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Foraminifera from the Kuromatsunai and Setana Formations in southwestern Hokkaido, Japan -Preliminary report-

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Key words : foraminifera, Kuromatsunai Formation, Setana Formation, Pliocene, Pleistocene, southwestern Hokkaido.

1. Introduction

Neogene to Quaternary deposits distributed along the Japan Sea side in Hokkaido, implying a history of development and changes of the Japan Sea, are one of most important subjects for the study to understand geological and geographical frameworks of the present Japanese Islands. In spite of these facts, there have not been enough data about the environmental changes of these areas, near the northern end of the Japan Sea areas, or around the Oshima Peninsula.

The Oshima Peninsula in southwestern Hokkaido is regarded geologically as the northern extension of the "Green Tuff" region of the Inner Zone of the Northeast Japan (e.g. Kato et al. eds., 1990). The peninsula has extensive distributions of the Neogene and Quaternary deposits which unconformably overlie pre-Tertiary sedimentary and igneous rocks. This region has been one of stratigraphical standards of the Neogene in Hokkaido since the study by Nagao and Sasa (1933).

Neogene to Pleistocene marine sediments in this region are generally classified into the following ascending-ordered formations, Kunnui, Yakumo, Kuromatsunai, and Setana (Nagao and Sasa, 1933). These formations are well exposed in middle to northern parts of the peninsula. Such stratigraphy first proposed by Nagao and Sasa (1933) has been accepted, but recent biostratigraphical data reveal that the Setana Formation should be of Pleistocene age (e.g. Nojo et

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al., in press). General relationships among these formations are as follows: from the Kunnui to Kuromatsunai Formation they contact conformably each other, but they are clinounconformably overlain by the Setana (e.g. Nagao and Sasa, 1933; Matsui et al., 1955; Hashimoto et al., 1963; Oka and Mitani, 1981; Nojo et al., 1994).

There are a few reports on microfossils in the Kuromatsunai and Setana Formations. In particular, despite abundant yieldings of foraminifera from the Setana Formation, there have not been so many reports on foraminifera (Asano, 1936a, b, 1937, 1939; Asano and Nakamura, 1937; Shirai, 1959, 1960; Masatani and Ohkura, 1980MS; Takahashi et al., 1980MS; Tsuchi and Ibaragi, 1982; Tsubakihara et al., 1989; Nojo et al., 1997), and we have only chronostratigraphical data by Nojo et al.(in press), which are related to paleoenvironmental changes on the basis of micropaleontological analyses.

The rock materials for this study were sampled from the formations in northern to middle part of the Oshima Peninsula, and were analyzed in 1994 to 1998 by the author when he was a curator of Imakane Borad of Education. Some data of these works have been reported by Nojo et al. (1997: Tab. 1). This study is preliminaly report and list of foraminifera from the Kuromatsunai and Setana Formations to indicate a history of paleoenvironmental changes. The author mainly describes about some occurrences of foraminfera (Tab. 2) and shows their fuanal list with plates in this report. A detailed discussion about paleoenvironmental changes is left for another opportunity.

Table 1 Foraminifera from the Kuromatsunai and Setana Formation in Imakane area (after Nojo et al., 1997)

Sample number (Kmu: Sakkurubetsu Pyro. Mem., Kms: Okusawa Sand. Mem, Ss: Setana F.)	Kmu-1	Kmu-2	Kmu-3	Kmu-4	Kmu-5	Kms-1	Ss-1	Ss-2
Planktonic Foraminifea								
Globigerina bulloides d'Orbigny	+	+	+	+		+	+	
Globigerina quinqueloba Natland			+					
Globigerina sp.							+	
Globigerinita glutinata (Egger)				+				
Globigerinita uvula (Ehrenberg)		+					+	
Neogloboquadrina incompta (Cifelli)	+	+	+	+			+	
Neogloboquadrina pachyderma (Ehrenberg) (dextral)	+	+	+	+			+	+
Neogloboquadrina pachyderma (Ehrenberg) (sinistral)	+	+	+	+			+	+
Benthic Formainifera								
Ammonia sp.								+
Angulogerina kokozuraensis Asano			+	+				
Angulogerina sp.		+						
Asterononion hamadaense Asano			+	+				
Bolivina decussata Brady				+				
Bolivina spp.		+	+					
Bolivinita quadrilatera (Schwager)	+							
Buccella frigida (Cushman)			+	+				
Buccella tenerrima (Bandy)		+						
Buccella sp.			+					
Bulimina sp.								+
Cibicides lobatulus (Walker & Jacob)			+					+
Cibicides refulgens de Montfort		+						
Cibicides subdepressus (Asano)		+		+				+
Cibicides spp.	+			+				
Cribroelphidium yabei (Asano)			+					+
Cribroelphidium sp.								+
Dyocibicides perforata Cushman & Valentine	+							
Elphidium crispum (Linné)		+						+
Elphidium excavatum (Terquem) forma *clavata* (Cushman)			+	+				
Elphidium jenseni (Cushman)		+						
Elphidium subarcticum Cushman				+				
Elphidium spp.		+						+
Epistominella pulchella Husezima & Maruhasi		+		+				
Epistominella spp.		+						+
Eponides ? spp.		+		+				
Fissurina annectens (Burrows & Holland)			+					
Fissurina baccata (Hellon-Allen & Earland)	+							
Fissurina marginata (Montagu)	+	+	+	+			+	
Fissurina orbignyana Seguenza				+				

Sample number (Kmu: Sakkurubetsu Pyro. Mem., Kms: Okusawa Sand. Mem, Ss: Setana F.)	Kmu-1	Kmu-2	Kmu-3	Kmu-4	Kmu-5	Kms-1	Ss-1	Ss-2
Benthic Foraminifera								
Fissurina cf. *rizzae* Seguenza				+				
Fissurina cf. *subquadrata* Parr		+						
Fissurina sp.			+					
Glabratella spp.		+					+	
Globocassidulina bisecta Nomura	+	+	+	+				
Globocassidulina jamesoni (McCulloch)				+				
Globocassidulina spp.			+			+		
Guttulina yabei Cushman & Ozawa							+	
Globulina sp.				+				
Guttulina spp.	+	+		+			+	+
Hanzawaia nipponica Asano				+				+
Heterolepa praecincta (Karrer)		·		+				
Heterolepa subhaidingerii (Parr)			+					
Islandiella japonica (Asano & Nakamura)	+		+				+	+
Islandiella norcrossi (Cushman)		+						
Islandiella setanaensis (Asano & Nakamura)	+		+				+	+
Islandiella sublimbata (Asano & Nakamura)	+	+	+	+		+	+	+
Islandiella yabei (Asano & Nakamura)		+	+	+			+	+
Islandiella spp.	+	+					+	
Lagena acuticosta Reuss	+							
Lagena apiopleura Loeblich & Tappan			+					
Lagena striata (d'Orbigny)	+							
Lagena spp.	+			+				
Lenticulina sp.	+							
Melonis pompilioides' (Fichtel & Moll)	+							
Melonis uchioi Hasegawa	+							
Nonion sp.		+						
Nonionellina labradorica (Dawson)			+	+				
Oolina striatopunctata (Parker & Jones)				+				
Oridorsalis umbonatus (Reuss)	+							
Planoglabratella subopercularis (Asano)	+							
Polystomellina discorbinoides Yabe & Hanzawa		+						
Pseudoparrella takayanagii (Iwasa)			+					
Pullenia apertura Cushman			+					
Pyrgo ezo Asano					+			
Stilostomella sp.	+							
Uvigerina akitaensis Asano				+				
Uvigerina juncea Cushman & Todd	+							
Uvigerina schencki Asano			+					
Uvigerina spp.								

Table 2 Foraminifera from the Kuromatsunai and Setana Foramtions

Sampling horizon	Upper Kuroma tsu-nai F.	Lower Setana F.	Upper Setana F.
Planktonic Foraminifera			
Globigerina bulloides d'Orbigny	A	A	A
Globigerina quinqueloba Natland	R	C	F
Globigerinita glutinata (Egger)	F	F	F
Globigerinita uvula (Ehrenberg)	R	VR	F
Globigerinoides ruber (d'Orbigny)	-	-	R
Globorotalia inflata (d'Orbigny)	C	C	VR
Grobigerina spp.	-	-	R
Neogloboquadrina cf. asanoi (Maiya, Saito, and Sato)	VR	-	-
Neogloboquadrina dutertrei (d'Orbigny)	VR	-	-
Neogloboquadrina incompta (Cifelli)	C	A	A
Neogloboquadrina pachyderma(D) (Ehrenberg)	F	A	C
Neogloboquadrina pachyderma(S) (Ehrenberg)	F	C	C
Neogloboquadrina sp.	-	VR	R
Gen. et sp. indet.	VR	R	VR
TOTAL COUNTED	296	308	5035
Benthic Foraminifera			
Alabamina japonica (Asano)	VR	-	-
Ammonia beccarii (Linné)	-	VR	-
Ammonia ketienziensis (Ishizaki)	-	VR	-
Ammonia inflata (Seguenza)	-	R	-
Ammonia takanabensis (Ishizaki)	-	VR	-
Ammonia spp.	-	VR	R
Angulogerina hughesi (Galloway and Wissler)	R	VR	R
Angulogerina kokozuraensis Asano	R	-	R
Anomalina rostata (Brdy)	-	-	VR
Anomalinella spp.	-	-	R
Anomalinoides globulosus (Chapman & Parr)	VR	-	R
Astacolus hyalacrulus Loeblich and Tappan	VR	-	VR
Astrononion aomoriense Asano	-	VR	-
Astrononion hamadaense Asano	-	F	R
Astrononion spp.	R	-	VR
Bolivina decussata Brady	F	-	R
Bolivina sp. A	VR	R	R
Bolivina spp.	R	-	R
Brizalina alata (Seguenza)	-	-	VR
Brizalina spp.	-	-	R
Buccella frigida (Cushman)	VR	R	R
Buccella makiyamai (Chiji)	VR	R	C
Buccella nipponica (Husezima & Maruhasi)	-	VR	R
Buccella tanaii (Uchio)			R
Buccella tenerrima (Bandy)	R	-	C
Buccella spp.	VR	VR	R
Bulimina cf. imamurai Tai	R	-	-
Buliminella elegantissima (d'Orbigny)			F
Cancris auriculus (Fichtel & Moll)			VR
Chrysalidinella dimorpha (Brady)			VR
Cibicides cf. kamadai Asano			VR
Cibicides lobatulus (Walker & Jacob)	A	A	F
Cibicides refulgens de Montfort	C	C	C
Cibicides subdepressus (Asano)	R	F	R
Cibicides tani Iwasa and Kikuchi	F	R	R
Cibicides spp.	R	R	R
Cibicidoides pachydermus (Rzehak)	R	-	VR
Cornuspira involvens (Reuss)			R
Cribloelphidium oregonense (Cushman & Grant)	-	-	VR
Cribroelphidium yabei (Asano)			R
Cribrolinoides curta (Cushman)			VR
Cycloforia contorta (d'Orbigny)	-	VR	R
Cystammina pauciloculata (Brady)	VR	-	-
Discorbinella araucana (d'Orbigny)	R	VR	F

Sampling horizon	Upper Kuroma tsu-nai F.	Lower Setana F.	Upper Setana F.
Benthic Foraminifera			
Discorbinella bertheloti (d'Orbigny)	-	-	R
Discorbinella spp.	R	-	VR
Eilohedra spp.	R	-	-
Elphidiella arctica (Parker & Jones)	C	-	-
Elphidium aculeatum (d'Orbigny)	-	-	VR
Elphidium advena (Cushman)	-	-	VR
Elphidium bartletti Cushman	R	F	R
Elphidium crispum (Linné)	F	F	F
Elphidium excavatum (Terquem) forma clavata Cushn	-	R	F
Elphidium frigidum Cushman	R	-	R
Elphidium hanzawai Asano	-	VR	-
Elphidium incertum (Williamson)	-	-	VR
Elphidium janseni (Cushman)	VR	-	R
Elphidium macellum (Fichtel & Moll)	VR	-	-
Elphidium subarcticum Cushman	-	F	C
Elphidium subgranulosum Asano	-	-	F
Elphidium subincertum Asano	-	R	-
Elphidium translucens Natland	-	-	R
Elphidium spp.	F	VR	R
Epistominella pulchella Husezima & Maruhasi	R	VR	R
Epistominella spp.	VR	-	R
Eponides? sp.	R	-	R
Fissurina annectens (Burrows & Holland)	-	-	R
Fissurina cf. annectens (Burrows & Holland)	VR	-	-
Fissurina lacunata (Burrows & Holland)	-	-	R
Fissurina lucida (Williamson)	-	-	R
Fissurina marginata (Walker & Boys)	R	R	F
Fissurina obscurocostata Galloway & Wisser	VR	-	R
Fissurina orbignyana Seguenza	R	-	VR
Fissurina cf. rizzae Seguenza	-	-	R
Fissurina semimarginata (Reuss)	VR	R	-
Fissurina cf. subquadrata Parr	-	-	R
Fissurina spp.	R	VR	R
Gavelinopsis praegeri (Heron-Allen & Earland)	-	-	R
Gavelinopsis spp.	R	-	R
Glabratella cf. aurantista Seiglie & Bermúdes	-	-	R
Glabratella murabilis panamensis Seiglie & Bermúdes	-	-	R
Glabratella pulvinata (Brady)	-	-	R
Glabratella sp. A	-	-	R
Glabratella sp. B	-	-	R
Glabratella spp.	VR	-	R
Glandulina ovula d'Orbigny	-	-	-
Globocassidulina bisecta Nomura	F	R	R
Globocassidulina canalisuturata Eade	-	R	-
Globocassidulina neobrocha	-	-	R
Globocassidulina spp.	F	R	F
Guttulina spp.	VR	-	R
Gyroidina spp.	-	-	R
Hanzawaia nipponica Asano	R	VR	R
Haynesina sp.	-	-	R
Heronallenia sp.	-	-	VR
Heterolepa subhaidingerii (Parr)	-	-	R
Heterolepa sp.	VR	-	-
Islandiella helenae Feyling-Hassen & Buzas	-	-	R
Islandiella islandica (Nørbang)	F	-	-
Islandiella japonica (Asano & Nakamura)	F	C	R
Islandiella norcrossi (Cushman)	-	-	R
Islandiella sublimbata (Asano & Nakamura)	A	A	F
Islandiella yabei (Asano & Nakamura)	F	F	-
Islandiella spp.	-	R	R

Table 2 Foraminifera from the Kuromatsunai and Setana Foramtions (continued)

Sampling horizon	Upper Kuromatsu-nai F.	Lower Setana F.	Upper Setana F.
Benthic Foraminifera			
Karreriella baccata japonica Asano	-	VR	-
Karreriella spp.	R	-	R
Lagena acuticosta (Reuss)	-	-	VR
Lagena apiopleura (Loeblich & Tappan)	VR	VR	R
Lagena sulcata spicata Cushman & McCulloch	-	-	R
Lagena sp.	-	-	VR
Lenticulina nikobarensis (Schwager)	-	-	VR
Lenticulina sp.	-	-	VR
Melonis pacificus (Cushman)	VR	-	VR
Melonis uchioi Hasegawa	-	-	VR
Melonis spp.	VR	-	-
Miliolinella circularis (Bornemann)	-	-	R
Miliolinella spp.	-	-	R
Neoconorbina stachi (Asano)	-	VR	-
Neoeponides procerus (Brady)	-	R	R
Neoeponides spp.	VR	-	-
Nodosarina? sp.	-	-	VR
Nonion japonicus Asano	-	-	R
Nonion spp.	R	VR	R
Nonionella stella Cushman &Moyer	-	-	R
Nonionoides grateloupi (d'Orbigny)	-	-	VR
Oolina carteri Albani and Yassini	VR	-	-
Oolina costata (Williamson)	-	-	VR
Oolina melo d'Orbigny	-	VR	R
Oolina striatopunctata (Parker & Jones)	-	-	VR
Oolina sp.	-	-	VR
Oridosalis umbonatus (Reuss)	-	-	VR
Oridosalis cf. umbonatus (Reuss)	VR	-	-
Osangularinella umbonifera (Cushman)	VR	-	-
Paracassidulina sulcata Belford	-	-	R
Pararotalia nipponica (Asano)	-	-	R
Patellina corrugata Williamson	-	VR	R
Patellinella hanzawai Asano	-	-	R
Pateoris hauerinoides (Rhmbler)	-	-	F
Planoglabratella australensis (Heron-Allen & Earland)	-	-	R
Planoglabratella opercularis (d'Orbigny)	-	-	R
Planoglabratella pateriformis (Brady)	-	-	R
Planoglabratella subopercularis (Asano)	R	R	F
Planoglabratella? sp. C	-	-	VR
Polystomellina discorbinoides Yabe & Hanzawa	-	VR	R
Poroeponides cribrorepondus Asano & Uchio	-	-	R
Pseudononion japonicum Asano	-	VR	R
Pseudononion spp.	-	VR	VR
Pseudoparrella naraensis Kuwano	VR	-	F
Pseudoparrella takayanagii (Iwasa)	VR	R	F
Pseudoparrella spp.	-	-	R
Pseudopolymorphina sp.	-	-	VR
Pullenia apertura Cushman	VR	-	-
Pyrgo ezo Asano	VR	-	-
Pyrgo fornasinii Chapman & Parr	-	R	-
Quinqueloculina agglutinata Cushman	-	-	R
Quinqueloculina akneriana d'Orbigny	R	R	R
Quinqueloculina costata d'Orbigny	-	-	R
Quinqueloculina elongata Natland	-	-	R
Quinqueloculina kuromatunaiensis Asano	-	-	R
Quinqueloculina sawanensis Asano	-	-	R
Quinqueloculina seminulum (Linné)	-	VR	R
Quinqueroculina vulgaris d'Orbigny	-	R	R
Quinqueloculina cf. vulgaris d'Orbigny	-	-	VR
Quinqueloculina yezoensis Asano	-	-	R
Quinqueloculina sp. B			R
Quinqueloculina sp. C	-	-	R
Quinqueloculina sp. F	-	-	R
Quinqueloculina sp. G	-	-	R
Quinqueloculina sp. H	-	-	R
Quinqueloculina spp.	R	R	F
Rectobolivina rephanus (Parker & Jones)	-	-	VR
Rosalina australis (Parr)	VR	VR	R
Rosalina bradyi (Cushman)	VR	VR	F
Rosalina isabelleana d'Orbigny	-	-	R
Rosalina vilardeboana d'Orbigny	-	-	R
Rosalina spp.	R	VR	R
Sigmohauerina sp.	-	-	VR
Sigmoidella pacifica Cushman & Ozawa	-	-	VR
Sigmoidella spp.	VR	-	-
Sigmoilina sigmoidea compressa Cushman	-	R	-
Sigmoilina sp.	-	-	VR
Sigmomorphina spp.	-	VR	-
Sigmomorphina semitecta terquemiana (Fornasini)	-	-	R
Sigmomorphina trilocularis (Bagg)	VR	-	-
Sigmovirgulina sp.	-	-	VR
Sphaeroidina japonica Brady	VR	-	-
Sphaeroidina spp.	-	-	-
Spirillina limbata Brady	-	-	VR
Spirillina vivipara Ehrenberg	-	-	R
Spirillina sp.	-	-	VR
Spiroloculina hadai Thalmann	-	-	R
Spiroloculina sp.	-	-	VR
Spiroplectammina sp. A	-	-	R
Spiroprectammina sp.	-	-	VR
Spiroplectinella wrightii (Silvestri)	-	-	R
Textularia conica d'Orbigny	-	-	VR
Textularia spp.	-	-	R
Triloculina rotunda d'Orbigny	-	VR	-
Triloculina suttuensis Asano	-	-	R
Triloculina tricarinata d'Orbigny	-	-	VR
Triloculina sp. A	-	-	VR
Uvigerina juncea Cushman	-	VR	-
Uvigerina spp.	VR	-	-
Valvulineria hamanakoensis (Ishiwada)	-	-	VR
Valvulineria japonica Asano	-	VR	-
Gen. et sp. indet.	R	F	F
Total counted	869	780	4652

A: 80.5-13.5%, C: 13.5-4.5%, F: 4.5-1.5%, R: <1.5%, VR: two or less occurrences, -: no occurrence

2. Faunal Reference List

Foraminiferal species from the Kuromatsunai and Setana Formations are alphabetically listed below, under the categories of planktons and benthos. The selected species are illustrated with scanning electron micrographs in Plates 1 to 12. The original references are given for species. Additional references are selected from those with helpful remarks and illustrations about the species from the areas studied in this report. All specimens are catalogued and deposited in Department of Science Education, Iwamizawa College, Hokkaido University of Education.

Planktonic Foraminifera

Globigerina bulloides d'Orbigny

Globigerina bulloides d'Orbigny, 1826, Ann. Sci. Nat., Paris, ser. 1, v. 7, p. 277, Modéle nos. 17, 76; Brady, 1884, Voy. Challenger, Rep., Zool., v. 9, p. 593, pl.79,figs. 7a-c.

Globigerina quinqueloba Natland

Globigerina quinqueloba Natland, 1938, Bull. Scripps Inst. Oceanogr., Tech. Ser., v. 4, no. 5, p. 149, pl. 6, figs. 7a-c.

Globigerinita glutinata (Egger)

Globigerina glutinata Egger, 1893, Abhadle. K. Bayer. Akad. Wiss. Munchen, CLII, v. 18, p. 371, pl. 13, figs. 19-21.

Glonbigerinita glutinata (Egger), Parker, 1962, Micropal. v. 8, no. 2, p. 246, pl. 9, figs. 1-16.

Globigerinita uvula (Ehrenberg)

Pylodexia uvula Ehrenberg, 1861, K. Preuss., Akad. Wiss. Berlin, Monatsber., p. 276, 277, 308.

Globigerinita uvula (Ehrenberg), Parker, 1962, Micropal., v. 8, no. 2, p. 252, pl. 8, figs. 14-26.

Globigerinoides ruber (d'Orbingy)

Globigerina rubra d'Orbigny, 1839, *in* Sagra, R. de la, Hist. Ohys. Pol. Nat. Cuba, Foraminiferes, p. 82, pl. 4, figs. 12-14.

Globigerinoides rubra (d'Orbingny) (sic.), Cushman, 1927, Cushman Lab. Foram. Res., Contr., v. 3, pt. 1, p. 87, pl. 19, figs. 6a-c.

Globorotalia inflata (d'Orbigny)

Globigerina inflata d'Orbigny, 1839, *in* Barker-Webb and Berthelot, Hist. Nat. Canaries, v. 2, pt. 2, Zool., p. 134, pl. 2, figs. 7-9.

Globorotalia inflata (d'Orbigny), sensu strict, Maiya Saito and Sato, 1976, *in* Takayanagi and Saito eds. Progress in Micropaleontology, Micropal. Press, p. 408, pl. 2, figs. 5-7.

Neogloboquadrina cf. *asanoi* (Maiya, Saito, and Sato)

cf. *Globoquadrina asanoi* Maiya, Sato, and Saito, 1976, Progress in Micropaleontology. p.

409, pl. 3, figs. 1a-c, 2a-c, 3.

cf. *Neogloboquadrina asanoi* (Maiya, Saito, and Sato), Thompson, 1980, Init. Rep. DSDP. v. 56-57, pl. 3, figs. 10-12.

Neogloboquadrina dutertrei (d'Orbigny)

Globigerina dutertrei d'Orbigny, 1839, Foraminiferés, p. 84, pl. 4, figs. 19-21.

Neogloboquadrina dutertrei (d'Orbigny), Rögl and Bolli, 1973, Init. Rep. DSDP, v. 27, 743-767, pl. 9, figs. 1-3, 7-10; pl. 17, figs. 1-6.

Neogloboquadrina incompta (Cifelli)

Globigerina incompta Cifelli, 1961, Cushman Found. Foram. Res., Contr., v. 12, pt. 3, p. 84, pl. 4, figs 1-7.

Neogloboquadrina incompta (Cifelli), Rogl and Bolli, 1973, Init. Repts. DSDP, v. 15, p. 571, pl. 10?

Neogloboquadrina pachyderma (Ehrenberg)

Aristerospira pachyderma Ehrenberg, 1861, K. Preuss. Akad. Wiss, Berlin, Monatsber. p. 276, 277, 303.

Globigerina pachyderma (Ehrenberg), Brady, 1884, Voy. Challenger, Rep., Zool., v. 9, p. 600, pl. 114, figs. 19, 20.

Neogroboquadrina pachyderma (Ehrenberg), Rogl and Bolli, 1973, Init. Repts. DSDP, v. 15, p. 571, pl. 11, figs. 2-6; pl. 16, fig. 12.

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Pseudoparrella japonica Asano, 1949, Jour. Paleont., 23 (4), p430, fig. 2, Nos. 2-4.

Alabamina japonica (Asano), Takayanagi and Hasegawa, 1987, Checklist and bibliography of post-Paleozoic foraminifera established by Japanese workers, 1890-1986, p. 39.

Ammonia beccarii (Linné)

Nautilus beccarii Linne, 1758, Syst. Nat., se. 10, p. 710.

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Ammonia ketienziensis (Ishizaki)

Steblus ketienziensis Ishizaki, 1948, Acta Geol. Taiwan, 2 (1), 59, pl. 1, figs. 2a-c.

Ammonia ketienjiensis (Ishizaki), Huang, 1964, Micropaleont. v. 10, no. 1, p. 53, pl. 1, figs. 13a-c.

Angulogerina hughesi (Galloway and Wissler)

Uvigerina hughesi Galloway and Wissler, 1927, Jour. Pal., v. 1, p.76, pl. 12, figs. 5a, b.

Angulogerina hughesi (Galloway and Wissler), Asano, 1950, Pacific Sci. v. 4, no. 2, p. 19, figs. 91-93.

Angulogerina kokozuraensis Asano

Angulogerina kokozuraensis Asano, 1949, Jour. Pal., v. 23 no. 4, p. 428, text-fig. l, nos. 50-53; 1950, Illust. Cat.Japan. Tert. Small. Foram., pt. 2, p. 19, figs- 94-96.

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Anomalina grosserugosa Brady, 1884, Challenger Foram., p.675, pl. 94, figs. 4, 5.

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Astrononion aomoriense Asano

Astrononion aomoriense Asano, 1950, Illust. Cat. Japan. Tert. Small. Foram., pt.1, p. 5, figs. 25, 26.

Astrononion hamadaense Asano

Astrononion hamadaense Asano, 1950, Illust. Cat. Japan. Tert. Small. Foram., pt.1, p.6, figs. 29-31.

Bolivina decussata Brady

Bolivina decussata Brady , 1881, Quart. Jour. Micr. Sci., n.s., v. 21, p. 28; 1884,Voy. Challenger, Rep., Zool., v. 9, p. 423, pl. 53, figs. 12-13.

Bolivina sp.A

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Bolivinita quadrilatera (Schwager)

Textularia quadrilatera Schwager, 1866. Novara Exp. Geol. Theil., 2, p. 253, pl. 7, fig. 10.

Bolivina quadrilatera (Schwager), Asano, 1938, Jour. Geol. Soc. Japan, 45, p. 607, pl.16, fig. 10.

Brizalina alata (Seguenza)

Vulvulina alata Seguenza, 1862, Atti Accad. Gioenia Sci. Nat., 2 (18), p. 115, pl. 2, figs.5, 5a.

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Eponides schreibersii Morishima and Chiji (not of Reuss), 1952, Mem. Coll. Sci., Univ. Kyoto, ser. B, v. 20, no. 2, pl. 2 (XIII), figs. 6a-c.

Buccella makiyamae (sic.) Chiji, 1961, Prof. J. Makiyama, Mem. Vol., Kyoto, p. 234, text-figs. 2a-c, pl. l, figs. 13-14.

Buccella nipponica (Husezima and Maruhasi)

Discorbis nipponica Husezima and Maruhasi, 1944, Jour. Shigenkagaku Kenkyusho (Res. Inst. Nat. Resour., Japan), v. l, no. 3, p. 397, pl. 34. figs. 9a-c.

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Buccella tanaii (Uchio)

Eponides tanaii Uchio, 1951, Jour. Geol. Soc. Japan, 57, p. 376, pl. 5, fig. 8.

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Buccella tenerrima (Bandy)

Rotalia tenerrima Bandy, 1950, Paleont., vol. 24, Tulsa, Okula., p. 278, pl. 42, fig. 3.

Eponides frigidus (Cushman) , Cushman and Todd, 1947, (not *Pulvinulina frigida* Cushman, 1922), Cushman Lab. Foram. Res. Spec. Publ. v. 23, p. 71, pl. 8, fig. 7.

Buccella inusitata Andersen, 1952, Washington Acad. Sci., Jour., v. 42, no. 5, p. 148, figs.10-11.

Buccella tenerrima (Bandy), Feyling-Hanssen, 1976, Maritime Sediments Spec. Publ. 1, p. 353, pl. 1, fig. 8-10; pl. 2, fig. 10-12.

Bulimina cf. *imamurai* Tai

cf. *Bulimina imamurai* Tai, 1959, Hiroshima Univ., Jour. Sci. ser. C, v. 2, no. 4, p. 387, pl. 40, fig. 3.

Buliminella elegantissima (d'Orbigny)

Bulimina elegantissima d'Orbigny, 1839, Voy. Amer. Mérid., Foraminiféres, v. 5, pt,. 5, p. 51, pl. 7, figs. 13, 14.

Buliminella elegantissima (d'Orbigny), Cushman, 1919, U.S. Nat. Mus., Proc., v. 56, p. 606.

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Nautilus auriculus Fichtel and Moll, 1789, Testacea microscopica, p. 105, pl. 20, figs. a-f; 1803 var. a, p. 108, pl. 20, figs. a-c; var. b, p. 110, pl. 20, figs. d-f.

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Chrysalidina dimorpha Brady, 1881, Quart. Jour. Micr. Sci., n. s., v. 21, p. 24; 1884, Voy. Challenger, Rep., Zool., v. 9, p. 388, pl. 46, figs. 20-21.

Chrysalidinella dimorpha (Brady), Schubert, 1908, Neues Jb. Min. Geol. Pa,1., Beil.-Bd. 25, p. 242.

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cf. *Cibicides kamadai* Asano, 1951, Illust. Cat. Japan. Tert. Small. Foram., pt. 13, p. 17, figs. 33-35.

Cibicides lobatulus (Walker and Jacob)

Nautilus lobatulus Walker and Jacob, 1789, Adams Essays, p. 642, pl. 14, fig. 36.

Cibicides lobatula (Walker and Jacob) (sic.), Cushman, 1931, U.S. Nat. Mus., Bull. 104, pt. 8, p. 118, pl. 21, figs. 3a-c.

Cibicides refulgens de Montfort

Cibicides refulgens de Montfort, 1808, Conch. Syst., v. l, p. 122.

Truncatulina refulgens (Montfort), Brady, 1884, Voy. Challenger, Rep., Zool., v. 9, p. 659, pl. 92, figs. 7-9.

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Planulina subdepressa Asano (sic.), 1951, Illust. Cat. Japan. Tert. Small. Foram., pt. 13, p. 15, figs. 16-18.

Cibicides subdepressus (Asano), Takayanagi and Hasegawa, 1987, Checklist and bibliography of post-Paleozoic foraminifera established by Japanese workers, 1890-1986, p. 37.

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Cibicides tani Iwasa and Kikuchi, 1954, Paleont. Soc. Japan, Trans. Porc., N. S., no. 16, p. 193, text-figs. 8a-c.

Cibicidoides pachydermus (Rzehak)

Truncatulina pachyderma Rzehak, 1886, Die Foraminiferenfauna der Neogenformation der Umgeburg von Mähr.-Osturf. Naturf. Ver. Brünn, Verh., Bruenn [Brno, Czechoslovakia], vol. 24 (1885), p. 87, pl. 1, fig. 5a-c.

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Cibicidoides pachyderma (sic.), van Morkhoven, 1986, Cenozoic Cosmopolitan Deep-Water Benthic Foraminifera, p. 68-71, pl. 22.

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Operculina involvens Reuss, 1849, Denkschr. Akad. Wiss., Wien, vol. 1, p. 370, pl. 45, fig. 20.

Cornuspira involvens (Reuss), Barker, 1960, SEPM, Spec. Publ., 9, pl. 11, figs. 1-3.

Cribroelplhidium oregonensis (Cushman and Grant)

Elphidium oregoense Cushman and Grant (sic.), 1927, San Diego Soc. Nat. Hist., Trans., V, no.6, 79, viii, 3.

Cribroelphidium yabei (Asano)

Elphidium yabei Asano, 1938, Geol. Soc. Japan, Jour., v. 45, no. 538, p. 589, pl. 14, figs. 9-10.

Cribroelphidium yabei (Asano), Asano, 1950, Illust, Cat. Japan. Tert. Small. Foram., pt. l, p. 11, figs. 64-65.

Cribrolinoides curta (Cushman)

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Cribrolinoides curta (Cushman), Cusuman and Leroy, 1939, Contr. Cushman Lab. Foram. Res., v. 15, no. 1, p. 17, pl. 3, figs. 1-11; pl. 4, figs. 1-13.

Cycloforia contrta d'Orbigny

Cycloforia contrta d'Orbigny, 1846, Foram. Foss. Viene, p. 298, pl. 20, figs. 4-6.

Cystammina pauciloculata (Brady)

Trochammina pauciloculata Brady, 1879, Quaterly Jour. Microscopical Science, new ser. 19, p. 58, pl. 5, figs. 13, 14.

Ammpchilostoma pauciloculata (Brady), Eimer and Fickert, 1899, Zeitschriftf Wissenschaftiliche Zoologie 65, p. 692.

Cystammina pauciloculata (Brady), Galloway, 1933, A Manual of Foraminifera. p. 186, pl. 16, fig. 12.

Discorbinella araucana (d'Orbigny)

Rosanila araucana d'Orbigny, 1839,

Discorbinella araucana (d'Orbigny), Jones, 1994, Challenger Foraminifera, p. 93, pl. 86, figs. 10, 11.

Discorbinella bertheloti (d'Orbigny)

Rosalina bertheloti d'Orbigny, 1839, *in* Barker-Webb and Berthelot, Hist. nat.Canaries,v. 2, pt. 2, Zool., p. 135, pl.,1. figs.28-30

Discorbinella bertheloti (d'Orbigny), Loeblich and Tappan, 1964, Treatise on Inbertebrate Pal., Moore R.C., ed., pt. C, Protista, 2, v. 2, p. C575, figs. 453.

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Dyocibicides perforata Cushman and Valentine, 1930, Contr. Stanford Geol. Dept., v. l, no. l, p. 31, pl. l0, figs. 3a-c.

Elphidiella arctica (Parker and Jones)

Polystomella arctica Parker and Jones, 1864, *in* Brady, Trans. Linn. Soc. London, Zool., v. 24, p. 471, pl. 48, fig. 18.

Elphidium arcticum (Parker and Jones), Cushman, 1930, U. S. Nat. Mus. Bull. 104, pt. 7, p. 27, pl. 11, figs. 1-6.

Elphidiella arctica (Parker and Jones), Cushman, 1939, U. S. Geol. Surv. Prof. Pap. 191, p. 65, pl. 18, figs. 11-14.

Elphidium aculeatum (d'Orbigny)

Polystomella aculeata d'Orbigny (sit.), 1846, Foraminiferes fossiles du Bassin Tertiare de Vienne (Autriche). Gide et Comp. p. 131, pl. 6, figs. 27-28.

Elphidium aculeatum (d'Orbigny), Thalmann, 1932, Ecologae Geologicae Helvetiae, v. 25, 293-312.

Elphidium advena (Cushman)

Polystomella advena Cushman, 1922, Carnegie Inst. Washington, Publ. 311, p. 56, pl. 9, figs. 11, 12.

Elphidium advenum (sit.), Cushman, 1930, U.S. Nat. Mus., Bull. 104, pt. 7, p. 25, pl. l0, figs. l, 2.

Elphidium articulatum (d'Orbigny)

Polystomella articulata d'Orbigny, 1839, Amer. Merid., Foraminiféres, v. 5, pt. 5, p. 30, pl. 3, figs. 9, l0.

Elphidium articulatum (d'Orbigny), Cushrnan, 1930, U.S. Nat. Mus., Bull. 104, pt. 7, p. 26, pl. l0, figs. 6-8.

Elphidium bartletti Cushman

Elphidium bartletti Cushman, 1933, Smithsonian Misc. Coll., v. 89, no. 9., p. 4, pl. 1, figs. 9a, b.

Elphidium bartletti Cushman, Loeblich and Tappan, 1953, Smithsonian Misc. Coll., v. 121, no. 7, p. 96, pl. 18, figs. 10-14.

Elphidium crispum (Linné)

Nautilus crispum Linné, 1758, Syst, Nat., ed. 10, p. 709.

Elphidium crispum (Linné), Cushman and Grant, 1927, San Diego Soc. Nat. Hist. Trans., v. 5, no. 6, p. 73, pl. 7, figs. 8a, b.

Elphidium excavatum (Terquem) forma *clavata* Cushman

Elphidium incertum (Wllliamson) var. *clavatum* Cushman, 1930, U. S. Nat. Mus., Bull. 104, pt. 7, p. 20, pl. 7, figs. 10a, b.

Elphidium decipiens (Costa), Hada, 1931, Tohoku Imp. Univ. Scl., Rep., 4th, ser. v. 6, no.3, p. 126, text-figs. 83a, b.

Elphidium hughesi foraminosun Cushman, Asano, 1950, Illust. Cat. Japan. Tert. Small. Foram., pt. 1, p. 8, text-figs. 46, 47.

Elphidium clavatum Cushman, Loeblich and Tappan, 1953, Smith. Misc. Coll., v. 121, no. 7, p. 98, pl. 19, figs. 8-10.

Elphidium excavatum (Terquem) forma *clavata* Cushman, Takayanagi, 1955, Tohoku Univ., Inst., Geol., Pal., Contr., no. 45. p. 42, pl. 1, fig. 25.

Elphidium frigidum Cushman

Elphidium frigidum Cushman, 1933, Smithsonian Misc. Coll., vol. 89, no. 9, p. 5, pl. 1, fig. 8.

Elphidium hanzawai Asano

Elphidium hanzawai Asano, 1939, Jour. Geol., Soc., Japan. v. 46, no 551, 426, figs. 3, 4a, b.

Elphidium incertum (Williamson)

Polystomella umbilicatula var. *incerta* Williamson, 1858, Recent Foraminifera of Great Britain, p. 44, pl. 3, fig. 82a.

Elphidium incertum (Williamson), Macfadyen, 1932, Geol. Mag., vol. 69, no. 821, pl. 35, figs. 6a, b.

Elphidium jenseni (Cushman)

Polystomella macella (Fichtel and Moll) var., Jensen, 1904, Linnean Soc. New South Wales Proc., v. 29, p. 817, pl. 23, fig. 4.

Polystomella jenseni Cushman, 1924, Carnegie Inst. Washington, Publ. 342, p. 49, pl.16, figs. 4 (?), 6.

Elphidium jenseni (Cushman), Cushman, 1933, U.S. Nat. Mus., Bull. 161, pt. 2, p. 48, pl. 11, figs. 6, 7.

Elphidium macellum (Fichtel and Moll)

Elphidium macellus (Fichtel and Moll) var., 1798, Testacea microscopia, aliaque minuta ex generibus Argonauta et Natutilus, ad naturam picta et descripta. p. 68, pl. 10, figs. h, i, k.

Elphidium macellum var. tumidocamerale Bogdanowicz, 1932, Oil Geol., Inst., Leningrad, Trans., ser. A, fasc. 22, II, i, 2, text-figs. 9, 10.

Elphidium macellum (Fichtel and Moll), Cushman, 1939, Geol. Surv. prof. paper, 191, p. 51, pl. 14, figs. 1-3

Elphidium subarcticum Cushman

Elphidium subarcticum Cushman, 1944, Cushman Lab. Foram. Res., Spec,. Publ., no.

12, p. 27. pl. 3, figs. 34, 35.

Elphidium nakanokawaense Shirai, 1960, Jour. Fac. Sci. Hokkaido Univ., Ser. IV, vol. X, 537-543, pl. 1, figs. 4a-b, 5a-b.

Elphidium subgranulosum Asano

Elphidium subgranulosum Asano, 1938, Jour. Geol. Soc. Japan, 45, p. 586, pl. 14, figs. 4a, b.

Elphidium subincertum Asano

Elphidium subincertum Asano, 1951, Illust. Cat. Japan Tert. Small Foram., pt. 1, p. 10, figs. 56, 57.

Elphidium translucens Natland

Elphidium translucens Natland, 1938, Scripps Inst. Oceanogr. Bull., Tech. ser., v. 4, p. 144, pl. 5, figs. 3, 4.

Epistominella pulchella Husezima and Maruhasi

Epistominella pulchella Husezima and Maruhasi, 1944, Jour. Shigenkagaku Kenkyusho (Res. Inst. Nat. Resour., Japan), v. l, no. 3, p. 398, pl. 34, figs. l0a-c.

Fissurina annectens (Burrows and Holland)

Lagena annectens Burrows and Holland, 1895, *in* Jones, Parker and Brady, 1985, Palaeontogr. Soc., London, Part II, p. 203, pt. vii, II.

Fissurina annectens (Burrows and Holland), Barker, 1960, Spc.Publ., Soc. Economic Paleontlogists and Mineralogists, 9.

Fissurina baccata (Hellon-Allen and Earland)

Lagena orbignyana var. *baccata* Hellon-Allen and Earland, 1922, Terra Nova Exped., Zool., VI, no. 2, p. 162, pt. vi, figs. 15, 16.

Fissurina baccata (Hellon-Allen and Earland), Jones, 1994, Challenger Foram., Pl. 59, Fig.20.

Fissurina lacunata (Burrows and Holland)

Lagena castrensis Brady (not of Schwager), 1884, Voy. Challenger, Rep. Zool., v. 9, p.485, pl. 60, figs. 1, 2.

Lagena lacunata Burrows and Holland, 1895, *in* Jones, T.R., Palaeontogr. Soc. London, p. 205, pl. 7, fig. 12.

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Fissurina lucida (Williamson)

Entosolenia marginata (Montagu) var. *lucida* Williamson, 1848, Ann. Mag. Nat. Hist., ser. 2, v. l, p. 17, pl. 2, fig. 17.

Fissurina lucida (Williamson), Loeblich and Tappan, 1953, Smithsonian Misc. Coll., v. 121, no. 7, p. 76, pl. 14, fig. 4.

Fissurina marginata (Montagu)

Vermiculum marginatum Montagu, 1803, Testacea Britannica, p. 524.

Fissurina marginata (Montagu), Loeblich and Tappan, 1953, Smithsonian Misc. Coll., v. 121, no. 7, p. 77, pl. 14, figs. 6-9.

Fissurina obscurocostata Galloway and Wissler

Fissurina obscurocostata Galloway and Wissler, 1927, Jour. Pal., v. l, p. 52, pl. 9, fig. l.

Fissurina orbignyana Seguenza

Fissurina orbignyana Seguenza , 1862, Foram. monotal. Mioc. Messina, p. 66, pl. 2, figs. 24, 26.

Fissurina cf. *rizzae* Seguenza

cf. *Fissurina rizzae* Seguenza, 1862, Foram. monotal., Mioc. Messina, p. 72, pl. 2, fig. 50.

Fissurina semimarginata (Reuss)

Lagena sp. (Nos. 64-65) von Schlict, 1870. Die Foraminiferen Septarienthones Pielzpuhl, p. 11, pl. 4, figs. 4-6, l0-12.

Lagena marginata Williamson var. *semimarginata* Reuss, 1870, Sitzb. Akad. Wiss. Wien, v. 62, pt. l, p. 468.

Fissurina semimarginata (Reuss), Barker, 1960, Spc.Publ., Soc. Economic Paleontlogists and Mineralogists, 9.

Fissurina cf. *subquadrata* Parr

cf. *Fissurina subquadrata* Parr , 1954, Roy. Soc. Victria, Proc., n. s., LVI, pt. 2, 203, ix, 5.

Gavelinopsis praegeri (Heron-Allen and Earland)

Discorbina praegeri Heron-Allen and Earland, 1913, Royal Irish Acad., Proc., v. 31, pt. 64, p. 122, pl. l0, figs. 8-l0.

Gavelileopsis praegeri (Heron-Ailen and Earlalld), Hofker, 1951, Siboga Exped., Mon. IV, pt. 3, p. 485. figs. 332-334.

Glabratella cf. *aurantista* Seiglie and Bermúdez

cf.*Glabratella aurantista* Seiglie and Bermúdez, 1965, Monographia de la familia de foraminíferos Glabratellidae, Geos, 1965, no. 12,

Glabratella mirabiris panamensis Seiglie and Bermúdez

Glabratella mirabiris panamensis Seiglie and Bermúdez , 1965, Geos, 12, p. 33, pl. 6, a-b, 7, 8.

Glabratella pulvinata (Brady)

Discorbina pulvinata Brady, 1884, Rept. on the Sci. Reslt. of the Voy. of the H. M. S. Challenger during the years 1873-1876, Zoology, v. 9,

Glabratella pulvinata, (Brady), Barker, 1960, SEPM Spec. Publ., 9, pl. 88, figs. 10a, b.

Glabratella sp.A

This species is somewhat resembles *G. crassa* Hofker but differs from it in having more rounded and inflated chambers, and five to six chambers in final whorl.

Glabratella sp.B

This species is characterized in having planoconvex test with low trochospiral coiling and wiht long spines in its periphery.

Glandulina ovula d'Orbigny

Glandulina ovula d'Orbigny, 1846, Foram. Foss. Bass. Tert. Vienne, p. 29, pl. 1, figs. 6, 7.

Globocassidulina bisecta Nomura

Globocassidulina bisecta Nomura, 1983, Tohoku Univ. Sci. Rep., 2nd ser. (Geol), v. 53, no. 1, p. 73-77, pl. 2,figs. 2,3; pl. 14, figs. 8-12; pl. 15, figs. 1-5.

Globocassidulina jamesoni (McCulloch)

Cassidulina (?) *jamesoni* McCulloch, 1977, Quantitative obserbations on Recent foram. tests, with emphasis on the eastern Pacific, p. 390, pl. 164, figs. 15a-c.

Globocassidulina jamesoni (McCulloch), Nomura, 1983, Tohoku Univ. Sci. Rep., 2nd ser. (Geol), v. 54, no. 1, p. 33, 34, pl. 3, figs. 7a-c, 8a, b; pl. 19, figs. 1, 2.

Globocassidulina canalisuturata Eade

Globocassidulina canalisuturata Eade,1967, N.Z. Jour. Mar. Freshwater Res., 1. no. 4, p. 440, fig. 3 (5-7), fig. 5 (7, 8).

Globocassidulina neobrecha Nomura

Globocassidulina neobrecha Nomura,1983, Tohoku Univ. Sci. Rep., 2nd ser. (Geol), v. 53, no. 1, p. 67-68, pl. 1,figs. 16a-c; pl. 19, figs. 3-6.

Guttulina yabei Cushman and Ozawa

Guttulina yabei Cushman and Ozawa, 1929, Japan ,Jour. Geol. Gcogr., v. 6, nos. 3-4, p. 68, pl. 13, flg. 2, pl, 14, fig. 6.

Hanzawaia nipponica Asano

Hanzawaia nipponica Asano, 1943, Jour. Geol. Soc. Japan, v. 51, no. 606, p. 98, pl. 4, figs. 1-2.

Heterolepa praecincta (Karrer)

Rotalia praecinctus Karrer, 1868, Sitz. Akad. Wiss. Wien, v. 58, p. 189, pl. 5, fig. 7.

Truncatulina praecincta Cusuman, 1915, U.S. Nat. Mus. Bull., v. 71, no. 5, p. 39, pl. 26, fig. 2. *Eponides praecinctus* (Karrer), Asano, 1951, Illust. Cat. Japan Tert. Small Foram., pt. 14, p. 11, figs. 30-32.

Heterolepa subhaidingerii (Parr)

Cibicides subhaidingerii Parr, 1950, Foraminifera, Rep. B.A.N.Z. Antarctic Rese. Exp. 1929-1931, Ser. B. (Zoology and Bontany), 5, p. 364, pl. 15, fig.7.

Heterolepa subhaidingerii (Parr), Tappan and Loeblich, 1982, Synopsis and Classification Living Organisms, pl. 53, fig. 10.

Islandiella helenae Feyling-Hanssen and Buzas

Cassidulina teretis Tappan, Loeblich and Tappan (not of Tappan, 1951), 1953, Smithsonian Misc. Coll., v. 121, no. 7, p. 121, pl. 24, figs. 3. 4.

Islandiella helenae Feyling-Hanssen and Buzas, 1976, Jour. Foram. Res., v. 6, no. 2, p. 155, figs. 1-4.

Islandiella islandica (Nørbang)

Cassidulina islandica Nørbang, 1945, Foraminifera. *in* the Zoology of Iceland. v.2, p. 42, text-figs. 7, 8d-f.

Islandiella islandica (Nørbang), Nørbang, 1958, Vidensk. Medd. Dansk Natur-hist. Foren., v. 120, p. 27, 28, pl. 6, figs. 1a, b, 2-5, pl. 7, figs. 6a,b, 7a, b,

Islandiella japonica (Asano and Nakamura)

Cassidulina japonica Asano and Nakamura, 1937, Japan Jour. Geol. Geogr., v. 14, nos. 3-4, p. 144, pl. 13, figs. l, 2.

Islandiella japonica (Asano and Nakamura), Troitskaja, 1970, Usloviya obitaniya i raspredelenie foraminifer v Yaponskom More (semeistva Elphidiidae, Cassidulinidae i Islandiellidae). In Fursenko A.V. ed., Obstchie voprosy izucheniya mikrofauny Sibiri, dalinego vostoka i drugikh raionov. Instituta Geologii i Geofiziki, Akademiya Nauk SSSR, Sibirskoe Otdelenie, Trudy, vol. 71, p.150, pl. 6, figs. 3,4.

Islandidlla norcrossi (Cushman)

Cassidulina norcrossi Cnshman, 1933, Smithsonian Misc. Coll., v. 89, no. 9, p. 7, pl. 2, figs. 7a-c.

Islandiella norcrossi (Cushman), Nørbang, 1958, Dansk Naturh. Foren. Kobenhavn Vidensk. Meddel., v. 120, p.26.

Islandiella setanaensis (Asano and Nakamura)

Cassidulina setanaensis Asano and Nakamura, 1937, Japan Jour. Geol. Geogr., v. 14, nos. 3-4, pl. 13, figs. 7a,b

Islandiella setanaensis (Asano and Nakamura) , Nomura, 1983, Tohoku Univ. Sci. Rep., 2nd ser. (Geol), v. 53, no. 1, p. 1-101, pl. 3, fig. 6, pl.4, figs. 3,4, pl. 10, fig. 11, pl.11, fig. 1-3; 1983, Tohoku Univ. Sci. Rep., 2nd ser. (Geol), v. 54, no. 1, p. 5, pl. 1, figs. 3a-c.

Islandiella sublimbata (Asano and Nakamura)

Cassidulina sublimbata Asano and Nakamura, 1937, Japan Jour. Geol Geogr., v. 14, nos. 3-4, p. 146, pl. 14, figs. 3, 4a, b.

Islandiella sublimbata (Asano and Nakamura), Nomura, 1983, Tohoku Univ. Sci. Rep., 2nd ser. (Geol), v. 53, no. 1, pl. 3, fig. 7, pl. 4, fig. 2, pl. 5, fig. 7, pl. 9, figs. 1-8; 1983, Tohoku Univ. Sci. Rep., 2nd ser. (Ge0l), v. 54, no. 1, p. 9, pl. 1, figs. 6-8.

Islandiella yabei (Asano and Nakamura)

Cassidulina yabei Asano and Nakamura. 1937, Japan. Jour. Geol. Geogr., v. 14, nos. 3-4, p. 145, pl. 14, figs. 1a, b.

Islandiella yabei (Asano and Nakamura), Nomura, 1983, Tohoku Univ. Sci. Rep., 2nd ser. (Geol), v. 53, no. 1, pl. 3, fig. 1; pl. 4, fig. 7; pl. 9, figs. 9-12, pl. 10, figs. 1-3.

Karreriella baccata (Schwager) *japonica* Asano

Karreriella baccata (Schwager) *japonica* Asano, 1938, Japanese Jour. Geol. Geogr., v.15, nos. 1-2, p. 90, pl. 10, figs. 1a-c.

Lagena acuticosta Reuss

Lagena acuticosta Reuss, 1861, Sitz. Akad. Wiss. Wier., v. 44, no. 1, p. 305, pl. 1, fig. 4.

Lagena apiopleura Loeblich and Tappan

Lagena apiopleura Loeblich and Tappan, 1953, Smithsonian Misc. Coll., v. 121, no. 7, p. 59, pl. l0, figs. 14, 15.

Lagena striata (d'Orbigny)

Oolina striata d'Orbigny, 1839, Voy. Amer. Merid., Foralminiféres, v. 5, pt. 5, p. 21, pl. 5, fig. 12.

Lagena striata (d'Orbigny), Asano, 1938, Tohoku Imp. Univ., Sci. Rep., 2nd ser. (Geol.), v. 19, p. 217, pl. 27, fig. 26; pl. 28, fig. 28.

Lagena sulcata spicata Cushman and McCulloch

Lagena sulcata var. *spicata* Cushman and McCulloch, 1950, Allan Hancock Pacific Exped., v. 6, no. 6, p. 360, pl. 48, figs. 3-7.

Lenticulina nikobarensis (Schwager)

Cristellaria nikobarensis Schwager, 1886, Novara Exp. Geol. Thell., 2, p. 243, pl. 6, fig. 87.

Robulus nikobarensis (Schwager), Asano, 1938, Sci. Rep. Tohoku Univ. ser. 2, 19 (2), p. 204, pl. 28, figs. 5, 6; pl. 29, fig. 8.

Lenticulina nikobarensis (Schwager), Loeblich and Tappan, 1988, Foraminiferal genera and their classification. p. 405. Pl. 446, figs. 9, 10.

Melonis pompilioides (Fichtel and Moll)

Nautilus pompilioides Fichtel and Moll, 1798, Testacea microscopica, p. 31, pl. 2, figs. a-c.

Melonis etruscus Montfort, 1808, Conch. Syst., p. 67.

Melonis pompilioides (Fichtel and Moll), Voloshinova, 1958, Mikrofauna SSSR, Sbornik 9, VNIGRI, Trudy, p. 149, pl. 3, fig. 1

Melonis uchioi Hasegawa

Melonis uchioi Hasegawa, 1991, Trans. Proc. Palaeont. Soc. Japan, N.S., no. 164, p. 1003.

Melonis pacificus (Cushman)

Nonion umbilicatula var. *pacifica* Cushman, 1924, Carnegie Inst. Wash., v. 342, p. 48, pl. 16, fig. 3.

Nonion pacificum Cushman, 1939, U.S. Geol. Surv., Prof. paper v. 191, p.25, pl. 6, fig. 25.

Melonis pacificus (Cushman), Hasegawa, 1979, Tohoku Univ., Sci. Rep., 2nd ser. (Geol), v. 49, no. 2, p. 151.

Miliolinella circularis (Bornemann)

Triloculina circularis Bornemann, 1855, Zeit. deutsch. Geol. Ces., v. 7, p. 349, pl. 19, fig. 4

Miliolinella circularis (Bornemann), Asano, 1951, Illust. Cat. Japan. Tert. Small. Foram., pt. 6, p. 9, figs. 65-67.

Neoconorbina stachi (Asano)

Discopulvinulina stachi Asano, 1951, Illust. Cat. Japan Tert. Small. Foram., pt. 14, p. 7, figs. 46-48.

Neoconorbina stachi (Asano), Matoba, 1970, Tohoku Univ., Sci. Rep., 2nd ser. (Geol), v. 42, no. 2, p. 57, pl. 4, flgs. 6a-c.

Neoeponides procerus (Brady)

Pulvinulina procera Brady, 1884, Voy. Challenger, Rep., Zool., v. 9, p. 698, pl. 105, figs. 7a-c. *Neoeponides procerus* (Brady), Reiss, 1960. Israel Geol. Surv., Bull. no. 29, p. 17.

Nonion japonicus Asano

Nonion japonicum Asano (sic.) , 1938, Jour. Geol. Soc. Japan, v. 45, no. 593, pl. 15(4), figs. 1, 2.

Nonionella stella Cushman and Moyer

Nonionella miocenica Cushman var. *stella* Cushman and Moyer, 1930, Cushman Lab. Foram. Res., Contr., v. 6, pt. l, p. 56, pl. 7, figs. 17a-c.

Nonionellina labradorica (Dawson)

Nonionina labradorica Dawson, 1860, Canad. Nat., v. 5, p. 191, text-fig. 4.

Nonionellina labradorica (Dawson), Voloshinova, 1958, Mikrofauna SSSR, Sbornik 9, VNIGRI, Trudy, no. 115, p. 142.

Nonionoides grateloupi (d'Orbigny)

Nonionina grateloupi d'Orbigny, 1826, Annales des Sciences Naturelles v. 7, p. 294,

Nonionoides grateloupi (d'Orbigny), Saidova, 1975, Bentosnye Foraminifery Tikhogo Okeana, 3 vol., p. 248.

Oolina carteri Albani and Yassini

Oolina carteri Albani and Yassini, 1989, Aust. J. Mar. Freshw. Res., v. 70, p. 385, fig. 3r-s.

Oolina costata (Williamson)

Entosolenia costata Williamson, 1858, Recent Foraminifera Great Britain, p. 9, pl. 1, fig.

18.

Lagena costata (Williamson), Cushman, 1923, U.S. Nat. Mus. Bull. v. 104, pt.4, p.12, pl.1, fig. 16, pl. 2, figs. 1, 2 (not pl. 3, fig. 8)

Oolina costata (Williamson), Parker, 1952, Bull. Mus. Comp. Zool., v. 106, no. 9, p. 409, pl. 4, figs. 20,21.

Oolina melo d'Orbigny

Oolina melo d'Orbigny, 1839, Voy. Amer. Merid., Foraminiféres, v. 5, pt. 5, p. 20, pl. 5, fig. 9.

Oolina striatopunctata (Parker and Jones)

Lagena sulcata (Walker and Jacob) var. *striatopunctata* Parker and Jones, 1865, Philos. Trans. Roy. Soc. London, v. 155, p. 350, pl. 13, figs. 25-27.

Entosolenia striatopunctata (Parker and Jones) Dawson, 1870, Can. Nat., n.s., v. 5, p. 178, fig. 11. *Lagena striatopunctata* Parker and Jones, Brady, 1878, Ann. Mag. Nat. Hist., ser. 5, v. 1, p. 434, pl. 20, fig. 3.

Oolina striatpunctata (Parker and Jones) Loeblich and Tappan, 1953, Smithsonian Misc. Coll. v. 121, no. 7, p. 74, pl. 12, figs. 2-5.

Oridorsalis umbonatus (Reuss)

Rotalia umbonata Reuss, 1851, Deutsch. geol. Gesell., Zeischr., v. 3, p. 75, pl. 5, figs. 35a-c.

Oridorsalis umbonatus (Ruess), Parker, 1964, Jour. Pal., v. 38, no. 4, p. 626, pl. 99, figs. 4-6.

Osangulariella umbonifera (Cushman)

Pulvinulinella umbonifera Cushman, 1933, Cushman Lab. Foram. Res., Contr., 9, 90.

Osangulariella umbonifera (Cushman), Jones, 1994, Challenger Foraminifera, p. 99, pl. 95, figs. 9, 10.

Paracassidulina sulcata Belford

Paracassidulina sulcata Belford, 1966, Bur. Min. Resour. Aust. Rep., no. 79, p. 142, 144, pl. 24, figs. 11-14, text-fig. 16, nos. 7, 8.

Pararotalia nipponica (Asano)

Rotalia nipponica Asano, 1936, Jour. Soc. Japan, v. 43, no. 515, p. 614, pl. 30, figs. 2a-c.

Pararotalia nipponica (Asano), Ujiie, 1966, Palaeont. Soc. Japan, Trans. Proc., N.S.m no. 61, p. 192, text-figs. 1-3; pl. 24, figs. 1-7; pl. 25, figs. 1-5.

Patellina corrugata Williamson

Patellina corrugata Williamson, 1858, Rec. Foram. Gt. Britain, p. 46, pl. 3, figs. 86-89.

Patellinella hanzawai Asano

Patellinella hanzawai Asano, 1936, Jour. Geol. Soc. Japan, v. 43, no. 515, p. 613, pl. 31, figs. 3a-c.

Pateoris hauerinoides (Rhumbler)

Quinqueloculina subrotunda (Montagu) forma *hauerinoides* Rhumbler, 1936, Foram. der Kieler Bucht, Teil II-Ammodisculinidae bis Textulinidae, v. 1, no. 1, p. 206, 217, 226, text-figs. 167, 208-212.

Pateoris hauerinoides (Rhumbler) Loeblich and Tappan, 1953, Smithsonian, Misc. Coll. v. 121, no. 7, p. 42, pl. 6, figs. 8-12, text-figs. 1A, B.

Planoglabratella australensis (Heron-Allen and Earland)

Discorbis australensis Hellon-Allen and Earland, 1932, Discovery Repts., IV, 416.

Glabratella australensis (Heron-Allen and Earland), Loeblich and Tappan, 1964, Treatise on Invertebrate. p. 588.

Planoglabratella opercularis (d'Orbigny)

Rosalina opercularis d'Orbigny, 1839, Foraminiféres, p. 93, pl. 3, figs. 24, 25.

Discorbis opercularis Cushman, 1915, U.S. Nat. Mus. Bull., vol. 71, no. 5, p. 18, pl. 11, fig. 3.

Planolabratella opercularis (d'Orbigny), Seiglie and Bermúdes, 1965, Geos, 1965, no. 12, 15-65.

Planoglabratella patelliformis (Brady)

Discorbina patelliformis Brady, 1884, Rept. on the Sci. Reslt. of the Voy. of the H. M. S. Challenger during the years 1873-1876, Zoology, v. 9,

Glabratella patelliformis (Brady), Seiglie and Bermúdez, 1965, Monographia de la familia de foraminíferos Glabratellidae, Geos, 1965, no. 12,

Planoglabratella subopercularis (Asano)

Discorbis subopercularis Asano, 1951, Illust. Cat. Japan Tert. Small Foram., pt. 14, p. 3, figs. 17-19.

Glabratella subopercularis (Asano), Matoba, 1970, Tohoku Univ., Sci. Rep., 2nd ser. (Geol.), v. 42, no. l, p. 54, pl. 5, figs. Sa-c.

Planolabratella subopercularis (d'Orbigny), Seiglie and Bermúdes, 1965, Geos, 1965, no. 12, 15-65.

Planoglabratella ? sp. C

This species resembles *Planoglabratella subopercularis* (Asano). but differs from it in havng less number of chambers in final whorl.

Polystomelina discorbinoides Yabe and Hanzawa

Polystomdlina discorbinoides Yabe and Hanzawa , 1923, Japan Jour. Geol. Geogr., v. 2, p. 99, text-flgs. a-c.

Poroeponides cribrorepandus Asano and Uchio

Poroeponides cribrorepandus Asano and Uchio, 1951, Illust. Cat. Japan. Tert. Small. Foram., pt. 14, p.18, figs. 134, 135.

Pseudononion japonicum Asano

Pseudononion japonicum Asano, 1936, Jour. Geol. Soc. Japan, v. 43, no. 512, p. 347, text-figs. a-c.

Pseudoparrella naraensis Kuwano

Pseudoparrella naraensis Kuwano, 1950, Jour. Geol. Soc. Japan, v. 56, no. 657, p. 317, text-figs. 6a-c.

Pseudoparrella takayanagii (Iwasa)

Epistominella takayanagii lwasa, 1955, Jour. Geol. Soc. Japan, v. 61, no. 712, p. 16, text-figs. 4a-c.

Epistominella suttsuensis Shirai, 1960, Jour. Fac. Sci. Hokkaido Univ., Ser. IV, vol X, 537-543, pl. 2,figs. 3a-c.

Pseudoparrella takayanagii (Iwasa), Hasegawa, 1979, Tohoku Univ., Sci. Rep., 2nd ser.

(Geol), v. 49, no. 2, p. 153, pl. 5, figs. 7a-c.

Pseudopolymorphina suboblonga Cushman and Ozawa

Pseudopolymorphina suboblonga Cushman and Ozawa, 1930, U.S. Nat. Mus., Proc., v. 77, p. 91, pl. 23, figs. 3a-c.

Pullenia apertura Cushman

Pullenia apertura Asano (not of Cushman, 1927), 1951, Illust. Cat. Japan. Tert. Small. Foram., pt. 12, p. l0, figs. 3, 4.

Pyrgo ezo Asano

Pyrgo ezo Asano, 1938, Japanese Jour. Geol. Geogr., v.15, nos. 1-2, p.93, pl. 9, figs. 1-4, 6.

Pyrgo fomasinii Chapman and Parr

Pyrgo fomasinii Chapman and Parr, 1935, Roy. Soc. W. Australia, Jour., XXI, p. 5.

Quinqueloculiua agglutinata Cushman

Quinqueloculiua agglutinata Cushman, 1917, U.S. Nat. Mus., Bull. 71, pt. 6, p. 43, pl. 9, figs. 2a-c.

Quinqueloculina akneriana d'Orbigny

Quinqueloculina akneriana d'Orbigny, 1846, Foram. Foss. Bas. Vienne, p. 290, pl. 18, figs. l6-21.

Quinqueloculina costata d'Orbigny

Quinqueloculina costata d'Orbigny, 1826, Ann. Sci. Nat., v. 7, p. 301. no. 3.

Quinqueloculina elongata Natland

Quinqueloculina elongata Natland, 1938, Bull. Scripps Inst. Oceanogr. Tech. Ser., v. 4, no.5, p. 141, pl. 4, fig. 5.

Quinqueloculina kuromatunaiensis Asano

Quinqueloculina kuromatunaiensis Asano, 1936, Jour. Geol. Soc. Japan, v. 43, no. 515, p. 621, pl. 32, figs. 4a-d.

Quinqueloculina sawanensis Asano

Quinqueloculina sawanensis Asano, 1951, Illust. Cat. Japan. Tert. Small. Foram., pt. 6, p. 6, figs. 40-42.

Quinqueloculina seminulum (Linné)

Serpula seminulum Linné, 1758, Syst. Nat., ed. l0, p. 786.

Quinqeloculina seminulum (Linné), d'Orbigny, 1826, Ann. Sci. Nat., Paris, ser. l, v. 7, . 303, no. 4.

Quinqueloculina vulgaris d'Orbigny

Quinqueloculina vulgaris d'Orbigny, 1826, Ann. Sci. Nat., v. 7, p. 302, no. 33.

Quinqueloculina cf. *vulgaris* d'Orbigny

cf. *Quinqueloculina vulgaris* d'Orbigny , 1826, Ann. Sci. Nat., v. 7, p. 302, no. 33.

Quinqueloculina yessoensis Asano

Quinqueloculina yessoensis Asano, 1936, Jour. Geol. Soc. Japan. 43, p. 620, pl. 32, figs. 3a-c.

Quinqueloculina sp.B

This species is somewhat similar to *Quinqueloculina elongata* Natland of Asano (1950) in its outline, but is distinguished from it by more inflated chmbers and coarsely perforated wall.

Quinqueloculina sp.C

This species is somewhat similar to *Quinqueloculina contrta* d'Orbigny, but is distinguished by more rounded outline, short size, and apertural view.

Quinqueloculina sp.F

This form is similar to *Quinquelocilina yessoensis* Asano, but is differs from it in having a broadly oval test with more sharply angled periphery in apertural view. This is also similar to *Quinqueloculina kuromatunaiensis* Asano, but is distinguished in having angled periphery of chambers.

Quinqueloculina sp.G

This form is somewhat similar to Quinqueloculina elongata Natland, but is distinguished from it by its triangular appearance in apertural view.

Quinqueloculina sp.H

This form is similar to *Quinqueloculina hasimotoi* Asano, but differs from it in having a test without apertural protrusion.

Rectobolivina raphanuss (Parker and Jones)

Uvigerina (*Sagrina*) *raphana* Parker and Jones, 1865, Roy. Soc. London Philos. Trans, v. 155, p. 364, pl. 18, figs. 16, 17.

Rectobolivina raphana (sic.) (Parker and Jones), Loeblich and Tappan, 1964, Treatise on Invertebrate Pal., Moore, R.C., ed., pt. C, Protista 2, v. 2, p. C533, figs. 438 (9-11).

Rosalina australis (Parr)

Discorbis australis Parr, 1932, Roy. Soc. Victoria, Proc., XLIV (n.s.) p. 227, pl. xxii, 31.

Rosalina australis (Parr), Jones, 1994, Challenger Foram., pl. 87, figs. 5-7.

Rosalina bradyi (Cushman)

Discorbina globularis Brady (not of d'Orbigny, 1826), 1884, Voy. Challenger, Rep., Zool., v. 9, p. 86, figs. 8a-c.

Discorbina globularis var.*bradyi* Cushman, 1915, U.S. Nat. Mus., Bull. 71, pt. 5, p. 12, pl. 8, figs. 1a-c.

Rosalina bradyi (Cushman), Hornibrook and Vella, 1954, Micropal., v. 8, no. l, p. 26.

Rosalina globularis d'Orbigny

Rosalina globularis d'Orbigny , 1926, Ann. Sci. Nat., Paris, ser. l, v. 7, p. 271, no. l, pl. 13, figs. 1-14; Modele no. 69.

Rosalina isabelleana d'Orbigny

Rosalina isabelleana d'Orbigny, 1839, Foraminiféres. p. 43, pl. 6, figs. 10-12.

Rosalina vilardeboana d'Orbigny

Rosalina vilardeboana d'Orbigny, 1839, Voy. Amer. Merid., Foraminiféres, v. 5, pt. 5, p. 44, pl. 6, figs. 13-15.

Rosalina vilardeboana d'Orbigny

Rosalina vilardeboana d'Orbigny , 1839, Voy. Amér. Mérid., Foraminiféres, v. 5, pt. 5, p. 44, pl. 6, figs. 13-15.

Sigmoidella pacifica Cushman and Ozawa

Sigmoidella (*Sigmoidina*) *pacifica* Cushman and Ozawa, 1928, Cushman Lab. Foram. Res., Contr., v. 4, p. 19, pl. 2, fig. 13.

Sigmoilina sigmoidea (Brady) *compressa* Cushman

Sigmoilina sigmoidea (Brady) *compressa* Cushman, 1946, Contr. Cushman Lab. Foram. Res., 22, no. 2, p. 32, pl. 5, figs. 10-12.

Sigmomorphina semitecta terquemiana (Fornasini)

Polymorphina amygdaloides Reuss var. *terquemiana* Fornasini, 1902, Mem. Accad. Inst. Sci. Bologna, ser. 5, no. 9, p. 72, fig. 25.

Sigmomorphina semitecta (Reuss) var. *terquemiana* Cushman and Ozawa, 1930, U.S. Nat. Mus. Proc., v. 77, no. 6, p. 129, pl. 33, figs. 4, 5; pl. 34, figs. 2, 3; pl. 35, fig. 1.

Sigmomorphina trilocularis (Bagg)

Polymorphina trilocularis Bagg, 1912, U. S. Geol. Surv. Bull., 513, p. 75, pl. 20, figs. 15-18.

Sigmomorphina trilocularis (Bagg), Cushman and Ozawa, 1930, U. S. Nat. Mus. Proc., v. 77, no. 6. p. 136, pl. 36, fig. 5.

Sphaeroidina japonica Asano

Sphaeroidina japonica Asano, 1953, Tohoku Univ., Inst. Geol. Paleont., Short Papers, no. 5, p. 17, pl. 2, figs. 43, 44.

Spirillina limbata Brady

Spirillina limbata Brady, 1879, Quart. Jour. Microscopic Sci., n.s., vol. 19, p. 64, pl. 8, figs. 26a, b.

Spirillina vivipara Ehrenberg

Spirillina vivipara Ehrenberg, 1843, Phys. Ab. K. Akad. Wiss. Berlin, 1841 (1), p. 323, 422, pl. 3, VII, fig. 41.

Spiroloculina hadai Thalmann

Spiroloculina costata Hada, 1931, Tohoku Univ. Sci. Rep., 4th ser., Biol., v. 6, no. 1, p. 84, text-figs. 37a,b.

Spiroloculina hadai Thalmann, 1933, Jour. Paleont., v. 7, no. 30, p. 354.

Spiroplectammina sp.A

This form somewhat similar to*Textularia candeiana* d'Orbigny, but has a test with planispirally arranged chambers in the early portion.

Spiroplectinella wrightii (Silvestri)

Spiroplecta wrightii Silvestri, 1903, Accad. Pont. Nuovi Lincei, Atti, LVI, p. 59, pl. 1x, figs. 1-6.

Textularia conica d'Orbigny

Textularia conica d'Orbigny, 1839, Foraminiféres, p. 143, pl. 1. figs. 19, 18.

Triloculina rotunda d'Orbigny

Triloculina rotunda d'Orbigny, 1826, Ann. Sci. Nat. v. 7, p. 299, no. 4.

Triloculina suttuensis Asano

Triloculina suttuensis Asano, 1936, Jour. Geol. Soc. Japan, v. 43, no. 515, p. 621, pl. 33, figs. 2a-c.

Triloculina tricarinata d'Orbigny

Triloculina tricarinata d'Orbigny, 1826, Ann. Sci. Nat., 7, p. 299, no. 7.

Uvigerina akitaenesis Asano

Uvigerina akitaenesis Asano, 1950, Illust. Cat. Japan. Tert. Small. Foram. pt. 2, p. 14, figs 60-62.

Uvigerina juncea Cushman and Todd

Uvigerina juncea Cushman and Todd, 1941, Cushman Lab. Foram. Res., Contr., XVII, p. 78, pl. xx, 4-11.

Uvigerina schencki Asano

Uvigerina schencki Asano, 1950, Illust. Cat. Japan. Tert. Small. Foram. pt. 2, p. 17, figs. 74, 75.

Valvulineria hamanakoensis (Ishiwada)

Anomalina hamanakoensis Ishiwada, 1958, Geol. Surv. Japan Rep., no. 180, p. 18, text-figs. 3a-c; pl. 1, 24-27.

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Plates (Scale bar = 100μm)

Planktonic Foraminifera (Plate 1)

1. *Globigerina bulloides* d'Orbigny, 2. *Globigerina quinqueloba* Natland,

3. *Globigerinita uvula* (Ehrenberg), 4. *Globigerinita glutinata* (Egger),

5. *Globorotalia inflata* (d'Orbibny), 6. *Globigerinoides ruber* (d'Orbingy),

7-9. *Neogloboquadrina incompta* (Chifelli), 10-11. *Neogloboquadrina pachyderma* (Ehrenberg)

Benthic Foraminifera (Plate 2-12)

Plate 2

1. *Angulogerina kokozuraensis* (Asano), 2. *Uvigerina akitaenesis* Asano,

3. *Uvigerina schencki* Asano, 4. *Uvigerina juncea* Cushman and Todd,

5. *Rectobolivina rephanus* (Parker and Jones), 6. *Buliminella elegantissima* (d'Orbigny),

7. *Bolivinita quadrilatera* (Schwager), 8. *Spiroplectammina* sp. A, 9. *Bolivina* sp. A,

10. *Bolivina decussata* Brady, 11. *Spirillina limbata* Brady,

12. *Cancris auriculus* (Fichtel and Moll)

Plate 3

1. *Oolina melo* d'Orbigny, 2-3. *Lagena apiopleura* Loeblich and Tappan,

4. *Oolina costata* (Williamson), 5. *Fissurina lacunata* (Burrows and Holland),

6. *Lagena striata* (d'Orbigny), 7. *Oolina striatopunctata* (Parker and Jones),

8. *Lagena acuticosta* Reuss, 9. *Fissurina baccata* (Hellon-Allen and Earland),

10. *Fissurina orbignyana* Seguenza, 11. *Fissurina* cf. *rizzae* Seguenza,

12. *Fissurina annectens* (Burrows and Holland), 13. *Fissurina cf. subquadrata* Parr,

14. *Fissurina marginata* (Montagu)

Plate 4

1. *Cibicides lobatulus* (Warker and Jacob), 2-3. *Cibicides refulgens* de Montfort,

4-5. *Cibicides subdepressus* (Asano), 6. *Heterolepa subhaidingerii* (Parr),

7. *Anomalinoides globulosus* (Cushman and Parr),

8. *Dyocibicides perforata* Cushman and Valentine

Plate 5

1. *Buccella frigida* (Cushman), 2. *Buccella makiyamai* (Chiji), 3. *Buccella tenerrima* (Brady),

4. *Patellinella hanzawai* Asano, 5. *Hanzawaia nipponica* Asano, 6. *Rosalina australis* (Parr),

7. *Rosalina bradyi* (Cushman), 8. *Guttulina yabei* Cushman and Ozawa

Plate 6

1. *Elphidium subgranulosum* Asano, 2. *Elphidium frigidum* Cushman,

3-5. *Elphidium subarcticum* Cushman, 6-7. *Elphidium crispum* (Linné),

8. *Polystomelina discorbinoides* Yabe and Hanzawa, 9. *Elphidium jenseni* (Cushrnan),

10. *Cribroelphidium yabei* (Asano), 11. *Cribroeplhidium oregonensis* (Cushman and Grant)

Plate 7

1, 8. *Astrononion hamadaense* Asano,

2. *Elphidium excavatum* (Terquem) forma *clavata* Cushman,

3. *Nonion japonicus* Asano, 4. *Melonis uchioi* Hasegawa, 5. *Pullenia apertura* Cushman,

6. *Melonis pompilioides* (Fichtel and Moll), 7. *Lenticulina nicobarebsis* (Schwager),

9. *Nonionellina labradorica* (Dawson)

Plate 8

1. *Planoglabratella*? sp. C, 2. *Planoglabratella australensis* (Hellon-Allen and Earland),

3. *Planoglabratella opercularis* (d'Orbigny), 4. *Planoglabratella subopercularis* (Asano),

5. *Glabratella mirabiris panamensis* Seiglie and Bermúdez,

6. *Planoglabratella patelliformis* (Brady), 7-8. *Glabratella* sp. A,

9. *Glabratella pulvinata* (Brady), 10. *Glabratella* sp. B

Plate 9

1. *Planoglabratella subopercularis* (Asano), 2. *Epistominella pulchella* Husezima and Maruhasi,

3. *Ammonia beccarii* (Linné), 4. *Islandidlla norcrossi* (Cushman),

5. *Islandiella japonica* (Asano and Nakamura), 6. *Islandiella yabei* (Asano and Nakamura),

7. *Islandiella helanae* Feyling-Hanssen and Buzas,

8. *Islandiella sublimbata* (Asano and Nakamura),

9. *Pseudoparella takayanagii* (Iwasa), 10. *Pseudoparella naraensis* Kuwano

Plate 10

1. *Quinqueloculina* sp.G, 2. *Pateoris hauerinoides* (Rhunbler),

3. *Quinqueloculina costata* d'Orbigny, 4. *Quinqueloculina kuromatunaiensis* Asano,

5. *Quinqueloculiua agglutinata* Cuslunan, 6. *Quinqueloculina* sp.F

Plate 11

1. *Cycloforia contrta* (d'Orbigny), 2. *Quinqueloculina akneriana* d'Orbigny,

3. *Quinqueloculina* sp. C, 4. *Cribrolinoides* curta (Cushman), 5. *Quinqueloculina* sp. B,

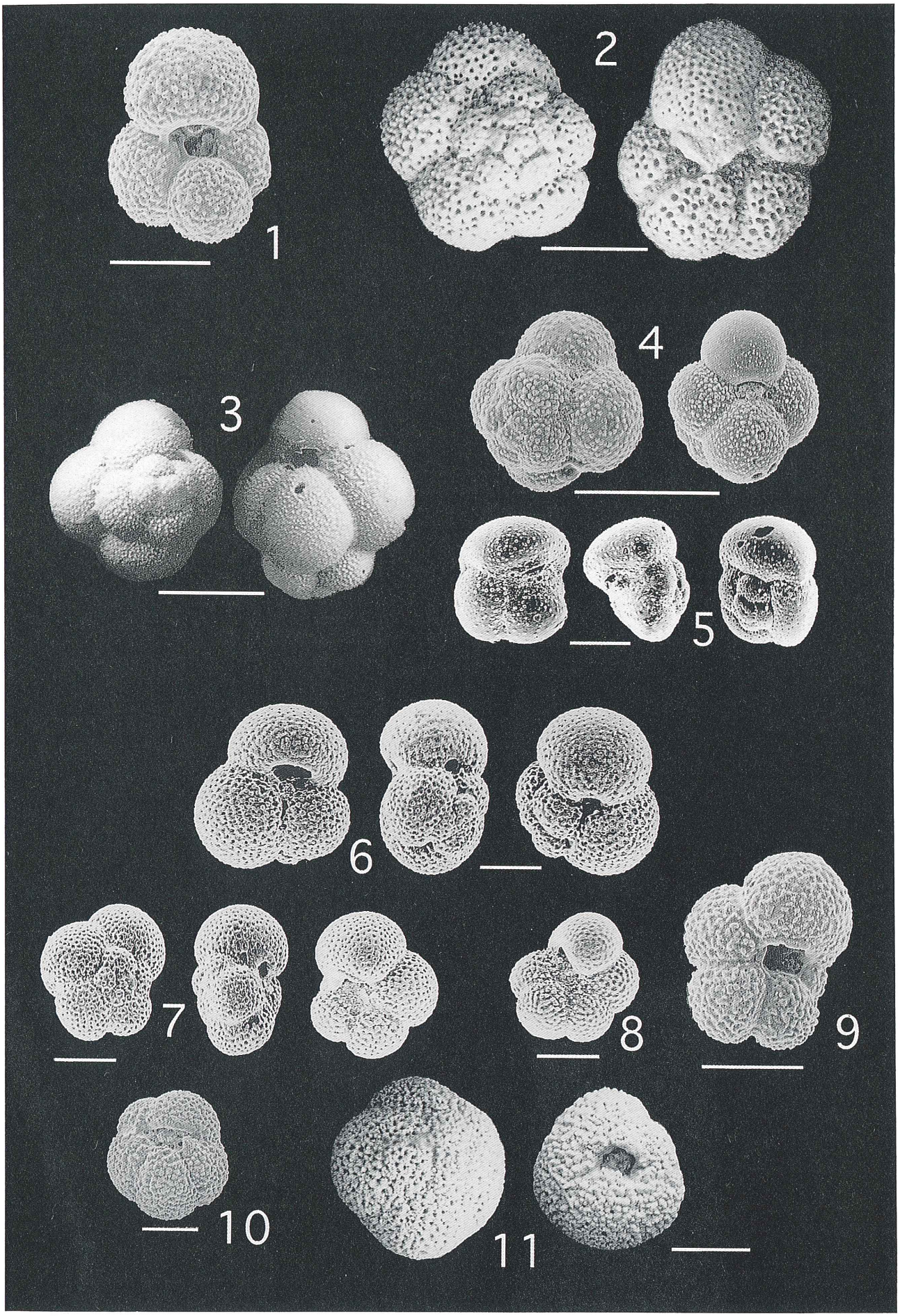
6. *Quinqueloculina yessoensis* Asano

Plate 12

1. *Quinqueloculina akneriana* d'Orbigny, 2. *Quinqueloculina sawanensis* Asano,

3. *Triloculina suttuensis* Asano, 4. *Triloculina tricarinata* d'Orbigny, 5-6. *Pyrgo ezo* Asano

Plate 1



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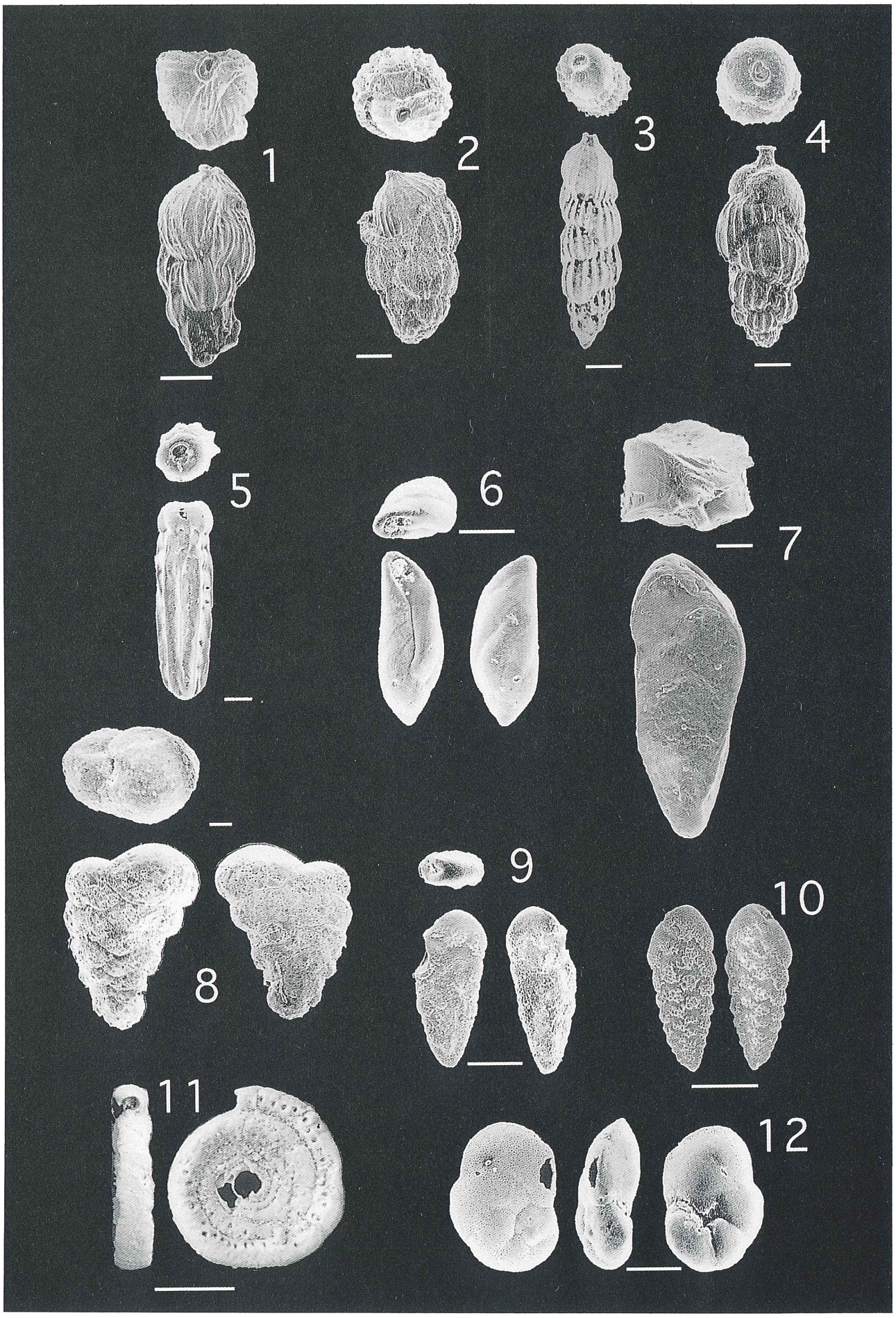

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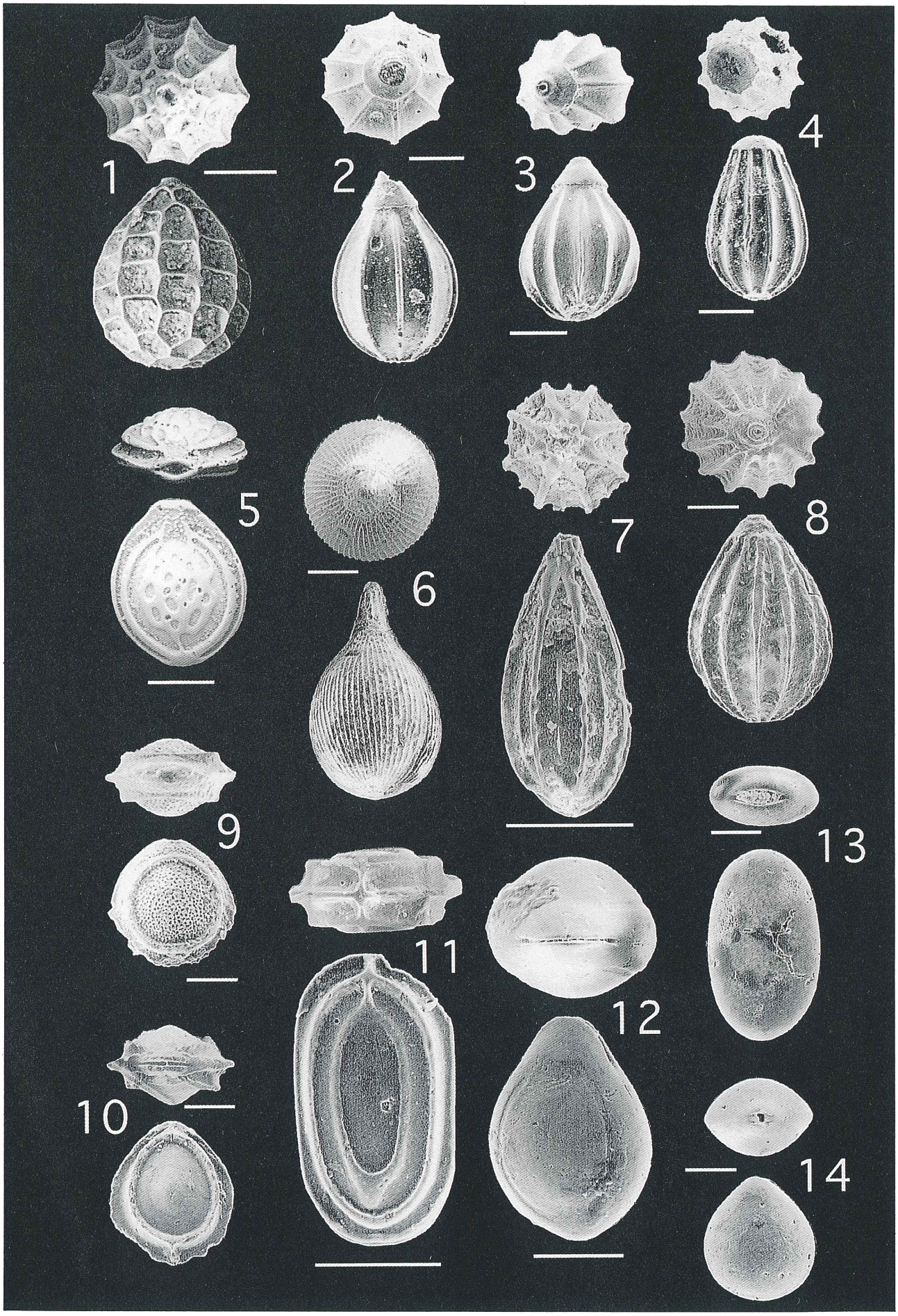

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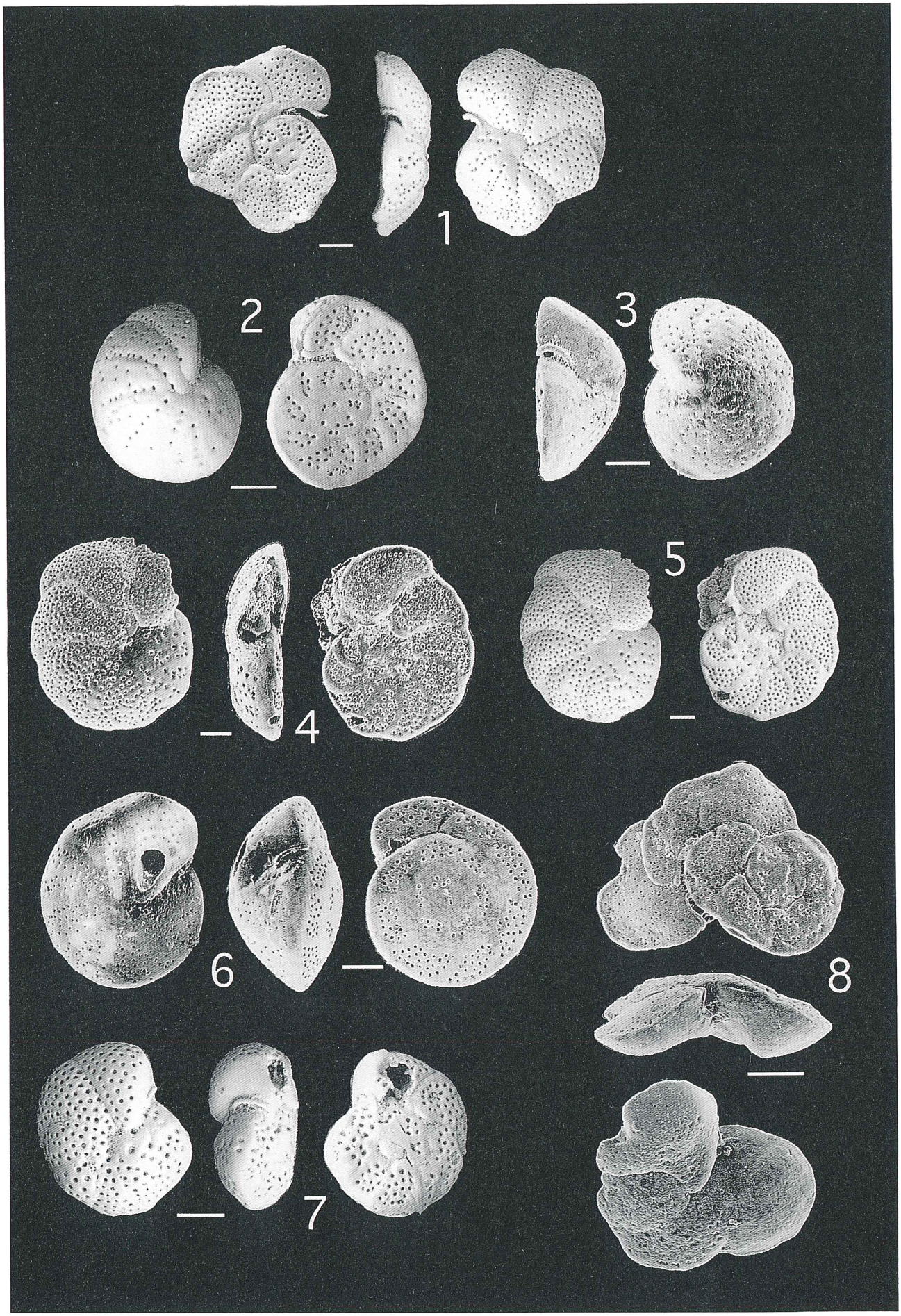

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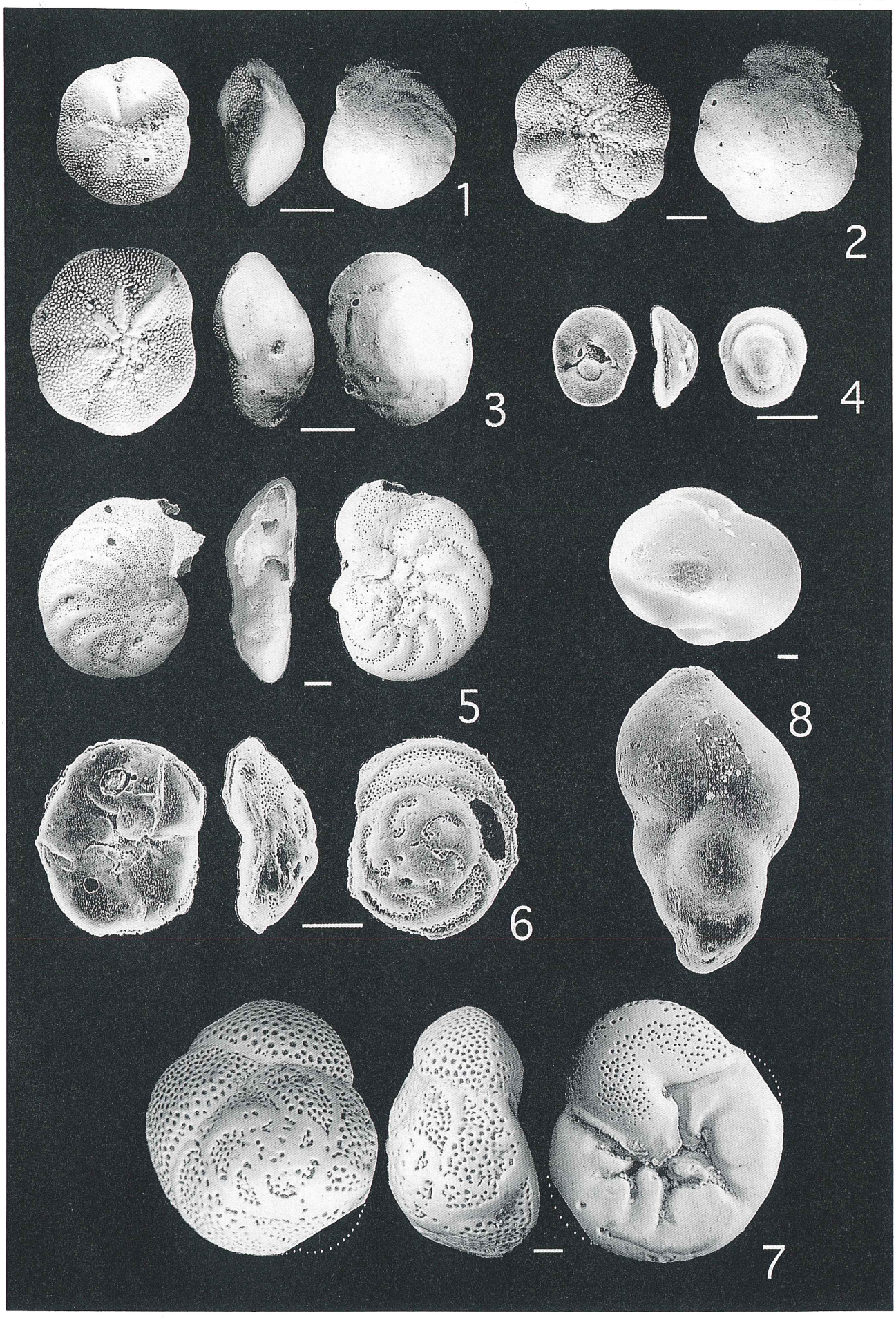

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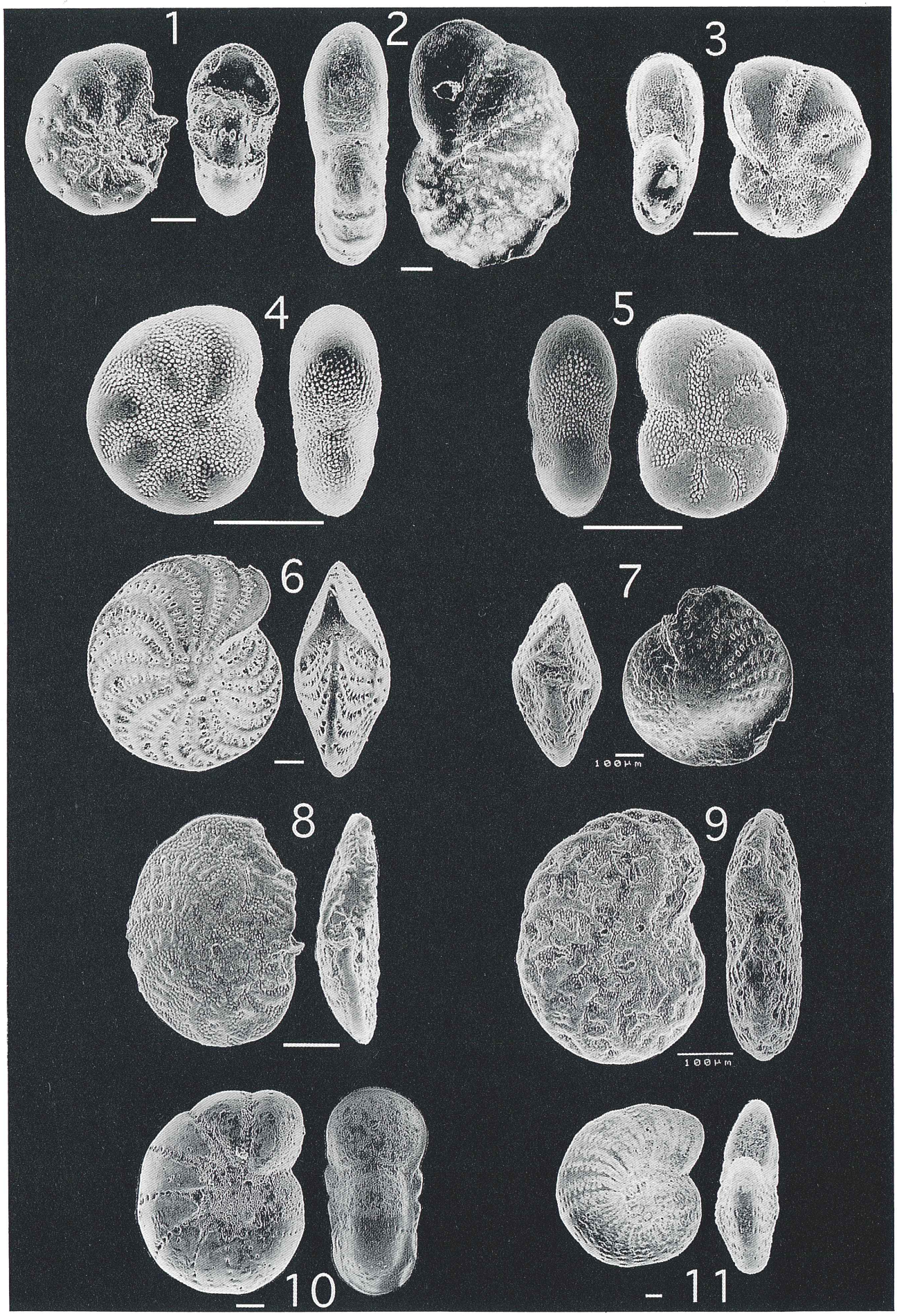

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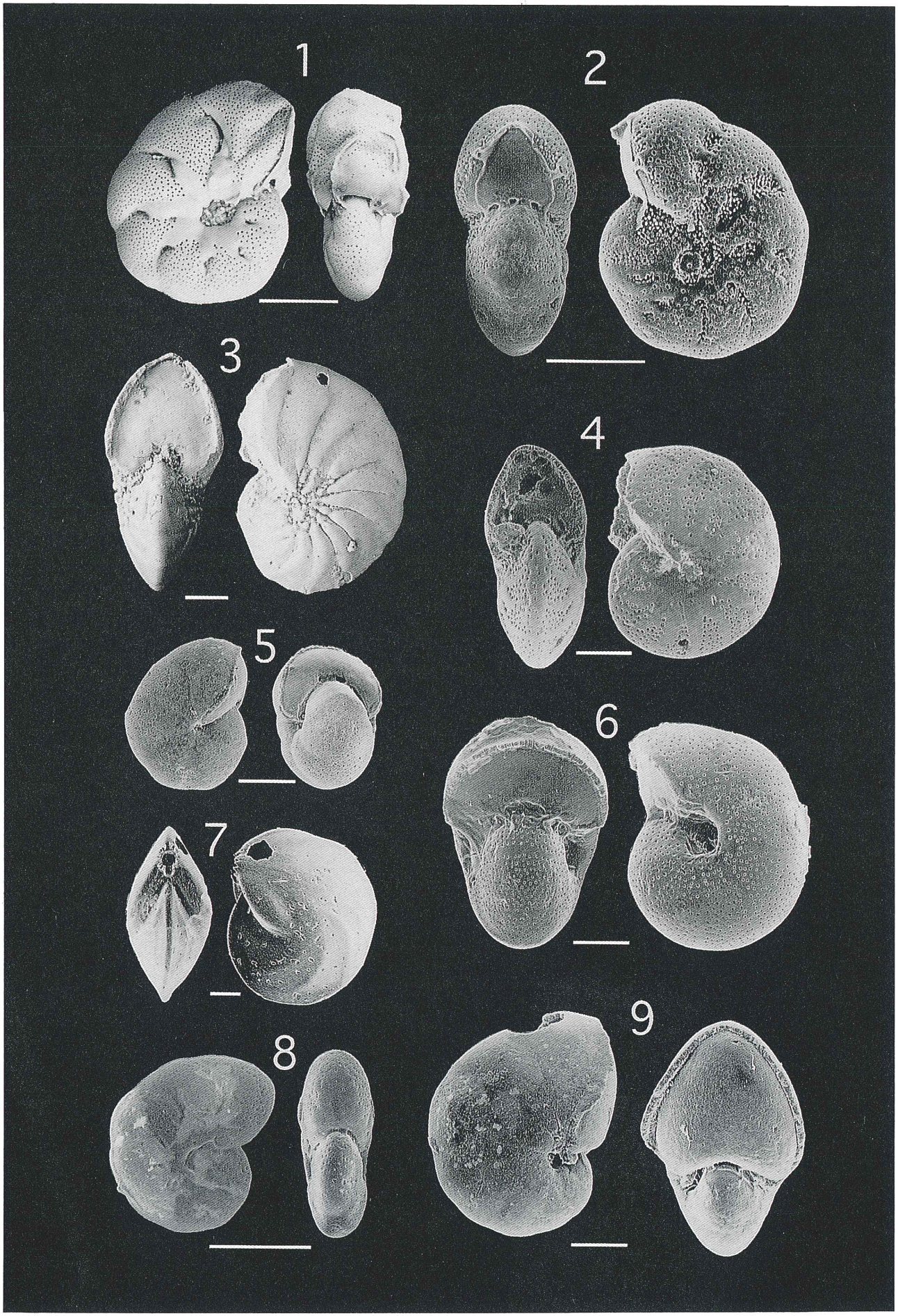

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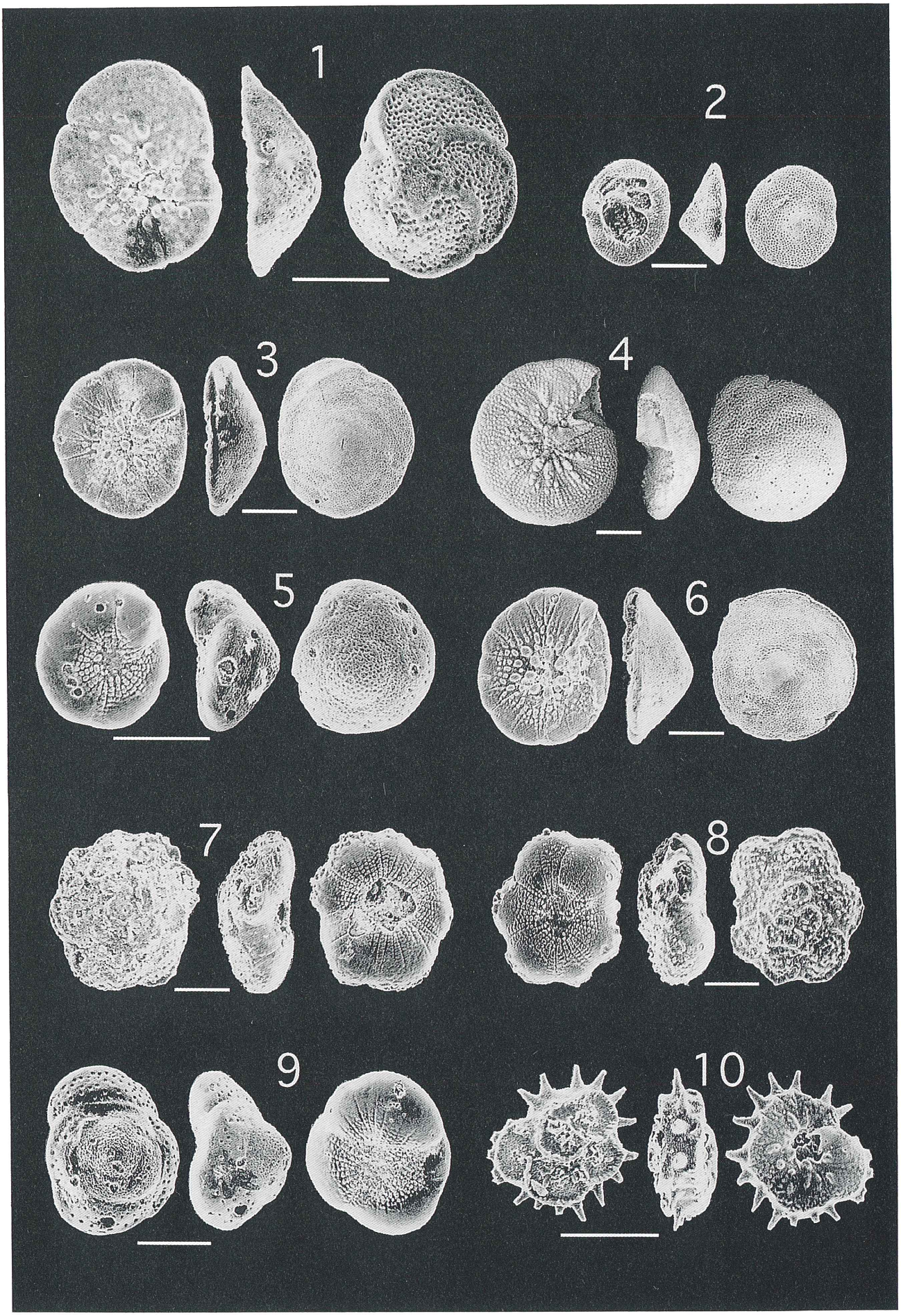

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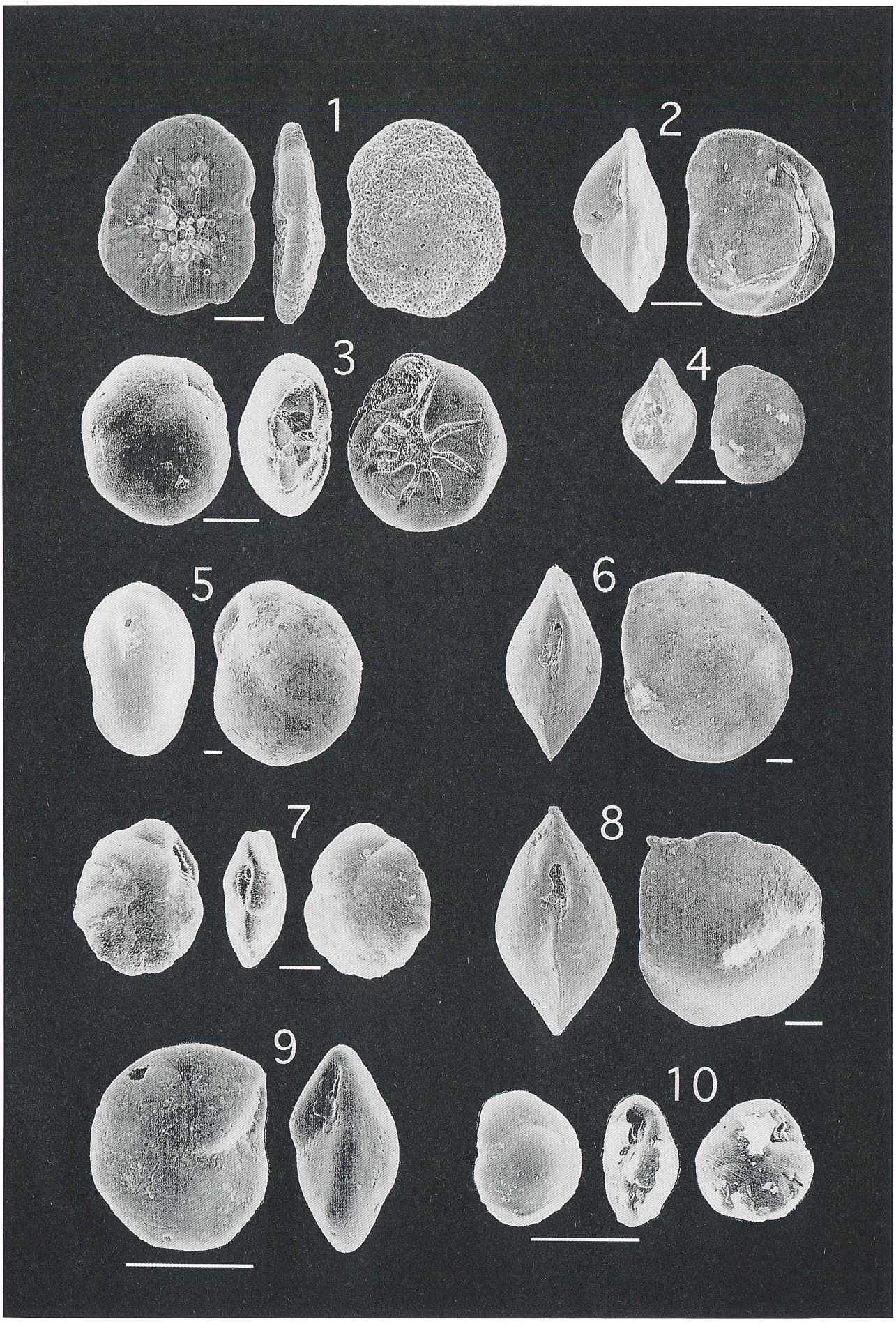

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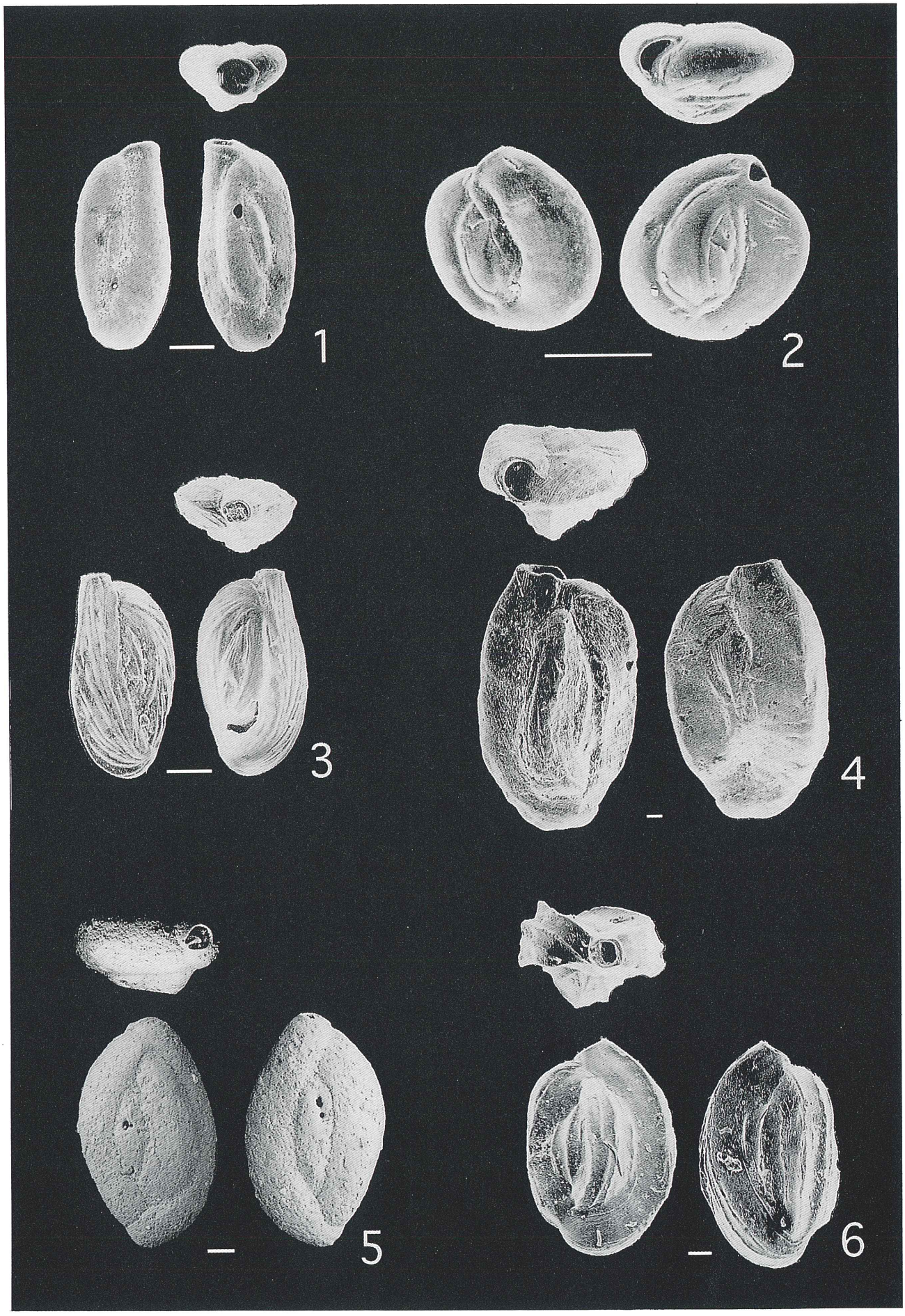

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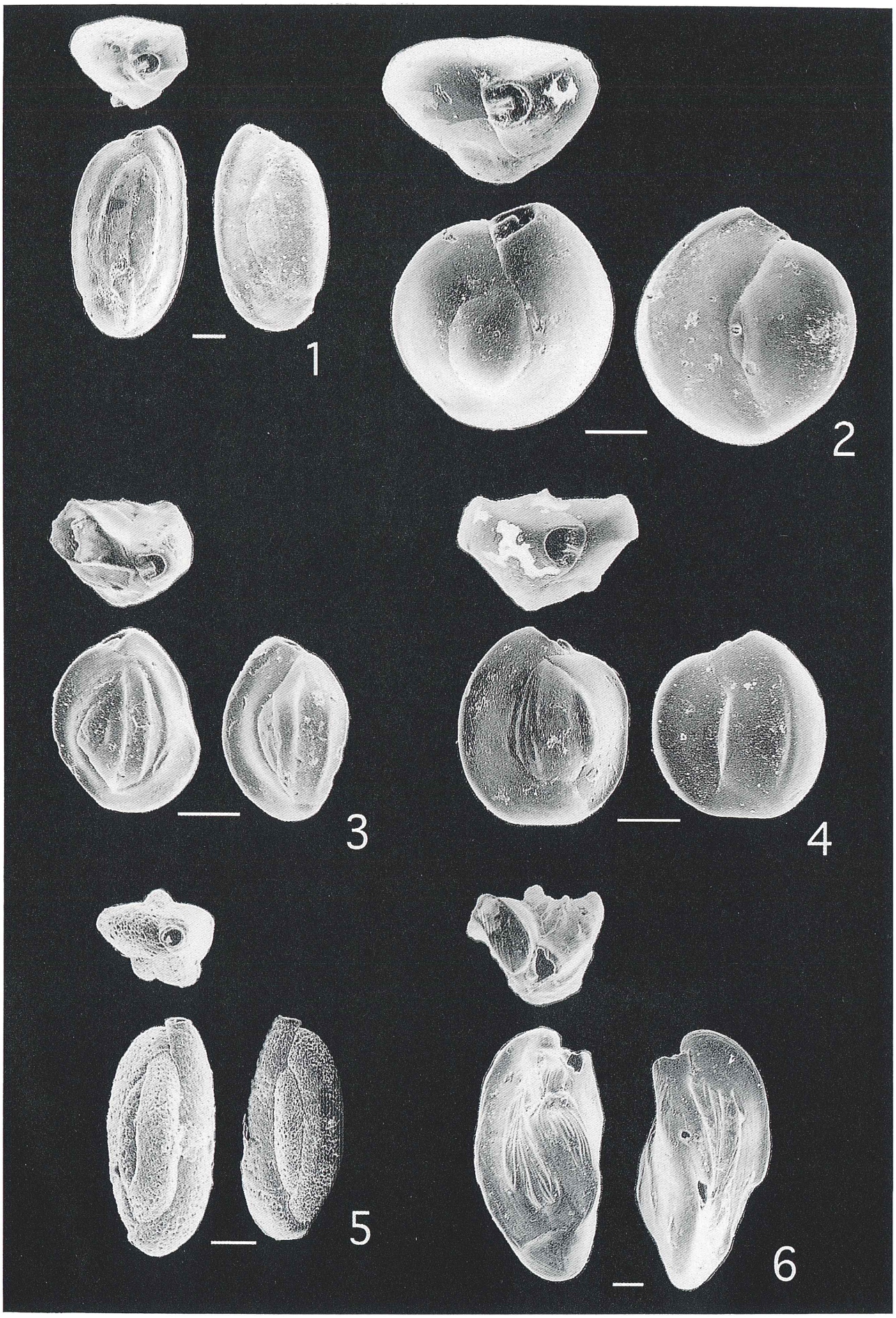
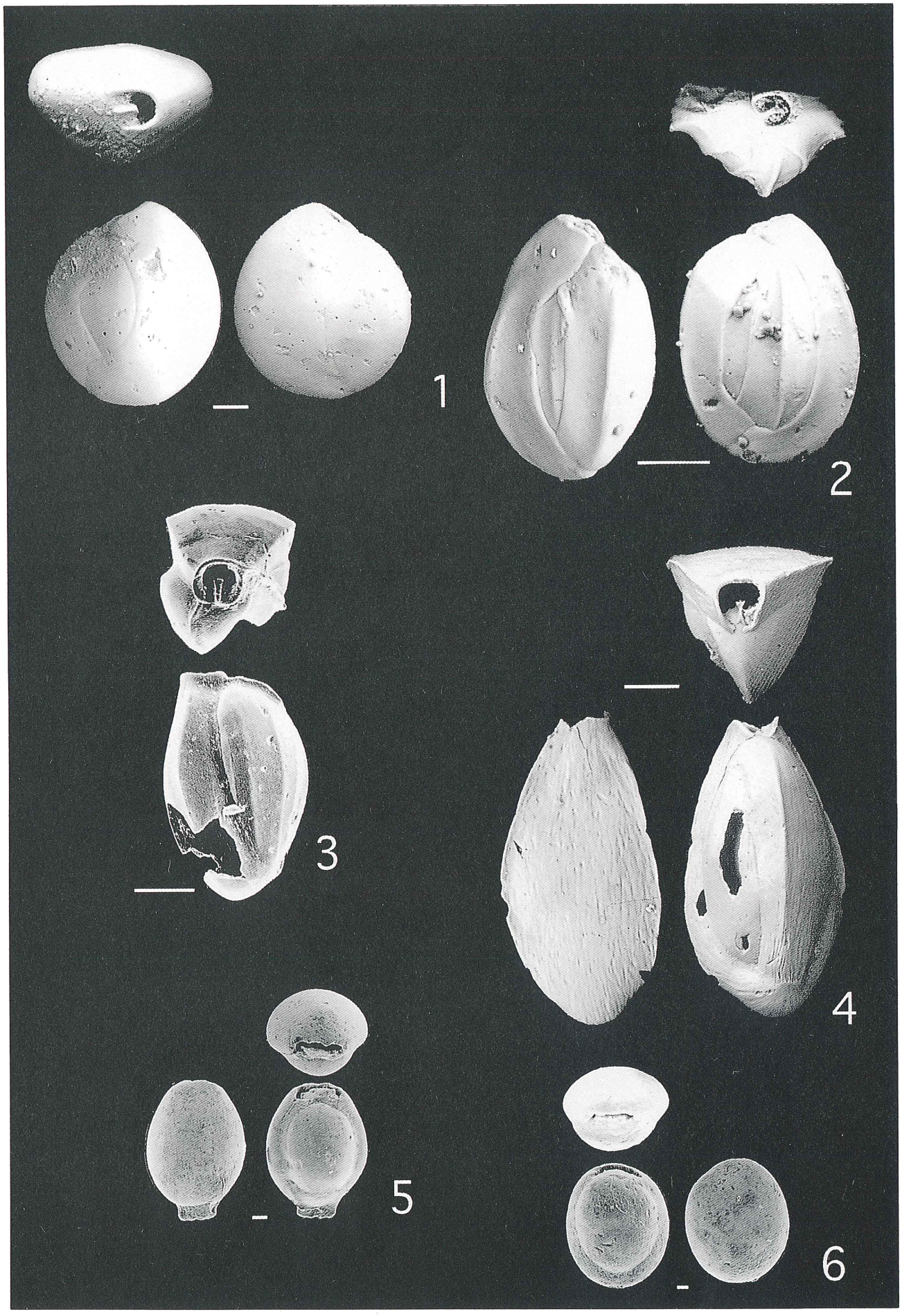
Plate 12