26. LATE CRETACEOUS ARCHAEOMONADACEAE, DIATOMACEAE, AND SILICOFLAGELLATAE FROM THE SOUTH PACIFIC OCEAN, DEEP SEA DRILLING PROJECT, LEG 29, SITE 275[1]

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ABSTRACT

Site 275 of the Deep Sea Drilling Project is located in the South Pacific, at the southeast margin of Campbell Plateau, on a relatively elevated bottom eroded by bottom currents. Under a thin layer of Recent-Pleistocene foraminiferal ooze, Late Cretaceous siliceous sediments were drilled: a bright-yellow upper unit is 14.5 meters thick and is underlain by a dark-brown unit down to 62.0 meters. At this depth further drilling was prevented by hard siliceous shale. The two units are distinctly different both lithologically and paleontologically. Unit 1, down to 14.5 meters, consists of diatom-radiolarian ooze with abundant siliceous microfossils, mostly of cold-water oceanic plankton, such as Archaeomonadaceae, Diatomaceae, Radiolaria, Silicoflagellatae, with accessory sponge spicules. Microfossils make up 60%-90% of the sediment. The underlying Unit 2 consists of olive-gray partly detrital clayey silt with thin intercalations of lithified siliceous shale. It yielded Radiolaria, Dinoflagellata, and colonies of green algae, but no Archaeomonadaceae, Diatomaceae, or Silicoflagellatae.

The microfossil assemblages of 21 samples from Cores 1 and 2 of Unit 1 were examined and evaluated in detail. Thus far, 158 species have been determined, including 4 new genera, 57 new species, and 3 new combinations, all extinct. The sediment is of Late Cretaceous age. Based on the abundance and vertical ranges of the species, 9 biozones and 12 subzones have been established.

INTRODUCTION

Site 275 of the Deep Sea Drilling Project was drilled 4-6 March 1973, in the South Pacific, at the southeast margin of Campbell Plateau (Figure 1). A veneer of a few cm of a Recent-Pleistocene white foraminiferal ooze with manganese nodules, as well as 62 meters of siliceous sediments of Late Cretaceous age were drilled. Two units were easily defined both lithologically and paleontologically (Figure 2).

The uppermost unit, Unit 1 consists of relatively soft bright-yellow diatom-radiolarian ooze, rich in siliceous microfossils. Unit 2 consists of dark-olive-gray, partly detrital clayey silt and silty clay with thin intercalations of lithified siliceous shale. It contains no siliceous microfossils except for a few radiolarians, but does contain some nannoplankton, palynomorphs, and green algae.

Initially 24 samples from 5 cores and 5 Core Catcher samples were investigated. For preliminary examination preparations were made merely by embedding the sediment in hyrax without the use of any chemicals and/or sieves, in order to avoid mixing the microfossils. The samples from Cores 1 and 2 (Unit 1) contain many siliceous microfossils. This paper deals only with the siliceous microfossils (excluding radiolarians) of Unit 1 (Table 1).

TECHNIQUES

For detailed investigation and microphotography the material was prepared as follows: 1 cc of each sample was disaggregated with a 10% H_2O_2 solution, and the microfossils were separated from quartz, glauconite, feldspar, and other mineral grains, by washing with and sedimentation in distilled water. Sieves were not used, and accordingly, the undamaged tests were well suited for light microscopy and for electron microscopy and fine-structure microphotography. The prepared microfossils, mounted in hyrax medium (n=1.65), were covered with 18×18 mm cover slides. For each sample, the field of vision of two slides was thoroughly examined and evaluated row by row. Four abundance categories were distinguished (Table 1). Particular attention was paid to some very characteristic, short-range, zone marker species even if they were represented by only a few specimens, or if they were fragmentary, due to their

[1]Publication authorized by the Director of the Hungarian Geological Survey.

[2]Publication of contribution and electron micrographs on the ultrastructure of the microfossils authorized by the Director of the Geological Survey of Austria, Vienna, Austria.

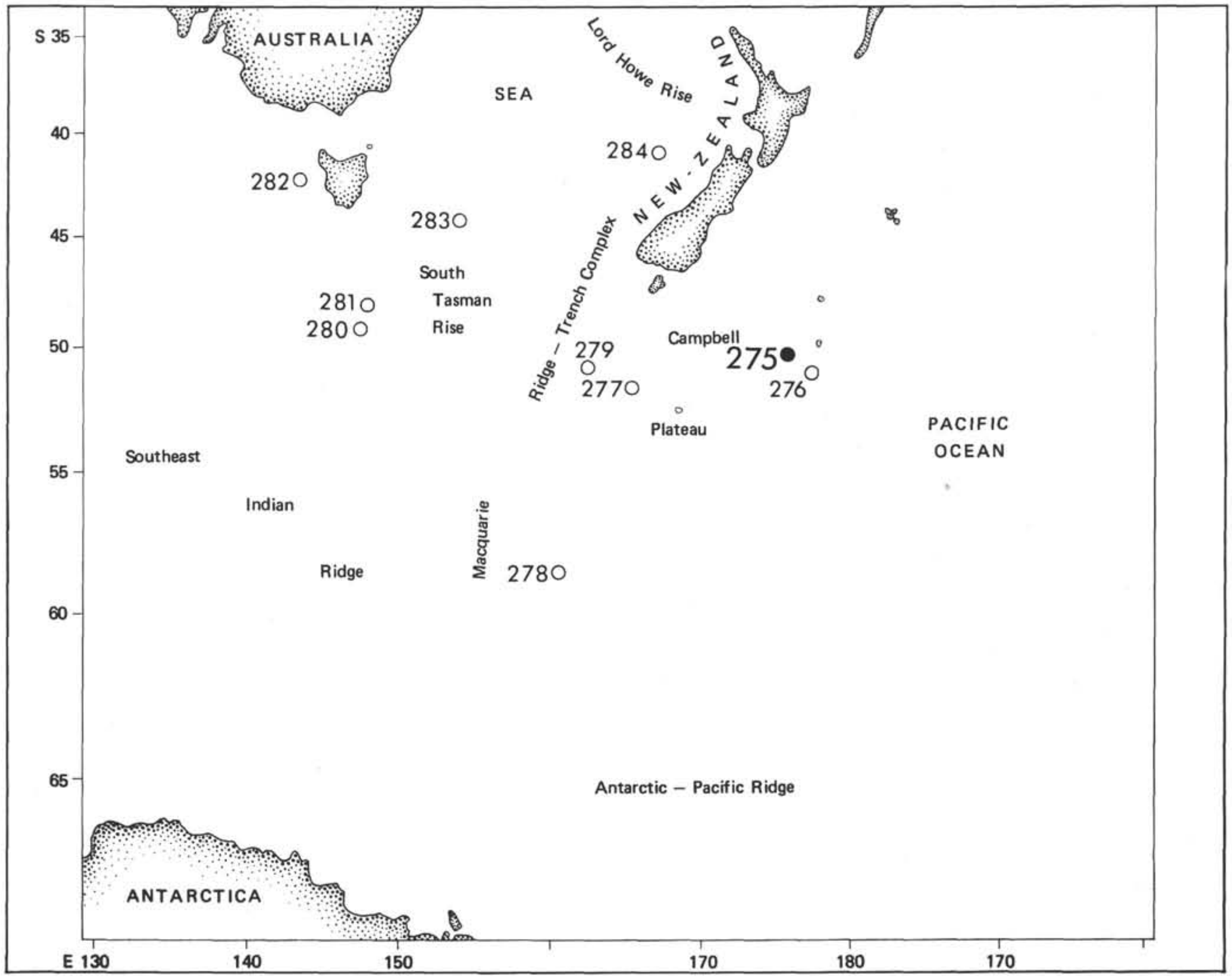


Figure 1. *Location map of drilling sites in the South Pacific Ocean, Leg 29, Deep Sea Drilling Project.*

relatively large size and thin tests (e.g., *Huttonia punctata, Kentrodiscus aculeatus,* and *Tubularia antarctica.*)

For visual microscopy and microphotography, an Amplival microscope was used (oil immersion objectives, with a magnification of ×40 and ×100, oculars with a magnification of ×4 and ×15. Stereoscan microphotographs are the courtesy of Katharina Perch-Nielsen (Universitets Institut for Historisk Geologi og Palaeontologi, Copenhagen, Denmark). Transmission electron micrographs were made by Herbert Stradner (Geological Survey of Austria, Vienna, Austria). Their work made it possible to study the morphological microstructure of the tests, not discernible under ordinary light microscope. This is of paramount importance for the correct description of extinct species and for the interpretation of their phylogenetic relationships.

BIOSTRATIGRAPHY

Archaeomonadaceae, Diatomaceae, Radiolaria, Silicoflagellatae and siliceous sponge spicules make up 40%-92% of the sediment of Unit 1. Mineral grains are: quartz (overwhelming), with subordinate glauconite and some feldspar. Calcite and other carbonate minerals are completely absent. Even the few agglutinated foraminifera (fine-grained *Bolivinopsis spectabilis*) obtained from Site 275 are siliceous. This suggests that the medium may have been free of carbonates at the time of sediment deposition.

The transitional sediment between Units 1 and 2 contains scarce Silicoflagellata only. Unit 2 itself has yielded only a few Radiolaria specimens. However, this unit may have been rich in siliceous microfossils, but their tests, consisting of amorphous silica, were dissolved during diagenesis. The originating silica gel contributed to the lithification of certain layers, producing the hard siliceous shales encountered.

The 21 samples of Cores 1 and 2 are very rich in microfossils. In Tables 2 and 3 only the most common or stratigraphically most important species are enumerated. The listing in the tables includes 158 species that have been determined as well as 4 new genera, 56 new species, and 3 new combinations.

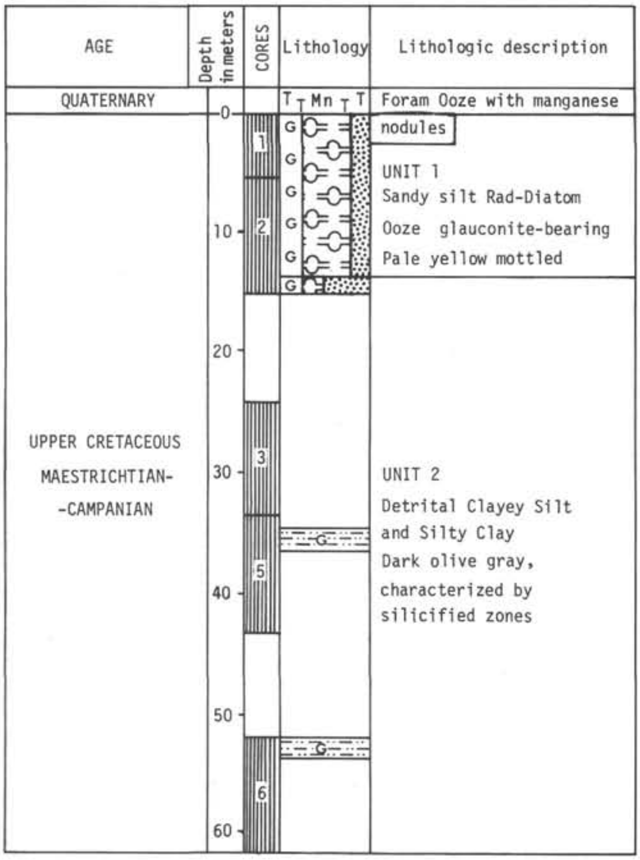


Figure 2. *Stratigraphy and lithology of Site 275.*

Preference was given to species conveniently described in the literature (Deflandre, 1950, 1969; Gleser, 1962, 1963, 1966; Hanna, 1927, 1928, 1934; Jousé, 1949, 1951a, 1951b, 1955, 1963; Loeblich et al., 1968; Long et al., 1946; Mandra, 1968; Pantocsek, 1886-1905; Proschkina-Lavrenko, 1949; Rampi, 1940; Schmidt, 1874-1959; Strelnikova, 1965a, 1965b, 1971; and van Heurck, 1896). The abundance, range, and preservation of the species were also evaluated (Tables 2 and 3).

The 125 species and varieties disappear within the Cretaceous and they are known to occur in the Campanian and Maestrichtian. Seventeen species are known from the Paleocene, nine from the late Eocene, and only seven from the Miocene (or at least some closely related variety is known from the Miocene). A similar statement has been made by Pessagno (Site Report, Chapter 2, this volume) who attributed the radiolarians determined in samples from Core 1, Section 1 to Core 4, Section 2 as correlating with Californian occurrences, the *Patulibracchium dickinsoni* Zone, dated latest Campanian. Taking this into consideration, the age of the sediments studied by this writer is late Campanian-Maestrichtian.

TABLE 1
Siliceous Microfossils of Leg 29, Site 275
in Lithologic Unit 1

Sample (Interval in cm)	Marine, Planktonic Archaeomonadaceae, Diatoms, Silicoflagellates and Porifera Spicules: Species Number[a]	Abundance[b]	Preservation[c]	Zone	Age
1-1, 118-120	M	A	M	I	
1-2, 40-42	M	A	G		
1-2, 117-119	M	C	G		
1-3, 40-42	P	C	G	II	
1-4, 40-42	P	C	G		
1-4, 120-122	P	C	G		
1, CC	P	A	G		
2-1, 25-27	P	A	G		
2-1, 40-42	P	A	G	III	Late Cretaceous Maestrichtian
2-1, 120-122	P	A	G		
2-1, 130-132	P	A	G	IV	
2-2, 60-62	P	A	G	V	
2-2, 120-122	P	A	G		
2-3, 40-42	P	A	G	VI	
2-3, 120-122	P	A	G	VII	Late Cretaceous Late Campanian
2-4, 40-42	P	A	G		
2-4, 120-122	P	C	G		
2-5, 40-42	P	C	G	VIII	
2-5, 116-118	P	C	G		
2-6, 39-41	F	F	M	IX	
2-6, 119-120	F	R	P		
2, CC	EMPTY				

[a]P = plenty, 30-60; M = mediocre, 15-30; F = few, 0-15

[b]A = abundant, 75%-100%; C = common, 50%-75%; F = few, 25%-50%; R = rare, 0%-25%.

[c]G = good; M = moderate; P = poor.

RANGES OF SELECTED TAXA AND BIOSTRATIGRAPHIC ZONATION

From the intensive study of the siliceous microfossils of Cores 1 and 2 of Site 275, the ranges of selected diatoms, Archaeomonadaceae and Silicoflagellatae have been compiled into a chronological chart (Table 4).

The chronological order shows the first and last occurrences of species, which can be used to divide and define the Upper Cretaceous sediments into nine biostratigraphic range zones. Good preservation and high frequency of microplanktonic siliceous fossils enabled the establishment of these zones.

Pseudopyxilla jouseae Zone

This zone is defined as the interval which starts with the first occurrence of *Eunotogramma marginopunctata, Sceptroneis immaculata,* and *Pterotheca danica.* The upper limit of this zone probably was not encountered at Site 275. Among common species of this zone are: *Stephanopyxis hannai, Incisoria inordinata, I. lanceolata, Sceptroneis gracilis, S. grunowii, Hemiaulus gleseri, H. polycystinorum, Triceratium nobile,* and *Trinacria anissimowi.*

Acanthodiscus antarcticus Zone

This zone starts with the first occurrence of *Corbisema archangelskiana* and ends with the extinction of

TABLE 2
Ranges of Selected Siliceous Microfossil Species

Species		1-1, 118-120	1-2, 40-42	1-2, 117-119	1-3, 40-42	1-4, 40-42	1-4, 120-122	1, CC	2-1, 25-27	2-1, 40-42	2-1, 120-122	2-1, 130-132	2-2, 60-62	2-2, 120-122	2-3, 40-42	2-3, 120-122	2-4, 40-42	2-4, 120-122	2-5, 40-42	2-5, 116-118	2-6, 39-41	2-6, 118-120
		Sample (Interval in cm)																				
	Abundance[a]	A	A	C	C	C	C	A	A	A	A	A	A	A	A	A	A	C	C	C	F	R
	Preservation[b]	M	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	M	P
BACILLARIOPHYTA																						
Bacillariophyceae (Diatomacea)																						
Acanthodiscus antarcticus n. sp. Hajós			R	R	R	R						R								A		
A. convexus n. sp. Hajós				R	R							C								A		
A. ornatus n. sp. Hajós and Stradner												C			C					A		
Acanthodiscus sp. 1																	R		R			
Acanthodiscus sp. 2			R																	R		
Actinoptychus packi Hanna		R										R					R					
Anaulus birostratus Grunow					R																	
A. californicus Long, Fuge, and Smith													R									
A. incisus n. sp. Hajós and Stradner					R																	
A. subantarcticus n. sp. Hajós															R							
Aulacodiscus sp.												R										
Biddulphia cretacea n. sp. Hajós and Stradner										R		R			C					C		
B. sparsepunctata n. sp. Hajós													R	R						C		
Cerataulina cretacea n. sp. Hajós												R		R			R			R		
Creataulus sp.									R			R										
Chasea bicornis Hanna										A		C		R			C	C	C	R		
Ch. ornata n. sp. Hajós and Stradner																		C	R			
Cladogramma jordanii Hanna		C			R	R					R	C					C			C		
Coscinodiscus circumspectus Long, Fuge, and Smith			R							R												
C. ildicoi n. sp. Hajós										R			R						R	R		
C. lineatus Ehr. f. *fossils* Jousé							R					A										
Coscinodiscus sp.												R										
Epithelion curvatum Pantocsek		R												R		R				R		
E. russicum Pantocsek														R		R	R					
E. spinifer Pantocsek														R		R	R		R			
Ethmodiscus sp.												R										
Eunotogramma fueloepi n. sp. Hajós			C	C	C							R	R									
E. marginopunctatum Long, Fuge, and Smith		R		C	C		R		R	R			R		R		R					
Gladius maximum n. sp. Hajós									R			R							R	R		
G. jouseanus n. sp. Hajós			R	R	R				R			R			R					R		
G. pacificus n. sp. Hajós and Stradner									R			C			C					R		
G. pacificus n. sp. f. *minor* n. f. Hajós				R	R				R			C						C	C	C		
G. speciosus Schulz									R			R								R		
Goniothecium odontella Ehrenberg												C								R		
G. odontella Ehr. var. *danica* Grunow												R										
Helminthopsis wornardti n. sp. Hajós					R	R							R		C				R			
Hemiaulus altus n. sp. Hajós			R						C									R	R			
H. andrewsi n. sp. Hajós																				R		
H. curvatulus Strelnikova																			R			
H. danicus Grunow		C							C			R								R		
H. echinulatus Jousé			C																R			
H. gleseri n. sp. Hajós		C		C	C		C		C		R	C	R				C			C	C	C
H. kondai n. sp. Hajós			R		R				C	R	R	C										
H. polycystinorum Ehrenberg		C		C	C	C		R			R	C			C		C		C		C	C
H. polycystinorum Ehr. v. *brevicornis* Jousé		C	C	C	C							C			C		C		R	C	C	
H. polymorphus Grunow												R					R			R		
H. prae-elegans Jousé					R	R						R						C	C	C		
H. schmidti n. sp. Hajós												C							R			
Horodiscus rugosus n. sp. Hajós																				R		
Huttonia antiqua n. sp. Hajós				R	C							R										
H. punctata n. sp. Hajós and Stradner					R										R							

TABLE 2 – *Continued*

Species		1-1, 118-120	1-2, 40-42	1-2, 117-119	1-3, 40-42	1-4, 40-42	1-4, 120-122	1, CC	2-1, 25-27	2-1, 40-42	2-1, 120-122	2-1, 130-132	2-2, 60-62	2-2, 120-122	2-3, 40-42	2-3, 120-122	2-4, 40-42	2-4, 120-122	2-5, 40-42	2-5, 116-118	2-6, 39-41	2-6, 118-120
	Abundance[a]	A	A	C	C	C	C	A	A	A	A	A	A	A	A	A	A	C	C	C	F	R
	Preservation[b]	M	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	M	P
Incisoria inordinata n. sp. Hajós		C		R	R		R		C						R	C						
I. lanceolata n. sp. Hajós and Stradner		C		R	R		R		C			R				C				R		
I. punctata n. gen. n. sp. Hajós and Stradner					R		R		C			R			R	C				R		
Kentrodiscus aculeatus Hanna																				R		
K. armatus n. sp. Hajós												C										
Longinata acuta n. gen. n. sp. Hajós			R						R	C		R					R		C	R		
Melosira patera Long, Fuge, and Smith												R										
M. vetustissima n. sp. Hajós and Stradner															R							
M. (Paralia) sulcata (Ehr.) Kützing												C								C		
Odontotropis sp.									R			R										
Poretzkia circularis Jousé		R			R							R										
Poretzkia sp.															R	R				R		
Pseudopyxilla americana (Ehr.) Forti																				R		
P. jouseae n. sp. Hajós		R																				
P. russica (Pant.) Forti		R	R	R	R														C	C		
Pseudopodosira westii (Smith) Sheshukova and Gleser			R								C	C	R						C	C		
Pseudostictodiscus sp.			R		R										R							
Pteritheca aculeata n. sp. Hajós												C								C		
P. cf. *aculeifera* Grunow																				R		
P. capreolus (Forti) n. comb. Hajós			R									C					R					
P. cretacea n. sp. Hajós		C		C								C			C						C	C
P. crucifera Hanna		R	C			R				R		C	R			R	R		R	R		
P. danica Grunow		R																				
Pterotheca (Micrampulla) parvula (Hanna) n. comb. Hajós and Stradner			C	C	R		R					C			R	C	R		C			
Pterotheca sp.												R										
Pyrgodiscus cameratus n. sp. Hajós			R														R		R			
Pyxidicula minuta Grunow		C		R								R									C	C
Rattrayella antiqua n. sp. Hajós and Stradner		R							R	R	R			R	C					R		
Rhizosolenia cretacea n. sp. Hajós and Stradner		R		R		R		R	C	C	R		R			R			R	R	C	C
Skeletonema punctatum Schmidt							R					R							R			
S. subantarctica n. sp. Hajós			R									R					R					
Sceptroneis gracilis n. sp. Hajós		C		R	R		R		C				R			C	R					
S. grunowii Anissimowa		C		R	R		R		C			R	R		R	C	R		C			
S. praecaducea n. sp. Hajós and Stradner		C	C	R	R		R						R			C	R			R	R	
Sceptioneis sp.		C																				
Stephanopyxis discrepans Hanna																			R			
S. hannai n. sp. Hajós		C		R								R										
S. lavrenkoi Jousé												R				R						
S. cf. *marginata* Grunow																				R		
S. simonseni n. sp. Hajós		A	C	C											C		C			C		
S. superba (Grev.) Grunow		C						R				C							R			
S. turris (Grev. and Arn.) Ralfs v. *intermedia* Grunow							R	C			R	C					R		C	C	C	
S. weyprechtii (Grunow) n. comb. Hajós																			R			
Stephanopyxis sp. 1																			C	C	C	
Stephanopyxis sp. 2																			R			
Triceratium arietinum Schmidt												R										
T. cristatum Pantocsek																		R	R			
T. dignum Long, Fuge, and Smith		R								R							R					
T. edgari n. sp. Hajós		R															R					
T. gratum Schmidt																				R		
T. idoneum Pantocsek															R							
T. kennetti n. sp. Hajós and Stradner																			R	R		
T. kuepperi n. sp. Hajós and Stradner			C	C				R											R	R		
T. nobile Witt		A	R	R						R										R		

TABLE 2 – *Continued*

Species	1-1, 118-120	1-2, 40-42	1-2, 117-119	1-3, 40-42	1-4, 40-42	1-4, 120-122	1, CC	2-1, 25-27	2-1, 40-42	2-1, 120-122	2-1, 130-132	2-2, 60-62	2-2, 120-122	2-3, 40-42	2-3, 120-122	2-4, 40-42	2-4, 120-122	2-5, 40-42	2-5, 116-118	2-6, 39-41	2-6, 118-120
Abundance[a]	A	A	C	C	C	C	A	A	A	A	A	A	A	A	A	A	C	C	C	F	R
Preservation[b]	M	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	M	P
T. occultum Hustedt	C	C									C					C		C			
T. praetenue Greville	R										R										
T. schulzii Jousé											R							C	C		
T. sectum Witt									R					R		R			C		
Trinacria anissimowii Jousé	C	C	C											C				A	C	C	C
T. aries Witt																R		C	C		
T. excavata Heiberg	C				C						C			C		C					
T. insipiens Witt											C			C					C		
T. pileolus (Ehr.) Grunow	C	C																C	C		
T. princeps Witt											C										
T. tristictia Hanna								C			R			C							
Trinacria sp.																			R		
Tubularia antarctica n. sp. Hajós																		R			
Xanthiopyxis granti Hanna		R						R			R							C	C		
X. rotunda n. sp. Hajós											R										
Xanthiopyxis sp. 1																			R		
Xanthiopyxis sp. 2											R										
Xanthiopyxis sp. 3														R							
CHRYSOPHYTA																					
Archaeomonadaceae																					
Acanthosphaeridium reticulatum n. gen. n. sp. Hajós and Stradner				A		R				R				C				C	C		
Archaeomonas ambigua Rampi								R						R		R			R		
A. Chiarugii Rampi											R			R					R		
A. cingulata Deflandre																R					
A. cretacea Rampi												R	R	R		C			C		
A. heteroptera Deflandre																R					
A. membranosa Rampi																R					
A. smithi Rampi											C										
A. spinulosa Rampi											C										
Litheusphaerella spectabilis Deflandre																			R		
Parachaeomonas colligera Deflandre											R					R			C		
P. ornata n. sp. Hajós														R							
Silicoflagellates																					
C. geometrica Hanna	R							R			C			R			R		C		
C. geometrica Hanna v. *apiculata* Jousé		R									C								C		
C. parallela n. sp. Hajós	R								C	C	C		C	C							
Dictyocha quadralta Hanna		C												R	R				R		
Lyramula sp.						R	R				C										
L. furcula Hanna	C	C	R	R	R						C	R				C			C	C	C
L. furcula Hanna v. *minor* Deflandre	C										C	R			R	R			C		
L. simplex Hanna	C																		C		
L. tenuipertica Kokubo-Tsumura		C	R																		
Vallacerta hortonii Hanna					R						C			C							
V. quadrata n. sp. Hajós																			C		
V. tumidula Gleser		C	C																		
PLANKTON																					
Tetraporina											R										
membranilarnax													R								
PORIFERA																					
Spicules	C	C					R				R								R	R	R

[a]A = abundant, 75%-100%; C = common, 50%-75%; F = few, 25%-50%; R = rare, 0%-25%.

[b]G = good; M = moderate; P = poor.

TABLE 3
Stratigraphic Ranges of Selected Siliceous Microfossils and Tentative Zonal Subdivision at Site 275

Species	Sample (Interval in cm)																				
	1-1, 118-120	1-2, 40-42	1-2, 117-119	1-3, 40-42	1-4, 40-42	1-4, 120-122	1, CC	2-1, 25-27	2-1, 40-42	2-1, 120-122	2-1, 130-132	2-2, 60-62	2-2, 120-122	2-3, 40-42	2-3, 120-122	2-4, 40-42	2-4, 120-122	2-5, 40-42	2-5, 116-118	2-6, 39-41	2-6, 118-120
Pseudopyxilla jouseae																					
Sceptroneis sp.																					
Pterothece danica																					
Poretzkia circularis																					
Stephanopyxis hannai																					
Triceratium praetenue																					
Corbisema parallela																					
Incisoria inordinata																					
Triceratium dignum																					
T. edgari																					
Trinacria excavata																					
Sceptroneis gracilis																					
S. grunowii																					
Actinoptychus packi																					
Eunotogramma marginopunctatum																					
Stephanopyxis superba																					
Triceratium occultum																					
Cladogramma jordanii																					
Epithelion curvatumHer																					
Hemiaulus danicus																					
Incisoria lanceolata																					
Pterotheca crucifera																					
Rattrayella antiqua																					
Stephanopyxis simonseni																					
Triceratium nobile																					
Trinacria pileolus																					
Corbisema geometrica																					
Lyramula furcula v. *minor*																					
L. simplex																					
Hemiaulus polycystinorum v. *brevicornis*																					
Sceptroneis praecaducea																					
Pyxidicula minuta																					
Hemiaulus gleseri																					
H. Polycystinorum																					
Pterotheca cretacea																					
Rhizosolenia cretacea																					
Trinacria anissimowii																					
Lyramula furcula																					
Vallacerta tumidula																					
Lyramula tenuipertica																					
Coscinodiscus circumspectus																					
Hermiaulus stradneri																					
Eunotogramma fueloepi																					
Pseudostictodiscus sp.																					
Pterotheca capreolus																					
Skeletonema subantarctica																					
Hemiaulus altus																					
H. echinulatus																					
Pterotheca (Micrampulla) parvula																					

TABLE 3 – *Continued*

Species	1-1, 118-120	1-2, 40-42	1-2, 117-119	1-3, 40-42	1-4, 40-42	1-4, 120-122	1, CC	2-1, 25-27	2-1, 40-42	2-1, 120-122	2-1, 130-132	2-2, 60-62	2-2, 120-122	2-3, 40-42	2-3, 120-122	2-4, 40-42	2-4, 120-122	2-5, 40-42	2-5, 116-118	2-6, 39-41	2-6, 118-120
	Sample (Interval in cm)																				
Archaeomonas smithi											—										
A. spinulosa											—										
Stephanopyxis lavrenkoi											—	—	—	—	—						
Acanthodiscus ornatus											—	—	—	—	—	—	—	—	—		
Goniothecium odontella											—	—	—	—	—	—	—	—	—		
Hemiaulus polymorphus											—	—	—	—	—	—	—	—	—		
Pseudopodosira westii											—	—	—	—	—	—	—	—	—		
Melosira (Paralia) sulcata											—	—	—	—	—	—	—	—	—		
Pterotheca aculeata											—	—	—	—	—	—	—	—	—		
Trinacria insipiens											—	—	—	—	—	—	—	—	—		
Xanthiopyxis sp. 1											—	—	—	—	—	—	—	—	—		
Archaeomonas chiarugii											—	—	—	—	—	—	—	—	—		
Parachaeomonas colligera											—	—	—	—	—	—	—	—	—		
Cerataulina cretacea											—	—	—	—	—	—	—	—	—		
Anaulus californicus												—									
Lyramula furcula var. *minor*												—	—	—	—	—					
Biddulphia sparsepunctata												—	—	—	—	—	—	—	—		
Archaeomonas cretacea]												—	—	—	—	—	—	—	—		
Membranilarnax													—								
Epithelion russicum													—	—	—	—					
E. spinifer													—	—	—	—	—	—	—		
Pterotheca													—	—	—	—	—	—	—		
Anaulus subantarcticus														—							
Triceratium idoneum														—							
Xanthiopyxis sp.3														—							
Parachaeomonas ornata														—							
Corbisema															—	—	—				
Archaeomonas heteroptera																—					
A. membranosa																—					
Acanthodiscus sp. 1																—	—	—			
Triceratium kennetti																—	—	—	—		
Trinacria aries																—	—	—	—		
Chasea ornata																	—	—			
Triceratium cristatum																	—	—			
Hemiaulus curvatulus																		—			
Stephanopyxis discrepans																		—			
S. weyprechtii																		—			
Tubularia antarctica																		—			
Triceratium schulzii																		—	—		
Hemiaulus andrewsi																			—		
Horodiscus rugosus																			—		
Kenterodiscus aculeatus																			—		
Pseudopyxilla emericana																			—		
Pterotheca cf. *aculeifera*																			—		
Stephanopyxis cf. *marginata*																			—		
Triceratium gratum																			—		
T. kennetti																			—		
Trinacria sp.																			—		
Litheusphaerella spectabilis																			—		
Vallacerta quadrata																			—		

TABLE 3 – *Continued*

Stratigraphic Ranges of Selected Siliceous Microfossils and Tentative Zonal Subdivision at Site 275

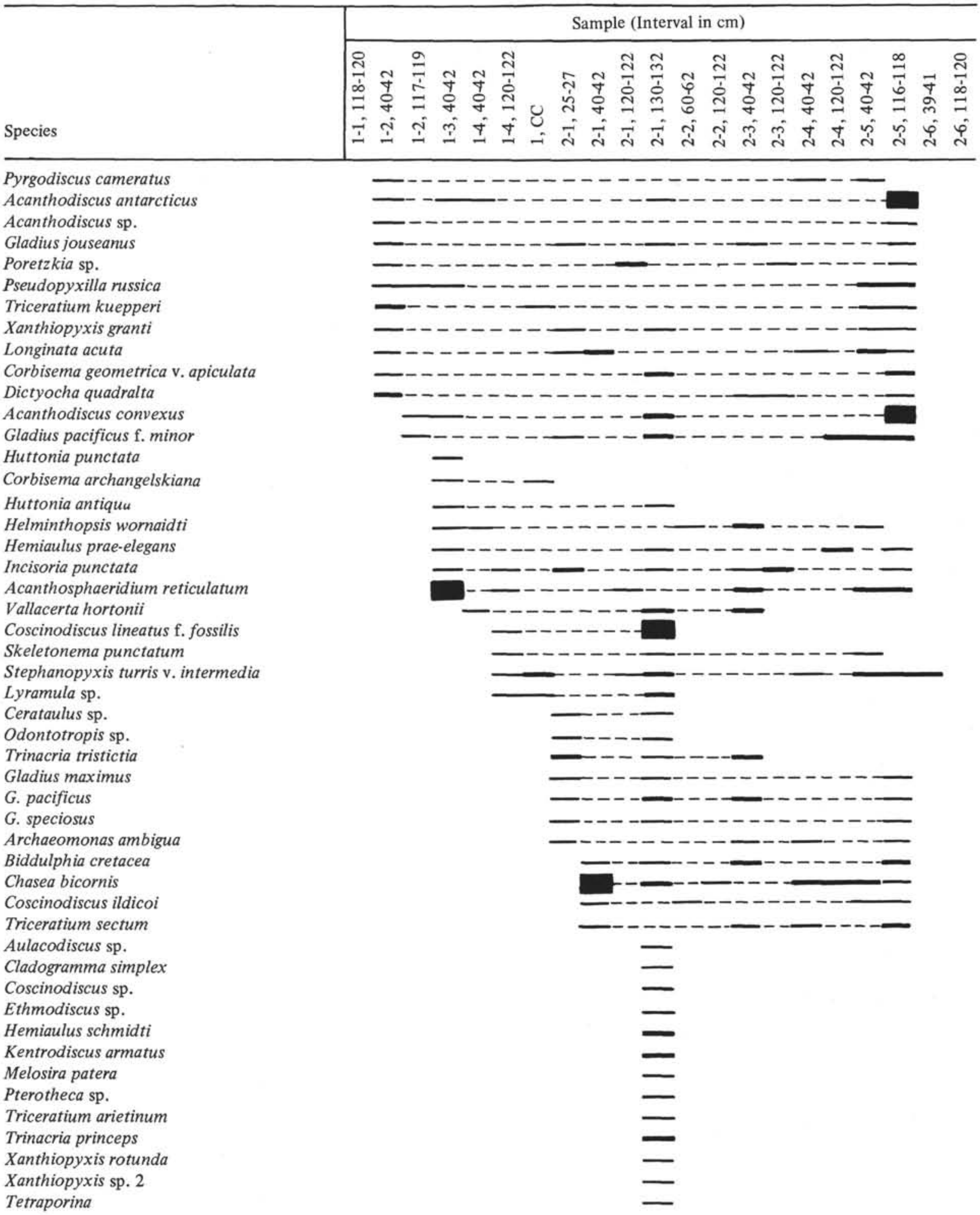
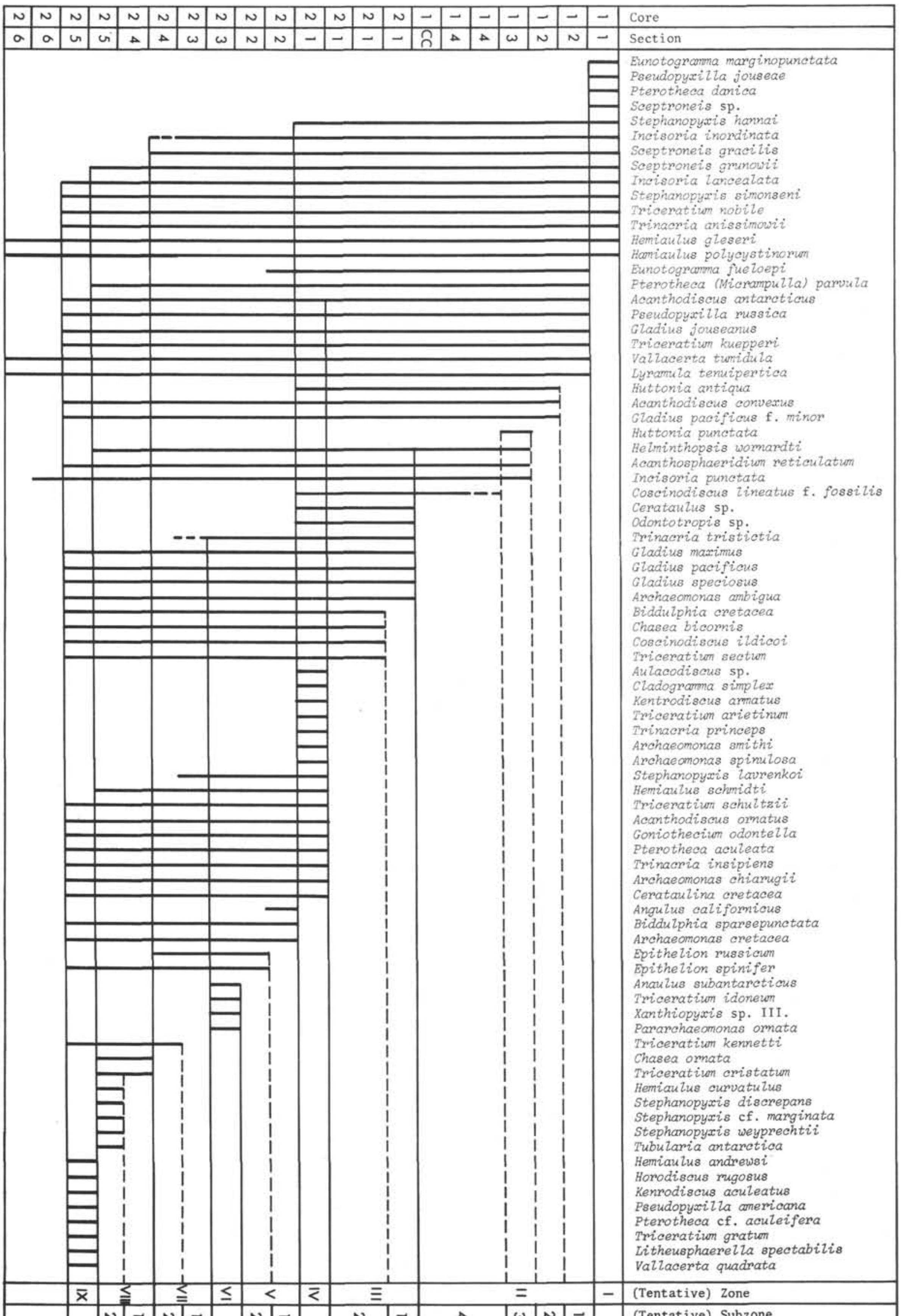


TABLE 4
Stratigraphic Occurrence of the Important Upper Cretaceous Siliceous Microfossils



Acanthodiscus antarcticus. It can be subdivided into four subzones.

Subzone 1: The interval between the extinction of *Huttonia antiqua, Acanthodiscus convexus, Gladius pacificus* f. *minor*, and the extinction of *Eunotogramma fueloepi* and *Pterotheca parvula*.

Subzone 2: The interval between the extinction of *Huttonia punctata, Helminthopsis wornardti, Acanthosphaeridium reticulatum, Incisoria punctata*, and the lower boundary of Subzone 1.

Subzone 3: Defined by the first and last occurrence of *Huttonia punctata*. Its end is also marked by the extinction of *Corbisma archangelskiana*.

Subzone 4: The interval between the first occurrence of *Corbisema archangelskiana* and the first occurrence of *Huttonia punctata*.

Urataulus-Odontotropis Zone

This Zone is the interval from the extinction of *Kentrodiscus armatus, Cladogramma simplex, Triceratium arietinum* to the extinction of *Cerataulus* sp. and *Odontotropis* sp. It can be divided into two subzones.

Subzone 1: The interval from the extinction of *Biddulphia cretacea, Chasea bicornis*, and *Coscinodiscus ildicoi*, to the first occurrence of *Corbisema archangelskiana*.

Subzone 2: The interval from the extinction of *Kentrodiscus armatus, Cladogramma simplex*, and *Triceratium arietinum*, to the extinction of *Biddulphia cretacea, Chasea bicornis*, and *Coscinodiscus ildicoi*.

Kentrodiscus armatus Zone

This zone is defined as the interval between the first and last occurrences of *Triceratium sectum, Cladogramma simplex, Kentrodiscus armatus, Triceratium arietinum, Trinacria princeps, Archaeomonas smithi*, and *A. spinulosa*.

Biddulphia sparsepunctata Zone

This zone is the interval between the extinction of *Anaulus subantarcticus, Triceratium idoneum*, and *Pararchaeomonas ornata*, and the extinction of *Anaulus californicus* and *Biddulphia sparsepunctata*. This zone can be divided into two subzones.

Subzone 1: The interval between the first and last occurrence of *Anaulus californicus*.

Subzone 2: The interval from the extinction of *Anaulus subantarcticus, Triceratium idoneum*, and *Pararchaeomonas ornata* to the first occurrence of *Anaulus californicus* and the extinction of *Epithelion russicum* and *E. spinifer*.

Anaulus subantarcticus Zone

This zone is the interval between the first and last occurrence of *Anaulus subantarcticus, Triceratium idoneum*, and *Pararchaeomonas ornata*.

Epithelion russicum Zone

This zone is the interval from the first occurrence of *Epithelion russicum* and *Sceptroneis gracilis* to the first occurrence of species which are the zonal markers of the *Anaulus subantarcticus* Zone. It can be divided into two subzones.

Subzone 1: Starts with the first occurrence of *Stephanopyxis lavrenkoi*, and ends with the first occurrence of the *Anaulus Subantarcticus* Zone markers.

Subzone 2: From the first occurrence of *Epithelion russicum* to the first occurrence of *Stephanopyxis lavrenkoi*.

Chasea ornata Zone

This zone can be defined as the interval from the first occurrence of *Hemiaulus curvatulus, Stephanopyxis discrepans, Stephanopyxis weyprechtii* and *Tubularia* sp., to the first occurrence of *Epithelion russicum* and *Sceptroneis gracilis*. Within this zone lie the extinctions of *Hemiaulus curvatulus, Stephanopyxis discrepans, Stephanopyxis weyprechtii*, and *Tubularia* sp. It can be divided into two subzones.

Subzone 1: Lies above these extinctions and extends to the first occurrence of *Epithelion russicum*.

Subzone 2: The first and last occurrence of *Hemiaulus curvatulus, Stephanopyxis discrepans, Stephanopyxis weyprechtii*, and *Tubularia* sp.

Horodiscus rugosus Zone

Only the upper boundary of this zone can be given, as the diatoms and other siliceous microfossils below Core 2, Section 5 were partly or totally destroyed by solution. The upper boundary of the zone can be defined by the extinction of *Hemiaulus andrewsi, Horodiscus rugosus, Kentrodiscus aculeatus, Pseudopyxilla americana, Pterotheca aculeifera, Triceratium gratum*, and *Litheusphaerella spectabilis*.

A correlation of the tentative zonal ranges with other occurrences from California, Siberia, and the Ural Mountains in the USSR has, up to the present time, not been possible, as only descriptions of single outcrops were known from these areas.

PALEOECOLOGY

As the majority of the species studied disappeared as early as the Late Cretaceous, it is rather difficult to draw conclusions on paleotemperature of the sea. There are no relevant literature data available. The great variety of the assemblage and the very abundant specimen numbers, as well as some closely related species of longer-range genera (e.g. *Coscinodiscus lineatus*) suggest cold water, good aeration, and sedimentation controlled by currents. Currents must have been fairly slow, because most of the larger and thin-walled diatoms are also intact and well preserved. The diatoms of Core 1, Section 1, and Sample 1, CC of Site 275, i.e., of the topmost part of Unit 1, seem to indicate the influence of warmer waters, supported by the common occurrence of such species (of the genera *Stephanopyxis, Triceratium, Trinacria, Hemiaulus*, etc.) which reached a peak in tropical and subtropical waters during the Eocene. It should be noted, however, that these species are represented by much smaller specimens than in the Eocene.

PALEOGEOGRAPHIC DISTRIBUTION

The short-range species presented in the tables and on the plates are presumably high-latitude forms. Although all are planktonic forms, only 50% of them could be identified with previously known Late Cretaceous species (Moreno Formation, California—Hanna, 1927, 1928, 1934; Mandra, 1968; Long et al., 1946; and Rampi, 1940: the Ural Mountains region and the Ob area of the USSR—Gleser, 1962, 1963, 1966; Jousé, 1949, 1951a, 1951b, 1955, 1963; Proschkina-Lavrenko, 1949; and Strelnikova, 1965, 1971: Arkhangelsk, Ananino, and Simbirsk, USSR—Pantocsek, 1886-1905.) Species described from these localities are usually considerably larger than the forms studied in this report (e.g., *Gladius pacificus* f. *minor*).

One should also consider that plankton forms are easily transported by sea currents. It is commonplace that recent planktonic diatoms, transported by currents, occur both in the Mediterranean and the North Atlantic waters of the circum-European seas. Accordingly, one may suppose the presence of a cold water, subantarctic current in the Late Cretaceous in the area of study.

SUMMARY

As shown in Tables 1-4, the samples studied are very rich in both species and specimens of siliceous microfossils. All of them are extinct. From the biostratigraphical point of view, the relatively large number of short-range species is of particular importance. Abundance of species and specimens as well as the state of preservation abruptly decreases in the Core 2, Section 6 samples. Sample 2, CC was practically empty.

It can be stated that in Core 2, (lower portion of Unit 1) the percentage of extinct, short-range species is higher, particularly so in the case of Archaeomonadaceae and Diatomaceae. Silicoflagellata have a longer range. The shape and ornamentation of diatom tests are very different from those of the Recent species, and some superficially resemble radiolarians (e.g. *Pterotheca* n. sp.). The great variety of species and forms and the good state of preservation especially revealed by electgron microscope photographs, indicate favorable conditions of sedimentation during the Late Campanian-Maestrichtian. Vertical distribution, abundance, appearance, and disappearance of species permitted the subdivision of Unit 1 (diatom-radiolarian ooze) into 9 biozones and 12 subzones (Table 4).

SYSTEMATIC PALEONTOLOGY

All the genera of diatoms found in the samples of Site 275 were arranged in the systematic order followed by Proschkina-Lavrenko (1949), whose descriptions have been used to identify the species. The new genera were inserted into this order according to their morphology. All the species, varieties, and forms are in alphabetical order within each genus. Descriptions are given for those species which have not been found in literature. The holotypes are deposited in the type collection of the Hungarian Geological Survey at Budapest XIV, Népstadion út 14 and in the Elmilab of the Geological Survey of Austria, Wien III, Rasumofskygasse 23.

All the diatom taxa found in the Upper Cretaceous of Site 275 belong systematically to the order of the Centrales Schütt, Mediales Jousé and Proschkina-Lavrenko. Not a single taxon was found with a raphe. Pennales apparently did not exist in Upper Cretaceous, at least in marine environment. The elongated forms of the genera Sceptroneis and Incisoria show at one of their ends a longitudinal pore, which might be considered as the beginning of a raphe.

BACILLARIOPHYCEAE
(DIATOMACEAE)

Genus MELOSIRA Agardh 1824

Melosira patera Long, Fuge, and Smith, 1946
(Plate 1, Figures 1, 2)

Description: Valves corresponding to original diagnosis (p. 109, pl. 17, fig. 18) from Moreno shale in California. Upper Cretaceous.
Occurrence: Sample 2-1, 130-132 cm.

Melosira sparsepunctata n. sp. Hajós
(Figure 3a, b. Holotype)

Derivation of name: sparsus (lat.) = scattered, punctatus (lat.) = scored.
Description: The single, well-preserved valve is circular and areolated similar to *M. vetustissima;* however, it does not show any reticulate ornamentation.
Dimensions: valve diameter, 25μ.
Holotype: Prep. 2817/1 HGS (Hungarian Geological Survey).
Type locality: DSDP Leg 29, Sample 275-2-5, 116-118 cm.
Type level: Upper Cretaceous.

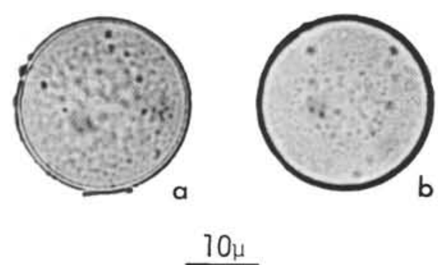


Figure 3a-b. Melosira sparsepunctata *n. sp.*

Melosira sulcata (Ehr.) Kützing (1844) var(?)

Description: The rare and poorly preserved specimens correspond to those described in Hustedt (1930, p. 276-278, fig. 118-120).
Occurrence: Sample 2-5, 116-118 cm.
Dimensions: diameter, 14μ-45μ.

Melosira vetustissima n. sp. Hajós and Stradner
(Plate 1, Figures 9-12; Plate 18, Figures 1, 2)

Derivation of name: vetus (lat.) = old.
Diagnosis and description: Circular valves, slightly convex, on the convex side ornamented with a reticulate system of radial costae and radial rows of areolae. Around each areola are ridges in peripheral direction which connect the radial ribs (costae). Near the margin they sometimes bifurcate. The central area of the valve is bare of ribs. In its center there is an irregular thickening as shown in electron photomicrograph Plate 1, Figure 12.
Dimensions: diameter, 8μ-16μ.
Holotype: Prep. 2812/1, HGS, Plate 1, Figures 9-11.
Paratype: 5069, Elmilab GSA (Geological Survey of Austria).
Type locality: DSDP Leg 29, Sample 275-2-3, 40-42 cm (holotype).
Occurrence: Sample 275-2-1, 130-132 cm (paratype).
Type level: Upper Cretaceous.

Genus PSEUDOPODOSIRA Jousé, 1949

Pseudopodosira westii (W. Smith)
Sheshukova and Gleser, 1964
(Plate 1, Figures 3, 4; Plate 19, Figures 1, 2, 4)

Sheshukova-Poretzkaja and Gleser, 1964, pl. 1, fig. 4, 5.

Description: Similar to the Paleocene forms described by Gleser; however, different from the Recent litoral *Melosira westii* Smith in Hustedt (1930, v. 1, p. 268-269, fig. 113).
Occurrence: Samples 2-3, 130-132 cm; 1-2, 40-42 cm.
Age: Upper Cretaceous.

Pseudopodosira sp. Hajós
(Figure 4a, b; Plate 19, Figures 3, 5)

Only one fragmentary valve with sporadical short marginal costae and distinct central area was found resembling Hyalodiscus.
Dimension: diameter, 53μ; central area, 20μ.
Occurrence: Sample 2-3, 40-42 cm.

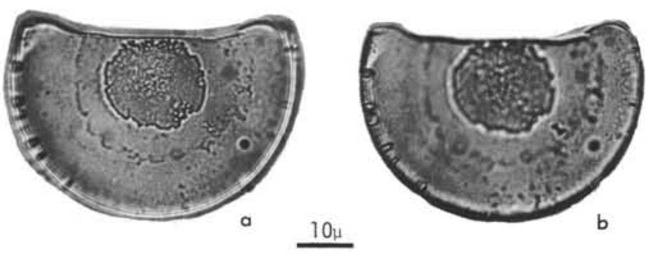


Figure 4a-b. Pseudopodosira *sp. Hajós.*

Pseudopodosira sp. Stradner
(Plate 19, Figure 3)

Description: Circular valve with two concentrical rings of single pores. In relief similar to *Pseudopodosira westii* (Smith) Gleser.
Dimensions: diameter, 8μ.
Occurrence: Sample 2-1, 130-132 cm.
Age: Upper Cretaceous.

Genus BENETORUS Hanna, 1927

Benetorus fantasmus Hanna, 1927
(Plate 19, Figure 6)

Hanna, 1927, p. 16, 19, 10.
Occurrence: Sample 2-1, 130-132 cm.
Age: Upper Cretaceous.

Genus HORODISCUS Hanna, 1927

Horodiscus rugosus n. sp. Hajós
(Plate 1, Figures 7, 8)

Derivation of name: rugosus (lat.) = rugged.
Diagnosis and description: Circular, slightly convex valve with the marginal zone covered with roughly radially arranged fine bars and radial rows of areolae in between. The central area is covered by a system of reticulate ridges about twice as numerous as in *Horodiscus macroscriptus* Hanna (1927, p. 21, pl. 2, fig. 11).
Dimension: diameter, 64μ; central area, 35μ.
Holotype: Prep. 2817/1 HGS, Plate 1, Figures 7, 8.
Type locality: DSDP Leg 29, Sample 275-2-5, 116-118 cm.
Type level: Upper Cretaceous.
Discussion: This species can be compared to, but differs from that shown in Proschkina-Lavrenko (1949, pl. 76, fig. 7), described from Hanna (1927) as *Horodiscus macroscriptus* from Moreno Gulch, Fresno County, California; Upper Cretaceous.

Genus SKELETONEMA Greville, 1865

Skeletonema alternans n. sp. Stradner
(Plate 20, Figure 4, Holotype)

Derivation of name: alternare (lat.) = alternate
Diagnosis and description: A Skeletonema with crown-shaped valves, which are connected with those of the adjoining cells by 10-12 interfingering extensions. These are about twice as long as wide, slightly bent inward, and formed in such a way that they fit together with those of the neighboring valve similar to a jigsaw puzzle. The margin of the valve shows a groove concentric to its periphery.
Dimensions: diameter, 11μ; height of valve including extensions, 5μ.
Holotype: Pl. 5091 Elmilab GSA.
Type locality: DSDP Leg 29, Sample 275-2-1, 130-132 cm.
Type level: Upper Cretaceous.

Skeletonema punctatum A. Schmidt, 1892
(Plate 1, Figures 5, 6; Plate 20, Figures 1, 2)

Our rare specimens correspond to those shown in Schmidt's Atlas (1874-1959, pl. 180, fig. 34) from the Upper Cretaceous of Ananino-Simbirsk, USSR.
Diameter: 20μ.
Occurrence: Sample 2-1, 130-132 cm.
Age: Upper Cretaceous.

Skeletonema subantarctica n. sp. Hajós
(Plate 2, Figure 1)

Derivation of name: found near the Antarctic.
Diagnosis and description: The valves are convex, with long filaments inserted near the constricted margin. The filaments, which connect the frustulae to chain-colonies, are about 1μ thick and about 70μ long. They are not straight as in other species of Skeletonema with closely arranged cells, but curved in such a way that they appear tied together near the apex of each valve.
Dimensions: diameter, 12μ-28μ; height of valve, 7μ-100μ; length of filaments, 20μ-100μ.
Holotype: Prep. 2800/1, HGS, Plate 2, Figure 1.
Type locality: DSDP Leg 29, Sample 275-1-2, 40-42 cm.
Type level: Upper Cretaceous.
Occurrence: Samples 275-1-2, 130-132 cm; 275-2-4, 40-42 cm (paratype).

Genus PYXIDICULA Ehrenberg, 1833

Pyxidicula minuta Grunow, 1884
(Plate 1, Figures 16-18)

Grunow, 1884, p. 92, pl. 5, fig. 6.
Occurrence: Sample 2-1, 130-132 cm.
Age: Upper Cretaceous.

Genus STEPHANOPYXIS Ehrenberg, 1844

Stephanopyxis discrepans Hanna, 1927
(Plate 2, Figures 5, 6)

Hanna, 1927, p. 33, pl. 4, fig. 10-11
Description: Valvae with areolae more in a random assemblage, not in rows. Diameter, approx. 30μ.
Occurrence: Sample 2-5, 40-42 cm; Moreno shale, California (Hanna).
Age: Upper Cretaceous.

Stephanopyxis hannai n. sp. Hajós
(Figure 5a, b; Plate 2, Figures 9, 10)

Hanna, 1927, pl. 4, fig. 12, non *St. grunowi* Grove and Sturt
Derivation of name: Dedicated to the memory of George Dallas Hanna.
Diagnosis: A Stephanopyxis with areolated large margin, not hyaline, as shown by Hanna (1927). The areolae are arranged in quincunx pattern, about 3 to each 10μ.
Dimension: diameter, 40μ-44μ.
Holotype: Prep. 2799/1 HGS, Plate 2, Figures 9, 10.
Type locality: DSDP Leg 29, Sample 275-2-1, 130-132 cm.
Type level: Upper Cretaceous.

Stephanopyxis lavrenkoi Jousé
(Plate 2, Figures 2-4)

Proschkina-Lavrenko, 1949, p. 40, 41, pl. 10, fig. 9a-c.
Occurrence: Samples 2-1, 130-132 cm; 2-3, 40-42 cm.
Age: Upper Cretaceous.

Stephanopyxis cf. marginata Grunow, 1884

Grunow, 1884, p. 90, pl. E. fig. 17.
Proschkina-Lavrenko, 1949, p. 39, pl. 9, fig. 7, pl. 80, fig. 1.

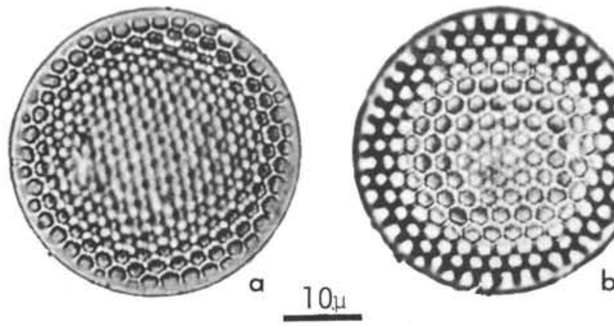


Figure 5a-b. Stephanopyxis hannai *n. sp. Hajós.*

Our specimens have 8-12 robust marginal spicules and diameters up to 65μ.

Occurrence: Sample 2-5, 116-118 cm.

Stephanopyxis megapora Grunow, 1884
(Plate 22, Figure 6)

Grunow, 1884, p. 89, pl. 5, fig. 24a,b.

Description: One small valve (diameter, 8.5μ) with comparatively large areolae (diameter, 1.5μ) and interstitial triangular gaps. No ultrastructure discernible within the areolae.

Occurrence: Sample 2-1, 130-132 cm.

Age: Upper Cretaceous.

Stephanopyxis superba (Greville) Grunow, 1884
(Plate 2, Figures 11, 12)

Greville, 1861, p. 2, pl. 8, fig. 3-5.
Grunow, 1884, p. 91.
Schmidt, 1874, pl. 123, fig. 5-8.
Greville, pl. 1, fig. 11.

Occurrence: Sample 2-1, 130-132 cm.

Age: Upper Cretaceous.

Stephanopyxis turris (Greville and Arnott) Ralfs *in* Pritcshard, 1861
(Plate 22, Figure 4; Plate 23, Figures 1-6; Plate 30, Figure 5)

Hustedt, 1927-1966, v. 1, p. 304-307, fig. 140.

Occurrence: Sample 2-1, 130-132 cm.

Stephanopyxis turris (Greville and Arnott) Ralfs var. intermedia Grunow, 1884
(Plate 1, Figures 13-15)

Grunow, 1884, p. 88, pl. 5, fig. 15, 16.
Proschkina-Lavrenko, 1949, v. 2, p. 40, pl. 10, fig. 4a,b.

Occurrence: Samples 2-1, 130-132 cm; 2-5, 40-42 cm; 2-5, 116-118 cm.

Age: Upper Cretaceous.

Stephanopyxis simonseni n. sp. Hajós
(Plate 2, Figures 7, 8, Holotype)

Derivation of name: In honor of Reimer Simonsen, Institut für Meeresforschung, Bremerhaven, West Germany.

Diagnosis: A Stephanopyxis with areolae arranged in tangential rows. Towards their margin the areolae appear to decrease in size, 5-6 areolae for each 10μ, near the center they are in quincunx pattern.

Dimensions: diameter, 27μ-45μ; wall, 2μ-3μ thick; height varying, as complete cells are occasionally composed of differently vaulted valves (compare Plate 30, Figure 5).

Holotype: Prep. 2800/1 HGS.

Type locality: DSDP Leg 29, Sample 275-1-2, 40-42 cm.

Type level: Upper Cretaceous.

Occurrence: Samples 2-3, 40-42 cm; 2-4, 40-42 cm; 2-5, 116-118 cm.

Stephanopyxis weyprechtii (Grunow) n. comb. Hajós
(Plate 22, Figures 1, 2, 5)

Grunow, 1884, p. 92, pl. 5, fig. 5 (*Pyxidicula weyprechtii*)

Species designation on account of size of pores, with transfer into the genus Stephanopyxis on account of ultrastructure within the areolae. Diameter of areolae, approx. 2μ.

Occurrence: Samples 2-1, 130-132 cm; 2-5, 40-42 cm.

Age: Upper Cretaceous.

Stephanopyxis sp. 1 Hajós
(Figure 6a,b)

Highly vaulted valves with rather thick wall and deep areolae in quincunx pattern.

Dimensions: diameter, 22μ-30μ.

Occurrence: Samples 2-5, 40-42 cm; 2-6, 116-118 cm.

Age: Upper Cretaceous.

Stephanopyxis sp. 2 Hajós
(Figure 7)

Large, flat circular valves with hyaline border, and about 15 spicules near the margin. Approx. 3 areolae per 10μ. Valve diameter over 80μ.

Occurrence: Sample 2-5, 40-42 cm.

Age: Upper Cretaceous.

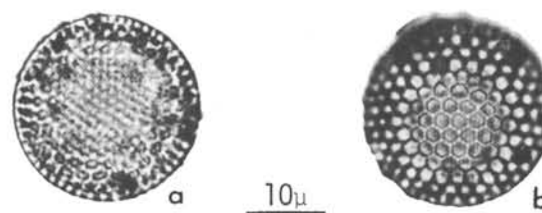


Figure 6a-b. Stephanopyxis *sp.1 Hajós.*

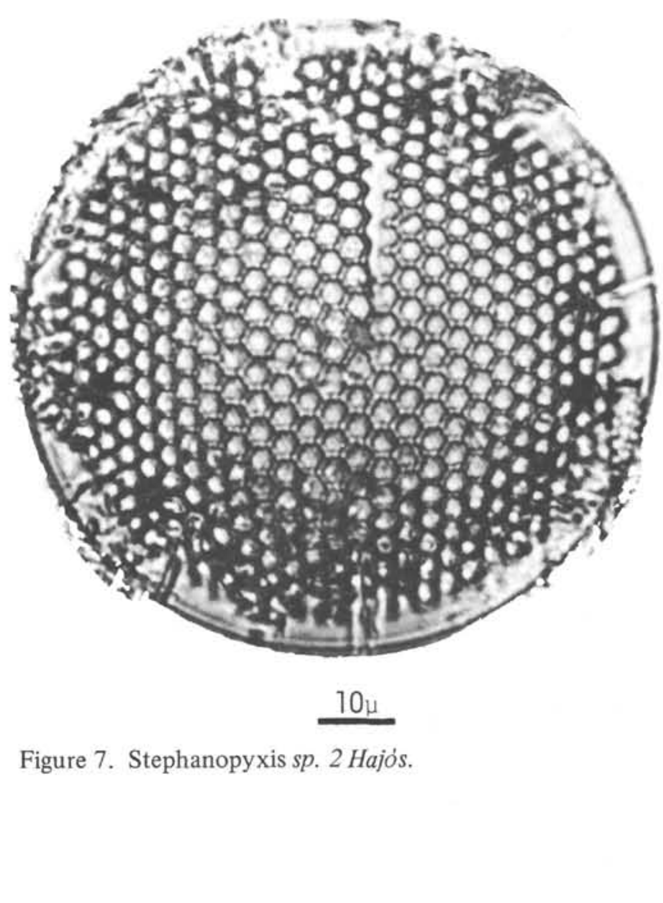


Figure 7. Stephanopyxis *sp. 2 Hajós.*

Genus COSCINODISCUS Ehrenberg 1838

Coscinodiscus circumspectus Long, Fuge, and Smith, 1946
(Plate 4, Figure 1)

Long, Fuge, and Smith, 1946, p. 102, pl. 15, fig. 12.
Occurrence: Samples 1-2, 40-42 cm; 2-1, 40-42 cm (rare).

Coscinodiscus ildicoi n. sp. Hajós
(Plate 3, Figures 4, 5, Holotype)

Non *C. stellaris* Roper, 1858, described in Hustedt (1930, p. 396-398, fig. 207).
Derivation of name: Dedicated with thanks to Mrs. Ildiko Mihály, HGS.
Diagnosis and description: A conscinodiscus with circular, slightly convex valves, which are areolated similar to *C. stellaris* Roper; however, the areolae are bundled to form sectors. The center of the valve is irregular, with a small hyaline spot, and situated where the central parts of the sectors of areolae meet. The margin is decorated with seven small spicules.
Dimensions: diameter, 58μ; 6-7 areolae per 10μ in center; 10 areolae per 10μ near the margin.
Holotype: Prep. 2816/1 HGS.
Type locality: DSDP Leg 29, Sample 275-2-5, 40-42 cm.
Type level: Upper Cretaceous.
Occurrences: Samples 2-1, 40-42 cm; 2-2, 60-62 cm; 2-5, 40-42 cm; 2-5, 116-118 cm.
Discussion: *Coscinodiscus stellaris* Roper, 1858, differs from *C. ildicoi* n. sp. by having smaller areolae, and not having marginal spicules.

Coscinodiscus lineatus Ehrenberg forma fossilis Jousé, 1963
(Plate 3, Figures 1-3, Plate 38, Figure 1)

Jousé, 1963, p. 98, fig. 4, pl. 8, fig. 1-3.
Occurrence: Sample 2-1, 130-132 cm (rather common).
Age: Upper Cretaceous

Coscinodiscus morenoensis Hanna, 1927
(Plate 3, Figures 6, 7; Plate 4, Figure 2; Plate 24, Figures 1-3; Plate 25, Figures 1-5)

Hanna, 1927, p. 18, pl. 2, fig. 3, 4.
Description: In some of our specimens there are fewer sectors (fascicules of areolae) than originally described. The electronmicrographs show the margins of the areolae to be rosette-shaped. The bottom of the areolae has a circular pore (Plate 25). The asymmetrical central pore is elongate, and lies next to a hyaline central spot.
Occurrence: Sample 2-1, 130-132 cm.
Age: Upper Cretaceous.

Genus ETHMODISCUS Castracane, 1886

Ethmodiscus sp. Hajós
(Plate 4, Figures 3, 4)

Description: Circular, slightly convex disc with finely radially perforated margin, and irregular punctures in the central part. No distinct boundary between margin and central area.
Dimensions: diameter, 55μ; distance between dots, approx. 1μ.
Occurrence: Sample 2-1, 130-132 cm.

Genus XANTHIOPYXIS Ehrenberg, 1845

Xanthiopyxis granti Hanna
(Plate 4, Figures 16, 17; Plate 26, Figures 4, 5; Plate 35, Figure 7)

Hanna, 1927, p. 39, pl. 5, fig. 13, 14.
Description and discussion: The surface of the elongate valvae is decorated by a system of pores and surrounding ridges, each pore forming a small crater with an elevated center (Plate 26, Figure 5). The large polyhedral central pore is accompanied by an eccentric elongate pore. The lateral parts of the valve also have pores and craters; the margin is serrate (Plate 26, Figure 4). Related to the Biddulphinae?
Dimensions: length, 23μ; width, 8μ.
Occurrence: Sample 2-1, 130-132 cm.
Age: Upper Cretaceous.

Xanthiopyxis rotunda n. sp. Hajós
(Figure 8a,b; Holotype)

Derivation of name: rotundus (lat.) = round.
Diagnosis: Circular lid of permanent spore. The cupular disc is ornamented with various spines and spicules.
Dimensions: diameter, 18μ; 5-6 spicules per each 10μ.
Holotype: Prep. 2809/1 HGS.
Type locality: DSDP Leg 29, Sample 275-2-1, 130-132 cm.
Type level: Upper Cretaceous.

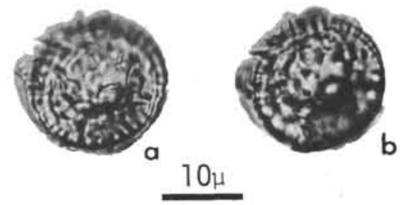


Figure 8a-b. Xanthiopyxis rotunda *n. sp. Hajós*.

Xanthiopyxis sp. 1 Hajós
(Plate 4, Figure 13)

Broadly lanceolate valve of a permanent spore, sparsely covered with small spicules.
Dimensions: length, 28μ; width 13μ.
Occurrence: Sample 2-5, 116-118 cm (rare).

Xanthiopyxis sp. 2 Hajós
(Plate 4, Figure 12)

An elongate, curved Xanthiopyxis decorated with long spines, and cristae.
Dimensions: length, 30μ; width 12μ.
Occurrence: Sample 2-1, 130-132 cm.

Xanthiopyxis sp. 3 Hajós
(No illustration)

Elongate, rounded, with 2μ-5μ long spines round the margin. Surface of the valve is rugose.
Dimensions: length 70μ; width, 22μ.
Occurrence: Sample 2-3, 40-42 cm.
Age: Upper Cretaceous.

Genus PORETZKIA Jousé, **1949**

Poretzkia circularis Jousé, 1949
(Plate 4, Figures 5, 6)

Proschkina-Lavrenko, 1949, v. 2, p. 88, pl. 32, fig. 8a, b.
Dimension: 28μ-40μ diameter.
Occurrence: Samples 1-1, 118-120 cm; 1-3, 40-42 cm; 2-1, 130-132 cm.

Poretzkia sp. Hajós
(Figure 9)

Description: Discs with flat concentrical undulation, and very finely punctured. The circular margin appears striated with 12 striae per 10μ.
Dimensions: diameter, 20μ-30μ.
Occurrence: Samples 2-3, 40-42 cm; 2-5, 116-118 cm.

Figure 9. Poretzkia *sp.*

Genus CHASEA Hanna, 1934

Chasea bicornis Hanna, 1934
(Plate 5, Figures 1-3; Plate 27, Figures 3, 5, 6, ?8)

Hanna, 1934, p. 354, pl. 48, fig. 12-16.
Description: The radial striation of the central dome-shaped protuberance is best seen in the direct electron transmission (Plate 27, Figure 3); evidently the valves of permanent spores.
Occurrence: Samples 1-1, 118-120 cm; 2-1, 130-132 cm; 2-4, 40-42 cm; 2-5, 40-42 cm; (abundant).

Chasea ornata n. sp. Hajós and Stradner
(Plate 5, Figures 4, 5; Plate 27, Figure 4)

Derivation of name: ornatus (lat.) = decorated.
Diagnosis and description: Valves broadly lanceolate with rounded ends and a central protuberance. In addition to a radial striation, the valve is decorated with sparse round warts. The margin of the valve has on each side up to 20 tooth-shaped stubs.
Dimensions: length, 30μ-40μ; width, 20μ-25μ.
Holotype: Prep. 2816/1 HGS, Plate 5, Figures 4, 5.
Paratype: Plate 27, Figure 4 (SEM)
Type locality: DSDP Leg 29, Sample 275-2-15, 40-42 cm; Paratype in Sample 275-2-1, 130-132 cm.
Type level: Upper Cretaceous.

Genus CLADOGRAMMA Ehrenberg, 1854

Cladogramma jordani Hanna, 1927
(Plate 4, Figures 9-11; Plate 20, Figure 6)

Hanna, 1927, p. 16, pl. 2, fig. 1.
Diameter: 20μ-24μ.
Occurrence: Samples 2-1, 130-132 cm; 2-4, 40-42 cm; 2-5, 116-118 cm; (common).

Cladogramma simplex n. sp. Hajós and Stradner
(Plate 4, Figures 7, 8; Plate 28, Figure 5)

Derivation of name: simplex (lat.) = simple.
Diagnosis and description: Circular valve with vaulted center; 10-13 radial ridges are running from the margin towards the center, where they meet, and are enclosing hyaline sectors.
Dimension: diameter, 25μ.
Holotype: Prep. 2809/1 HGS, Plate 4, Figures 7, 8.
Paratype: 5173 Elmilab GSA.
Type locality: DSDP Leg 29, Sample 275-2-1, 130-132 cm.
Type level: Upper Cretaceous.

Genus ACTINOPTYCHUS Ehrenberg, 1841

Actinoptychus packi Hanna, 1927
(Plate 5, Figures 23, 24; Plate 29, Figures 1-4; Plate 30, Figures 1-4)

Hanna, 1927, p. 12, pl. 1, fig. 1-2.
Occurrence: Sample 2-1, 130-132 cm.

Genus RATTRAYELLA De Toni, 1889

Rattrayella antiqua n. sp. Hajós and Stradner
(Plate 4, Figures 14, 15; Plate 38, Figure 5)

Derivation of name: antiquus (lat.) = ancient.
Diagnosis and description: Circular discs with irregular perforations all over, somewhat denser near the margin (20-25 per 10μ) than in the center (10 per 10μ). At a distance of about 3μ from the margin there is a ring of 12 or more elliptical sieve plates, with their longer axis in peripheral direction (see Plate 38, Figure 5). The pores of the sieve-plates are arranged in radial rows, about 5 per 1μ.
Dimensions: diamter, 55μ.
Holotype: Prep. 2812/1 HGS.
Paratype: 4891 Elmilab GSA.
Type locality: DSDP Leg 29, Sample 275-2-3, 40-42 cm; paratype found in Sample 275-2-1, 130-132 cm.
Type level: Upper Cretaceous.
Discussion: This new species differs from *Rattrayella oamaruensis* (Grunow) De Toni in Van Heurck (1899, p. 491) by not having little spines between the sieve-plates and by not being radially striated.

Genus AULACODISCUS Ehrenberg, 1844

?Aulacodiscus sp., Hajós
(No illustration)

Large areolated valve, with areolae in tangential arrangement. Near the border are six heavy spatulate spinous processes.
Diameter: 80μ.
Occurrence: Sample 2-1, 130-132 cm.

Genus PYRGODISCUS Kitton, 1885

Pyrgodiscus cameratus n. sp. Hajós
(Figure 10a,b, Holotype)

Derivation of name: cameratus (lat.) = cambered.
Pyrgodiscus specimens similar to *Pyrgodiscus triangulatus* n. sp., but with more pronounced central knob, which wears the distinct Y-mark, and about a dozen radial ridges subdividing the disc into striated sectors.
Dimension: diameter, 12μ-15μ.
Holotype: Prep. 2814/1 HGS.
Type locality: DSDP Leg 29, Sample 275-2-4, 40-42 cm.
Occurrences: Samples 1-2, 40-42 cm; 2-4, 40-42 cm.
Type level: Upper Cretaceous.

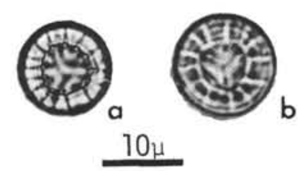


Figure 10a-b. Pyrgodiscus cameratus *n. sp. Hajós.*

Pyrgodiscus sinuatus n. sp. Stradner
(Plate 18, Figure 3, 4)

Derivation of name: sinus (lat.) = bay.
Diagnosis and description: A pyrgodiscus with circular discs, the margin of which is subdivided by more than a dozen semicircular bays. These are lying within a hyaline marginal zone, with only very rare pores, and are themselves perforated by two pores each. The center of the disc is either hyaline (Plate 18, Figure 3), or with reticulated ridges (Plate 18, Figure 4) and is surrounded by radial ridges lining deep furrows with rows of pores (approx. 4 per 10μ). Many of the approx. 60 ridges are bifurcated.
Dimension: diameter, 8μ-22μ.
Holotype: Prep. 2816/1, HGS.
Paratype: 4834 Elmilab GSA (Plate 18, Figures 3, 4).
Type locality: DSDP Leg 29, Sample 275-2-5, 40-42 cm. Paratype found in Sample 275-2-1, 130-132 cm.
Type level: Upper Cretaceous.

Pyrgodiscus triangulatus n. sp. Hajós and Stradner
(Figure 11a,b, Holotype; Plate 18, Figures 5, 6: Paratype)

Derivation of name: triangulatus (lat.) = triangular.
Diagnosis and description: A Pyrgodiscus with circular valves, the center of which is marked by an Y-shaped, hollow elevation. About 80 radial rugulose ridges divide the disc into more or less straight furrows, in which are rows of minute circular pores (3-4 per 10μ).
Dimensions: diameter, 10μ-15μ.
Holotype: Prep. 2816/1 HGS.
Paratype: 4844 Elmilab GSA.
Type locality: DSDP Leg 29, Sample 275-2-5, 40-42 cm. Paratype found in Sample 275-2-1, 130-132 cm.
Type level: Upper Cretaceous.

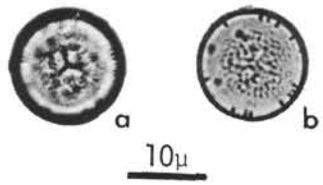


Figure 11a-b. Pyrgodiscus triangularus *n. sp. Hajós and Stradner.*

Genus RHIZOSOLENIA Ehrenberg, 1841

Rhizosolenia cretacea n. sp. Hajós and Stradner
(Plate 7, Figure 1; Plate 31, Figures 4-6)

Derivation of name: cretaceus (lat.) = Cretaceous.
Diagnosis and description: Curved, tubular, siliceous bodies, which appear to be composed of compact hyaline, pillars with a network of thin stripes of perforated lamina connecting them. The basal end shows a semilunar grip, which hints that these cell elements (or cells?) were connected with something of different shape. Near this basal end, which appears compact and lacks pores, the small pores are sparsely distributed and are surrounding one elongate, larger pore. The distal end often is split up and thus proves the fasciculated structure.
Dimensions: length, 40μ-100μ; width, 3μ-9μ.
Pores: 4-5 per 10μ in central part of reticulate stripes.
Holotype: Prep. 2799/1 HGS, Plate 17, Figure 1.
Paratype: 4980 Elmilab GSA (Plate 31, Figure 4).
Type locality: DSDP Leg 29, Sample 275-1-1, 118-120 cm. Paratype found in Sample 275-2-1, 130-132 cm.
Type level: Upper Cretaceous.
Discussion: This species differs from *Rhizosolenia curvirostris* Jousé by not being sigmoid, and also by its different fine-structure.

Genus PSEUDOSTICTODISCUS Grunow, 1882

Pseudostictodiscus sp. Hajós
(Plate 5, Figure 12)

Schmidt, 1874, pl. 74, fig. 24-30.
Description: Valve broad-elliptical with two little processes at the ends of the longer axis. Perforated in radial rows.
Occurrence: Samples 1-2, 40-42 cm; 2-3, 40-42 cm; (rare).
Age: Upper Cretaceous.

Genus HUTTONIA Grove and Sturt, 1887

Huttonia antiqua n. sp. Hajós and Stradner
(Plate 5, Figures 13, 14; Plate 31, Figures 1-3)

Derivation of name: antiquus (lat.) = ancient
Diagnosis and description: Narrowly-elongate valves with slightly enlarged ends, somewhat twisted round the main axis. Four hyaline depressed bands subdivide the surface of the valve into a central convex field with rows of radially arranged pores about 4 per 1μ, two intermediate elongate fields with rows of pores pointing to the center of the central field; and two distally inflated, cupula-shaped "ocelli" which have the appearance of oval sieves with about 7 pores per 1μ. The oval sieve plate is surrounded by a ½μ hyaline zone, and in centripetal direction by a semilunar double-row of slightly larger pores.
Dimensions: length 30μ-90μ; width, 6μ-8μ; height, 6μ.
Holotype: Prep. 2823/1 HGS, Plate 5, Figures 13, 14.
Paratype: 5238 Elmilab GSA.
Type locality: DSDP Leg 29, Sample 275-1-3, 40-42 cm. Para-type found in Sample 275-2-1, 130-132 cm.
Type level: Upper Cretaceous.

Huttonia constricta n. sp. Hajós
(Figure 12a,b, Holotype)

Derivation of name: constrictus (lat.) = constricted.
Diagnosis and description: A Huttonia in general appearance similar to *Huttonia antiqua* n. sp., but constricted in the middle, which is smaller than the ends.

Figure 12a-b. Huttonia constricta *n. sp. Hajós.*

Dimensions: length, 50μ; width, 6μ-8μ.
Holotype: Prep. 2809/1 HGS.
Type locality: DSDP Leg 29, Sample 275-2-1, 130-132 cm.
Type level: Upper Cretaceous.

Huttonia punctata n. sp. Hajós
(Plate 5, Figures 15, 16, Holotype)

Derivation of name: punctum (lat.) = dot.
Diagnosis and description: Valves lanceolate, elongate, with two transverse hyaline lines and ocelli at the end. Each ocellus is twisted with the same sense of rotation, thus if one can look on top of one ocellus, the other is averted. Surface of the valve is coarsely perforated.
Dimension: length, 30μ; width, 9μ.
Holotype: Prep. 2823/1 HGS.
Type locality: DSDP Leg 29, Sample 275-1-3, 40-42 cm.
Type level: Upper Cretaceous.

Genus TRICERATIUM Ehrenberg, 1839

Triceratium arietinum A. Schmidt, 1886
(Plate 8, Figures 9, 10)

Schmidt, 1874, pl. 96, fig. 19-21.
Proschkina-Lavrenko, 1949, v. 2, p. 164, pl. 61, fig. 5.
Dimension: length of side, 63μ.
Occurrence: Sample 2-1, 130-132 cm.
Age: Upper Cretaceous.

Triceratium cristatum Pantocsek, 1905
(Plate 8, Figure 11, 12)

Pantocsek, 1886-1905, v. 3, p. 107, pl. 14, fig. 218.
Dimension: length of side, 55μ.
Occurrence: Sample 2-5, 40-42 cm.
Age: Upper Cretaceous.

Triceratium dignum Long, Fuge, and Smith, 1946
(Plate 8, Figures 7, 8)

Long, Fuge, and Smith, 1946, p. 113, pl. 18, fig. 10.
Dimension: length of side, 45μ-47μ.
Occurrence: Sample 1-1, 118-120 cm.
Age: Upper Cretaceous.

Triceratium edgari n. sp. Hajós
(Plate 8, Figures 13, 14, Holotype)

Derivation of name: Named in honor of N. Terence Edgar, Chief Scientist of the Deep Sea Drilling Project, La Jolla, California.
Diagnosis and description: Triangular valves with slightly convex sides and rounded corners. The areolae near the margin appear larger than those of the central area (approx. 5 per 10μ).
Dimension: length of side, 17μ-28μ.
Holotype: Prep. 2789/1 HGS.
Type locality: DSDP Leg 29, Sample 275-2-3, 40-42 cm.

Occurrence: Sample 2-5, 116-118 cm.
Type level: Upper Cretaceous.

Triceratium gratum A. Schmidt, 1874
(Plate 8, Figures 15, 16)

Schmidt, 1874, pl. 77, fig. 19.
Description: Triangular valves with perforated apices and elongated triangular processes. Areolae arranged in radiating rows and appear elongated near margin; 2-3 central areolae.
Dimension: length of side, 60μ.
Occurrence: Sample 2-5, 116-118 cm.
Age: Upper Cretaceous.

Triceratium idoneum Pantocsek, 1905
(Plate 9, Figure 6)

Pantocsek, 1886-1905, v. 3, p. 91, pl. 24, fig. 357.
Triceratium uralense Strelnikova, 1965a, p. 34, pl. 5, fig. 3, 4.
Dimension: length of side, 75μ.
Occurrence: Sample 2-3, 40-42 cm.
Age: Upper Cretaceous.

Triceratium kennetti n. sp. Hajós and Stradner
(Plate 7, Figures 11-15; Plate 32, Figures 1-6)

Derivation of name: Named in honor of James P. Kennett, Chief Scientist of DSDP Leg 29.
Diagnosis and description: Triangular valves with concave sides and narrowly rounded corners. Valves are decorated with radial and arcuated areolae, larger near margin and smaller near center and girdle. Each areola has a rosette-shaped grid inserted. Adjoining cells of same cell-chain may show different patterns of grids inside their areolae (Plate 32, Figure 3). Simple pores are cratered. Girdle perforated by straight rows of elongate pores in axial direction.
Dimensions: length of side, 25μ-35μ; diameter of areolae, 0.5μ-1μ.
Holotype: Prep. 2817/1 HGS, Plate 7, Figures 11-13.
Paratype: 4913 Elmilab GSA.
Type locality: DSDP Leg 29, Sample 275-2-5, 116-118 cm; paratype found in Sample 275-2-1, 130-132 cm.
Type level: Upper Cretaceous.

Triceratium kuepperi n. sp. Hajós and Stradner
(Plate 7, Figures 9, 10; Plate 33, Figure 1)

Derivation of name: Named in honor of Heinrich Küpper, Chief Geologist, Vienna, Austria.
Diagnosis and description: Triangular valves with convexly arcuated sides and acute angles. Valve area perforated by radially arranged round or oval pores. Pores near center less than 2μ; near margin, about 1μ in diameter.
Dimension: length of sides, about 28μ.
Holotype: Prep. 2800/1 HGS, Plate 7, Figures 9, 10.
Paratype: 5017 Elmilab GSA.
Type locality: DSDP Leg 29, Sample 275-1-2, 40-42 cm; paratype found in Sample 275-2-1, 130-132 cm.
Type level: Upper Cretaceous.
Discussion: Related to *Triceratium dignum* Long, Fuge, and Smith, 1946 (p. 113, pl. 17, fig. 15; pl. 18, fig. 10) but sides are equal in length.

Triceratium nobile Witt, 1886
(Plate 9, Figure 3)

In Schmidt, 1874, pl. 111, fig. 26-29.
Proschkina-Lavrenko, 1949, v. 2, p. 164, pl. 94, fig. 2.
Dimension: length of side, 95μ.
Occurrence: Cores 275-1 and -2 (common)

Triceratium occultum Hustedt, 1930
(Plate 9, Figure 1, 2)

In Schmidt, 1874, pl. 372, fig. 6.
Dimension: length of side, 45μ.
Occurrence: Sample 2-1, 120-122 cm.

Triceratium praetenue Greville, 1864
(Plate 8, Figures 5, 6)

Greville, 1861-1866, Sev. 13, p. 3, fig. 16.
Schmidt, 1874, pl. 95, fig. 20.
Dimension: length of side, 33μ.
Occurrence: Samples 1-1, 118-120 cm.

Triceratium schulzii Jouse, 1949
(Plate 8, Figures 1, 2; Plate 33, Figure 2)

Proschkina-Lavrenko, 1949, v. 2, p. 161, pl. 58, fig. 3a, b.
Dimension: length of side, 50μ.
Occurrence: Sample 2-5, 40-42 cm (common).

Triceratium sectum Witt, 1890
(Plate 9, Figures 3, 4)

In Schmidt, 1874, pl. 150, fig. 2-4.
Triceratium heibergii Grunow, *in* Van Heurck, 1880-1885, pl. 112, fig. 9-11.
Similar to *Trinacria interlineata* Long, Fuge, and Smith, 1946 (pl. 19, fig. 11) from the Upper Cretaceous Moreno shale in California.
Dimension: length of side, 33μ.
Occurrence: Samples 2-3, 40-42 cm; 2-5, 116-118 cm.

Genus BIDDULPHIA Gray, 1821 emend. Van Heurck, 1885

Biddulphia cretacea n. sp. Hajós and Stradner
(Plate 5, Figures 6, 7; Plate 34, Figures 1, 2)

Derivation of name: cretaceus (lat.) = Cretaceous.
Diagnosis and description: Valves elliptical with rostrate ends, two biddulphoid processes outside the focuses of the ellipse, and radially arranged round or oval pores with delicate grid (generally missing). Between the processes two convex or undulated lines separate an inner zone from the marginal zone. Central cupula elliptical in adverse direction, surmounted by a tubular spine.
Dimensions: length, 18μ-28μ; width, 16μ-24μ.
Holotype: Prep. 2812/1 HGS, Plate 5, Figures 6, 7.
Paratype: 5159 Elmilab GSA.
Type locality: DSDP Leg 29, Sample 275-2-1, 25-27 cm; paratype found in Sample 275-2-1, 130-132 cm; common in all samples of Core 275-2.
Type level: Upper Cretaceous.

Biddulphia sparsepunctata n. sp. Hajós
(Plate 5, Figures 8, 9 Holotype)

Derivation of name: sparse (lat.) = sparsely; punctatus (lat.) = dotted.
Diagnosis and description: Valves asymmetrically ovate, "bean-shaped," with broadly rounded ends. Two hyaline channels, converging toward the convex side, subdivide the valve into a central, vaulted area and two large processes. Surface sparsely punctuated.
Dimensions: length, 27μ-30μ; width, 17μ-18μ.
Holotype: Prep. 2812/1 HGS.
Type locality: DSDP Leg 29, Sample 275-2-2, 60-62 cm.
Type level: Upper Cretaceous.

Genus ODONTOTROPIS Grunow, 1884

Odontotropis sp. Hajós
(Figure 13)

Only two fragments of large spines (part of the valve) were encountered. They are not comparable with *O. cristata* Grunow, 1884, p. 59, pl. 2, fig. 23 or with *O. vitrea* Pantocsek, 1905, v. 3, p. 86, pl. 38, fig. 535.
Occurrence: Samples 2-1, 25-27 cm; 2-1, 130-132 cm.
Age: Upper Cretaceous.

Genus CERATAULUS Ehrenberg, 1843

Cerataulus sp. Hajós
(Figure 14)

Description: Circular valves with 1μ-wide hyaline margin. Disc marked with a fine perforation. Two round, 2μ-wide ocelli or large pores at margin.
Diameter: 38μ.
Occurrence: Sample 2-1, 130-132 cm (very rare).
Age: Upper Cretaceous.

Genus CERATAULINA Peragallo, 1892

Cerataulina cretacea n. sp. Hajós
(Plate 10, Figures 3, 4 Holotype)

Derivation of name: cretaceas (lat.) = Cretaceous.

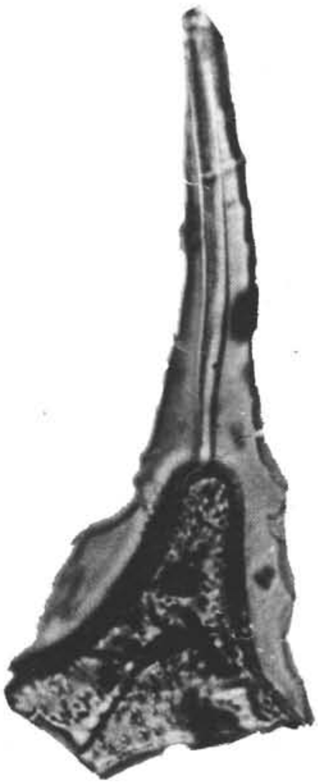


Figure 13. Odontotropis *sp.*

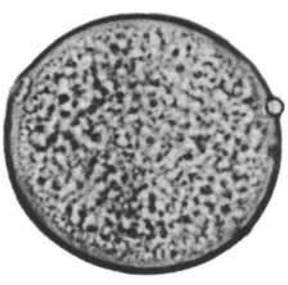


Figure 14. Cerataulus *sp.* *Hajós.*

Diagnosis and description: Frustula elongated, consisting of a longer cylindrical and a shorter conical part with 2-6 long filaments branching from the apex. Walls hyaline except for lower part of finely perforated cylinder.

Dimensions: diameter, 18µ-22µ; filaments, 30µ-40µ long.

Holotype: Prep. 2809/1 HGS.

Type locality: DSDP Leg 29, Sample 275-2-1, 130-132 cm.

Type level: Upper Cretaceous.

Discussion: Evidently the permanent spore of a nonidentified planktonic diatom.

Genus HEMIAULUS Ehrenberg, 1884

Hemiaulus altus n. sp. Hajós
(Plate 5, Figures 17-19 Holotype)

Derivation of name: altus (lat.) = high.

Diagnosis and description: A Hemiaulus with extremely high valves, height of saddle between horns exceeding diameter of basal ellipse about twice. Thin horns shorter than distance from saddle to bottom. Valve surface sparsely perforated.

Dimensions: diameter, 9µ; length, 8µ-10µ; height, 20µ-42µ.

Holotype: Prep. 2809/1 HGS.

Type locality: DSDP Leg 29, Sample 275-1-2, 40-42 cm. Further occurrences in Samples 2-1, 25-27 cm; 2-5, 40-42 cm.

Type level: Upper Cretaceous.

Discussion: This new species is related to *Hemiaulus februatus* Heiberg, *in* Schmidt, 1874, pl. 143, fig. 44, but differs by dimension relationships.

Hemiaulus andrewsi n. sp. Hajós
(Plate 7, Figure 8 Holotype)

Derivation of name: named in honor of George W. Andrews, U.S. Geological Survey, Washington.

Diagnosis and description: A hemiaulus, lanceolate in valve view, longer than high. Two nearly cylindrical horns are crowned with short spines at their flat top. Areolae wide, becoming narrower near ends of horns. Transapical constrictions on both sides of valve.

Dimensions: diameter, 66µ; length, 65µ; height, 9µ-29µ.

Holotype: Prep. 2817/1 HGS.

Type locality: DSDP Leg 29, Sample 275-2-5, 116-118 cm.

Discussion: This species is close to *Hemiaulus polycystinorum* Ehrenberg, 1854, p.36, fig. 43, but differs in horn shape.

Hemiaulus curvatulus Strelnikova, 1971
(Plate 6, Figure 8)

Strelnikova, 1971, p. 49, pl. 1, fig. 12, 13.

Dimension: length, 22µ.

Occurrence: Sample 2-5, 40-42 cm (rare); Campanian strata in the USSR (Strelnikova, 1971).

Age: Upper Cretaceous.

Hemiaulus danicus Grunow, 1884
(Plate 5, Figures 10, 11)

Grunow, 1884, p. 65, pl. 2, fig. 40.

Dimension: length, 27µ-35µ.

Occurrence: Samples 1-1, 118-120 cm; 2-1, 130-132 cm; 2-5, 116-118 cm.

Hemiaulus echinulatus Jousé, 1951
(Plate 5, Figures 21, 22)

Jousé, 1949, p. 186, pl. 72, fig. 5.
Jousé, 1951, p. 53, pl. 3, fig. 3a-v.

Dimensions: length, 75µ; width, 15µ-18µ.

Occurrences: Sample 1-2, 40-42 cm; Upper Cre-taceous of the northern Ural region.

Hemiaulus gleseri n. sp. Hajós
(Plate 5, Figure 20; Plate 7, Figures 6, 7 Holotype)

Derivation of name: Dedicated to S. I. Gleser, VSEGEI, Geol. Institute of Leningrad, USSR.

Diagnosis and description: Valves are in plan view lanceolated and subdivided by two transversal costae into three approximately equal parts. Low horns at ends curve inward and each wears a short spine. Valve margin is hyaline. Pores show a somewhat radial arrangement. Valve ends pointed.

Dimensions: length, 54µ-84µ; height, 8µ-10µ; width, 13µ-15µ.

Holotype: Prep. 2799/1 HGS.

Type locality: DSDP Leg 29, Sample 275-1-1, 118-120 cm.

Type level: Upper Cretaceous. (Common in all studied samples of Cores 275-1 and -2.)

Hemiaulus polycystinorum Ehrenberg, 1854
(Plate 6, Figures 4-7; Plate 34, Figure 3; Plate 35, Figures 2-5)

Ehrenberg, 1854, p. 36, fig. 43.
Proschkina-Lavrenko, 1949, pl. 71, fig. 3a.
Hemiaulus polycystinorum var. *simbirskiana* Grunow, 1884, p. 65, pl. 2, fig. 44-45.
Hemiaulus antarcticus Weisse, 1854, p. 242, pl. 1, fig. 18a-f, *in* Schmidt, 1874, pl. 144, fig. 28-35.

Diameter: 40µ-45µ.

Occurrence: Cores 275-1 and -2 (common).

Hemiaulus polycystinorum Ehrenberg var. brevicornis Jousé, 1951
(Plate 6, Figures 1-3)

Jousé, 1951, p. 97, pl. 5, fig. 4, 5.
Diameter: 20μ-23μ.
Occurrences: Samples 1-1, 118-120 cm; 2-1, 130-132 cm; 2-5, 116-118 cm.
Age: Upper Cretaceous.

Hemiaulus polymorphus Grunow, 1884
(Plate 6, Figure 9; Plate 34, Figure 4; Plate 35, Figure 6)

Grunow, 1884, p. 66.
Grove and Sturt, 1887, pl. 11.
Hanna, 1927, p. 20-21, pl. 2, fig. 9, 10.
Schmidt, 1874, p. 143, fig. 11-13, 30-34.
Diameter: 20μ-57μ.
Discussion: A very common and rather variable species in our samples.
Occurrences: Sample 2-1, 130-132 cm; 2-5, 116-118 cm; 2-4, 40-42 cm.
Age: Upper Cretaceous.

Hemiaulus prae-elegans Jousé, 1951
(Plate 6, Figures 12, 14)

Jousé, 1951, p. 53, pl. 3, fig. 4a,b.
Dimensions: diameter, 38μ; height, 20μ-38μ.
Occurrence: Samples 1-3, 40-42 cm; 1-4, 40-42 cm; 2-1, 130-132 cm; 2-4, 40-42 cm; 2-5, 40-42 cm; 2-5, 116-118 cm.
Age: Upper Cretaceous.
Discussion: Described from Upper Cretaceous level in Ural Mountains.

Hemiaulus schmidti n. sp. Hajós
(Plate 7, Figures 2-5)

Derivation of name: Named after A. Schmidt, who illustrated this taxon in his Atlas as "Fragliche Form".
Diagnosis and description: Valve lanceolate, elongate with rounded ends, divided by six costae into seven parts. End horns narrow, with a short spine. Valve surface finely perforated.
Dimension: length, 42μ-48μ; width, 9μ-10μ; height, 12μ.
Holotype: Prep. 2809/1 HGS, Plate 7, Figures 2, 3.
Type locality: DSDP Leg 29, Sample 275-2-1, 130-132 cm.
Type level: Upper Cretaceous.
Discussion: Illustrated by Schmidt (1874) as "Fragliche Form" (= questionable form) from Springfield, Barbadoes (pl. 144, fig. 45).

Hemiaulus sporalis Strelnikova, 1971
(Plate 29, Figures 5, 6)

Strelnikova, 1971, p. 48, pl. 3, fig. 1-10.
Occurrence: Sample 2-1, 130-132 cm.
Age: Upper Cretaceous.

Hemiaulus kondai n. sp. Hajós
(Plate 6, Figures 10, 11 Holotype)

Derivation of name: Named in honor of Józef Konda, HGS, Budapest.
Diagnosis and description: Lanceolate, elongate valves with conical diverging horns at their ends. Each horn surmounted by a spine bent in converging direction. Two nonparallel costae subdivide the valve into one short central and two longer lateral partitions, and into smaller valves with three equal partitions. Valves sparsely perforated, with short spines at their dorsal side.
Dimensions: length, 68μ-110μ; width, 12μ-15μ.
Holotype: Prep. 2800/1 HGS.
Type locality: DSDP Leg 29, Sample 275-1-2, 40-42 cm.
Type level: Upper Cretaceous.
Discussion: A similar form was illustrated by Schmidt (1874-1959, pl. 144, fig. 44, 51, 52, 57, 58) as "Fragliche Form, n. sp?" from Springfield, Barbadoes.
Occurrence: Sample 2-1, 130-132 cm.
Age: Upper Cretaceous.

Genus TRINACRIA, Heiberg, 1863

Trinacria anissimowii Jousé, 1949
(Plate 10, Figure 2)

Proschkina-Lavrenko, 1949, p. 192, pl. 73, fig. 2.
Dimension: length of side: 35μ-65μ.
Occurrence: Core 275-1 and -2; (common).
Age: Upper Cretaceous.

Trinacria aries Witt, 1886
(Plate 9, Figures 9-11; Plate 33, Figure 5)

Schmidt, 1874, pl. 150, fig. 14, 15.
Hanna, 1927, p. 36, pl. 5, fig. 1, 2.
Dimension: length of side, 40μ-65μ.
Occurrences: Samples 2-4, 40-42 cm; 2-5, 40-42 cm; 2-5, 116-118 cm.
Age: Upper Cretaceous.

Trinacria excavata Heiberg, 1863
(Plate 10, Figure 1)

Schmidt, 1886, pl. 97, fig. 6-10.
Hanna, 1927, p. 37, pl. 5, fig. 6.
Hustedt, 1930, p. 887, fig. 529.
Dimension: length of side 63μ-90μ.
Occurrence: Cores 275-1 and -2 (common).
Age: Upper Cretaceous.

Trinacria insipiens Witt, 1886
(Plate 10, Figures 5, 6)

Schmidt, 1886, pl. 97, fig. 16.
Hanna, 1927, p. 37, pl. 5, fig. 7-9.
Proschkina-Lavrenko, 1949, p. 191, pl. 73, fig. 7.
Occurrence: Core 275-2 (common).
Age: Upper Cretaceous.

Trinacria pileolus (Ehrenberg) Grunow, 1884
(Plate 9, Figures 7, 8)

Grunow, 1884, p. 68, pl. 2, fig. 59, 60.
Schmidt, 1874, pl. 97, fig. 11-14.
Dimensions: length of side, 33μ-45μ.
Occurrences: Samples 1-1, 118-120 cm; 1-2, 40-42 cm; 2-5, 40-42 cm; 2-5, 116-118 cm.
Age: Upper Cretaceous.

Trinacria princeps Witt, 1886
(Plate 10, Figures 7, 8)

In Schmidt, 1874, pl. 110, fig. 15-17. Sample 2-1, 130-132 cm.
Proschkina-Lavrenko, 1949, p. 194, pl. 73, fig. 10.
Occurrence: Sample 1-1, 130-132 cm.
Age: Upper Cretaceous.

Trinacria tristictia Hanna, 1927
(Plate 9, Figures 5, 6)

Hanna, 1927, p. 38, pl. 5, fig. 11, 12.
Trinacria interlineata Long, Fuge, and Smith, 1946, p. 116, pl. 18, fig. 11.
Dimension: length of side, 40μ-80μ.
Occurrences: Samples 2-1, 130-132 cm; 2-3, 40-42 cm (common).
Age: Upper Cretaceous.

Trinacria sp. Hajós
(Figure 15a,b)

Description: Single specimen with concave flanks and pointed ends; surface sparsely perforated.
Dimension: length of side, 30μ.
Occurrence: Sample 2-5, 116-118 cm.
Age: Upper Cretaceous.

Genus GLADIUS Forti and Schulz 1932

Gladius jouseanus n. sp. Hajós
(Plate 11, Figures 7-12)

Derivation of name: In honor of Anastasia Jousé, Institute of Oceanography at Moscow.

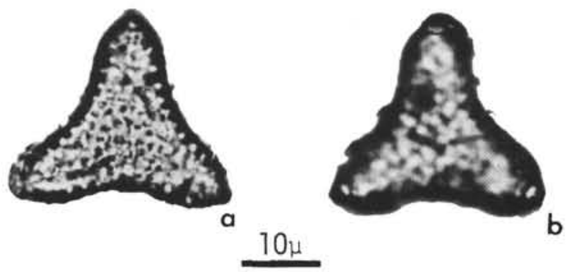


Figure 15a-b. Trinacria *sp.*

Diagnosis and description: Valves shaped like the upper part of a bowling skittle, cylindrical, with a constricted neck. Surface areolated in quincunx pattern, each areola with fine round pores inside.

Dimensions: only fragmentary cylinders found; total length, 21μ-28μ; width, 10μ-13μ; at the neck, 7μ-11μ.

Areolae: 6 per 10μ, at the end up to 10 per 10μ.

Discussion: Differs from *Gladius pistilliformis* Jousé (1955, p. 74, 75, fig. 2) by short neck and fine structure inside wall; much smaller.

Holotype: Prep. 2809/1 HGS, Plate 11, Figures 9, 10.

Type locality: DSDP Leg 29, Sample 275-1-2, 40-42 cm.

Type level: Upper Cretaceous.

Occurrences: Samples 2-1, 130-132 cm; 2-3, 40-42 cm.

Gladius maximus n. sp. Hajós
(Plate 11, Figure 13 Holotype)

Derivation of name: maximus (lat.) = the greatest.

Diagnosis and description: Valves cylindrical with flat end and a constriction below it. Wall areolated, with hexagonal areolae decreasing in size toward flat end, and arranged in typical quincunx pattern.

Dimensions: length of cylinder, up to 130μ; width, 65μ; at constriction, 45μ.

Areolae: 7 per 10μ at the end, 4-5 on the cylindrical wall.

Holotype: Prep. 2809/x HGS.

Type locality: DSDP Leg 29, Sample 275-2-1, 130-132 cm.

Type level: Upper Cretaceous.

Other occurrences: Samples 2-1, 25-27 cm; 2-1, 120-122 cm; 2-5, 40-42 cm; 2-5, 116-118 cm; (up to now only encountered in Core 275-2, Leg 29).

Gladius pacificus n. sp. Hajós and Stradner
(Plate 11, Figures 1, 2; Plate 26, Figure 2)

Derivation of name: pacificus (lat.) = from the Pacific Ocean.

Diagnosis and description: Slender cylindrical tubular valves broaden conically toward the end, closed by a flat top with rather sharp rim. Areolae hexagonal, in quincunx arrangement, with irregular number of round inner pores.

Dimensions: length, 110μ; width, 10μ-12μ; at the ends, 20μ-30μ.

Holotype: Prep. 2812/2 HGS, Plate 11, Figures 1, 2.

Paratype: 4962 Elmilab GSA.

Type locality: DSDP Leg 29, Sample 275-2-3, 40-42 cm.

Type level: Upper Cretaceous.

Occurrences: Samples 2-1, 130-132 cm, to 2-5, 116-118 cm.

Discussion: Differs from other species of Gladius by sharp turn of areolated wall at the top which, in cross section, comes close to outline of equilateral triangle.

Gladius pacificus n. sp. forma minor n. f. Hajós
(Plate 11, Figures 3, 4 Holotype)

Diagnosis and description: Slender, cylindrical tubular valves broaden conically toward the end, closed by a flat top. Areolae hexagonal, in quincunx arrangement.

Dimensions: height 50μ-90μ; width, 8μ; at the ends, 10μ-12μ.

Holotype: Prep. 2809/x HGS.

Type locality: DSDP Leg 29, Sample 275-2-1, 130-132 cm.

Type level: Upper Cretaceous.

Occurrences: Samples 2-5, 40-42 cm; 2-5, 116-118 cm.

Discussion: Differs from the species *G. pacificus*, by being smaller, finely areolated, and constricted before the ends.

Gladius speciosus Schulz, 1935
(Plate 11, Figures 5, 6; Plate 26, Figure 3)

Schulz, 1935, p. 3.
Jousé, 1955, p. 76, fig. 4.

Dimensions: length, 56μ; width, 17μ.

Occurrence: Sample 2-1, 130-132 cm.

Age: Upper Cretaceous.

Genus PSEUDOPYXILLA Forti, 1909

Pseudopyxilla americana (Ehrenberg) Forti, 1909
(Plate 12, Figure 3)

Forti, 1909, pl. 1, fig. 6, 7.
Proschkina-Lavrenko, 1949, p. 200, 201, pl. 98, fig. 4a,b.

Occurrence: Sample 2-5, 116-118 cm.

Age: Upper Cretaceous.

Pseudopyxilla jouseae n. sp. Hajós
(Plate 12, Figures 4, 5 Holotype)

Jousé, 1951b, p. 59, pl. 4, fig. 4, described as *Pterotheca* sp. (affine *carinifera* Grunow).

Derivation of name: After A. Jousé, Moscow.

Diagnosis and description: Cylindrical frustula with hyaline wall, conical at one end, and extending into a long tapered spine, bifurcated at end.

Dimensions: width, 10μ; height, 10μ; length of spine, 28μ; bifurcations, 7μ.

Holotype: Prep. 2799/1 HGS.

Type locality: DSDP Leg 29, Sample 275-1-1, 118-120 cm (rare).

Type level: Upper Cretaceous.

Pseudopyxilla russica (Pantocsek) Forti, 1909
(Plate 12, Figures 1, 2; Plate 27, Figure 9)

Pantocsek, 1905, v. 3, p. 86, pl. 19, fig. 277.

Dimensions: width, 8μ-13μ; height, 15μ-35μ.

Occurrence: Cores 275-1 and -2 (common).

Age: Upper Cretaceous.

Genus PTEROTHECA (Grunow), Forti, 1909

Pterotheca aculeata n. sp. Hajós
(Plate 12, Figures 10, 11)

Derivation of name: aculeus (lat.) = spur.

Diagnosis and description: Valves cylindrical, about as broad as high, conical at one end, and extending into tapering spine. Walls hyaline, with cycle of short spines (1μ-2μ), and short spines also sparsely distributed over the conical part.

Dimensions: width, 15μ; length, 28μ-38μ.

Holotype: Prep. 2809/1 HGS, Plate 12, Figure 11.

Paratype: Prep. 2817/1 HGS.

Type locality: DSDP Leg 29, Sample 275-2-5, 116-118 cm.

Type level: Upper Cretaceous.

Discussion: Seems to be related to the genus Kentrodiscus Pantocsek (1889, p. 15).

Pterotheca cf. aculeifera Grunow, 1880
(Plate 12, Figure 6; Plate 28, Figures 1, 2)

Van Heurck 1880-1885, Synopsis pl. 83, fig. 13, 14.
Proschkina-Lavrenko, 1949, pl. 75, fig. 4b.

Dimension: diameter, 13μ.

Occurrence: Sample 2-5, 116-118 cm.

Age: Upper Cretaceous.

Pterotheca capreolus (Forti) n. comb. Hajós
(Plate 12, Figure 7)

Pseudopyxilla capreolus Forti (1908).
Proschkina-Lavrenko, 1949, p. 210, pl. 98, fig. 5a,b.

Diagnosis and description: Permanent spore with long branching spine, hollow only in its lowest part; compact otherwise. Transferred to the genus *Pterotheca* (Grunow) Forti because morphological features suggest its affiliation to Pterotheca, rather than to Pseudopyxilla. (Van Heurck, 1896, p. 430).

Dimensions: width, 13μ-15μ; height, 40μ.

Occurrence: Sample 2-1, 130-132 cm.

Age: Upper Cretaceous.

Pterotheca cretacea n. sp. Hajós and Stradner
(Plate 12, Figures 16-18, 21; Plate 26, Figure 1)

Derivation of name: cretaceous (lat.) = of Cretaceous age.
Diagnosis and description: Valves asymmetrically dumbbell-shaped. Smaller open end slightly constricted near margin; larger, more inflated end closed with a crown of spines. Larger end decorated wtih longitudinal ridges extending into the spines; numerous pores in between. Shorter, evidently proximal part of valve does not wear ridges, appears more finely dotted.
Dimension: diameter, 8μ-14μ.
Holotype: Prep. 2799/1 HGS, Plate 12, Figures 17, 18.
Type locality: DSDP Leg 29, Sample 275-1-1, 118-120 cm.
Type level: Upper Cretaceous.
Occurrence: Cores 275-1 and -2 (common).

Pterotheca crucifera Hanna, 1927
(Plate 12, Figures 8, 9, 22; Plate 27, Figure 7, Plate 28, Figures 3)

Hanna, 1927, p. 30, 31, pl. 4, fig. 5.
Dimension: diameter, 10μ-23μ.
Occurrence: Cores 275-1 and -2 (common).
Age: Upper Cretaceous.

Pterotheca danica Grunow, 1880
(No illustration)

Proschkina-Lavrenko, 1949, p. 203, pl. 75, fig. 9.
Van Heurck, 1880-1885, Synopsis, pl. 83, fig. 7, 8.
Dimension: diameter, 18μ. Specimens are smaller than those of the Eocene.
Occurrence: Sample 1-1, 118-120 cm.

Pterotheca (Micrampulla) parvula (Hanna) n. comb. Hajós and Stradner
(Plate 12, Figures 12-15; Plate 37, Figures 1-4)

Hanna, 1927, p. 26, pl. 3, fig. 15.
Diagnosis and description: According to our evidence, the globose part and the collar are merely the distal side of a cell, which has formed a permanent spore. The proximal part resembles Pterotheca, for which reason we propose the transfer to this genus. Deflandre (1969) has suggested a similarity to the Archaeomonadaceae; however, the ultrastructure of the wall appears to be different from the unperforatedwalls of the Archaeomonadaceae.
Dimensions: diameter, 8μ-20μ; height, 23μ-40μ.
Occurrences: Cores 275-1 and -2 (common).

Genus ACANTHODISCUS Pantocsek, 1892

Acanthodiscus antarcticus n. sp. Hajós
(Plate 13, Figures 1-6)

Derivation of name: found near the Antarctic.
Diagnosis and description: Valves circular, with hyaline girdle. Central part of valve convex with irregular diverging ridges, sparsely perforated.
Dimension: diameter, 35μ-50μ.
Holotype: Prep. 2817/1 HGS, Plate 13, Figures 1-3.
Type locality: DSDP Leg 29, Sample 275-2-5, 116-118 cm.
Type level: Upper Cretaceous.
Occurrences: Samples 1-2, 40-42 cm; 2-5, 116-118 cm.

Acanthodiscus convexus n. sp. Hajós and Stradner
(Figure 16; Plate 13, Figure 8; Plate 28, Figure 6)

Derivation of name: convexus (lat.) = vaulted.
Diagnosis and description: Circular valves with the central convexity in proportion to the valve-diameter smaller than in *Acanthodiscus antarcticus* n. sp. In the latter species it is larger than half the diameter, with *Acanthodiscus convexus* less than half the diameter or just about it. Central convexity is hyaline, without diverging ridges. Irregularly arranged ridges are confined to hyaline marginal zone.
Dimensions: diameter, 27μ-35μ; central convexity, 10μ-15μ.
Holotype: Prep. 2809/1 HGS, Plate 13, Figure 8.
Paratype: 5112 Elmilab GSA.
Type locality: DSDP Leg 29, Sample 275-2-1, 130-132 cm.
Type level: Upper Cretaceous.
Other occurrence: Sample 2-5, 116-118 cm (common).

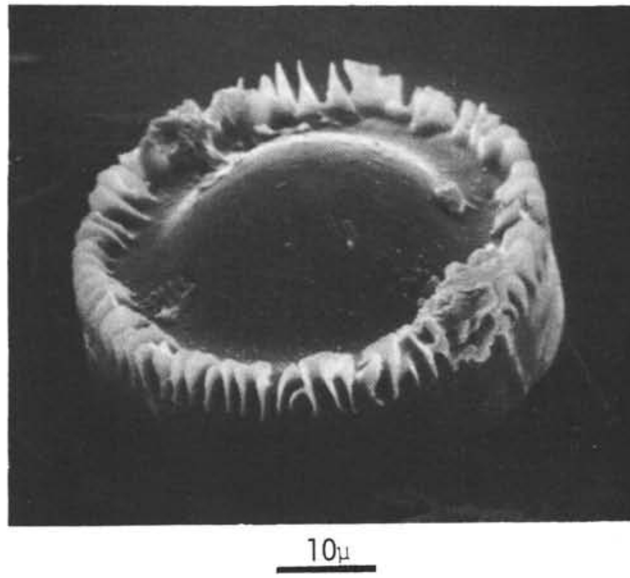


Figure 16. Acanthodiscus convexus *n. sp. Hajós and Stradner.*

Acanthodiscus ornatus n. sp. Hajós and Stradner
(Plate 13, Figures 7, 9, 10; Plate 28, Figure 4)

Derivation of name: ornatus (lat.) = decorated.
Diagnosis and description: Large, circular valves with central convexity, decorated with dense ridges and dots. Numerous irregular ridges along margin.
Dimensions: diameter, 40μ-55μ; central part, 25μ-30μ.
Holotype: Prep. 2812/1 HGS, Plate 13, Figures 9, 10.
Type locality: DSDP Leg 29, Sample 275-2-3, 40-42 cm. Common in all samples of Core 275-2.
Type level: Upper Cretaceous.

Acanthodiscus sp. Hajós
(Figure 17)

Description: Circular valves decorated with dense, fine ridges; dots along the margin.
Diameter: 28μ.
Occurrence: Samples 2-4, 40-42 cm; 2-5, 40-42 cm; (rare).

Figure 17. Acanthodiscus *sp. 1 Hajós.*

Genus GONIOTHECIUM Ehrenberg, 1841
(Chaetoceros spores Ehrenberg, 1844, p. 198.)

Goniothecium odontella Ehrenberg, 1844
(Plate 10, Figures 11, 12)

Jousé, 1951, p. 60-62, pl. 5, fig. 1-7.
Proschkina-Lavrenko, 1949, p. 204, pl. 75, fig. 10a,b.

Diameter: 50μ-111μ.
Occurrence: Samples 2-1, 130-132 cm; 2-5, 116-118 cm; (common).
Age: Upper Cretaceous.

Goniothecium odontella Ehrenberg var. danica Grunow, 1883

In Van Heurck, 1880-1885, pl. 105, fig. 11, 12.
Van Heurck, 1896, p. 428, fig. 148.
Jousé, 1951, p. 62, pl. 5, fig. 8-17.

Diameter: 30μ.
Occurrence: with the species.
Age: Upper Cretaceous.

Genus HELMINTHOPSIS Van Heurck, 1892

Helminthopsis wornardti n. sp. Hajós
(Plate 13, Figure 24, Holotype)

Derivation of name: Named in honor of W. W. Wornardt, Jr., Brea, California.
Diagnosis and description: Valve elongated, lanceolate, with its dorsal side subdivided by about 14 hyaline transversal costae, therefore slightly undulated. All the higher parts of the wall are sparsely perforated.
Dimensions: length, 55μ-110μ; width, 8μ.
Holotype: Prep. 2812/1 HGS.
Type locality: DSDP Leg 29, Sample 275-2-3, 40-42 cm.
Type level: Upper Cretaceous.
Discussion: Differs from *H. sokoli* Hanna and Brigger, 1964, (p. 16, pl. 3, fig. 6, 7), by not having inflated ends and from *H. weissflogii* Van Heurck, 1896 (p. 455, fig. 181) by not being sigmoid.

Genus LONGINATA n. gen. Hajós

Derivation of name: longus (lat.) = long.
Genero-diagnosis: Frustules elongated with pointed ends bent to one side. Central part of the arch-shaped valve slightly broadened, with fewer short spines than at the ends.
Dimensions: length, 95μ; width, 7μ.
Genero-type: *Longinata acuta* n. gen. n. sp. Hajós

Longinata acuta n. sp. Hajós
(Plate 13, Figure 12, Holotype)

Derivation of name: acutus (lat.) = sharp.
Diagnosis and description: See description of genero-type.
Holotype: Prep. 2800/1 HGS.
Type locality: DSDP Leg 29, Sample 275-1-2, 40-42 cm.
Type level: Upper Cretaceous.
Occurrence: Cores 275-1 and -2 (common).

Genus ANAULUS Ehrenberg 1844

Anaulus incisus n. sp. Hajós and Stradner
(Figure 18; Plate 13, Figure 23)

Derivation of name: incisus (lat.) = cut.
Diagnosis and description: Valves elongated with drop-shaped ends, two constrictions at those places where the two transversal costae subdivide it into one central part and two longer lateral parts. Surface with sparse fine dots.
Dimensions: length, 60μ; width, 5μ; 3μ at the ends.
Holotype: Prep. 2823/1 HGS.
Paratype: 5018 Elmilab GSA.
Type locality: DSDP Leg 29, Sample 275-1-3, 40-42 cm.
Type level: Upper Cretaceous.
Discussion: Differs from *A. undulatus* Long, Fuge, and Smith, 1946, the middle part of which is longer and broader than in *A. incisus* n. sp.

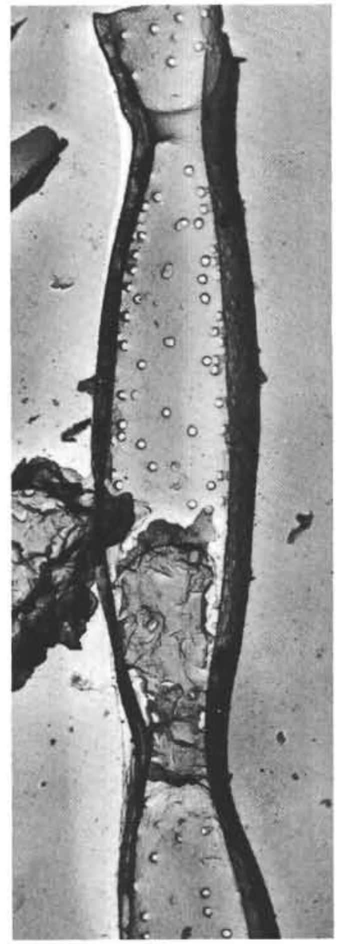


Figure 18. Anaulus incisus *n. sp. Hajos and Stradner.*

Anaulus californicus Long, Fuge, and Smith, 1946
(No illustration)

Long, Fuge, and Smith, 1946, p. 95, pl. 14, fig. 2.

Occurrence: Sample 2-2, 60-62 cm.
Age: Upper Cretaceous.

Anaulus subantarcticus n. sp. Hajós
(Plate 13, Figure 26, Holotype)

Derivation of name: Found near the Antarctic.
Diagnosis and description: Frustule elongated, with two transverse costae and drop-shaped ends. The flanks are straight. The two apical parts are slightly longer than the central part. Surface with fine sparse dots.
Dimensions: length, 27μ-48μ; width, 7μ.
Holotype: Prep. 2812/1 HGS.
Type locality: DSDP Leg 29, Sample 275-2-3, 40-42 cm.
Type level: Upper Cretaceous.
Discussion: Differs from *A. birostratus* Grunow in Van Heurck (1896, p. 451, fig. 179) by being smaller and thinner, and from *A. incisus* n. sp. by being not constricted.

Genus EUNOTOGRAMMA Weisse, 1854

Eunotogramma fueloepi n. sp. Hajós
(Plate 13, Figure 19, Holotype)

Derivation of name: Named in honor of J. Fülöp, President of the Central Office of Geology, Budapest, Hungary.
Diagnosis and description: Elongate valves with two asymmetrically bent ends. The longer central part is round and separated from the shorter, pointed ends by transverse costae. Surface sparsely dotted.
Dimensions: length, 75μ; width, 7μ in the middle, 4μ at the ends.
Holotype: Prep. 2809/1 HGS.
Type locality: DSDP Leg 29, Sample 275-2-1, 130-132 cm.
Type level: Upper Cretaceous.
Discussion: This new species differs from *E. margino-punctatum* Long, Fuge, and Smith, 1946 (pl. 16, fig. 14) which is dotted only along the margin, by its different proportions.

Eunotogramma marginopunctatum
Long, Fuge, and Smith, 1946
(No illustration)

Long, Fuge, and Smith, 1946, p. 106, pl. 16, fig. 14.
Occurrence: Core 275-1 (common), Core 275-2 (rare).
Age: Upper Cretaceous.

Genus KENTRODISCUS Pantocsek, 1889, p. 75

Kentrodiscus aculeatus Hanna, 1927
(Plate 10, Figure 10)

Hanna, 1927, p. 22, 23, pl. 3, fig. 6.
Diameter: 40μ.
Occurrence: Sample 2-5, 116-118 cm.
Age: Upper Cretaceous.

Kentrodiscus armatus n. sp. Hajós
(Plate 10, Figure 9; Plate 12, Figures 19, 20, Holotype)

Derivation of name: armatus (lat.) = armed.
Diagnosis and description: Valve cylindrical, with conical top which is terminating into a long, slightly curved spine. Conical part and spine are covered with small scattered acute spinulae 2μ-4μ long.
Dimensions: diameter, 18μ-21μ.
Holotype: Prep. 2809/1 HGS.
Type locality: DSDP Leg 29, Sample 275-2-1, 130-132 cm.
Type level: Upper Cretaceous.
Discussion: Differs from *K. aculeatus* Hanna by its smaller diameter and by the many small spines.

Genus SCEPTRONEIS Ehrenberg, 1844

Sceptroneis gracilis n. sp. Hajós
(Figure 19, Holotype)

Derivation of name: gracilis (lat.) = slender.
Diagnosis and description: Heteropolar elongate valves with one end headed, the other end acute. Surface finely perforated. The dots are lying in parallel lines, about 15 per 10μ.
Dimensions: length, 40μ-78μ; width, 5μ-6μ.
Holotype: Prep. 2799/1 HGS.
Type locality: DSDP Leg 29, Sample 275-1-1, 118-120 cm.
Type level: Upper Cretaceous.

Sceptroneis grunowii Anissimowa, 1937
(Plate 11, Figures 14, 15)

Proschkina-Lavrenko, 1949, v. 2, p. 217, pl. 75, fig. 13/3.
Occurrence: Sample 2-1, 130-132 cm.
Age: Upper Cretaceous.

Sceptroneis praecaducea n. sp. Hajós and Stradner
(Plate 13, Figures 13, 14; Plate 36, Figures 1-4)

Derivation of name: prae (lat.) = before, caduceus (lat.) = staff.
Diagnosis and description: Valves heteropolar, elongated, one end with broad heading, the other end tapering. Alternating areolae in transversal lines. Head end finely perforated like a sieve; elongated end-pore on other end.

Figure 19. Sceptroneis gracilis *n. sp. Hajós.*

Dimensions: length, 65μ-98μ; width, 3μ-8μ.
Holotype: Prep. 2799/1 HGS, Plate 13, Figures 13, 14.
Paratype: 5179 Elmilab GSA.
Type locality: DSDP Leg 29, Sample 275-1-1, 118-120 cm.
Type level: Upper Cretaceous.

Genus TUBULARIA Brun, 1894

Tubularia antarctica n. sp. Hajós
(Figure 20, Holotype)

Derivation of name: Found near the Antarctic.
Diagnosis and description: Valves elongate with rounded ends, narrower in the middle part than at the ends. Areolae in transversal parallel lines, about 8 per 10μ.
Dimensions: 55μ wide in the middle.
Holotype: Prep. 2816/1 HGS.
Type locality: DSDP Leg 29, Sample 275-2-5, 40-42 cm.
Type level: Upper Cretaceous.

Genus EPITHELION Pantocsek, 1892

Epithelion curvatum Pantocsek, 1892
(Plate 14, Figures 3, 4)

Pantocsek, 1886-1905, v. 3, p. 48, pl. 17, fig. 253.
Proschkina-Lavrenko, 1949, v. 2, p. 224, pl. 101, fig. 16.
Diameter: 18μ-28μ.
Occurrence: Samples 1-1, 118-120 cm; 2-5, 116-118 cm.

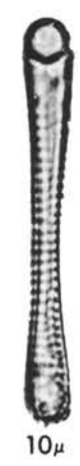


Figure 20. Tubularia antarctica *n. sp. Hajós.*

Epithelion russicum Pantocsek, 1892
(Plate 14, Figure 2; Plate 27, Figures 1, 2)

Pantocsek, 1886-1905, v. 3, p. 48, pl. 29, fig. 424.
Proschkina-Lavrenko, 1949, v. 2, p. 224, pl. 101, fig. 17.

Diameter: 30μ.
Occurrence: Sample 2-4, 40-42 cm.

Epithelion spinifer Pantocsek, 1892
(Plate 14, Figure 1)

Pantocsek, 1886-1905, v. 3, p. 48, pl. 20, fig. 291.
Proschkina-Lavrenko, 1949, p. 224, pl. 101, fig. 18.

Dimensions: length, 50μ-65μ; width, 25μ-30μ.
Occurrence: Samples 2-4, 40-42 cm; 2-5, 40-42 cm.
Age: Upper Cretaceous.

Genus INCISORIA n. gen. Hajós

Derivation of name: incisus (lat.) = notched.

Genero-diagnosis: Diatoms with elongate, heteropolar valves with one end rounded, the other notched or incised. Surface decorated with pores.

Genero-type: *Incisoria punctata* n. gen. n. sp. stands near the genus Sceptroneis, especially *Incisoria punctata* and *Sceptroneis praecaducea* show some common features.

Incisoria punctata n. gen. n. sp. Hajós and Stradner
(Plate 13, Figures 15, 16; Plate 36, Figure 6)

Diagnosis and description: Elongate, heteropolar valves with one end round and one end broadened, terminating with a concave notch. Middle part of the valve broadened, striated by transversal rows of pores.

Dimensions: length, 80μ; width, 6μ-10μ.
Holotype: Prep. 2809/x HGS, Plate 13, Figures 15, 16.
Paratype: 5114 Elmilab GSA.
Type locality: DSDP Leg 29, Sample 275-2-1, 130-132 cm.
Type level: Upper Cretaceous.
Occurrence: In almost all samples of Cores 275-1 and -2.
Discussion: This species differs from *Sceptroneis praecaducea* by its concave notch.

Incisoria inordinata n. sp. Hajós
(Plate 13, Figures 20, 21, Holotype)

Derivation of name: inordinatus (lat.) = disordered.

Diagnosis and description: Elongate, heteropolar valves, one end round, the other end broadened, concave incised on the top. Surface with disordered pores. Middle part of the valve broadened.

Dimensions: length, 58μ-105μ; 4μ-5μ at the middle part; 8μ-12μ at the concave notch.
Holotype: Prep. 2812/1 HGS.
Type locality: DSDP Leg 29, Sample 275-2-3, 40-42 cm.
Type level: Upper Cretaceous.
Occurrence: In almost all samples of Cores 275-1 and -2.
Discussion: This new species differs from *Incisoria punctata* by the valves not being striated with transversal rows of pores.

Incisoria lanceolata n. sp. Hajós and Stradner
(Plate 13, Figures 22, 25; Plate 36, Figure 5)

Derivation of name: lanceolatus (lat.) = lance-shaped.

Diagnosis and description: Elongate, heteropolar valves with one end round, the other notched. Both ends narrower than the somewhat broader middle part, with slightly convex flanks. Valves striated with transversal rows of pores.

Dimensions: length, 40μ-92μ; width, 6μ-7μ; 3μ-5μ at the ends.
Holotype: Prep. 2817/1 HGS.
Paratype: 5008 Elmilab GSA.
Type locality: DSDP Leg 29, Sample 275-2-5, 116-118 cm.
Type level: Upper Cretaceous.
Discussion: Differs from *Incisoria punctata* n. sp. by being narrower at the notched end and by its rather straight flanks.

ARCHAEOMONADACEAE

Genus ACANTHOSPHAERIDIUM n. gen.
Hajós and Stradner

Derivation of name: acantha (greek) = thorn; sphaira (greek) = sphere.

Genero-diagnosis: Siliceous ovoid cysts with one large pore surrounded by crooked spines about as long as or longer than cyst diameter. Cyst wall ornamented by reticulate ridges. One or two pores perforate wall of cyst between ridges.

Genero-type: *Acanthosphaeridium reticulatum* n. gen. n. sp. *Acanthosphaeridium reticulatum,* sole representative of this genus to date, is tentatively assigned to the Archaeomonadaceae. Some resemblance to the loricas of the Ebriidae, considered zooflagellates.

Acanthosphaeridium reticulatum n. gen. n. sp. Hajós and Stradner
(Plate 14, Figures 5-11; Plate 37, Figure 6)

Derivation of name: reticulum (lat.) = net.

Diagnosis and description: Globular or ovoid cysts with large rounded pore and 3-5 heavy long spines surrounding the pore. Spine shape variable but seldom straight. Cyst surface is decorated by reticulate pattern of ridges with pores in between.

Dimensions: diameter, 8μ-10μ; spines, 12μ-14μ long.
Holotype: Prep. 2812/1 HGS, Plate 14, Figures 5, 7.
Paratype: 4843 Elmilab GSA.
Type locality: DSDP Leg 29, Sample 275-2-3, 40-42 cm.
Type level: Upper Cretaceous.

Genus ARCHAEOMONAS Deflandre, 1932

Archaeomonas ambigua Rampi, 1940
(Plate 14, Figures 12, 13)

Rampi, 1940, p. 64, fig. 10; Deflandre, 1969, no. 4179.

Occurrence: Sample 2-3, 40-42 cm.
Age: Upper Cretaceous.

Archaeomonas chiarugii Rampi, 1940
(Plate 14, Figures 14-16; Plate 39, Figure 2)

Rampi, 1940, p. 64, fig. 8; Deflandre, 1969, no. 4204.

Occurrences: Samples 2-1, 130-132 cm; 1-1, 119-120 cm.

Archaeomonas cingulata Deflandre, 1938
(Figure 21a,b)

Deflandre, 1938, p. 80, fig. 18, 19; 1969, no. 4205.

Occurrence: Sample 2-4, 40-42 cm.

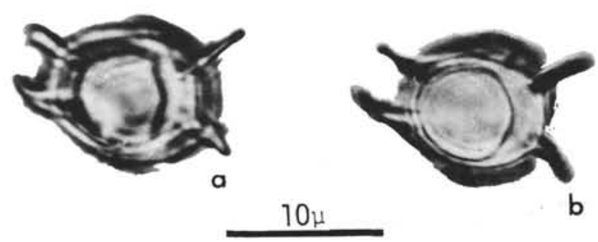


Figure 21a-b. Archaemonas cingulata *Deflandre, 1938.*

Archaeomonas cratera Deflandre, 1933
(Plate 39, Figure 1)

Deflandre, 1933, p. 86, fig. 24; Deflandre, 1969, no. 4214-4216.

Occurrence: Sample 2-1, 130-132 cm.
Age: Upper Cretaceous.

Archaeomonas cretacea Rampi, 1940
(Plate 14, Figures 17, 18)

Rampi, 1940, p. 65, fig. 14; Deflandre, 1969, no. 4219.

Occurrence: Samples 1-1, 118-120 cm; 2-5, 116-118 cm.

Archaeomonas heteroptera Deflandre, 1932
(Plate 14, Figures 19, 20)

Deflandre, 1932, p. 349, fig. 10-17; 1969, no. 4244-4250.

Occurrence: Sample 2-4, 40-42 cm.
Age: Upper Cretaceous.

Archaeomonas membranosa Rampi, 1940
(Plate 14, Figures 21, 22)

Rampi, 1940, p. 64, fig. 15; Deflandre, 1969, no. 4278.
Occurrence: Sample 2-4, 40-42 cm.
Age: Upper Cretaceous.

Archaeomonas smithi Rampi, 1940
(Plate 14, Figures 28, 29)

Rampi, 1940, p. 66, fig. 2; Deflandre, 1969, no. 4321.
Occurrence: Sample 2-1, 130-132 cm.
Age: Upper Cretaceous.

Archaeomonas spinulosa Rampi, 1940
(Plate 14, Figures 23, 24)

Rampi, 1940, p. 63, fig. 5; Deflandre, 1969, no. 4334.
Occurrence: Sample 2-1, 130-132 cm.
Age: Upper Cretaceous.

Genus LITHEUSPHAERELLA Deflandre, 1932

Litheusphaerella spectabilis Deflandre, 1932
(Plate 14, Figures 25-27)

Deflandre, 1932, p. 354, fig. 34-37; 1969, no. 4386-4393.
Occurrence: Sample 2-5, 116-118 cm.
Age: Upper Cretaceous.

Genus PARARCHAEOMONAS Deflandre, 1932

Pararchaeomonas colligera Deflandre, 1932
(Plate 14, Figures 30, 31)

Deflandre, 1932, p. 351, fig. 25, 26; 1969, no. 4397, 4398.
Occurrence: Samples 2-4, 40-42 cm; 2-5, 116-118 cm.
Age: Upper Cretaceous.

Pararchaeomonas ornata n. sp. Hajós
(Plate 14, Figures 32-34, Holotype)

Derivation of name: ornatus (lat.) = decorated.
Diagnosis and description: Globular cyst with large pore and only a short collar. Wall structure irregularly densely granulated.
Dimensions: diameter, 10μ; pore, 4μ wide; neck, 1μ high.
Holotype: Prep. 2812/1 HGS.
Type locality: DSDP Leg 29, Samples 275-2-3, 40-42 cm.
Type level: Upper Cretaceous.

Genus ARTISPHAERIDIUM n. gen. Stradner

Derivation of name: artes (lat.) = the fine arts.
Genero-diagnosis: Spherical cysts with surface ornamentation consisting of mushroom-shaped protrusions and large spines.
Diameter: 6μ.
Genero-type: *Artisphaeridium fragile* n. gen. n. sp.

Artisphaeridium fragile n. gen. n. sp. Stradner
(Plate 39, Figures 4-6)

Derivation of name: fragilis (lat.) = fragile.
Diagnosis and description: Spherical cyst covered with hundreds of small mushroom-shaped protrusions with an irregular outline. Some standing free, others grown together. Length of 12 or more larger spines unknown, as all are missing in type-specimen.
Holotype: 5136 Elmilab GSA, Plate 39, Figure 4.
Type locality: DSDP Leg 29, Sample 275-2-1, 130-132 cm.
Type level: Upper Cretaceous.
Discussion: *Litheusphaerella spectabilis* Deflandre has similar mushroom-shaped protrusions which are at least twice as big and not so frequent, and is lacking spines.

SILICOFLAGELLATAE

Genus CORBISEMA Hanna, 1928

Corbisema geometrica Hanna, 1928
(Plate 15, Figure 1)

Hanna, 1928, p. 261, pl. 41, fig. 1, 2.
Occurrence: Sample 2-5, 116-118 cm.
Age: Upper Cretaceous.

Corbisema geometrica Hanna var. apiculata Jouse, 1949
(Plate 15, Figures 2, 3, 5)

In Jousé, 1951b, p. 63, pl. 6, fig. 2; Loeblich et al., 1968, p. 76, pl. 5, fig. 15.
Occurrence: Sample 2-1, 130-132 cm.
Age: Upper Cretaceous.

Corbisema parallela n. sp. Hajós
(Plate 15, Figures 4, 6, 7)

Derivation of name: parallelus (lat.) = with equal intervals.
Diagnosis and description: A corbisema with basal ring bent so that it appears almost 6-cornered. Peripheral stretch of each arc more or less straight and without basal spine. Triangular apical area slightly rounded.
Holotype: Prep. 2812/2 HGS, Plate 15, Figure 4.
Type locality: DSDP Leg 29, Sample 275-2-3, 40-42 cm.
Type level: Upper Cretaceous.
Dimensions: 90μ-120μ.
Discussion: This new species differs from *Dictyocha triacantha* Ehr. var. *archangelskiana* Schulz, 1928, p. 250, fig. 28a-c, by having a central area.

Genus DICTYOCHA Ehrenberg, 1837

Dictyocha quadralta Hanna, 1928
(Plate 16, Figure 3)

Hanna, 1928, p. 261, pl. 41, fig. 3; Loeblich et al., 1968, p. 109, pl. 19, fig. 11.
Basal ring spines are longer than in original description.
Dimensions: overall, 130μ; length of spines, 25μ.
Occurrence: Sample 2-5, 116-118 cm.
Age: Upper Cretaceous.

Genus LYRAMULA Hanna, 1928

Lyramula furcula Hanna, 1928
(Plate 16, Figures 7, 8; Plate 40, Figure 2)

Hanna, 1928, p. 262, pl. 40, fig. 4, 5; Loeblich et al., 1968, p. 125, pl. 26, fig. 1, 2.
Tips of horseshoe-shaped basal arc can be of different lengths. Surface ornamentation only rarely discernible.
Dimensions: length, 40μ-130μ; width, 20μ-80μ.
Occurrence: Samples 1-2, 40-42 cm; 2-5, 116-118 cm.
Age: Upper Cretaceous.

Lyramula furcula Hanna var. minor Deflandre, 1940
(Plate 16, Figures 4-6; Plate 40, Figure 1)

Deflandre, 1940; *in* Loeblich et al., 1968, p. 125, pl. 26, fig. 3-6.
Smaller than the species, with the tips of the basal arc bent apart.
Dimensions: length, 25μ-40μ; width, 30μ-35μ.
Occurrences: Sample 1-1, 118-120 cm, and together with the species.
Age: Upper Cretaceous.
Remarks: Those forms with an additional third spine, listed in the tables as *Lyramula deflandrei* are teratological forms of *Lyramula furcula* Hanna var. *minor* Deflandre.

Lyramula simplex Hanna, 1928
(Plate 17, Figure 1)

Hanna, 1928, p. 262, pl. 41, fig. 6; Loeblich et al., 1968, p. 126, pl. 26, fig. 9.
Basal arcs without a horn in the middle of the arc.
Dimensions: length, 85μ; width, 65μ.
Occurrence: Sample 2-5, 116-118 cm.
Age: Upper Cretaceous.

Genus VALLACERTA Hanna, 1928

Vallacerta hortonii Hanna, 1928
(Plate 17, Figures 2, 3)

Hanna, 1928, p. 262, pl. 41, fig. 7-11; Loeblich et al., 1968, p. 142, pl. 34, fig. 21-25.
Dimensions: diameter, 40μ-55μ; length of spines, 10μ.
Occurrence: Samples 2-1, 130-132 cm; 2-3, 40-42 cm.
Age: Upper Cretaceous.

Vallacerta quadrata n. sp. Hajós
(Plate 16, Figure 9, Holotype)

Diagnosis and description: a 4-rayed Vallacerta with short spines and circular central cupula similar to *Vallacerta tumidula* Gleser.
Dimensions: diameter, 50μ; spines 5μ-8μ.
Holotype: Prep. 2817/1 HGS.
Type locality: DSDP Leg 29, Sample 275-2-5, 116-118 cm.
Type level: Upper Cretaceous.

Vallacerta tumidula Gleser, 1959
(Plate 17, Figures 4, 5)

In Gleser, 1966, p. 220, pl. 1, fig. 3-6; Loeblich et al., 1968, p. 144, pl. 34, fig. 26, 27.
Dimensions: diameter, 70μ-80μ; spines, 15μ-25μ.
Occurrence: Sample 1-2, 40-42 cm.
Age: Upper Cretaceous.

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ULTRASTRUCTURE OF UPPER CRETACEOUS SILICEOUS MICROFOSSILS FROM THE CAMPBELL PLATEAU, SITE 275

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of Austria, Vienna, Austria

The transmission electron micrographs of Late Cretaceous Diatomaceae, Archaeomonadaceae, and Silicoflagellatae (Plates 18-40) are a contribution from the Electronmicroscopical Laboratory of the Geological Survey of Austria, Vienna, to Volume 29 of the Initial Reports of the Deep Sea Drilling Project. After having been confronted with the fact that the Cretaceous microfossils from the southern Pacific still are as well-preserved there as those from very young sediments, it became almost compulsory to study such extraordinarily well-preserved, and also extremely rarely encountered siliceous microfossils in the electron microscope.

Dr. Marta Hajós, who kindly sent cleaned core material, also did the taxonomic interpretation. More than 500 transmission electron micrographs were made on a Philips EM 75 by the author. Dipl. Ing. G. Lechner from Reichert, Austria, Optical Works, contributed a dozen scanning electronmicrographs which were taken on the new Cwikscan 100-5 instrument. These electron micrographs are thankfully acknowledged.

Thanks are due to HR Dr. Anton Ruttner, Director of the Geological Survey of Austria, for furthering this project on diatom ultrastructure.

Only a small choice of 141 pictures (Figures 3-21; Plates 18-40) are reproduced here to give an impression of the wealth of information accessible by electron-microscopic methods. Mostly small to middle-sized diatoms and other siliceous microfossils were contained in the studied fraction, but also some fragments of larger diatoms, such as *Coscinodiscus morenoensis* and *Rattrayella antiqua.* Three different modes of electron-microscopic techniques were applied:

1) Direct electron transmission of the original fossil after platinum shadowing. The plates are shown as direct prints (fossil dark on bright background) or reversed prints (fossil bright on dark background).

2) Electron transmission of carbon replicas after platinum shadowing and subsequent chemical removal of the original fossil. The majority of photographs were done in this way. They are either shown as direct prints (fossil darker than background), but some are also shown as reversed prints (fossil bright with black shadow on dark background). Extended exposure times gave access to faintly visible details within the areolae of the diatoms (see Plate 25, Figures 2, 3).

3) Scanning electron micrographs of the original fossil after all around shadowing with copper. Direct prints on Polaroid paper.

Stereoscopic electron micrographs (stereo-couples) were also made by tilting the object-grids $\pm 5°$; however, they are not included in this report since their reproduction requires special photographic techniques.

In spite of the fact that only a small fraction of the numerous species occurring in the studied sample was "captured" on the photographic plates, the additional information gained and the high resolution of details accomplished justifies the effort. Some of the new results are incorporated in our Systematic Descriptions of this chapter, others in our explanations to the Plates. The magnifications are given within a margin of error of $\pm 5\%$. The scale bars are 1μ on all figures of Plates 18-40.

PLATE 1

(Figures 1-11, 13-18, ×1000; Figure 12, ×5000)

Figures 1, 2	*Melosira patera* Long, Fuge, and Smith. Sample 2-1, 130-132 cm.
Figures 3, 4	*Pseudopodosira westii* (Smith) Gleser. Sample 2-1, 130-132 cm.
Figures 5, 6	*Skeletonema punctatum* Schmidt. Sample 2-1, 130-132 cm.
Figures 7, 8	*Horodiscus rugosus* n. sp. Hajós. Sample 2-5, 116-118 cm; Holotype.
Figures 9-11	*Melosira vetustissima* n. sp. Hajós and Stradner. Sample 2-3, 40-42 cm; Holotype.
Figure 12	*Melosira vetustissima* n. sp. Hajós and Stradner. Sample 2-1, 130-132 cm; interior side of the valve; Stereoscan micrograph.
Figures 13-15	*Stephanopyxis turris* (Greville and Arnott) Ralfs var. *intermedia* Grunow. Sample 1-2, 40-42 cm.
Figures 16-18	*Pyxidicula minuta* Grunow. Sample 2-1, 130-132 cm.

PLATE 1

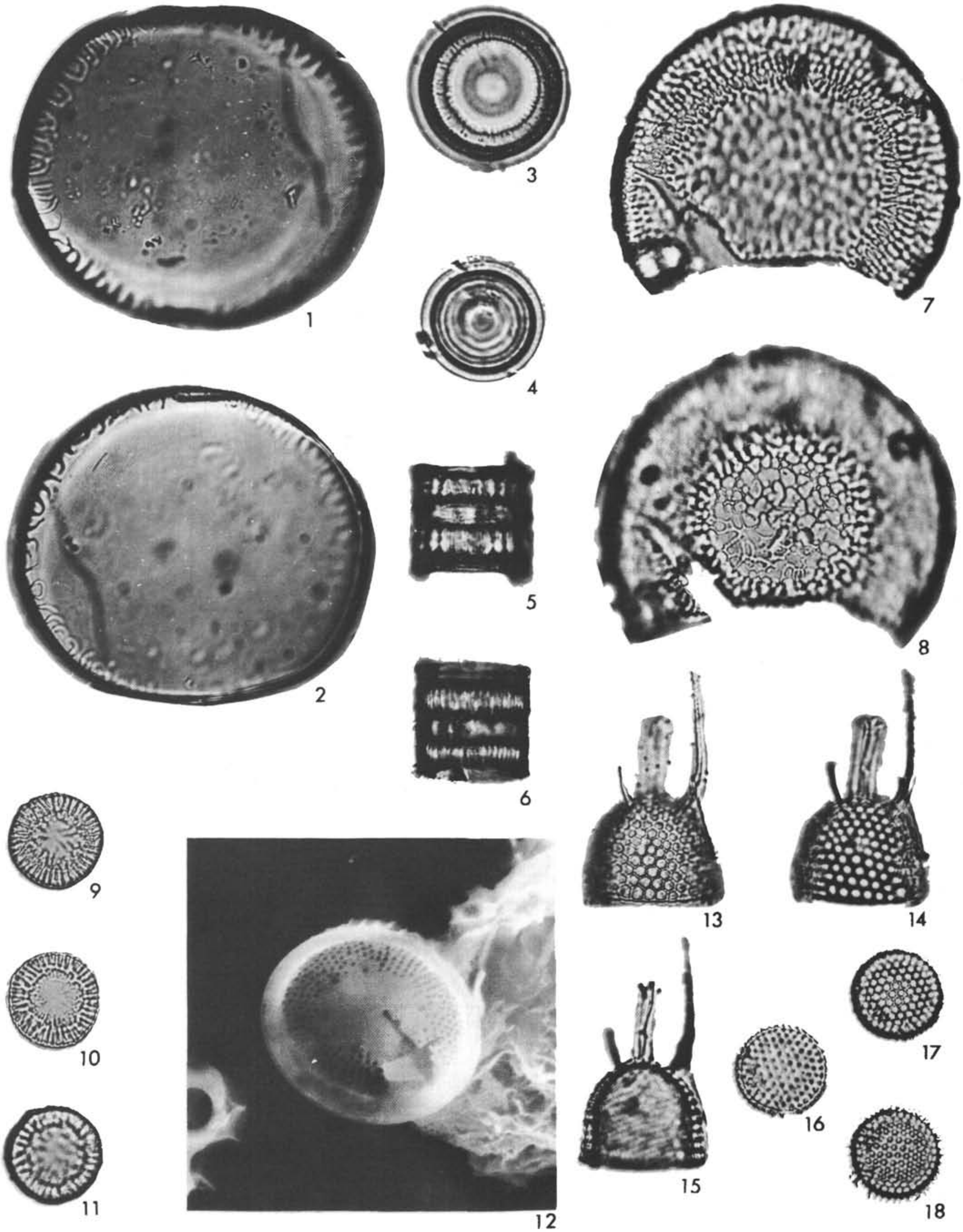


PLATE 2

(All figures ×1000)

Figure 1	*Skeletonema subantarctica* n. sp. Hajós. Sample 1-2, 40-42 cm; Holotype.
Figures 2-4	*Stephanopyxis lavrenkoi* Jousé. Sample 2-1, 130-132 cm.
Figures 5, 6	*Stephanopyxis discrepans* Hanna. Sample 2-5, 40-42 cm.
Figures 7, 8	*Stephanopyxis simonseni* n. sp. Hajós. Sample 1-2, 40-42 cm; Holotype.
Figures 9, 10	*Stephanopyxis hannai* n. sp. Hajós. Sample 1-2, 40-42 cm; Holotype.
Figures 11, 12	*Stephanopyxis superba* (Greville) Grunow. Sample 2-1, 130-132 cm.

PLATE 3

(Figures 1, 2, 4-6, ×1000; Figure 3, ×14,000; Figure 7, ×2400)

Figures 1-3	*Coscinodiscus lineatus* Ehrenberg f. *fossilis* Jousé. Sample 2-1, 130-132 cm. 3. Transmission electronmicrograph.
Figures 4, 5	*Coscinodiscus ildicoi* n. sp. Hajós. Sample 2-5, 40-42 cm; Holotype.
Figures 6, 7	*Coscinodiscus morenoensis* Hanna. Sample 2-1, 130-132 cm. 7. Transmission electronmicrograph.

(See p. 946)

PLATE 2

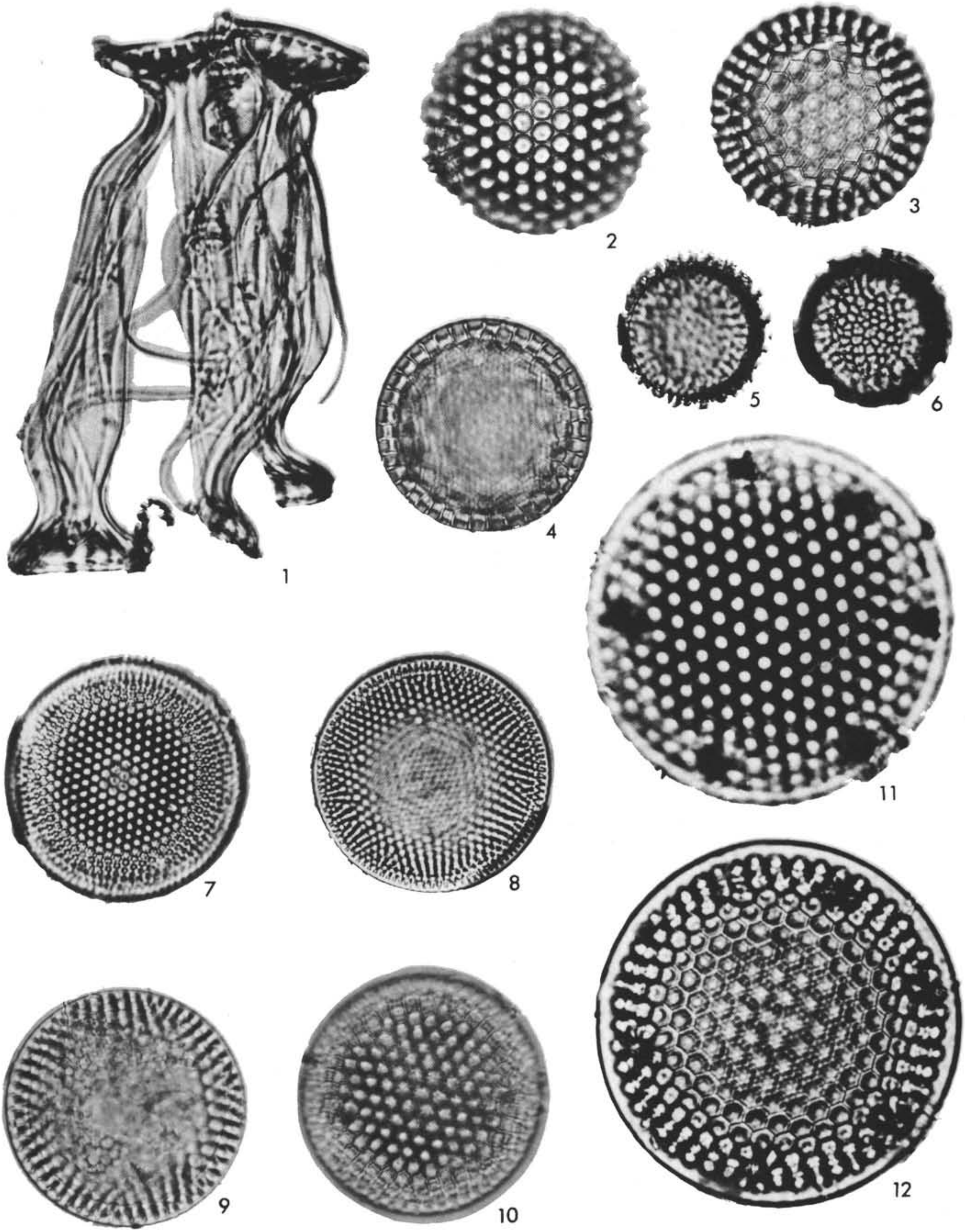
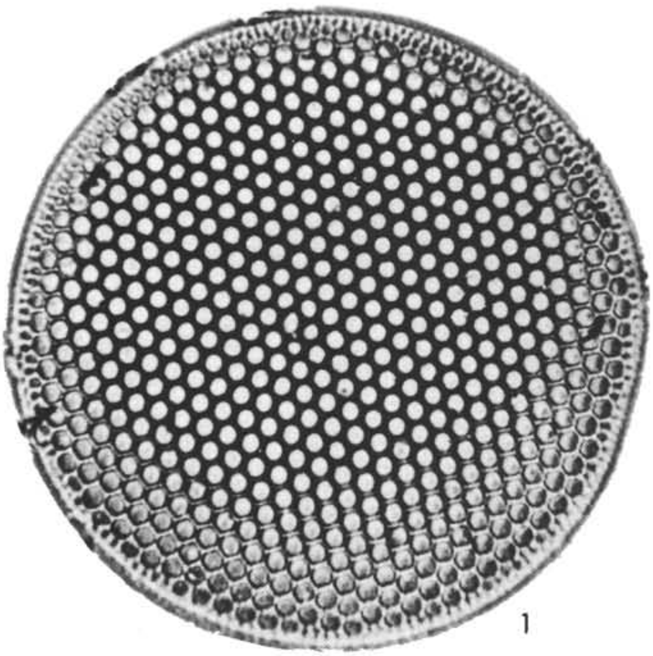


PLATE 3



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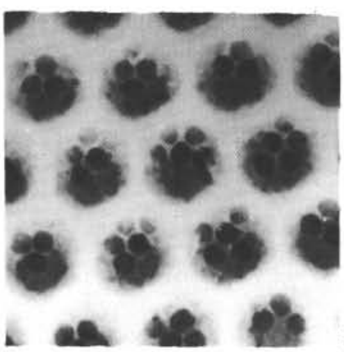

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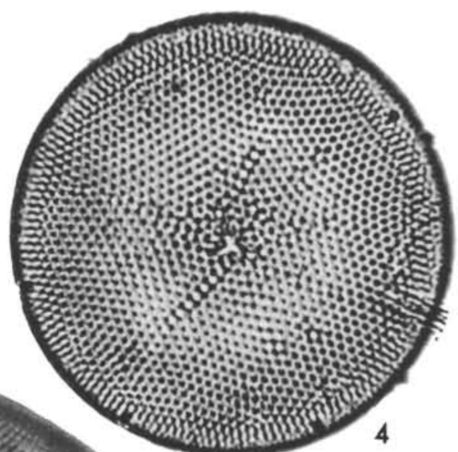

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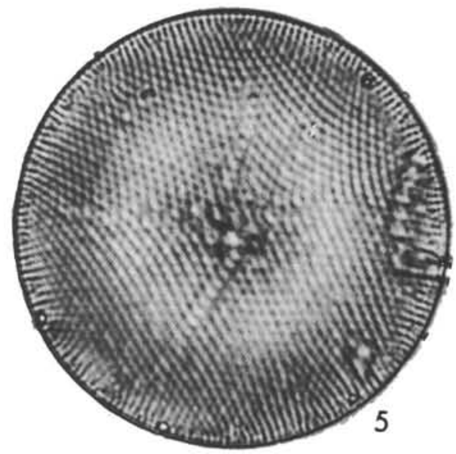

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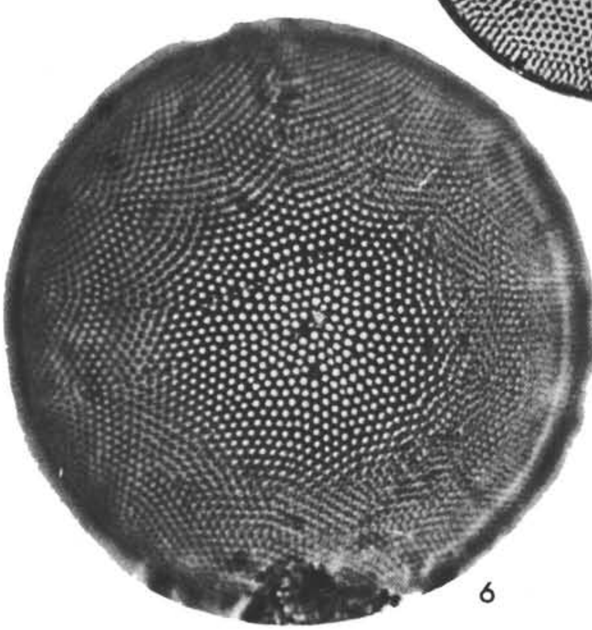

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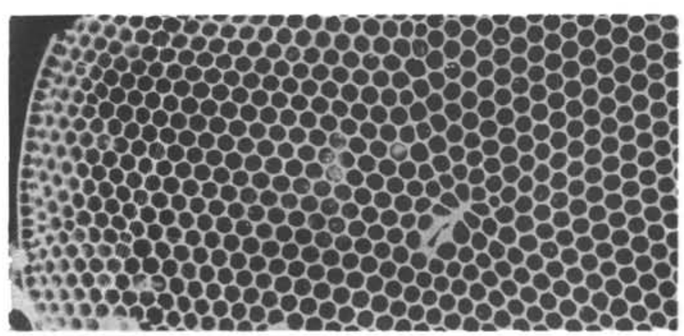

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PLATE 4

(Figures 1-16, ×1000; Figure 17, ×2875)

Figure 1	*Coscinodiscus circumspectus* Long, Fuge, and Smith. Sample 1-2, 40-42 cm.
Figure 2	*Coscinodiscus morenoensis* Hanna. Sample 2-1, 130-132 cm.
Figures 3, 4	*Ethmodiscus* sp. Hajós. Sample 2-1, 130-132 cm.
Figures 5, 6	*Poretzkia circularis* Jousé. 5. Sample 1-1, 118-120 cm. 6. Sample 1-3, 40-42 cm.
Figures 7, 8	*Cladogramma simplex* n. sp. Hajós. Sample 2-1, 130-132 cm; Holotype.
Figures 9-11	*Cladogramma jordanii* Hanna. 9, 11. Sample 1-1, 118-120 cm. 10. Sample 2-4, 40-42 cm.
Figure 12	*Xanthiopyxis* sp. 2. Hajós. Sample 2-1, 130-132 cm.
Figure 13	*Xanthiopyxis* sp. 1. Hajós. Sample 2-5, 116-118 cm.
Figures 14, 15	*Rattrayella antiqua* n. sp. Hajós and Stradner. Sample 2-3, 40-42 cm; Holotype.
Figures 16, 17	*Xanthiopyxis granti* Hanna. Sample 2-1, 130-132 cm. 17. Transmission electron micrograph.

(See p. 948)

PLATE 4

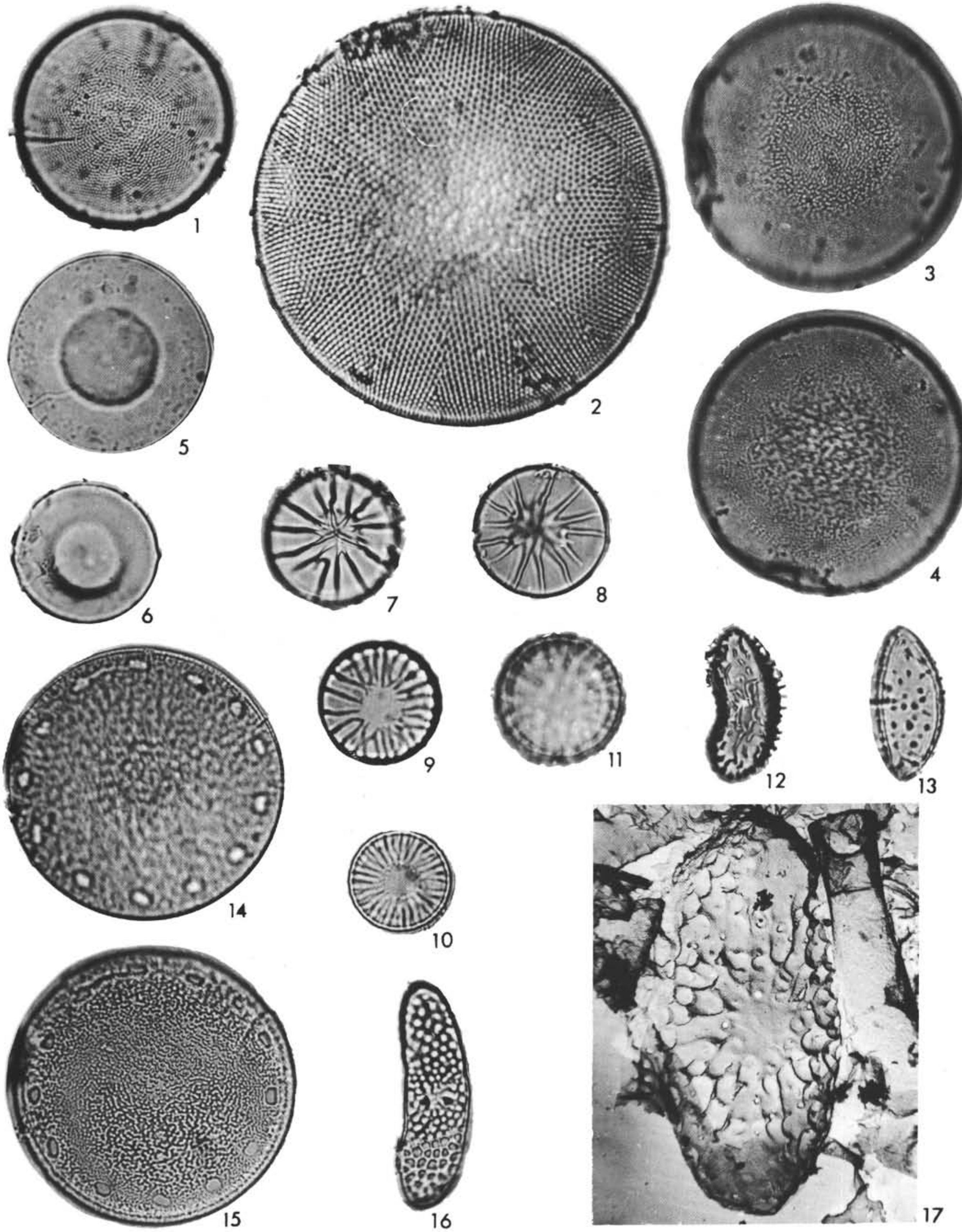

PLATE 5

(Figures 1-18, 20-23, ×1000; Figure 19, ×2520;
Figure 24, ×3800)

Figures 1-3	*Chasea bicornis* Hanna 1, 2. Sample 2-1, 130-132 cm. 3. Sample 2-5, 40-42 cm.
Figures 4, 5	*Chasea ornata* n. sp. Hajós and Stradner. Sample 2-5, 40-42 cm; Holotype.
Figures 6, 7	*Biddulphia cretacea* n. sp. Hajós and Stradner. Sample 2-3, 40-42 cm; Holotype.
Figures 8, 9	*Biddulphia sparsepunctata* n. sp. Hajós. Sample 2-3, 40-42 cm; Holotype.
Figures 10, 11	*Hemiaulus danicus* Grunow. Sample 2-5, 116-118 cm.
Figure 12	*Pseudostictodiscus* sp. Hajós. Sample 2-3, 40-42 cm.
Figures 13, 14	*Huttonia antiqua* n. sp. Hajós and Stradner. Sample 1-3, 40-42 cm; Holotype.
Figures 15, 16	*Huttonia punctata* n. sp. Hajós. Sample 1-3, 40-42 cm; Holotype.
Figures 17-19	*Hemiaulus altus* n. sp. Hajós. Holotype. 17, 18. Sample 1-2, 40-42 cm. 19. Sample 2-5, 40-42 cm; stereoscan micrograph.
Figure 20	*Hemiaulus gleseri* n. sp. Hajós. Sample 2-5, 40-42 cm.
Figures 21, 22	*Hemiaulus echinulatus* Jousé. Sample 1-2, 40-42 cm.
Figures 23, 24	*Actinoptychus packi* Hanna 23. Sample 1-1, 118-120 cm. 24. Sample 2-1, 130-132 cm; transmission electron micrograph.

(See p. 950)

PLATE 5

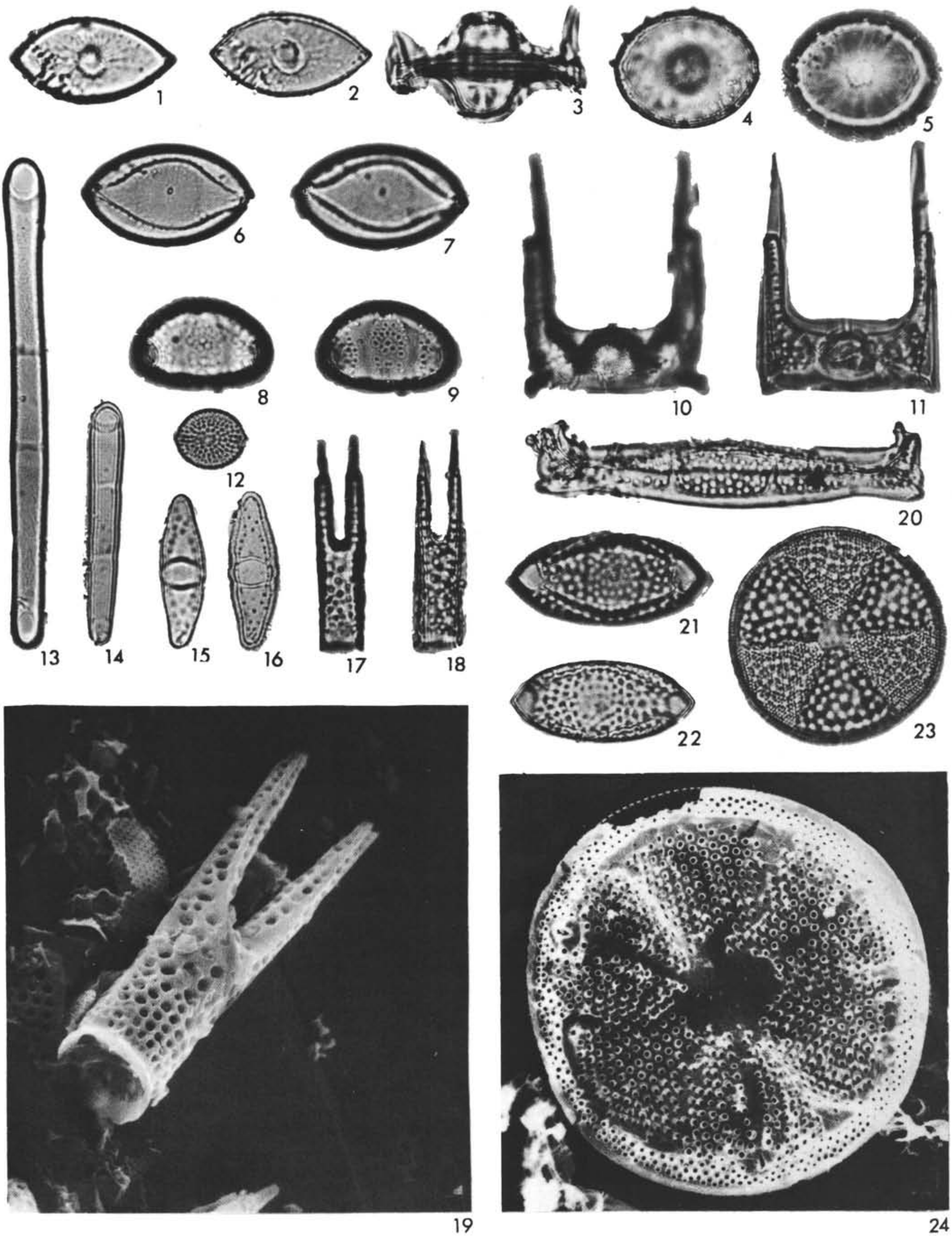

PLATE 6

(Figures 1-6, 8-13 ×1000; Figures 7, 14 ×2100)

Figures 1-3	*Hemiaulus polycystinorum* Ehrenberg var. *brevicornis* Jousé. 1, 2. Sample 2-1, 130-132 cm. 3. Sample 2-5, 116-118 cm.
Figures 4-7	*Hemiaulus polycystinorum* Ehrenberg. 4. Sample 2-1, 130-132 cm. 5, 6. Sample 2-4, 40-42 cm. 7. Sample 2-5, 40-42 cm; stereoscan micrograph.
Figure 8	*Hemiaulus curvatulus* Strelnikova. Sample 2-5, 40-42 cm.
Figure 9	*Hemiaulus polymorphus* Grunow. Sample 2-1, 130-132 cm.
Figures 10, 11	*Hemiaulus kondai* n. sp. Hajós. 10. Sample 2-1, 130-132 cm. 11. Sample 1-2, 40-42 cm; Holotype.
Figures 12-14	*Hemiaulus prae-elegans* Jousé. 12. Sample 2-5, 116-118 cm. 13, 14. Sample 2-5, 40-42 cm; stereoscan micrograph.

(See p. 952)

PLATE 6

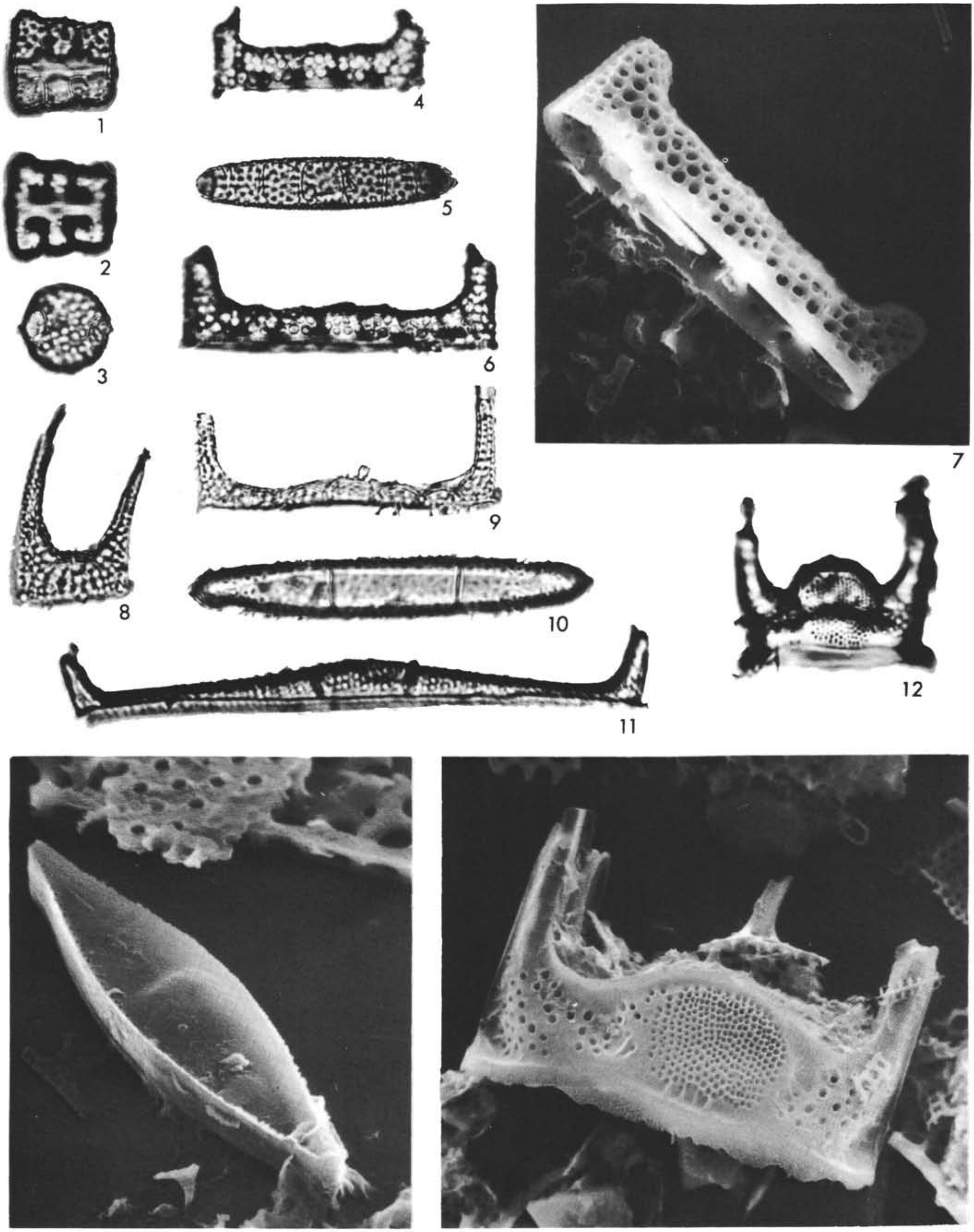

PLATE 7

(Figures 1-4, 6-13 ×1000; Figures 5, 14, 15 ×2575)

Figure 1	*Rhisosolenia cretacea* n. sp. Hajós and Stradner. Sample 1-1, 118-120 cm; Holotype.
Figures 2-5	*Hemiaulus schmidti* n. sp. Hajós. 2, 3. Sample 2-1, 130-132 cm; Holotype. 4. Sample 2-5, 130-132 cm. 5. Sample 2-5, 40-42 cm; stereoscan micrograph.
Figures 6, 7	*Hemiaulus gleseri* n. sp. 6. Sample 1-1, 118-120 cm; Holotype. 7. Sample 2-5, 116-118 cm.
Figure 8	*Hemiaulus andrewsi* n. sp. Hajós. Sample 2-5, 116-118 cm; Holotype.
Figures 9, 10	*Triceratium kuepperi* n. sp. Hajós and Stradner. Sample 1-2, 40-42 cm; Holotype.
Figures 11-15	*Triceratium kennetti* n. sp. Hajós and Stradner. 11-13. Sample 2-5, 116-118 cm; Holotype. 14. Sample 2-5, 40-42 cm; stereoscan micrograph; view of the interior side of the valve. 15. Sample 2-5, 40-42 cm; stereoscan micrograph; girdle view.

(See p. 954)

PLATE 7

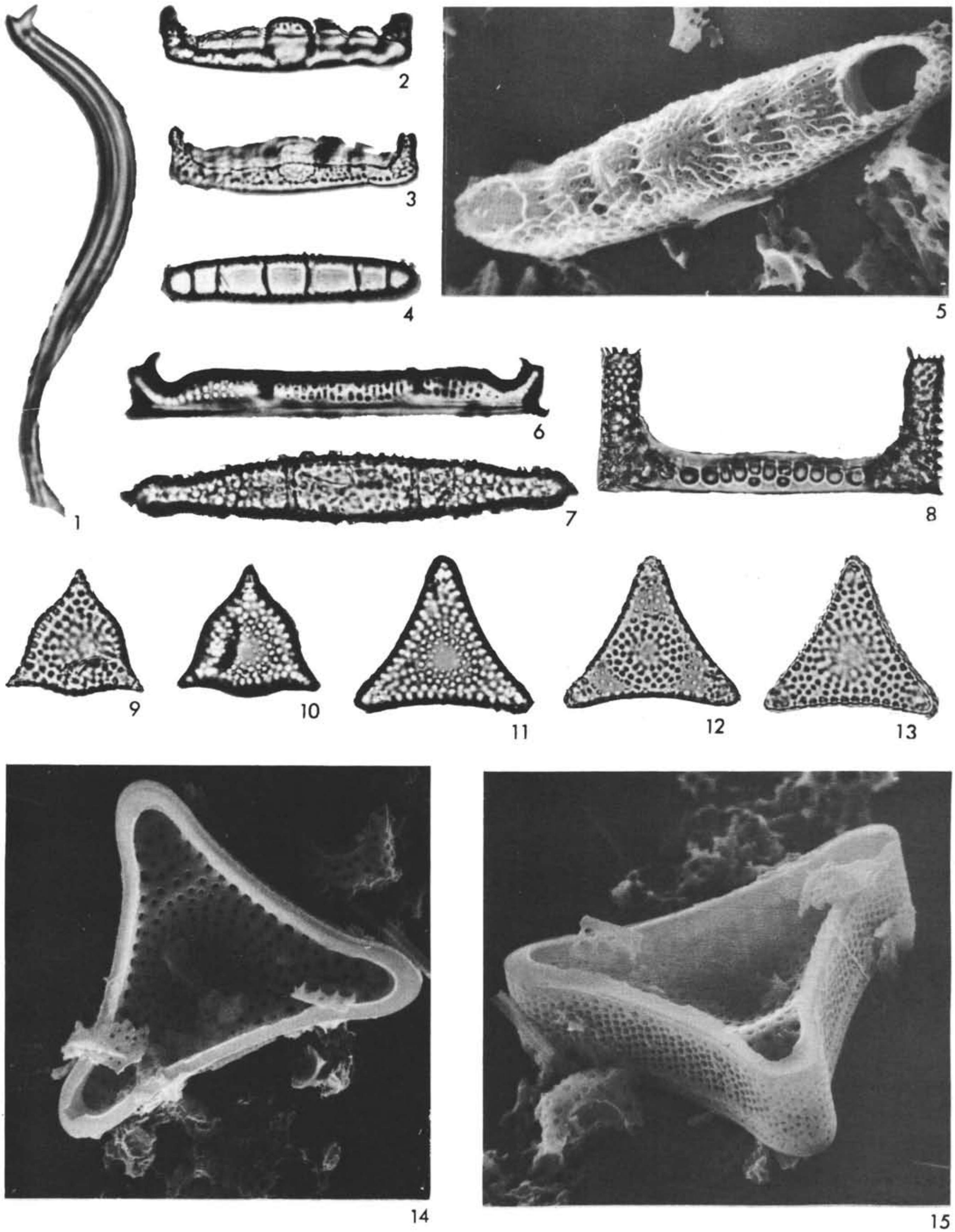

PLATE 8

(All figures ×1000)

Figures 1, 2	*Triceratium schulzii* Jousé. Sample 2-5, 40-42 cm.
Figures 3, 4	*Triceratium sectum* Witt. Sample 2-5, 116-118 cm.
Figures 5, 6	*Triceratium praetenue* Greville. Sample 1-1, 118-120 cm.
Figures 7, 8	*Triceratium dignum* Long, Fuge, and Smith. Sample 1-1, 118-120 cm.
Figures 9, 10	*Triceratium arietinum* Schmidt. Sample 2-1, 130-132 cm.
Figures 11, 12	*Triceratium cristatum* Pantocsek. Sample 2-5, 40-42 cm.
Figures 13, 14	*Triceratium edgari* n. sp. Hajós. Sample 1-1, 118-120 cm; Holotype.
Figures 15, 16	*Triceratium gratum* Schmidt, Sample 2-5, 116-118 cm.

(See p. 956)

PLATE 9

(Figures 1-10, ×1000; Figure 11, ×2520)

Figures 1, 2	*Triceratium occultum* Hustedt. Sample 2-1, 130-132 cm.
Figure 3	*Triceratium nobile* Witt. Sample 1-1, 118-120 cm.
Figure 4	*Triceratium idoneum* Pantocsek. Sample 2-3, 40-42 cm.
Figures 5, 6	*Trinacria tristictia* Hanna. Sample 2-3, 40-42 cm.
Figures 7, 8	*Trinacria pileolus* (Ehrenberg) Grunow. Sample 1-2, 40-42 cm.
Figures 9-11	*Trinacria aries* Witt. Sample 2-5, 40-42 cm. 11. Stereoscan micrograph; view of the exterior side of the valve.

(See p. 957)

PLATE 8

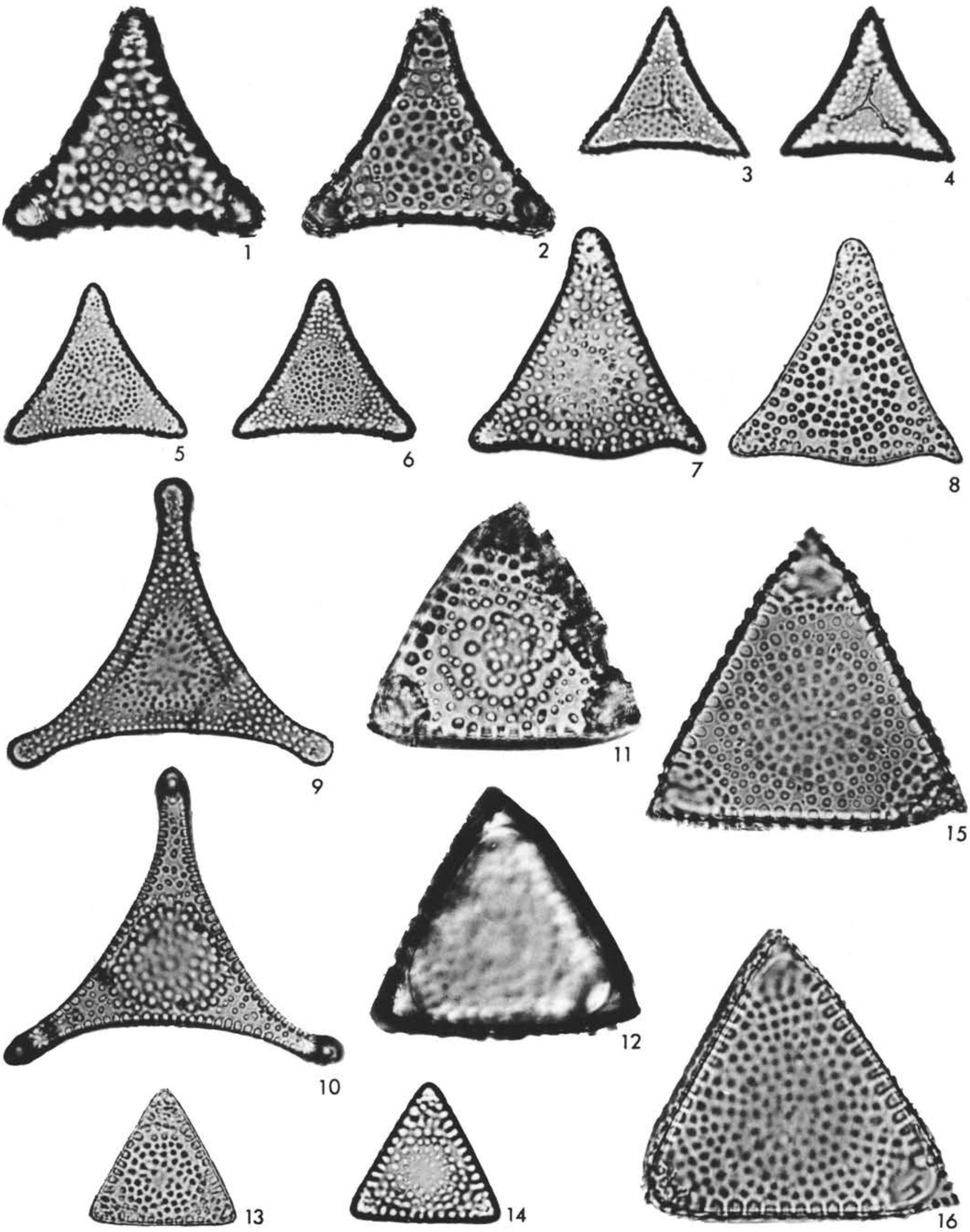

PLATE 9

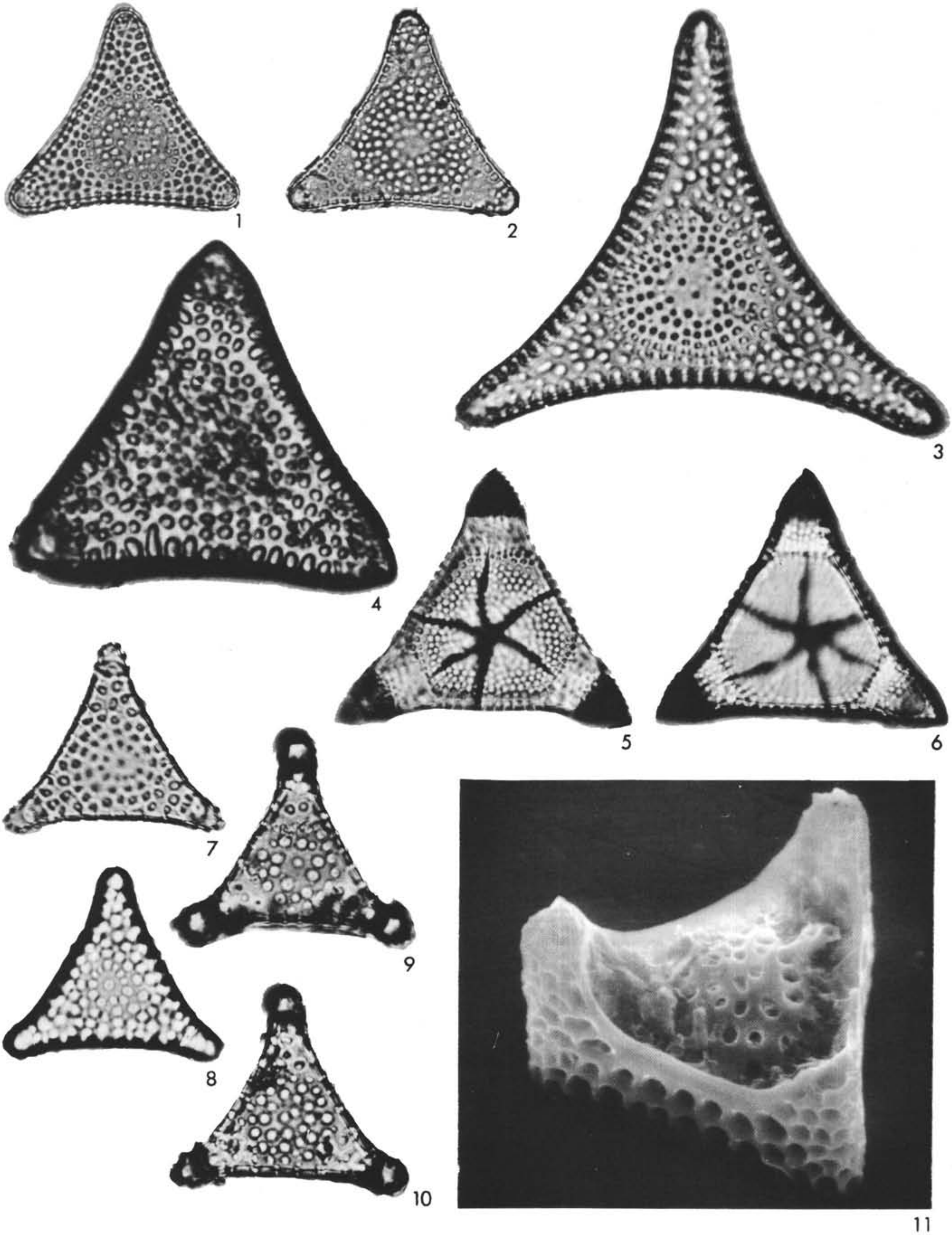

PLATE 10

(All figures ×1000)

Figure 1	*Trinacria excavata* Heiberg. Sample 2-3, 40-42 cm.
Figure 2	*Trinacria anissimowii* Jousé. Sample 2-3, 40-42 cm.
Figures 3, 4	*Cerataulina cretacea* n. sp. Hajós. 3. Sample 2-5, 116-118 cm; Holotype. 4. Sample 2-1, 130-132 cm.
Figures 5, 6	*Trinacria insipiens* Witt. Sample 2-5, 116-118 cm.
Figures 7, 8	*Trinacria princeps* Witt. Sample 2-1, 130-132 cm.
Figure 9	*Kentrodiscus armatus* n. sp. Hajós. Sample 2-1, 130-132 cm.
Figure 10	*Kentrodiscus aculeatus* Hanna. Sample 2-5, 116-118 cm; View from below.
Figures 11, 12	*Goniothecium odontella* Ehrenberg. Sample 2-1, 130-132 cm; Girdle view.

PLATE 10

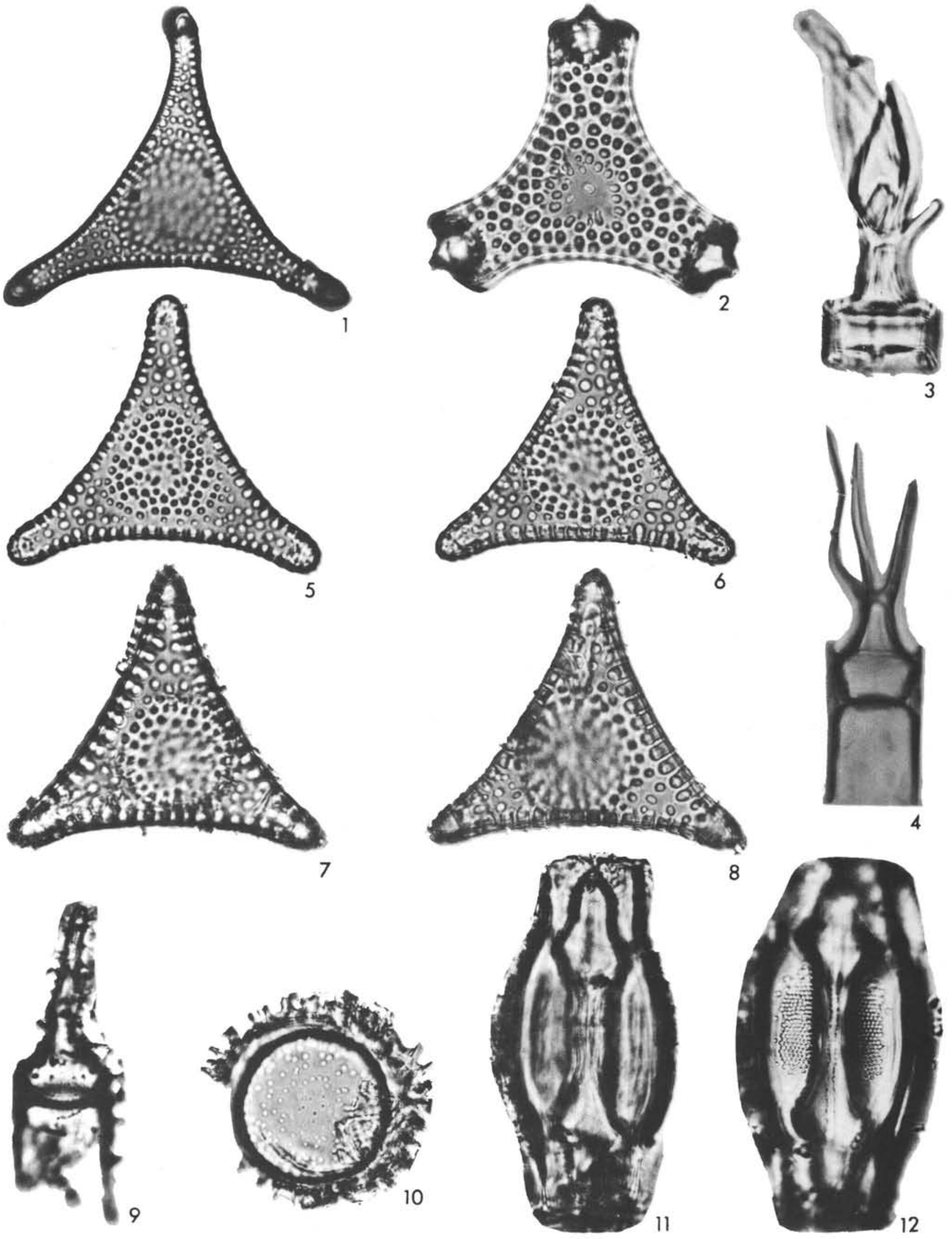

PLATE 11

(Figures 1-15 ×1000; Figure 16 ×3740)

Figures 1, 2	*Gladius pacificus* n. sp. Hajós and Stradner. Sample 2-3, 40-42 cm; Holotype.
Figures 3, 4	*Gladius pacificus* n. sp. f. *minor* n. f. Hajós. Sample 2-1, 130-132 cm; Holotype.
Figures 5, 6	*Gladius speciosus* Schulz. Sample 2-1, 130-132 cm.
Figures 7-12	*Gladius jouseanus* n. sp. Hajós. 7, 8. Sample 2-1, 130-132 cm. 9, 10. Sample 1-2, 40-42 cm; Holotype. 11. Sample 2-3, 40-42 cm.
Figure 13	*Gladius maximus* n. sp. Hajós. Sample 2-1, 130-132 cm; Holotype.
Figures 14-16	*Sceptroneis grunowii* Anissimowa. 14, 15. Sample 2-1, 130-132 cm. 16. Sample 2-5, 40-42 cm; stereoscan micrograph.

PLATE 11

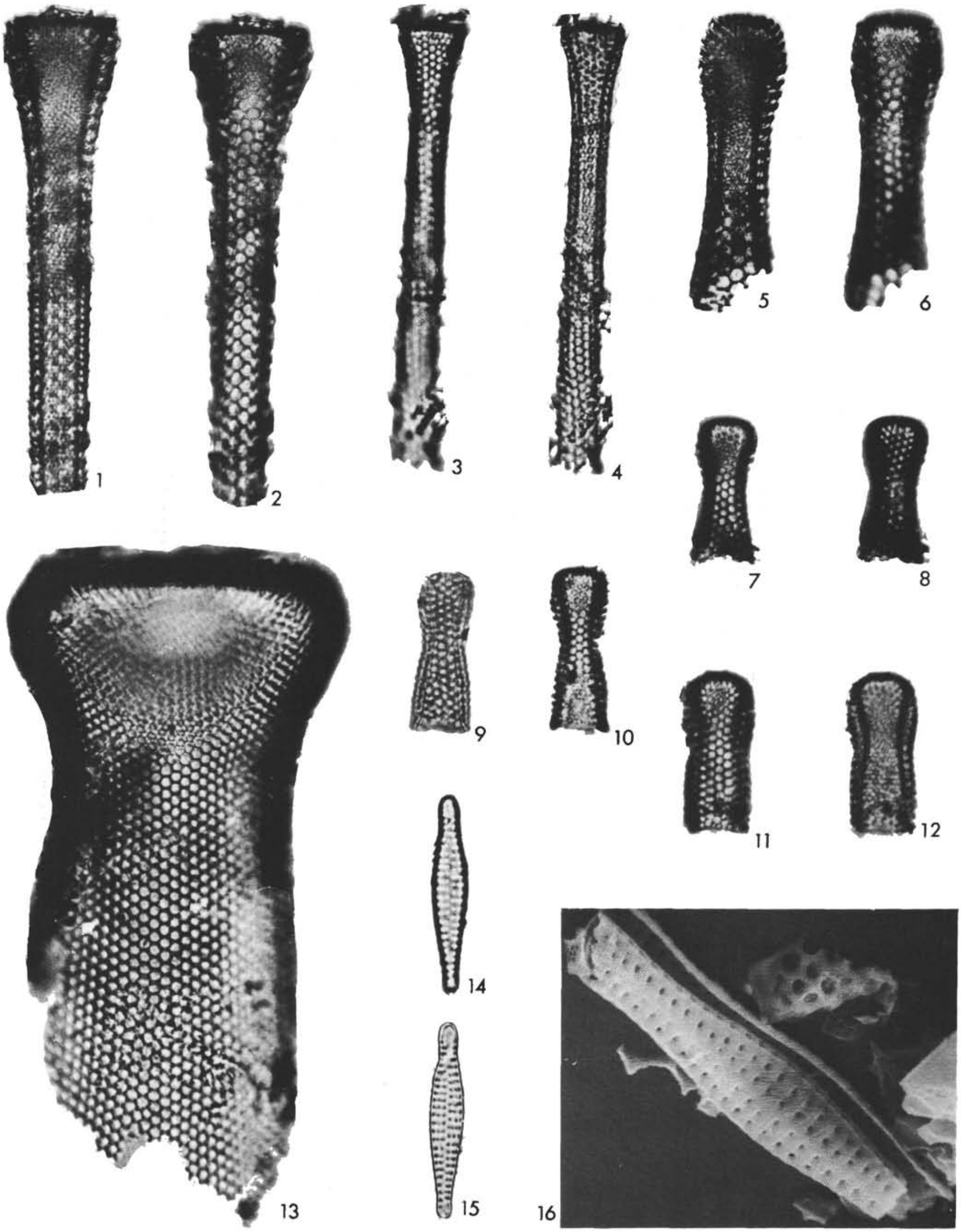

PLATE 12

(Figures 1-20 ×1000; Figures 21, 22 ×2600)

Figures 1, 2	*Pseudopyxilla russica* (Pantocsek) Forti. Sample 2-5, 116-118 cm.
Figure 3	*Pseudopyxilla americana* (Ehrenberg) Forti. Sample 2-5, 116-118 cm.
Figures 4, 5	*Pseudopyxilla jouseae* n. sp. Hajós. Sample 1-1, 118-120 cm; Holotype.
Figure 6	*Pterotheca* cf. *aculeifera* Grunow. Sample 2-5, 116-118 cm.
Figure 7	*Pterotheca capreolus* (Forti.)n. comb. Hajós. Sample 2-1, 130-132 cm.
Figures 8, 9, 22	*Pterotheca crucifera* Hanna. 8. Sample 1-2, 40-42 cm. 9. Sample 2-1, 130-132 cm. 22. Sample 2-1, 130-132 cm; stereoscan micrograph.
Figures 10, 11	*Pterotheca aculeata* n. sp. Hajós. 10. Sample 2-1, 130-132 cm. 11. Sample 2-5, 116-118 cm; Holotype.
Figures 12-15	*Pterotheca (Micrampulla) parvula* Hanna n. comb. Hajós and Stradner. Sample 2-1, 130-132 cm.
Figures 16-18, 21	*Pterotheca cretacea* n. sp. Hajós and Stradner. 16. Sample 2-1, 130-132 cm. 17, 18. Sample 1-1, 118-120 cm; Holotype. 21. Sample 2-1, 130-132 cm; stereoscan micrograph.
Figures 19, 20	*Kentrodiscus armatus* n. sp. Hajós. Sample 2-1, 130-132 cm; Holotype.

PLATE 12

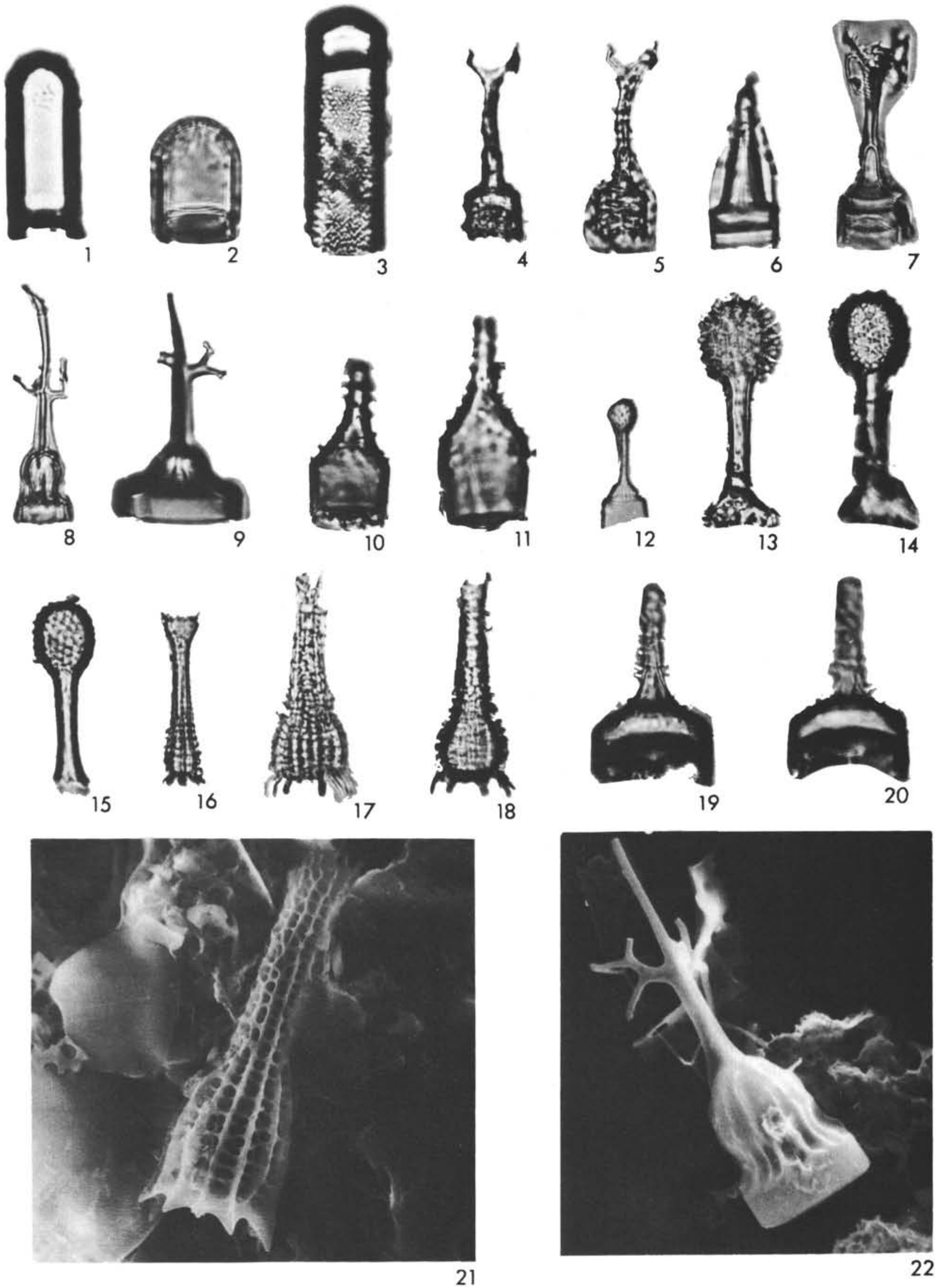

PLATE 13

(All figures ×1000)

Figures 1-6	*Acanthodiscus antarcticus* n. sp. Hajós. 1-3. Sample 2-5, 116-118 cm; Holotype. 4-6. Sample 2-5, 116-118 cm.
Figures 7, 9, 10	*Acanthodiscus ornatus* n. sp. Hajós and Stradner. 7. Sample 2-3, 40-42 cm. 9, 10. Sample 2-3, 40-42 cm; Holotype.
Figure 8	*Acanthodiscus convexus* n. sp. Hajós and Stradner. Sample 2-1, 130-132 cm; Holotype.
Figure 11	*Pyrgodiscus sinuatus* n. sp. Hajós and Stradner. Sample 2-5, 40-42 cm; Holotype.
Figure 12	*Longinata acuta* n. sp. Hajós. Sample 1-2, 40-42 cm; Generotype, Holotype.
Figures 13, 14	*Sceptroneis praecaducea* n. sp. Hajós and Stradner. Sample 1-1, 118-120 cm; Holotype.
Figures 15, 16	*Incisoria punctata* n. sp. Hajós and Stradner. Sample 2-1, 130-132 cm; Generotype, Holotype.
Figures 17, 18	*Sceptroneis* sp. Sample 1-1, 118-120 cm.
Figure 19	*Eunotogramma fueloepi* n. sp. Hajós. Sample 2-1, 130-132 cm; Holotype.
Figures 20, 21	*Incisoria inordinata* n. sp. Hajós. Sample 2-3, 40-42 cm; Holotype.
Figures 22, 25	*Incisoria lanceolata* n. sp. Hajós and Stradner. 22. Sample 2-5, 116-118 cm; Holotype. 25. Sample 2-1, 130-132 cm.
Figure 23	*Anaulus incisus* n. sp. Hajós and Stradner. Sample 1-3, 40-42 cm; Holotype.
Figure 24	*Helminthopsis wornardti* n. sp. Hajós. Sample 2-3, 40-42 cm; Holotype.
Figure 26	*Anaulus subantarcticus* n. sp. Hajós. Sample 2-3, 40-42 cm; Holotype.

PLATE 13

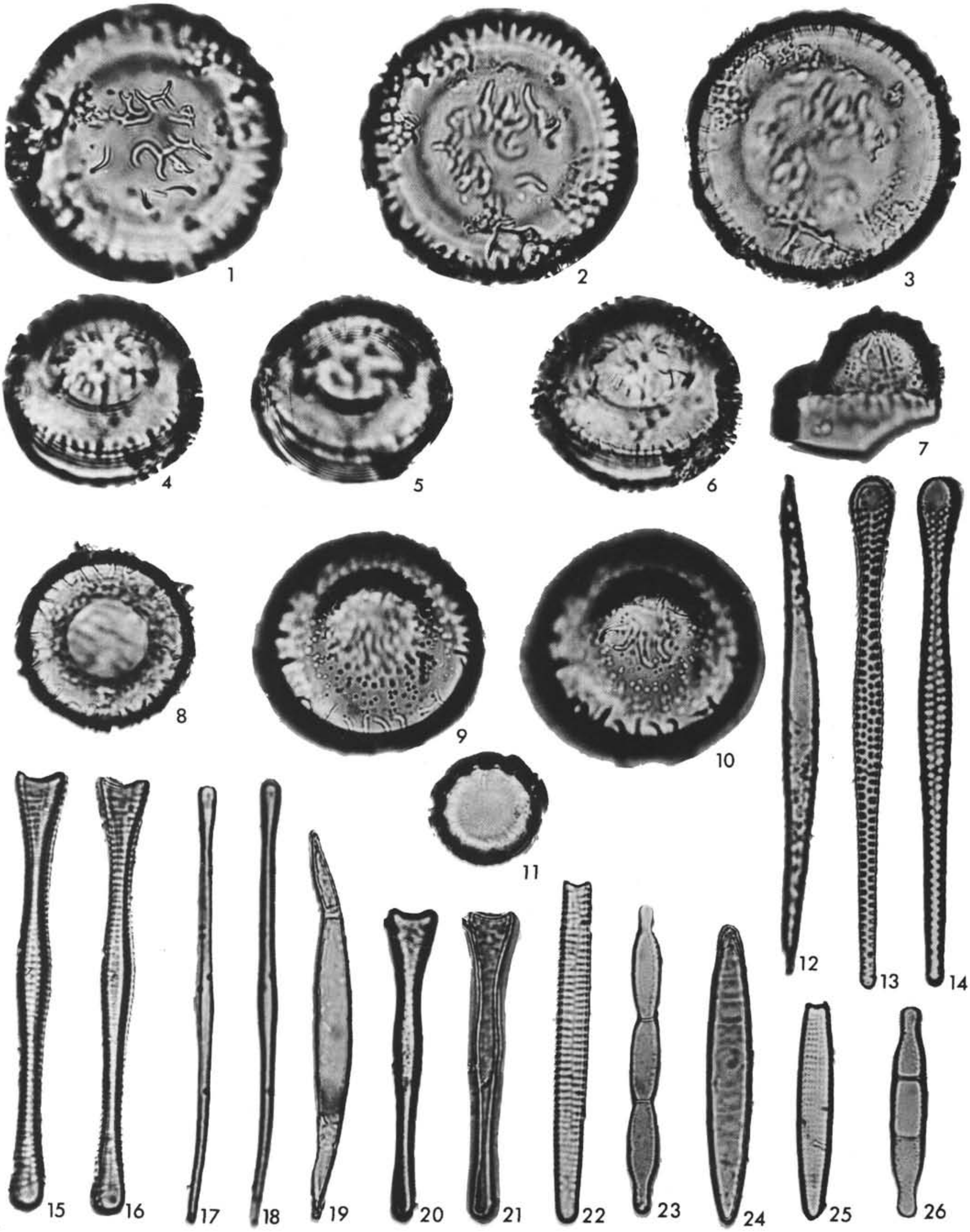

PLATE 14

(Figures 1-4, 6, 8-34 ×1000; Figures 5, 7 ×2000)

Figure 1	*Epithelion spinifer* Pantocsek. Sample 2-4, 40-42 cm.
Figure 2	*Epithelion russicum* Pantocsek. Sample 2-4, 40-42 cm.
Figures 3, 4	*Epithelion curvatum* Pantocsek. Sample 1-1, 118-120 cm.
Figures 5-11	*Acanthosphaeridium reticulatum* n. sp.Hajós and Stradner. 5, 7. Sample 2-3, 40-42 cm; Generotype, Holotype. 6. Sample 2-1, 130-132 cm; Electron micrograph. 8, 9. Sample 1-1, 118-120 cm. 10, 11. Sample 2-5, 116-118 cm.
Figures 12, 13	*Archaeomonas ambigua* Rampi. Sample 2-4, 40-42 cm.
Figures 14-16	*Archaeomonas chiarugii* Rampi. Sample 2-4, 40-42 cm.
Figures 17, 18	*Archaeomonas cretacea* Rampi. Sample 2-4, 40-42 cm.
Figures 19, 20	*Archaeomonas heteroptera* Deflandre. Sample 2-4, 40-42 cm.
Figures 21, 22	*Archaeomonas membranosa* Rampi. Sample 2-4, 40-42 cm.
Figures 23, 24	*Archaeomonas spinulosa* Rampi. Sample 2-1, 130-132 cm.
Figures 25-27	*Litheusphaerella spectabilis* Deflandre. Sample 2-5, 116-118 cm.
Figures 28, 29	*Archaeomonas smithi* Rampi. Sample 2-1, 130-132 cm.
Figures 30, 31	*Pararchaeomonas colligera* Deflandre. Sample 2-1, 130-132 cm.
Figures 32-34	*Pararchaeomonas ornata* n. sp. Hajós. Sample 2-3, 40-42 cm; Holotype.

PLATE 14

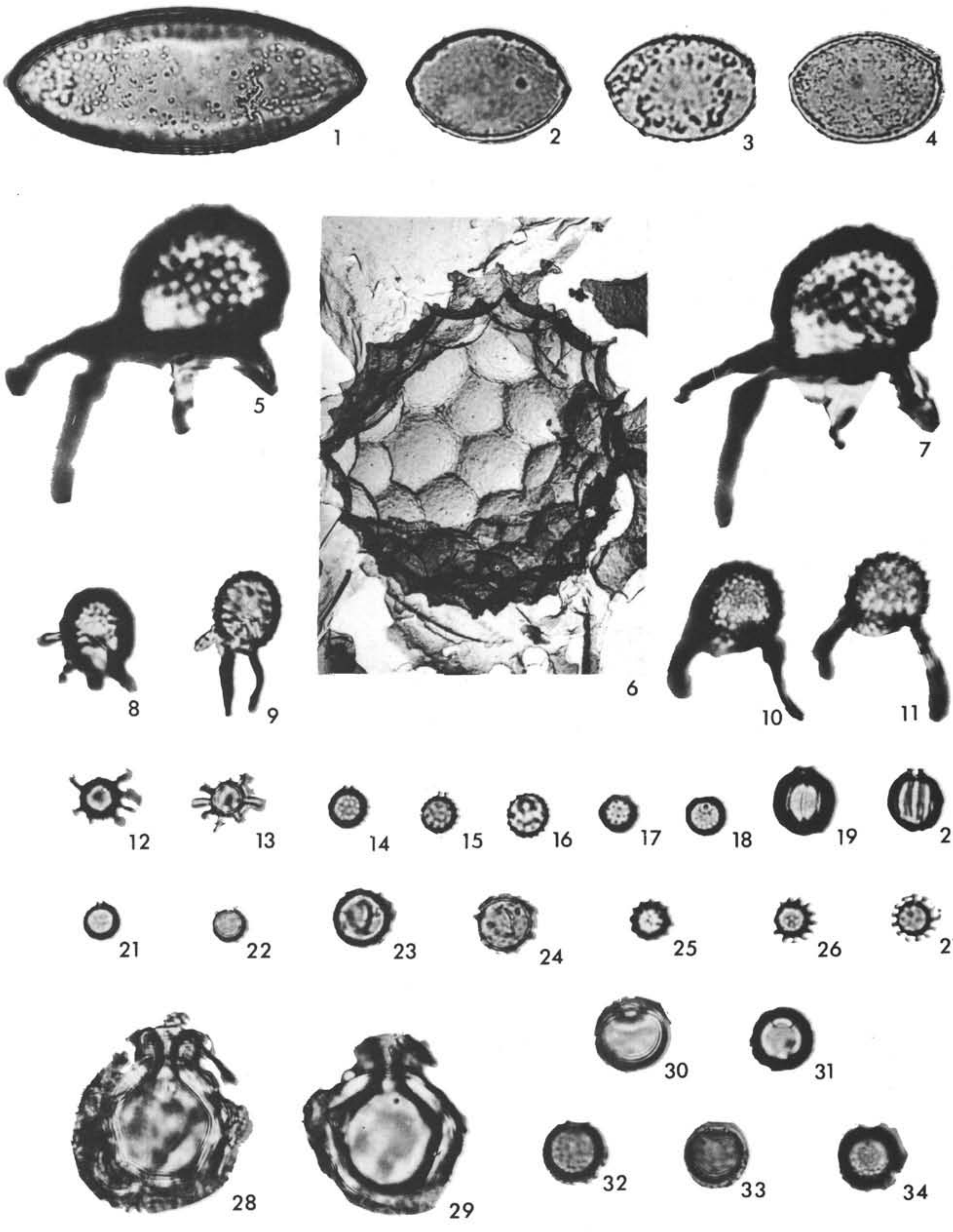
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PLATE 15

(All figures ×1000)

Figure 1	*Corbisema geometrica* Hanna. Sample 2-1, 130-132 cm.
Figures 2, 3, 5	*Corbisema geometrica* Hanna var. *apiculata* Jousé. 2, 5. Sample 2-5, 116-118 cm. 3. Sample 1-2, 40-42 cm.
Figures 4, 6, 7	*Corbisema parallela* n. sp. Hajós. Sample 2-3, 40-42 cm. 4. Holotype.

PLATE 16

(All figures ×1000)

Figures 1, 2	*Lyramula deflandrei* n. sp. Hajós. Sample 2-1, 130-132 cm; Holotype.
Figure 3	*Dictyocha quadralta* Hanna. Sample 2-5, 116-118 cm.
Figures 4-6	*Lyramula furcula* Hanna var. *minor* Deflandre. 4, 6. Sample 2-5, 116-118 cm. 5. Sample 1-1, 118-120 cm.
Figures 7, 8	*Lyramula furcula* Hanna. 7. Sample 1-2, 40-42 cm. 8. Sample 2-1, 130-132 cm.
Figure 9	*Vallacerta quadrata* n. sp. Hajós. Sample 2-5, 116-118 cm; Holotype.

(See p. 970)

PLATE 15

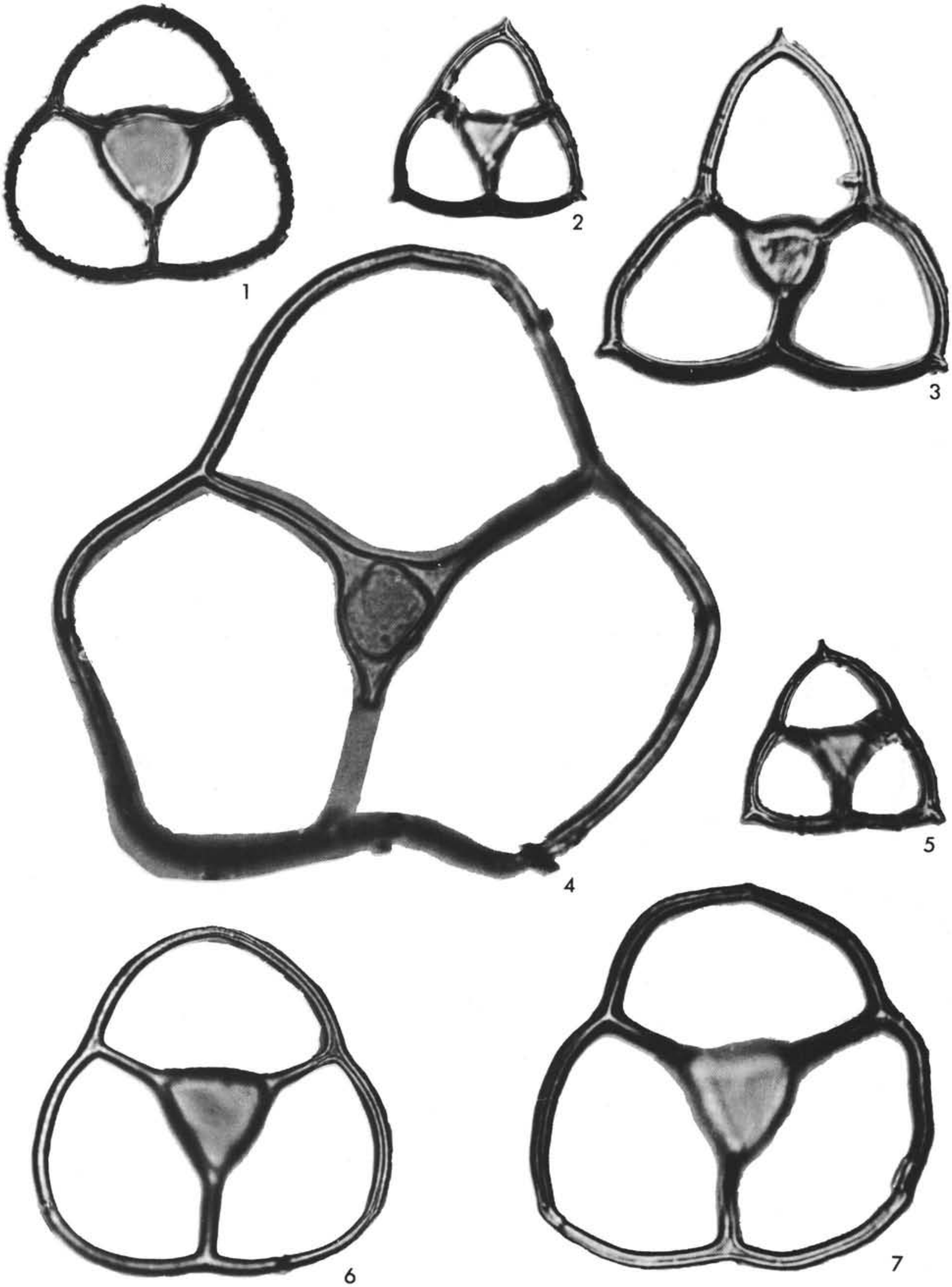


PLATE 16

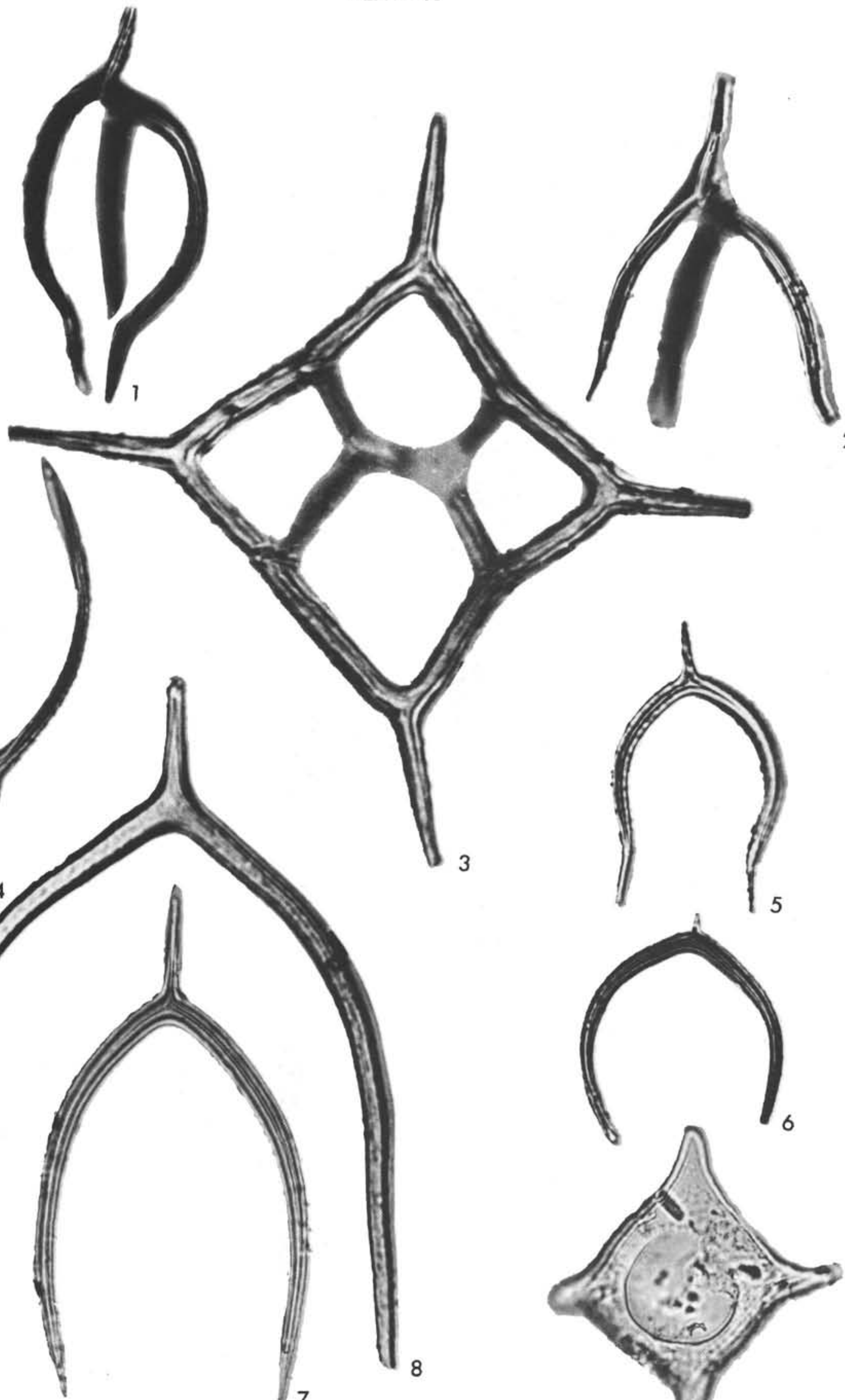


PLATE 17

(All figures ×1000)

Figure 1	*Lyramula simplex* Hanna. Sample 2-5, 116-118 cm.
Figures 2, 3	*Vallacerta hortonii* Hanna. Sample 2-1, 130-132 cm.
Figures 4, 5	*Vallacerta tumidula* Gleser. Sample 1-2, 40-42 cm.
Figures 6-11	*Porifera* spicules. 6-8, 10, 11. Sample 2-1, 130-132 cm. 9. Sample 2-5, 116-118 cm.

(See p. 972)

PLATE 18

Transmission electron micrographs of Cretaceous diatoms from Sample 2-1, 130-132 cm

Figures 1, 2	*Melosira vetustissima* n. sp. Hajós and Stradner. 1. Valve view, exterior side; ×9000. 2. Valve in oblique view, direct transmission; ×18,000.
Figures 3, 4	*Pyrgodiscus sinuatus* n. sp. Hajós and Stradner. Valve view. 3. Reversed print; ×9000. 4. Close up of sinus; ×18,000.
Figures 5, 6	*Pyrgodiscus triangulatus* n. sp. Hajós and Stradner Paratype. Valve view. 5. ×4500. 6. ×8000.

(See p. 973)

PLATE 17

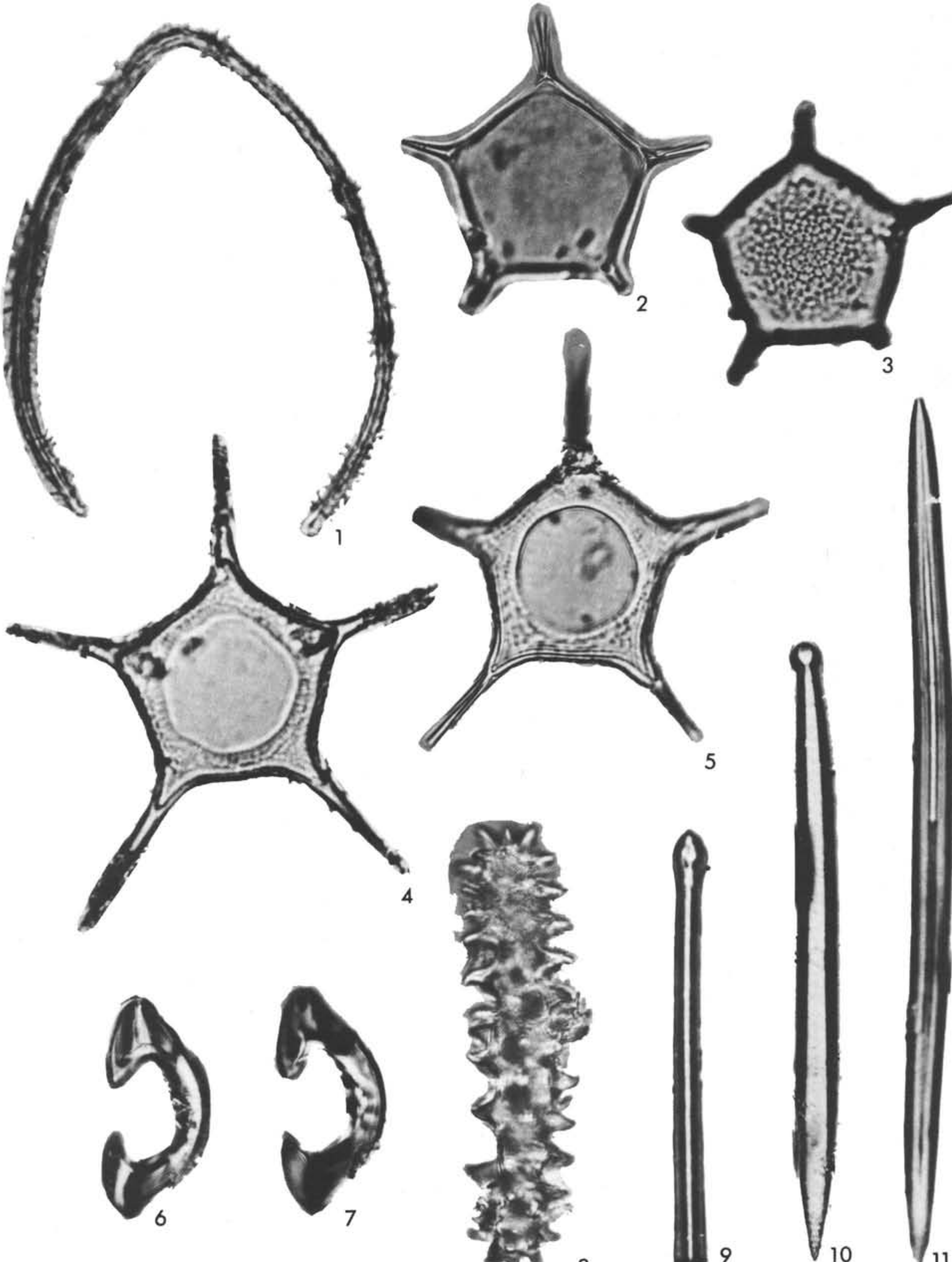


PLATE 18

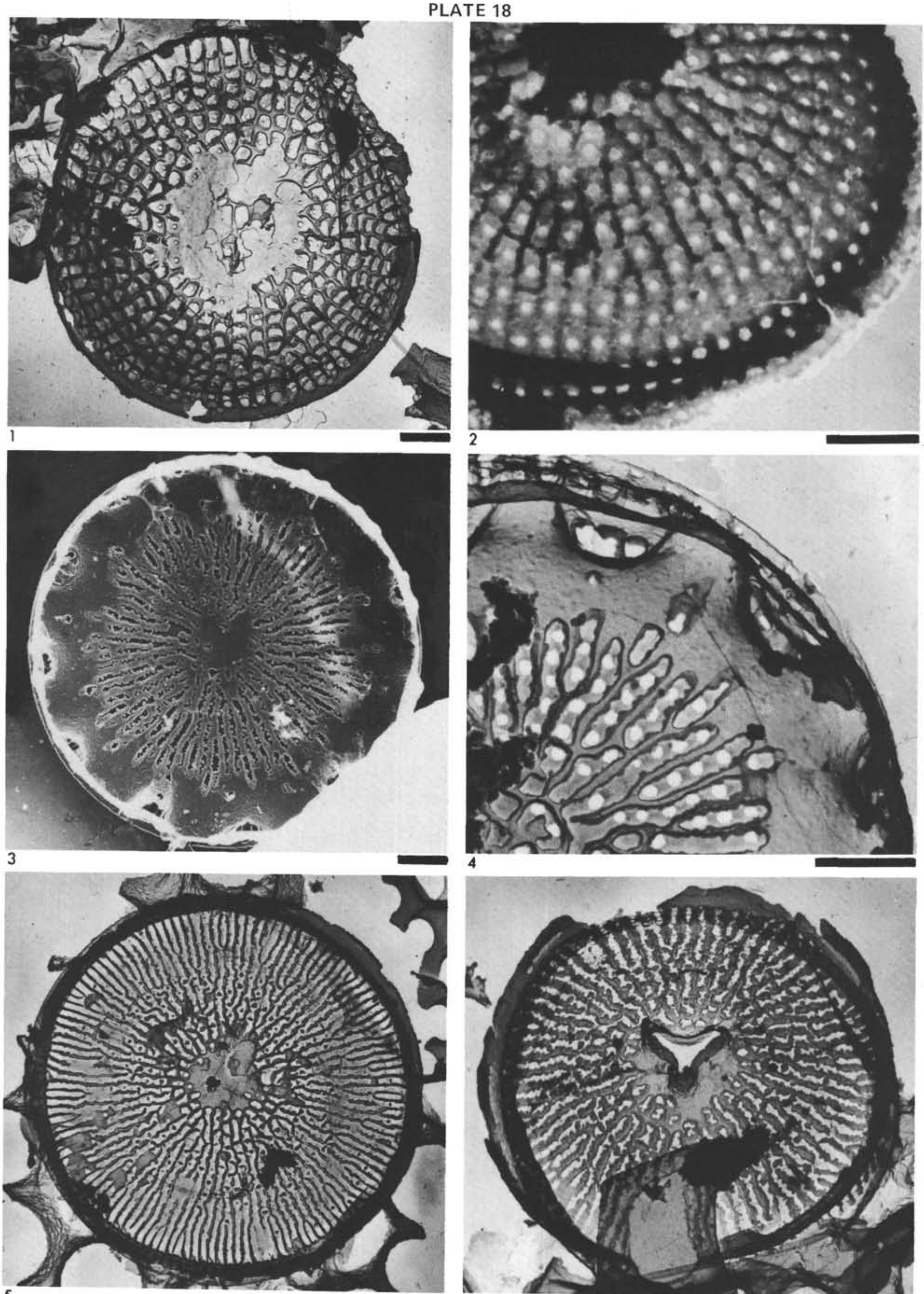


PLATE 19

Cretaceous diatoms from Sample 2-1, 130-132 cm

Figures 1, 2, 4	*Pseudopodosira westii* (Smith) Sheshakova and Gleser. 1. Valve view; ×4000. 2. Valve view, close up showing ring of pores; ×7500. 4. Central disc of the valve; ×3300.
Figure 3	*Pseudopodosira* sp. Hajós. Valve view; ×9000.
Figure 5	Unidentified lid of a permanent diatom-spore. Valve view; ×14,000.
Figure 6	*Benetorus fantasmus* Hanna. Valve view of external side; reversed print of carbon replica; ×9600.

PLATE 20

Cretaceous diatoms from Sample 2-1, 130-132 cm

Figures 1, 2	*Skeletonema punctatum* Schmidt. 1. Oblique view; ×6000. 2. Oblique view; close up showing connections between two valves and marginal pores; ×21,000.
Figure 3	*Skeletonema* sp. Valve view. ×4150.
Figure 4	*Skeletonema alternans* n. sp. Stradner. Oblique side view; ×8000; Holotype.
Figure 5	*Melosira* sp. Valve view of disc with finely crenulated margin; ×8660.
Figure 6	*Cladogramma jordani* Hanna. Valve view of internal side; ×4500.

(See p. 976)

PLATE 19

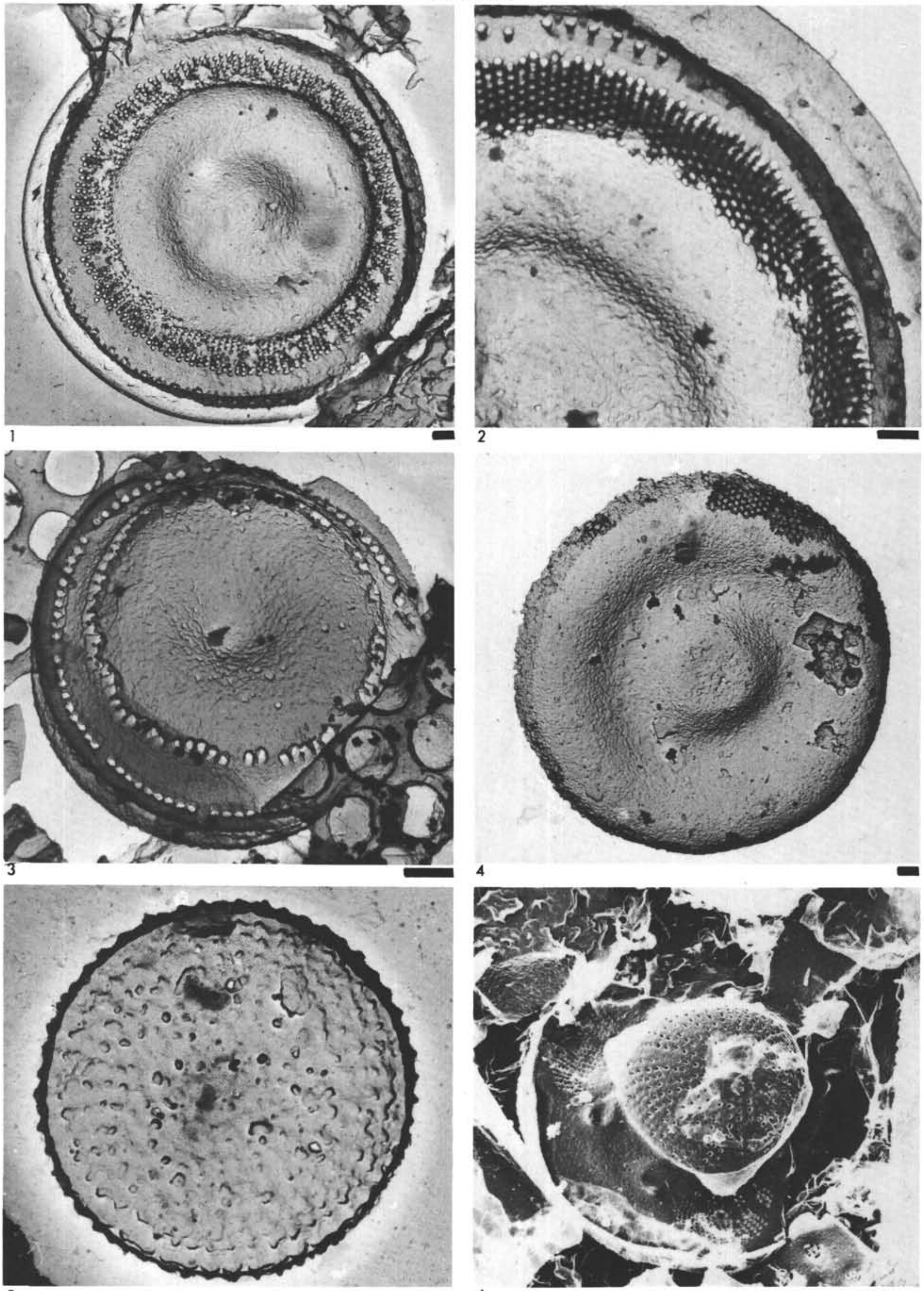
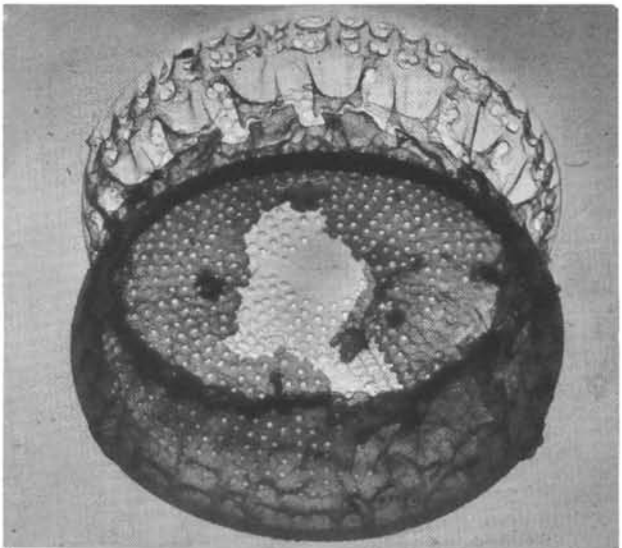


PLATE 20



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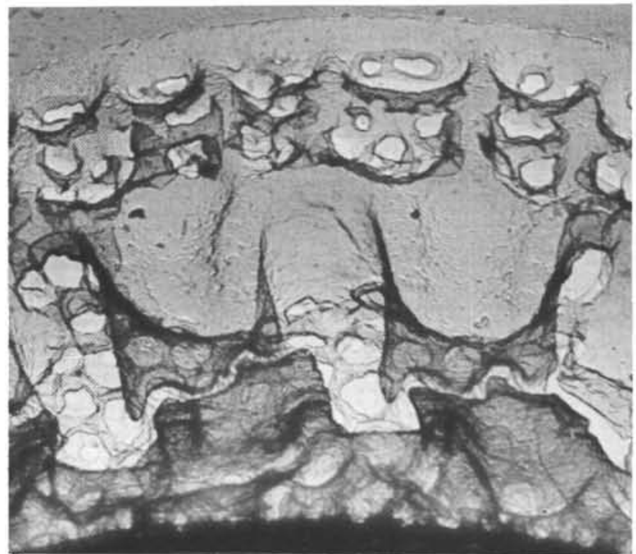

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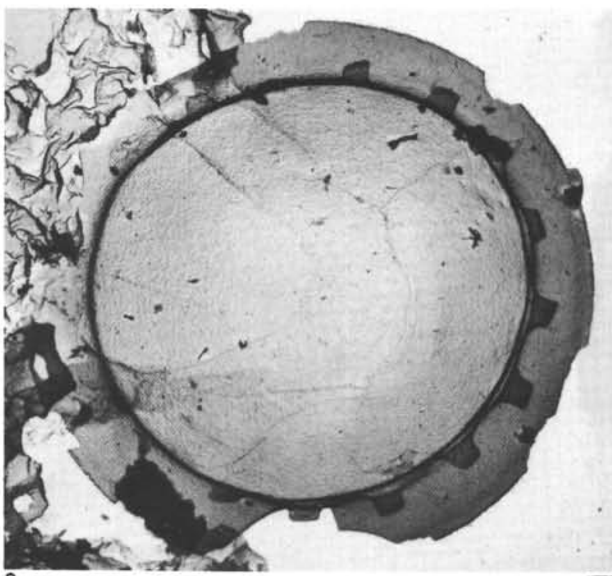

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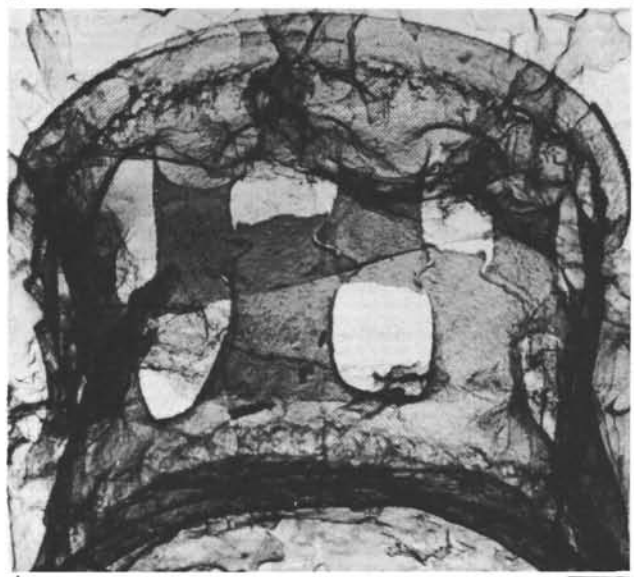

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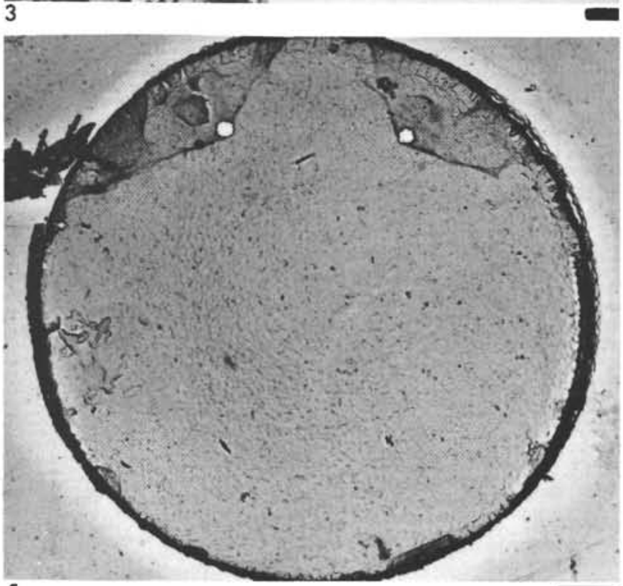

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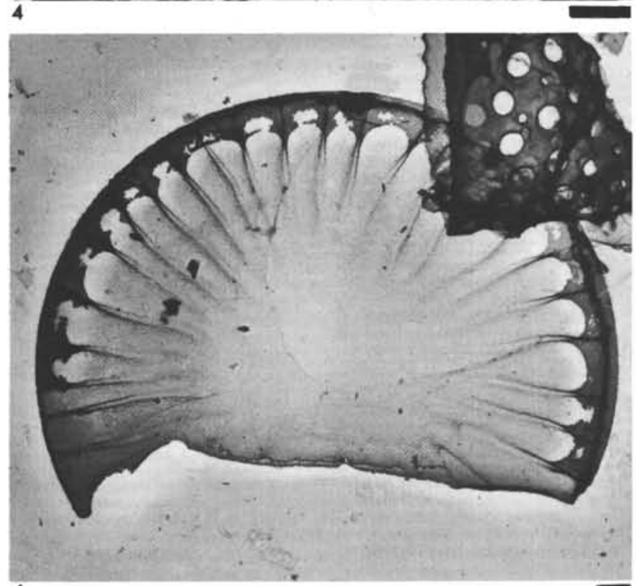


6

PLATE 21

Cretaceous diatoms from Sample 2-1, 130-132 cm

Stephanopyxis sp.

Figure 1	Valve view, external side; areolae closed by compact membranes; double row of pores near the margin; ×7500.
Figure 2	Valve view, external side of a valve with five apical spines; areolae closed except for the marginal ring of pores; ×7500.
Figure 3	Valve view; external side with apical spines; ×4400.
Figure 4	Valve view of interior side showing the radial rows of marginal pores, and the membranes occluding the areolae; broad hyaline marginal rim; ×5250.
Figure 5	Interior view of a valve showing structure of the wall and granulation of the inner membrane occluding the areolae; ×15,000.
Figure 6	Same view as Figure 5, but slightly tilted, showing double row of marginal pores; ×15,000.

(See p. 978)

PLATE 21

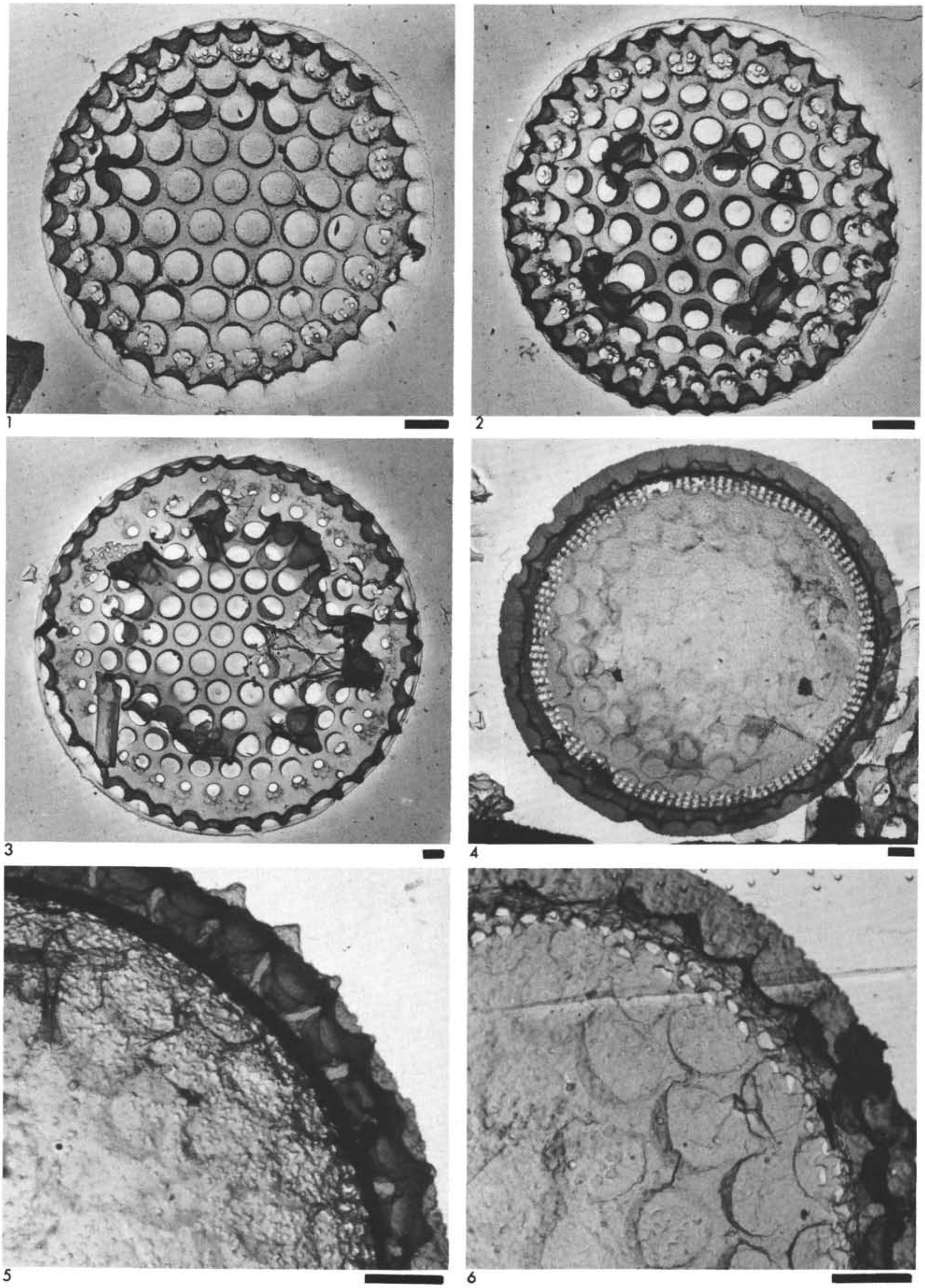


PLATE 22

Cretaceous diatoms from Sample 2-1, 130-132 cm

Figures 1, 2 — *Stephanopyxis weyprechtii* (Grunow) n. comb. Hajós.
1. Valve view of internal side; ×3000.
2. Internal view of valve; showing grids and one elongate pore; ×13,500.

Figure 3 — *Stephanopyxis* sp. Direct transmission of the margin of a large valve showing ultrastructure of areolae, and larger additional pores; reversed print; ×10,400.

Figure 4 — *Stephanopyxis turris* (Greville and Arnott) Ralfs. External view of the apical part of a valve with a view into the cavities of the areolae; reversed print; ×7500.

Figure 5 — *Stephanopyxis* cf. *weyprechtii* Grunow. Direct transmission of part of a valve in oblique view showing how transparent the septa between the areolae are; direct print; ×14,000.

Figure 6 — *Stephanopyxis megapora* Grunow. External valve view showing interstitial triangular gaps between the rings surrounding the areolae; ×9600.

(See p. 980)

PLATE 22

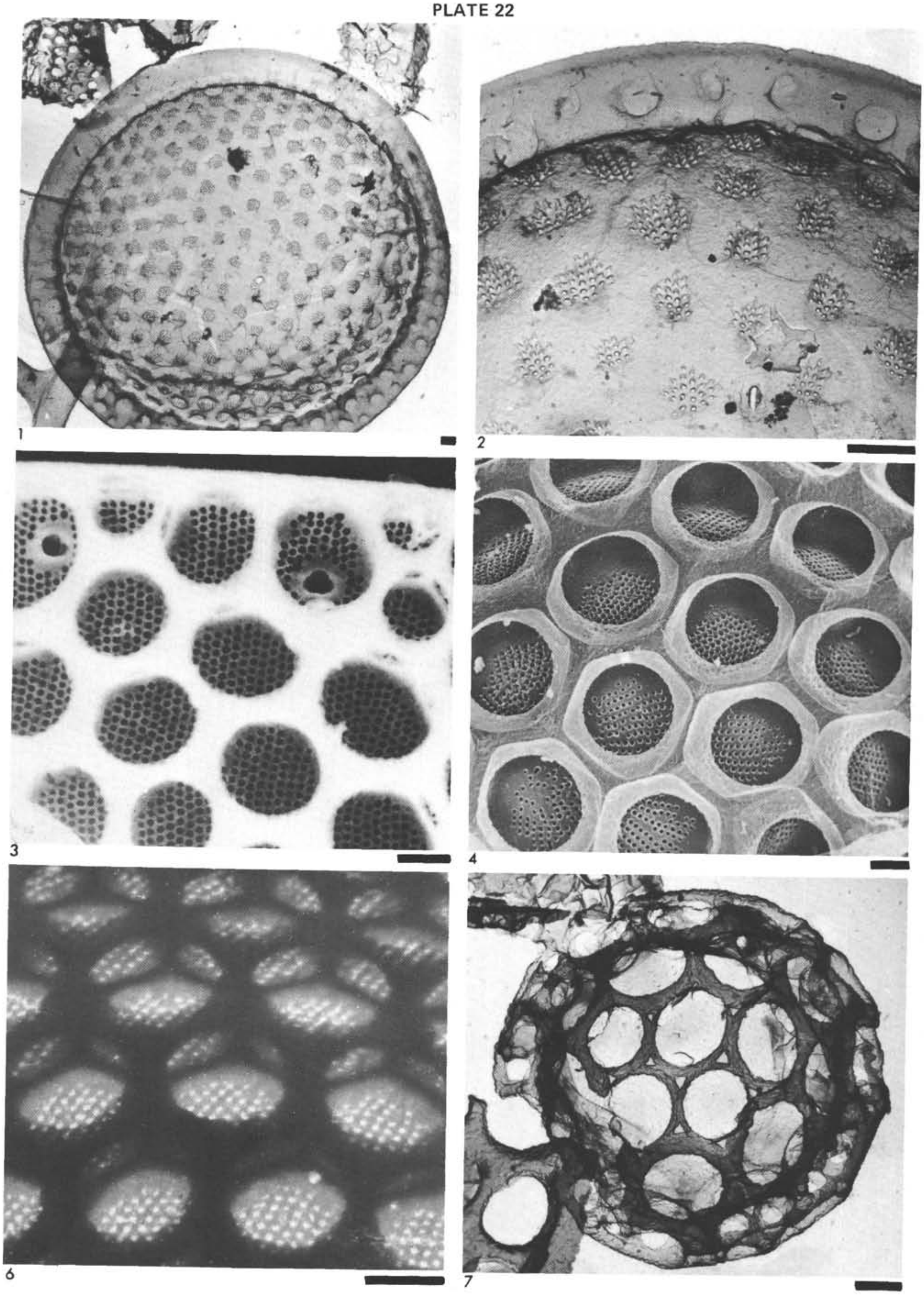


PLATE 23

Cretaceous diatoms from Sample 2-1, 130-132 cm

Figure 1	*Stephanopyxis turris* (Greville and Arnott) Ralfs. Side view of a valve with comparatively large areolae; ×3750.
Figure 2	Oblique side view of a valve with five apical spines; reversed print of carbon replica; ×3300.
Figure 3	Close up of same specimen as in Figure 2, showing ultrastructure of grids and additional pores from inside; reversed print of carbon replica; ×9000.
Figure 4	Same specimen as in Figures 2, 3; apical spines and ultrastructure of apical areolae; direct print; ×6000.
Figure 5	Valve view, external side; reversed print; ×4000.
Figure 6	Side view of a complete shell showing connection between two valves; ×7000.

(See p. 982)

PLATE 24

Cretaceous diatoms from Sample 2-1, 130-132 cm

Figures 1-3	*Coscinodiscus morenoensis* Hanna. 1. Valve view; direct transmission; ×1600. 2. Central part of same specimen as in Figure 1, showing ecentrical elongate pore; direct transmission; ×10,000. 3. Valve view of marginal area of same specimen; direct transmission; ×10,000.
Figures 4, 6	*Coscinodiscus* sp. 4. Valve view of external side with circular pores in quincunx arrangement; Carbon replica; ×12,-000. 6. Valve view of external side with hexagonal areolae; lower part of the picture shows erosion, and thus the insertion lines of the septa. ×10,000.
Figure 5	?*Coscinodiscus* sp. Direct transmission of very fine network of hexagonal areolae with circular pores, two per 1μ; ×24,000.

(See p. 983)

PLATE 23

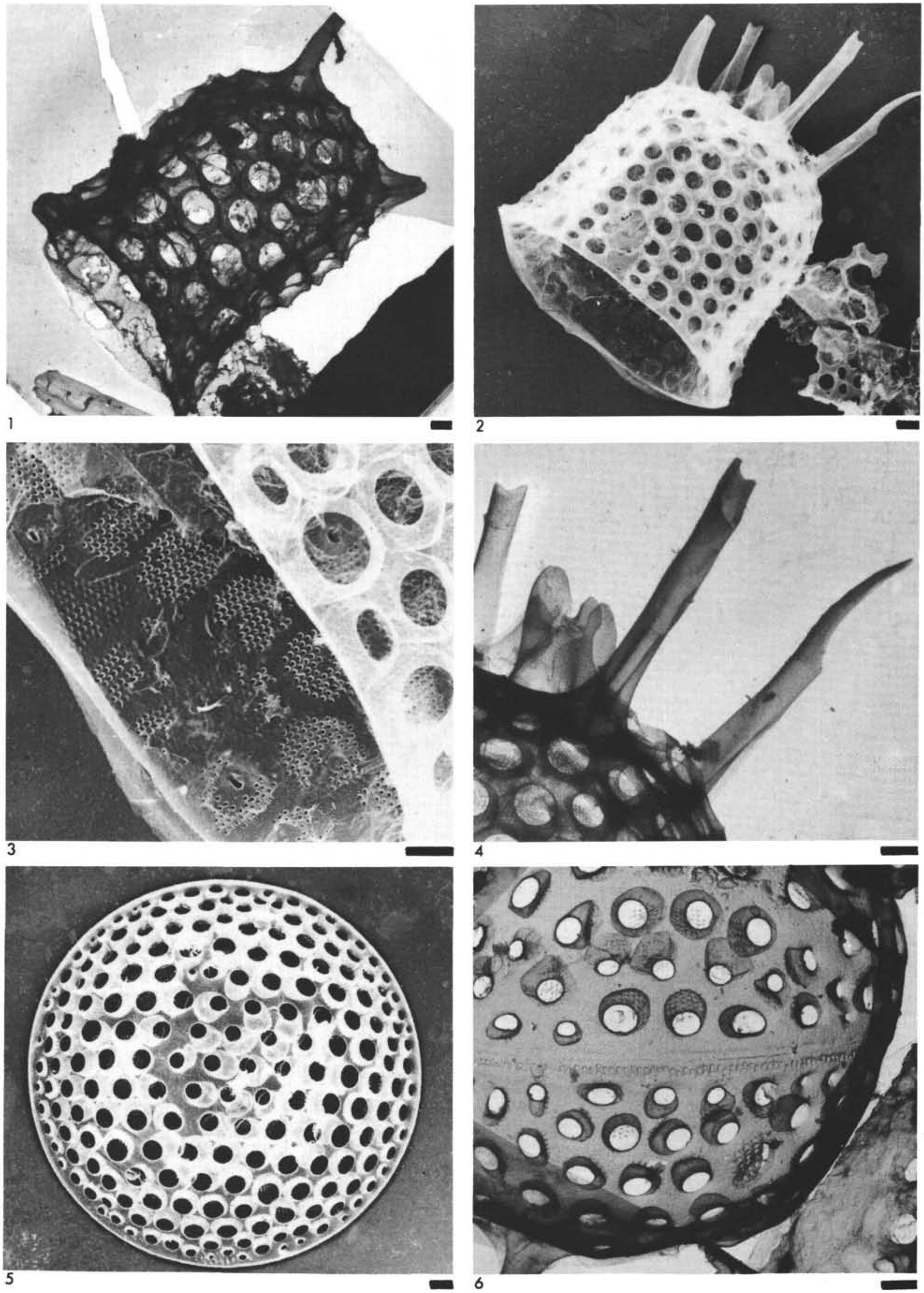


PLATE 24

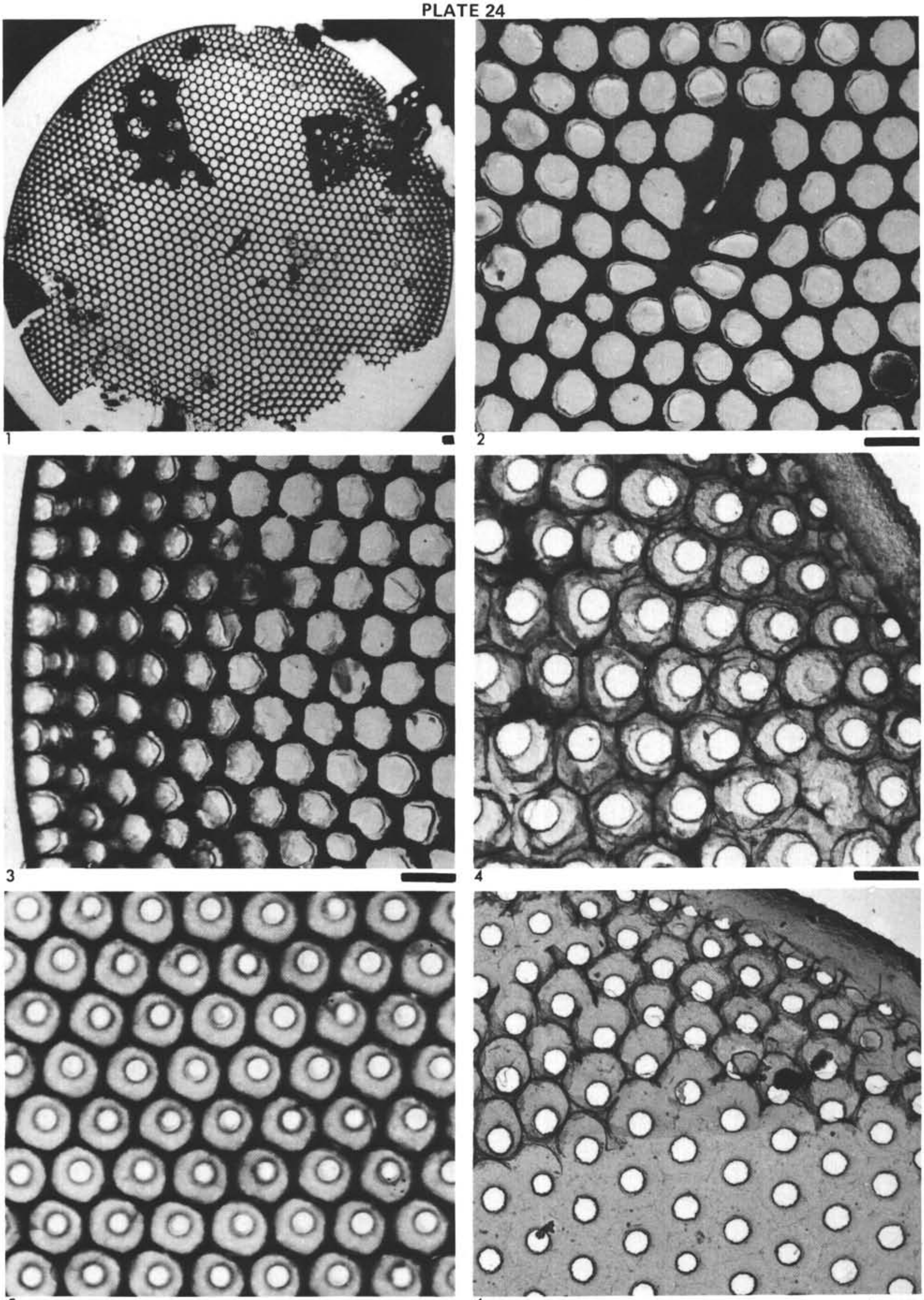


PLATE 25

Cretaceous diatoms from Sample 2-1, 130-132 cm

Figures 1-5 *Coscinodiscus morenoensis* Hanna.
1. Valve view of central portion showing fasciculation of areolae; external view; ×3000.
2. "Navel" of same specimen with ecentrical oval pore; normal exposure, direct print; each areola has a wavy inner contour; external view; ×12,500.
3. Same negative as in Figure 2 after overexposure, showing the interior of the areolae and the circular contour of the inner pore; carbon replica; direct print; ×12,500.
4. Irregular borderline between two fasciculi of rows of areolae; external view; ×12,000.
5. Pattern of areolae with irregular "step" marking the boundary between two fasciculi of rows; external view; ×15,000.

Figure 6 ?*Coscinodiscus* sp. Characteristic ultrastructure of hexagonal areolae, the craters of which are connected with each other by means of lateral pores; reversed print; ×17,500.

PLATE 25

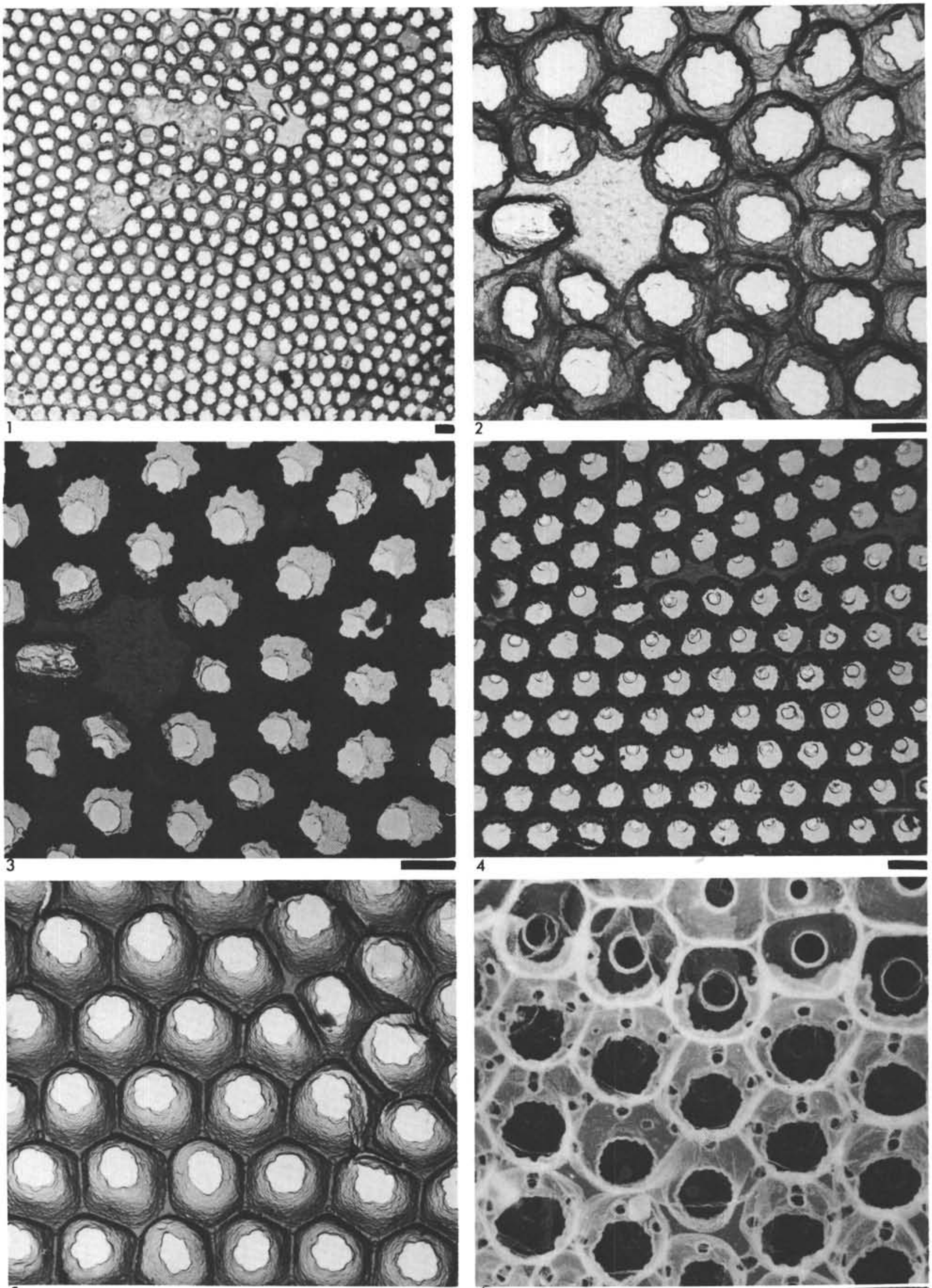


PLATE 26

Cretaceous diatoms from Sample 2-1, 130-132 cm

Figure 1	*Pterotheca cretacea* n. sp. Hajós and Stradner. Side view of the entire frustula; basal end (left) shows characteristic double spines with pores close to the margin; reversed print of carbon replica; ×5400.
Figure 2	*Gladius pacificus* n. sp. Hajós and Stradner. Side view of broadened end; hexagonal to rounded areolae with irregular number of inner circular pores; ×6000.
Figure 3	*Gladius speciosus* Schulz. Ultrastructure of unusually large areolae; inner pores at random or in quincunx arrangement; ×7000.
Figures 4, 5	*Xanthiopyxis granti* Hanna. 4. Oblique side view of frustula; reversed print; external view; ×4125. 5. Central area of valve in top view showing craters of central pore and surrounding pores; ×8000.

PLATE 26

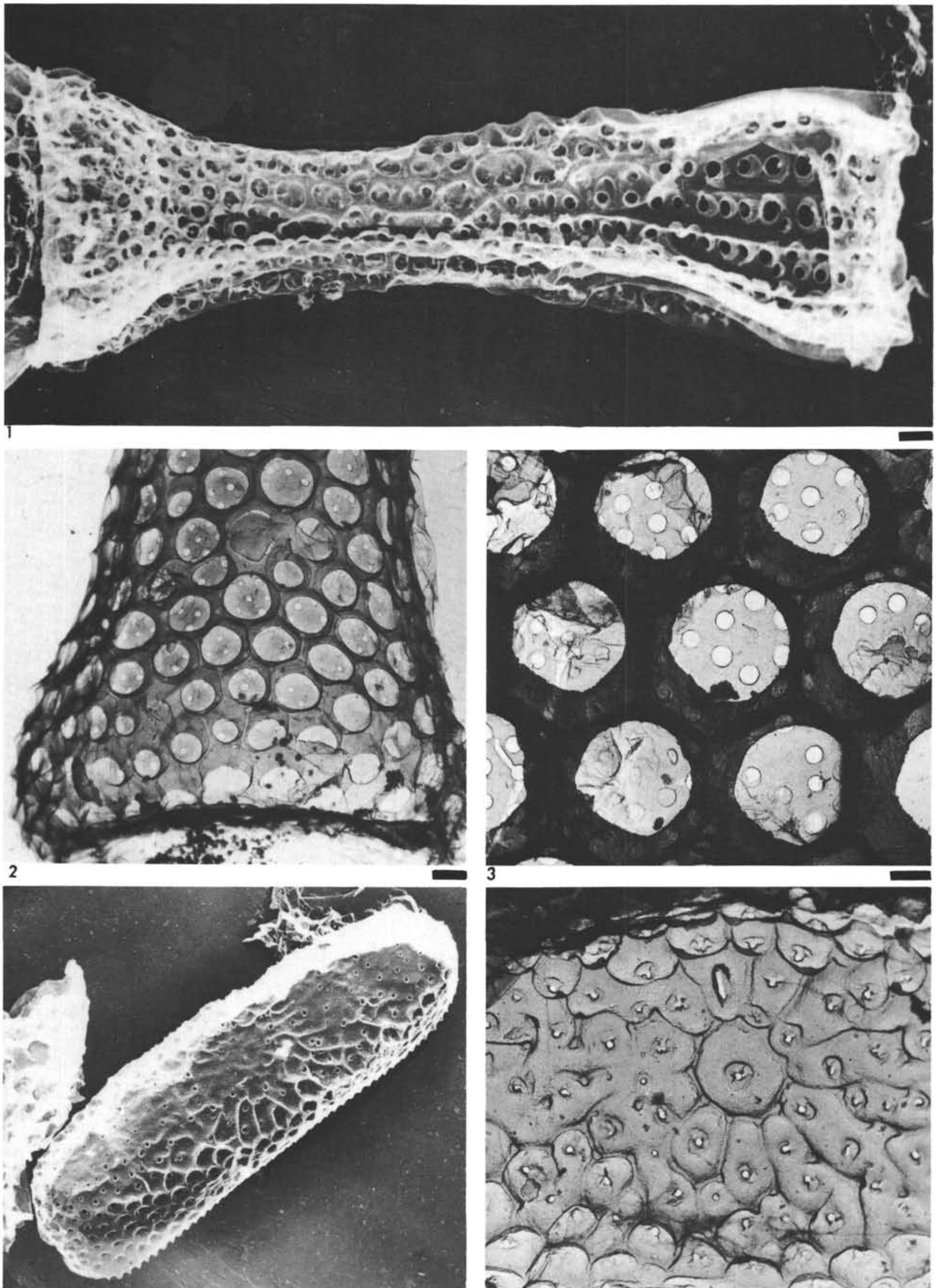


PLATE 27

Cretaceous diatoms from Sample 2-1, 130-132 cm

Figures 1, 2	*Epithelion russicum* Pantocsek. Valve view. 1. ×3300. 2. ×3500.
Figures 3, 5, 6	*Chasea bicornis* Hanna. 3. Valve view; direct transmission; direct print; ×3000. 5. Valve view of specimen similar to that of Figure 3; external side; ×4000. 6. Broad valve with central protuberance in valve view; external view; ×4500.
Figure 4	*Chasea ornata* n. sp. Hajós and Stradner. Oblique valve view; scanning electron micrograph by G. Lechner, Reicheirt, Austria; ×2000.
Figure 7	*Pterotheca crucifera* Hanna. Side view of complete permanent spore; ×3500.
Figure 8	?*Chasea bicornis* Hanna. Side view; ×7500.
Figure 9	*Pseudopyxilla russica* (Pantocsek) Forti. Side view; ×5250.

PLATE 27

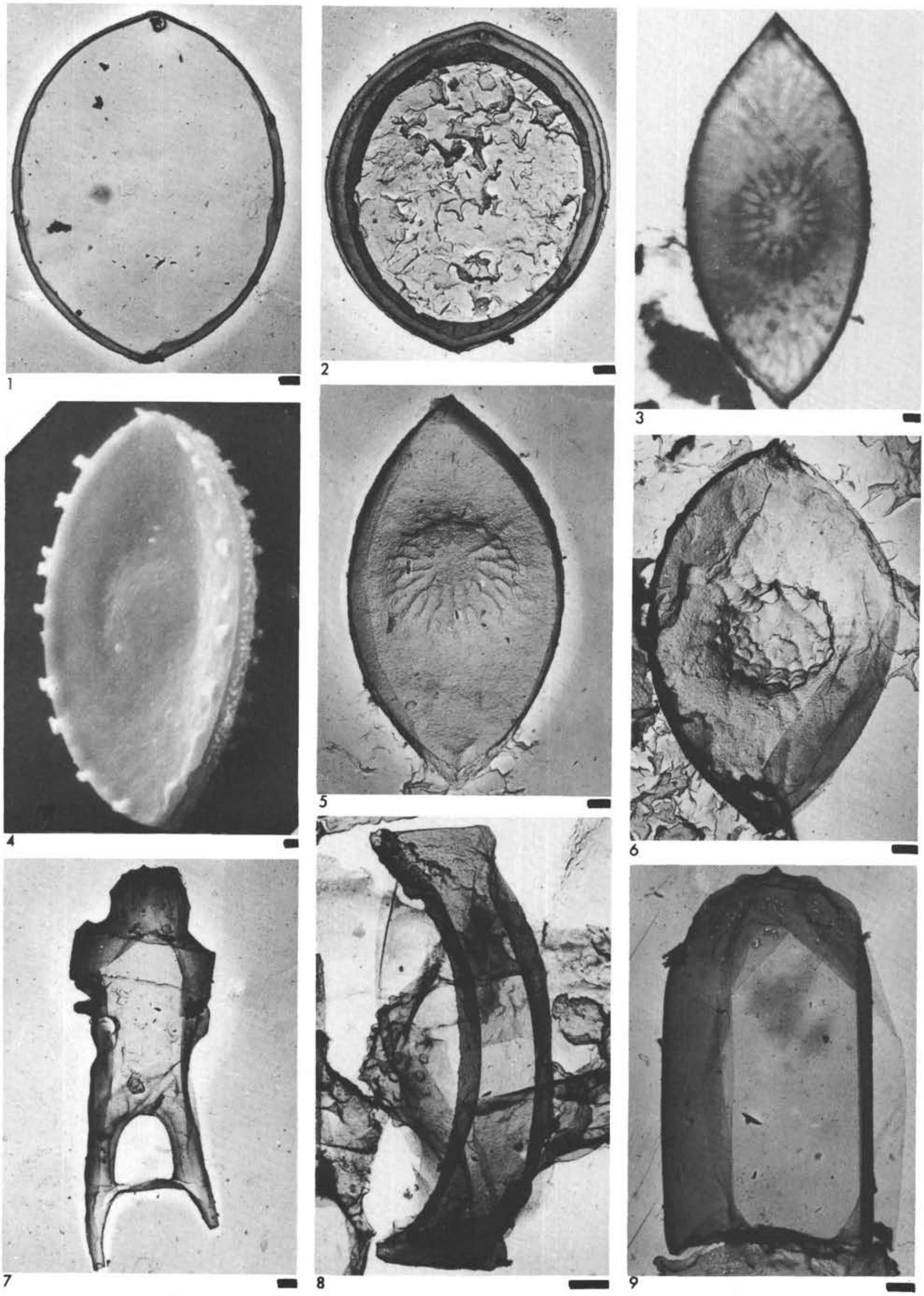


PLATE 28

Cretaceous diatoms from Sample 2-1, 130-132 cm

Figure 1	*Pterotheca* cf. *aculeifera* Grunow. Side view; ×4000.
Figure 2	*Pterotheca aculeifera* Grunow. Side view; ×2650.
Figure 3	*Pterotheca crucifera* Hanna. Side view; ×4330.
Figure 4	*Acanthodiscus ornatus* n. sp. Hajós and Stradner. Oblique apical view showing central protuberance and marginal ridges; ×3000.
Figure 5	*Cladogramma simplex* n. sp. Hajós and Stradner. Valve view; external side; ×4000.
Figure 6	*Acanthodiscus convexus* n. sp. Hajós and Stradner. Oblique side view showing undulating ridges; ×3500.

PLATE 29

Diatoms from Sample 2-1, 130-132 cm

Figures 1-4	*Actinoptychus packi* Hanna. 1. Valve view; ×5000. 2. Valve view; ×4400. 3. Close up of single sector; reversed print; ×11,000. 4. Close up of single sector with marginal pore and hyaline channels; ×9500.
Figures 5, 6	*Hemiaulus sporalis* Strelnikova. 5. Valve view; ×4500. 6. Central area of same specimen showing radial rows of round pores; ×12,000.

(See p. 992)

PLATE 28

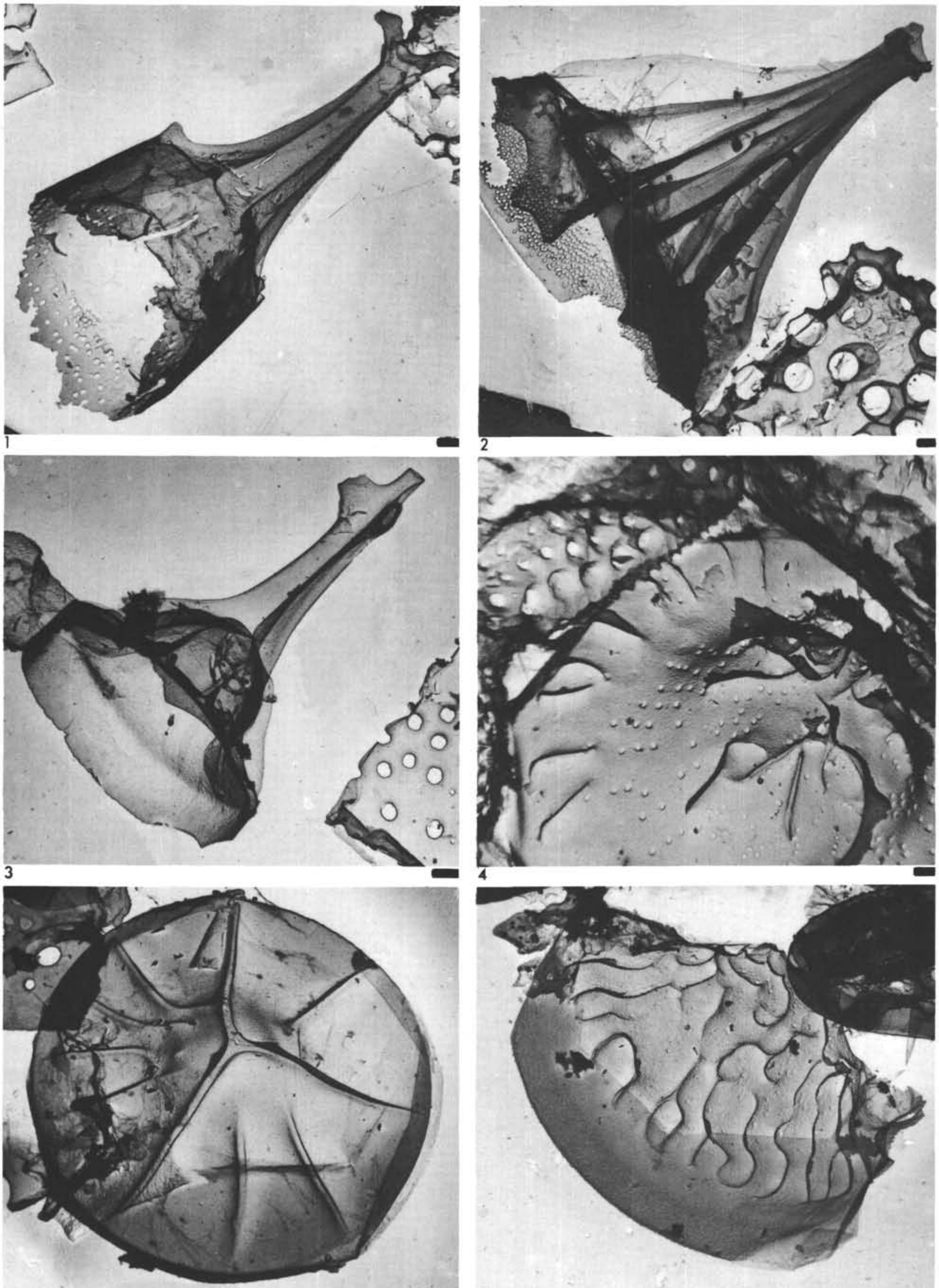


PLATE 29

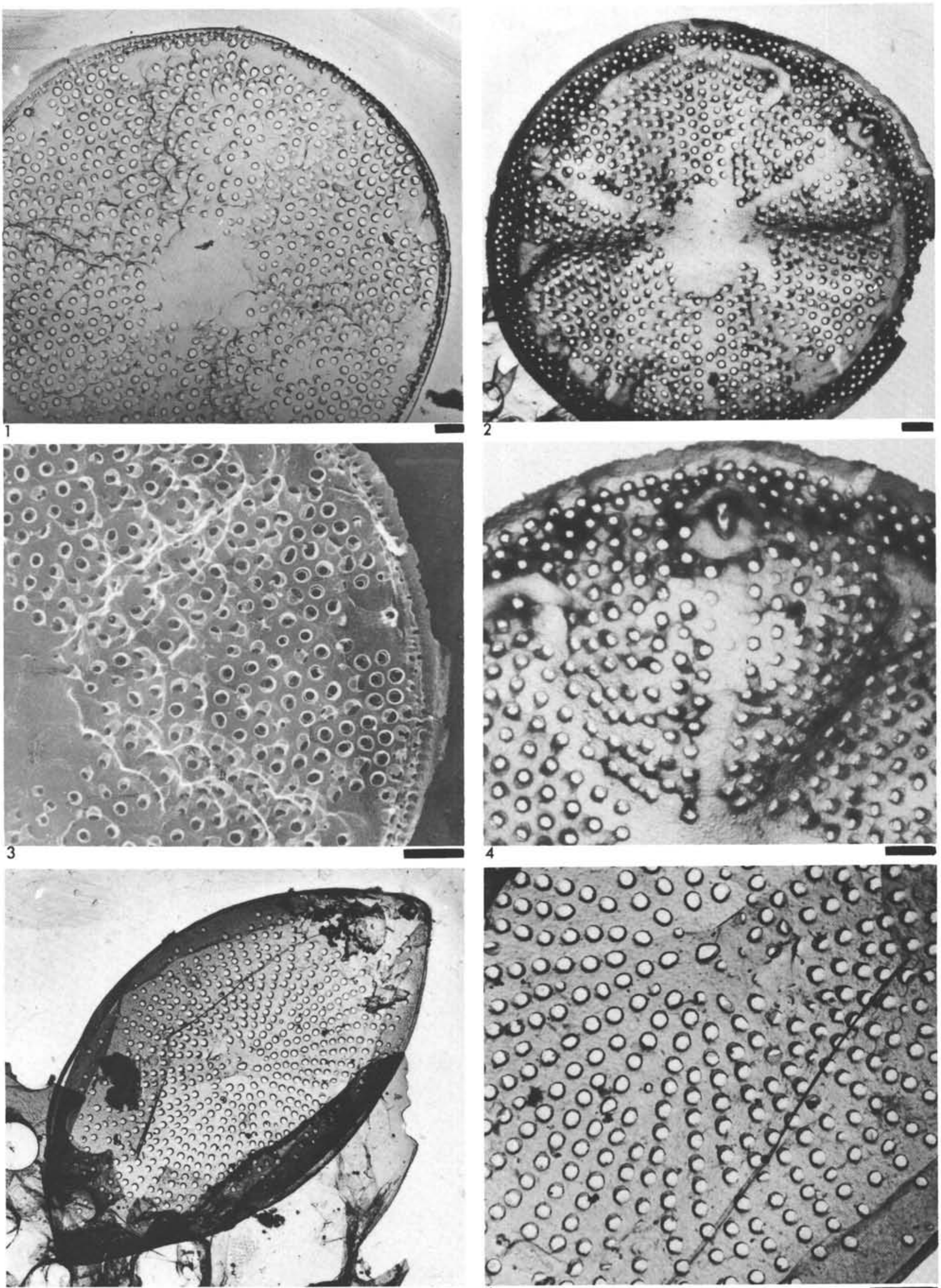


PLATE 30

Cretaceous diatoms from Sample 2-1, 130-132 cm
(Scanning electron micrographs by G. Lechner, Reichert, Austria)

Figures 1-4 — *Actinoptychus packi* Hanna.
1. Plan view, 0°; ×1500.
2. Same specimen in oblique view; 60°; ×1500.
3. Same specimen in oblique view, 60°, rotated 30° in respect to position of Figure 2; ×1750.
4. Same as Figure 3; close up of central portion, 60°; ×7500.

Figure 5 — *Stephanopyxis turris* (Greville and Arnott) Ralfs. Oblique side view of complete frustule, 55°; ×1500.

Figure 6 — *Stephanopyxis* sp. Oblique apical view of valve with spines; 45°; ×1250.

(See p. 994)

PLATE 31

Cretaceous diatoms from Sample 2-1, 130-132 cm

Figures 1-3 — *Huttonia antiqua* n. sp. Hajós and Stradner.
1. Oblique side view of valve; ×3750.
2. Valve with sparsely distributed rows of pores and terminal sieve plate; ×5000.
3. Close up of terminal sieve plate and surrounding semilunar double-row of pores; ×14,500.

Figures 4-6 — *Rhizosolenia cretacea* n. sp. Hajós and Stradner.
4. Side view; ×2700.
5. Close up of middle portion showing densely perforated stripes between hyaline pillars; ×9000.
6. Proximal end with elongate pore; ×10,660.

(See p. 995)

PLATE 30

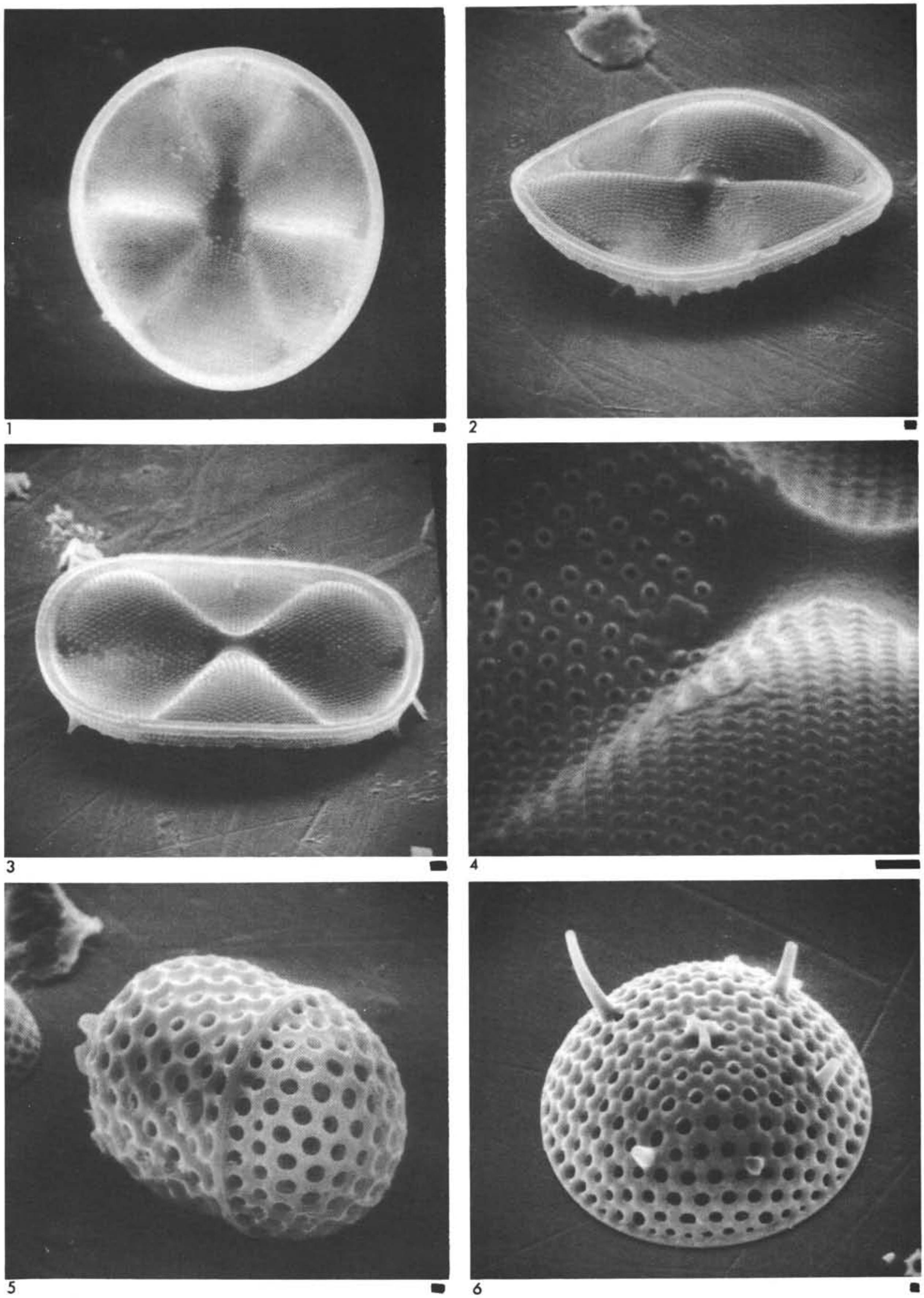


PLATE 31

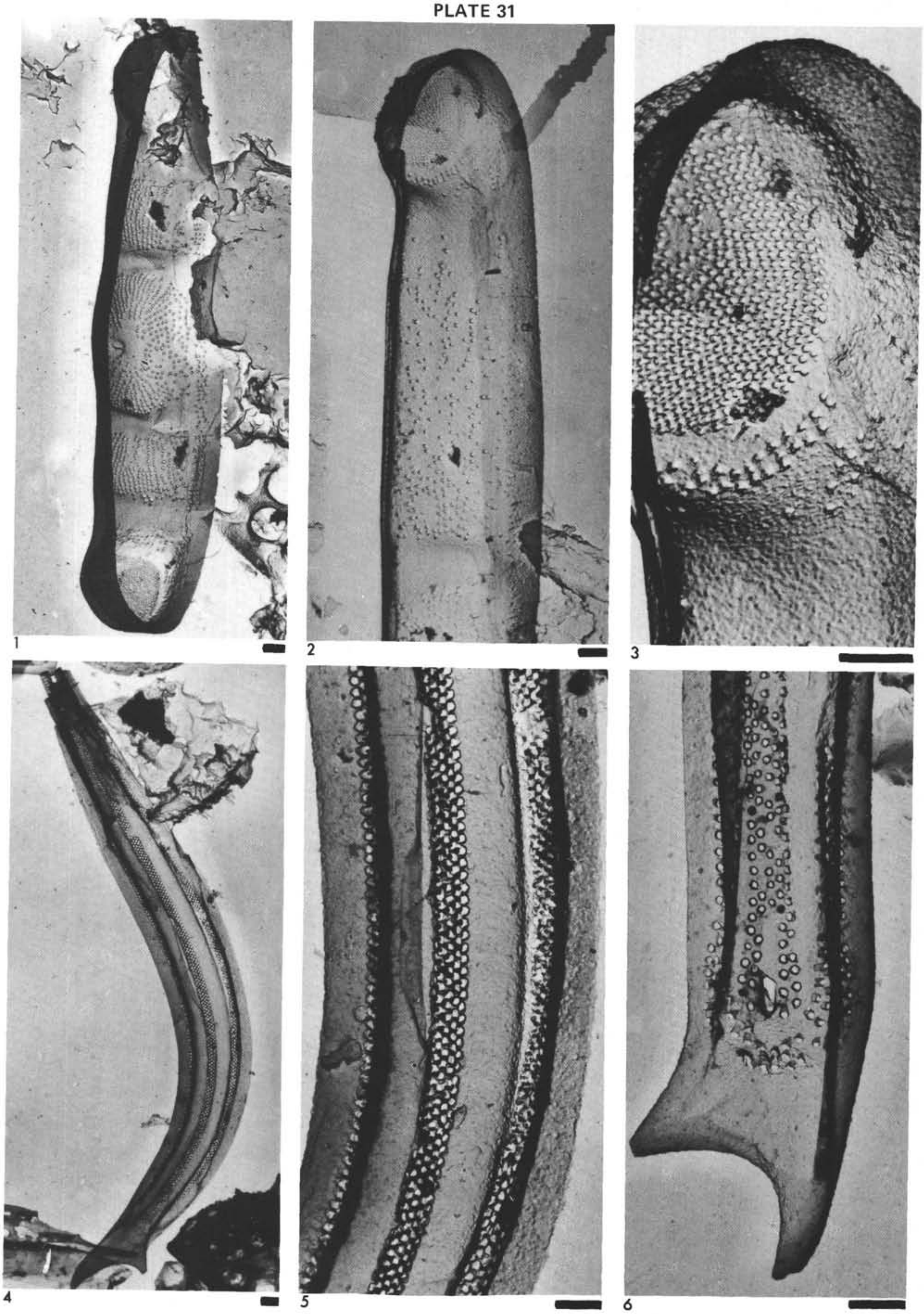


PLATE 32

Cretaceous diatoms from Sample 2-1, 130-132 cm

Triceratium kennetti n. sp. Hajós and Stradner

Figure 1	Valve view, internal side; ×4125.
Figure 2	Areolae of side wall, external view, reversed print of carbon replica; ×8000.
Figure 3	Interfingering spines connecting neighboring valves of two adjoining frustulae. Note the different types of grids inside the areolae. ×10,000.
Figure 4	Grids at the bottom of each areola in internal view; reversed print of carbon replica; ×15,750.
Figure 5	Small areolae (less than 1μ) with delicate grid; direct print; ×30,000.
Figure 6	Side wall with serrate margin towards the girdle; areolae and pores of girdle separated by hyaline zone; ×6300.

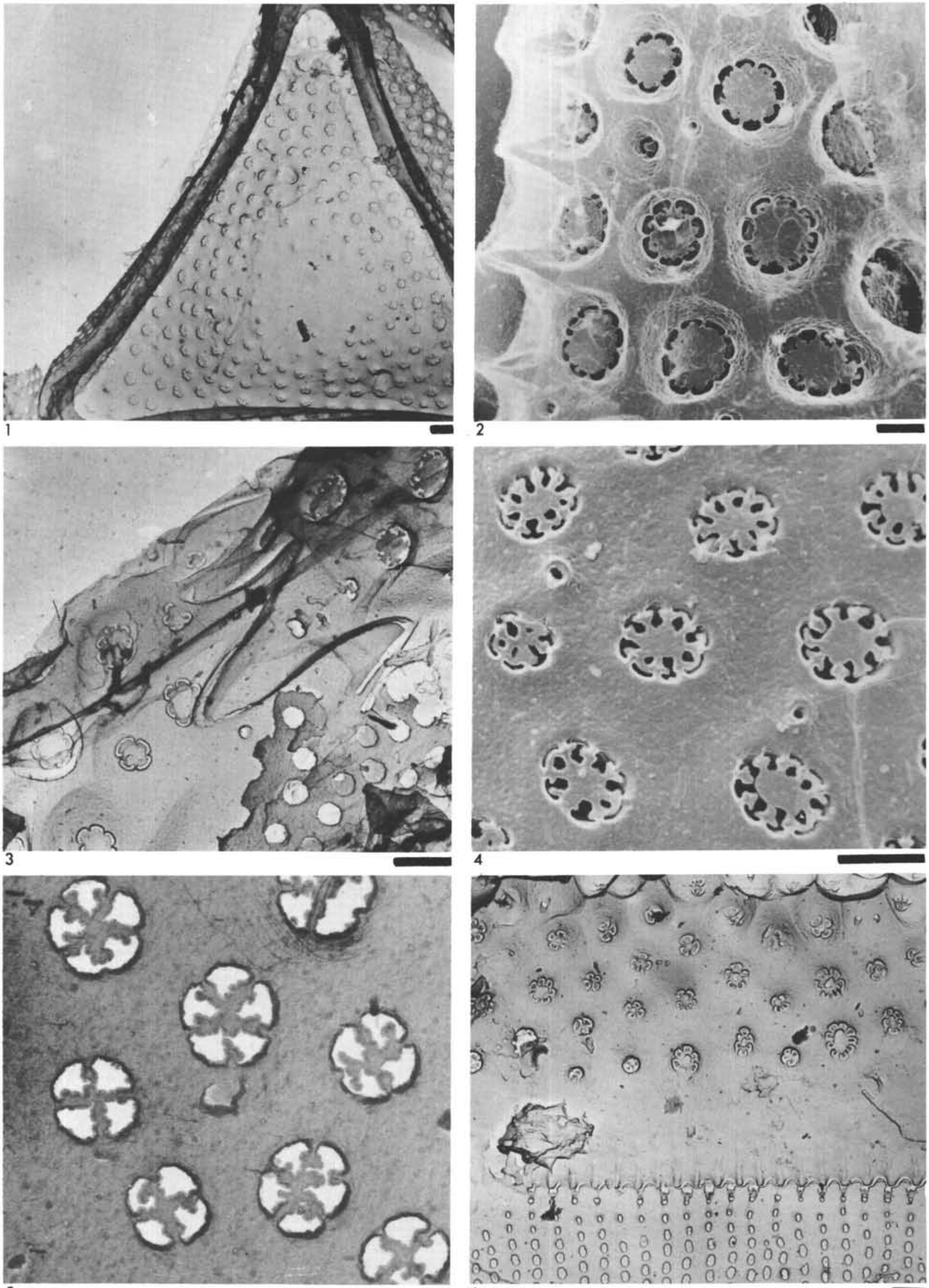
PLATE 33

Cretaceous diatoms of Sample 2-1, 130-132 cm

Figure 1	*Triceratium kuepperi* n. sp. Hajós and Stradner. Valve view, internal side; ×2500.
Figure 2	*Triceratium schulzii* Jousé. Valve view, internal side; ×3000.
Figures 3, 4	*Trinacria* sp. ×1750 (by G. Lechner, Reichert/Austria) 3. SEM oblique apical view of valve (55°) 4. SEM oblique basal view of valve (55°).
Figure 5	*Trinacria aries* Witt. Valve view, external side; ×2500.
Figure 6	*Triceratium idoneum* Pantocsek. Valve view, internal side; ×3300.

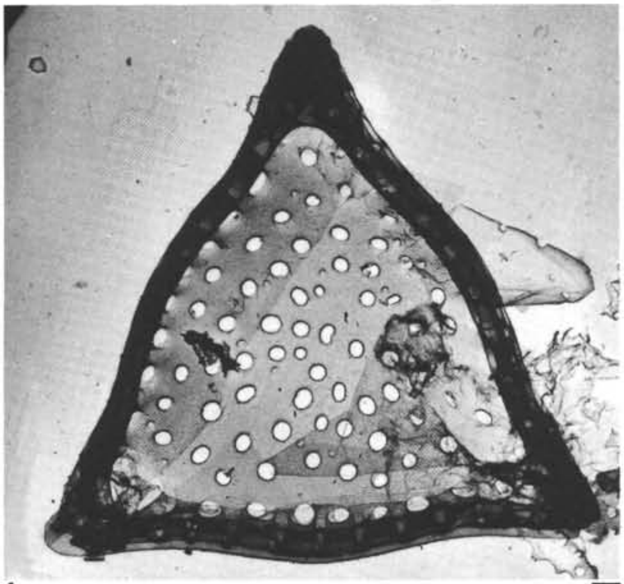
(See p. 998)

PLATE 32



1 2 3 4 5 6

PLATE 33



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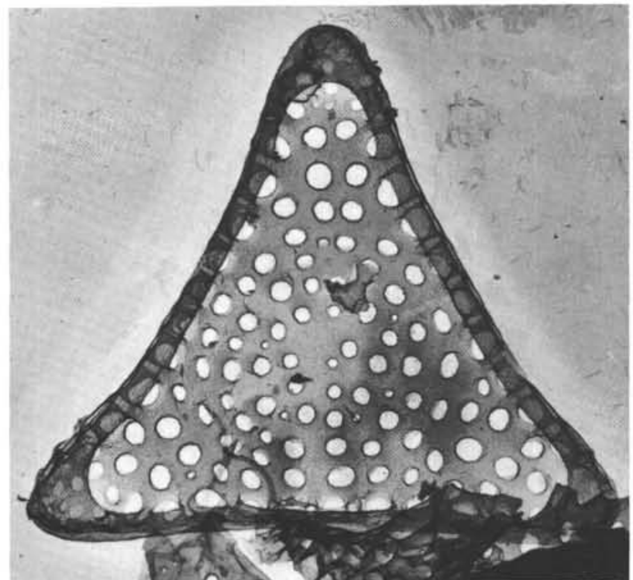

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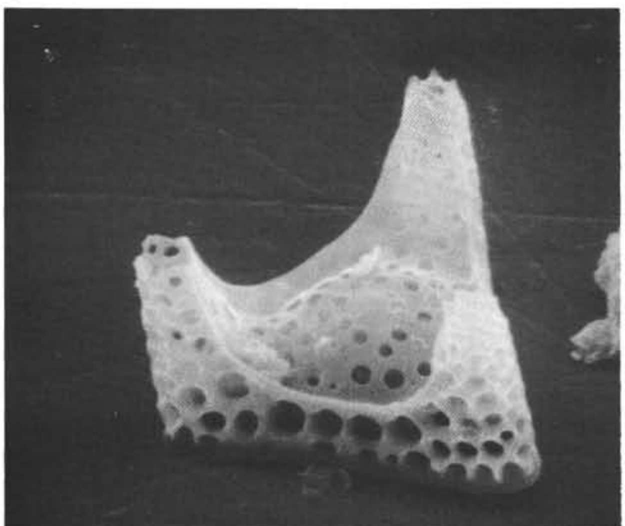

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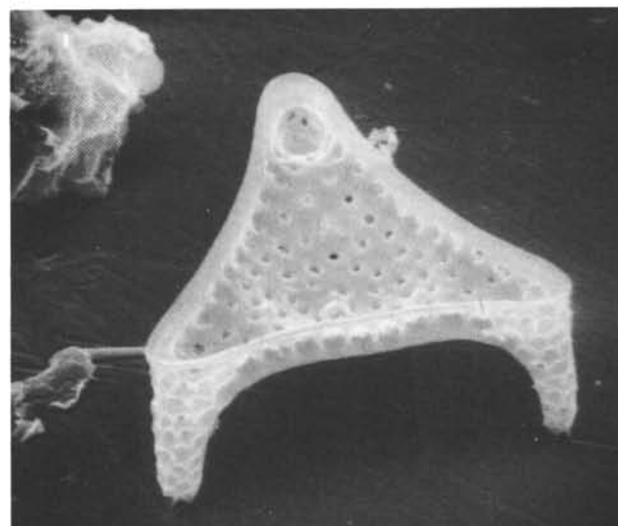

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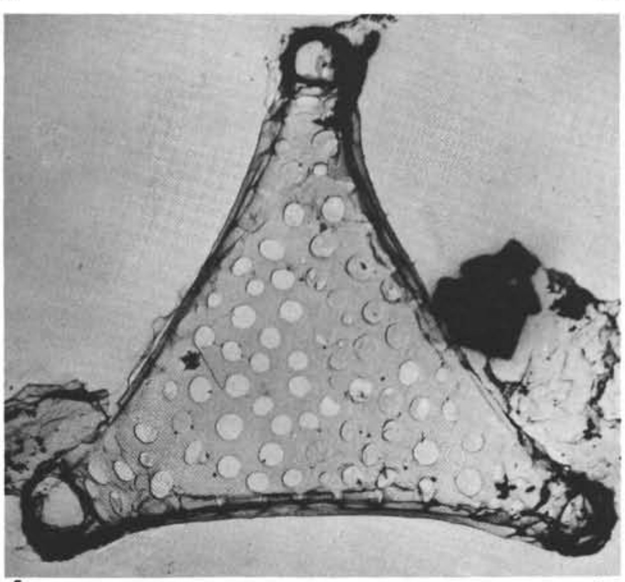

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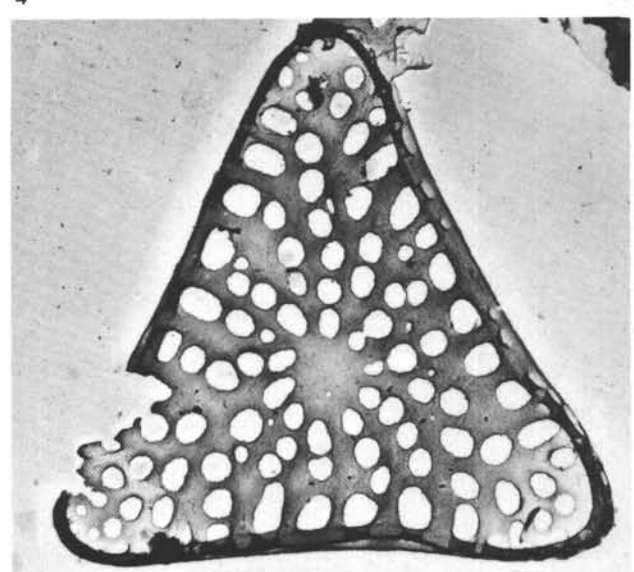


6

PLATE 34

Cretaceous diatoms from Sample 2-1, 130-132 cm

Figures 1, 2	*Biddulphia cretacea* n. sp. Hajós and Stradner. 1. Valve view, external side; ×4000. 2. Central cupula with spine; external side; ×8000.
Figure 3	*Hemiaulus polycystinorum* Ehrenberg. Lateral view; ×3300.
Figure 4	*Hemiaulus* cf. *polymorphus* Grunow. Side view; (in background, apical view of a valve of *Stephanopyxis* sp.); ×3300.
Figures 5, 6	?*Hemiaulus* sp. 5. Side view, valve with rosette-shaped areolae; ×3750. 6. Side view, valve; ×3500.
Figure 7	?*Biddulphia* vel *Hemiaulus* sp. Valve view, internal side; ×5500.

(See p. 1000)

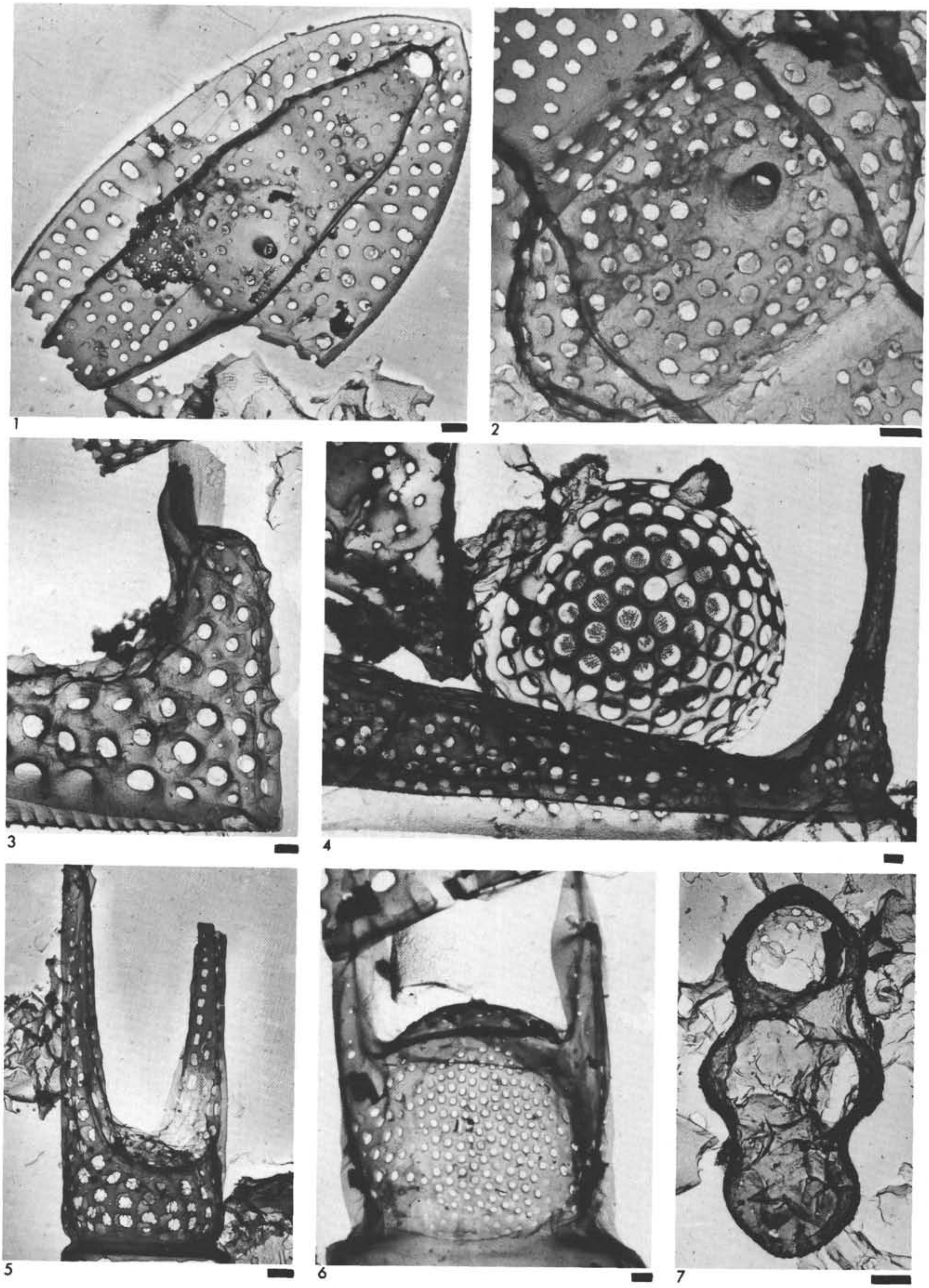
PLATE 35

Cretaceous diatoms from Sample 2-1, 130-132 cm

Figure 1	*Hemiaulus* sp. Side view; ×2500.
Figures 2-5	*Hemiaulus polycystinorum* Ehrenberg. Side view. 2. Twisted valve, reversed print; ×4500. 3. Reversed print; ×4500. 4. Reversed print; ×4400. 5. ×2400.
Figure 6	*Hemiaulus polymorphus* Grunow. Side view; ×2750.
Figure 7	*Xanthiopyxis granti* Hanna. Valve view, internal side with transversal stripes corresponding to the hyaline belts of the outer surface. ×4000.

(See p. 1001)

PLATE 34



1 2 3 4 5 6 7

PLATE 35

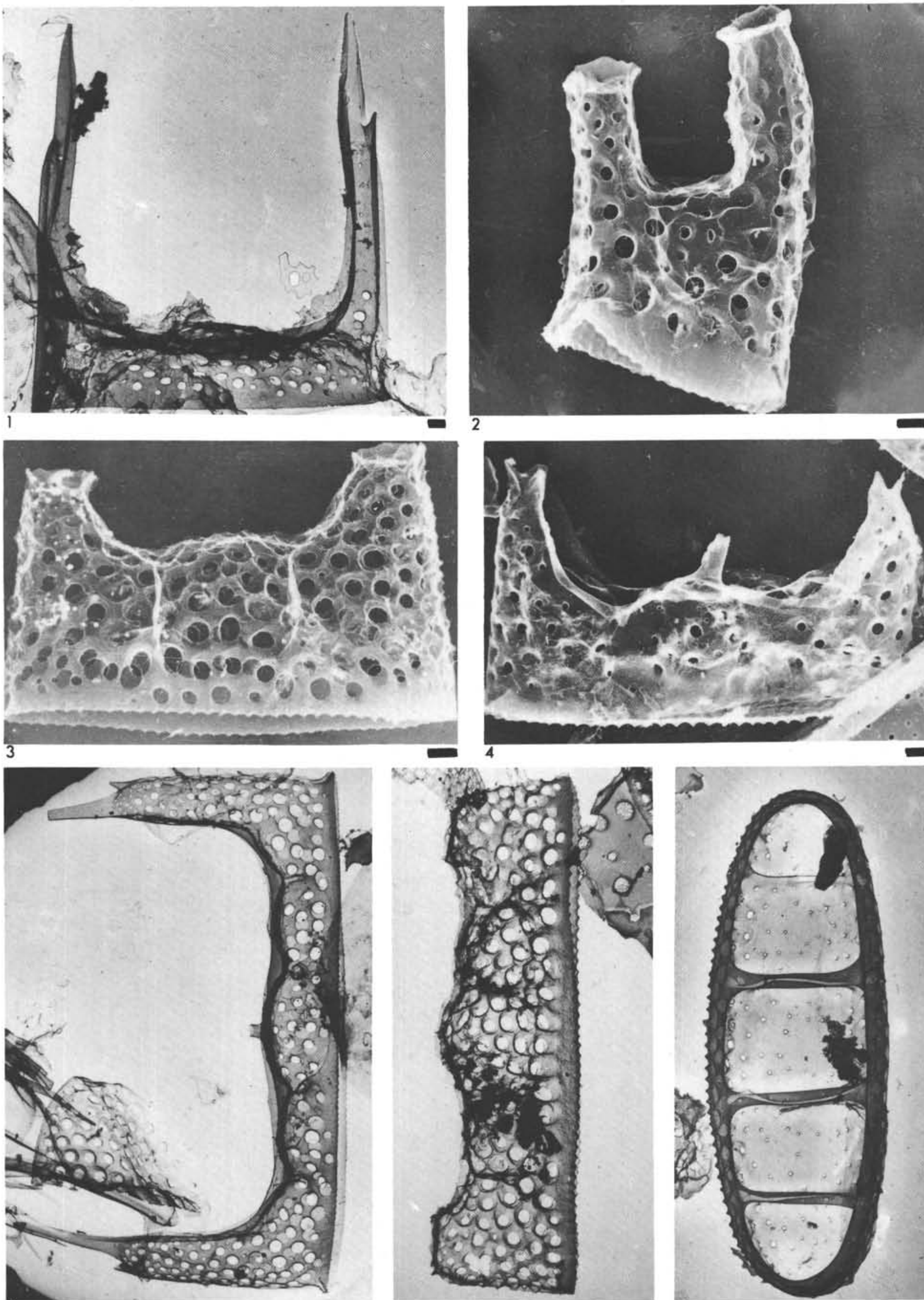


PLATE 36

Cretaceous diatoms from Sample 2-1, 130-132 cm

Figures 1-4 — *Sceptroneis praecaducea* n. sp. Hajós and Stradner.
1. Valve view, broadened end with sieve plate; external side; ×6000.
2. Valve view, middle portion; internal side; ×10,000.
3. Oblique valve view, broadened end with sieve plate; internal side; ×9000.
4. Valve view, narrow end with elongate terminal pore; external side; ×9000.

Figure 5 — *Incisoria lanceolata* n. sp. Hajós and Stradner. Valve view, notched end with terminal, elongate pore; internal side; ×9000.

Figure 6 — *Incisoria punctata* n. sp. Hajós and Stradner. Valve view of broadened sinuated end. The rows of large pores permit a view of an internal structure; ×5330.

PLATE 37

Cretaceous diatoms from Sample 2-1, 130-132 cm

Figures 1-4 — *Pterotheca (Micrampulla) parvula* (Hanna) n. comb. Hajós and Stradner.
1. Side view of cyst, reversed print of carbon replica; ×5000.
2. Broken-off tube with external reticulate ornamentation, and longitudinal rows of pores; oblique side view; ×11,000.
3. Oblique side view of the cyst; same specimen as Figure 2; ×8250.
4. Close up of the cyst showing cratered pores and ruglose wall; ×16,000.

Figure 5 — ?*Acanthosphaeridium* sp. View of a cyst with obliquely crossing ridges surrounding craters with two double-pores; ×6750.

Figure 6 — *Acanthosphaeridium reticulatum* n. sp. Hajós and Stradner. Side view of paratype; ×6000.

(See p. 1004)

PLATE 36

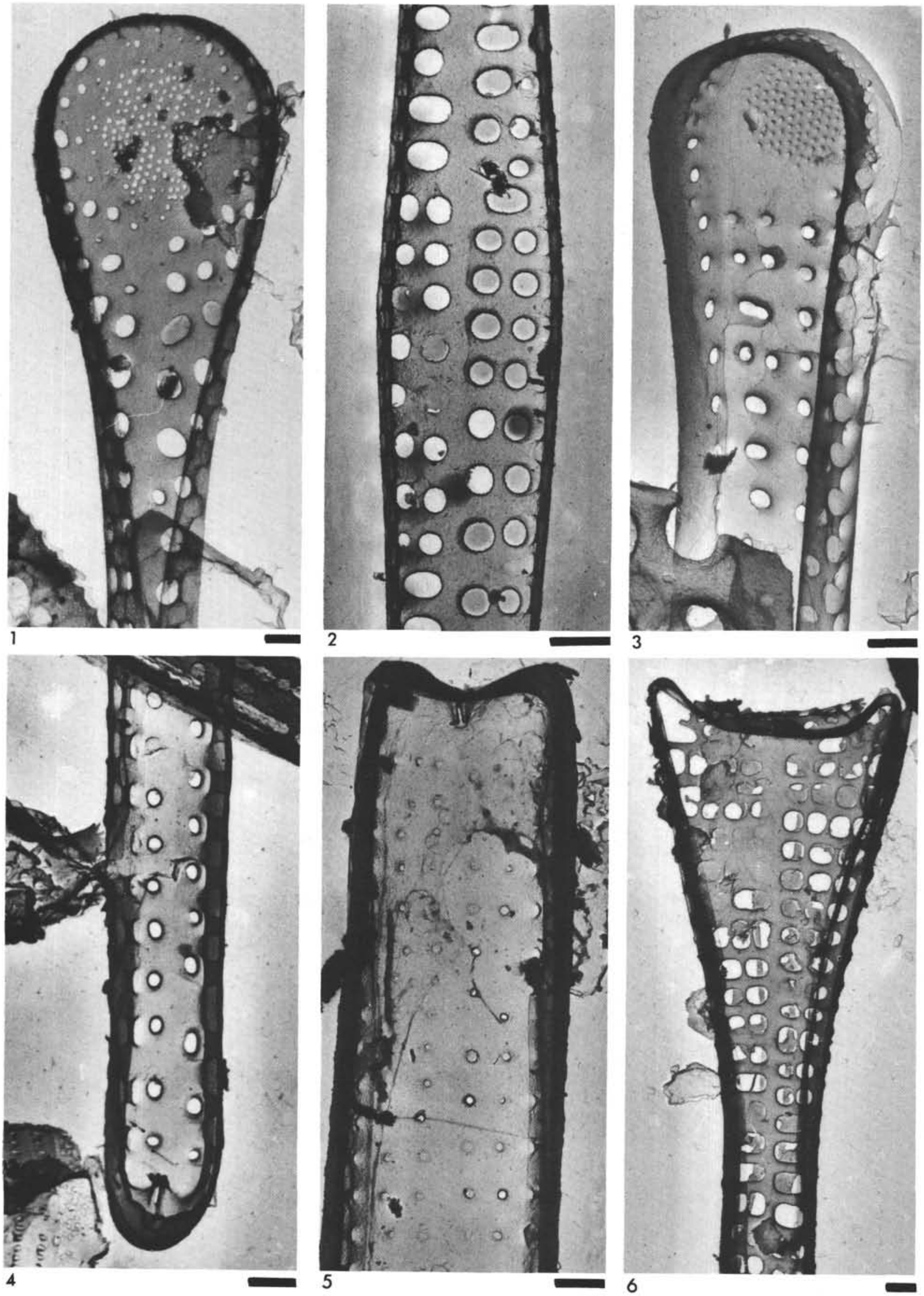


PLATE 37

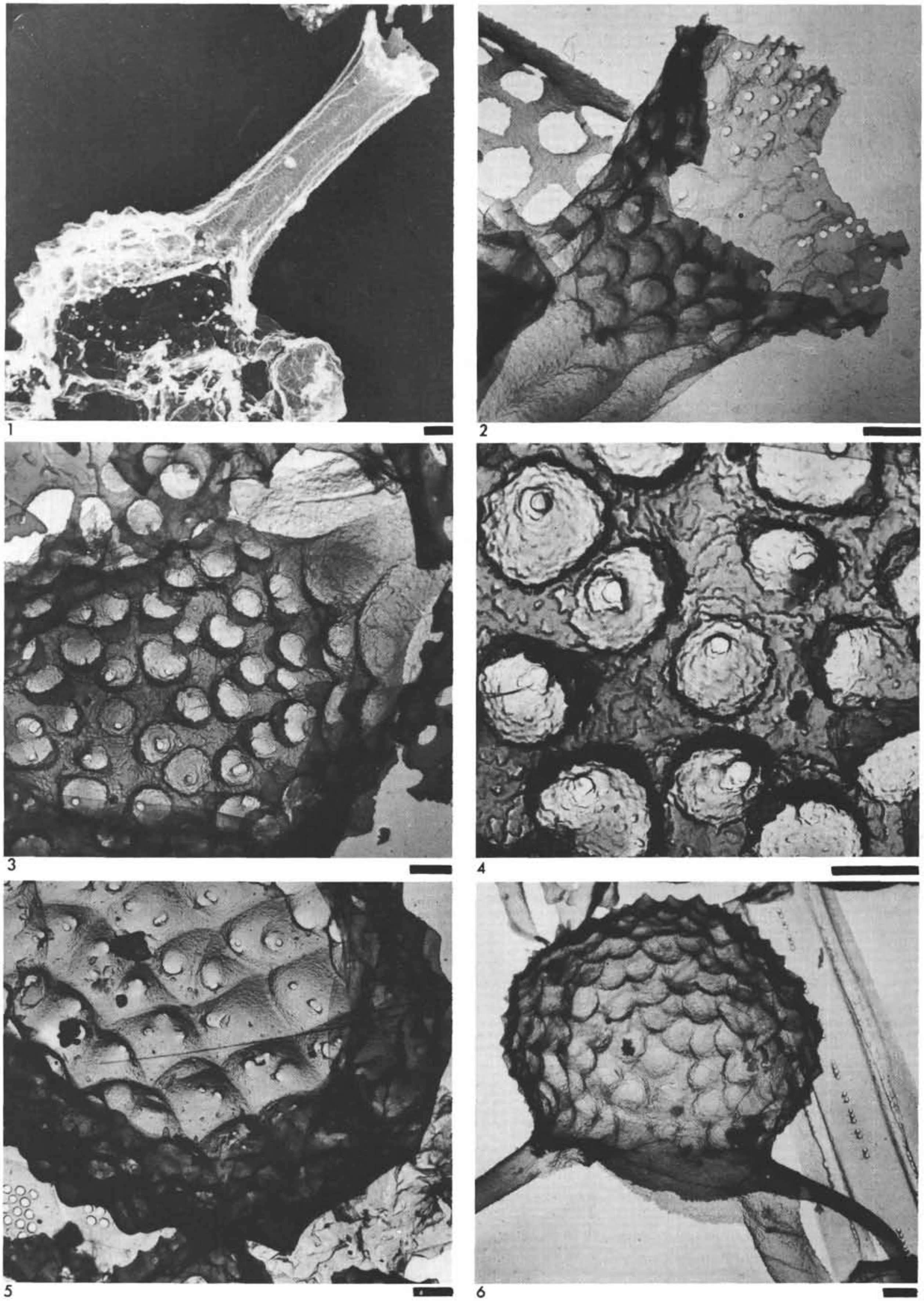


PLATE 38

Cretaceous diatoms from Sample 2-1, 130-132 cm

Figure 1 — ?*Coscinodiscus lineatus* Ehrenberg forma *fossilis* Jousé. Direct transmission of marginal zone, direct print; Areolae with 6-8 pores in random distribution; ×14,000.

Figure 2 — Genus and species indeterminate. Oblique external view of hexagonal areolae with strictly geometrical inner structure; ×7500.

Figure 3 — ?*Coscinodiscus* sp. Inner wall of areolae with round pores, with septa and external structure eroded; external view; ×8000.

Figure 4 — Genus and species indeterminate. Inner side of valve with sieve plates of areolae surrounded by radial grooves; ×12,000.

Figure 5 — *Rattrayella antiqua* n. sp. Hajós and Stradner. Marginal pore with sieve plate showing radial rows of pores; ×13,000.

Figure 6 — Genus and species indeterminate. A circular valve with hyaline center and radial rows of pores; internal side: Possibly related to *Stephanopyxis* sp.; ×13,000.

(See p. 1006)

PLATE 39

Cretaceous Archaeomonadaceae from Sample 2-1, 130-132 cm

Figure 1 — *Archaeomonas cratera* Deflandre. Oblique apical view showing the operculum with surrounding crater; ×15,000.

Figure 2 — *Archaeomonas chiarugii* Rampi. Side view of the cyst with short spines and collar; ×12,600.

Figure 3 — *Archaeomonas* sp. Averted side of a cyst with surface ornamentation of hundreds of warts; ×6750.

Figures 4-6 — *Artisphaeridium fragile* n. sp. Stradner.
4. Generotype, holotype with spines broken off; reversed print of carbon replica; ×9000.
5. Surface ornamentation of cyst in oblique side view; ×45,000.
6. Surface ornamentation of cyst in apical view. The mushroom-shaped protrusions stand either singly, or are connected with the neighboring ones; ×45,000.

(See p. 1007)

PLATE 38

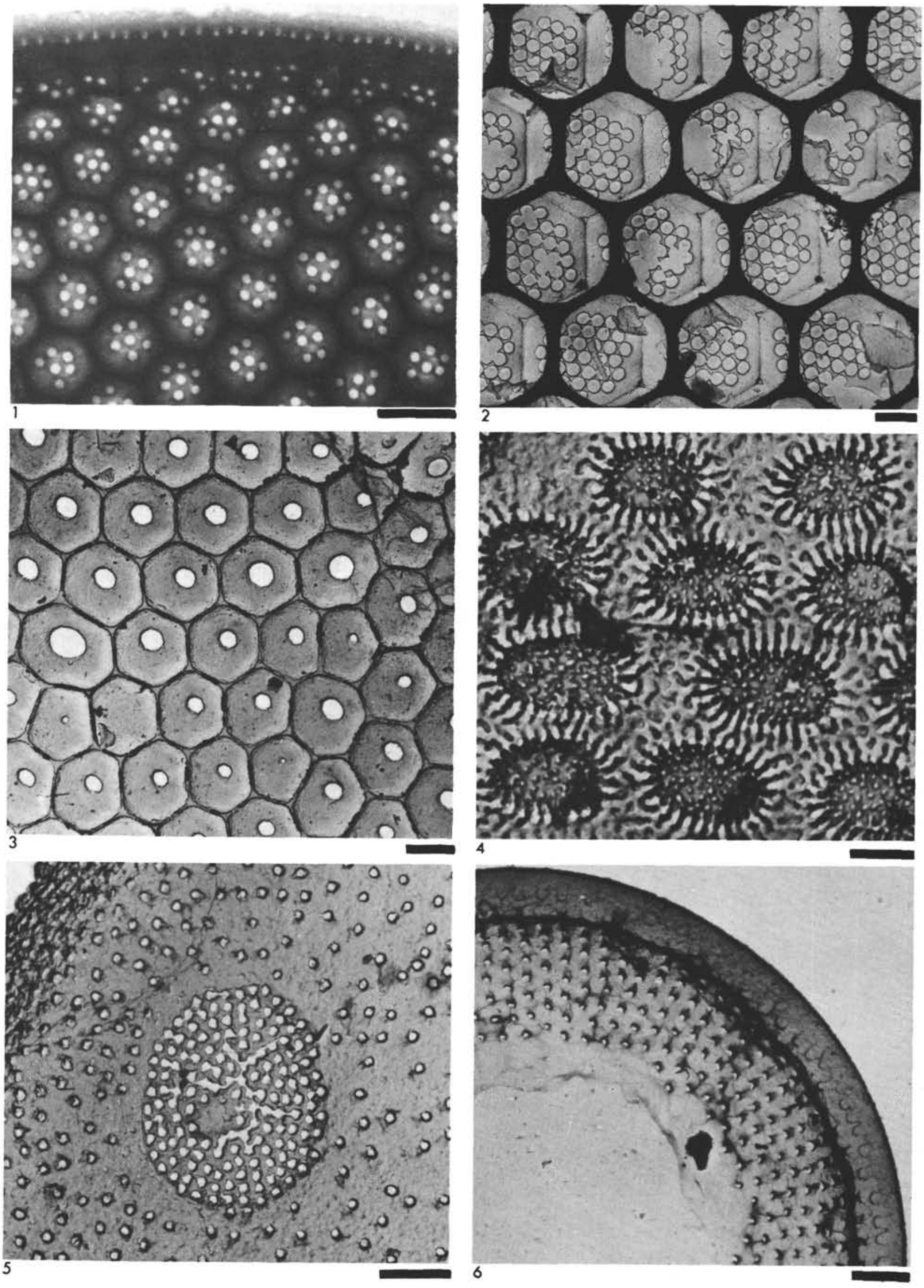


PLATE 39

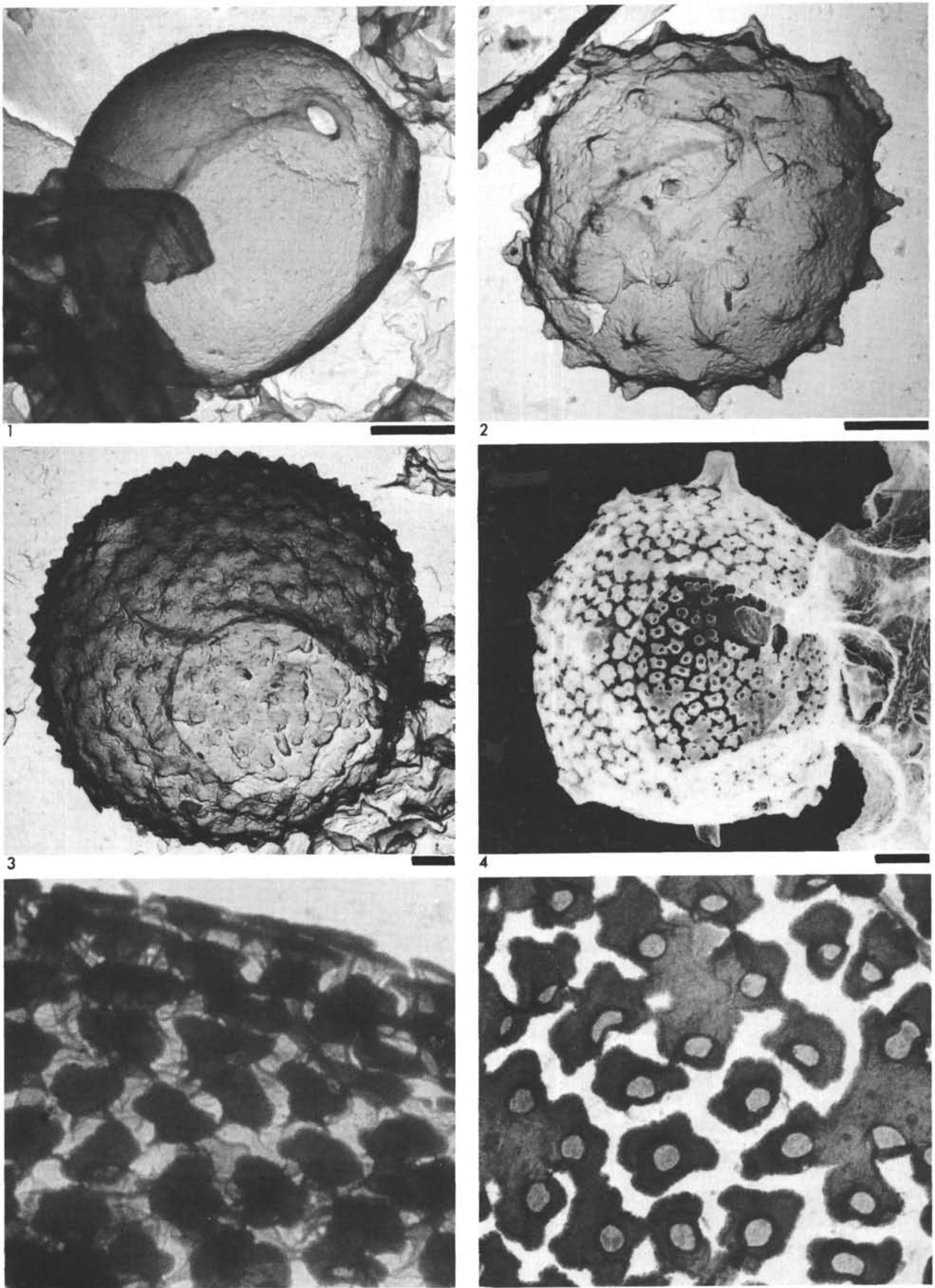


PLATE 40

Cretaceous Silicoflagellata from Sample 2-1, 130-132 cm

Figure 1	*Lyramula furcula* Hanna var. *minor* Deflandre. Plan view; ×4000.
Figure 2	*Lyramula furcula* Hanna. SEM oblique view (by G. Lechner, Reichert/Austria); ×2000.
Figures 3-5	*Lyramula* sp. 3. Middle part of arc with spine; ×8250. 4. Fractured arc with oblique view into tube; ×8000. 5. Middle part of arc and spine; reticulate surface ornamentation; ×7800.
Figure 6	*Corbisema* sp. Oblique view of the basal side of the central area with view into bifurcating tube. ×10,600.

PLATE 40