

## **An Illustrated Catalogue of Type Specimens from the H.M.S. *Challenger* Voyage in Castracane's Slide Collection in the Natural History Museum, London**

Akihiro Tuji<sup>1</sup>, David M. Williams<sup>2</sup>, Patricia A. Sims<sup>2</sup> and Yoshihiro Tanimura<sup>3</sup>

<sup>1</sup> Department of Botany, National Museum of Nature and Science, 4-1-1, Amakubo, Tsukuba 305-0005, Japan

<sup>2</sup> Botany Department, The Natural History Museum, Cromwell Road, London SW7 5BD, UK

<sup>3</sup> Department of Geology and Paleontology, National Museum of Nature and Science, Tokyo 169-0073, Japan

Corresponding Author: Akihiko Tuji (e-mail: tuji@kahaku.go.jp)

**Abstract** Castracane's diatom collection from the H.M.S. Challenger voyage, housed in the Natural History Museum, London (BM), was examined for type slides. Of the 259 taxa described in his report, 17 type specimens have been discovered. Details of their type status and illustrations are provided.

**Key words:** Castracane, diatoms, H.M.S. Challenger, Type.

### **Introduction**

Francesco Saverio Castracane degli Antelminelli (1817–1899, referred to as Castrance; see TL2, volume 1, p. 469, 1976 and TL2, supplement 3, pp. 460–462, 1995 for details of Castracane's biographers, collections and major publications) described 259 taxa in his report on the diatoms collected on the H.M.S. Challenger voyage (Castracane 1886, see also Castracane 1887 ["1886"]), which are important for the taxonomy of marine diatoms (T-2 in CD).

The Castracane diatom collection in the Natural History Museum, London (BM) consists of 143 microscope slides (T-1 in CD). Roughly half of these slides consist of a single valve and/or a single species, with its name attached to the label. Twenty three slides have the annotation "n. sp." indicating their possible holotype status. As there is no certainty of their status, the specimens below are considered as lectotypes. The remaining slides are strewn mounts with the annotation "Collections of H.M.S. Challenger" with longitude and latitude indicated or a place name.

No other slide collection exists of Castracane Challenger material. Some of the original material collected on the Challenger voyage is retained in the Mineralogy Department, Natural History Museum, London, and should be considered as isotype material.

### **Methods**

An Olympus BH2 microscope equipped with Zeiss objectives (40× and 63×) and Lumera CCD camera (LU135M) was used for the micrographs. The 40× was used as some of the slides in Castracane's collection have coverslips that are too thick for the use of the 63× lens.

## Results and Discussion

### a) *Valid species*

1. *Actinocyclus complanatus* Castracane, *Rep. Voy. Challenger, Diatom*, p. 145, *pl. iv. f. 9*. 1886.

Lectotype: BM33771a.

Locality from Castrance 1886: “In mari Japonico” [“...Sea of Japan”]

Locality from slide: “...Dredge...”

Figure: Pl. 1, figs 1a–b.

2. *Actinocyclus* (?) *denticulatus* Castracane, *Rep. Voy. Challenger, Diatom*, p. 146, *pl. iv. f. 5*. 1886.

Lectotype: BM33776.

Locality from Castrance 1886: “In mari Arafura, et fossilis as Richmond in Virginia” [“...Arafura Sea, and has been observed in a fossilized condition at Richmond, Virginia”]

Locality from slide: “Richmond earth”.

Figure: Pl. 2, figs 2a–c.

3. *Actinocyclus pruinosus* Castracane, *Rep. Voy. Challenger, Diatom*, p. 144, *pl. iv. f. 2*. 1886.

Lectotype: BM33772.

Locality from Castrance 1886: “In mari Pacifico” [“...in the Pacific Ocean...”]

Locality from slide: “Chall.[enger] trawl, lat. 34°, 37'N. long. 140°, 32'S”.

Figure: Pl. 1, figs 2a–b.

4. *Cestodiscus convexus* Castracane, *Rep. Voy. Challenger, Diatom*, p. 123, *pl. vii. f. 6*. 1886.

Lectotype: BM33780.

Locality from Castrance 1886: “In oceano Pacifico”

Locality from slide: “Chall.[enger] sound. 25.8.75.”

Figure: Pl. 4, figs 2a–c.

5. *Cestodiscus coronatus* Castracane, *Rep. Voy. Challenger, Diatom*, p. 124, *pl. vii. f. 9*. 1886.

Syntypes: BM 33781, BM33782.

Locality from Castrance 1886: “In mari Pacifico”

Locality from slide: BM 33781, “Chall.[enger] sound. 25.8.75.”; BM 33781, “Chall.[enger] trawl 2900<sup>th</sup>, lat. 24°, 42'N, long. 152°, 1' W”.

Figures: BM 33781: Pl. 4, figs 1a–d; BM33782: Pl. 3, figs 1a–d, 2a–d.

6. *Coscinodiscus denticulatus* Castracane, *Rep. Voy. Challenger, Diatom*, p. 155, *pl. iii. f. 8*. 1886.

Lectotype: BM33796.

Locality from Castrance 1886: “In mari Pacifico”

Locality from slide: “Dredge. Bay of Kerguelen, 4<sup>th</sup>.”

Figure: Pl. 9, figs 1a–b, 2–4.

7. *Coscinodiscus megacoccus* Castracane, *Rep. Voy. Challenger, Diatom*, p. 162, *pl. xvii. f. 2*. 1886.

Lectotype: BM33784.

Locality from Castrance 1886: "In Oceano Pacifico" [...Pacific Ocean...].

Locality from slide: "Philippines 785<sup>th</sup>. 2.11.74."

Figure: Pl. 5, figs 3a–c.

8. *Coscinodiscus reniformis* Castracane, *Rep. Voy. Challenger, Diatom*, p. 160, *pl. xii. f. 12.* 1886.

Lectotype: BM33797.

Locality from Castrance 1886: "... from different and widely separated localities".

Locality from slide: "Chall.[enger] Zebu 95<sup>th</sup>."

Figure: Pl. 10, figs 3a–b.

9. *Glyphodesmis challengerensis* Castracane, *Rep. Voy. Challenger, Diatom*, p. 44, *pl. xviii. f. 13.* 1886.

Lectotype: BM33794.

Locality from Castrance 1886: "... Ad mare Philippinarum".

Locality from slide: "200<sup>th</sup>. Sound Philippines."

Figure: Pl. 9, figs 7a–c.

10. *Glyphodesmis murrayana* Castracane, *Rep. Voy. Challenger, Diatom*, p. 43, *pl. xviii. f. 12.* 1886.

Holotype: BM33793.

Locality from Castrance 1886: "... Ad insulas Philippinas".

Locality from slide: "576<sup>th</sup> sound, 25/22 1/2, 25.1.75".

Figure: Pl. 10, figs 2a–b.

11. *Isthmia enervis* var. *japonica* Castracane, *Rep. Voy. Challenger, Diatom*, p. 96, *pl. xxv. f. 5.* 1886.

Lectotype: BM33812.

Locality from Castrance 1886: "... from the Sea of Japan...".

Locality from slide: "lat. 32°, 31'N, long. 135°, 29'E."

Figure: Pl. 10, figs 1a–e.

12. *Navicula janischii* Castracane, *Rep. Voy. Challenger, Diatom*, p. 29, *pl. xxx. f. 5.* 1886.

Lectotype: BM33808.

Locality from Castrance 1886: "... Ad insulas Bermudas".

Locality from slide: "Zebu 100<sup>th</sup> Challenger."

Figure: Pl. 9, figs 6a–b.

13. *Stictodiscus affinis* Castracane, *Rep. Voy. Challenger, Diatom*, p. 119, *pl. i. f. 4.* 1886.

Holotype: BM33787.

Locality from Castrance 1886: "... Ad Zebu in mari Philippinarum".

Locality from slide: "Chall. [enger] Zebu 100<sup>th</sup>"

Figure: Pl. 8, figs 1a–c.

14. *Stictodiscus affinis* var. *late-zonata* Castracane, *Rep. Voy. Challenger, Diatom*, p. 119. *pl.*

*xvii. f. 11.* 1886.

Lectotype: BM33788.

Locality from Castrance 1886: None

Locality from slide: “off Manila sea 100<sup>th</sup>. 2.11.74.”

Figures: Pl. 6, figs 1a–d, Pl. 7, figs 1a–c, 2a–b.

15. *Stictodiscus bicoronatus* Castracane, *Rep. Voy. Challenger; Diatom*, p. 120, *pl. vi. f. 5.* 1886.

Syntypes: BM33785, BM 33789.

Locality from Castrance 1886: “... Ad oras Japonicas”.

Locality from slide: BM 33785: “Chall.[enger] trawl, lat. 34°, 37’N. long 140°, 32’S”; BM 33789: “Chall.[enger] dredge Hyalnema ground 345<sup>th</sup>.”

Figures: BM 33785: Pl. 5, figs 2a–b; BM33789: Pl. 5, figs 1a–c.

16. *Stictodiscus elegans* Castracane, *Rep. Voy. Challenger; Diatom*, p. 121, *pl. xii. f. 3.* 1886.

Holotype: BM33786.

Locality from Castrance 1886: “In mari Japonico”

Locality from slide: “Chall.[enger] trawl, 14.4.75”.

Figure: Pl. 8, figs 2a–c.

17. *Stictodiscus margaritaceus* Castracane, *Rep. Voy. Challenger; Diatom*, p. 120, *pl. xvii. f. 12.* 1886.

Holotype: BM33783.

Locality from Castrance 1886: “As insulas Philippinas”

Locality from slide: “Philippines 705<sup>th</sup>. 2.11.74”

Figure: Pl. 6, figs 2a–b.

*b) Invalid species*

1. *Actinocyclus decipiens* Castracane ex Rattray *nom. nud.*

Specimen: BM33775.

Locality from slide: “Surface net, Arafura sea, Challenger.”

Rattray (1890, p. 146) notes this taxon as a synonym of *A. subocellatus*; he provides no description. The name has never been validly published.

Figure: Plate 1, figs 3a–c.

2. *Odontodiscus trochos* Castracane, *nom. herb.*

Slide: BM33778.

Locality from slide: “Chall.[enger] sound 25.8.75”

Figure: Plate 2, figs 1a–c.

3. *Odontodiscus parmula* Castracane, *nom. herb.*

Slide: BM33779.

Locality from slide: “Chall.[enger] sound 26.8.75”

Figure: Plate 2, figs 3a–b.

4. *Navicula spectabilis* var. Castracane *nom. nud.*, *Rep. Voy. Challenger; Diatom*, p. 32, *pl. xviii.*

f. 9. 1886.

Slide: BM33807.

Locality from slide: "Zebu 95<sup>th</sup> Chall.[enger]"

Figure: Plate 9, fig. 5.

### References

Castracane, C. A. F., 1886. Report on the Diatomaceae collected by H. M. S. Challenger during the years 1873–1876. *Rep. Sci. Res. Voy. H. M. S. Challenger 1873–1876, Bot.*, **2**, 1–178, 30 pls.

Castracane, C. A. F., 1887 ("1886"). *Le raccolte di Diatomee pelagiche del Challenger ... Atti Accad. pont. Nuovi Lincei*, **39**: 231–239.

Rattray, J., 1890. A revision of the genus *Actinocyclus* Ehrb. *Jour. Quekett Microscopical Club, Ser. 2*, **4**: 137–212.

(Note: All the plates and other tables are prepared as the attachments in the CD at the back of the monograph.)

Table 2. Diatom taxa described by Castracane (1886)

Genus	Species	Page	Plate-Figure	Sea / Ocean	Plate (Tuji et al., 2009)	
<i>Achnanthes</i>	<i>keruelensis</i>	41	xx-15			
	<i>parallela</i>	41	xix-11			
<i>Actinocyclus</i>	<i>anceps</i>	146	iv-1	Sea of Japan		
	<i>clevei</i>	143	iv-6	Sea of Japan		
	<i>complanatus</i>	145	iv-9	Sea of Japan	1	
	<i>denticulatus</i>	146	iv-5		2	
	<i>fasciculatus</i>	144, 145	iv-8			
	<i>japonicus</i>	143	iv-3	the vicinity of the coast of Japan		
	<i>pellucidus</i>	147	xxix-13	an inland sea at Japan		
	<i>pruinosis</i>	144, 146, 147	iv-2	Pacific Ocean	1	
	<i>punctulatus</i>	146	xvi-3	Sea of Japan		
	<i>rafsii</i> var. <i>challengerensis</i>	143	xxx-1	the neighbourhood of Japan		
<i>Actinopterychus</i>	<i>umbonatus</i>	145	iv-4	Antarctic Ocean		
	<i>erosus</i>	128	vii-8			
<i>Alloioneis</i>	<i>raeanus</i>	127	vii-4			
	<i>japonica</i>	36	xx-12, bis	Sea of Japan		
<i>Amphiprora</i>	<i>fimbriata</i>	40	xxvii-15	Pacific Ocean		
	<i>plicata</i> var. <i>japonica</i>	40	xxx-8	Sea of Japan		
<i>Ampora</i>	<i>decora</i>	18	xxvii-14			
	<i>meneghiniana</i>	17	xxvii-16			
	<i>oceanica</i>	20	xxvii-20			
	<i>philippinica</i>	19	xxvii-2			
	<i>polyzonata</i>	18	xxvii-18			
	<i>scalaris</i>	18	xxvii-19			
	<i>staurophora</i>	20	xxvii-6			
	<i>thaitiana</i>	19	xxvii-15			
	<i>Asrerionella</i>	<i>glacialis</i>	50, 51	xiv-1	Antarctic Ocean	
	<i>Asterolampra</i>	<i>grevillii</i> var. <i>eximia</i>	136	v-5		
<i>Asteromphalus</i>	<i>antarcticus</i>	135	xvi-11	Antarctic Ocean		
	<i>challengerensis</i>	134	v-2	Antarctic Ocean		
	<i>ovatus</i>	132, 133	v-7	Antarctic Ocean		
	<i>roperianus</i> var. <i>atlantica</i>	133	v-3			
	<i>wyvilii</i>	134	v-6			
<i>Bacillaria</i>	<i>socialis</i> var. <i>indica</i>	69	xxv-9, 10			
<i>Bacteriastrum</i>	<i>brevispinum</i>	83	xv-8			
	<i>spirillum</i>	83	xix-2, xxix-1			
	<i>varians</i> var. <i>princeps</i>	84	xix-2, xxix-3			
	<i>walchii</i> var. <i>hispidum</i>	83	xv-8			
	<i>Biddulphia</i>	<i>japonica</i>	104	xxiii-14	Sea of Japan	
	<i>ornata</i> var. <i>hirsuta</i>	105	xxiii	Sea of Japan		
	<i>parallela</i>	103	xxiii-10, xxvi-7	Sea of Japan		
	<i>pellucida</i>	103	xxvi-5			
	<i>pellucida</i> var. <i>major</i>	102	xxiii-6			
	<i>pumila</i>	103	xxiii-12	Sea of Japan		
	<i>reticulata</i> var. <i>inermis</i>	102	xxvi-9			
	<i>tuomeyi</i> var. <i>pacifica</i>	106	xxx-6			
<i>Brightwellia</i>	<i>murrayi</i>	138	x-2			
<i>Campylodiscus</i>	<i>anceps</i>	66	xvi-2			
	<i>bicinctus</i>	63	xi-12	Sea of Japan		
	<i>erosus</i>	63	xi-3	the vicinity of the coast of Japan		
	<i>humilis</i>	64	xi-8			
	<i>japonicus</i>	62	xi-1	Sea of Japan		
	<i>lepidus</i>	63, 64, 65	xi-7			
	<i>nitens</i>	65	xi-6			
	<i>oceanicus</i>	65	xi-4			
	<i>orbicularis</i>	64	xvi-10	Sea of Japan		
	<i>philippinarum</i>	64	xi-9			
	<i>wallichianus</i> var. <i>thaitiensis</i>	65	xvi-6			
	<i>zebuanus</i>	62, 64	xi-10			
	<i>Cerataulus</i>	<i>turgidus</i> var. <i>polyceros</i>	101	xxvi-6, 8	Sea of Japan	
	<i>Cestodiscus</i>	<i>convexus</i>	123	vii-6		4
		<i>coronatus</i>	124	vii-9		3, 4
<i>gemmifer</i>		124, 125	ii-7			
<i>gemmifer</i> var. <i>decrescens</i>		125	xii-11			
<i>parmula</i>		125	vii-5			
<i>rapax</i>		125	xviii-2			
<i>trochus</i>		123	vii-1			
<i>Chaetoceros</i>		<i>convolutum</i>	78		Antarctic Ocean	
		<i>criophilum</i>	78		Antarctic Ocean	
		<i>curvatum</i>	77			
	<i>dicladia</i>	82	viii-1, xix-7, 8	Antarctic Ocean		
	<i>dispar</i>	76	vii-6	Antarctic Ocean		
	<i>incurvum</i> var. <i>umbonatum</i>	80	xxix-10, 16			
	<i>jamischianum</i>	77		Antarctic Ocean		
	<i>radiculum</i>	79, 80				
<i>Corethron</i>	<i>criophilum</i>	85	xxi-14	Antarctic Ocean		
	<i>hispidum</i>	86	xxi-3, 5	Antarctic Ocean		
	<i>murrayanum</i>	86	xxi-4	Antarctic Ocean		
<i>Coscinodiscus</i>	<i>africanus</i> var. <i>rotunda</i>	159	xxiv-3			
	<i>antarcticus</i>	157	xii-10			
	<i>atlanticus</i>	158	v-8			
	<i>bifrons</i>	156, 157	ii-1	Antarctic Ocean		
	<i>comptus</i>	157	xiii-9	Antarctic Ocean		
	<i>cycloteres</i>	161	xxii-8	Antarctic Ocean		
	<i>decrescens</i>	159	xii-14			
	<i>denticulatus</i>	155, 158	iii-8		9	
	<i>dimorphus</i>	157	xvii-6			
	<i>diophthalmus</i>	163	xvi-4			
	<i>diophthalmus</i> var. <i>monophthalma</i>	163	xvi-7			
	<i>gemmatulus</i>	161	xvii-9			
<i>janus</i>	157	ii-2				
<i>lanceolatus</i>	164	xvii-19				
<i>margaritaceus</i>	164	xviii-3	Antarctic Ocean			

Genus	Species	Page	Plate-Figure	Sea / Ocean	Plate (Tuji et al., 2009)
	<i>megacoccus</i>	162	xvii-2		
	<i>mirificus</i>	154	iii-6		
	<i>obovatus</i>	160	vii-4, xviii-7, xxii-9		
	<i>pacificus</i>	158	viii-5, xxii-1		
	<i>papuanus</i>	154, 155	iii-3		
	<i>patera</i>	155	ii-6		
	<i>polygonus</i>	161	xxii-6	Antarctic Ocean	
	<i>polyradiatus</i>	161	iii-4	Antarctic Ocean	
	<i>radiatus</i> var. <i>abyssalis</i>	165	xxix-2, 11, 15		
	<i>reniformis</i>	160	xi-12		10
	<i>rhombicus</i>	164	xxii-11	Sea of Japan	
	<i>rudis</i>	162	xxii-4		
	<i>stellaris</i> var. <i>faciculata</i>	158	v-9	Antarctic Ocean	
	<i>umbonatus</i>	156	ii-8		
	<i>undulatus</i>	159	viii-3		
	<i>variolatus</i>	155	ii-5		
	<i>venulosus</i>	162	xvii-1		
<i>Cyclophora</i>	<i>tenuis</i>	58			
	<i>tenuis</i> var. <i>tropica</i>	58			
<i>Cyclotella</i>	<i>fimbriata</i>	141	xvii-16		
<i>Cymbella</i>	<i>criophila</i>	20, 21	xxvii-5		
	<i>marina</i>	20, 21	xxvii-13	Sea of Japan	
	<i>pelagica</i>	21	xxvii-4		
<i>Dactyliosolen</i>	<i>antarcticus</i>	75	ix-7	Antarctic Ocean	
<i>Dimeregramma</i>	<i>nanum</i> var. <i>thaitiensis</i>	46	xix-5		
<i>Ethmodiscus</i>	<i>convexus</i>	167	iii-9		
	<i>coronatus</i>	168	xxii-7		
	<i>diadema</i>	169	xviii-1		
	<i>gigas</i>	169, 170	xiv-5		
	<i>humilis</i>	168	xvii-4	Antarctic Ocean	
	<i>japonicus</i>	168	xxii-2		
	<i>obovatus</i>	168	xvii-5		
	<i>perichantinos</i>	169	xxii-3		
	<i>punctiger</i>	167	iii-1	Sea of Japan	
	<i>radiatus</i>	167	xi-9		
	<i>sphaeroidalis</i>	170	xxii-10		
	<i>tympanum</i>	170	xiv-3	Sea of Japan	
	<i>wyvilleanus</i>	170	xiv-6		
<i>Eucampia</i>	<i>blaustium</i>	97	xvii-5	Antarctic Ocean	
	<i>blaustium</i> var. <i>minor</i>	98	xvii-6		
<i>Euodia</i>	<i>orbicularis</i>	149	xii-15		
	<i>radiata</i>	150	xii-4		
	<i>recta</i>	149	xii-3		
	<i>ventricosa</i>	150	xii-5		
<i>Eupleuria</i>	<i>insutus</i>	126	xix-6		
<i>Fragilaria</i>	<i>antarctica</i>	56	xxv-12	Antarctic Ocean	
	<i>linearis</i>	56, 57	xix-9	Antarctic Ocean	
<i>Glyphodesmis</i>	<i>challengerensis</i>	44	xviii-13		9
	<i>margaritacea</i>	44	xviii-10		
	<i>murrayana</i>	43	xviii-12		10
<i>Hemiaulus</i>	<i>glacialis</i>	100	xxv-4	Antarctic Ocean	
<i>Heterodictyon</i>	<i>jeffreysianum</i>	137	xxi-8		
<i>Hyalodiscus</i>	<i>subtilis</i> var. <i>japonica</i>	140	xvii-4	Sea of Japan	
<i>Isthmia</i>	<i>enervis</i> var. <i>japonica</i>	96	xxv-5	Sea of Japan	10
<i>Mastogloia</i>	<i>kerguelensis</i>	22	xv-11		
	<i>thaitiana</i>	22	xxvi-11		
<i>Lauderia</i>	<i>elongata</i>	89, 90	ix-4		
	<i>moseleyana</i>	90	xxiv		
	<i>pumila</i>	89	ix-8		
<i>Melosira</i>	<i>glomus</i>	95	xxi-10		
	<i>glomus</i> var. <i>major</i>	95	xxiii-4	Sea of Japan	
	<i>hyalina</i>	94	xxi		
	<i>thaitiensis</i>	94	xxi-2		
<i>Molleria</i>	<i>artarctica</i>	98	xviii-8		
<i>Navicula</i>	<i>abnormis</i>	27	xxviii-19		
	<i>bullata</i> var. <i>carinata</i>	29	xviii-7		
	<i>bullata</i> var. <i>obtusata</i>	29	xxviii-10		
	<i>bullata</i> var. <i>rhomboidea</i>	30	xxx-7		
	<i>cyclophora</i>	34	xxviii-18	Antarctic Ocean	
	<i>decipiens</i>	32	xxvii-17		
	<i>entomon</i> var. <i>thaitiana</i>	28	xx-17		
	<i>jamischii</i>	29	xxx-5		9
	<i>kerguelensis</i>	33	xxviii-16		
	<i>mammalis</i>	30	xx-2		
	<i>mirabilis</i>	34	xxx-10		
	<i>oxeia</i>	31	xx-8	Sea of Japan	
	<i>parallela</i>	31	xxviii-12		
	<i>subrhomboidea</i>	30	xx-4		
	<i>thaitiana</i>	27, 28	xx-5		
	<i>zanzibarica</i> var. <i>zebuana</i>	31	xxviii-8		
<i>Nitzschia</i>	<i>mammalis</i>	68	xxix-5		
	<i>obesa</i>	67	xii-11		
	<i>plana</i> var. <i>zebuana</i>	67	xiii-10		
	<i>vermiculata</i>	68	xiii-12		
<i>Omphalopelta</i>	<i>antarctica</i>	129	vii-2	Antarctic Ocean	
	<i>japonica</i>	129	vii-10	Sea of Japan	
	<i>parda</i>	131	xviii-9		
	<i>shrubsoleana</i>	131	xviii-2		
<i>Pinnularia</i>	<i>criophila</i>	26	xv-2	Antarctic Ocean	
	<i>raeana</i>	25	xv-3		
<i>Plagiogramma</i>	<i>margaritaceum</i>	45	xix-13		
	<i>thaitense</i>	45	xix-4		
<i>Pleurosigma</i>	<i>arafurensis</i>	38	xxvii-5		
	<i>elegantissimum</i>	37	xxvii-1	Sea of Japan	
	<i>japonicum</i>	38	xxix-14	Sea of Japan	

Genus	Species	Page	Plate-Figure	Sea / Ocean	Plate (Tuji et al., 2009)
	<i>smithianum</i>	38	xxviii-2		
	<i>thattense</i>	38	xxviii-4		
<i>Porodiscus</i>	<i>stolterfothii</i>	139	xii-8		
<i>Rhaphoneis</i>	<i>elliptica</i>	49	xxvi-13	Sea of Japan	
	<i>japonica</i>	49	xix-12	Sea of Japan	
	<i>mammalis</i>	48, 49	xxvi-3		
<i>Phizosolenia</i>	<i>arafurensis</i>	74, 75	xxx-12		
	<i>flaccida</i>	74	xxix-4		
	<i>inaequalis</i>	71	xxiv-15		
	<i>inermis</i>	71	xxiv-7, 8, 10, 13	Antarctic Ocean	
	<i>japonica</i>	72	xxiii-7	Sea of Japan	
	<i>murrayana</i>	72	xxiv-12	Antarctic Ocean	
	<i>polydactyla</i>	71	xxiv-2	Antarctic Ocean	
	<i>sima</i>	71	xxiv-11	Antarctic Ocean	
<i>Rutilaria</i>	<i>edentula</i>	92	xviii-14		
	<i>tulkii</i>	92	xviii-11		
<i>Stauroneis</i>	<i>breissonii</i>	24	xv-4		
	<i>glacialis</i>	24, 25	xxvii-11	Antarctic Ocean	
	<i>pacifica</i>	23	xx-9		
	<i>pygmaea</i>	25	xxix-7		
	<i>thaitiana</i>	23	xx-16		
<i>Stephanopyxis</i>	<i>campana</i>	88	xix-14	Sea of Japan	
	<i>kittoniana</i>	87	ix-5		
	<i>rapax</i>	88	ix-9	Antarctic Ocean	
<i>Stictodiscus</i>	<i>affinis</i>	119	i-4		8
	<i>affinis</i> var. <i>latezonata</i>	119	xvii-11		6, 7
	<i>anceps</i>	116, 121	i-5	Sea of Japan	
	<i>bicoronatus</i>	115, 120	vi-5	Sea of Japan	5
	<i>bicoronatus</i> var. <i>punctigera</i>	121	xiii-2		
	<i>elegans</i>	121	xiii-3	Sea of Japan	8
	<i>hexagonus</i>	122	xvii-17		
	<i>japonicus</i>	119	i-2	Sea of Japan	
	<i>margaritaceus</i>	120	xvii-12		6, 7
	<i>radiatus</i>	117	i-1		
	<i>radfodianus</i>	118	xvii-10		
	<i>reticulatus</i>	120	i-8		
	<i>trigonus</i>	122	xiii-1	Sea of Japan	
	<i>varians</i>	120	xvii-7		
<i>Synedra</i>	<i>atlantica</i>	53	xxv-16		
	<i>capitulata</i>	52	xxv-13		
	<i>fimbriata</i>	52	xxv-14		
	<i>lanceolata</i>	52, 53	xxv-20		
	<i>lanceolata</i> var. <i>thaitiensis</i>	53	xxv-18		
	<i>philippinarum</i>	52	xxv-15		
<i>Syatephania</i>	<i>raeana</i>	151	x-11		
	<i>argus</i>	60	x-9	Sea of Japan	
	<i>dives</i>	59, 60	x-4		
	<i>grandiuscula</i>	61	x-5		
	<i>japonica</i>	60	x-8	Sea of Japan	
	<i>multicostata</i>	61	x-6		
	<i>ocellata</i>	60	x-7	Sea of Japan	
	<i>thaitiana</i>	61	xix-3		
<i>Thalassiothrix</i>	<i>curvata</i>	55	xxiv-6	Sea of Japan	
<i>Toxonidea</i>	<i>challengeriensis</i>	39	xxvi-15		
<i>Triceratium</i>	<i>abyssale</i>	111	xiii-6		
	<i>arcticum</i> var. <i>keruelensis</i>	107	xiii-7		
	<i>calvescens</i>	107	ix-1	Sea of Japan	
	<i>cariosum</i>	108	vi-6		
	<i>coronatum</i>	108	vi-7		
	<i>favus</i> var. <i>late-areolata</i>	109	ix-3	Sea of Japan	
	<i>favus</i> var. <i>pacifica</i>	109	vi-1		
	<i>ferox</i>	107	vi-4	Sea of Japan	
	<i>grunowianum</i>	110, 111	vi-5		
	<i>increassatum</i>	110	ix-10	Sea of Japan	
	<i>insutum</i>	111	xxv-7		
	<i>pavimentosum</i>	108	xiii-8	Sea of Japan	
	<i>pulvillus</i>	106	vi-8		
	<i>punctigerum</i>	108	xiii-4		
	<i>sarcophagus</i>	109	vi-3		
	<i>thaitiense</i>	106	xiii-14		
	<i>tumescens</i>	109	vi-9	Sea of Japan	



# Plate 1

Figs. 1a–b. *Actinocyclus complanatus* Castracane

Slide: BM33771a

Locality in the description: off Japan

Description: Castracane (1886), page 145, plate-figure iv-9

Figs. 2a–b. *Actinocyclus pruinosis* Castracane

Slide: BM33772

Locality in the description: Pacific Ocean

Description: Castracane (1886), page 144, plate-figure iv-2

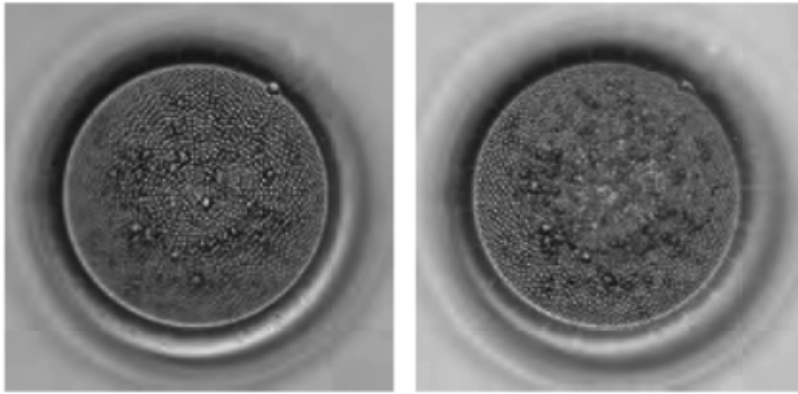
Figs. 3a–c. *Actinocyclus decipiens* Castracane nom. uud. sensu Rattray

Slide: BM33775

Locality in the description: Arafara Sea

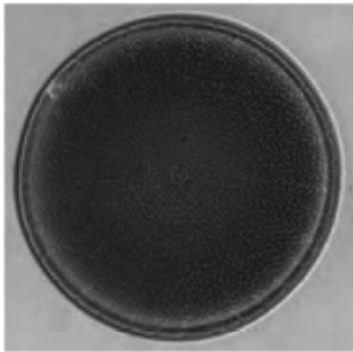
Description: Rattray (1890), page 146

Plate 1

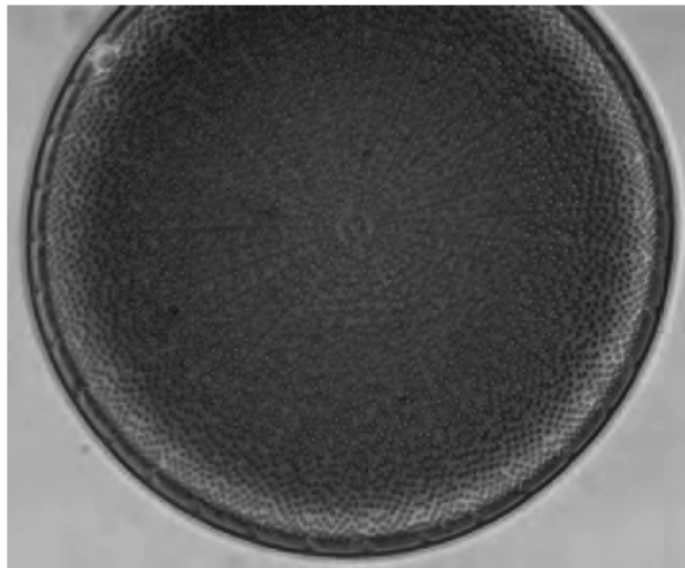


1a

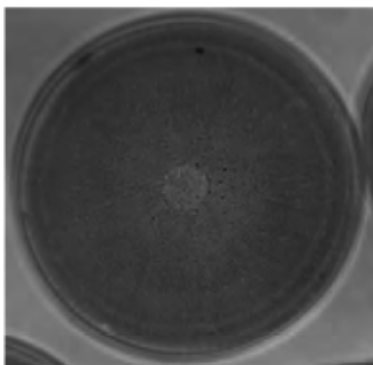
20 μm 1b



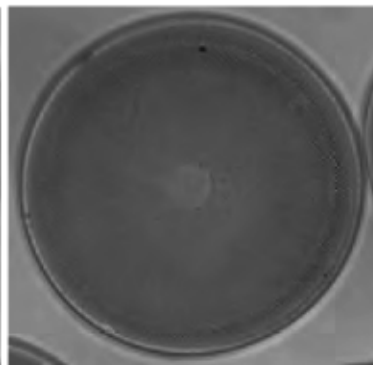
50 μm 2a



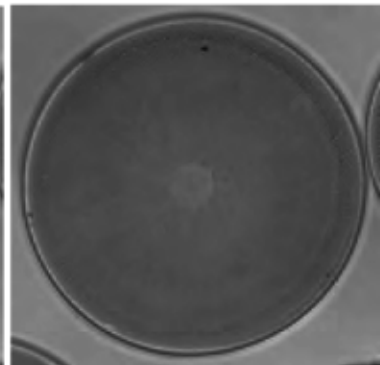
20 μm 2b



3a



3b



50 μm 3c

## Plate 2

Figs. 1a–c. *Odontodiscus trochos* Castracane nom. nud.

Slide: BM33778

Figs. 2a–c. *Actinocyclus* (?) *denticulatus* Castracane

Slide: BM33776

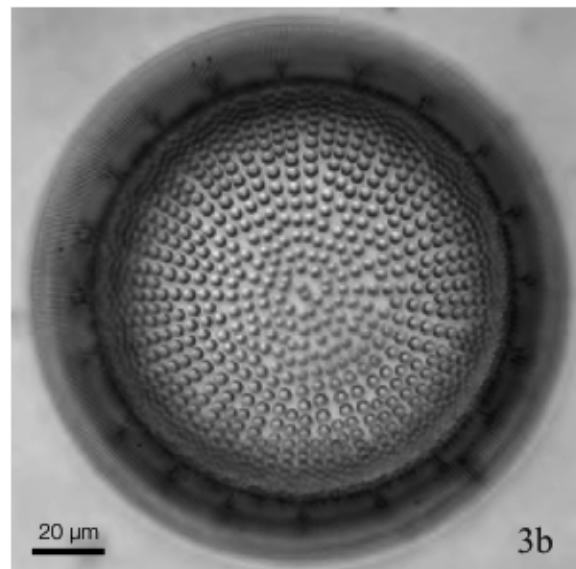
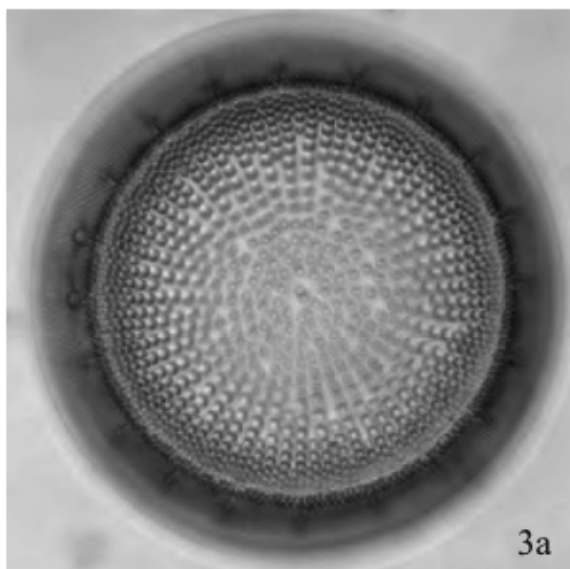
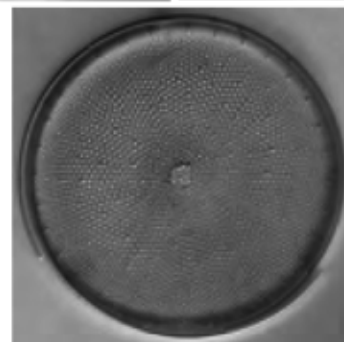
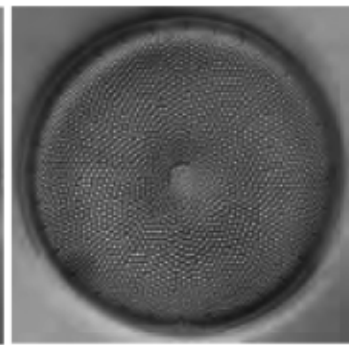
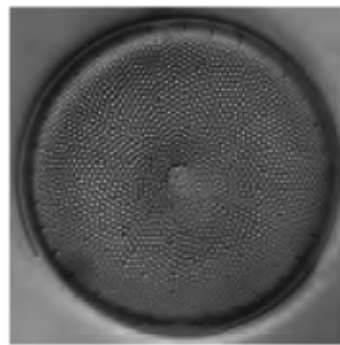
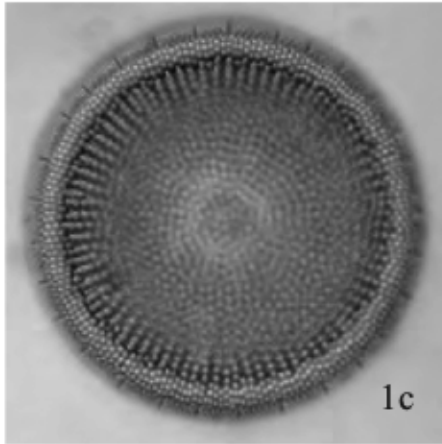
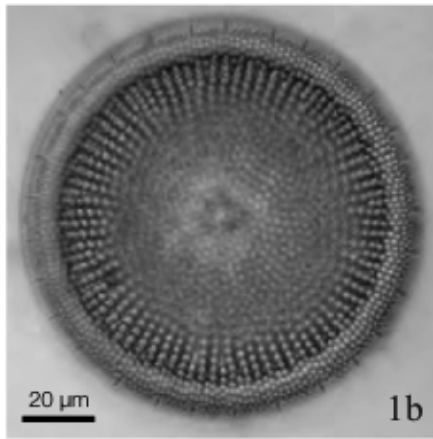
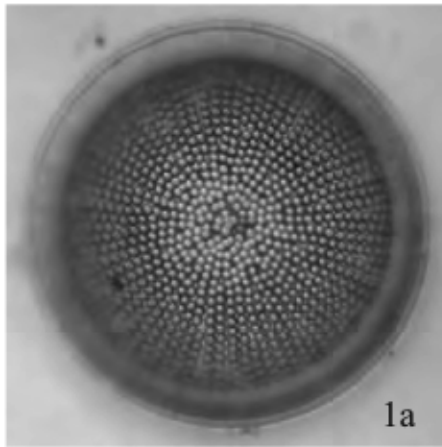
Locality in the description: Arafra Sea

Description: Castracane (1886), page 146, plate-figure iv-5

Figs. 3a–b. *Odontodiscus parmula* Castracane nom. nud.

Slide: BM33779

Plate 2



## Plate 3

Figs. 1a–e. *Cestodiscus coronatus* Castracane

Slide: BM33782

Locality in the description: Pacific Ocean

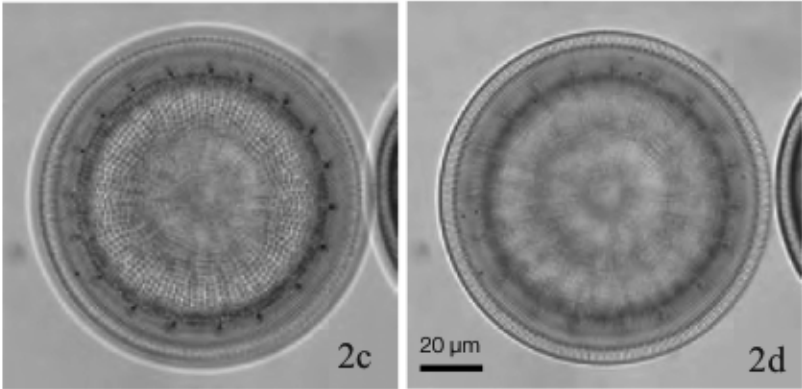
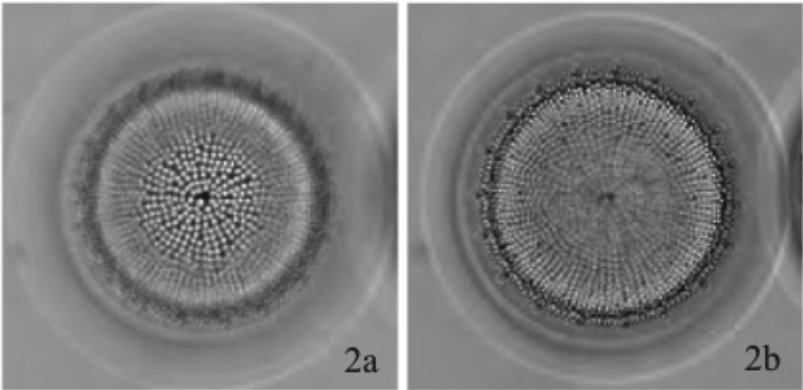
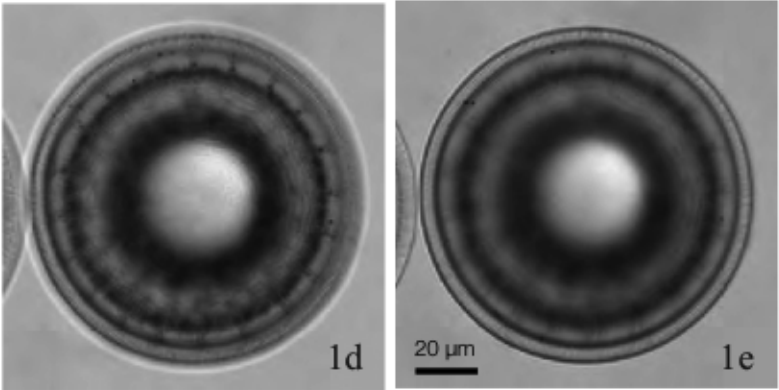
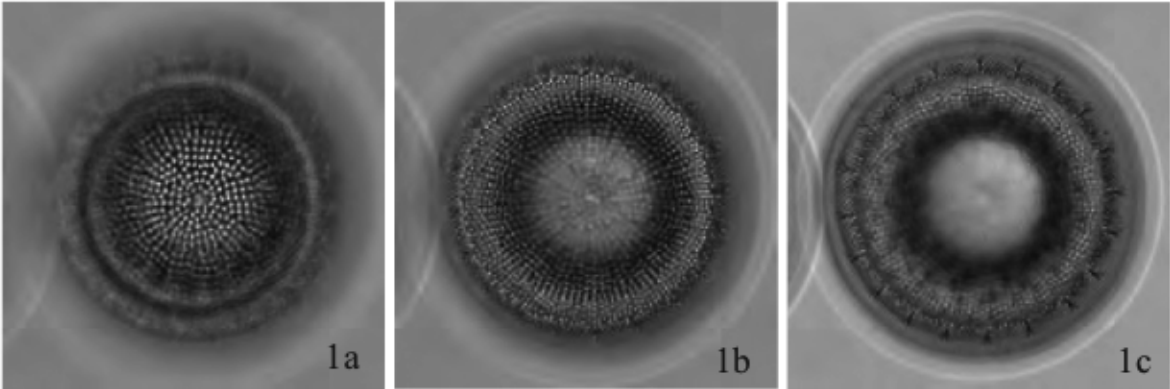
Description: Castracane (1886), page 124, plate-figure vii-9

Figs. 2a–d. *Cestodiscus coronatus* Castracane

Slide: BM33782

Locality in the description: Pacific Ocean

Description: Castracane (1886), page 124, plate-figure vii-9



## Plate 4

Figs. 1a–d. *Cestodiscus coronatus* Castracane

Slide: BM33781

Locality in the description: Pacific Ocean

Description: Castracane (1886), page 124, plate-figure vii-9

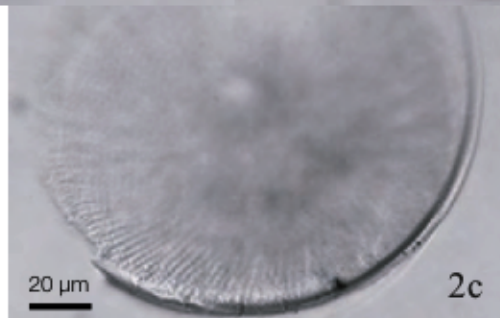
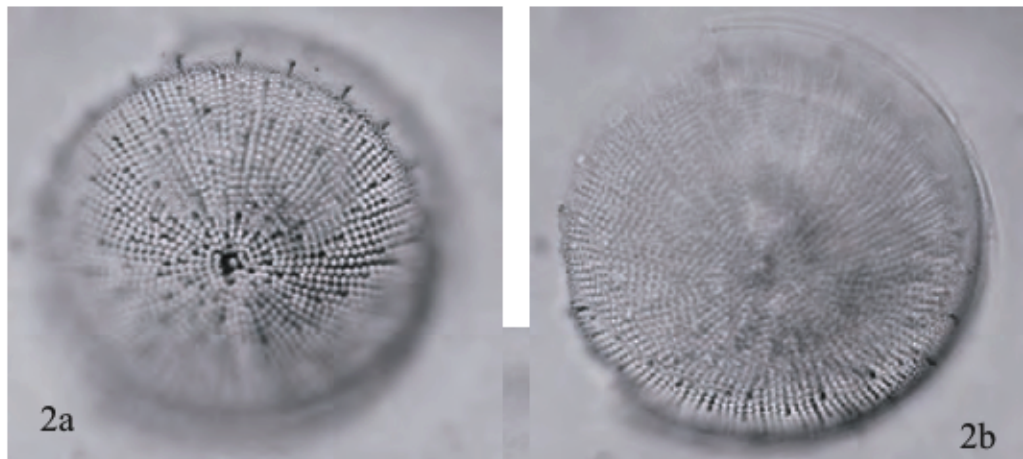
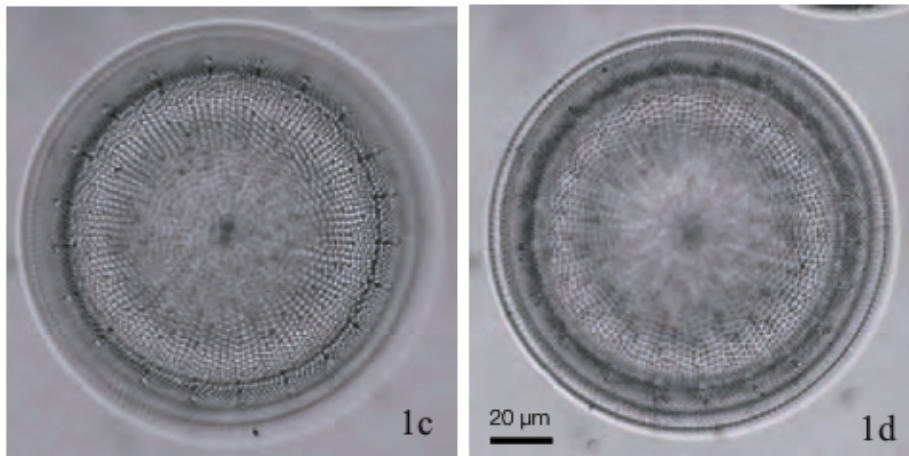
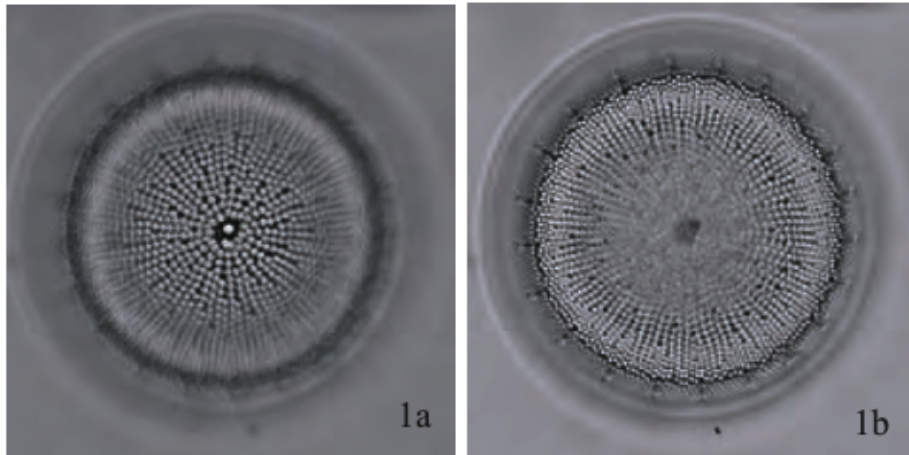
Figs. 2a–c. *Cestodiscus convexus* Castracane

Slide: BM33780

Locality in the description: Pacific Ocean

Description: Castracane (1886), page 123, plate-figure vii-6

Plate 4





## Plate 5

Figs. 1a–c. *Stictodiscus bicoronatus* Castracane

Slide: BM33789

Locality in the description: off Japan

Description: Castracane (1886), page 120, plate-figure vi-5

Figs. 2a–b. *Stictodiscus bicoronatus* Castracane

Slide: BM33785

Locality in the description: off Japan

Description: Castracane (1886), page 120, plate-figure vi-5

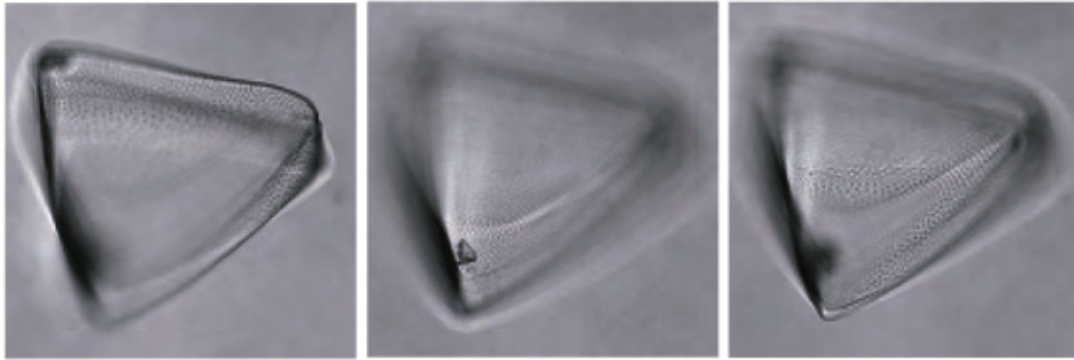
Figs. 3a–c. *Coscinodiscus megacoccus* Castracane

Slide: BM33784

Locality in the description: Pacific Ocean

Description: Castracane (1886), page 162, plate-figure xvii-2

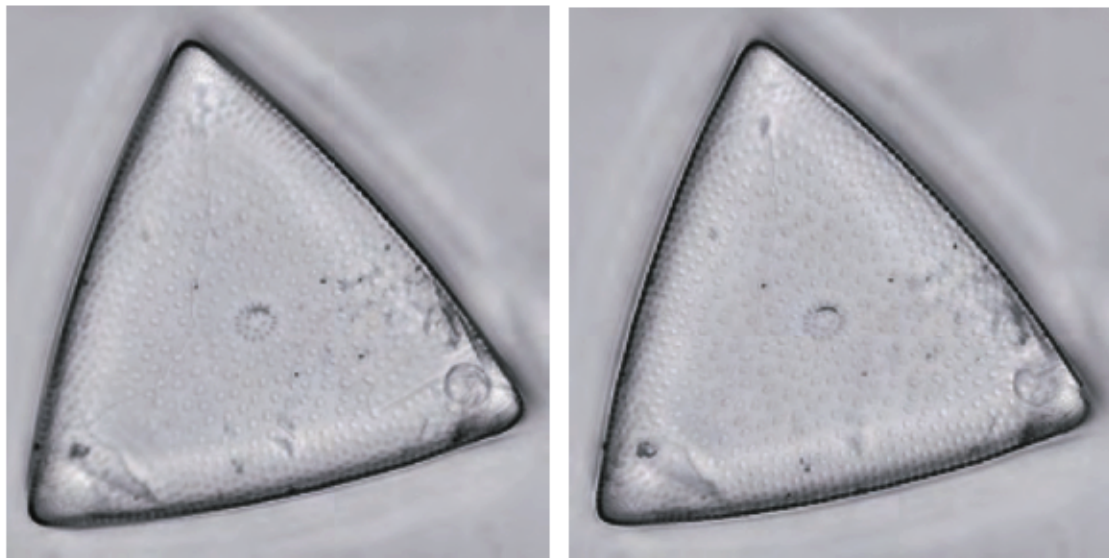
Plate 5



1a

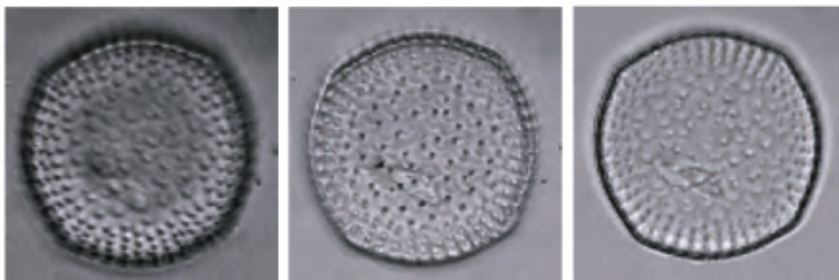
1b

50 μm 1c



2a

20 μm 2b



3a

3b

20 μm 3c

## Plate 6

Figs. 1a–d. *Stictodiscus affinis* var. *late-zonata* Castracane

Slide: BM33788

Locality in the description: off Manilla (Sulu Sea)

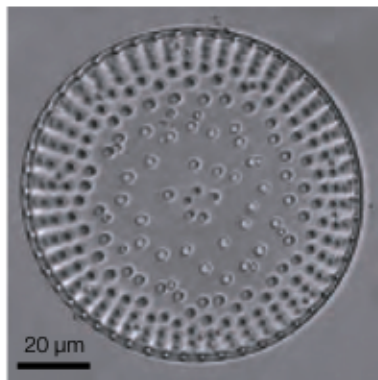
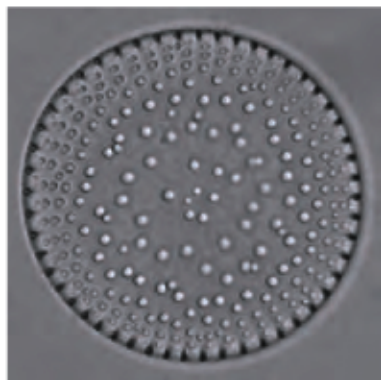
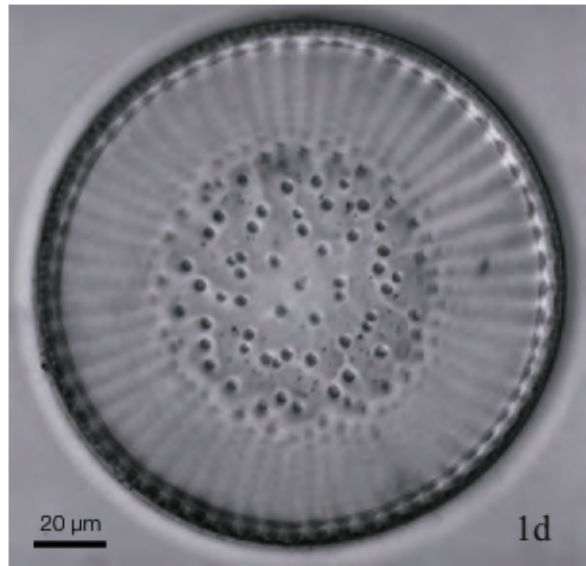
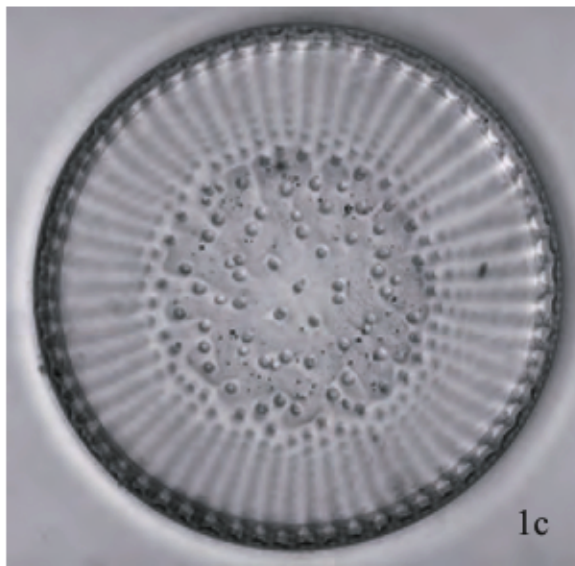
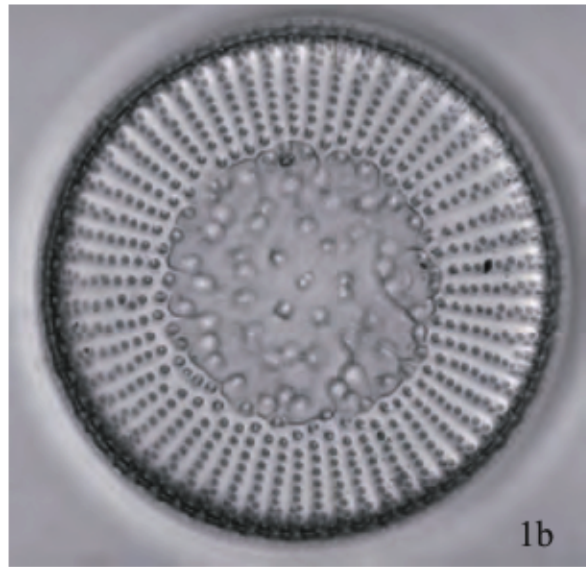
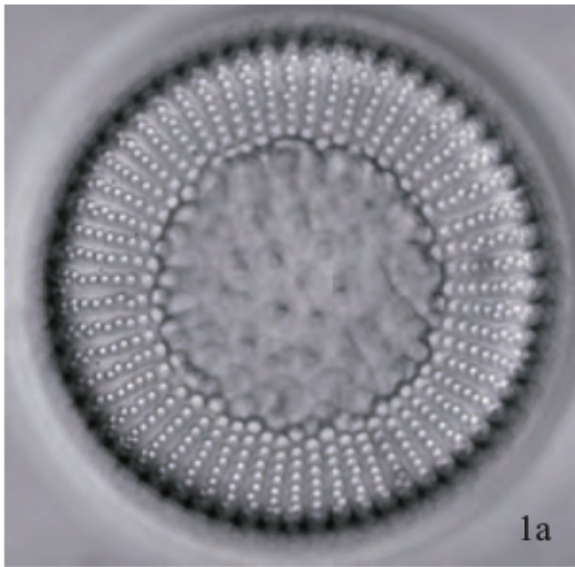
Description: Castracane (1886), page 119, plate-figure xvii-11

Figs. 2a–b. *Stictodiscus margaritaceus* Castracane

Slide: BM33783

Locality in the description: off Philippines

Description: Castracane (1886), page 120, plate-figure xvii-12



## Plate 7

Figs. 1a–c. *Stictodiscus affinis* var. *late-zonata* Castracane

Slide: BM33788

Locality in the description: off Manilla (Sulu Sea)

Description: Castracane (1886), page 119, plate-figure xvii-11

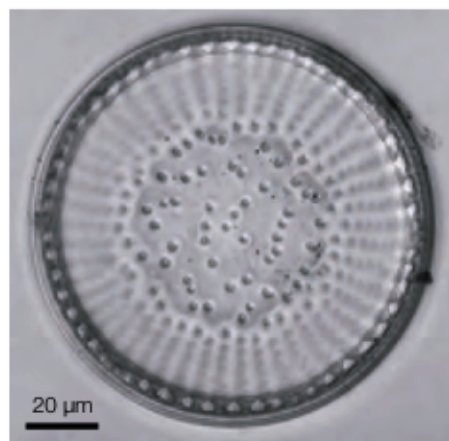
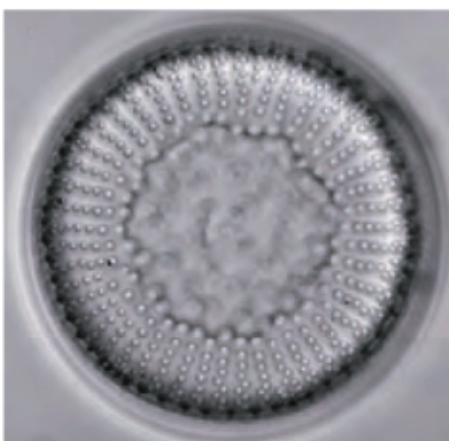
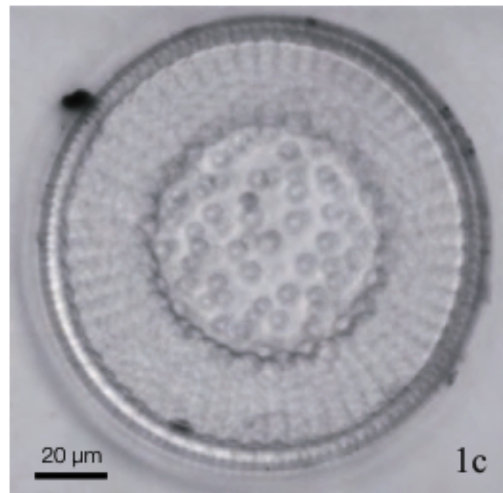
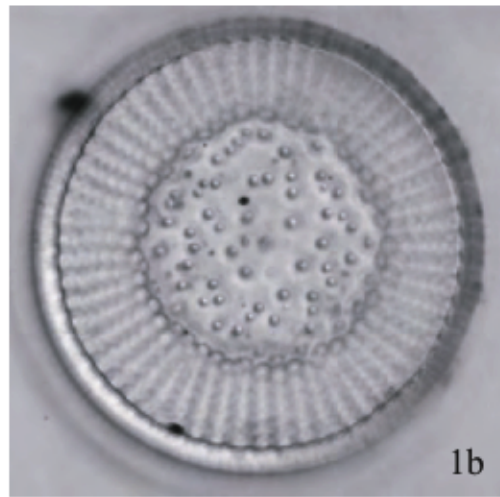
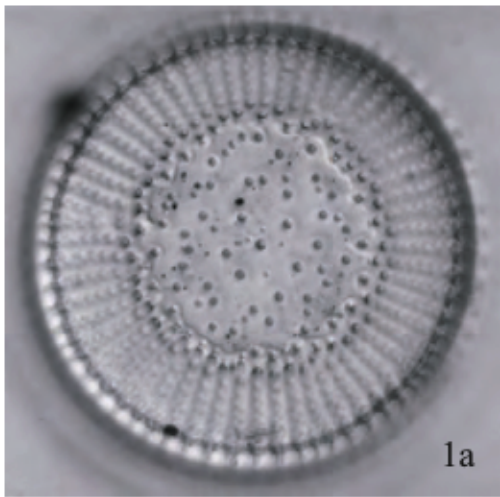
Figs. 2a–b. *Stictodiscus affinis* var. *late-zonata* Castracane

Slide: BM33788

Locality in the description: off Manilla (Sulu Sea)

Description: Castracane (1886), page 119, plate-figure xvii-11

Plate 7



## Plate 8

Figs. 1a–c. *Stictodiscus affinis* Castracane

Slide: BM33787

Locality in the description: off Cebu (Philippine Sea)

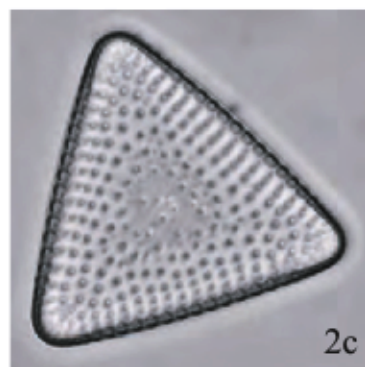
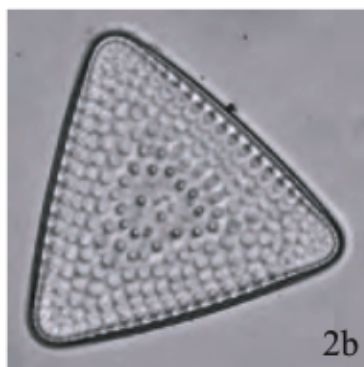
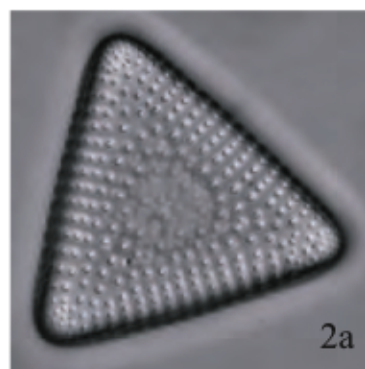
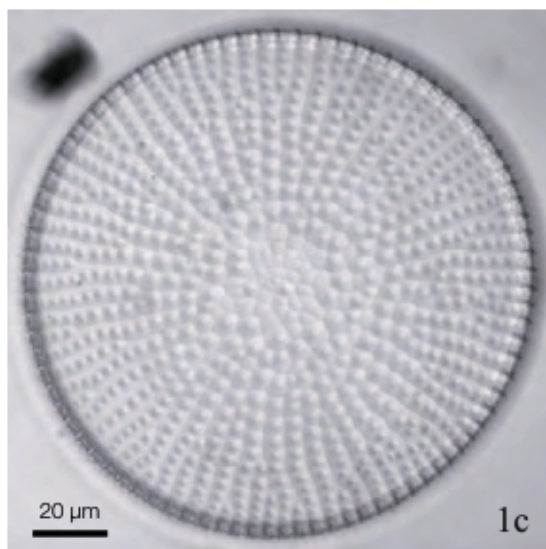
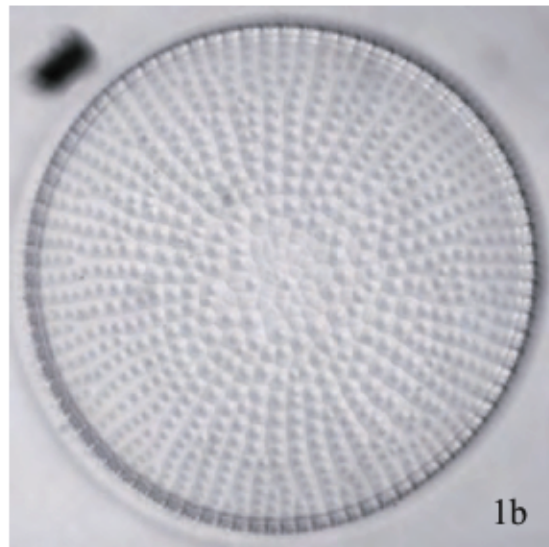
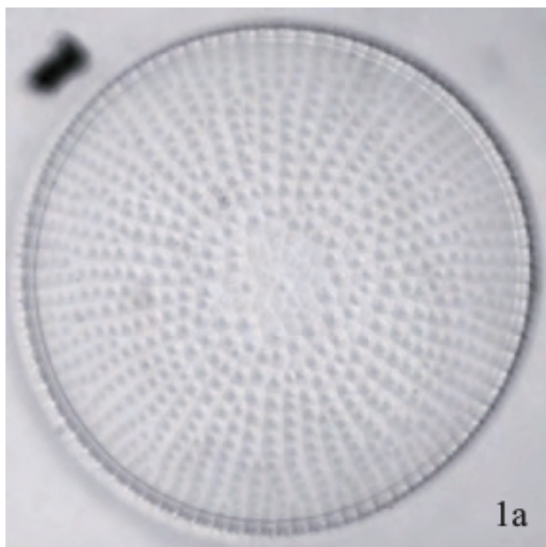
Description: Castracane (1886), page 119, plate-figure i-4

Figs. 2a–c. *Stictodiscus elegans* Castracane

Slide: BM33786

Locality in the description: off Japan

Description: Castracane (1886), page 121, plate-figure xii-3





## Plate 9

Figs. 1a–b. *Coscinodiscus denticulatus* Castracane

Slide: BM33796

Locality in the description: Pacific Ocean

Description: Castracane (1886), page 155, plate-figure iii-8

Figs. 2–4. *Coscinodiscus denticulatus* Castracane

Slide: BM33796

Locality in the description: Pacific Ocean

Description: Castracane (1886), page 155, plate-figure iii-8

Fig. 5. *Navicula spectabilis* var. Castracane nom. nud.

Slide: BM33807

Description: Castracane (1886), page 32, plate-figure xviii-9

Figs. 6a–b. *Navicula janischii* Castracane

Slide: BM33808

Locality in the description: off Bermuda

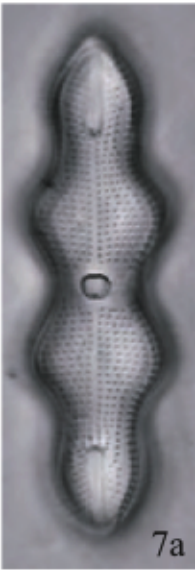
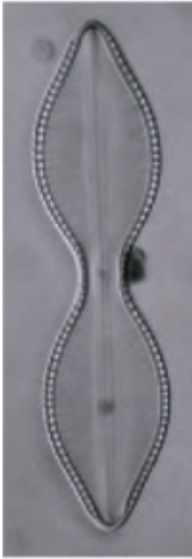
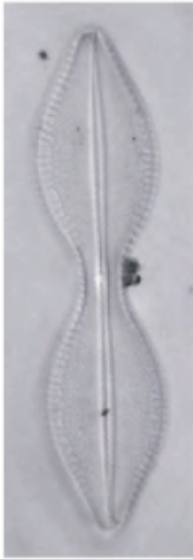
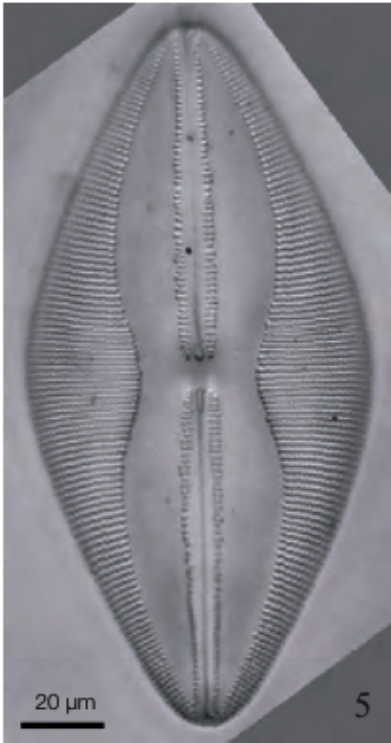
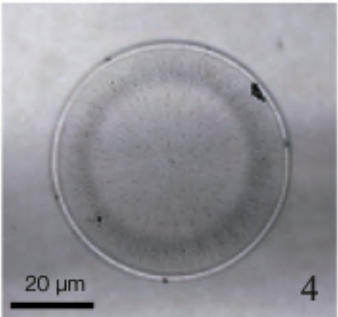
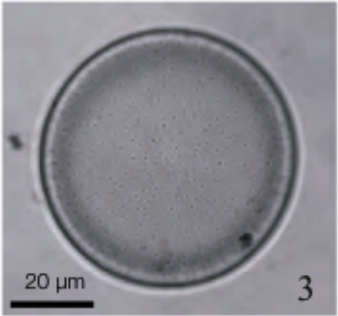
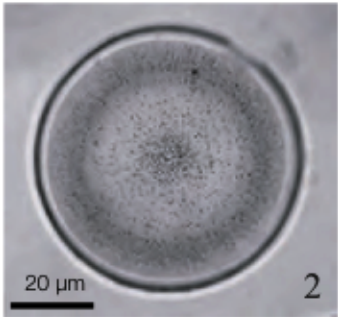
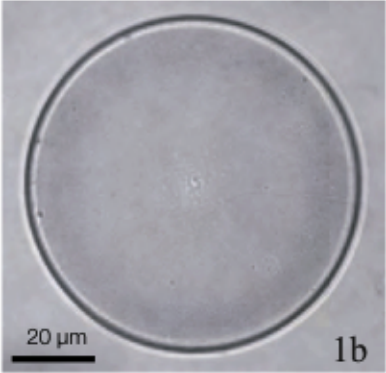
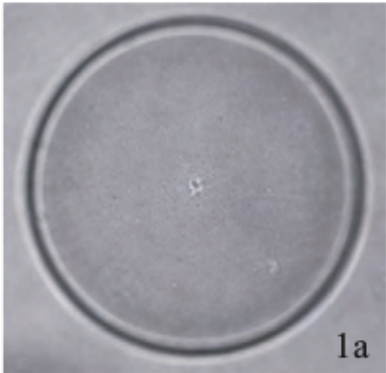
Description: Castracane (1886), page 29, plate-figure xxx-5

Figs. 7a–c. *Glyphodesmis challengerensis* Castracane

Slide: BM33794

Locality in the description: Philippines Sea

Description: Castracane (1886), page 44, plate-figure xviii-13



## Plate 10

Figs. 1a–e. *Isthmia enervis* var. *Japonoca* Castracane

Slide: BM33812

Locality in the description: off Japan

Description: Castracane (1886), page 96, plate-figure xxv-5

Figs. 2a–b. *Glyphodesmis murrayana* Castracane

Slide: BM33793

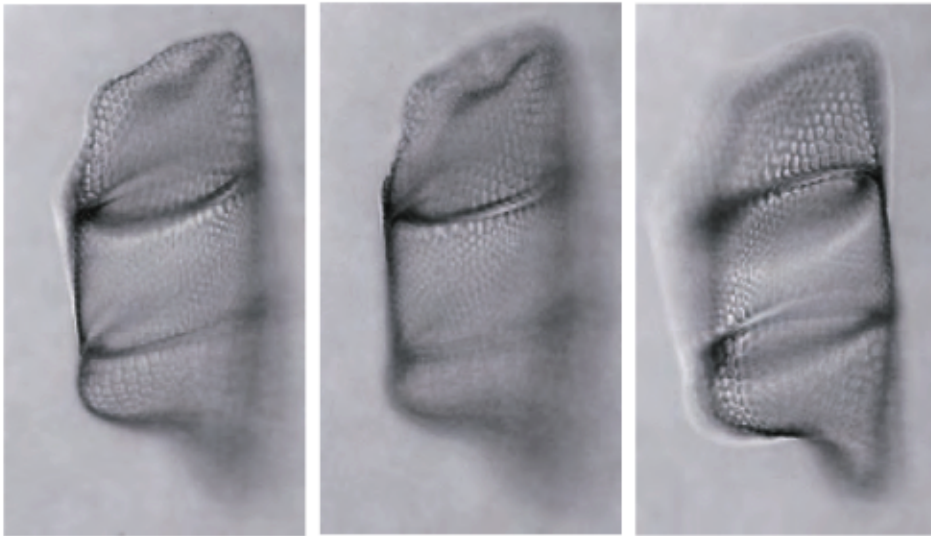
Locality in the description: off Philippines

Description: Castracane (1886), page 43, plate-figure xviii-12

Figs. 3a–b. *Coscinodiscus reniformis* Castracane

Slide: BM33797

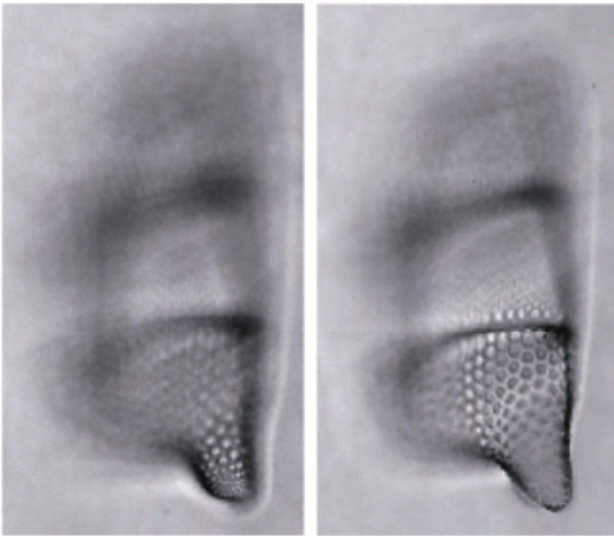
Description: Castracane (1886), page 160, plate-figure xii-12



1a

1b

1c



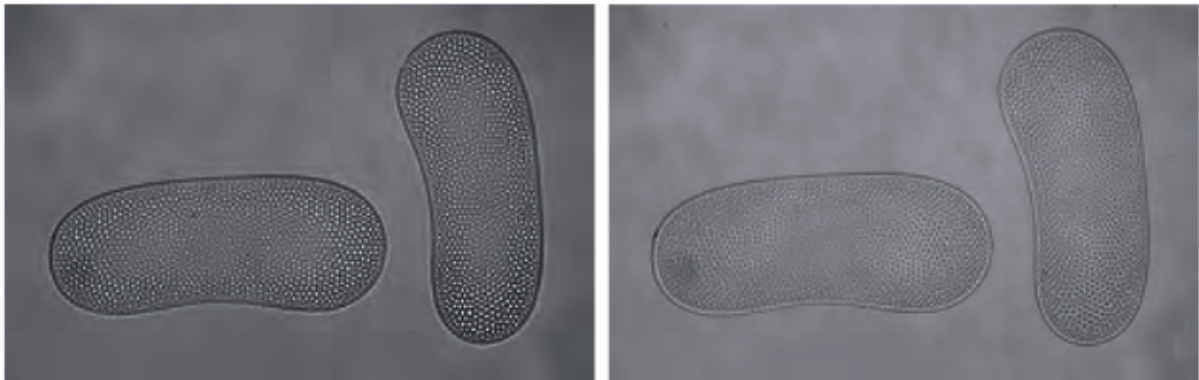
50 μm 1d

1e

50 μm

2a

2b



3a

50 μm 3b