



**SUPPLEMENTAL GUIDE TO**  
**PLANKTONIC PROTOZOA**

**Nanoplankton and Microplankton size:**  
**Ciliates**  
**Flagellates**  
**Radiolarians**

**We thank the following academic web sites for the illustrations in this guide booklet  
which were taken directly from the following sources in 1999.**

**They are used here for non-commercial, educational purpose only:**

Ciliates and Flagellates taken from:

Department of Marine Botany, Goteborg, Sweden

<http://www.marbot.gu.se/SSS/SSShome.htm>

Radiolarians taken from Scripps Institute, UCSD:

[http://gdcmp1.ucsd.edu/geol\\_coll/radlit/nm79titl.html](http://gdcmp1.ucsd.edu/geol_coll/radlit/nm79titl.html)

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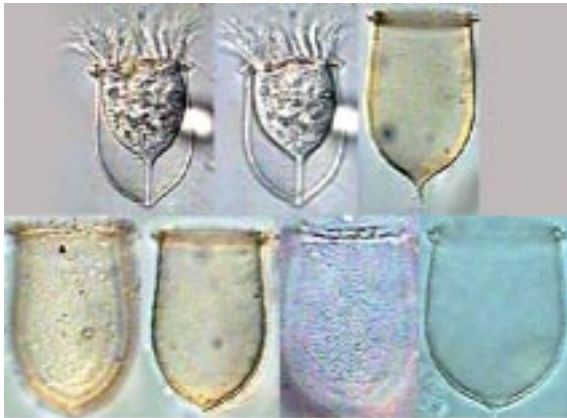
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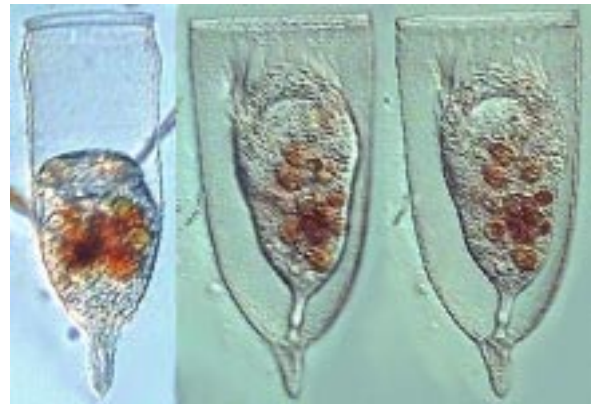
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## Phylum Protozoa - Class Ciliata

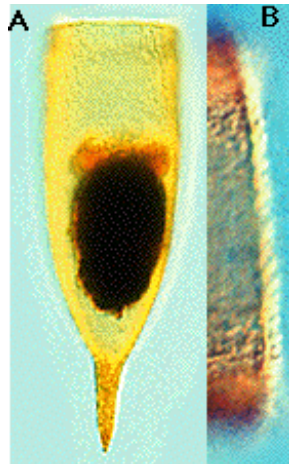


*Acanthostomella norvegica* (Daday, 1887)  
A living cell and empty loricae.  
Length 36-50µm, oral diameter 23-25 µm.

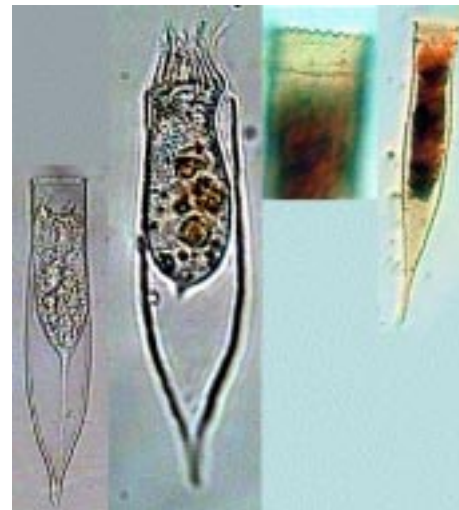


*Favella ehrenbergii* (Claparède et Lachmann, 1858)  
Length 195-466 µm, oral diameter 63-125 µm

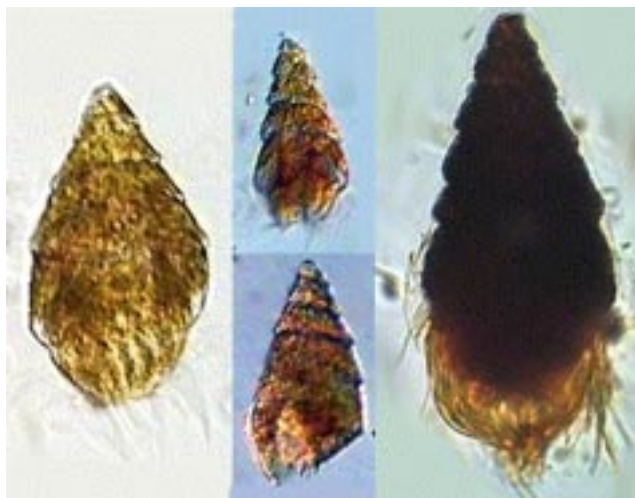
A = Lorica and cell in  
Lugols iodine stain;  
B = Denticulate oral rim



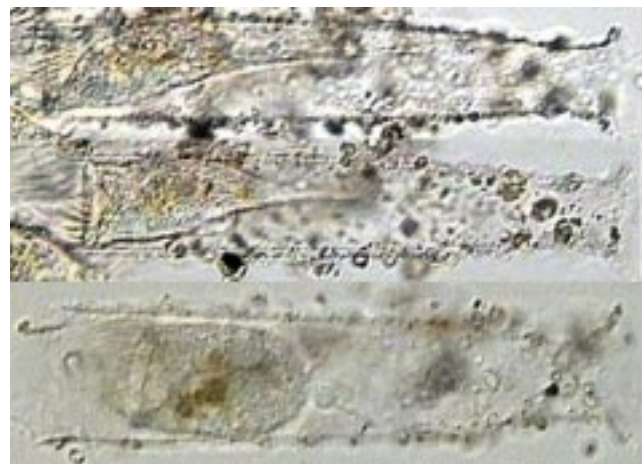
*Favella serrata* (Möbius, 1887)  
Length 180-348 µm, oral diameter 87-145 µm .



*Helicostomella fusiformis* (Meunier, 1919)  
Length 124-180 µm, oral diameter 20-29 µm .



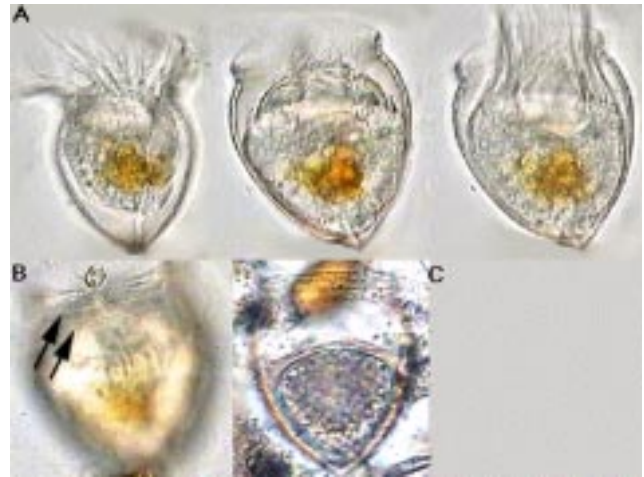
*Laboea strobila* Lohmann 1908  
Length 60-130 µm, width 20-65 µm .



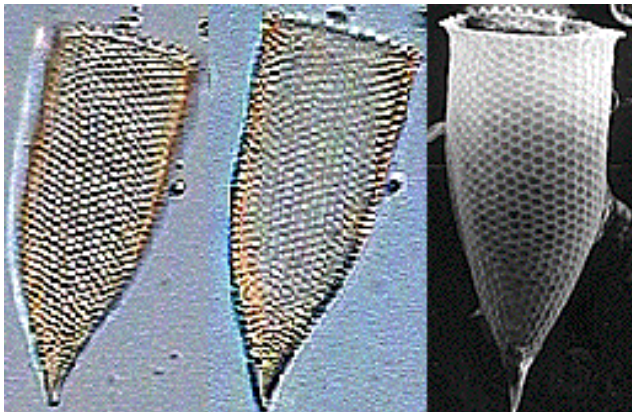
*Leprotintinnus pellucidus* (Cleve, 1899)  
Length 134-240 µm, oral diameter 27-47 µm .



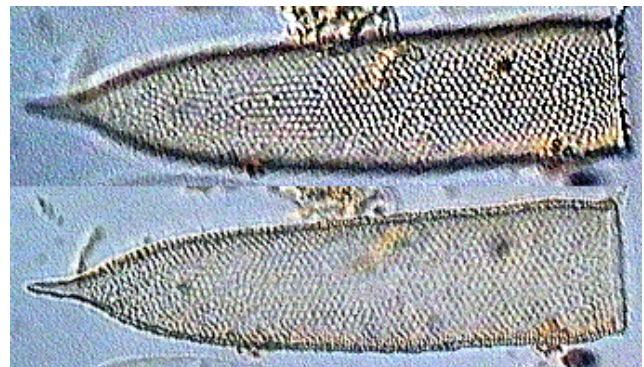
*Mesodinium rubrum* (Lohmann, 1908)  
Length 15-70  $\mu\text{m}$   
Obligate autotroph (?) with many red chloroplasts



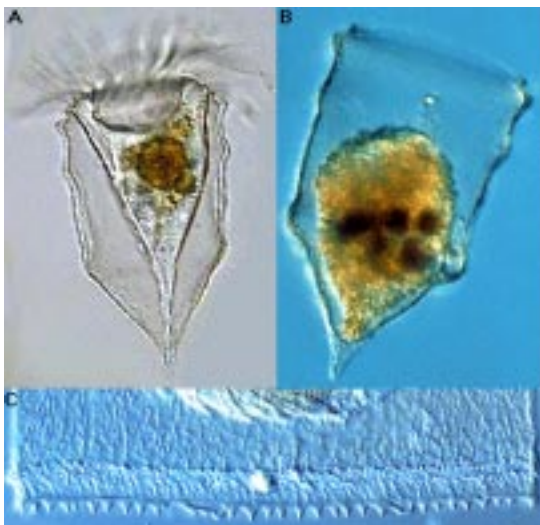
*Metacylis jorgensenii* (Cleve, 1902)  
Length 50-61  $\mu\text{m}$ , oral diameter 44-50  $\mu\text{m}$



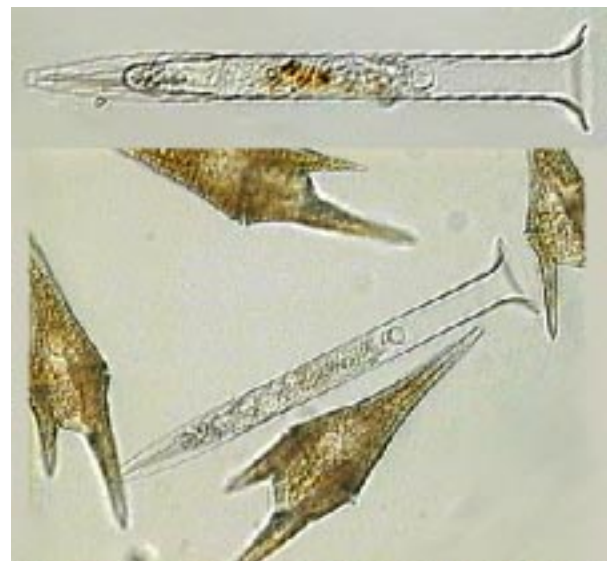
*Parafavella denticulata* (Ehrenberg, 1840)  
Length 120-327  $\mu\text{m}$ , oral diameter 38-62  $\mu\text{m}$



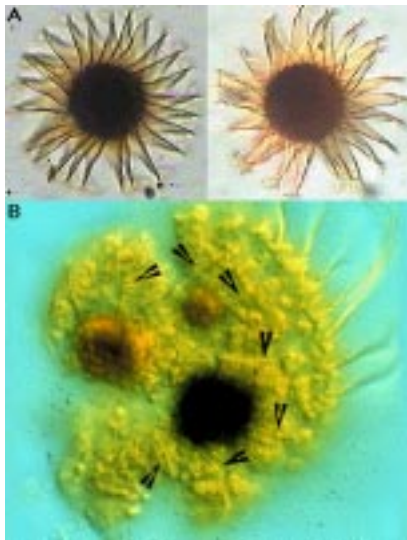
*Parafavella gigantea* (Brandt, 1896)  
Length 200-750  $\mu\text{m}$ , oral diameter 47-87  $\mu\text{m}$



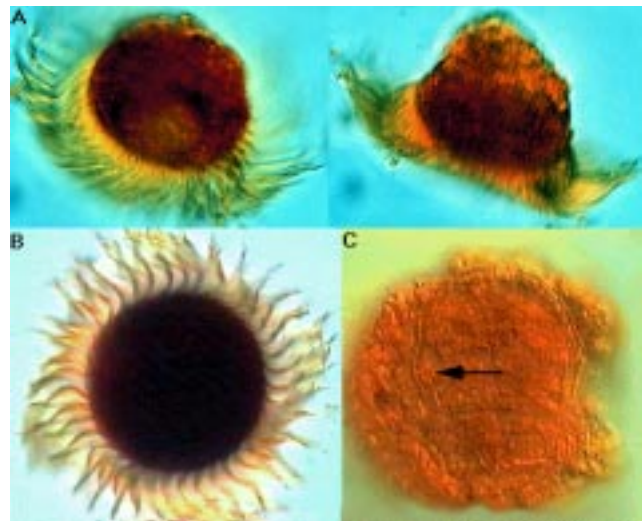
*Ptychocylis urnula* (Claparède et Lachmann, 1858)  
Length 113-190  $\mu\text{m}$ , oral diameter 66-100  $\mu\text{m}$



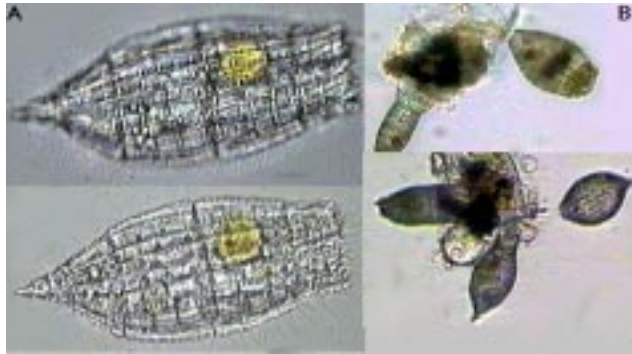
*Salpingella* and *Ceratium furca*  
*Salpingella acuminata* (Claparède et Lachmann, 1858)  
Length 200-370  $\mu\text{m}$ , oral diameter 29-47  $\mu\text{m}$



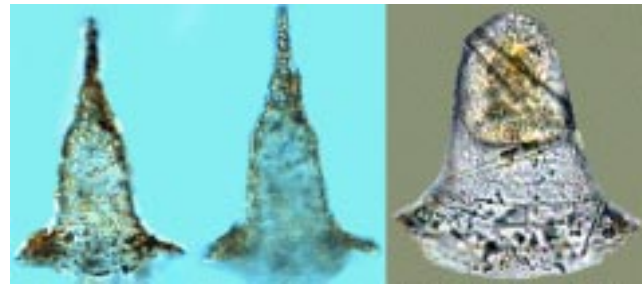
*Strobilidium sphaericum* Lynn et Montagnes 1988  
Length 40-70  $\mu\text{m}$ , width 40-60  $\mu\text{m}$



*Strobilidium spiralis* (Leegaard, 1915)  
A = Lateral view; B = Oral view  
Length 40-60  $\mu\text{m}$ , width 40-52  $\mu\text{m}$

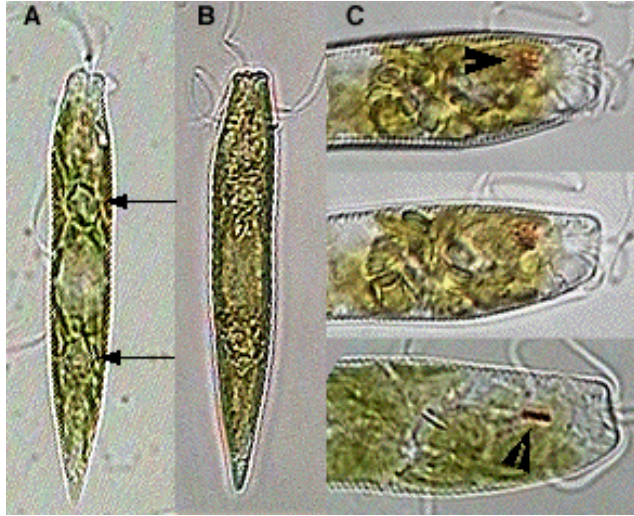


*Tiarina fusus* (Claparède et Lachmann, 1857)  
Length 85-135  $\mu\text{m}$

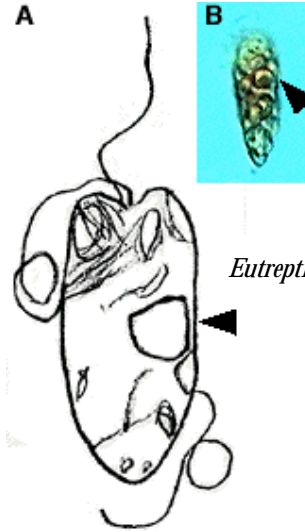


*Tintinnopsis campanula* (Ehrenberg, 1840)  
Length 109-200  $\mu\text{m}$ , oral diameter 63-150  $\mu\text{m}$

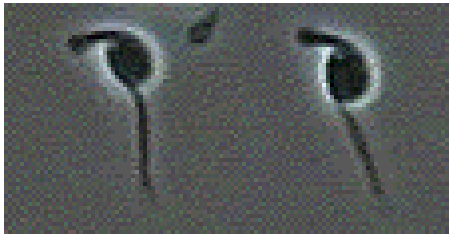
# Phylum Protozoa - Class Flagellata



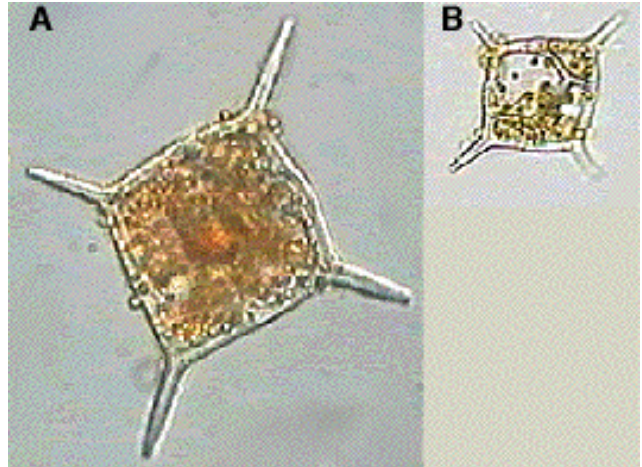
*Eutreptiella braarudii* Thronsen 1969  
Length 64-115  $\mu\text{m}$



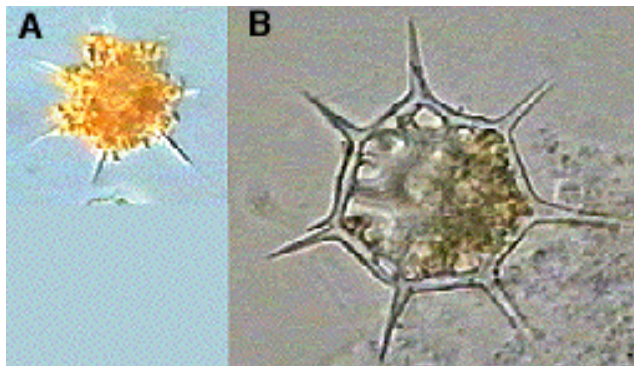
*Eutreptiella gymnastica* Thronsen 1969  
Length 17-38  $\mu\text{m}$



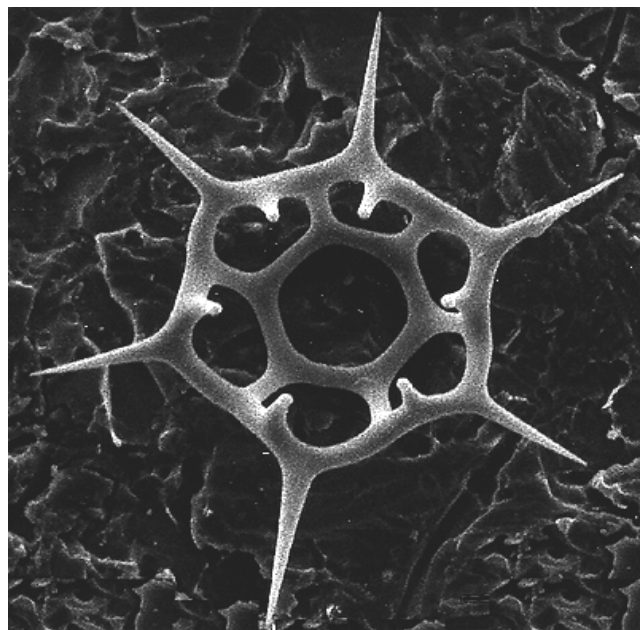
*Rhynchomonas nasuta* (Stokes) Klebs 1892  
Length 3-11  $\mu\text{m}$ , width 2-5  $\mu\text{m}$ .



*Dictyocha fibula* Ehrenberg 1839  
Size: 10-45  $\mu\text{m}$  (including spines)

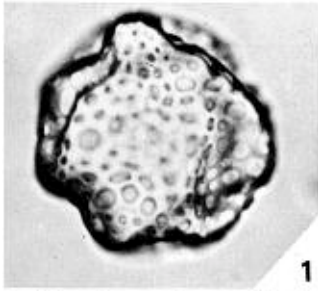


*Dictyocha speculum* Ehrenberg 1839  
Size: 19-34  $\mu\text{m}$  (including spines)



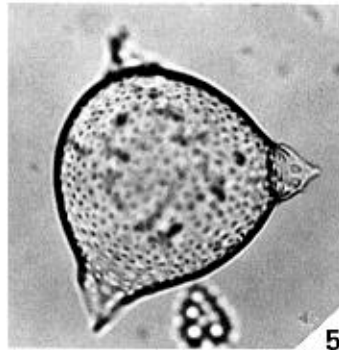
# Phylum Protozoa - Subclass Radiolaria

from: Nigrini and Moore, 1979.



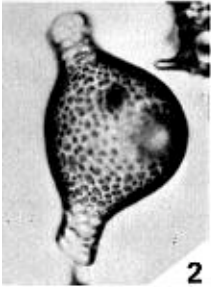
1

*Collosphaera tuberosa* Haeckel. AMPH 9P (7°31'S, 121°56'W), 8-10 cm, T19/4, USNM No. 650930. Nigrini, 1971, pl. 34.1, fig. 1. ×233.



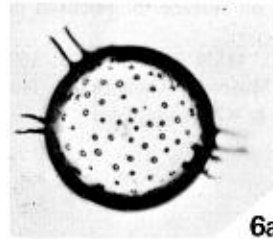
5

*Otosphaera polymorpha* Haeckel. LSDA 124G (32°44'S, 62°24'E), A-R32/0, Sedgwick Museum (Cambridge) No. 856.6. Nigrini, 1967, pl. 1, fig. 8. ×233.

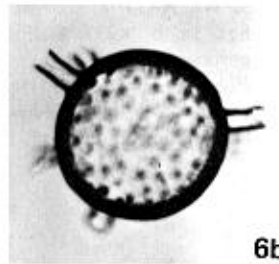


2

*Disolenia quadrata* (Ehrenberg). MSN 39G (12°22'S, 101°25'E), B-H42/1; Sedgwick Museum (Cambridge) No. 847.1. Nigrini, 1967, pl. 1, fig. 5. ×233.

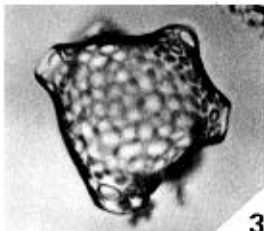


6a



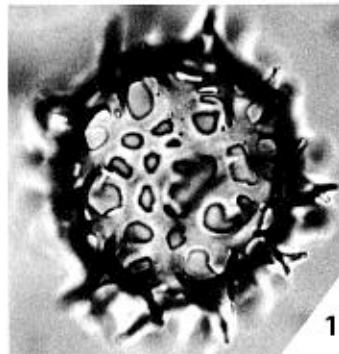
6b

*Siphonosphaera polysiphonia* Haeckel. MSN39G (12°22'S, 101°25'E), A-B30/3, Sedgwick Museum (Cambridge) No. 846.1. Nigrini, 1967, pl. 1, figs. 4a, b. ×233. a. Focused on surface. b. Focused on perimeter.



3

*Disolenia zanzebarica* (Ehrenberg). Discovery 5194 (2°34'S, 44°53'E), A-K28/0; Sedgwick Museum (Cambridge) No. 860.2. Nigrini, 1967, pl. 1, fig. 6. ×233.



1

*Polysolenia arktios* Nigrini. CK 11 (49°39'N, 177°39'W), A-W33/2, USNM No. 651202 (holotype). Nigrini, 1970, pl. 1, fig. 4. ×233.



4

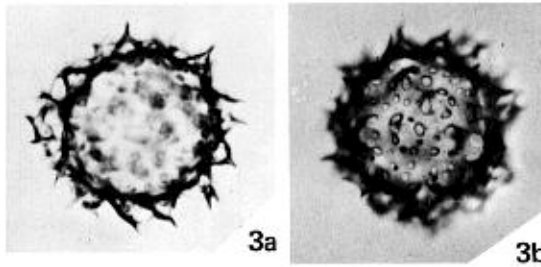
*Otosphaera auriculata* Haeckel. MSN 34G (11°38'S, 109°33'E), B-U36/4, Sedgwick Museum (Cambridge) No. 844.5. Nigrini, 1967, pl. 1, fig. 7. ×233.



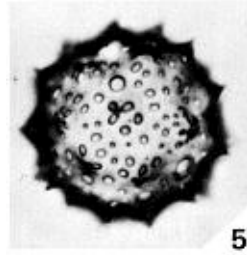
2

*Polysolenia flammabunda* (Haeckel). Discovery 5194 (2°34'S, 44°53'E), C-V39/4; Sedgwick Museum (Cambridge) No. 862.3. Nigrini, 1967, pl. 1, fig. 2. ×233.

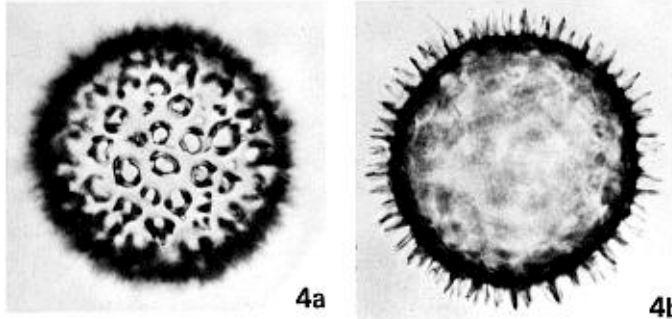




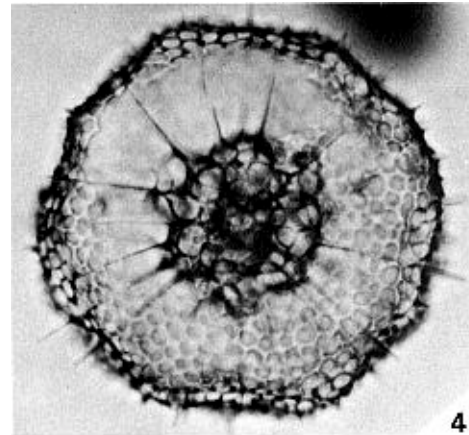
*Polysolenia lappacca* (Haeckel). Discovery 5194 (2°34'S, 44°53'E), C-U33/0; Sedgwick Museum (Cambridge) No. 862.2. Nigrini, 1967, pl. 1, figs. 3a, b. ×233. a. Focused on perimeter. b. Focused on surface.



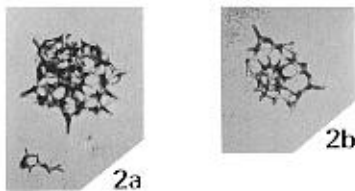
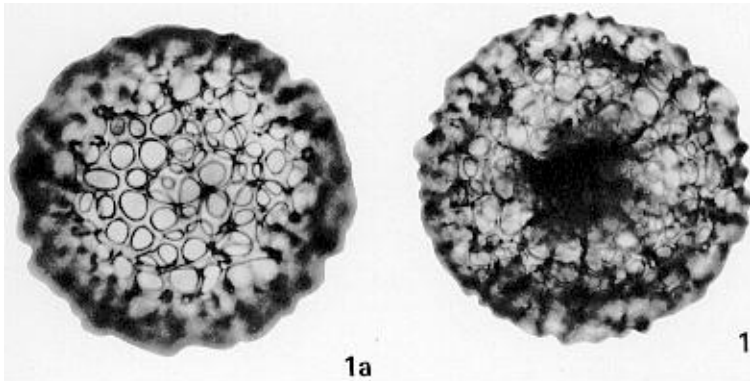
*Polysolenia spinosa* (Haeckel). MSN 34G (11°38'S, 109°33'E), A-W26/4; Sedgwick Museum (Cambridge) No. 843.5. Nigrini, 1967, pl. 1, fig. 1. ×233.



*Polysolenia murrayana* (Haeckel). RIS 36G (9°07'S, 81°32'W), A-G27/2, USNM No. 650022. Nigrini, 1968, pl. 1, figs. 1a, b. ×233. a. Focused on surface. b. Focused on perimeter.



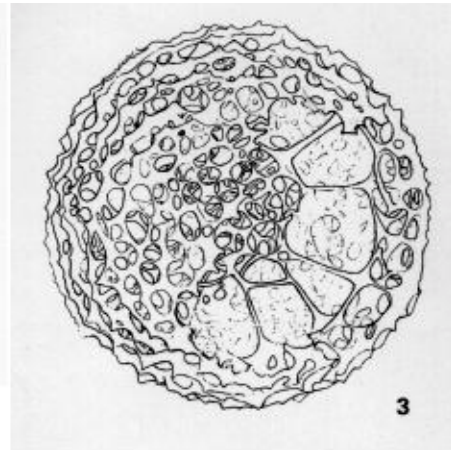
*Actinomma arcadophorum* Haeckel. MSN39G (12°22'S, 101°25'E), B-Y40/4; Sedgwick Museum (Cambridge) No. 847.7. Nigrini, 1967, pl. 2, fig. 3. ×233.

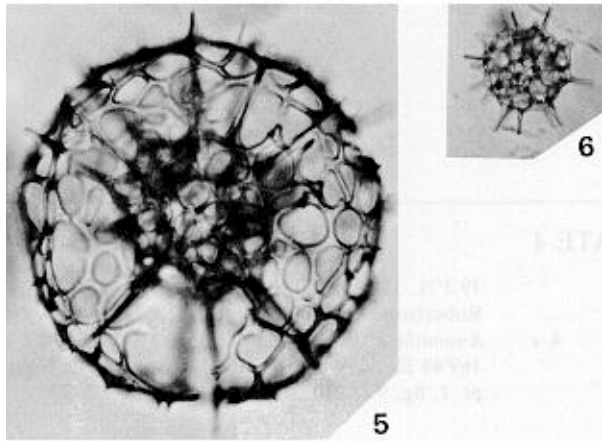


1a, b *Actinomma antarcticum* (Haeckel). LSDA 128G (44°38'S, 70°58'E), D-Q36/0; Sedgwick Museum (Cambridge) No. 859.2. Nigrini, 1967, pl. 2, figs. ×150. a. Focused on surface, no medullary shell or meshwork. b. Focused to show presence of medullary shell and meshwork.

2a, b *Actinomma antarcticum* (Haeckel). Medullary shell of broken specimen, photographed in wet preparation. Nigrini, 1967, pl. 2, figs. 1c, d. ×108.

3 *Actinomma antarcticum* (Haeckel). Antarctic sediments; portion of cortical shell broken away to reveal inner meshwork. Hays, 1965, pl. 1, fig. 1, (*Spongoplegma antarcticum*). ×225.

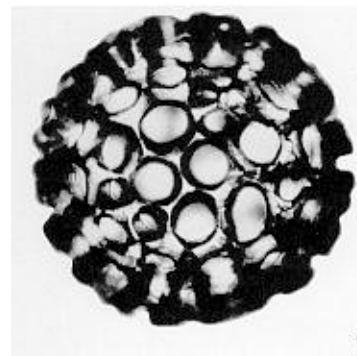




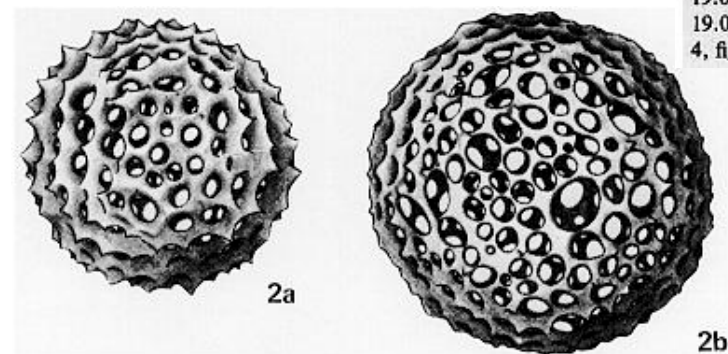
- 5 *Actinomma medianum* Nigrini. LSDA 124G (32°44'S, 62°24'E). A-P25/0, Sedgwick Museum (Cambridge) No. 856.5 (holotype). Nigrini, 1967, pl. 2, fig. 2a. ×233.
- 6 *Actinomma medianum* Nigrini. Medullary shell and meshwork of broken specimen. Nigrini, 1967, pl. 1, fig. 2b. ×108.



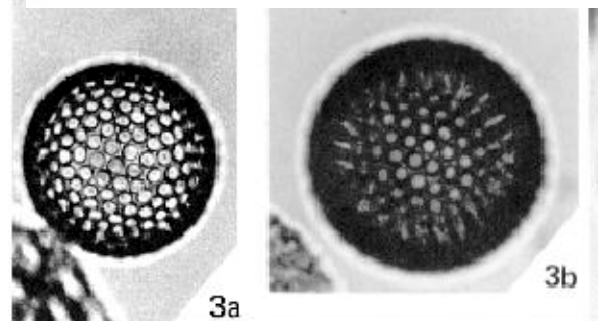
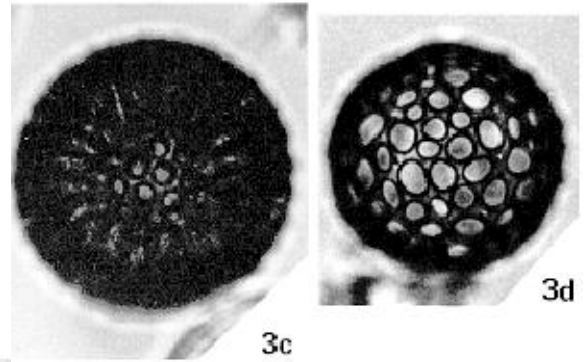
- Actinomma leptodermum* (Jorgensen). VS-R-27b (22°38.4'N, 108°51.5'W), 1–3 cm, J18/3. Benson, 1966, pl. 5, fig. 6, (*Actinomma* sp.). ×233.



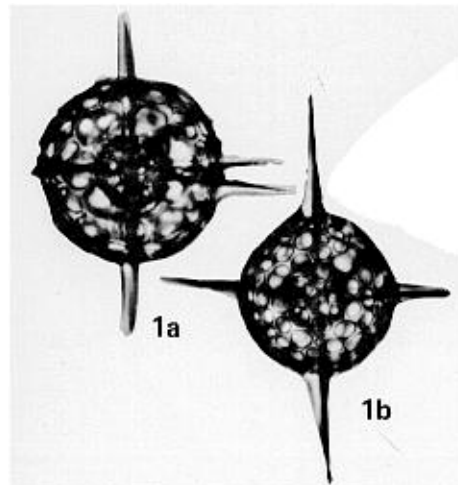
- Cenosphaera coronata* Haeckel. RIS 127G (28°47'N, 123°36'W). Moore, 1974, pl. 5, fig. 1. ×233.



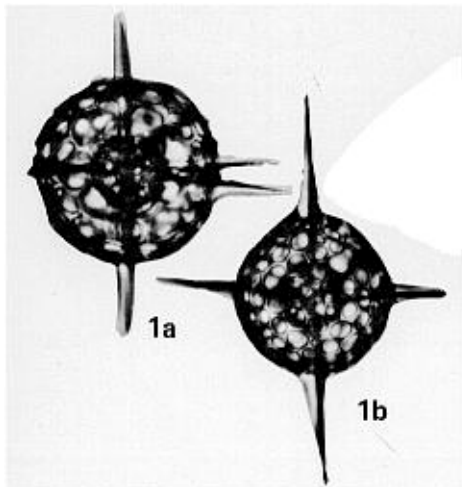
- Cenosphaera cristata* Haeckel?. BANZARE Station 94 (64°28'S, 114°59'E). Riedel, 1958, pl. 1, figs. 1, 2. ×233.



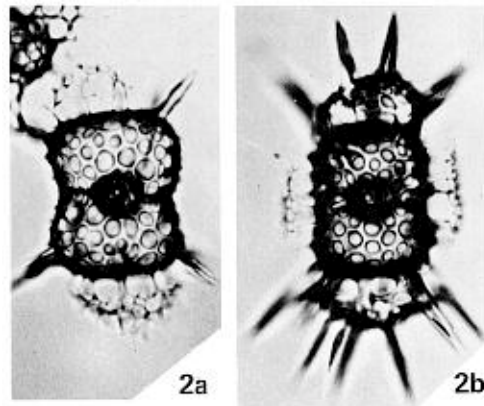
- Cenosphaera* spp. a. V21-71TW (27°54'N, 162°31'E). b. RC12-417TW (38°06'N, 170°00'E). c. RC14-104TW (40°19.3'N, 154°39.9'E). d. RC10-182TW (45°37'N, 177°52'E). Robertson, 1975, pl. 2, figs. 5–8. ×233.



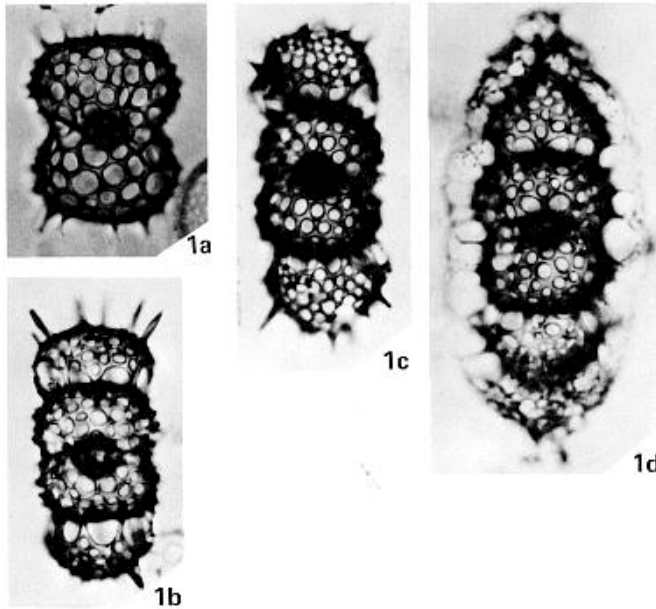
- Hexacontium enthacanthum* Jorgensen. a. VS-R-81a (25°19.0'N, 110°06.5'W), 1–3 cm, Q43/0. b. VS-R-81a (25°19.0'N, 110°06.5'W), 1–3 cm, E18/0. Benson, 1966, pl. 4, figs. 1, 2. ×233.



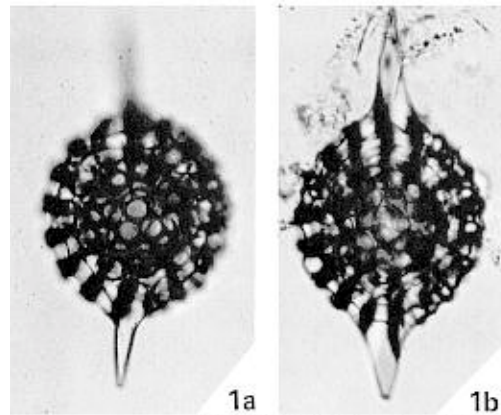
*Hexacontium enthacanthum* Jorgensen. a. VS-R-81a (25° 19.0'N, 110°06.5'W), 1-3 cm, Q43/0. b. VS-R-81a (25° 19.0'N, 110°06.5'W), 1-3 cm, E18/0. Benson, 1966, pl. 4, figs. 1, 2. ×233.



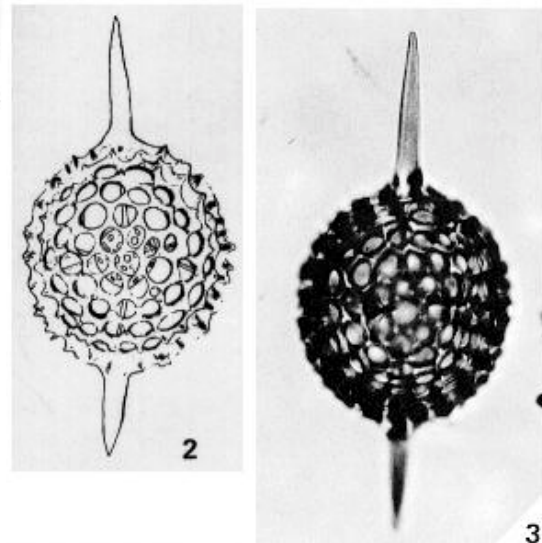
*Ommatartus tetralthalamus coronatus* (Haeckel). a. JYN II 19G (37°46'N, 149°49'E), AOY 25/2, USNM No. 651211. b. ZETES III, 3G (33°19'N, 158°02'E), A-N20/0, USNM No. 651212. Nigrini, 1970, pl. 1, figs. 13, 14. ×233.



*Ommatartus tetralthalamus tetralthalamus* (Haeckel). a. MSN 39G (12°22'S, 101°25'E), B-W27/3, Sedgwick Museum (Cambridge) No. 847.6, without polar caps. b. LSDA 124G (32°44'S, 62°24'E), A-K34/4, Sedgwick Museum (Cambridge) No. 856.4, with single polar cap bearing prominent spines. c. MSN 39G (12°22'S, 101°25'E), B-Z39/2, Sedgwick Museum (Cambridge) No. 847.8, with single polar caps. d. VEMA 19-168 (12°44'S, 82°01'E), A-C43/3, Sedgwick Museum (Cambridge) No. 864.1, with single polar caps and lateral meshwork. Nigrini, 1967, pl. 2, figs. 4a-d. ×233.



*Stylatractus* spp. 6604-10P (43°16'N, 126°24'W). Moore, 1974, pl. 9, figs. 5, 6. ×233.

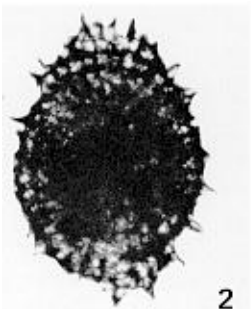


2 *Axoprimum stauraxonium* Haeckel. Antarctic sediments. Hays, 1965, pl. 1, fig. 3. ×225.

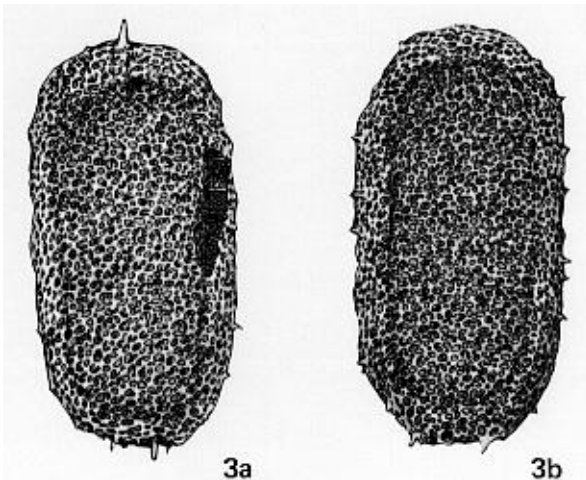
3 *Axoprimum stauraxonium* Haeckel. V24-52P (1°49'N, 127° 00'W). Moore, 1974, pl. 9, fig. 4. ×233.



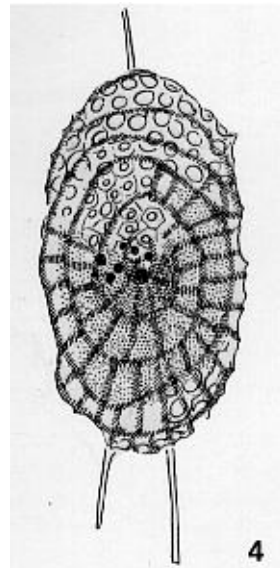
1  
*Ommatogramma dimitricai* Petrushevskaya. DSDP Leg 29, 278-28-3 (56°33.42'S, 160°04.29'E). Petrushevskaya, 1974, pl. 7, fig. 3. ×170.



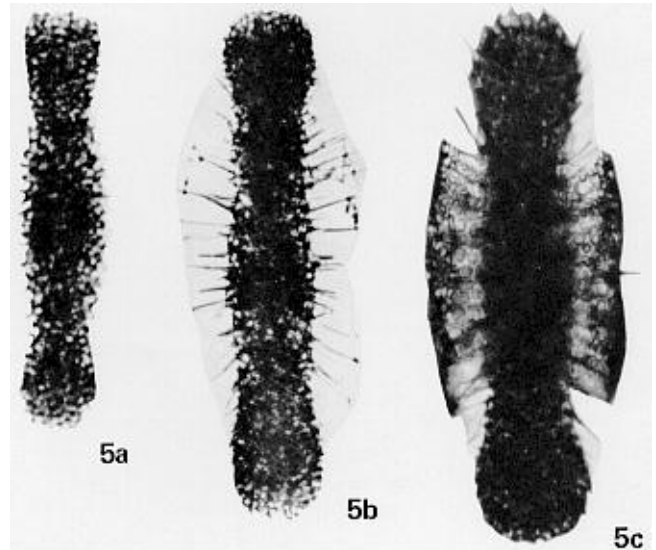
2  
*Spongurus* cf. *elliptica* (Ehrenberg). VS-R-27b (22°38.4'N, 108°51.5'W), 1-3 cm, T52/2. Benson, 1966, pl. 8, fig. 4. ×233.



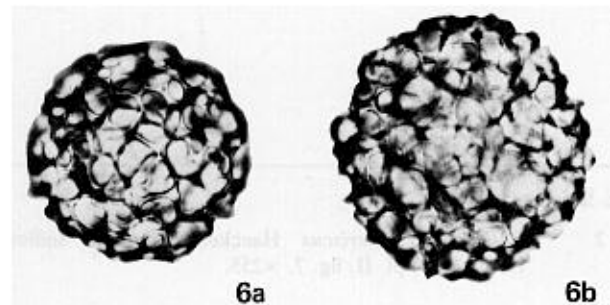
3a 3b  
*Spongurus pylomaticus* Reidel. BANZARE Station 94 (64°28'S, 114°59'E). a. Holotype. b. Paratype. Reidel, 1958, pl. 1, figs. 10, 11. ×233.



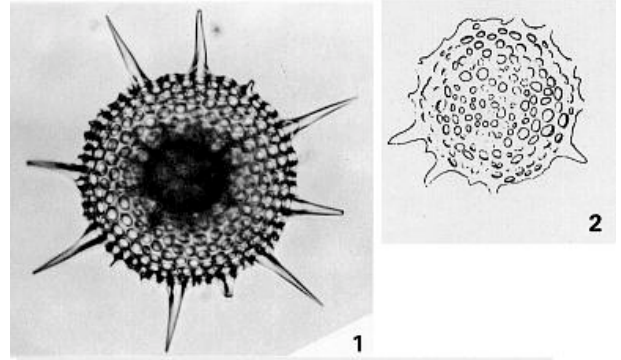
4  
*Spongurus* (?) sp. Deep water Antarctic sediments (station 16). Petrushevskaya, 1967, fig. 26-I. ×195.



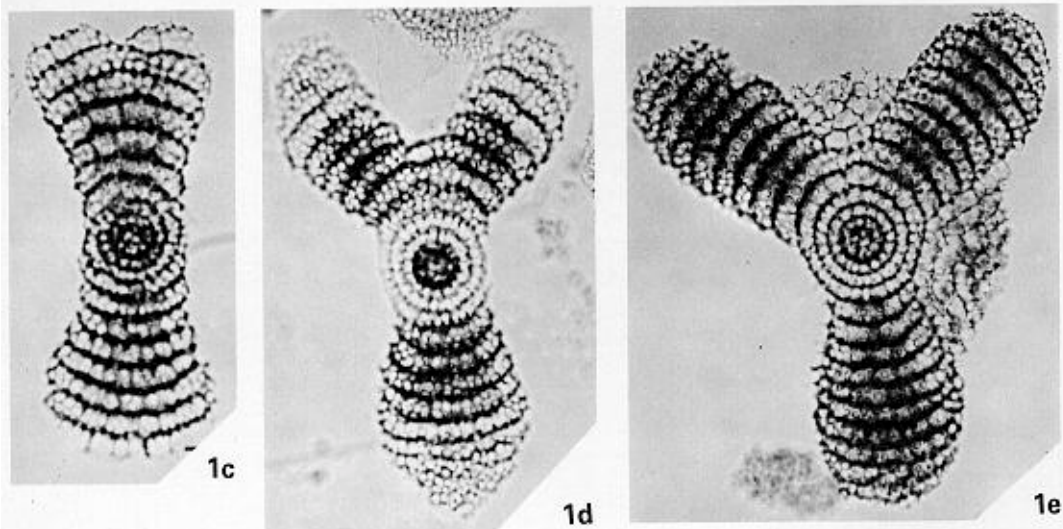
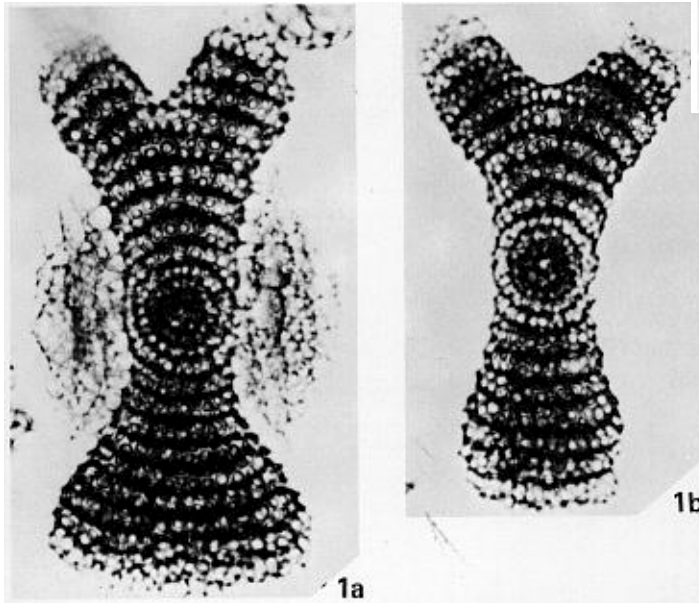
5a 5b 5c  
*Spongocore puella* Haeckel. VS-R-71a (24°42.5'N, 109°48.7'W), 1-3 cm. a. V 23/4, mantle lacking. b. Q12/0, mantle rudimentary. c. N26/4, mantle complete. Benson, 1966, pl. 8, figs. 1-3. ×233.



6a 6b  
*Styptosphaera* (?) *spumacea* Haeckel. 5a. CAS 2 (45°02'N, 127°13'W), A-M 25/0, USNM No. 651205; 5b. CK3 39°56'N, 158°38'W), A-Y 12/2, USNM No. 651206. Nigrini, 1970, pl. 1, figs. 7, 8. ×233.

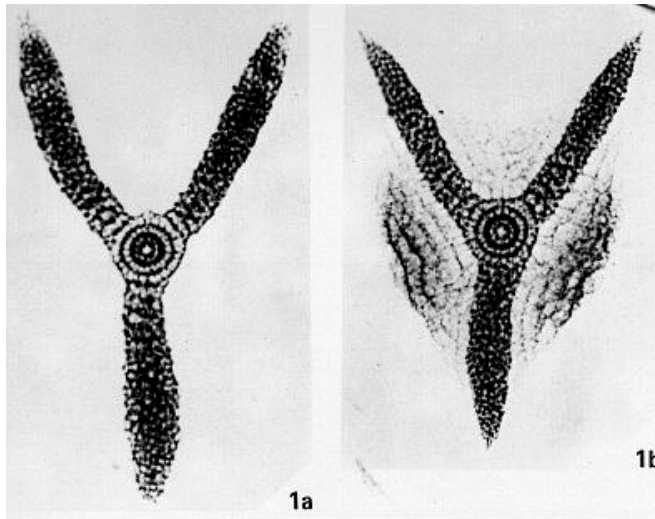


1 *Heliodiscus asteriscus* Haeckel. Discovery 5194 (2°34'S, 44°53'E), A-H 24/4, Sedgwick Museum (Cambridge) No. 860.1. Nigrini, 1967, pl. 3, fig. 1a. ×150.  
 2 *Heliodiscus asteriscus* Haeckel. Antarctic sediments. Hays, 1965, pl. II, fig. 7. ×255.

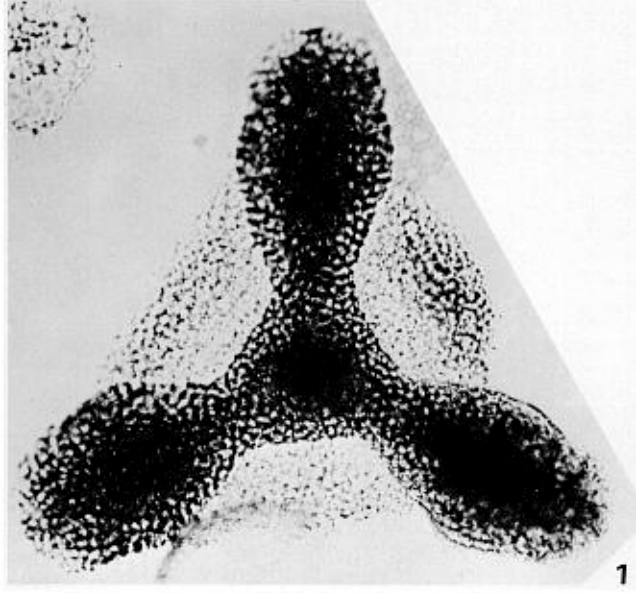


*Amphirhopatum ypsilon* Haeckel. a. Discovery 5194 (2°34'S, 44°53'E), C-X 34/0, Sedgwick Museum (Cambridge) No. 862.4, with patagium. b. MSN 34G (11°38'S, 109°33'E), B-Q 43/0, Sedgwick Museum (Cambridge) No. 844.3, without patagium; Nigrini, 1967, pl. 3, figs. 3a, b; ×233. c. AMPH 9P (7°31'S, 121°56'W), 8–10 cm, L54/2, USNM No. 650938, showing 5 chambers on the forked

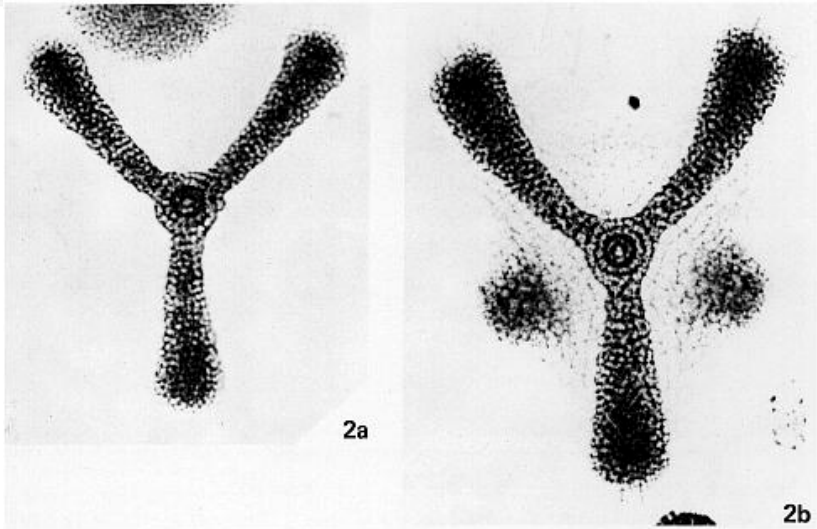
arm before bifurcation. d. SDSE 62 (3°00'S, 136°26'W), 1028–30 cm, M22/1, USNM No. 650939, showing 2 chambers on the forked arm before bifurcation. e. SDSE (3°00'S, 136°26'W), 788–90 cm, A-H 53/3, USNM No. 650940, showing 1 chamber on the forked arm before bifurcation. Nigrini, 1971, pl. 34.1, figs. 7a–c. ×233.



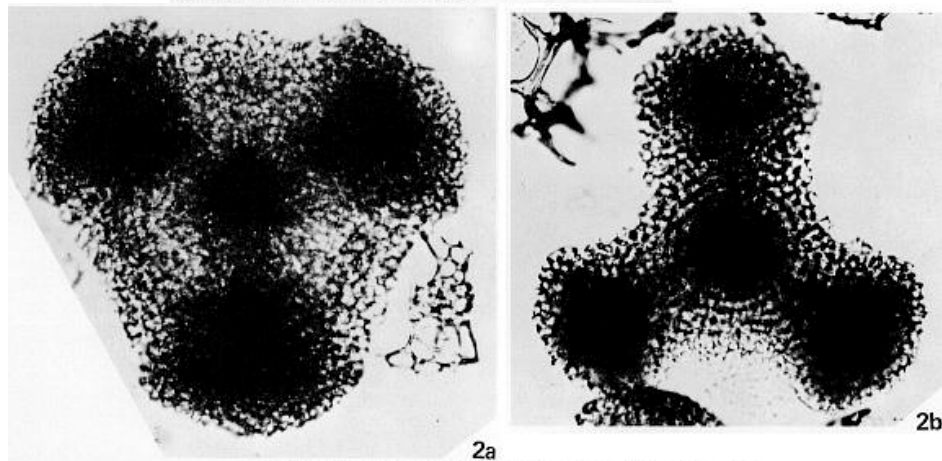
*Euchitonius elegans* (Ehrenberg). a. Discovery 5194 (2° 34'S, 44°53'E), D-K38/0, Sedgwick Museum (Cambridge) No. 863.5, without patagium. b. Discovery 5194 (2°34'S, 44°53'E), D-J 33/0, Sedgwick Museum (Cambridge) No. 863.2, with patagium. Nigrini, 1967, pl. 4, figs. 2a, b. ×150.



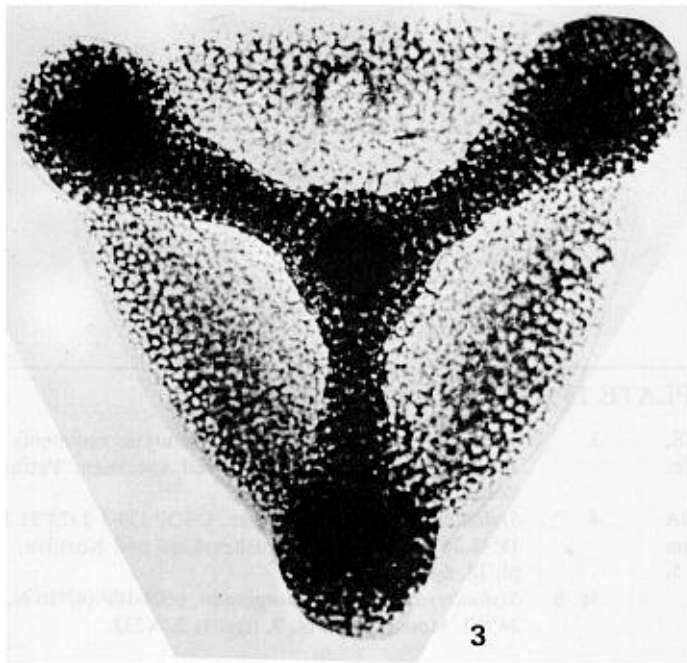
*Dictyocoryne profunda* Ehrenberg. RC11-209P (3°39'N, 140°04'W). Moore, 1974, pl. 7, fig. 5. ×233.



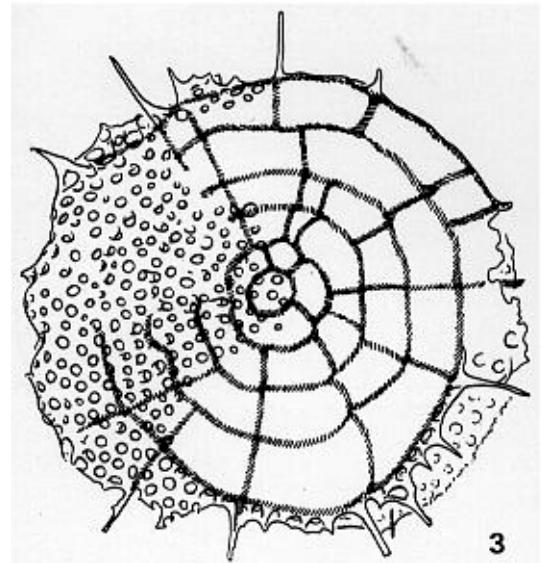
*Euchitonius furcata* Ehrenberg. a. MSN34G (11°38'S, 109° 33'E), B-V35/1, Sedgwick Museum (Cambridge) No. 844.7, without patagium. b. MSN39G (12°22'S, 101°25'E), B-N41/2, Sedgwick Museum No. 847.2, with patagium. Nigrini, 1967, pl. 4, figs. 1a, b. ×150.



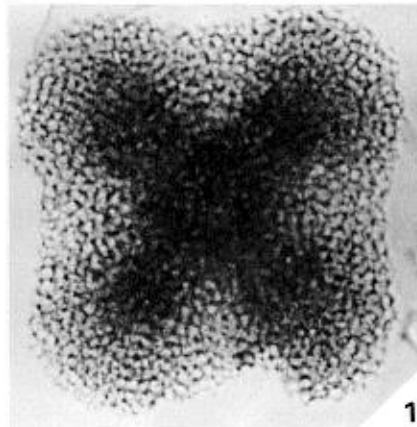
*Dictyocoryne truncatum* (Ehrenberg). a. RC11-209P (3° 39'N, 140°04'W); Moore, 1973, pl. 7, fig. 4; ×233. b. RC11-209P (3°39'N, 140°04'W); Moore, 1974, pl. 6, fig. 8 (*Euchitonius triangulum*). ×233.



*Hymeniastrum euclidis* Haeckel. VS-R-46b (23°39.0'N, 108°37.8'), 1-3 cm, U54/0; Benson, 1966, pl. 12, fig. 2. ×233.



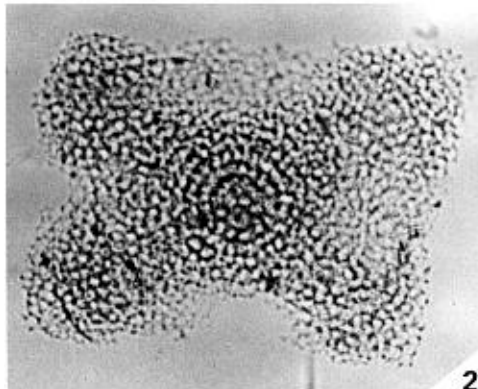
*Stylocladia aculeata* Jorgensen. Antarctic sediments (s 33) south of 60°S; well-preserved specimen. Petrushevskaya, 1967, fig. 17, I. ×380.



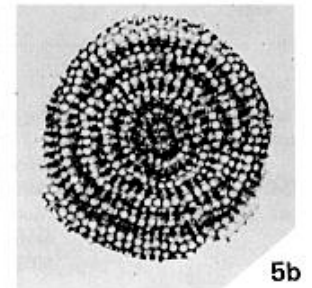
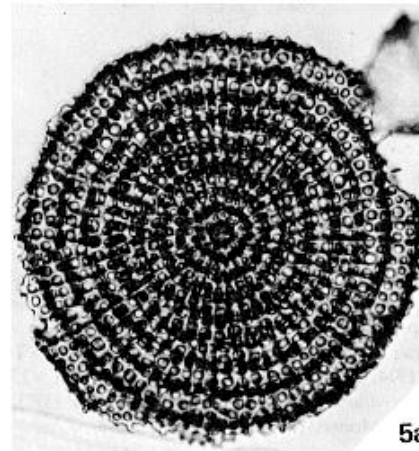
*Spongaster tetras tetras* Ehrenberg. MSN34G (11°38'S, 109°33'E), A-T43/4, Sedgwick Museum (Cambridge No. 843.4. Nigrini, 1967, pl. 5, fig. 1a. ×233.



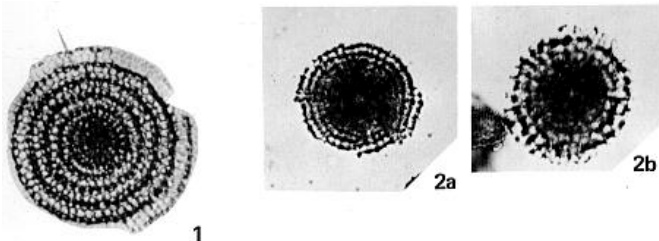
*Stylocladia aculeata* Jorgensen. DSDP 139-1-2 (23°31.14'N, 18°42.26'W), 5-7 cm. Petrushevskaya and Kozlova, 1972, pl. 18, fig. 6. ×200.



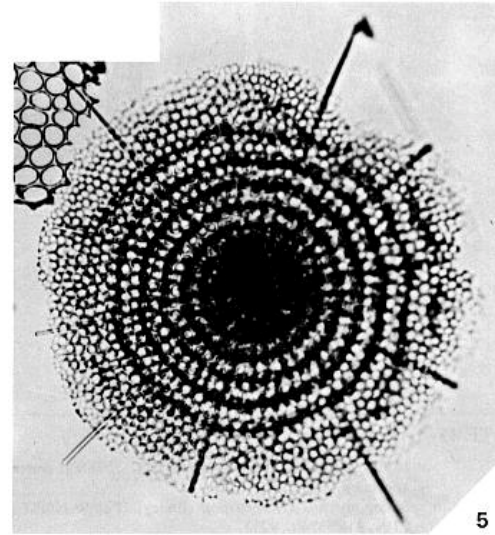
*Spongaster tetras Ehrenberg irregularis* Nigrini. LSDA 124G (32°44'S, 62°24'E), A-K31/0, Sedgwick Museum (Cambridge) No. 856.2 (holotype). Nigrini, 1967, pl. 5, fig. 2. ×233.



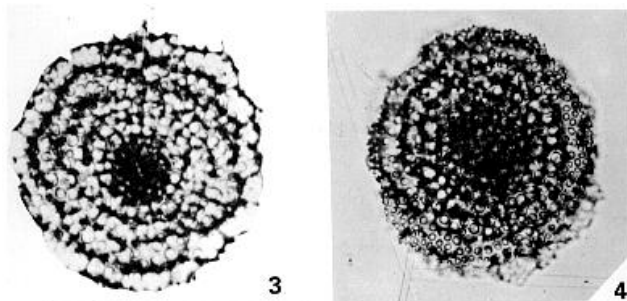
*Stylocladia validispina* Jorgensen. 6604-10P (43°16'N, 126°24'W). Moore, 1974, pl. 9, figs. 1, 2. ×233.



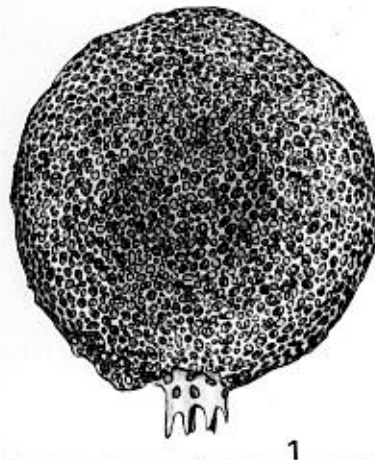
1 *Porodiscus* sp. A. VS-R-27b (22°38.4'N, 108°51.5'W), 1-3 cm, C46/4. Benson, 1966, pl. 10, fig. 3 (*Ommatodiscus* sp.). ×233.  
2a, b *Porodiscus* sp. A. Y70-2-34P (54°0.6'N, 154°47.2'W). Moore, 1974, pl. 8, figs. 4, 5 (*Ommatodiscus* sp. A). ×233.



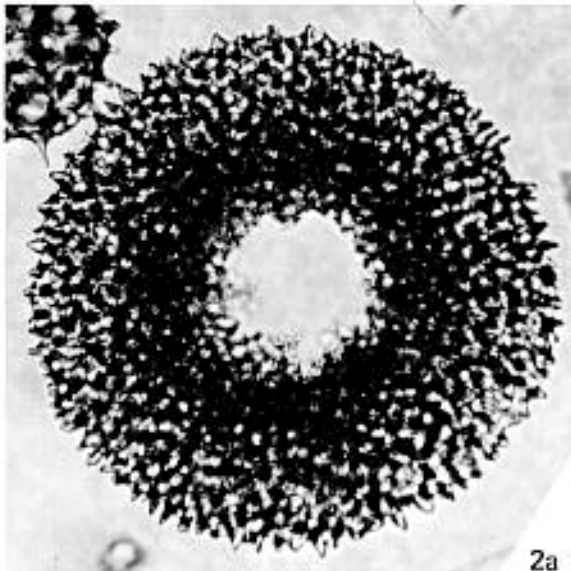
5 *Stylochlamyidium asteriscus* Haeckel. RC 9-79P (19°32.9'S, 150°00'W). Moore, 1974, pl. 6, fig. 2. ×233.



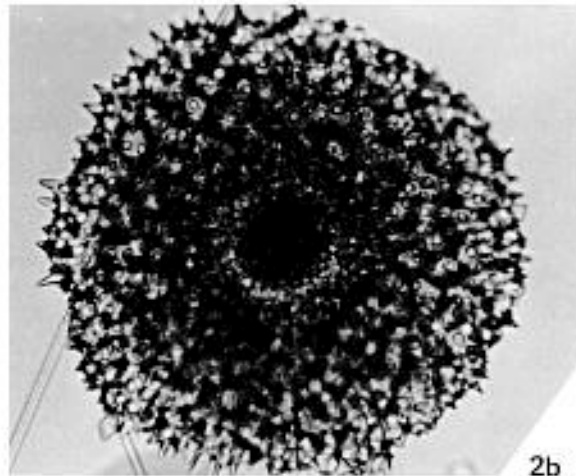
3 *Porodiscus* (?) sp. B. VS-R-71a (24°42.5'N, 109°48.7'W), 1-3 cm, X24/1. Benson, 1966, pl. 10, fig. 4 (*Ommatodiscus* sp.). ×233.  
4 *Porodiscus* (?) sp. B. 6604-10P (43°16'N, 126°24'W). Moore, 1974, pl. 9, fig. 3 (*Ommatodiscus* sp. B). ×233.



1 *Spongopyle osculosa* Dreyer. BANZARE Station 94 (64°28'S, 114°59'E). Riedel, 1958, pl. 1, fig. 12. ×233.



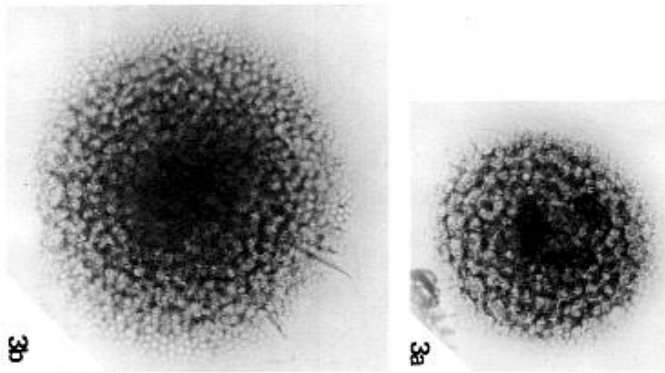
2a



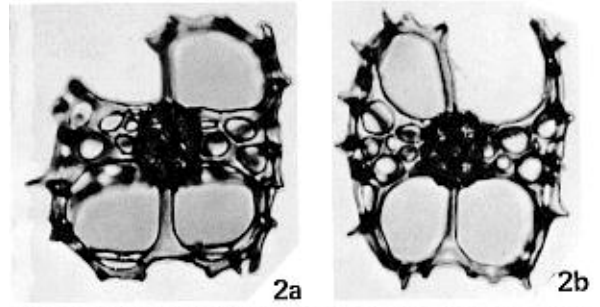
2b

*Spongotrochus glacialis* Popofsky group. a. V 29-88 (47°51'S, 26°47'E). b. V29-87 (49°10'S, 27°23'E). c. V16-65 (45°00'S, 45°46'E). d. V29-84 (43°51'S, 27°36'E), corroded specimen. ×100.

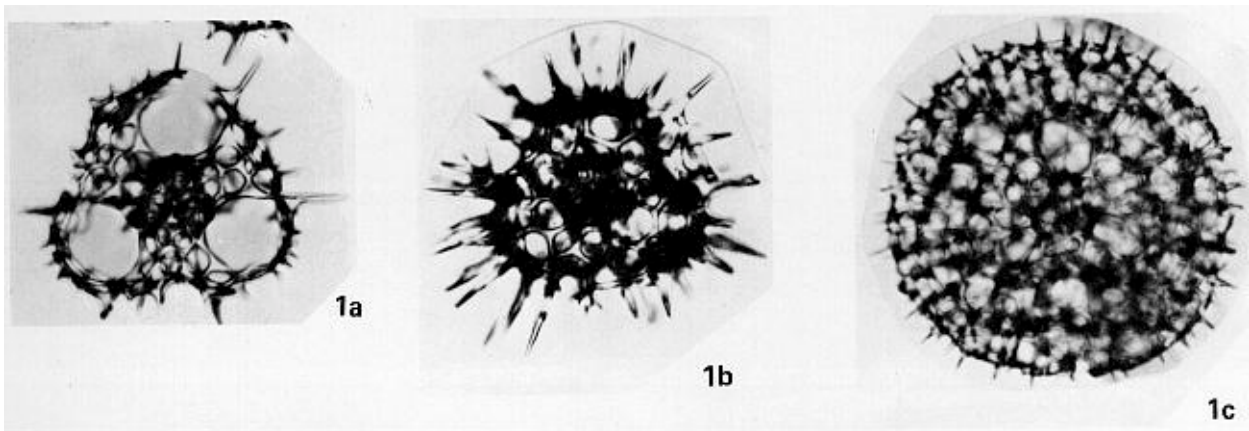




*Spongotrochus (?) venustum* (Bailey). Y71-10-116PG (28° 27'N, 116°56'W). ×233.

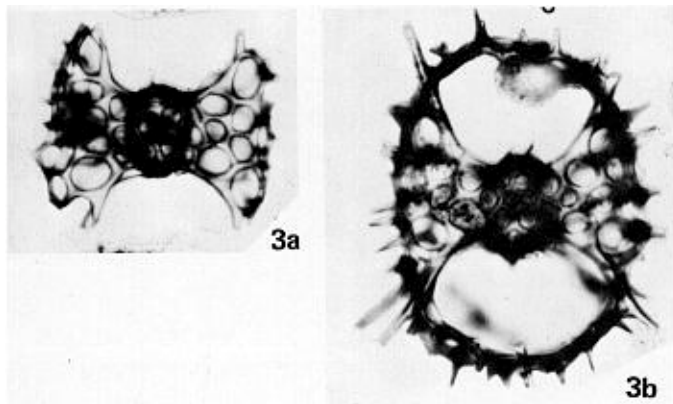


*Octopyle stenozona* Haeckel. a. VS-R-27b (22°38.4'N, 108° 51.5'W), 1-3 cm, E33/4, frontal view. b. VS-R-71a (24° 42.5'N, 109°48.7'W), 1-3 cm, G19/4, frontal view. Benson, 1966, pl. 16, figs. 3, 4. ×233.

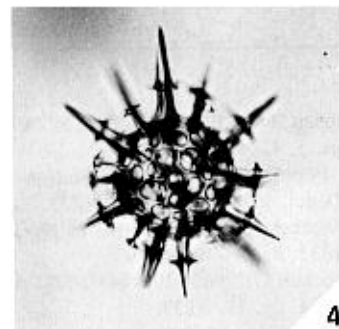


*Hexapyle* spp. a. VS-R-27b (28°38.4'N, 108°51.5'W), 1-3 cm, Y17/0. b. VS-R-81a (25°19.0'N, 110°06.5'W), 1-3 cm, X51/2. c. VS-R-92a (25°51.0'N, 110°40.6'W), 1-3 cm,

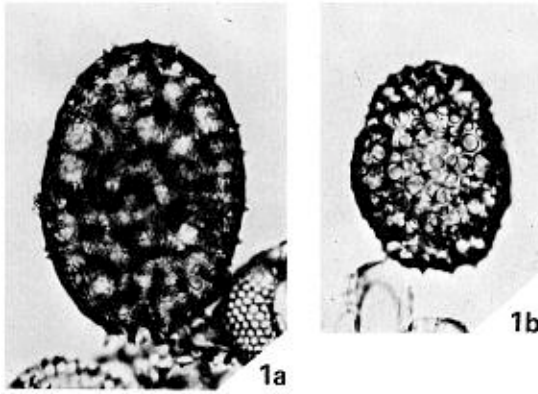
H17/1. Benson, 1966, pl. 18, figs. 14-16 (*Hexapyle dodecantha*). ×233.



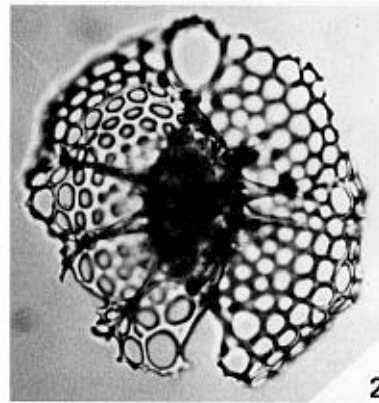
*Tetrapyle octacantha* Muller. a. VS-R-71A (24°42.5'N, 109°48.7'W), 1-3 cm, X20/0, frontal view. b. VS-R-71A (24°42.5'N, 109°48.7'W), 1-3 cm, D4/2, frontal view, eight diagonal spines. Benson, 1966, pl. 15, figs. 3, 8. ×233. See Benson, 1966, for additional illustrations.



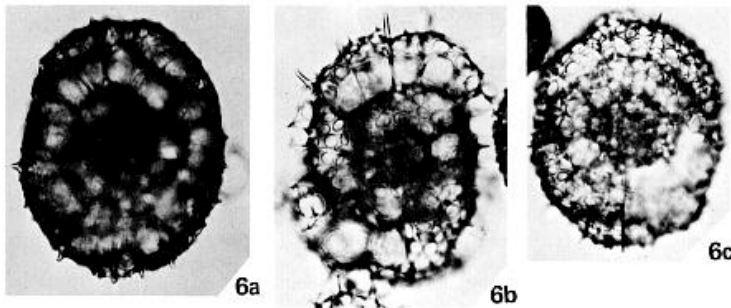
? *Prunopyle antarctica* Dreyer. 6604-10P (43°16'N, 126° 24'W). Moore, 1974, pl. 2, fig. 4 (*Cromyechinus antarctica*). ×233.



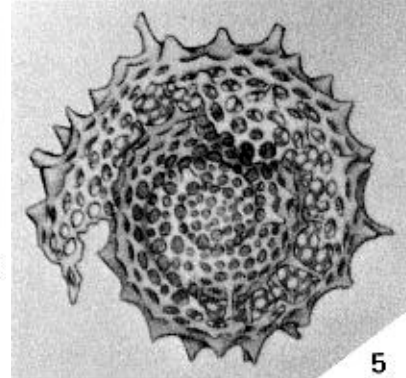
*Larcopyle butschlii* Dreyer. A. V18-314P (1°14'S, 122°55'W).  
b. RIS 127G (28°47'N, 123°36'W). Moore, 1974, pl. 6,  
figs. 1, 2. ×233.



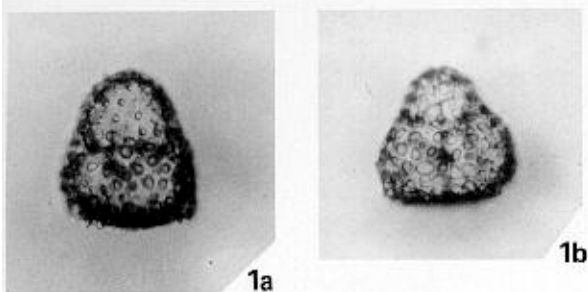
*Larcospira quadrangula* Haeckel. CAS2 (45°02'N, 127°  
13'W), A-Y44/0, USNM No. 651221. Nigrini, 1970, pl. 2,  
fig. 9. ×233.



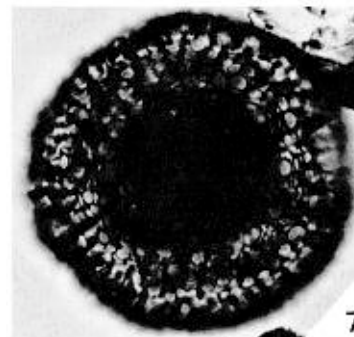
*Pylospira octopyle* Haeckel (?). 6604-10P (43°16'N, 126°  
24'W). Moore, 1974, pl. 5, figs. 8-10. ×233.



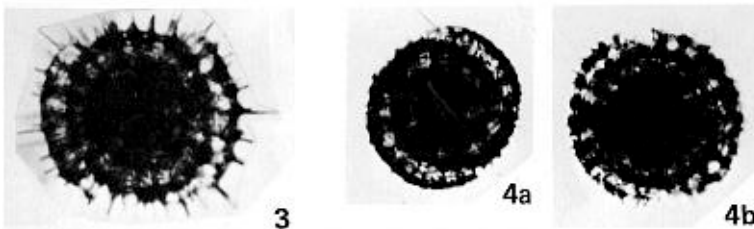
*Lithelius nautiloides* Popofsky. BANZARE Station 94,  
(64°28'S, 114°59'E). Riedel, 1958, pl. 2, fig. 3. ×233.



*Antarctica denticulata* (Ehrenberg). V16-129 (59°22'S,  
142°53'W), 10-2 cm. ×233.

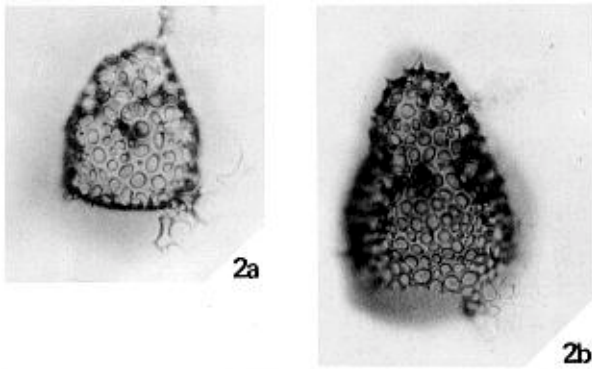


*Spirema melonia* Haeckel (?). 6604-10P (43°16'N, 126°  
24'W). Moore, 1974, pl. 5, fig. 11. ×233.

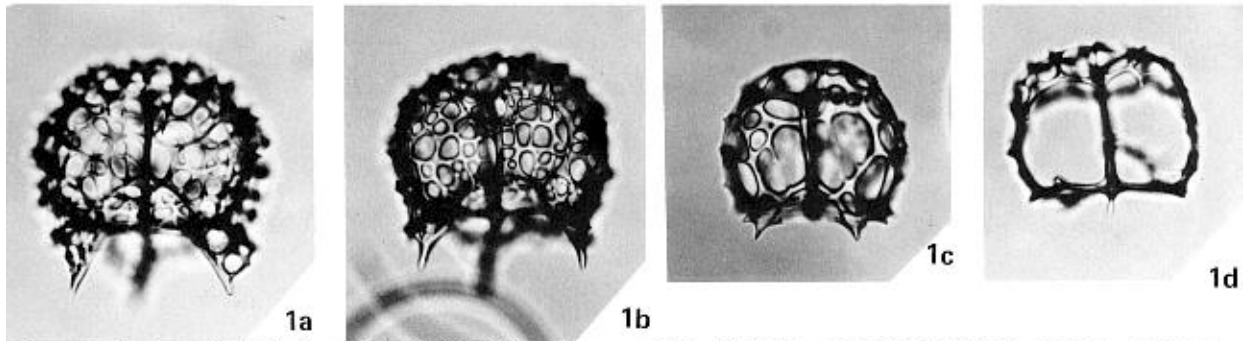


3 *Lithelius minor* Jorgensen. VS-R-71a (24°42.5'N, 109°48.7'  
W), 1-3 cm, L42/3. Benson, 1966, pl. 17, fig. 10. ×233.

4a, b *Lithelius minor* Jorgensen. 6604-10P (43°16'N, 126°24'W).  
Moore, 1974, pl. 5, figs. 3, 4. ×233.

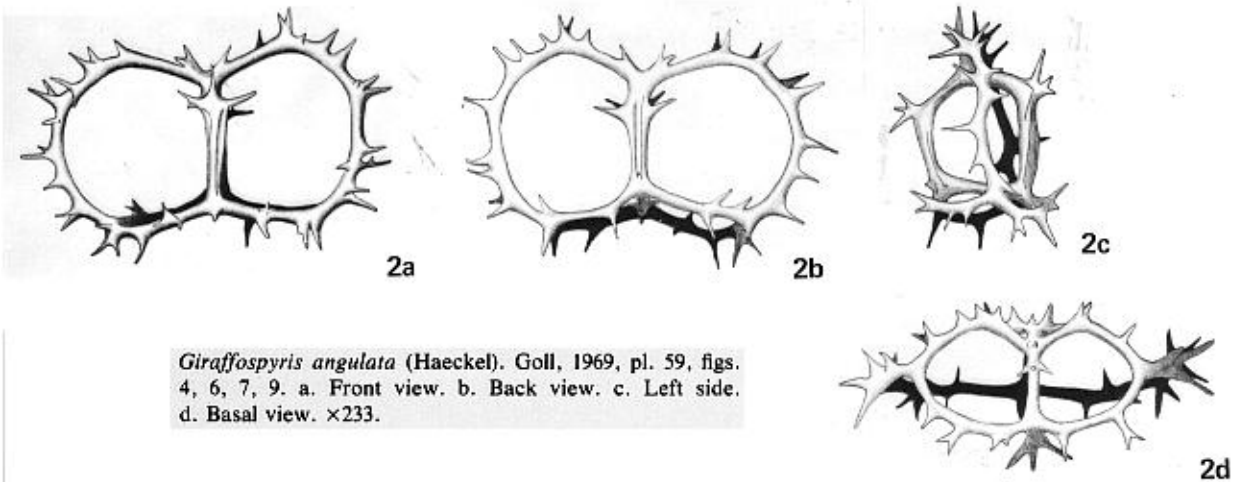


*Antarctissa strelkovi* Petrushevskaya. V16-129 (59°22'S, 142°53'W), 0-2 cm. ×233.

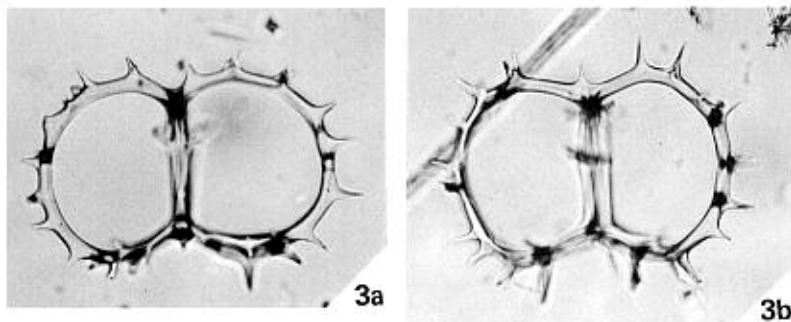


*Ceratospyris borealis* (Bailey). a. CK 11 (44°39'N, 177°39'W), A-J51/3, USNM No. 651224. b. CK 8 (53°01'N, 176°15'W), A-A16/3. USNM No. 651225. c. CK 8 (53°

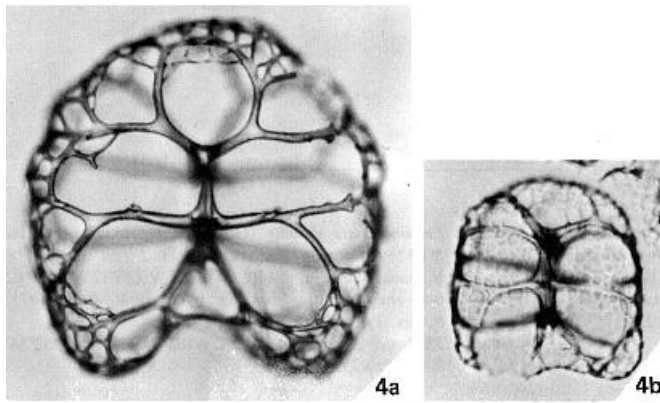
01'N, 176°15'W), A-U43/2, USNM No. 651226. d. CK 11 (44°39'N, 177°39'W), A-P22/1, USNM No. 651227. Nigrini, 1970, pl. 3, figs. 3-6, (*Tristylospyris* sp.). ×233.



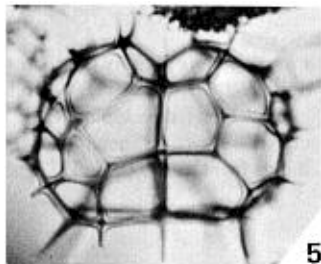
*Giraffospyris angulata* (Haeckel). Goll, 1969, pl. 59, figs. 4, 6, 7, 9. a. Front view. b. Back view. c. Left side. d. Basal view. ×233.



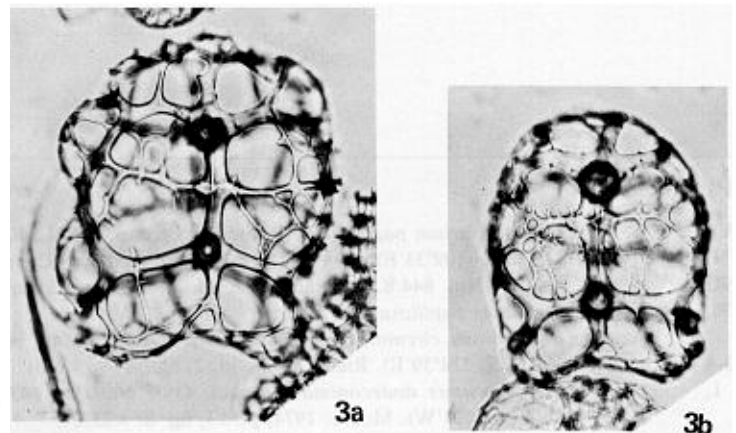
*Giraffospyris angulata* (Haeckel). DWBG 13 (1°01'N, 132°14'W), 2-4 cm. ×233.



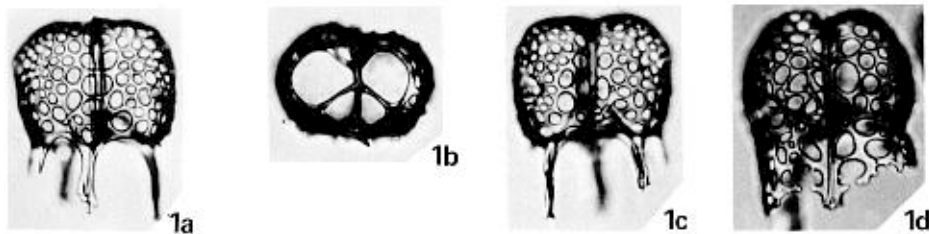
*Liriospyris reticulata* (Ehrenberg). a. DISCOVERY 5194 (2°34'S, 44°53'E), D-H32/0, Sedgwick Museum (Cambridge) No. 863.1. b. MSN 34G (11°38'S, 109°33'E), B-B32/0, Sedgwick Museum (Cambridge) No. 844.1. Nigrini, 1967, pl. 5, fig. 3 (*Amphispyris reticulata*), pl. 5, fig. 4 (*Amphispyris costata*). ×233.



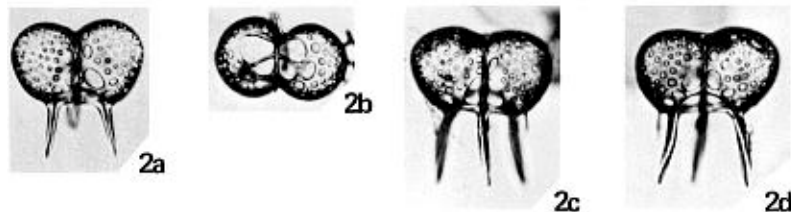
*Lophospyris pentagona pentagona* (Ehrenberg) emend. Goll. DISCOVERY 5194 (2°34'S, 44°53'E), C-D23/3; Sedgwick Museum (Cambridge) No. 862.1. Nigrini, 1967, pl. 5, fig. 6 (*Ceratospyris* sp.). ×233.



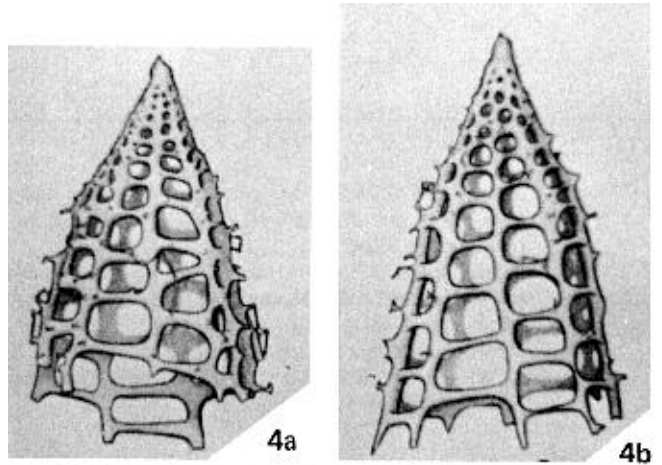
*Tholospyris procera* Goll. DWBG 13 (1°01'N, 132°14'W), 2-4 cm. ×233.



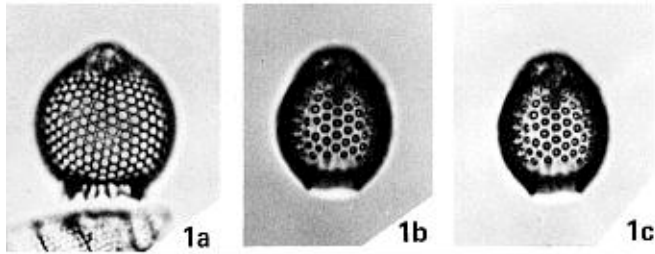
*Phormospyris stabilis* (Goll) *antarctica* (Haecker), V22-106 TW (46°08'S, 10°54'W), 0-2 cm. a-c. Specimen with delicate skeletal development: a. front view, b. basal view, c. back view. d. Specimen with massive skeletal development, front view. Goll, 1977, pl. 4, figs. 1-4. ×233.



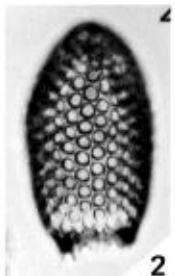
*Phormospyris stabilis* (Goll) *scaphipes* (Haeckel). a, b. V19-259 TW (19°52'S, 11°02'E), 0-2 cm: a. front view, b. basal view. c, d. RC11-162 TW (33°12'N, 139°02'E), 0-2 cm: c. front view, d. back view. Goll, 1977, pl. 8, figs. 1, 2, 14, 15. ×233.



*Peripyramis circumtexta* Haeckel. BANZARE Station 94 (64°28'S, 114°59'E). Riedel, 1958, pl. 2, figs. 8, 9. ×233.



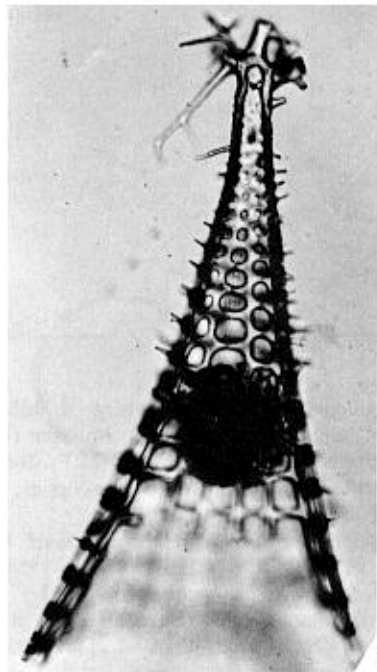
*Carpodanistrum* spp. a. MSN 155G (15°09'N, 137°06'W), A-X51/2, USNM No. 651236. b. MUK B31G (52°32'N, 141°44'W), A-R31/3, USNM No. 651237. c. JYN II 19G (37°46'N, 149°49'E), B-C36/3, USNM 651238. Nigrini, 1970, pl. 4, figs. 4-6 (*Carpodanistrum* spp.). ×233.



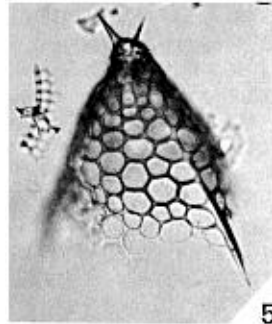
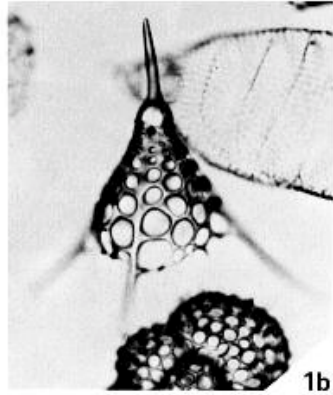
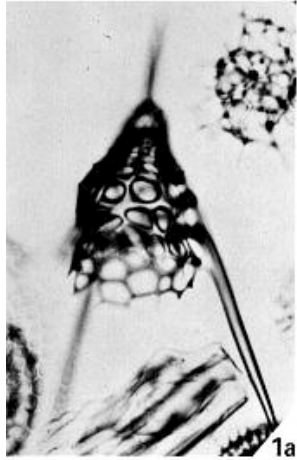
*Carpodanistrum* sp. A. RIS 11G (9°45'N, 117°37'W), 0-4 cm, B-R46/3, USNM No. 650028. Nigrini, 1968, pl. 1, fig. 4, (*Carpodanistrum* sp. A). ×233.



*Carpodanistrum papillosum* (Ehrenberg) group. MSN 34G (11°38'S, 109°33'E), B-V44/2, Sedgwick Museum (Cambridge) No. 844.8. Nigrini, 1967, pl. 6, fig. 6 (*Dictyocryphalus papillosus*). ×233.

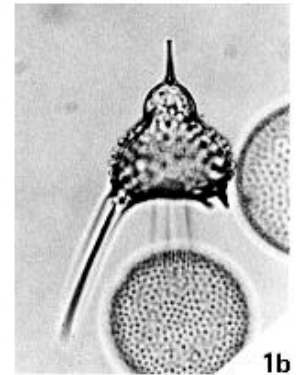
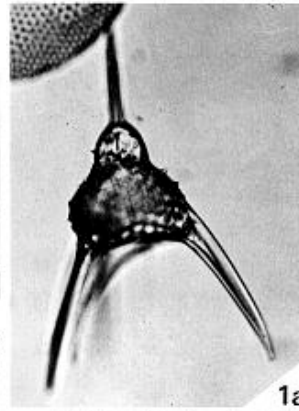
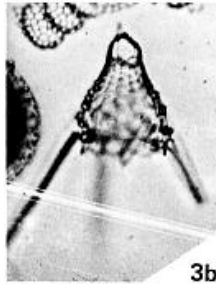
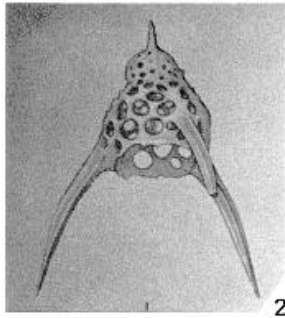


*Plectopyramis dodecomma* Haeckel. OSU 6604-10P (43°16'N, 126°24'W). Moore, 1974, pl. 13, fig. 8. ×233.



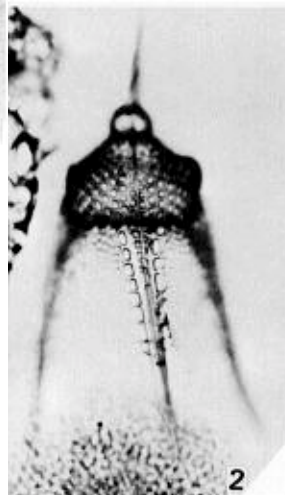
*Dictyophimus crisiæ* Ehrenberg. a. MSN39G (12°22'S, 101°25'E), B-T45/1, Sedgwick Museum (Cambridge) No. 847.5. b. MSN39G (12°22'S, 101°25'E), B-Q44/3, Sedgwick Museum (Cambridge) No. 847.3. Nigrini, 1967, pl. 6, figs. 7a, b.  $\times 233$ .

*Dictyophimus infabricatus* Nigrini. RIS 36G (9°07'S, 81°32'W) 4–7 cm, B-E 41/0, USNM No. 650031 (holotype). Nigrini, 1968, pl. 1, fig. 6.  $\times 233$ .

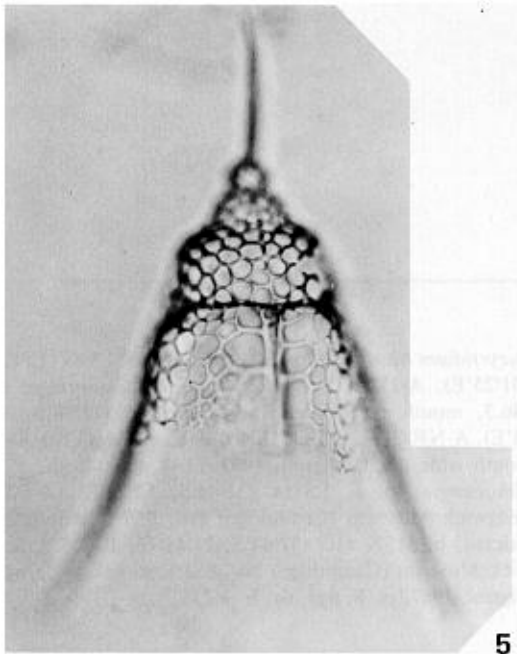


2 *Dictyophimus hirundo* (Haeckel) group. BANZARE Station 94 (64°28'S, 114°59'E). Riedel, 1958, pl. 3, fig. 11, pl. 4, fig. 1 (*Pterocorys hirundo*).  $\times 233$ .  
 3a, b *Dictyophimus hirundo* (Haeckel) group. a. DSDP 139-1-1, (23°31.14'N, 18°42.26'W), 80–2 cm. b. DSDP 139-1-2 (23°31.14'N, 18°42.26'W), 5–7 cm. Petrushevskaya and Kozlova, 1972, pl. 27, figs. 16, 17 (*Dictyophimus* sp. aff. *D. hirundo*).  $\times 200$ .  
 4 *Dictyophimus hirundo* (Haeckel) group. OSU 6604-10P (43°16'N, 126°24'W). Moore, 1974, pl. 14, fig. 8 (*Pterocorys* cf. *hirundo*).  $\times 233$ .

*Pterocanium korotnevi* (Dogiel). a. CK8 (53°01'N, 176°15'W), A-U32/1, USNM No. 651231. b. MUK B21G (52°32'N, 141°44'W), A-028/2, USNM No. 651232. Nigrini, 1970, pl. 3, figs. 10, 11.  $\times 233$ .

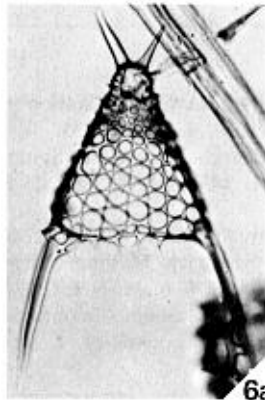


*Pterocanium praetextum praetextum* (Ehrenberg). MSN 39G (12°22'S, 101°25'E), B-Q46/0, Sedgwick Museum (Cambridge) No. 847.4. Nigrini, 1967, pl. 7, fig. 1.  $\times 233$ .

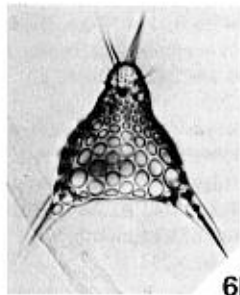


5

*Pterocanium brandiporus* Nigrini. R1S 11G (9°45'N, 117°37'W), 0-4 cm, A-J34/4, USNM No. 650032 (holotype). Nigrini, 1968, pl. 1, fig. 7. ×233.

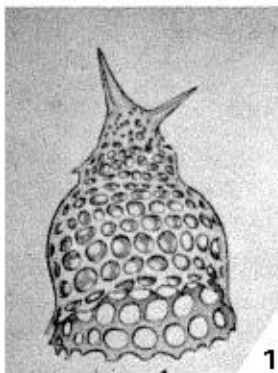


6a



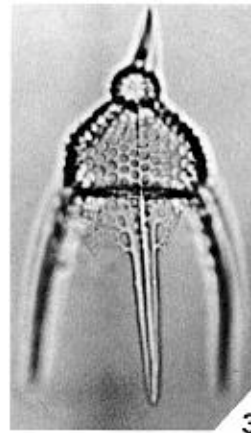
6b

*Pterocanium* sp. OSU 6604-10P (43°16'N, 126°24'W). Moore, 1974, pl. 13, figs. 6, 7 (*Dictyophimus infabricatus*). ×233.



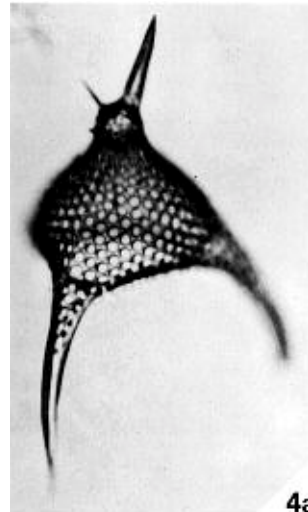
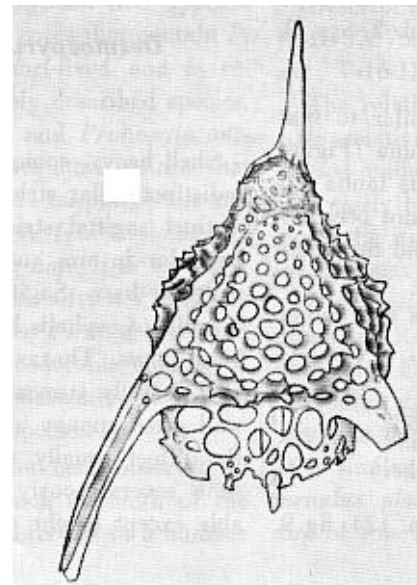
1

*Theocalyptra bicornis* (Popofsky). BANZARE Station 94 (64°28'S, 114°59'E). Riedel, 1958, pl. 4, fig. 4. ×233.

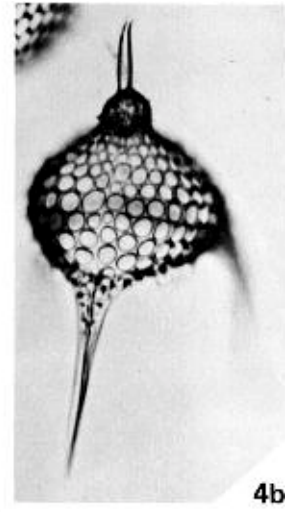


3

*Pterocanium praetextum* (Ehrenberg) *eucolpum* Haeckel. MSN 61G (37°44'S, 71°42'E) D-L41/1, Sedgwick Museum (Cambridge) No. 855.1. Nigrini, 1967, pl. 7, fig. 2. ×233.

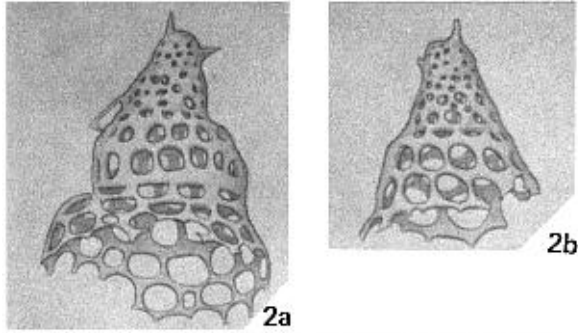


4a

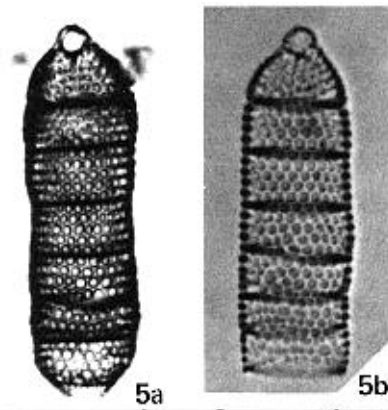


4b

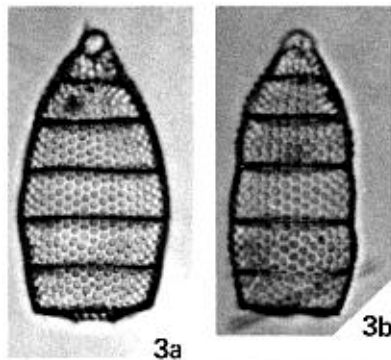
*Pterocanium trilobum* (Haeckel). a. LSDA 124G (32°44'S, 62°24'E), B-S22/2, Sedgwick Museum (Cambridge) No. 857.1. b. MSN34G (11°38'S, 109°33'E), C-V42/2, Sedgwick Museum (Cambridge) No. 845.1. c. Antarctic sediments. a, b from Nigrini, 1967, pl. 7, figs. 3a, b; ×233. c from Hays, 1965, pl. 3, fig. 10; ×225.



*Theocalyptra davisiana* (Ehrenberg). BANZARE Station 94 (64°28'S, 114°59'E). Riedel, 1958, pl. 4, figs. 2, 3. ×233.



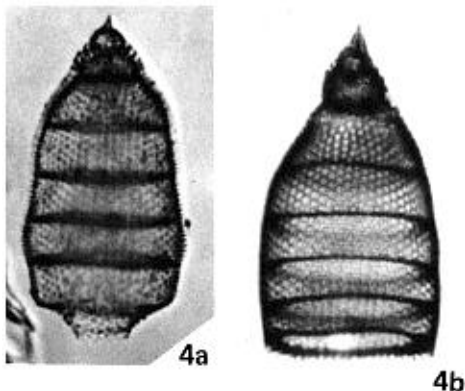
*Lithocampe* sp. a. LSDA (32°44'S, 62°24'E), A-F26/0, Sedgwick Museum (Cambridge) No. 856.1, mouth constricted. b. MSN 61G (37°44'S, 71°42'E), B-F37/1, Sedgwick Museum (Cambridge) No. 853.1, mouth wide open. Nigrini, 1967, pl. 8, figs. 6a, b. ×233.



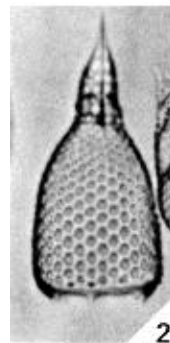
*Eucyrtidium acuminatum* (Ehrenberg). a. LSDA 124G (32°44'S, 62°24'E), A-K32/2, Sedgwick Museum (Cambridge) No. 856.3, mouth constricted. b. MSN 61G (37°44'S, 71°42'E), A-S29/3, Sedgwick Museum (Cambridge) No. 852.1, mouth wide open. Nigrini, 1967, pl. 8, figs. 3a, b. ×233.



*Anthocyrtidium ophirensis* (Ehrenberg). VEMA 19-168 (12°44'S, 82°01'E), B-R39/3, Sedgwick Museum (Cambridge) No. 865. 1. Nigrini, 1967, pl. 6, fig. 3. ×233.

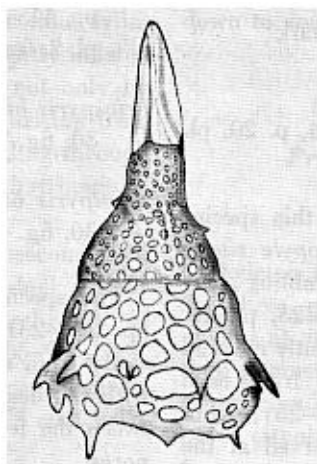


*Eucyrtidium hexagonatum* Haeckel. a. MSN 39G (12°22'S, 101°25'E), A-J32/2, Sedgwick Museum (Cambridge) No. 846.3, mouth constricted. b. MSN 34G (11°38'S, 109°33'E), A-N30/3, Sedgwick Museum (Cambridge) No. 843.2; mouth wide open. Nigrini, 1967, pl. 8, figs. 4a, b. ×233.

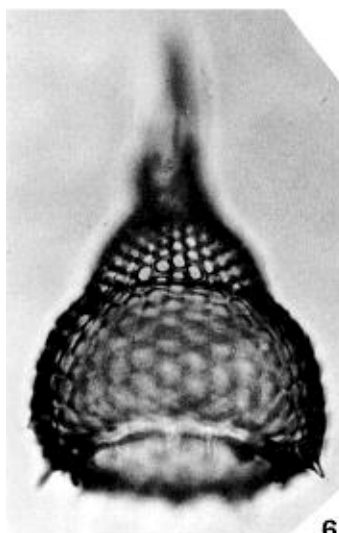


*Anthocyrtidium zanguebaricum* (Ehrenberg). MSN 34G (11°38'S, 109°33'E), B-S44/2; Sedgwick Museum (Cambridge) No. 844.4. Nigrini, 1967, pl. 6, fig. 4. ×233.

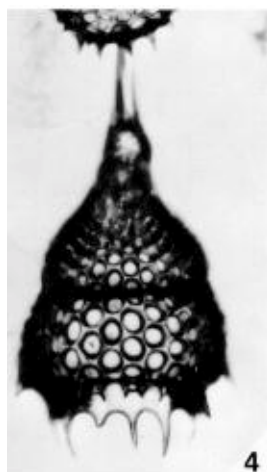




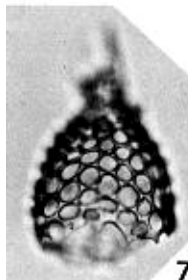
*Androcyclas gamphonycha* (Jorgensen). Antarctic sediments. Hays, 1965, pl. 3, fig. 2.  $\times 225$ .



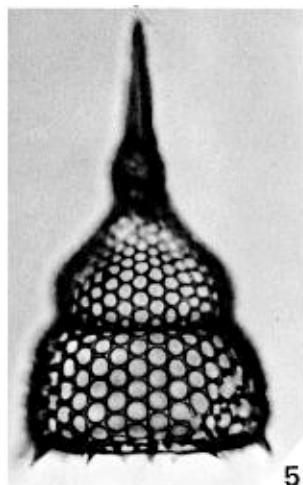
*Lamprocyclas maritalis* Haeckel *ventricosa* Nigrini. RIS 36G (9°07'S, 81°32'W), 4-7 cm, A-E45/1, USNM No. 650034 (holotype). Nigrini, 1968, pl. 1, fig. 9.  $\times 233$ .



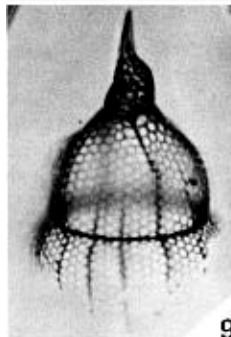
*Lamprocyclas maritalis maritalis* Haeckel. MSN 40Ga (1030'S, 99°00'E), B-G24/3, Sedgwick Museum (Cambridge) No. 850.2. Nigrini, 1967, pl. 7, fig. 5.  $\times 233$ .



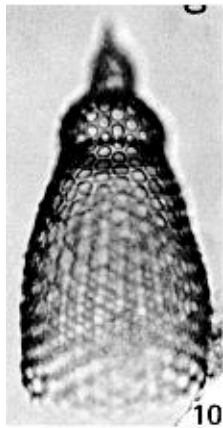
*Lamprocyrtilis nigriniaie* (Cautlet). RIS 36G (9°07'S, 81°32'W), 4-7 cm, A-047/4, USNM No. 650029. Nigrini, 1968, pl. 1, fig. 5a.  $\times 233$ .



*Lamprocyclas maritalis* Haeckel *polypora* Nigrini. MSN 39G (12°22'S, 101°25'E), A-J41/1, Sedgwick Museum (Cambridge) No. 846.4 (holotype). Nigrini, 1967, pl. 7, fig. 5.  $\times 233$ .



*Pterocorys hertwigii* (Haeckel). Discovery 5194 (2°34'S, 44°53'E), A-N25/0, Sedgwick Museum (Cambridge) No. 860.3. Nigrini, 1967, pl. 7, fig. 4a.  $\times 233$ .



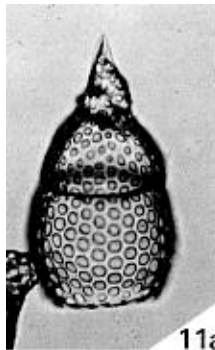
10

*Pterocorys minythorax* (Nigrini). R1S 36G (9°07'S, 81°32'W), 4–7 cm, A-T37/3, USNM No. 650033 (holotype). Nigrini, 1968, pl. 1, fig. 8. ×233.

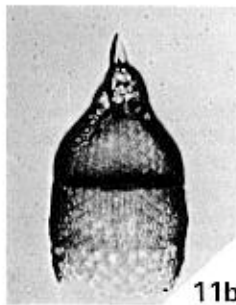


2

*Theocorythium trachelium trachelium* (Ehrenberg). MSN40Ga (10°30'S, 99°00'E), C-T26/4, Sedgwick Museum (Cambridge) No. 851.2. Nigrini, 1967, pl. 8, fig. 2. ×233.

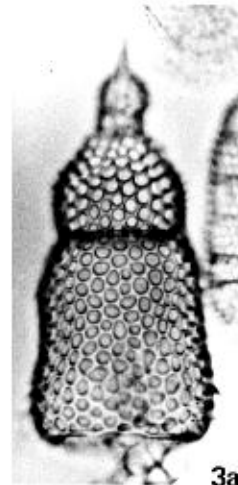


11a

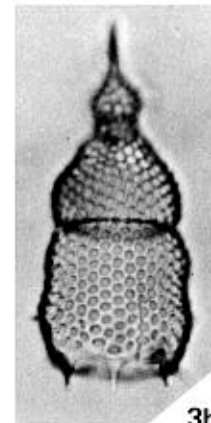


11b

*Pterocorys zancleus* (Mueller). OSU 6604-10P (43°16'N, 126°24'W). Moore, 1974, pl. 16, figs. 3, 4 (*Pterocorys zancleus*). ×233.



3a



3b

*Theocorythium trachelium diannae* (Haeckel). a. LSDA124G (32°44'S, 62°24'E), A-S32/0, Sedgwick Museum (Cambridge) No. 856.7. b. MSN61G (37°44'S, 71°42'E); B-W21/2, Sedgwick Museum (Cambridge) No. 853.2. Nigrini, 1967, pl. 8, figs. 1a, b. ×233.

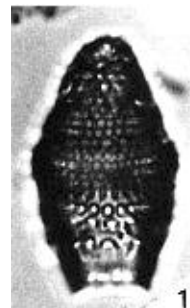


1a



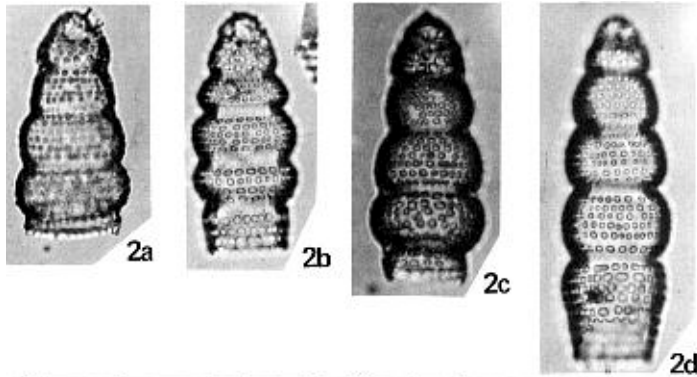
1b

*Stichopillium bicorne* Haeckel. a. VS-R-60b (24°20.5'N, 108°58.0'W), 3–5 cm, E17/4, dorsal view. b. VS-R-64b (24°45.4'N, 108°23.3'W), 1–3 cm G13/0, left lateral view. Benson, 1966, pl. 29, figs. 1, 2. ×233.



1

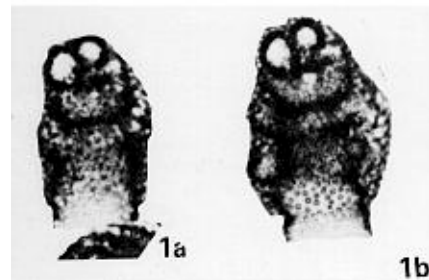
*Botryostrobos aquilonaris* (Bailey). DSDP 77B-2-2 (00°28.9'N, 133°13.7'W), A-V34/1. Nigrini, 1977, pl. 1, fig. 1. ×233.



*Botryostrobus auritus/australis* (Ehrenberg) group. a. DSDP 77B-2-2 (00°28.9'N, 133°13.7'W), A-V44/1, conical shell outline. b. DSDP 77B-8-5 (00°28.9'N, 133°13.70'W), A-N35/3, wide poreless intersegmental bands. c. DSDP 77B-15-2 (00°28.9'N, 133°13.7'W), A-020/4. Nigrini, 1977, pl. 1, figs. 2-5. ×233.



*Phormostichoartus corbula* (Harting). MSN 40 Ga (10° 30'S, 99°00'E), B-E23/0, Sedgwick Museum (Cambridge) No. 850.1. Nigrini, 1967, pl. 8, fig. 5 (*Siphocampe corbula*). ×233.



*Botryocyrtis scutum* (Harting). a. discovery 5194 (2°34'S, 44°53'E), B-K29/1, Sedgwick Museum (Cambridge) No. 861.1, with one post-thoracic segment. b. MSN40Ga (10° 30'S, 99°00'E), C-R29/3, Sedgwick Museum (Cambridge) No. 851.1, with two post-thoracic segments. Nigrini, 1967, pl. 6, figs. 1a, b. ×233.

## Bibliography

Nigrini, Catherine and T. C. Moore, Jr., A GUIDE TO MODERN RADIOLARIA. SPECIAL PUBLICATION NO. 16, Cushman Foundation for Foraminiferal Research. March 1979. Also on the web at [http://gdcmp1.ucsd.edu/geol\\_coll/radlit/nm79titl.html](http://gdcmp1.ucsd.edu/geol_coll/radlit/nm79titl.html), and <file://rads-www.oce.orst.edu/pub/pisias/mosrads/radhomp.html>.

Tomas, Carmelo R. (Ed.) Identifying Marine Phytoplankton. Academic Press, San Diego, CA. 858 p.