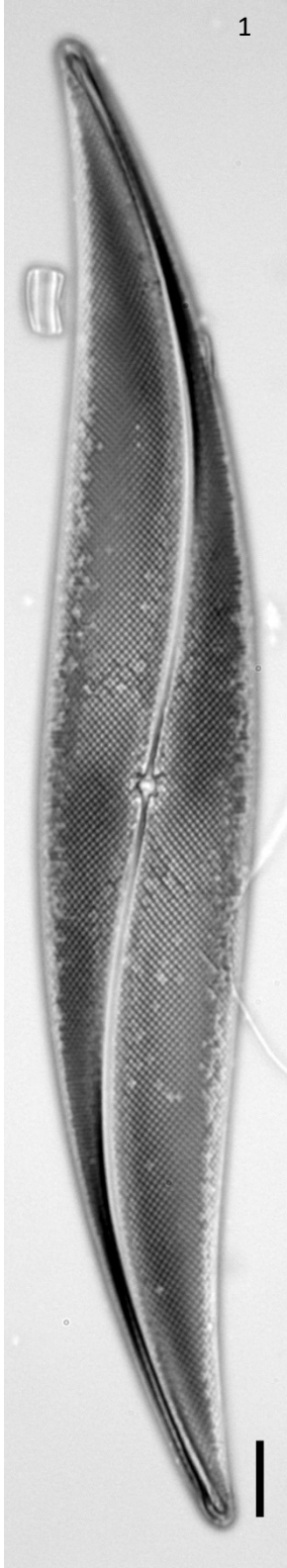


Plate 35

- 1 Pleurosigma sp. 40x. Scale bar 10 μ m. Focus on central area with proximal raphe ends in white spot. Easily confused with Donkinia. From Round et al. (1990). (IMG_8391-1.JPG)
- 2 Trachyneis aspera. 100x. From Round et al. (1990). (IMG_1250_1.JPG)
- 3 Trachyneis aspera. 60x, BF, NA055. Focus on hexagonal alveoli of the striae. From Round et al. (1990). (IMG_7382-1.JPG)

Plate 35



Monoraphid
Bilateral symmetry. Raphe on one valve.

Plate 36

- 1 *Achnanthes citronella*. 100x. Scale bar 10 μm . Outline focus. From Schmidt (1874-1959) pl 415: 3-8; Lobban et al. (2012) pl 38: 5-6. (IMG_1204_1.JPG)
- 2 *Achnanthes citronella*. 100x. Scale bar 10 μm . Sternum focus. From Schmidt (1874-1959) pl 415: 3-8; Lobban et al. (2012) pl 38: 5-6. (IMG_1205_1.JPG)
- 3 *Achnanthes* sp2. 100x. Scale bar 10 μm . (IMG_1198_1.jpg)
- 4 *Achnanthes* sp1. 100x. Scale bar 10 μm . (IMG_1197_1.jpg)
- 5 *Anorthoneis* sp1. 100x. Scale bar 10 μm . From Round et al. (1990); Lobban et al. (2012) p 286 good description. (IMG_1174_1.jpg)
- 6 *Cocconeis convexa*. 100x. Scale bar 10 μm . External view. High focus on striae between longitudinal lines. From López-Fuerte et al. (2020) fig 24g-j. (IMG_8364-1.JPG)
- 7 *Cocconeis convexa*. 100x. Scale bar 10 μm . External view. Low focus on outline. From López-Fuerte et al. (2020) fig 24g-j. (IMG_8366-1.JPG)

Plate 36

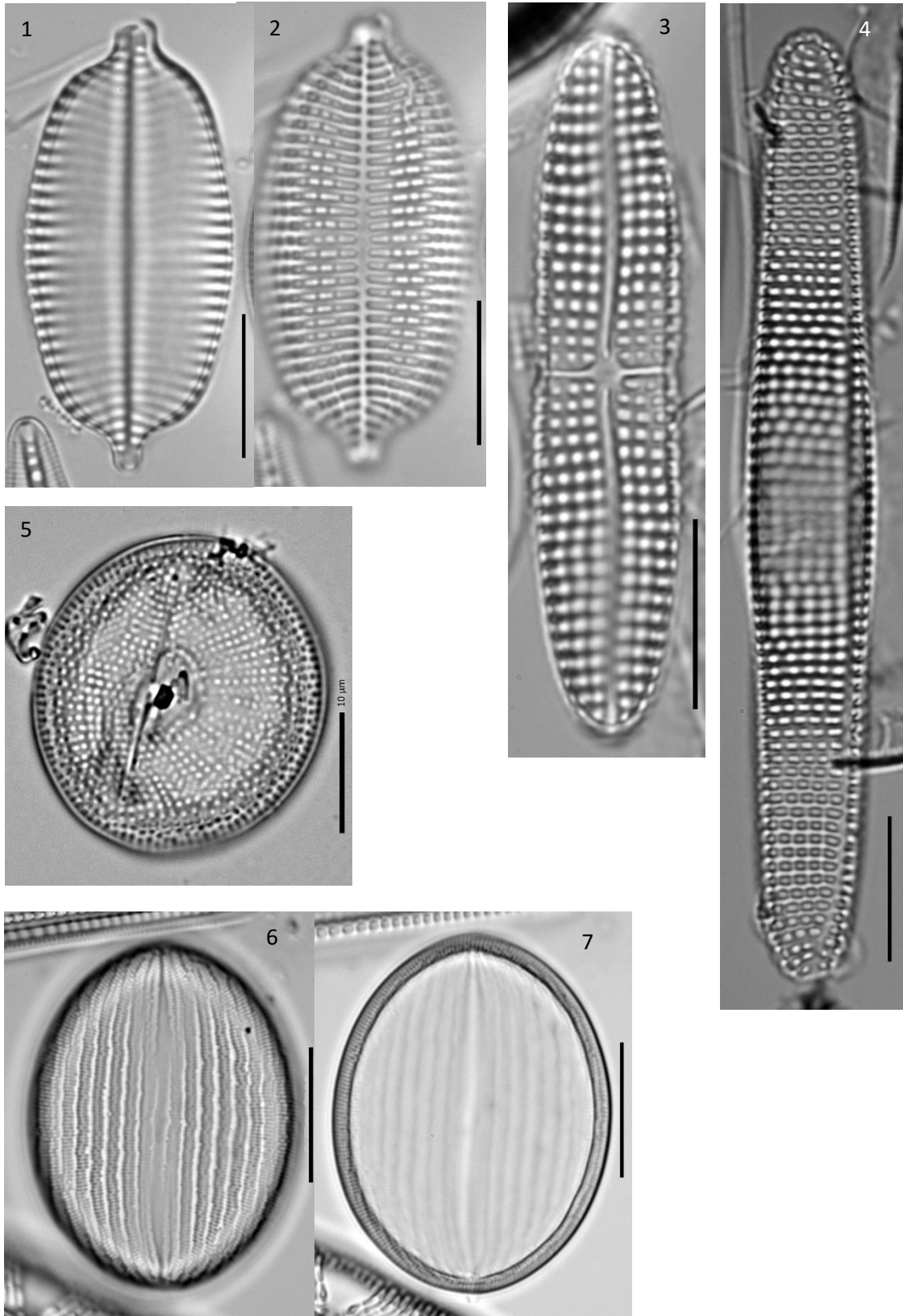
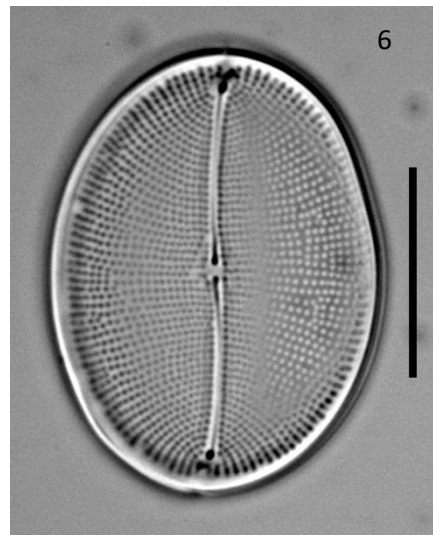
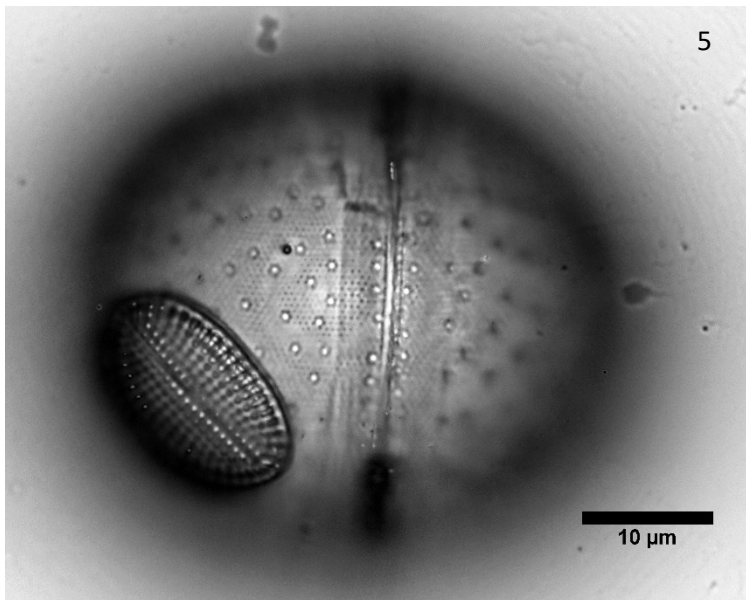
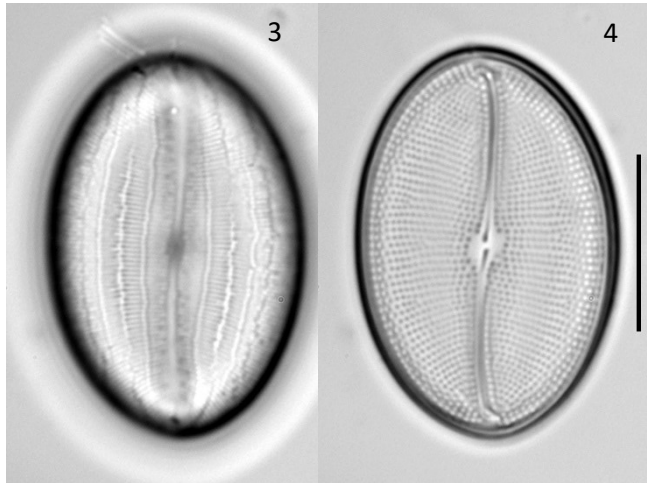
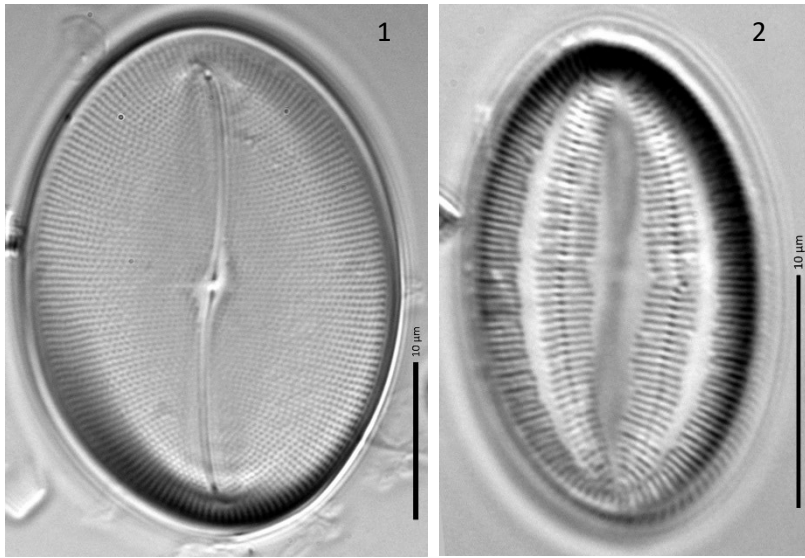


Plate 37

- 1 *Cocconeis heteroidea*. 100x, COL. Scale bar 10 μm . From Lobban et al. (2012) pl 41 fig 1-3 for raphe valve; Schmidt (1874-1959) pl 196 fig 40. (IMG_1199_1.jpg)
- 2 *Cocconeis heteroidea*. 100x, COL. Scale bar 10 μm . From Lobban et al. (2012) pl 41 fig 1-3 for raphe valve; Schmidt (1874-1959) pl 196 fig 40. (IMG_1211_1.jpg)
- 3 *Cocconeis* sp. 100x. Scale bar 10 μm . Whole frustule. High focus on rapheless valve striae. From Round et al. (1990). (IMG_8432-1.JPG)
- 4 *Cocconeis* sp. 100x. Scale bar 10 μm . Whole frustule. Low focus on raphe valve. From Round et al. (1990). (IMG_8435-1.JPG)
- 5 *Cocconeis* scutellum. 100x. Scale bar 10 μm . *Cocconeis* epiphytic on *Podosira*. A stacked image. From Schmidt (1874-1959) pl 130 fig 40. (IMG_0296-2-1.jpg)
- 6 *Cocconeis* sp5. 100x. Scale bar 10 μm . Focus on proximal raphe ends. From Round et al (1990). (IMG_8368-1.JPG)

Plate 37



**Asymmetric Biraphid
Transapical symmetry. Raphe on both valves.**

Plate 38

- 1 *Climaconeis riddleae*. 60x, Scale bar 20 μm . OL. Length 137 μm . From Prasad (2003). (IMG_4677-1.JPG)
- 2 *Climaconeis riddleae*. 100x, OL. Scale bar 10 μm . Focus on distal raphe end. From Prasad (2003). (IMG_4678_1.jpg)
- 3 *Climaconeis riddleae*. 100, OL. Scale bar 10 μm . Focus on proximal raphe ends. From Prasad (2003). (IMG_4679-1.JPG)
- 4 *Climaconeis riddleae*. 100, OL. From Prasad (2003). (IMG_4680-1.JPG)
- 5 *Halamphora coffeiformis*. 100x. Scale bar 10 μm . From Sims (ed.) (1996) pl 16:6; Stidolph et al. (2012) pl 17:114; AlgaeBase (2022). (IMG_0414_1.jpg)
- 6 *Tetramphora decussata*. 100x. Scale bar 10 μm . From image on protistcentral.org; Stepanek et al. (2016); Lobban et al. (2012) pl 54 fig 5, pl 55 fig 1-3 (SEM). (IMG_0286-1.JPG)
- 7 *Tetramphora decussata*. 100x, OL. Scale bar 10 μm . High focus F1 on raphe and decussate areolae in black spot. From Stepanek et al. (2016); Lobban et al. (2012) pl 54 fig 5, pl 55 fig 1-3 (SEM). (IMG_8513-1.JPG)
- 8 *Tetramphora decussata*. 100x, OL. Scale bar 10 μm . Focus F2 on raphe and ventral striae. From Stepanek et al. (2016); Lobban et al. (2012) pl 54 fig 5, pl 55 fig 1-3 (SEM). (IMG_8512-1.JPG)
- 9 *Tetramphora decussata*. 100x, OL. Scale bar 10 μm . Focus F3 on ventral edge and conopium. From Stepanek et al. (2016); Lobban et al. (2012) pl 54 fig 5, pl 55 fig 1-3 (SEM). (IMG_8511-1.JPG)
- 10 *Tetramphora decussata*. 100x, OL. Scale bar 10 μm . Low focus F4 on distal raphe ends. From Stepanek et al. (2016); Lobban et al. (2012) pl 54 fig 5, pl 55 fig 1-3 (SEM). (IMG_8510-1.JPG)

Plate 38

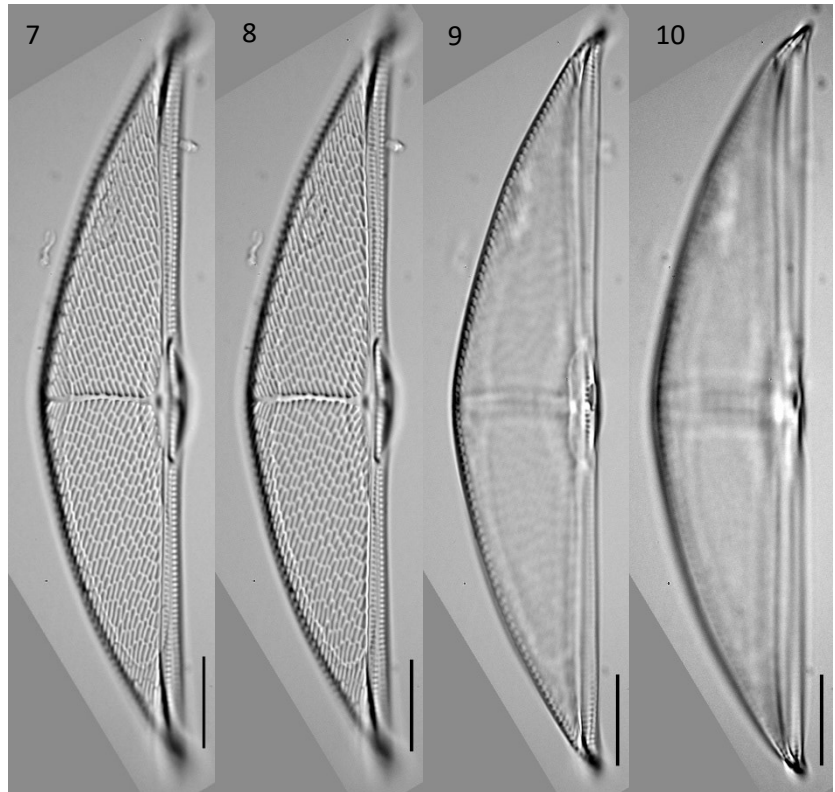
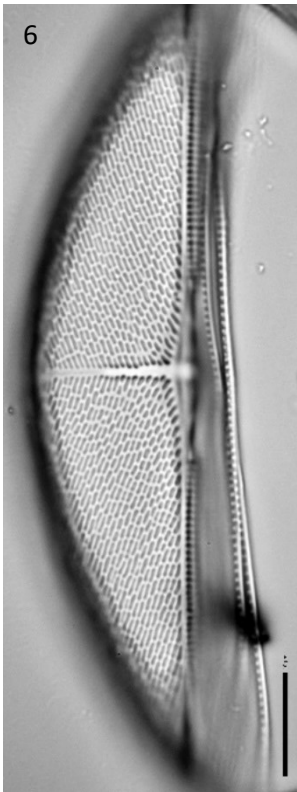
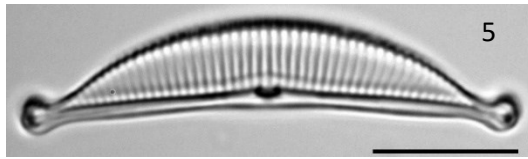
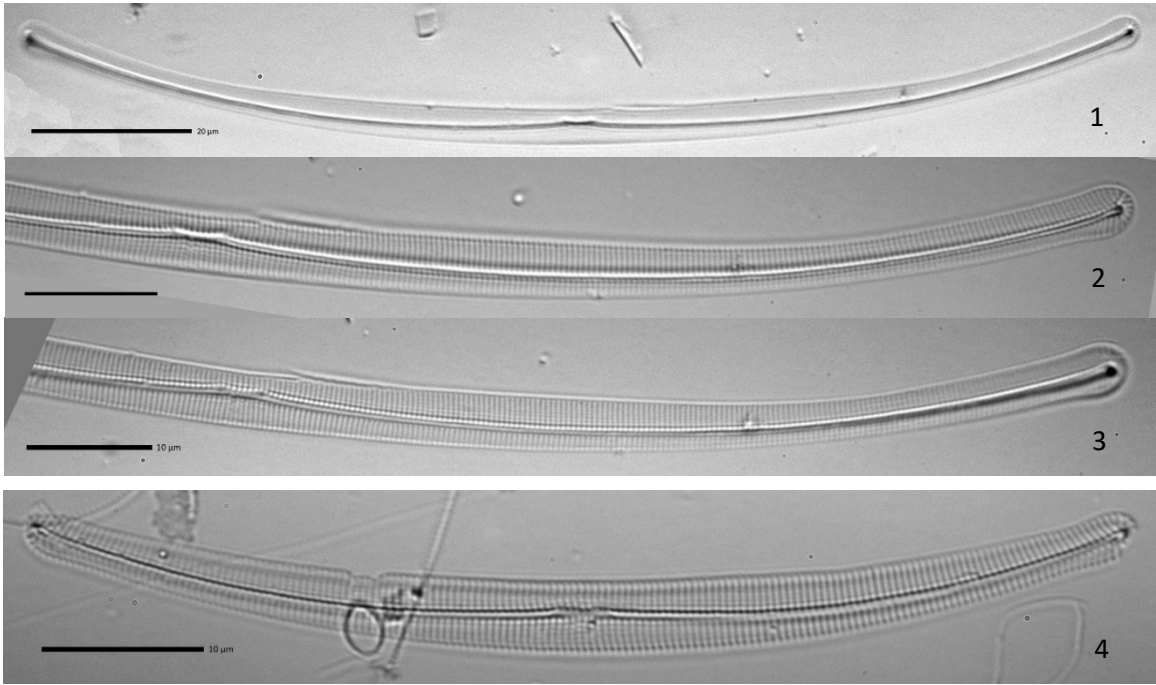


Plate 39

- 1 *Undatella quadrata*. 60x. Girdle view (copulae absent). High focus of mantle. Black spot. Scale bar 10 μm . From Lobban et al. (2012) pl 57 fig 3-6. (IMG_8311-1.JPG)
- 2 *Undatella quadrata*. 100x. Girdle view (copulae absent). High focus on edge of valve at the center. Scale bar 10 μm . From Lobban et al. (2012) pl 57 fig 3-6. (IMG_8330-1.JPG)
- 3 *Undatella quadrata*. 60x. Girdle view (copulae absent). Low focus on central nodule and raphe. Scale bar 10 μm . From Lobban et al. (2012) pl 57 fig 3-6. (IMG_8312-1.JPG)
- 4 *Undatella quadrata*. 100x. Girdle view (copulae absent). Low focus on raphe in center of valve and fibulae near distal raphe end. Scale bar 10 μm . From Lobban et al. (2012) pl 57 fig 3-6. (IMG_8331-1.JPG)
- 5 *Undatella quadrata*. 60x. Scale bar 10 μm . Girdle view. L 130, W (at central constriction) 53 μm . High focus on one central stauros, valvocopula in black spot. From Lobban et al. (2012) pl 57 fig 3-6. (IMG_8383-1.JPG)

Plate 39

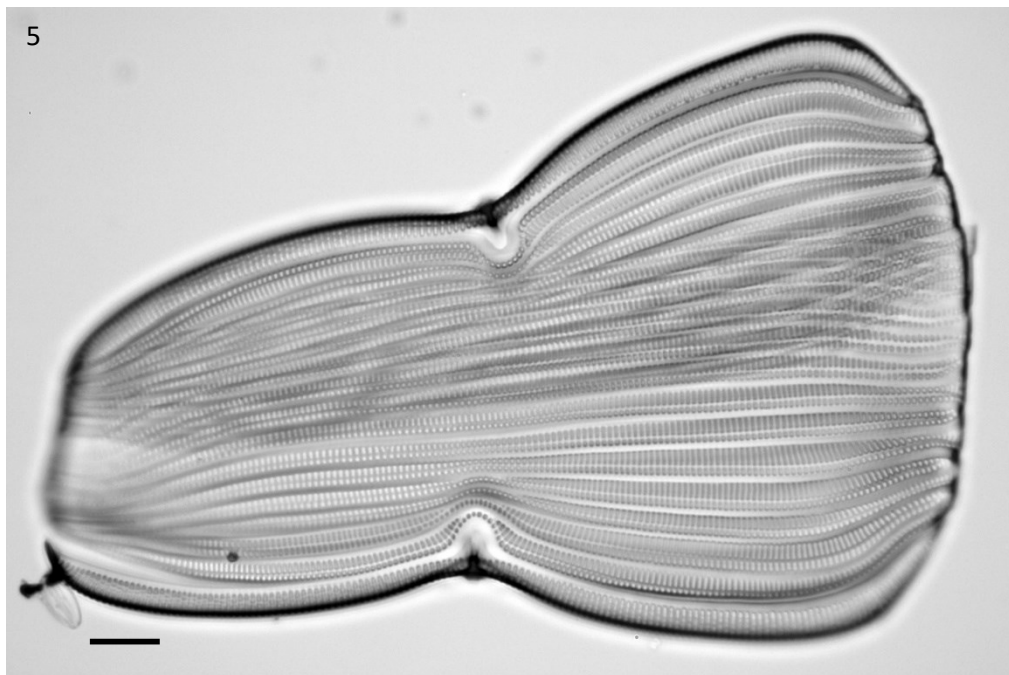
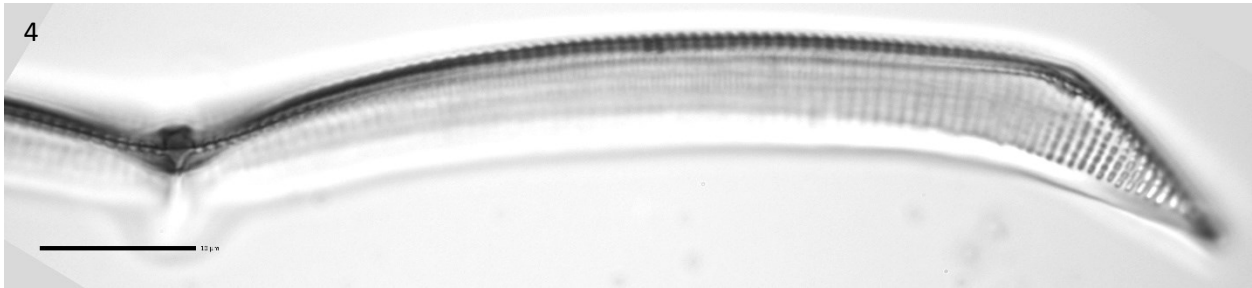
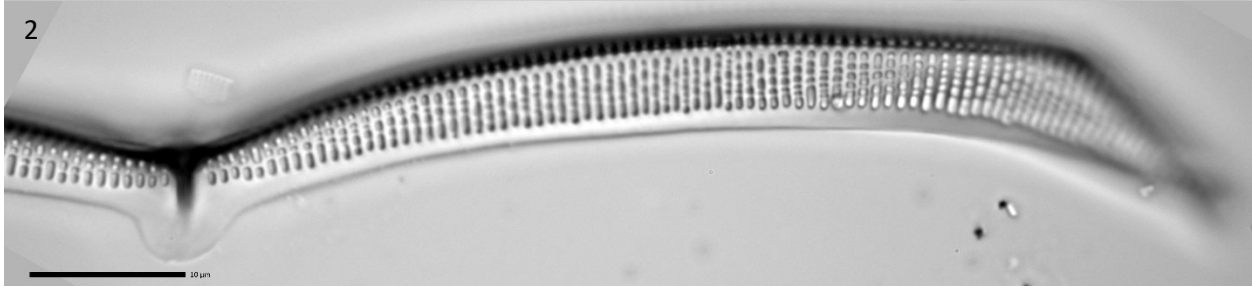
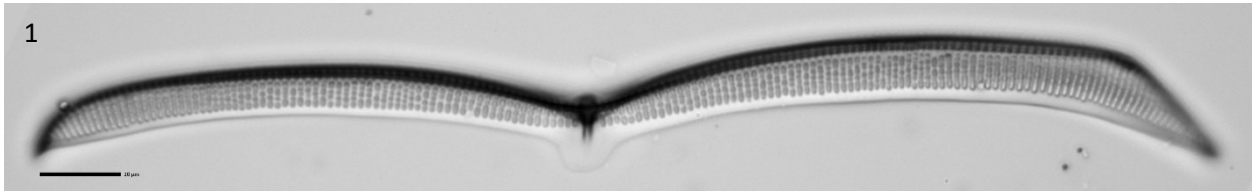
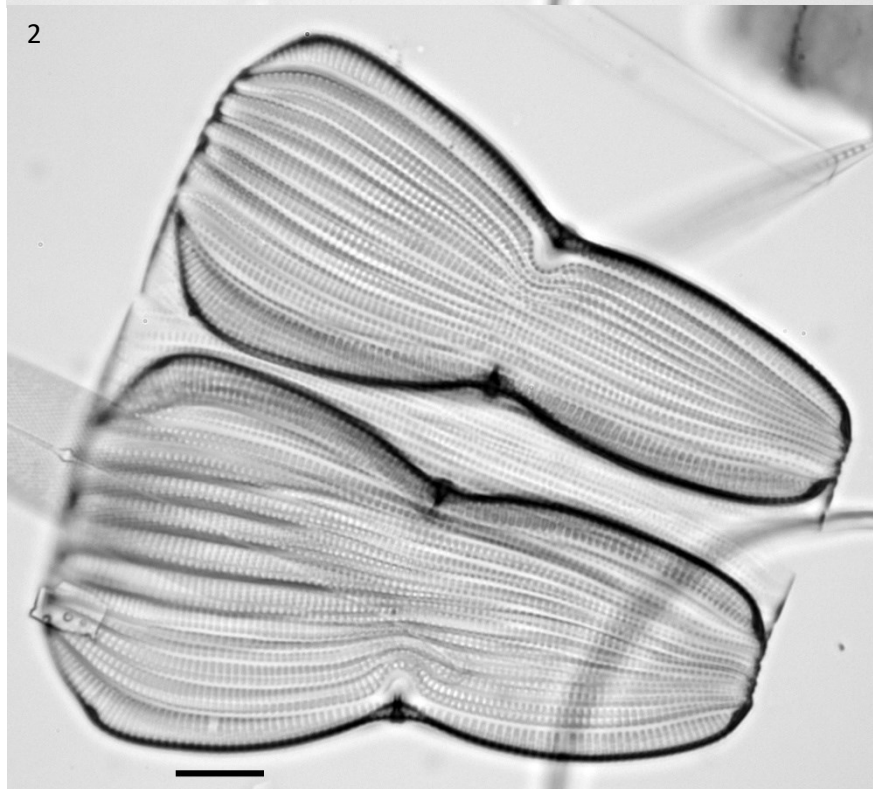
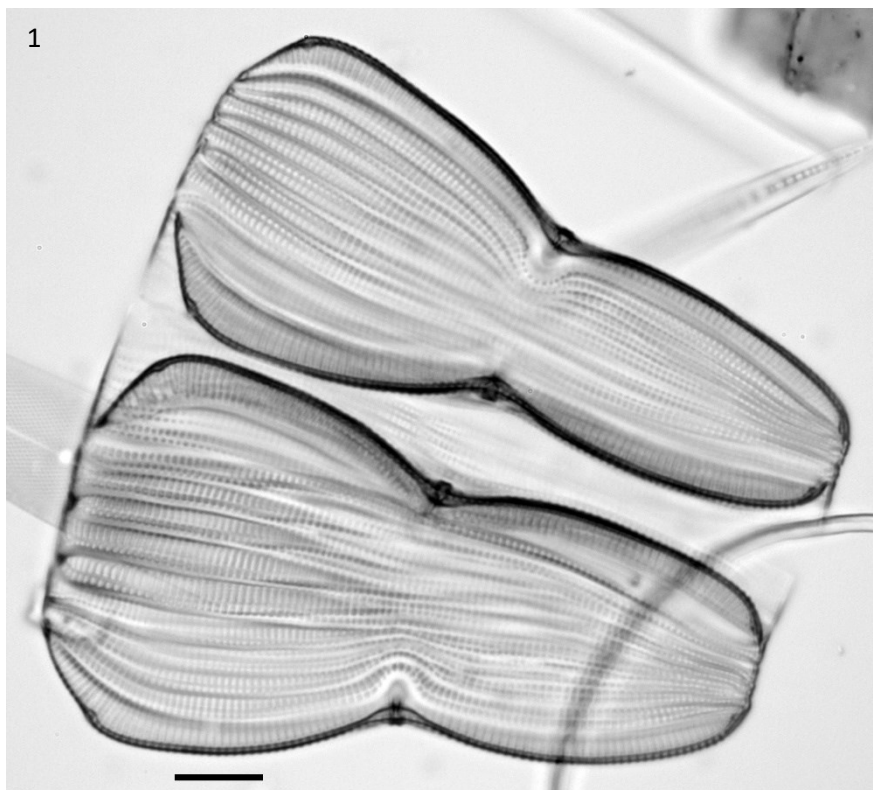


Plate 40

- 1 Undatella quadrata. 60x. Scale bar 10 μm . Low focus on central constrictions of daughter valves. From Lobban et al. (2012) pl 57 fig 3-6. (IMG_8385-1.JPG)
- 2 Undatella quadrata. 60x. Scale bar 10 μm . High focus on copulae of parent cell. From Lobban et al. (2012) pl 57 fig 3-6. (IMG_8386-1.JPG)

Plate 40

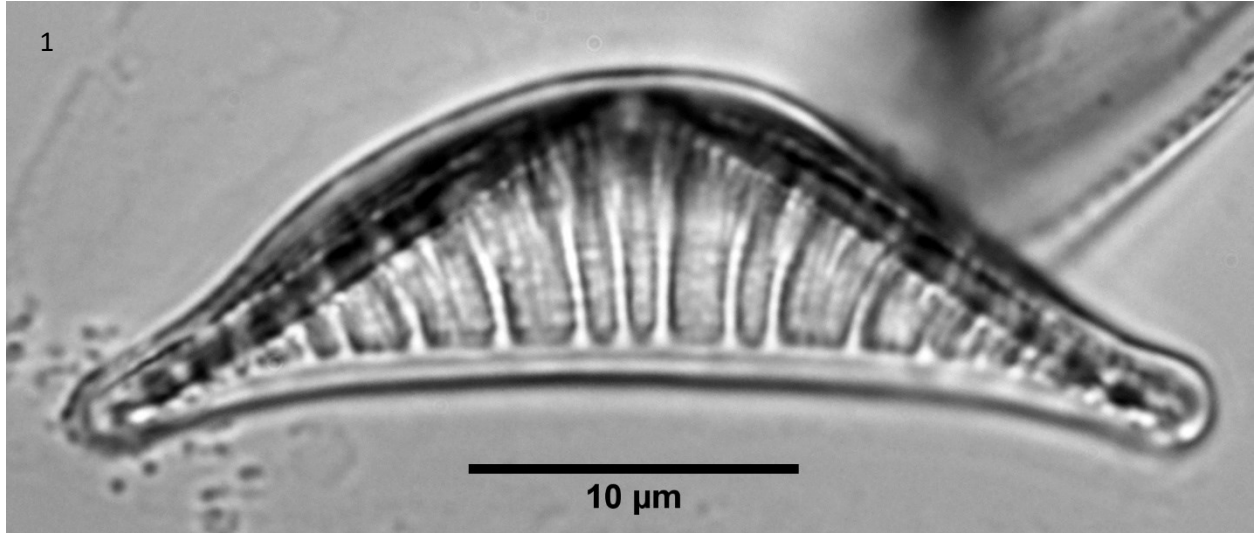


Epithemioid
Transapical symmetry. Raphe eccentric and on a canal.

Plate 41

- 1 *Rhopalodia gibberula*. 100x. Scale bar 10 μm . From Sims (ed.) (1996) pl 252 fig 8. (IMG_0958_1.JPG)

Plate 41



Nitzschioid
Bilateral symmetry. Raphe on a canal on a keel.

Plate 42

- 1 *Nitzschia angularis*. 100x. Scale bar 10 μm . Inside view. Raphe canal is central to valve face, instead of marginal as in many *Nitzschia*. Full valve in # 6418. From Sims (ed.) (1996) pl 181 fig 1; Lobban et al. (2012) pl 59 fig 3-5. (IMG_1244_1.JPG)
- 2 *Nitzschia angularis*. 60x, OL, NA065. Scale bar 10 μm . Inside view. High focus on outline. Raphe canal is central to valve face, instead of eccentric as in many *Nitzschia*. 100x view in # 1244. From Sims (ed.) (1996) pl 181 fig 1; Lobban et al. (2012) pl 59 fig 3-5. (IMG_6418_1.JPG)
- 3 *Nitzschia coarctata*. 100x, BF, NA070. Scale bar 10 μm . Internal view. L 74, W (at central constriction) 16 μm . High focus F1. Depth from coverslip 0. Striae 10.5 in 10 μm . From Sims (ed.) (1996) pl 182 fig 3; Lobban et al. (2012) for *N. constricta* comparison. (IMG_8200-1.JPG)
- 4 *Nitzschia coarctata*. 100x, BF, NA070. Scale bar 10 μm . Internal view. Focus F2. From Sims (ed.) (1996) pl 182 fig 3; Lobban et al. (2012) for *N. constricta* comparison. (IMG_8201-1.JPG)
- 5 *Nitzschia coarctata*. 100x, BF, NA070. Scale bar 10 μm . Internal view. Focus F3. From Sims (ed.) (1996) pl 182 fig 3; Lobban et al. (2012) for *N. constricta* comparison. (IMG_8202-1.JPG)
- 6 *Nitzschia coarctata*. 100x, BF, NA070. Scale bar 10 μm . Internal view. Focus F4. From Sims (ed.) (1996) pl 182 fig 3; Lobban et al. (2012) for *N. constricta* comparison. (IMG_8203-1.JPG)
- 7 *Nitzschia coarctata*. 100x, BF, NA070. Scale bar 10 μm . Internal view. Low focus F5. From Sims (ed.) (1996) pl 182 fig 3; Lobban et al. (2012) for *N. constricta* comparison. (IMG_8204-1.JPG)

Plate 42

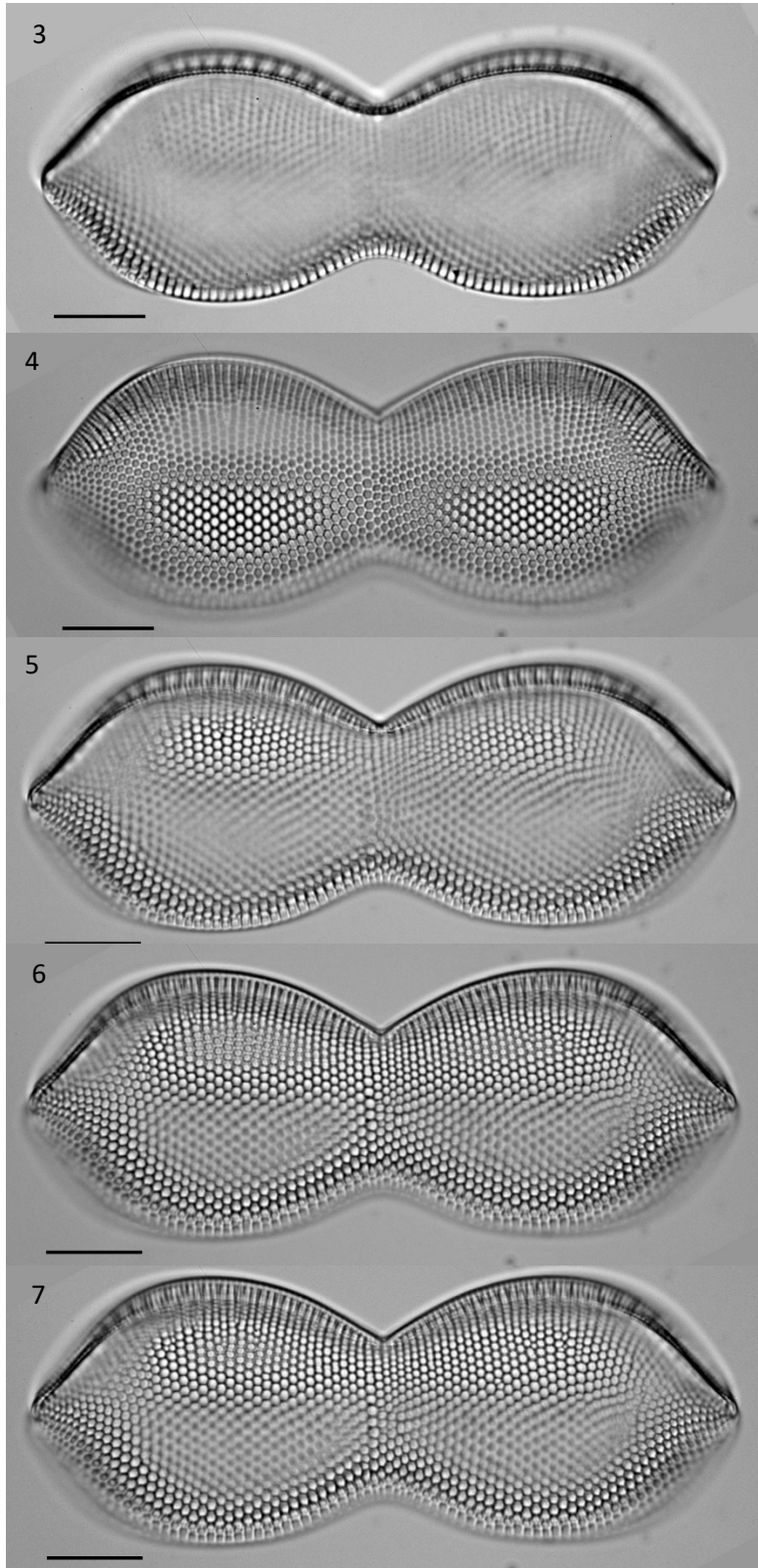
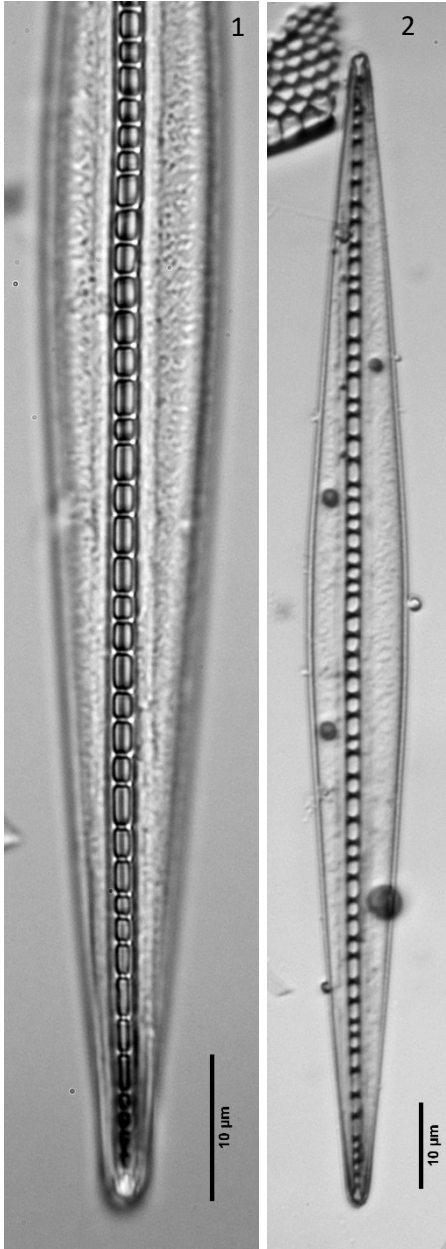


Plate 43

- 1 *Nitzschia longissima*. 60x. Scale bar 10 μm . From Lobban et al. (2012) pl 60 fig 9, pl 61 fig 1. (IMG_8411-1.JPG)
- 2 *Nitzschia longissima*. 60x. Scale bar 10 μm . From Lobban et al. (2012) pl 60 fig 9, pl 61 fig 1. (IMG_8413-1.JPG)
- 3 *Nitzschia longissima*. 100x. Scale bar 10 μm . Focus on central nodule with some striae just visible. From Lobban et al. (2012) pl 60 fig 9, pl 61 fig 1. (IMG_8437-1.JPG)
- 4 *Nitzschia sigma*. 100x. Scale bar 10 μm . Girdle view. Detail of an apex of complete frustule with a raphe on each valve. From Sims (ed.) (1996) pl 190 fig 1. (IMG_0299_1.jpg)
- 5 *Nitzschia sigma*. 40x. Scale bar 20 μm . Girdle view. Detail in # 0299. From Sims (ed.) (1996) pl 190 fig 1. (IMG_0300_1.jpg)

Plate 43

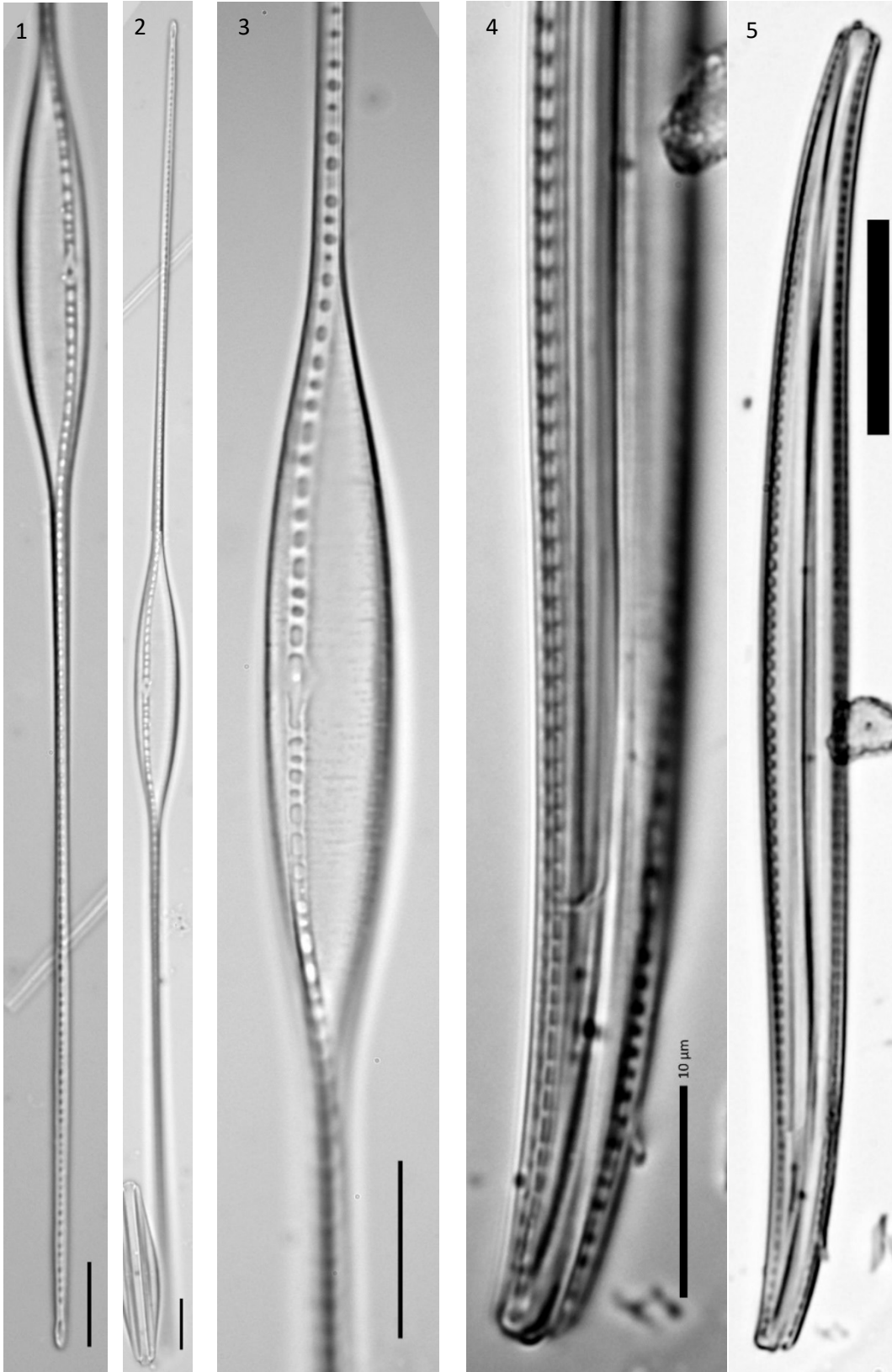


Plate 44

- 1 *Nitzschia sigma*. 10x, OL. Scale bar 100 μm . Reflected illumination, with light shining in from the side of the slide, showing the glassiness of the diatoms. From Sims (ed.) (1996) pl 190 fig 1 for *N. sigma*. (IMG_0930_1.JPG)
- 2 *Nitzschia* sp2. 100x. Scale bar 10 μm . Girdle view. High focus on central girdle bands. Raphe appears to be on a raised keel lower at the valve center. Long fibulae starting at valve margin. (IMG_0415_1.jpg)
- 3 *Nitzschia* sp2. 100x. Scale bar 10 μm . Girdle view. Low focus on outline. Raphe appears to be on a raised keel lower at the valve center. Long fibulae starting at valve margin. (IMG_0416_1.jpg)
- 4 *Nitzschia* sp2. 100x. Scale bar 10 μm . Faint striae in central area. From Kimmich (2022) nitzschioid key. (IMG_8484-1.JPG)
- 5 *Nitzschia* sp2. 100x. Scale bar 10 μm . Focus on center and apices. From Kimmich (2022) nitzschioid key. (IMG_8485-1.JPG)
- 6 *Nitzschia* sp2. 100x. Scale bar 10 μm . Focus on raphe. From Kimmich (2022) nitzschioid key. (IMG_8487-1.JPG)

Plate 44

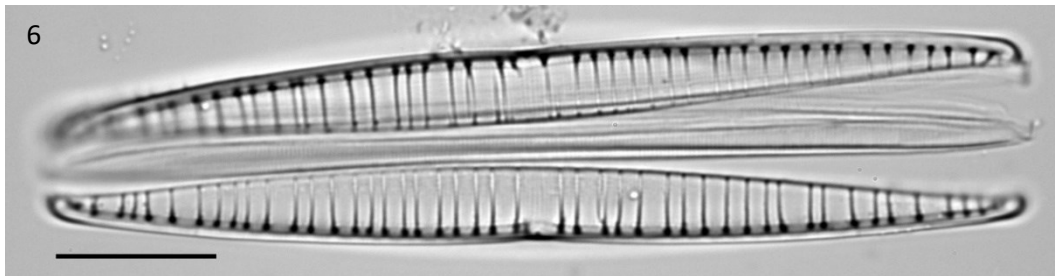
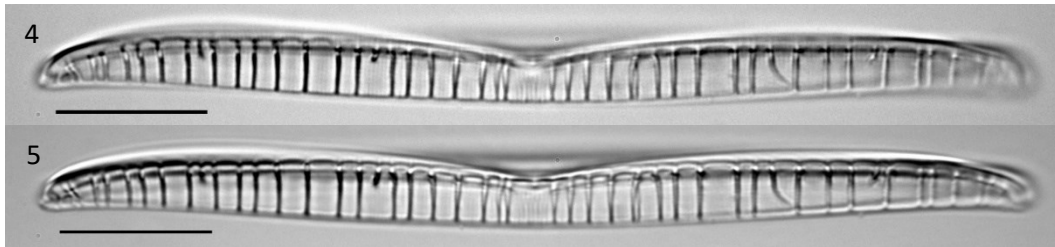
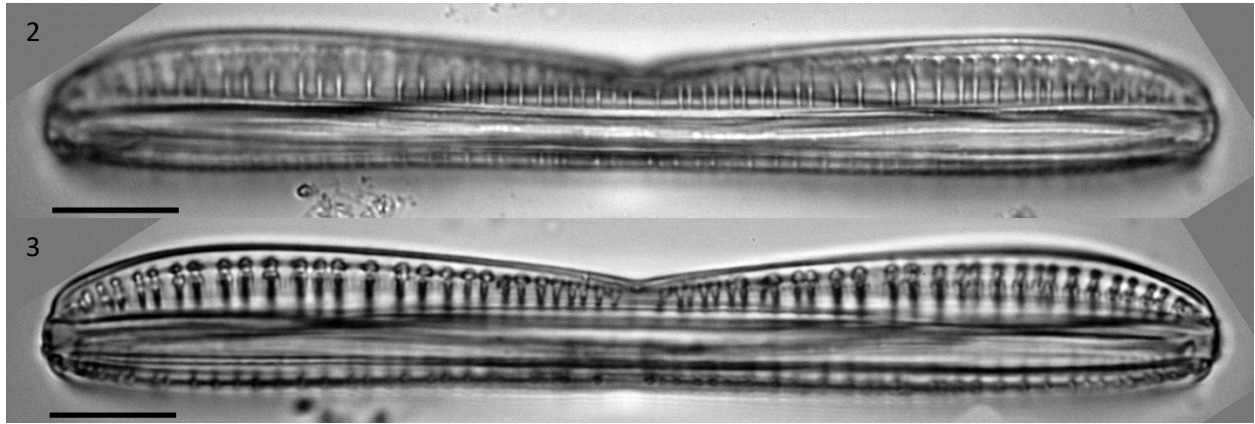
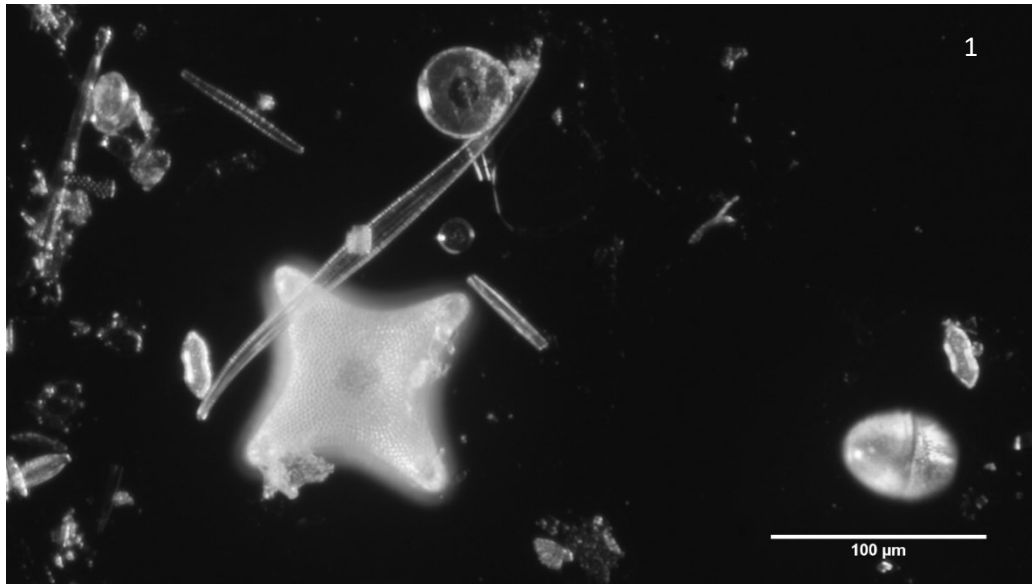


Plate 45

- 1 *Nitzschia ventricosa*. 100x. Scale bar 10 μm . From Lobban et al. (2012) pl 62 fig 1-2. (IMG_0266-1.JPG)
- 2 *Nitzschia ventricosa*. 40x. From Lobban et al. (2012) pl 62 fig 1-2. (IMG_1421_1.jpg)
- 3 *Nitzschia ventricosa*. 60x. Scale bar 10 μm . From Lobban et al. (2012) pl 62 fig 1-2. (IMG_8409-1.JPG)
- 4 *Nitzschia ventricosa*. 100x. Scale bar 10 μm . Focus on central nodule. From Lobban et al. (2012) pl 62 fig 1-2. (IMG_8436-1.JPG)
- 5 *Nitzschia ventricosa*. 60x. Scale bar 10 μm . From Lobban et al. (2012) pl 62 fig 1-2. (IMG_8415-1.JPG)
- 6 *Nitzschia ventricosa*. 100x. Scale bar 10 μm . Focus on ridge of keel. From Lobban et al. (2012) pl 62 fig 1-2. (IMG_8438-1.JPG)

Plate 45

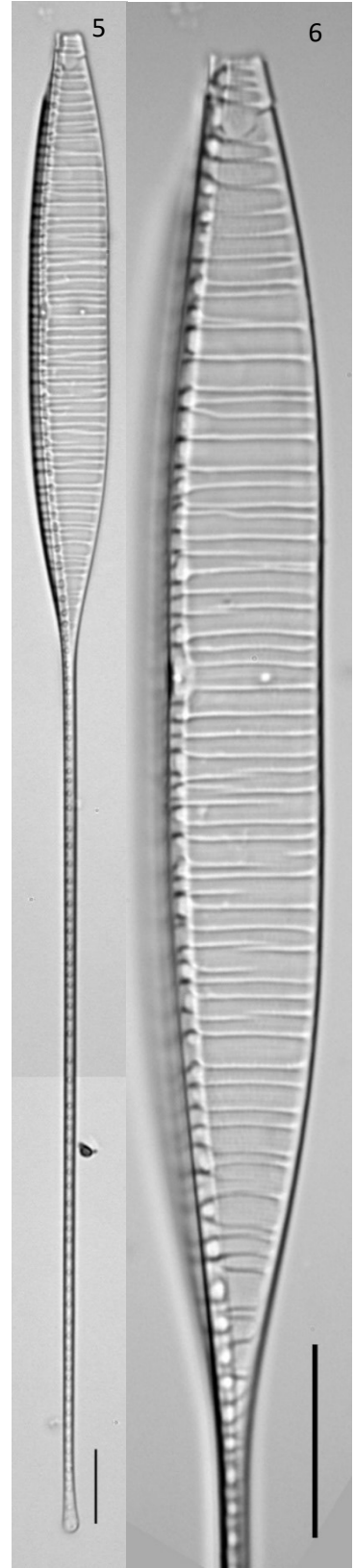
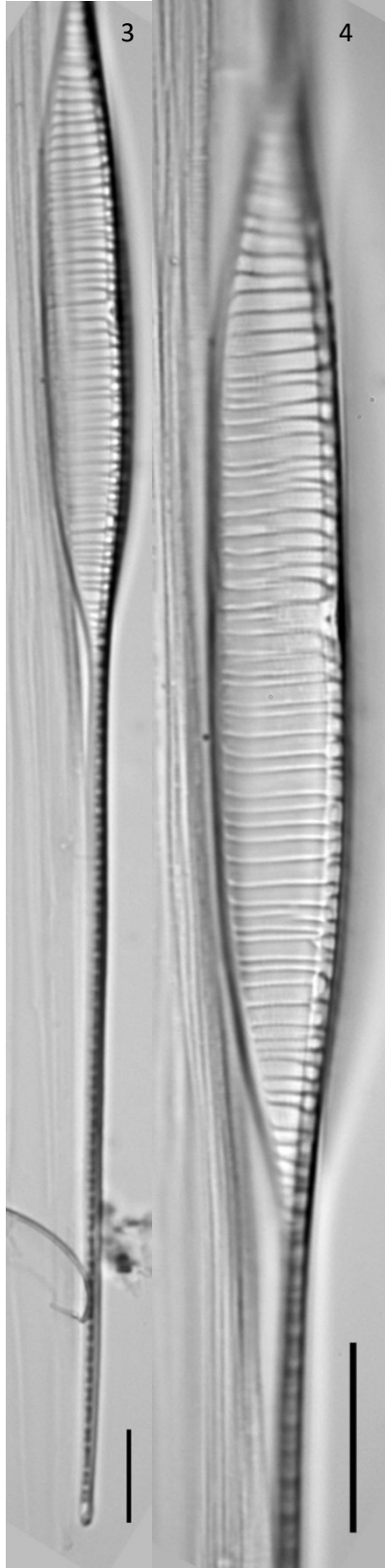
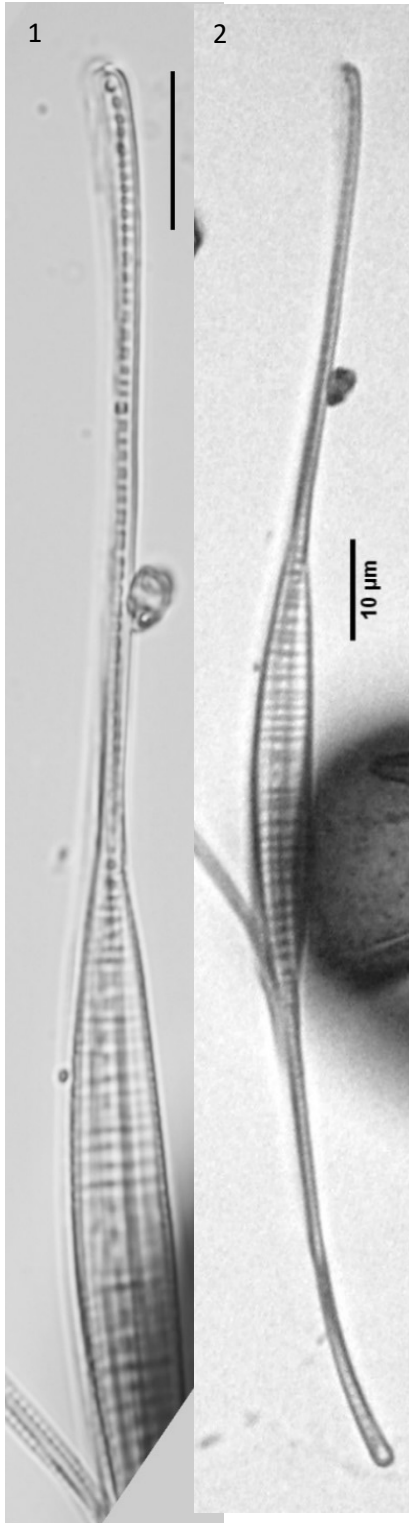
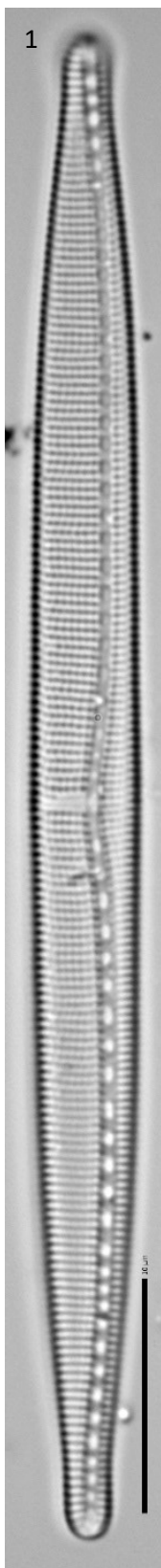


Plate 46

- 1 *Nitzschia vidovichii*. 100x. From Navarro & Lobban (2009) fig 102-104; Stidolph et al. (2012) pl 25 fig 92. (IMG_8322-1.JPG)
- 2 *Nitzschia vidovichii*. 100x. Whole frustule. 100x. From Navarro & Lobban (2009) fig 102-104; Stidolph et al. (2012) pl 25 fig 92. (IMG_8323-1.JPG)

Plate 46



Surirelloid

Bilateral symmetry. Raphe on a canal on a keel on the perimeter.

Plate 47

- 1 *Campylodiscus collare*. 60x. Scale bar 20 μm . L 113, W = 70 μm . High focus on outline. From Paddock, T.B.B. (1985) fig. A5; Schmidt (1874-1959) pl 4 fig 14. (IMG_8359-1.JPG)
- 2 *Campylodiscus collare*. 60x. Scale bar 20 μm . Middle focus on infundibula. From Paddock, T.B.B. (1985) fig. A5; Schmidt (1874-1959) pl 4 fig 14. (IMG_8360-1.JPG)
- 3 *Campylodiscus collare*. 60x. Scale bar 20 μm . Low focus on circlet. From Paddock, T.B.B. (1985) fig. A5; Schmidt (1874-1959) pl 4 fig 14. (IMG_8361-1.JPG)
- 4 *Campylodiscus comis*. 100x. Scale bar 10 μm . Has infundibula. No ornamentation in center. From Sims (ed.) (1996) pl 269 fig 1. (IMG_1242_1.jpg)
- 5 *Campylodiscus comis*. 100x. Scale bar 10 μm . Focus on outline and center. Assigned to *S. comis* by the unornamented central area. From Sims (ed.) (1996) pl 269 fig 1. (IMG_6292_1.JPG)
- 6 *Campylodiscus fastuosa*. 60x, BF, NA050. Scale bar 10 μm . Focus on circlet and infundibula. From Sims (ed.) (1996) pl 273 fig 1. (IMG_6302_1.JPG)
- 7 *Campylodiscus* sp1. 60x, BF. Scale bar 10 μm . Has infundibula. From Round et al. (1990.) (IMG_6258_1.jpg)

Plate 47

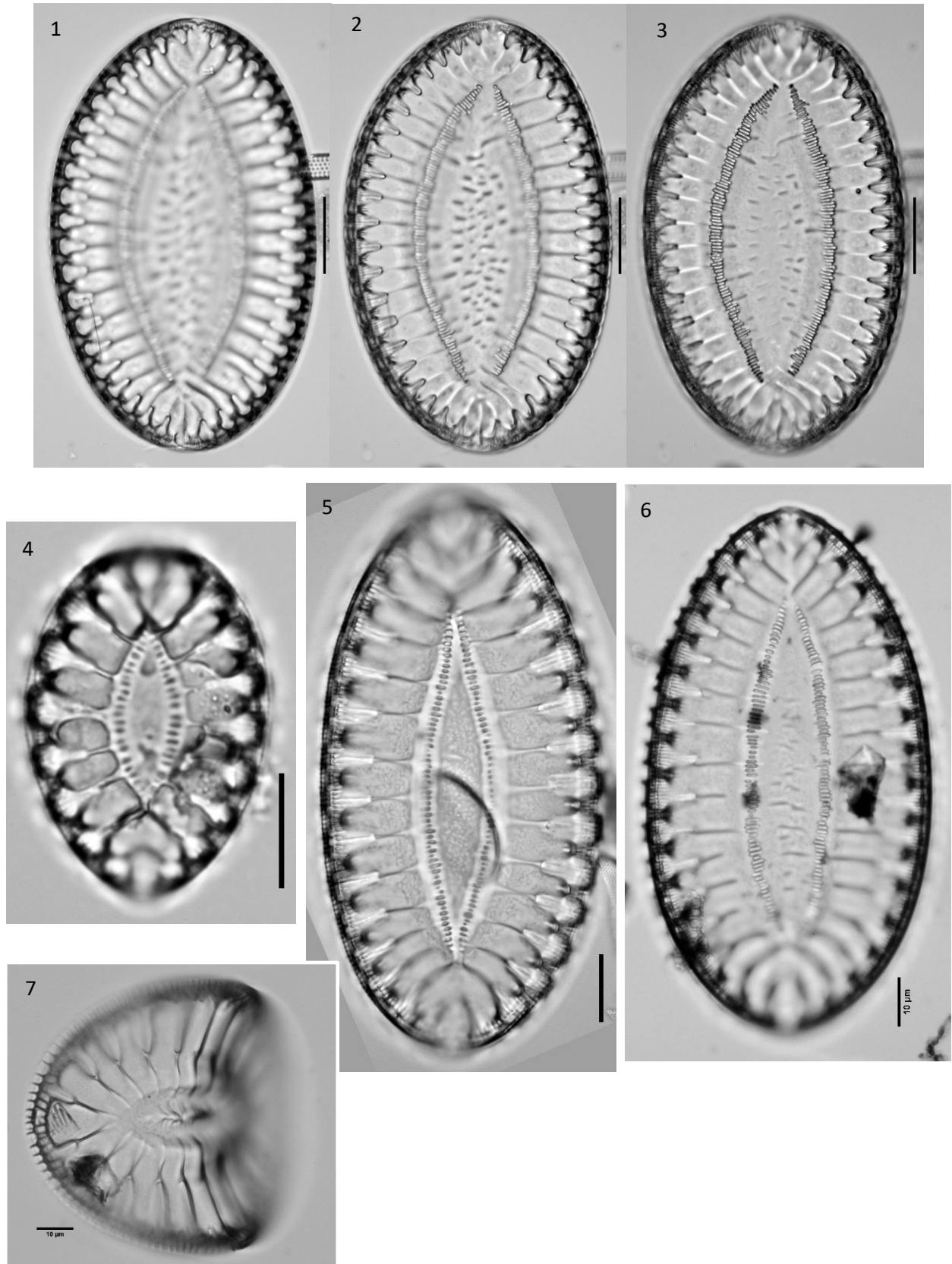


Plate 48

- 1 *Campylodiscus fastuosa*. 100x. Scale bar 10 μm . High focus on central area and central outline. From Sims (ed.) (1996). (IMG_8458-1.JPG)
- 2 *Campylodiscus fastuosa*. 100x. Scale bar 10 μm . Low focus on apices. From Sims (ed.) (1996). (IMG_8459-1.JPG)
- 3 *Campylodiscus fastuosa*. 100x. Scale bar 10 μm . Focus on central circllet. Apical axes in lower focal plane. (IMG_8471-1.JPG)
- 4 *Campylodiscus fastuosa*. 100x. Scale bar 10 μm . High focus on online. From Sims (ed.) (1996) pl 270-273. (IMG_8501-1.JPG)
- 5 *Campylodiscus fastuosa*. 100x. Scale bar 10 μm . Mid focus on infundibula. From Sims (ed.) (1996) pl 270-273. (IMG_8503-1.JPG)
- 6 *Campylodiscus fastuosa*. 100x. Scale bar 10 μm . Low focus on central area. From Sims (ed.) (1996) pl 270-273. (IMG_8505-1.JPG)
- 7 *Campylodiscus* sp7. 100x. Scale bar 10 μm . Internal view. High focus. In *Campylodiscus Fastuosae* group because of infundibula. From Ruck et al. (2016) Fig 3 node 4. (IMG_0417_1.jpg)
- 8 *Campylodiscus* sp7. 100x. Scale bar 10 μm . Internal view. Low focus. In the *Fastuosae*. (IMG_0418_1.jpg)

Plate 48

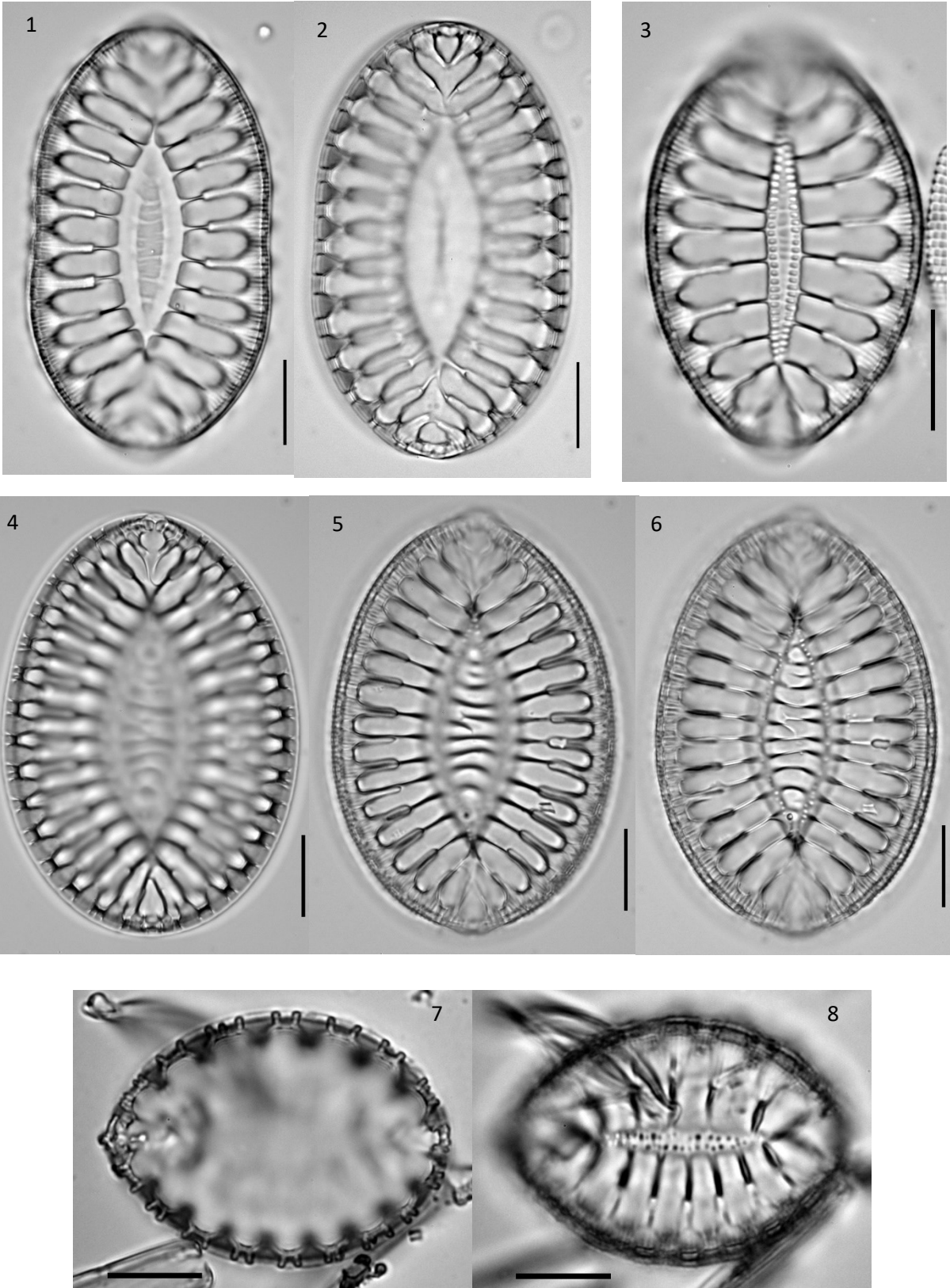


Plate 49

- 1 *Coronia decorus*. 100x, BF. Scale bar 10 μ m. Focus on visible areolae in striae. From Lobban et al. (2012) pl 64 fig 5-6; Schmidt (1874-1959) pl 14 fig 4; Ruck et al. (2016) Fig 3 node 4. (IMG_4793_1.JPG)
- 2 *Coronia decorus*. 100x, BF. Scale bar 10 μ m. High focus on outline. From Lobban et al. (2012) pl 64 fig 5-6; Schmidt (1874-1959) pl 14 fig 4; Ruck et al. (2016) Fig 3 node 4. (IMG_6267_1.jpg)
- 3 *Coronia decorus*. 100x, BF. Scale bar 10 μ m. Low focus on areolae. From Lobban et al. (2012) pl 64 fig 5-6; Schmidt (1874-1959) pl 14 fig 4; Ruck et al. (2016) Fig 3 node 4. (IMG_6268_1.jpg)
- 4 *Coronia decorus*. 100x, BF. Scale bar 10 μ m. High focus on outline. From Lobban et al. (2012) pl 64 fig 5-6; Schmidt (1874-1959) pl 14 fig 4; Ruck et al. (2016) Fig 3 node 4. (IMG_6275_1.JPG)
- 5 *Coronia decorus*. 100x, BF. Scale bar 10 μ m. Low focus on areolae. From Lobban et al. (2012) pl 64 fig 5-6; Schmidt (1874-1959) pl 14 fig 4; Ruck et al. (2016) Fig 3 node 4. (IMG_6276_1.JPG)

Plate 49

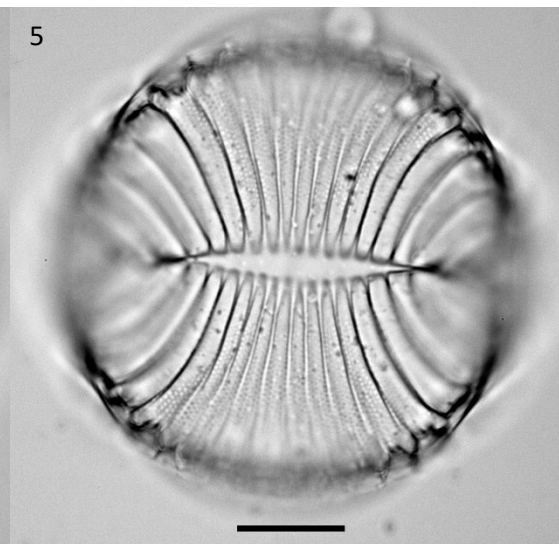
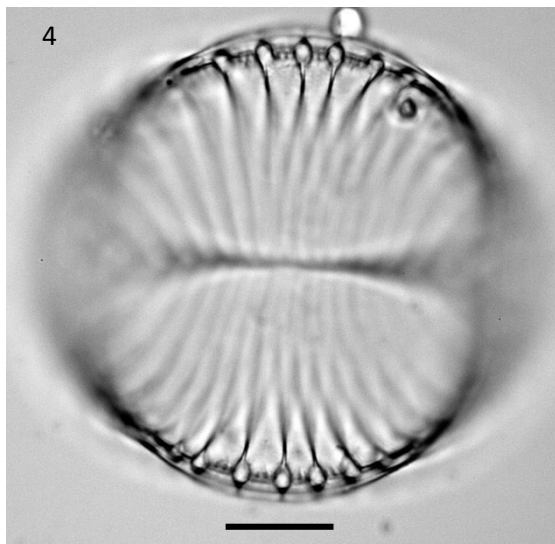
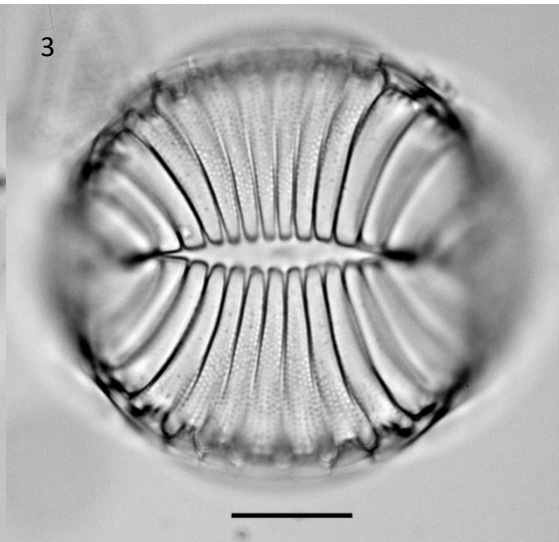
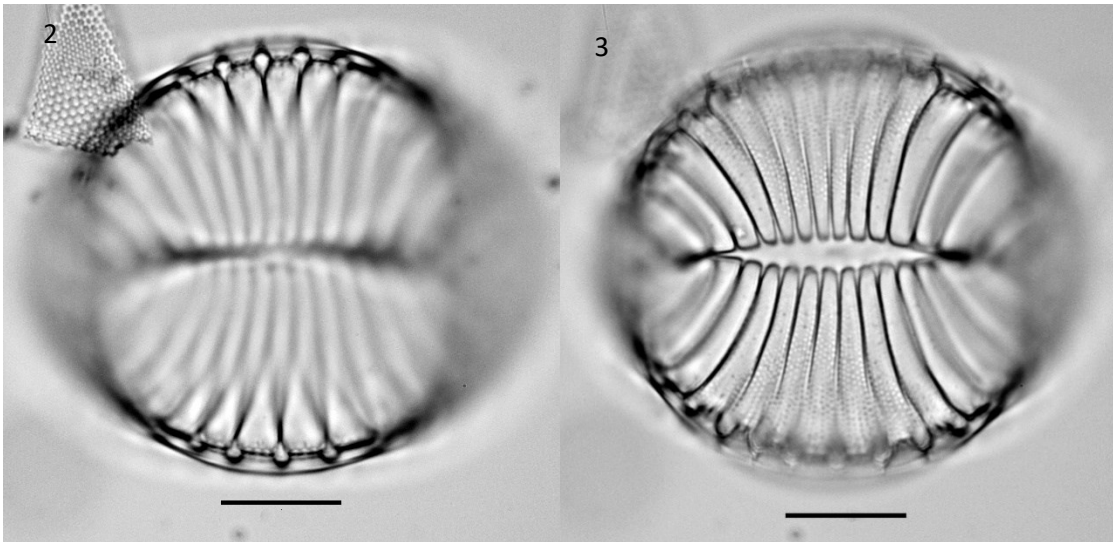
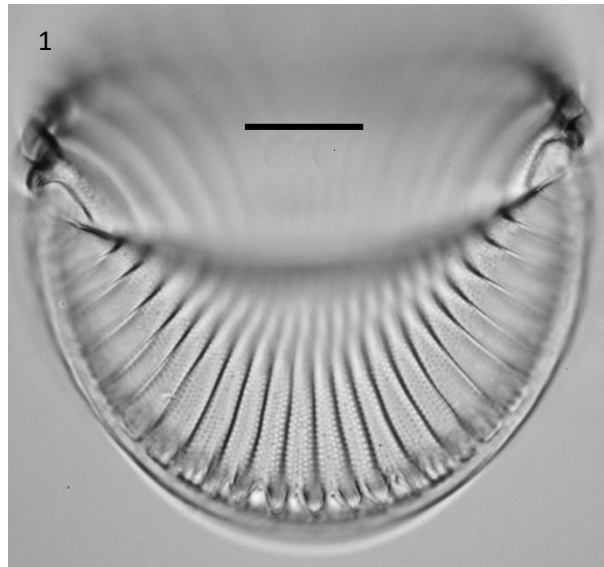


Plate 50

- 1 *Coronia decorus*. 100x. Scale bar 10 μ m. Mid focus. Apical axis (along the hyaline central area) curving away and transapical axis curving toward observer. From Lobban et al. (2012) pl 64 fig 5-6; Schmidt (1874-1959) pl 14 fig 4; Ruck et al. (2016) Fig 3 node 4. (IMG_8476-1.JPG)
- 2 *Coronia decorus*. 100x, BF, NA090. Scale bar 10 μ m. Mid focus. Areolae visible. From Lobban et al. (2012) pl 64 fig 5-6; Schmidt (1874-1959) pl 14 fig 4; Ruck et al. (2016) Fig 3 node 4. (IMG_6322_1.JPG)
- 3 *Coronia decorus*. 100x, BF, NA090. Scale bar 10 μ m. Low focus. Areolae visible. From Lobban et al. (2012) pl 64 fig 5-6; Schmidt (1874-1959) pl 14 fig 4; Ruck et al. (2016) Fig 3 node 4. (IMG_6323_1.JPG)
- 4 *Coronia samoensis*. 60x, OL. Scale bar 10 μ m. Structures along margin are not infundibula. From Schmidt pl 15 fig 20; Ruck et al. (2016) Fig 3 node 4. (IMG_6256_1.jpg)

Plate 50

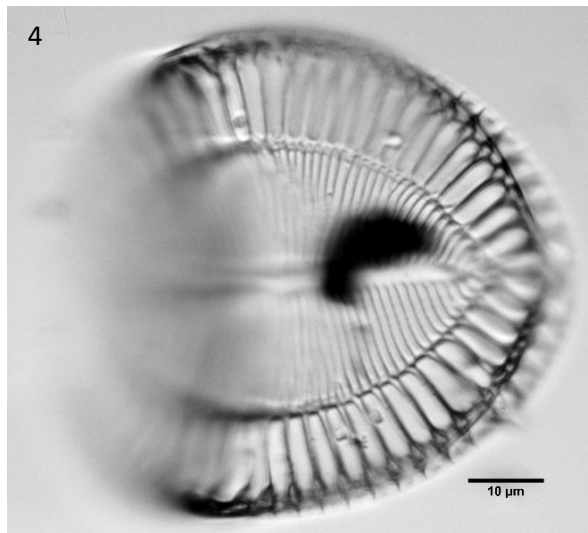
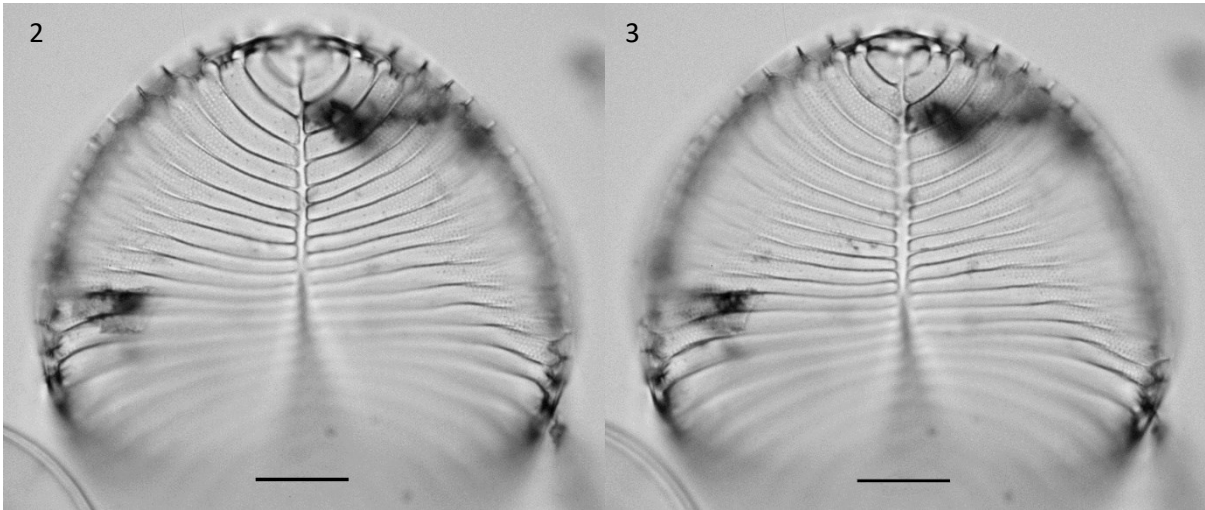
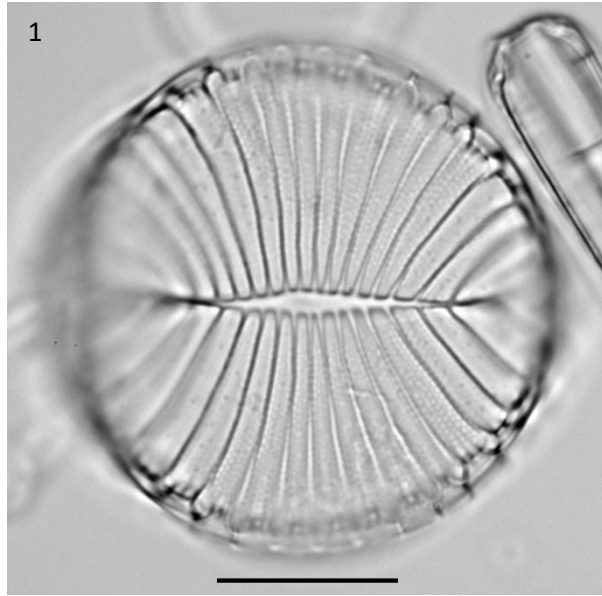
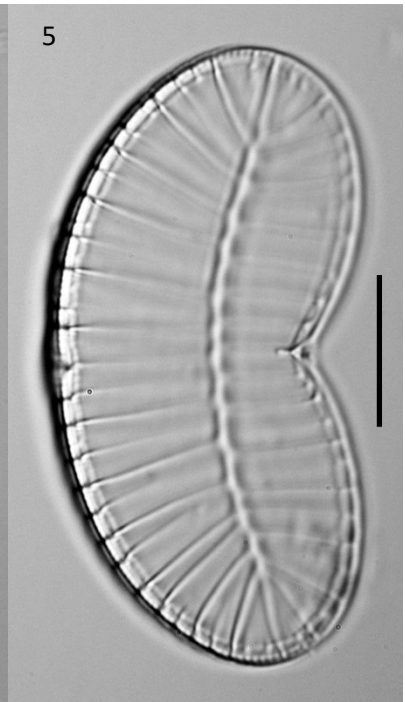
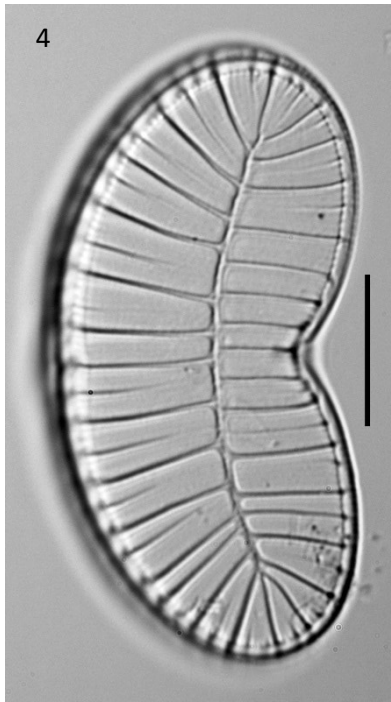
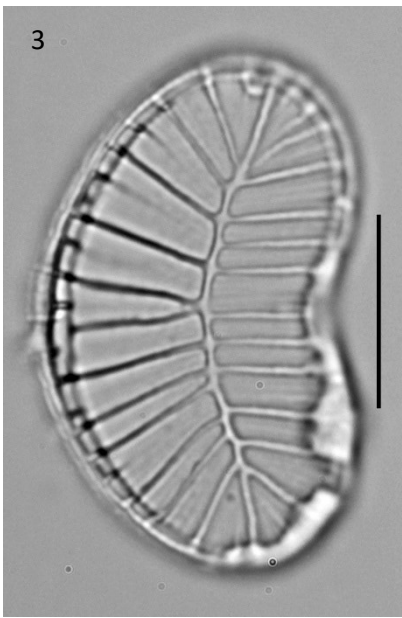
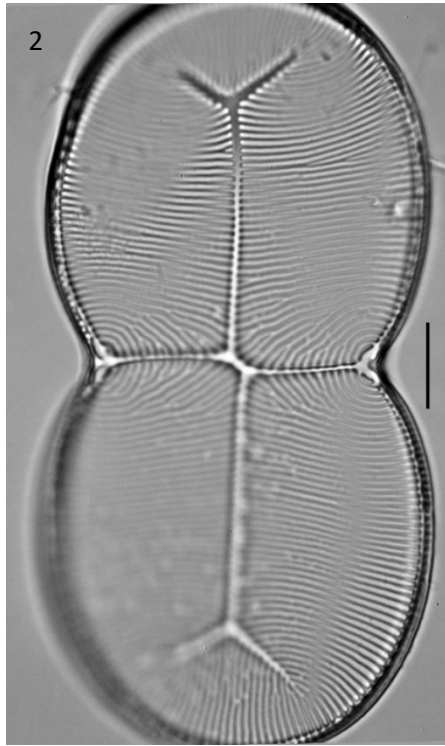


Plate 51

- 1 Hydrosilicon mitra. 40x, COL, Abbe condenser. Scale bar 10 μm . From Round et al. (1990) p 636. (IMG_1189_1.jpg)
- 2 Hydrosilicon mitra. 100x. Scale bar 10 μm . From Round et al. (1990) p 636. (IMG_1222_1.jpg)
- 3 Plagiodiscus nervatus. 100x. Scale bar 10 μm . From Stidolph et al. (2012) pl 26 fig 108; Round et al. (1990) p 640 for SEM. (IMG_1248_1.jpg)
- 4 Plagiodiscus nervatus. 100x, OL, NA090. Scale bar 10 μm . High focus. From Stidolph et al. (2012) pl 26 fig 108; Round et al. (1990) p 640 for SEM. (IMG_4683_1.jpg)
- 5 Plagiodiscus nervatus. 100x, OL, NA090. Scale bar 10 μm . Low focus on raphe ends in center. From Stidolph et al. (2012) pl 26 fig 108; Round et al. (1990) p 640 for SEM. (IMG_4684_1.jpg)

Plate 51



Acknowledgements

Michael J Sullivan (Emeritus, Mississippi State University) provided *Diploneis* species identifications. Mady Kimmich provided companionship on collecting trips.

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