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Taxonomic notes on Recent Foraminifera from the Continental Shelf-Slope Region of Southwestern Bay of Bengal, East Coast of India

Tabita K. Symphonia and Nathan D. Senthil

ABSTRACT

A fully comprehensive work comprising the systematics of benthic and planktonic foraminifera is attempted for the first time from the continental shelf-slope region between Chennai and Cuddalore on the east coast of India. A total of 45 surface sediment samples and 75 subsamples from three gravity cores obtained from various depths (10–300m) were analysed to identify 286 foraminiferal species. Thus, this paper examines the taxonomic description of 262 benthic foraminifera in 117 genera and 24 planktonic foraminifera in 13 genera illustrated by SEM images.

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INTRODUCTION

Foraminifera are abundant unicellular microorganisms with pronounced diversity in the marine realm. There are around 6,800 recent species (Hayward et al., 2017) which are either planktonic or benthic in habit. They possess a mostly calcareous test although few species form agglutinated tests by cementing foreign material which are better preserved in the sediments as fossils. They are the most studied part in foraminifera as the variations in depth, salinity, temperature, nutrient flux prevalent during their short life span are recorded in their tests. These incorporated signatures make them the most reliable bioindicators to understand the present ecological conditions and reconstruct the past. A systematic morphological description is therefore essential for accurate classification of

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taxa and thereafter to identify the influence of environmental changes on their distribution pattern.

Previous Work

Foraminifera in the Bay of Bengal were first studied by Schwager (1866). Reports on foraminifera from the east coast were initially given by Carter (1880) followed by Cushman (1939a), Gnanamuthu (1943), Ganapati and Satyavati (1958), Sarojini (1958), and Rao and Vedantam (1968). Various aspects such as ecology and distribution of foraminifera (Rajasekhar, 1981), foraminiferal diversity (Naidu et al., 1990), changes in intertidal foraminifera due to oceanic disturbances (Gadi and Rajasekhar, 2007) etc. were part of further studies. The shelf off Chennai and Pondicherry (Puducherry) was studied by Setty (1976a and 1976b), Setty (1978), and Setty and Rao (1978). In the recent years the sediments from the offshore side of Chennai (Siva Kumar, 2002; Nandhakumar and Rao, 2008), Pondicherry, and Cuddalore areas (Ramesh, 2005) were analyzed for the distribution of foraminifera, but a continuous and detailed record from the south western Bay of Bengal is still lacking. Therefore, this paper aims at providing a comprehensive report on the systematics of foraminifera from the shelf-slope region off Chennai-Cuddalore.

STUDY AREA

The Bay of Bengal is the world's largest semi-enclosed bay. This tropical bay is roughly triangular in shape and is situated in the northeastern part of the Indian Ocean. It covers a total area of about 2.2 million square kilometres (La Fond, 1966) and is bounded by the Ganges-Brahmaputra deltaic region on the north, the Burmese Peninsula on the east, the Andaman and Nicobar Islands on the southeast, the east coast of India on the west, and by the Indian Ocean on the south. The east coast of India enjoys a temperature range between 27 and 29°C, a salinity of 30-33‰ (Pannikar and Jayaraman, 1966), and organic carbon content of 0.88%, which is relatively less when compared to the west coast that exhibits 5–10% (Wiseman and Bennett, 1940; Subba Rao, 1960).

The bathymetry of the study area shows that the continental shelf has an average gradient of 1:115. The outer shelf is characterized by a steep gradient of 1:80 km while the inner shelf exhibits a gradient of 1:400 km. The shelf region between Chennai-Cuddalore is narrow with an average width of 35 km. Off Puducherry in the southern side the shelf is relatively narrower (only 25 km wide) than the broader off Chennai shelf (50 km wide). The Cuddalore shelf is concave shaped and narrow with an average width of 79 km and a gentle gradient up to 3,000 m of water depth (Murthy et al., 2006). This region experiences three seasons influenced by the surface currents which are the south-west monsoon (June–September), north-east monsoon (October–January) and summer (February–May). There are also four minor eastward flowing rivers—Palar, Gingee, Ponnaiyar, and Gadilam.

MATERIAL AND METHODS

The present study is based on the analyses of a) surface samples and b) cores collected from the off-shore region between Chennai and Cuddalore (Figure 1). The co-ordinates of the sample locations and the depths are given in Table 1. This region lies within 11°40'0" N to 12°40' 0" N longitude and 79°48'0" E to 80°28'0" E latitude in the southwestern Bay of Bengal.

Sample Collection

Surface samples. A total of 45 surface sediment samples were collected by using a brass van Veen grab sampler during a cruise in May–June 2012 (cruise no. 05/2012) from *ROV Sagar Paschimi,* along eight transects across the shelf-slope region off Mahabalipuram to off Cuddalore Old Town. Samples were obtained from the sea floor at different water depths ranging from ~10 m to ~300 m except in transects I, II, and VII. Sampling was difficult from beyond 100 m depth (in Transects I and VII) and beyond 150 m (in Transect II) owing to the strong currents during the onset of southwest monsoon in the Bay. The CTD (Conductivity, Temperature, and Density) measurements for the vertical water column between ~10 m and ~300 m were recorded on board by using the CTD probe Sea bird-25. Fifty grams of the sediment from each sample was preserved immediately in Rose bengal-ethanol solution after collection in clean labelled vials and set aside for a fortnight. Samples were then oven dried at 60°C overnight and used for further analyses.

Core samples. In February 2013, core samples were procured from three different locations using a gravity corer on *ORV Sagar Manjusha* cruise no. 02/2013. Three undisturbed sediment cores collected from depths ranging from 12.5 to 60 m of water depth were used for the present study. On reaching the laboratory, all the three cores namely, Chennai core (C1: 35 cm long), Emerald Island core (C2: 60 cm long), and Ponnaiyar core (C3: 36

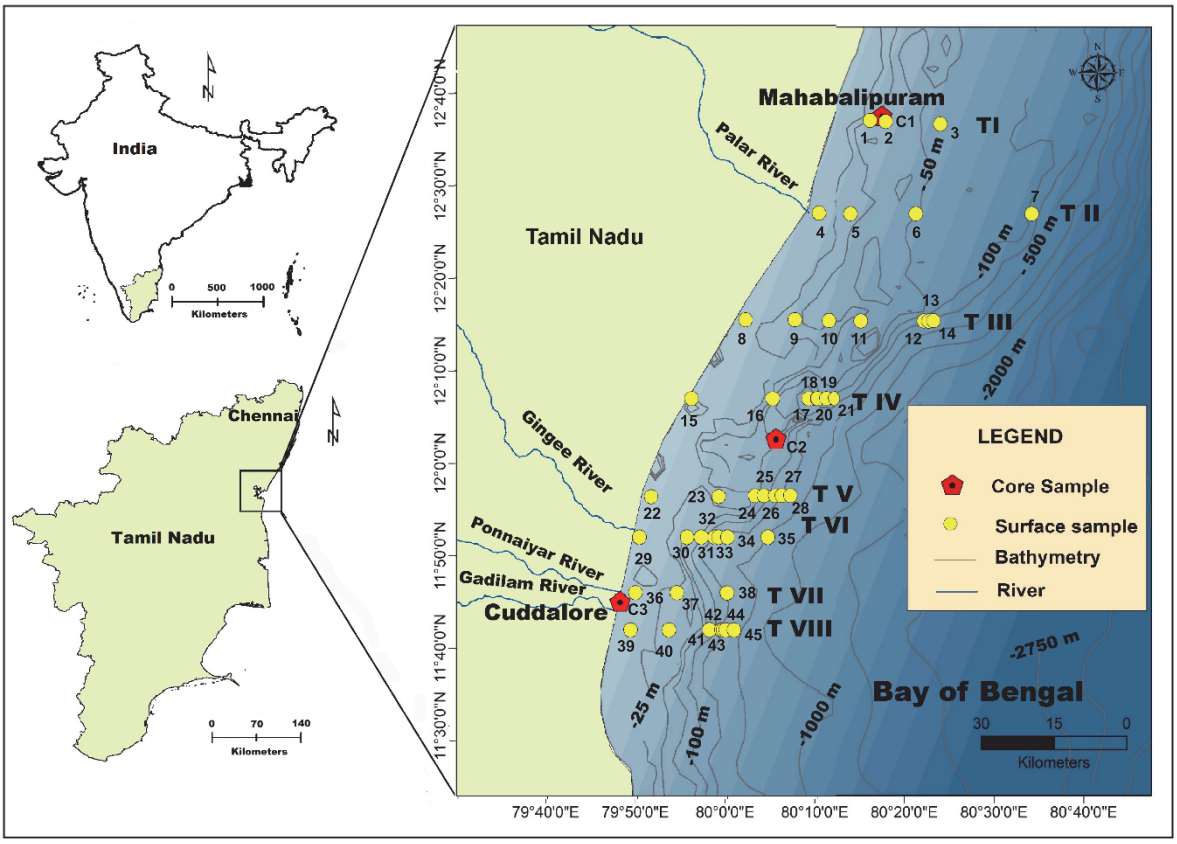

FIGURE 1. Map showing study area with sample locations. Solid yellow circles equals surface sample locations with sample numbers. TI–TVIII equals Eight traverses (I, Off Mahabalipuram; II, Off Palar River; III, Off Edierthittu; IV, Off Kazhikuppam; V, Off Muthialpet; VI, Off Gingee River; VII, Off Ponnaiyar River; VIII, Off Cuddalore) undertaken during the *ROV Sagar Paschimi* cruise 05/2012 ranging from a water depth of 10–300 m. Solid red polygons equals core sample locations with core numbers.

cm long) were sliced into 1 cm thick layers down to 5 cm and at 2 cm intervals in the remaining portion. Thus, a total of 74 subsamples—20 subsamples from C1 core, 33 subsamples from C2 core, and 21 subsamples from C3 core were obtained and investigated. Further, sediments till 10 cm depth were preserved in Rose bengal-ethanol solution and left to stand for a fortnight till further analyses.

Sample Preparation

The substrate sediments and the core samples were first washed through 40 µm, 63 µm, and 125 µm sieves in the laboratory. The residue was dried and for better identification of morphological features foraminifera were picked from >125 µm fraction. Around 300 foraminifera were picked from each subsample and sorted according to their genera and species level when possible. The list of foraminifer species with relative abundance of >5% as found in both surface and core samples are presented in Tables 2-5.

Classification

Digital photomicrographs of 286 species were obtained by Hitachi S-3400N Scanning Electron Microscope (SEM) at Pondicherry University. The images enabled the study of the morphological details and surface composition of the specimens.

The benthic foraminifera listed and described here are identified mainly based on the descriptions given by Loeblich and Tappan (1987) for supra generic level. Other references are Murray (1971), Jones (1994), Szarek (2001), Kaminski et al. (2002), Murray (2003), Javaux and Scott (2003), Riveiros and Patterson (2008), Margreth (2010), Milker and Schmiedl (2012), and Debenay (2012). A few taxa were referred from Hanagata and Nobuhara (2015).

TABLE 1. Sample locations along with geographic coordinates and depth (m).

Sample Id	Depth (m)	Station	Latitude and Longitude
S1	20	Off Mahabalipuram	N 11°34.00', E 80°15.81'
S2	32		N 11°34.00', E 80°25.50'
S3	63		N 11°34.00', E 80°34.89'
S4	8	Off Palar River	N 12°27.00', E 80°10.20'
S5	21		N 12°27.00', E 80°14.00'
S6	35		N 12°27.00', E 80°21.30'
S7	63		N 12°27.00', E 80°34.20'
S8	8	Off Edierthittu	N 12°15.50', E 80°02.00'
S9	28		N 12°15.50', E 80°07.50'
S10	46		N 12°15.40', E 80°11.30'
S11	71		N 12°15.40', E 80°15.16'
S12	86		N 12°15.40', E 80°22.20'
S13	156		N 12°15.40', E 80°22.70'
S14	205		N 12°15.44', E 80°23.24'
S15	6	Off Kazhikuppam	N 12°07.00', E 79°56.00'
S16	25		N 12°07.00', E 80°05.03'
S17	53		N 12°07.00', E 80°09.05'
S18	79		N 12°07.00', E 80°10.00'
S19	100		N 12°07.00', E 80°10.05'
S20	167		N 12°07.00', E 80°11.00'
S21	176		N 12°07.00', E 80°12.00'
S22	9	Off Muthialpet	N 11°56.40', E 79°51.50'
S23	26		N 11°56.41', E 79°59.01'
S24	51		N 11°56.50', E 80°03.05'
S25	91		N 11°56.50', E 80°04.05'
S26	138		N 11°56.50', E 80°05.30'
S27	176		N 11°56.50', E 80°06.05'
S28	308		N 11°56.50', E 80°07.00'
S29	8	Off Gingee River	N 11°52.00', E 79°50.20'
S30	25		N 11°52.00', E 79°55.50'
S31	45		N 11°52.00', E 79°57.07'
S32	95		N 11°52.00', E 79°58.60'
S33	130		N 11°52.00', E 79°59.00'
S34	149		N 11°52.00', E 80°00.00'
S35	229		N 11°52.00', E 80°04.50'
S36	11	Off Ponnaiyar River	N 11°46.00', E 79°49.74'
S37	32		N 11°46.00', E 79°54.35'
S38	74		N 11°46.00', E 79°59.95'

Table 1 (continued).

Sample Id	Depth (m)	Station	Latitude and Longitude
S39	9	Off Cuddalore	N 11°42.00', E 79°49.20'
S40	15		N 11°42.00', E 79°53.50'
S41	26		N 11°42.00', E 79°58.00'
S42	75		N 11°42.00', E 79°59.30'
S43	119		N 11°42.00', E 79°59.50'
S44	161		N 11°42.00', E 79°59.80'
S45	282		N 11°42.00', E 80°00.70'
C1	40	Off Chennai	N 12°37.61', E 80°17.52'
C2	51	Off Edierthittu	N 12°02.64', E 80°05.39'
C3	13	Off Cuddalore	N 11°45.04', E 79°48.04'

The identification of planktonic species follows the taxonomic concepts given by Parker (1962), Saito et al. (1981), Kennett and Srinivasan (1983), and Ovechkina et al. (2010). The revised names for both benthic and planktic species are according to the WoRMS classification (World Register of Marine Species by Hayward et al., 2017). All identified specimens illustrated in this paper are deposited in the Palaeontology Laboratory, Department of Earth Sciences, Pondicherry University, Puducherry, India.

SYSTEMATIC CLASSIFICATION

Kingdom CHROMISTA Cavalier-Smith, 1981
Subkingdom HAROSA Cavalier-Smith, 2010
Infrakingdom RHIZARIA Cavalier-Smith, 2002
Phylum FORAMINIFERA d'Orbigny, 1826
Class FORAMINIFERA INCERTAE SEDIS Pawlowski, Holzmann, and Tyszka, 2013
Order LAGENIDA Delage and Hérouard, 1896
Superfamily NODOSARIOIDEA Ehrenberg, 1838
Family VAGINULINIDAE Reuss, 1860
Subfamily MARGINULININAE Wedekind, 1937
Genus AMPHICORYNA Schlumberger, 1881
Amphicoryna scalaris (Batsch, 1791)
Figure 2.1-2

1791 *Nautilus (Ortoceras) scalaris* Batsch, p. 1, 4, pl. 2, fig. 4a-b.

2001 *Amphicoryna scalaris* (Batsch); Szarek, p. 201, pl. 14, fig. 18.

2003 *Amphicoryna scalaris* (Batsch); Murray, p. 17, fig. 5.1.

2010 *Amphicoryna scalaris* (Batsch); Margreth, p. 153, pl. 13, figs. 2-3.

2012 *Amphicoryna scalaris* (Batsch); Milker and Schmiedl, p. 73, fig. 18.22-25.

2012 *Amphicoryna scalaris* (Batsch); Debenay, p. 162.

Description. Test elongate, wall calcareous, surface ornamented with many striae and basal apiculate spine; chambers globular, chamber arrangement uniserial; sutures depressed; aperture crescent-shaped or radiate at the end of a long neck, rimmed, enveloped by concentric ridges.

Amphicoryna scalaris (Batsch, 1791)
macrospheric form
Figure 2.3

Description. In the macrospheric form, globular final chambers rapidly increase in size.

Subfamily LENTICULININAE Chapman, Parr, and Collins,1934
Genus LENTICULINA Lamarck, 1804
Lenticulina cultrata (de Montfort, 1808)
Figure 2.4

1808 *Robulus cultratus* de Montfort, p. 214, 540 genre.

2012 *Lenticulina cultrata* (de Monfort); Debenay, p. 223.

2015 *Lenticulina cultrata* (de Montfort); Hanagata and Nobuhara, p. 29, fig. 11.1-2.

Description. Test large, biconvex, wall finely perforate, surface smooth, no umbo; chambers many; periphery with a well-developed keel, sutures strongly curved; aperture terminal, radiate with many slits coalescing at the end of final chamber, a slit on the apertural side.

Lenticulina gibba (d'Orbigny, 1839a)
Figure 2.5

1839a *Cristellaria gibba* d'Orbigny, p. 292, no. 17.

2001 *Lenticulina gibba* (d'Orbigny); Szarek, p. 203, pl. 15, figs. 1-2.

TABLE 2. List of species showing >5% abundance in surface sediment samples.

Sample Id	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
Depth (m)	20	32	63	8	21	35	63	8	28	46	71	86
Ammonia beccarii	22	13	16	37	4	3	5	22	22	10	4	8
Rotalidium annectens	34	21	8	5	7			12				
Asterorotalia dentata	3	11						25		2		
Rotalinoides compressiuscula	21	31	3	14			5	34	31			
Quinqueloculina subparkeri	7	5	11		2			5			1	2
Quinqueloculina seminula	14	19	4	7	2	20	19	20	7	13	10	23
Lachlanella barnadi	14			13			4	3	3		2	
Quinqueloculina lamarckiana		3	10	6	8				3		1	
Quinqueloculina agglutinans	31	5	10	5	5	16	11	4	2	19	3	7
Triloculina trigonula	10		3					21				4
Triloculina insignis	9		10		7	4		8		2		2
Triloculina tricarinata	5		3	12			4	10	6		1	8
Amphistegina radiata	28	8	28	6	8	83	50		10	59	55	51
Amphistegina lessonii	3				17	12	17			26	3	16
Amphistegina papillosa		6	9		8	15	9		2	30	27	30
Amphistegina gibbosa						8	3				4	21
Amphistegina bicirculata										9	17	22
Elphidium crispum	14		6	7	3	31	9	4	4	13	8	7
Elphidium advenum var. *depressulum*	13			13				5	3	3		14
Elphidium macellum	17		3	12					6			
Textularia agglutinans	3	16	8			2			6	13	4	8
Spiroplectammina sagittula						2	4		2	7	7	5
Cibicides wuellerstorfi	16	13		69		3	10	9	37	4	9	
Cibicides praecinctus			15							11	1	
Cibicides kullenbergi					2	9	6		9		9	15
Nonionellina labradorica		5		10				8	2			
Nonionoides elongatum	2	4		19			3	15	6			
Nonion commune								11	10			
Eponides repandus	2							4			1	8
Operculina ammonoides		5	33			4			7	10	9	
Operculina granulosa			5		1	11	4	3	6	24	12	13
Rosalina globularis				20			4		10			
Lenticulina orbicularis			16				9			4	3	5
Rotalinoides gaimardi		6					3					
Pararotalia nipponica							10		1	2		
Neorotalia calcar												
Globigerinoides sacculifer	3	5	25	7	1	2	4	7	39	12	34	7
Neogloboquadrina dutertrei		3				2			5	3	20	
Globigerinella calida		2	2	2			1	2	11		2	1
Globigerina bulloides		4			1	1			2	1		
Globigerinoides ruber		1	2				3		2	3	5	5
Globigerinella siphonifera		6					1	1	2	1	1	

TABLE 3. List of species showing >5% abundance in the core sample C1 (Off Chennai).

Depth (cm)	1	2	3	4	5	7	9	11	13	15	17
Riminopsis asterizans	3	5	7	5	1			3	4	2	2
Nonionellina labradorica	33	19	42	32	18	33	12	25	10	22	25
Nonionoides boueana	10	18	18	10	12	15	10	13	20	6	15
Nonionina elongata	6	5	7	1		2	10	12	2	3	3
Nonion commune	17		9	1	3		6	6	8	7	15
Nonionoides turgida	4		1		1		8	9		3	4
Nonionoides grateloupii		2					10	2	1		
Cibicides wuellerstorfi	53	20	32	25	11	3	44	32	22	44	41
Cancris auriculus	2	2		2				2	1	2	8
Rotalinoides compressiucula	12	32	43	34	28	28	31	23	28	29	24
Asterorotalia dentata	5	15	8	11	20	18	6	12			3
Asterorotalia pulchella	28	11	21	31	46	23	10	17	25	9	5
Rotalidium annectens	4	21	34	25	73	43	7	2	34	6	3
Ammonia beccarii	17	10	8	2		5	17	20	4	26	13
Amphistegina radiata	3			2			4	2		4	1
Bolivina persiensis	2	3		1			5	3		12	6
Bolivina striatula	1	4		2			6	3		4	2
Bolivina spathulata							21	1		6	29
Pseudobrizalina lobata		2					2				2
Bulimina marginata	1						2		1		1
Siphouvigerina proboscidea		3					5			3	4
Stainforthia fusiformis	1	3					5			3	4
Textularia pseudogramen	8	7	2	4	10	5		8	17	2	3
Sahulia conica	6	12	4	5	12	19	5	9	19	9	5
Textularia agglutinans		6	10	5	16	13	3	4	8	6	1
Bigeneria nodosaria	3	18	14	12	33	21	2	8	25	5	5
Quinqueloculina undulose costata	1	2	5	1		2		1	6	5	2
Quinqueloculina seminula	2	3	1	3		8	10		5	10	5
Quinqueloculina lamarckiana		4	4	3	10	4	2	6	4	4	4
Massilina laevigata			1			2	2			3	2
Quinqueloculina bosciana		4					2			3	7
Miliolid sp.	2	6	3	5	1	4		1	3	2	2
Rosalina globularis		5					10	4		6	9
Martinottiella cylindrica		3		3	3	3	5	6	5	2	
Globigerina bulloides	15	8	5	13	9	12	9	4	6	13	7
Globogerinoides sacculifer	13	16	19	11	17	15	9	14	16	22	10
Globigerinella calida	5	10	5	11	15	4	9	3	2	8	9
Globigerinella aequilateralis	4	11	5	5	6	2	6	7	3		5
Globigerinoides ruber	2	4	8	5	5	3			2	2	
Neogloboquadrina duetertrei	5	4	8	16	15	9	3	7	8	4	5

TABLE 4. List of species showing >5% abundance in the core sample C2 (Off Emerald Island).

Depth (cm)	1	2	3	4	5	7	9	11	13	15	17
Quinqueloculina seminula	15	14	9	8	7	3	8	10	9	11	16
Quinqueloculina lamarckiana	20	15	12	7	14	9	8	17	13	4	8
Quinqueloculina laevigata	11		7	5	6	3	6	15	20	9	9
Quinqueloculina parkeri	3	4		2	3	7	2	2	3	2	5
Quinqueloculina agglutinans	14	6	4	10	24	12	15	15	3	12	5
Quinqueloculina barnadi		4	6	2	5	3	2		4	5	3
Quinqueloculina undulose costata			5	4		2		1	3	3	3
Quinqueloculina bosciana				5	3			10	4		5
Miliolid sp.	2			2	3			3			4
Miliolinella circularis		3		2	4			2	4	2	
Triloculina insignis	12	12		3	5	6	6	4	3	8	9
Pseudotriloculina sp.	8	4		3			2	1			5
Triloculina trigonula	4	11	9	12	10	11	7	7	4	23	9
Triloculina echinata	2	4		5		5	1	1		3	4
Triloculina tricarinata	2	11	8	3	6	7	8	6	13	13	15
Spiroloculina depressa	4	5		3	7	6	3	3	6	3	3
Spiroloculina excavata	2	3		2	3		2	2	3	3	
Spiroloculina orbis	4	3	5	3		5		1		3	
Spiroloculina sp.					7	4	1	3		3	4
Ammonia beccarii	16	15	22	23	13	24	23	10	30	13	15
Asterorotalia dentata	4	7	7	3	6	9	7	3	3	5	4
Rotalidium annectens	8	19	7	16	8	8	7	4	3		16
Ammonia tepida						2	1		9	2	3
Rotalinoides compressiuscula	21	15	17	24	11	28	23	19	17	21	14
Amphistegina radiata	4	3	5	2			1	1	4	3	3
Cribroelphidium excavatum	30	22	19	20	17	20	15	4	5	8	11
Elphidium crispum	15	12	17	8	12	11	17	7	13	20	13
Elphidium macellum	21	18	28	13	18	25	13	3	10	8	6
Elphidium asiaticum	8	6	8	4	5	7	4	2	5	8	3
Cibicides wuellerstorfi	46	44	51	38	45	28	68	66	63	39	41
Lobatula lobatula	6				7	4	4				
Nonionoides boueana			6	4	3		1	2	4	5	3
Nonionella labradorica	4		5	8		2	1	4		3	3
Nonionoides elongatum	10	11	14	9	11	13	22	20	17	19	22
Nonion commune	4	5	6		5		3	4		2	8
Riminopsis asterizans		5		4	3	3	5	1		2	
Pararotalia calcariformata	7	6	6	4	3	7	1	1	3	4	3
Operculina granulosa										5	3
Rosalina globularis			5	6	8	5	3	17	15	3	7
Asterorotalia inflata				2							
Globigerina bulloides	5	4	4	2	5	4	2	3		3	6
Globigerinoides sacculifer	3		6	6	5	3	2	5	7	6	8
Globigerinella calida		3		5	4	2		3	3	3	3
Globigerinoides ruber				2	3	2	2			2	

TABLE 5. List of species showing >5% abundance in the core sample C3 (Off Cuddalore).

Depth (cm)	1	2	3	4	5	7	9	11	13	15	17
Nonionoides elongatum	11	7	18	38	18	9	15	16	11	18	8
Nonion fabum	27	9	26	18	11	12	21	30	10	19	2
Nonionellina labradorica	45	93	87	57	84	90	98	75	63	53	99
Elphidium asiaticum	5	1		3			1	2	2	2	4
Spiroloculina excavata	3	2	2	3	7	1			2	1	1
Spiroloculina antillarum	2	8	12	8	7	11	9	1	4	4	3
Spiroloculina depressa	1	1	1	3	2	5	5	1	1	4	1
Ammonia beccarii	11	13	6	12	13	10	12	6	27	19	28
Asterorotalia dentata	5	9	12	13	14	12	5			2	9
Ammonia tepida	1	1		2	3		4	18	36	14	3
Triloculina tricarinata	5	9	3	7	8	12	3	6	8	8	11
Triloculina trigonula	10	20	13	4	11	9	9	8	9	16	4
Elphidium crispum	21	31	19	22	17	16	25	22	17	17	25
Elphidium hispidulum	6	12	5	6	5	11	10	10	3	8	7
Cibicides wuellerstorfi	34	24	19	33	23	22	24	24	33	32	34
Lobatula lobatula	4	3		2		2	10	1	1		
Cibicides kullenbergi	1	1	1	2	1	2	1		1		2
Quinqueloculina lamarckiana	4	8				6	3	1	2	1	
Adelosina longirostra	2		1	2		1		1	3	12	12
Rotalinoides compressiuscula	6	2	4	3	6	8	8	11	10	21	16
Rotalidium annectens			2	4	3		9	3		4	
Neorotalia calcar	8	12	3	2	2	2					
Globigerina bulloides		1		2	5	7	7	4	3	5	8

2002 *Lenticulina gibba* (d'Orbigny); Kaminski, Aksu, Box, Hiscott, Filipescu, and Al-Salameen, p. 172, pl. 2, fig. 6.

2010 *Lenticulina gibba* (d'Orbigny); Margreth, p. 150, pl. 12, fig. 7a-b.

2012 *Lenticulina gibba* (d'Orbigny); Debenay, p. 223.

Description. Test oblong, biconvex, wall finely perforate, surface smooth; chambers elongate, gradually increasing in size, chamber arrangement planispiral; periphery slightly keeled, sutures curved; aperture terminal, radiate, with a slightly longer slit on the apertural side.

Lenticulina orbicularis (d'Orbigny, 1826)
Figure 2.6-7

1826 *Robulina orbicularis* d'Orbigny, p. 288, pl. 15, figs. 8-9.

2010 *Lenticulina orbicularis* (d'Orbigny); Margreth, p. 150, pl. 12, fig. 8a-b.

2012 *Lenticulina orbicularis* (d'Orbigny); Debenay, p. 224.

2012 *Lenticulina orbicularis* (d'Orbigny); Milker and Schmiedl, p. 73, figs. 18.19-20.

Description. Test rounded, strongly biconvex, peripheral view lenticular, wall finely perforate, surface smooth, umbo prominent; chambers many, narrow; periphery with a thick keel, sutures strongly curved; aperture terminal, radiate, with a slit on the apertural side.

Lenticulina suborbicularis Parr, 1950
Figure 2.8-9

1950 *Lenticulina (Robulus) suborbicularis* Parr, p. 321, pl. 11, figs. 5-6.

2012 *Lenticulina suborbicularis* Parr; Debenay, p. 224.

Description. Test subcircular, biconvex, wall finely perforate, surface smooth, umbo broad and raised; chambers many; periphery with a thick keel, sutures strongly curved; aperture terminal, radiate, with a slit on the apertural face.

Genus MARGINULINOPSIS Silvestri, 1904
Marginulinopsis costata (Batsch, 1791)
Figure 2.10

1791 *Nautilus (Orthoceras) costatus* Batsch, p. 2, pl. 1, fig. 1.

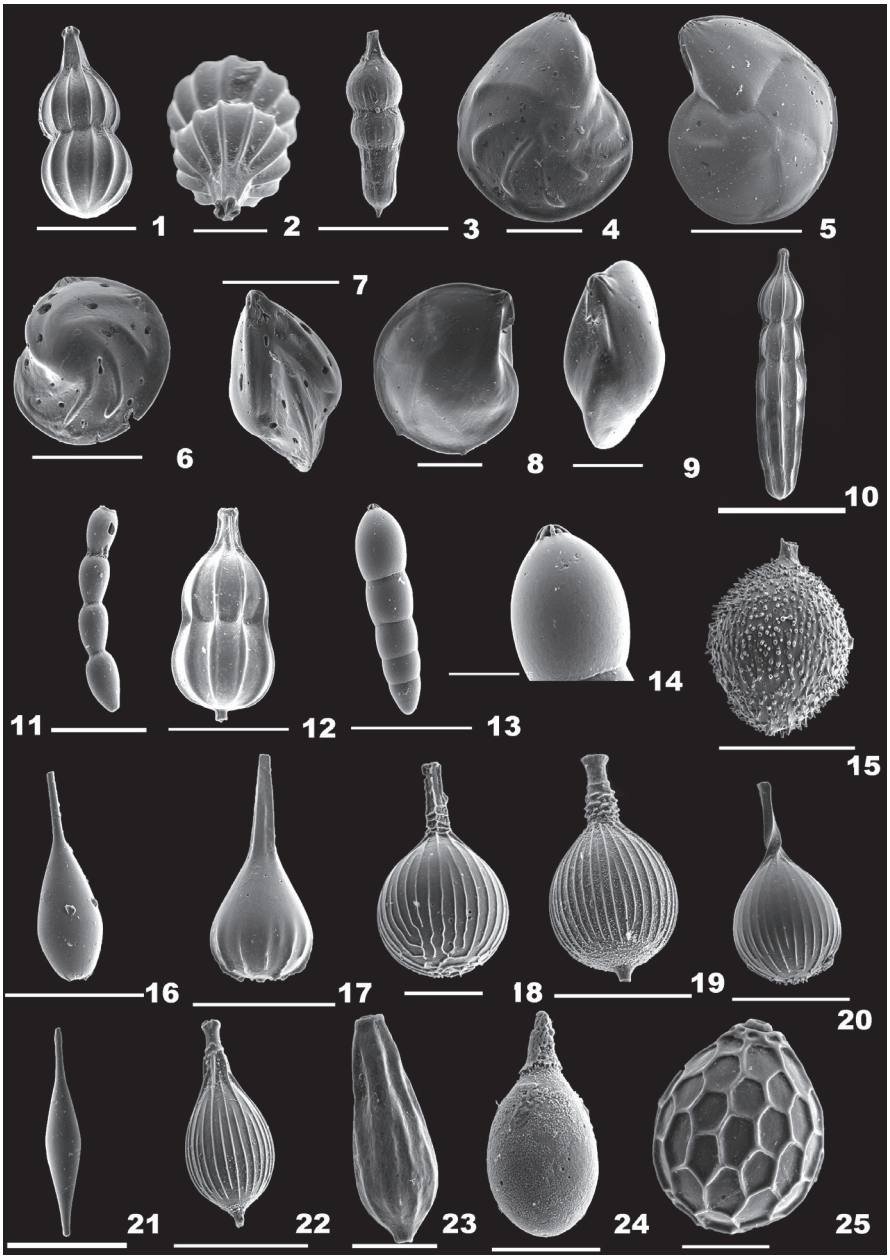

FIGURE 2. 1-3, *Amphicoryna scalaris* (Batsch, 1791) in dorsal view (scale equals 200 µm) (**1**); in apertural view (scale equals 100 µm) (**2**); and macrospheric form in dorsal view (scale equals 300 µm) (**3**). **4**, *Lenticulina cultrata* (de Montfort, 1808) in dorsal view (scale equals 500 µm). **5**, *Lenticulina gibba* (d'Orbigny, 1826) in dorsal view (scale equals 500 µm). **6-7**, *Lenticulina orbicularis* (d'Orbigny, 1826) in dorsal view (scale equals 300 µm) (**6**) and in apertural view (scale equals 300 µm) (**7**). **8-9**, *Lenticulina suborbicularis* Parr, 1950 in dorsal view (scale equals 100 µm) (**8**) and in apertural view (scale equals 100 µm) (**9**). **10**, *Marginulinopsis costata* (Batsch, 1791) in dorsal view (scale equals 1 mm). **11**, *Dentalina ittai* Loeblich and Tappan, 1953 in dorsal view (scale equals 200 µm). **12**, *Pyramidulina catesbyi* (d'Orbigny, 1839) in dorsal view (scale equals 200 µm). **13-14**, *Pseudolingulina bradii* (Silvestri, 1903) in dorsal view (scale equals 400 µm) (**13**) and in apertural view (scale equals 100 µm) (**14**). **15**, *Lagena aspera* Reuss, 1861 in dorsal view (scale equals 300 µm). **16**, *Lagena perlucida* (Montagu, 1803) in dorsal view (scale equals 300 µm). **17**, *Lagena semistriata* Williamson, 1848 in dorsal view (scale equals 200 µm). **18**, *Lagena striata* (d'Orbigny, 1839) in dorsal view (scale equals 100 µm). **19**, *Lagena strumosa* Reuss, 1858 in dorsal view (scale equals 200 µm). **20**, *Hyalinonetrion gracillima* (Seguenza, 1862) in dorsal view (scale equals 300 µm). **21**, *Lagena substriata* Williamson, 1848 in dorsal view (scale equals 200 µm). **22**, *Procerolagena gracilis* (Williamson, 1848) in dorsal view (scale equals 200 µm). **23**, *Procerolagena* sp. in dorsal view (scale equals 100 µm). **24**, *Reussoolina laevis* (Montagu, 1803) in dorsal view (scale equals 100 µm). **25**, *Favulina hexagona* (Williamson, 1848) in dorsal view (scale equals 50 µm).

2012 *Marginulina costata* (Batsch); Milker and Schmiedl, p. 73, fig. 18.26.

Description. Test elongate, cross section subcylindrical or oval, wall calcareous, surface ornamented with long striae; earlier chambers compact, final chambers inflated and subspherical, closely coiled initially, later uniserially arranged; sutures indistinct in the earlier chambers, straight and depressed in the final chambers; aperture terminal at the end of a short neck.

Family NODOSARIIDAE Ehrenberg, 1838
Subfamily NODOSARIINAE Ehrenberg, 1838
Genus DENTALINA d'Orbigny, 1826
Dentalina ittai Loeblich and Tappan, 1953
Figure 2.11

1953 *Dentalina ittai* Loeblich and Tappan, p. 56, pl. 10, figs. 10-12.

2008 *Dentalina ittai* Loeblich and Tappan; Riveiros and Patterson, p. 14, figs. 6.1a-b.

Description. Test free, elongate, slightly bent, wall calcareous, finely perforate, surface smooth; chambers elliptical, of uniform size, slightly overlapping, uniserially arranged; sutures distinct; aperture terminal, round, slightly raised.

Genus PYRAMIDULINA Fornasini, 1894
Pyramidulina catesbyi (d'Orbigny, 1839a)
Figure 2.12

1839a *Nodosaria catesbyi* d'Orbigny, p. 16, pl. 1, figs. 8-10.

2012 *Pyramidulina catesbyi* (d'Orbigny); Debenay, p. 168.

2012 *Pyramidulina catesbyi* (d'Orbigny); Milker and Schmiedl, p. 72, fig. 18.15-16.

Description. Test elongate, cross section subspherical or ovate, wall calcareous, finely perforate, surface ornamented with long striae and a prominent basal spine; chambers two, initial chamber globular, second chamber nearly pyriform, chamber arrangement uniserial; suture distinct, depressed; aperture terminal, radiate at the end of a well-developed neck.

Subfamily LINGULININAE Loeblich and Tappan, 1961
Genus PSEUDOLINGULINA McCulloch, 1977
Pseudolingulina bradii Silvestri, 1903
Figure 2.13-14

1903 *Lingulonodosaria bradii* Silvestri, p. 48.

2013 *Pseudolingulina bradii* Silvestri; Jones, p. 37, pl. 2, fig. 1.

Description. Test elongate, cross section circular, wall calcareous, surface smooth, no ornamentation; chambers subglobular, slightly overlapping, initial chamber tapering, gradually increasing in size as added, arranged linearly; sutures distinct and depressed; aperture terminal, radiate.

Family LAGENIDAE Reuss, 1862
Genus LAGENA Walker and Boys, 1784
Lagena aspera Reuss, 1861
Figure 2.15

1861 *Lagena aspera* Reuss, p. 305, pl. 1, fig. 5.

2006 *Lagena aspera* Reuss; Figueroa, Marchant, Gigglio and Ramírez, fig. 13.

Description. Test subglobular, wall calcareous, hyaline, surface ornamented with regular rows of spines; chamber single; aperture terminal, round at the end of a short neck.

Lagena perlucida (Montagu, 1803)
Figure 2.16

1803 *Vermiculum perlucidum* Montagu, p. 525, pl. 14, fig. 3.

2002 *Lagena perlucida* (Montagu); Gandhi, Rajamanickam and Nigam, p. 56, pl. 2, fig. 3.

Description. Test flask-shaped, unilocular, wall calcareous, finely perforate, surface smooth except for striations at the aboral end; aperture terminal, round at the end of a long neck.

Lagena semistriata Williamson, 1848
Figure 2.17

1848 *Lagena striata* (Montagu) var. *semistriata* Williamson, p. 14, pl. 1, figs. 9-10.

1994 *Lagena semistriata* Williamson; Jones, p. 64, pl. 57, figs. 14, 16.

Description. Test pear-shaped with a flat base, wall calcareous, finely perforate, surface smooth except for the striations in the basal half of the test; single chambered; aperture terminal at the end of a long, striated neck.

Lagena striata (d'Orbigny, 1839a)
Figure 2.18

1839a *Oolina striata* d'Orbigny, p. 21, pl. 5, fig. 12.

2002 *Lagena striata* (d'Orbigny); Kaminski, Aksu, Box, Hiscott, Filipescu, and Al-Salameen, p. 172, pl. 2, fig. 4.

2012 *Lagena striata* (d'Orbigny); Milker and Schmiedl, p.75, fig. 18.33.

Description. Test globular, wall calcareous, hyaline, unilocular, surface ornamented with many long striae and an apical pseudospine; aperture crescent-like with polygonal corrugations at the base of a long neck.

Lagena strumosa Reuss, 1858
Figure 2.19

1858 *Lagena strumosa* Reuss, p. 434.

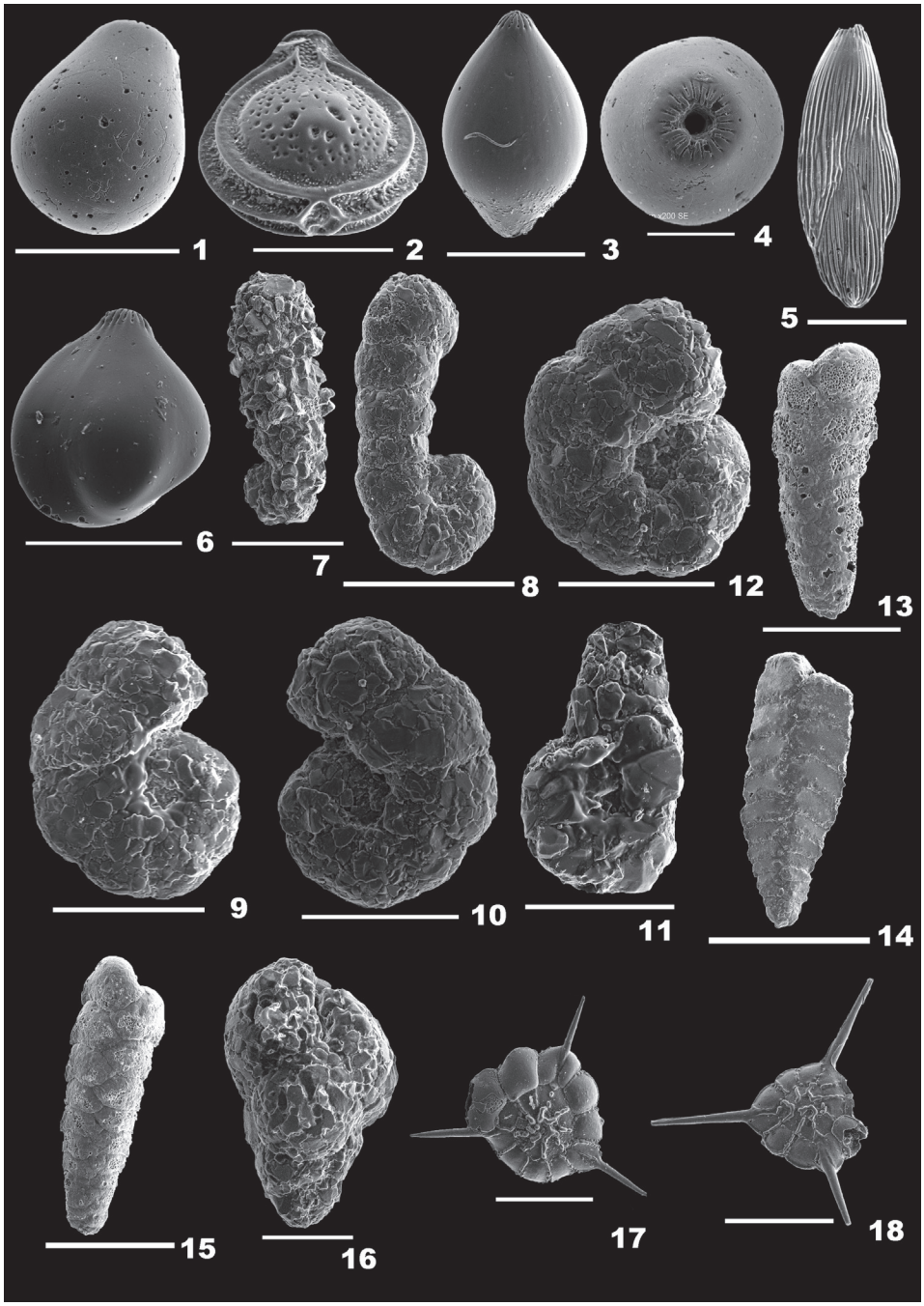

FIGURE 3. 1, *Fissurina laevigata* Reuss, 1850 in dorsal view (scale equals 400 µm). **2**, *Fissurina orbignyana* Seguenza, 1862 in lateral view (scale equals 100 µm). **3-4**, *Glandulina ovula* d'Orbigny, 1846 in dorsal view (scale equals 300 µm) (**3**) and in apertural view (scale equals 200 µm) (**4**). **5**, *Pseudopolymorphina* sp. in dorsal view (scale equals 500 µm). **6**, *Sigmoidella elegantissima* (Parker and Jones, 1865) in dorsal view (scale equals 300 µm). **7**, *Ammobaculites agglutinans* (d'Orbigny, 1846) in dorsal view (scale equals 500 µm). **8**, *Ammobaculites exiguus* Cushman and Brönnimann, 1948 in dorsal view (scale equals 300 µm). **9-10**, *Ammobaculites persicus* Lutze, 1974 in dorsal view (scale equals 200 µm) (**9**) and in ventral view (scale equals 200 µm) (**10**). **11**, *Ammoscalaria pseudospiralis* (Williamson, 1858) in dorsal view (scale equals 300 µm). **12**, *Labrospira crassimargo* (Norman, 1892) in dorsal view (scale equals 200 µm). **13**, *Spiroplectammina sagittula* (Defrance, 1824) in dorsal view (scale equals 400 µm). **14**, *Spiroplectinella wrightii* (Silvestri, 1903) in dorsal view (scale equals 500 µm). **15**, *Spirotextularia floridana* (Cushman, 1922a) in dorsal view (scale equals 500 µm). **16**, *Eggerelloides scaber* (Williamson, 1858) in dorsal view (scale equals 100 µm). **17-18**, *Asterorotalia pulchella* (d'Orbigny, 1839) in dorsal view (scale equals 500 µm) (**17**) and in dorsal view with long spines (scale equals 500 µm) (**18**).

2012 *Lagena strumosa* Reuss; Debenay, p. 153.

2012 *Lagena strumosa* Reuss; Milker and Schmiedl, p. 70, fig. 18.34.

Description. Test globular, unilocular, flask-shaped with a long neck, wall perforate, surface ornamented with long striae, neck with irregular annuli and fine spines, distinct basal spine; aperture crescent-like, at the end of the neck, with a thick, expanded lip.

Lagena substriata Williamson, 1848
Figure 2.20

1848 *Lagena substriata* Williamson, p. 15, pl. 2, fig. 12.

2003 *Lagena substriata* Williamson; Murray, p. 17, fig. 5.7.

Description. Test subglobular, wall calcareous, finely perforate, surface ornamented with long striae, base with short spines; single-chambered; aperture terminal, round at the end of a long neck twisted at the base.

Genus HYALINONETRION Patterson and Richardson, 1988
Hyalinonetrion gracillima (Seguenza, 1862)
Figure 2.21

1862 *Amphorina gracillima* Seguenza, p. 51, pl. 1, fig. 37.

2012 *Hyalinonetrion gracillima* (Seguenza); Debenay, p. 152.

2012 *Hyalinonetrion gracillima* (Seguenza); Milker and Schmiedl, p. 74, fig. 18.30.

Description. Test elongate, spindle-shaped with a long neck, aboral end acute, wall calcareous, hyaline with fine perforations, surface smooth; aperture terminal, rimmed by a phialine lip.

Genus PROCEROLAGENA Puri, 1954
Procerolagena gracilis (Williamson, 1848)
Figure 2.22

1848 *Lagena gracilis* Williamson, p. 13, pl. 1, fig. 5.

2008 *Procerolagena gracilis* (Williamson); Riveiros and Patterson, p. 16, fig. 6.7.

2015 *Procerolagena gracilis* (Williamson); Hanagata and Nobuhara, p. 37, fig. 13.12.

Description. Test slightly elongate, unilocular with a distinct basal spine, wall calcareous, finely perforate, surface ornamented with long striae extending only up to half of the neck; aperture terminal, at the end of the neck, bordered by a phialine lip.

Procerolagena sp.
Figure 2.23

Description. Test elongate, slightly compressed, wall calcareous, hyaline, surface ornamented with striae and a distinct, stout basal spine; single-chambered; aperture terminal, round at the end of a blunt neck, bordered by a thick rim.

Genus REUSSOOLINA Colom, 1956
Reussoolina laevis (Montagu, 1803)
Figure 2.24

1803 *Vermiculum laeve* Montagu, p. 524, pl. 1, fig. 9.

2008 *Lagena laevis* (Montagu); Riveiros and Patterson, p. 14, figs. 6.3a-b.

Description. Test flask-shaped with a rounded base and a subcylindrical neck; wall calcareous, finely perforate, surface smooth or with low costae developed on the basal half of the test; single-chambered; aperture terminal, round at the end of the neck, with a flared lip.

Superfamily POLYMORPHINOIDEA d'Orbigny, 1839
Family ELLIPSOLAGENIDAE Silvestri, 1923
Subfamily OOLININAE Loeblich and Tappan, 1961
Genus FAVULINA Patterson and Richardson, 1988
Favulina hexagona (Williamson, 1848)
Figure 2.25

1848 *Entosolenia squamosa* (Montagu) var. *hexagona* Williamson, p. 20, pl. 2, fig. 23.

2002 *Favulina hexagona* (Williamson); Kaminski, Aksu, Box, Hiscott, Filipescu, and Al-Salameen, p. 172, pl. 2, fig. 8.

2010 *Favulina hexagona* (Williamson); Margreth, p. 107, pl. 14, fig. 7.

2012 *Favulina hexagona* (Williamson); Debenay, p. 144.

2012 *Favulina hexagona* (Williamson); Milker and Schmiedl, p.77, fig. 19.4.

Description. Test subglobular, wall calcareous, hyaline, surface ornamented with large, raised hexagonal reticulate ridges; chamber single; aperture terminal, rounded at the end of a short neck surrounded by a thick band-like lip.

Subfamily ELLIPSOLAGENINAE Silvestri, 1923
Genus FISSURINA Reuss, 1850
Fissurina laevigata Reuss, 1850
Figure 3.1

1850 *Fissurina laevigata* Reuss, p. 366, pl. 46, fig. 1.

2012 *Fissurina laevigata* Reuss; Debenay, p. 147.

Description. Test pyriform, unilocular, wall calcareous, finely perforate, surface smooth; aperture terminal, an oval opening.

Fissurina orbignyana Seguenza, 1862
Figure 3.2

1862 *Fissurina orbignyana* Seguenza, p. 66, pl. 2, figs. 25-26.

2003 *Fissurina orbignyana* Seguenza; Murray, p. 17, fig. 5.5-6.

2012 *Fissurina orbignyana* Seguenza; Milker and Schmiedl, p. 79, fig. 19.13.

Description. Test subrounded, wall calcareous, thickly perforated, surface ornamented with short spines; single-chambered; periphery with three prominent keels; aperture terminal, an irregular oval-shaped opening, bordered by a thick lip.

Family GLANDULINIDAE Reuss, 1860
Subfamily GLANDULININAE Reuss, 1860
Genus GLANDULINA d'Orbigny, 1839a
Glandulina ovula d'Orbigny, 1846
Figure 3.3-4

1846 *Glandulina ovula* d'Orbigny, p. 21, pl. 2, figs. 6-7.

2006 *Glandulina ovula* d'Orbigny; Figueroa, Marchant, Gigglio and Ramírez, fig. 11a-b.

2015 *Glandulina ovula* d'Orbigny; Hanagata and Nobuhara, p. 41, fig. 14.20-21.

Description. Test fusiform, wall calcareous, finely perforate, surface smooth, basal part with short spines; chamber more inflated; aperture terminal, several slits fuse to form one circular opening.

Family POLYMORPHINIDAE d'Orbigny, 1839
Subfamily POLYMORPHININAE d'Orbigny, 1839
Genus PSEUDOPOLYMORPHINA Cushman and Ozawa, 1928
Pseudopolymorphina sp.
Figure 3.5

1884 *Polymorphina compressa* (d'Orbigny); Brady, p. 564, pl. 72, figs. 9-11.

2012 *Pseudopolymorphina* sp. Debenay, p. 176.

Description. Test oval-shaped, compressed, wall calcareous, finely perforate, surface ornamented with many, continuous striations; initial chambers compressed, final chambers slightly inflated, rapidly increasing in size as added, chamber arrangement biserial; sutures depressed; aperture terminal, radiate.

Genus SIGMOIDELLA Cushman and Ozawa, 1928
Sigmoidella elegantissima (Parker and Jones, 1865)
Figure 3.6

1865 *Polymorphina elegantissima* Parker and Jones, p. 438.

2012 *Sigmoidella elegantissima* (Parker and Jones); Debenay, p. 248.

2015 *Sigmoidella elegantissima* (Parker and Jones); Hanagata and Nobuhara, p. 38, fig. 13.24-26.

Description. Test large, asymmetrical, cross section sigmoidal, wall calcareous, finely perforate, surface smooth; final chambers enveloping the initial ones on one side, coiling partially evolute on the other side; sutures slightly depressed; aperture terminal, radiate.

Class GLOBOTHALAMEA Pawlowski, Holzmann, Tyszka, 2013
Subclass TEXTULARIIA Mikhalevich, 1980
Order LITUOLIDA Lankester, 1885
Suborder LITUOLINA Lankester, 1885
Superfamily LITUOLOIDEA de Blainville, 1827
Family LITUOLIDAE de Blainville, 1827
Subfamily AMMOMARGINULININAE Podobina, 1978
Genus AMMOBACULITES Cushman, 1910
Ammobaculites agglutinans (d'Orbigny, 1846)
Figure 3.7

1846 *Spirolina agglutinans* d'Orbigny, p. 137, pl. 7, figs. 10-12.

1985 *Ammobaculites agglutinans* (d'Orbigny); Papp and Schmidt, p. 54, pl. 45, figs. 6-9.

2001 *Ammobaculites agglutinans* (d'Orbigny); Szarek, p. 85, pl. 5, fig. 2.

2010 *Ammobaculites agglutinans* (d'Orbigny); Margreth, p. 97, pl. 3, fig. 4a-b.

2012 *Ammobaculites agglutinans* (d'Orbigny); Debenay, p. 74.

2014 *Ammobaculites agglutinans* (d'Orbigny); Panchang and Nigam, pl. 1, figs. 21-24.

Description. Test elongate, umbilical area slightly concave, wall coarsely agglutinated, surface rough; early chambers small, compressed, and planispirally coiled, later chambers uncoiled, cylindrical, gradually increasing in size as added; periphery rounded, sutures obscured; aperture terminal, simple at the centre of the apertural face.

Ammobaculites exiguus Cushman and Brönnimann, 1948
Figure 3.8

1948 *Ammobaculites exiguus* Cushman and Brönnimann, p. 38, pl. 7, figs. 7-8.

2012 *Ammobaculites exiguus* Cushman and Brönnimann; Debenay, p. 74.

Description. Test elongate, wall agglutinated, surface smoothly finished; early chambers closely coiled, adult chambers rectilinearly arranged; periphery rounded, sutures distinct, depressed; aperture terminal, a circular opening.

Ammobaculites persicus Lutze, 1974
Figure 3.9-10

1974 *Ammobaculites persicus* Lutze, p. 9, pl. 2, figs. 27-35.

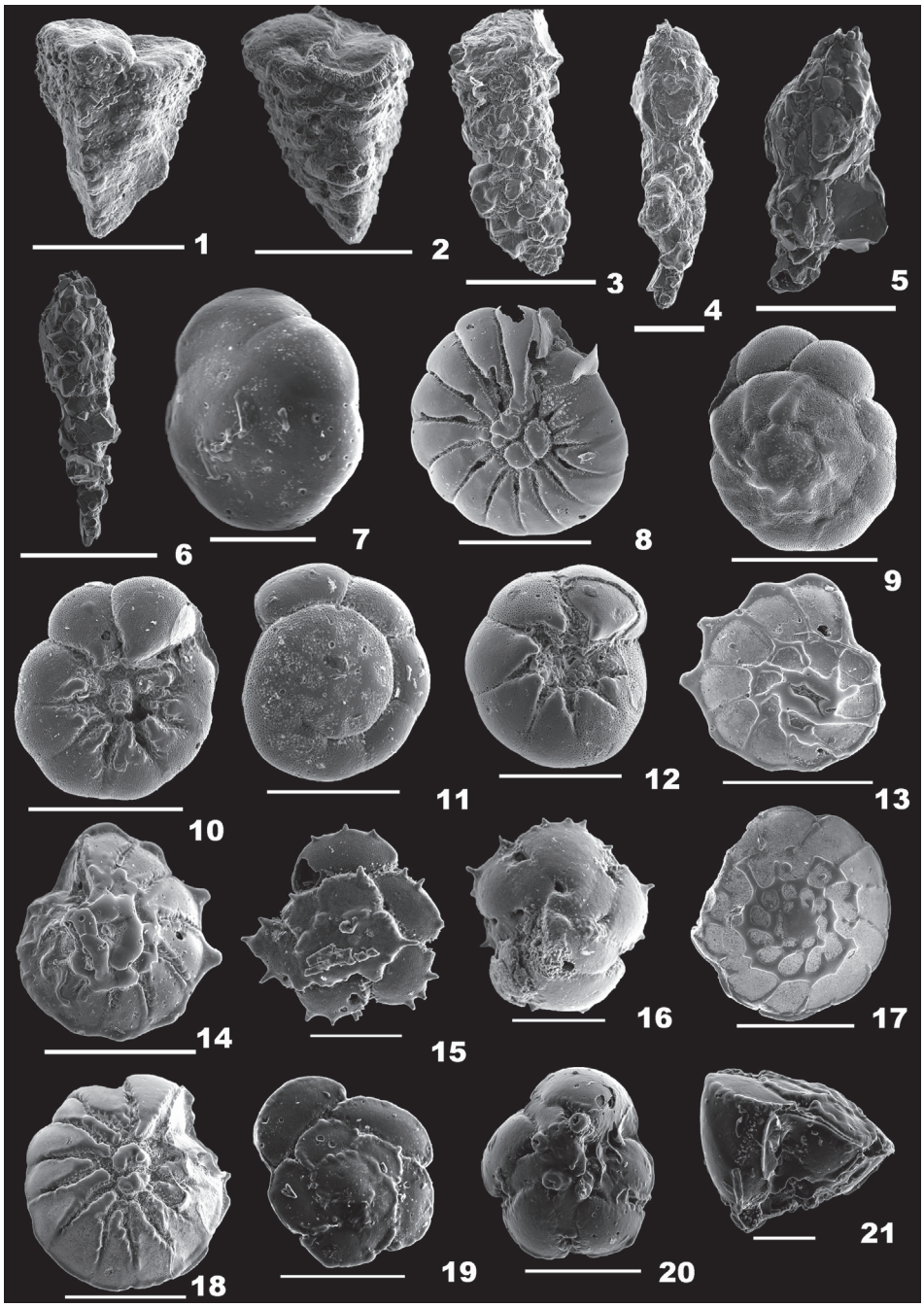

FIGURE 4. **1**, *Gaudryina angulata* Cushman, 1924 in dorsal view (scale equals 300 µm). **2**, *Gaudryina convexa* (Karrer, 1865) in dorsal view (scale equals 300 µm). **3**, *Reophax agglutinatus* Cushman, 1913 in dorsal view (scale equals 500 µm). **4-5**, *Reophax scorpiurus* de Montfort, 1808 in dorsal view (scale equals 500 µm) (**4**) and in dorsal view (scale equals 400 µm) (**5**). **6**, *Nodulina dentaliniformis* (Brady, 1881) in dorsal view (scale equals 500 µm). **7-8**, *Ammonia beccarii* (Linnaeus, 1758) in dorsal view (scale equals 100 µm) (**7**) and in ventral view (scale equals 500 µm) (**8**). **9-10**, *Ammonia parkinsoniana* (d'Orbigny, 1839) in dorsal view (scale equals 200 µm) (**9**) and in ventral view (scale equals 200 µm) (**10**). **11-12**, *Ammonia tepida* (Cushman, 1926) in dorsal view (scale equals 200 µm) (**11**) and in ventral view (scale equals 200 µm) (**12**). **13-14**, *Asterorotalia dentata* (Parker and Jones, 1865) in dorsal view (scale equals 500 µm) (**13**) and in ventral view (scale equals 500 µm) (**14**). **15-16**, *Asterorotalia inflata* (Millett, 1904) in dorsal view (scale equals 100 µm) (**15**) and in ventral view (scale equals 100 µm) (**16**). **17-18**, *Rotalidium annectens* Parker and Jones, 1865 in dorsal view (scale equals 500 µm) (**17**) and in ventral view (scale equals 400 µm) (**18**). **19-21**, *Rotalinoides compressiuscula* (Brady, 1884) in dorsal view (scale equals 200 µm) (**19**); in ventral view (scale equals 200 µm) (**20**); and in lateral view (scale equals 100 µm) (**21**).

1999 *Ammobaculites persicus* Lutze; Nigam and Khare, p. 288, pl. 1, fig. 5.

Description. Test short, stout, umbilical region excavated, wall coarsely agglutinated, surface smooth; chambers initially closely coiled, final chambers arranged uniserially; periphery rounded, sutures distinct, depressed; aperture terminal and round.

Family DISCAMMINIDAE Mikhalevich, 1980
Genus AMMOSCALARIA Höglund, 1947
Ammoscalaria pseudospiralis (Williamson, 1858)
Figure 3.11

1858 *Proteonina pseudospiralis* Williamson, p. 2, pl. 1, figs. 2-3.

2003 *Ammoscalaria pseudospiralis* (Williamson); Murray, p. 11, fig. 2.3.

2014 *Ammoscalaria pseudospiralis* (Williamson); Panchang and Nigam, pl. 1, figs. 16a-b, 17.

Description. Test free, elongate, flattened laterally, wall coarsely agglutinated, surface rough; initial chambers compressed, planispirally arranged, later arranged linearly, aboral end broadly rounded, sutures indistinct; aperture terminal, rounded at the end of the final chamber.

Family HAPLOPHRAGMOIDIDAE Maync, 1952
Genus LABROSPIRA Höglund, 1947
Labrospira crassimargo (Norman, 1892)
Figure 3.12

1892 *Haplophragmium crassimargo* Norman, p. 17, pls. 7-8.

2008 *Cribrostomoides crassimargo* (Norman); Riveiros and Patterson, p. 5, fig. 2.2.

2012 *Labrospira crassimargo* (Norman); Hemleben, Spindler and Anderson, p. 332, pl. 2, figs. 16-17; pl. 7, figs. 6-8.

Description. Test robust, wall coarsely agglutinated, surface smooth, umbilical region depressed; chambers slightly inflated, coiling planispiral, partially evolute, gradually increasing in size as added; periphery broadly rounded, sutures distinct, depressed; aperture terminal, rounded.

Suborder SPIROPLECTAMMININA Mikhalevich, 1992
Superfamily SPIROPLECTAMMINOIDEA Cushman, 1927
Family SPIROPLECTAMMINIDAE Cushman, 1927
Subfamily SPIROPLECTAMMININAE Cushman, 1927
Genus SPIROPLECTAMMINA Cushman, 1927
Spiroplectammina sagittula (Defrance, 1824)
Figure 3.13

1824 *Textularia sagittula* Defrance, p. 177, pl. 13, fig. 5-5a.

2003 *Textularia sagittula* (Defrance); Murray, p. 15, fig. 3.12-14.

2006 *Spiroplectinella sagittula* (d'Orbigny); Oflaz, p. 129, pl. 1, fig. 2.

Description. Test elongate, slightly compressed laterally, outline subtriangular, wall agglutinated, surface smooth; chambers biserially arranged, gradually increasing in size as added; periphery subacute, sutures curved, slightly depressed; aperture terminal, low arched opening, bordered by a lip.

Genus SPIROPLECTINELLA Kisel'man, 1972
Spiroplectinella wrightii (Silvestri, 1903)
Figure 3.14

1903 *Spiroplecta wrightii* Silvestri, p. 59, text-figs. 1-6.

2001 *Spiroplectinella wrightii* (Silvestri); Szarek, p. 88, pl. 6, fig. 8.

2010 *Spiroplectinella wrightii* (Silvestri); Margreth, p. 133, pl. 3, fig. 6a-c.

2012 *Spiroplectinella sagittula* s.l. (Defrance); Milker and Schmiedl, p. 31, fig. 9.19-21.

2015 *Spiroplectinella wrightii* (Silvestri); Hanagata and Nobuhara, p. 14, fig. 6.7-8.

Description. Test triangular, wall finely agglutinated, surface smooth; chambers not inflated, compressed, gradually increasing in size as added, biserially arranged; periphery acutely angled, sutures distinct, depressed; aperture terminal, low arched opening, bordered by a lip.

Subfamily SPIROTEXTULARIINAE Saidova, 1975
Genus SPIROTEXTULARIA Saidova, 1975
Spirotextularia floridana (Cushman, 1922a)
Figure 3.15

1922a *Textularia floridana* Cushman, p. 24, pl. 1, fig. 7.

2001 *Spirotextularia floridana* (Cushman); Szarek, p. 88, pl. 6, figs. 11-13.

2012 *Spirotextularia floridana* (Cushman); Debenay, p. 95.

Description. Test elongate, narrow, much longer than wide, compressed laterally, apertural end broadly rounded, gently tapering towards the aboral end, wall finely agglutinated, surface smooth; chambers biserially arranged, gradually increasing in size as added, chamber ends compressed and projected along the sides; periphery subangular, peripheral margins nearly parallel, sutures very distinct and curved, slightly depressed; aperture terminal, small slit-like opening, bordered by a lip.

Suborder VERNEUILININA Mikhalevich and Kaminski, 2004

Superfamily VERNEUILINOIDEA Cushman, 1911
Family PROLIXOPLECTIDAE Loeblich and Tappan, 1985
Genus EGGERELLOIDES Haynes, 1973
Eggerelloides scaber (Williamson, 1858)
Figure 3.16

1858 *Bulimina scabra* Williamson, p. 65, pl. 3, figs. 136-137.

2003 *Eggerelloides scaber* (Williamson); Murray, p. 13, fig. 2.11.

2010 *Eggerelloides scaber* (Williamson); Margreth, p. 98, pl. 5, fig. 4.

2012 *Eggerelloides scabrus* (Williamson); Milker and Schmiedl, p. 37, fig. 10.9.

Description. Test subfusiform, wall coarsely agglutinated, surface smooth; chambers inflated, subglobular, trochospirally arranged initially, later triserially arranged with gradual increase in size; periphery rounded, sutures arcuate, depressed; aperture terminal, interiomarginal with a curved toothplate.

Family VERNEUILINIDAE Cushman, 1911
Subfamily VERNEUILININAE Cushman, 1911
Genus GAUDRYINA d'Orbigny, 1839
Gaudryina angulata Cushman, 1924
Figure 4.1

1924 *Gaudryina triangularis* (Cushman) var. *angulata* Cushman, p. 22.

2014 *Gaudryina angulata* Cushman; Panchang and Nigam, pl. 2, fig. 18a-b.

Description. Test triangular, wall arenaceous, surface smooth; chambers broad at the apertural end, pointed at the aboral end, angular on both sides; periphery acutely angled, sutures distinct, depressed; apertural side truncate, aperture terminal, low, slit-like depression.

Gaudryina convexa (Karrer, 1865)
Figure 4.2

1865 *Textilaria convexa* Karrer, p. 78, pl. 16, fig. 8a-c.

2012 *Gaudryina convexa* (Karrer); Debenay, p. 81.

2014 *Gaudryina convexa* (Karrer); Panchang and Nigam, pl. 2, fig. 19a-b.

Description. Test triangular, wall coarsely agglutinated, surface rough; final chambers broad, tapering towards the apex, flat on one side, strongly convex on the opposite side; periphery subacutely rounded, sutures depressed; apertural side obliquely truncate, aperture a low depression in the final chamber, bordered by a lip.

Suborder HORMOSININA Haeckel, 1894
Superfamily HORMOSINOIDEA Haeckel, 1894
Family REOPHACIDAE Cushman, 1927
Genus REOPHAX de Montfort, 1808
Reophax agglutinatus Cushman, 1913
Figure 4.3

1913 *Reophax agglutinatus* Cushman, p. 637, pl. 79 fig. 6.

2010 *Reophax agglutinatus* Cushman; Margreth, p. 96, pl. 2, fig. 1a-b.

2012 *Reophax agglutinatus* Cushman; Debenay, p. 89.

Description. Test subcylindrical, tapering towards the aboral end, wall coarsely agglutinated, composed of arenaceous material held together with grayish cement, surface rough; chambers many; aperture terminal on a slightly raised neck.

Reophax scorpiurus de Montfort, 1808
Figure 4.4-5

1808 *Reophax scorpiurus* de Montfort, p. 331.

2001 *Reophax scorpiurus* de Montfort; Szarek, p. 80, pl. 3, figs. 1-5.

2010 *Reophax scorpiurus* de Montfort; Margreth, p. 96, pl. 2, fig. 3a-b.

2011 *Reophax scorpiurus* de Montfort; Kaminski and Cetean, p. 65, pl. 2, figs. 23-25.

2012 *Reophax scorpiurus* de Montfort; Milker and Schmiedl, p. 32, fig 9.8.

2012 *Reophax scorpiurus* de Montfort; Debenay, p. 91.

2014 *Reophax scorpiurus* de Montfort; Panchang and Nigam, pl. 1, fig. 9.

Description. Test elongate, uniserial, wall coarsely agglutinated, surface irregular; chambers almost cylindrical or pyriform, increasing in size as added, arranged in an irregular series, early chambers slightly arcuate, final chamber fusiform or globular, tapering to the aperture; sutures horizontal, distinct and depressed; aperture simple, rounded, terminal on a short neck.

Genus NODULINA Rhumbler, 1895
Nodulina dentaliniformis (Brady, 1881)
Figure 4.6

1881 *Reophax dentaliniformis* Brady, p. 49.

1987 *Nodulina dentaliniformis* (Brady); Loeblich and Tappan, p. 58, pl. 44, figs. 10-11.

2001 *Reophax dentaliniformis* (Brady); Szarek, p. 79, pl. 2, figs. 14-15.

2011 *Nodulina dentaliniformis* (Brady); Kaminski and Cetean, p. 65, pl. 2, figs. 19-22.

2012 *Reophax dentaliniformis* Brady; Debenay, p. 90.

Description. Test elongate, slender, tapering, cross section circular, wall coarsely agglutinated, surface irregular, rough; chambers subcylindrical,

arranged linearly; aperture terminal, rounded on a well-developed, distinct neck.

Order ROTALIIDA Delage and Hérouard, 1896
Superfamily ROTALIOIDEA Ehrenberg, 1839
Family ROTALIIDAE Ehrenberg, 1839
Subfamily AMMONIINAE Saidova, 1981
Genus AMMONIA Brünnich, 1772

Ammonia beccarii (Linnaeus, 1758)
Figure 4.7-8

1758 *Nautilus beccarii* Linnaeus, p. 710, pl. 1, fig. 1.

2001 *Ammonia beccarii* (Linnaeus); Szarek, p. 148, pl. 26, figs. 13-15.

2003 *Ammonia beccarii* (Linnaeus); Javaux and Scott, p. 10, fig. 2.2-3.

2005 *Ammonia beccarii* (Linnaeus); Debenay, Millet and Angelidis, p. 334, pl. 2, fig. 17.

2012 *Ammonia beccarii* (Linnaeus), Milker and Schmiedl, p. 117, fig. 27.1-2.

Description. Test calcareous, biconvex, wall perforate on both sides, surface smooth; chambers inflated, subglobular, trochospirally arranged, coiling evolute on the spiral side and involute on the umbilical side; periphery acute or slightly rounded, sutures radial and curved, thick and imperforate, depressed earlier and later incised on the spiral side, nearly radial and curved, deeply incised on the umbilical side; visible umbilical plug with pustules; aperture extraumbilical, interiomarginal, an arch shaped opening, sometimes covered by a calcitic boss.

Ammonia parkinsoniana (d'Orbigny, 1839b)
Figure 4.9-10

1839b *Rosalina parkinsoniana* d'Orbigny, p. 99, pl. 4, figs. 25-27.

2012 *Ammonia beccarii* (Linnaeus); Milker and Schmiedl, p. 117, figs. 27.3-4.

2015 *Ammonia parkinsoniana* (d'Orbigny); Hanagata and Nobuhara, p. 119, fig. 35.7-8.

Description. Test small, circular, spiral side convex, umbilical side flattened, wall calcareous, perforate, surface smooth; chambers subglobular, inflated on the spiral side, triangular on the umbilical side, arranged trochospirally; periphery broadly rounded, sutures nearly straight on the spiral side, radial on the umbilical side; umbilicus deeply sutured, with a calcitic knob; aperture an interiomarginal opening.

Ammonia tepida (Cushman, 1926)
Figure 4.11-12

1926 *Rotalia beccarii* (Linnaeus) var. *tepida* Cushman, p. 79, pl. 1.

2006 *Ammonia tepida* (Cushman); Oflaz, p. 231, pl. 9, figs. 13-15.

2012 *Ammonia tepida* (Cushman); Debenay, pp. 185-186.

2014 *Ammonia tepida* (Cushman); Panchang and Nigam, pl. 36, fig. 11a-c.

Description. Test small, biconvex, wall calcareous, densely perforate, surface smooth; chambers more inflated, subspherical on the spiral side, trochospirally arranged, gradually increasing in size as added; periphery slightly lobulated, broadly rounded, sutures almost straight, slightly depressed on the spiral side, radial, and more depressed on the umbilical side; umbilical plug missing; aperture terminal, an ovate slit-like opening.

Genus ASTEROROTALIA Hofker, 1950

Asterorotalia dentata (Parker and Jones, 1865)
Figure 4.13-14

1865 *Rotalia beccarii* (Linnaeus) var. *dentata* Parker and Jones, pp. 387-388, 422, pl. 19, fig. 18a-c.

2014 *Asterorotalia dentata* (Parker and Jones); Panchang and Nigam, pl. 36, fig. 12a-b.

Description. Test circular, wall calcareous, perforate, surface smooth; chambers many, arranged trochospirally, triangular and convex on the umbilical side; periphery keeled, with short, blunt spines, sutures distinct, thick, slightly curved on the spiral side, radial and deeply sutured on the umbilical side; aperture an arch-shaped opening at the terminal end of the apertural face.

Asterorotalia pulchella (d'Orbigny, 1839a)
Figure 3.17-18

1839a *Rotalia (Calcarina) pulchella* d'Orbigny, p. 80, pl. 5, figs. 16-18.

2001 *Asterorotalia pulchella* (d'Orbigny); Szarek, p. 147, pl. 27, figs. 11-12.

2015 *Asterorotalia pulchella* (d'Orbigny); Hanagata and Nobuhara, p. 119, figs. 35.9-10.

Description. Test small, outline nearly triangular, wall calcareous, perforate, surface strongly ornamented with knobs, pustules and ridges; chambers many, gradually increasing in size as added; periphery with imperforate keel and long triradiate spines, sutures nearly straight, raised and limbate on the dorsal side, radial and slightly curved on the ventral side; aperture an equatorial, terminal, ovate opening on the apertural side.

Asterorotalia inflata (Millett, 1904)
Figure 4.15-16

1904 *Rotalia schroeteriana* (Parker and Jones) var. *inflata* Millett, p. 504, pl. 10, fig. 5a-c.

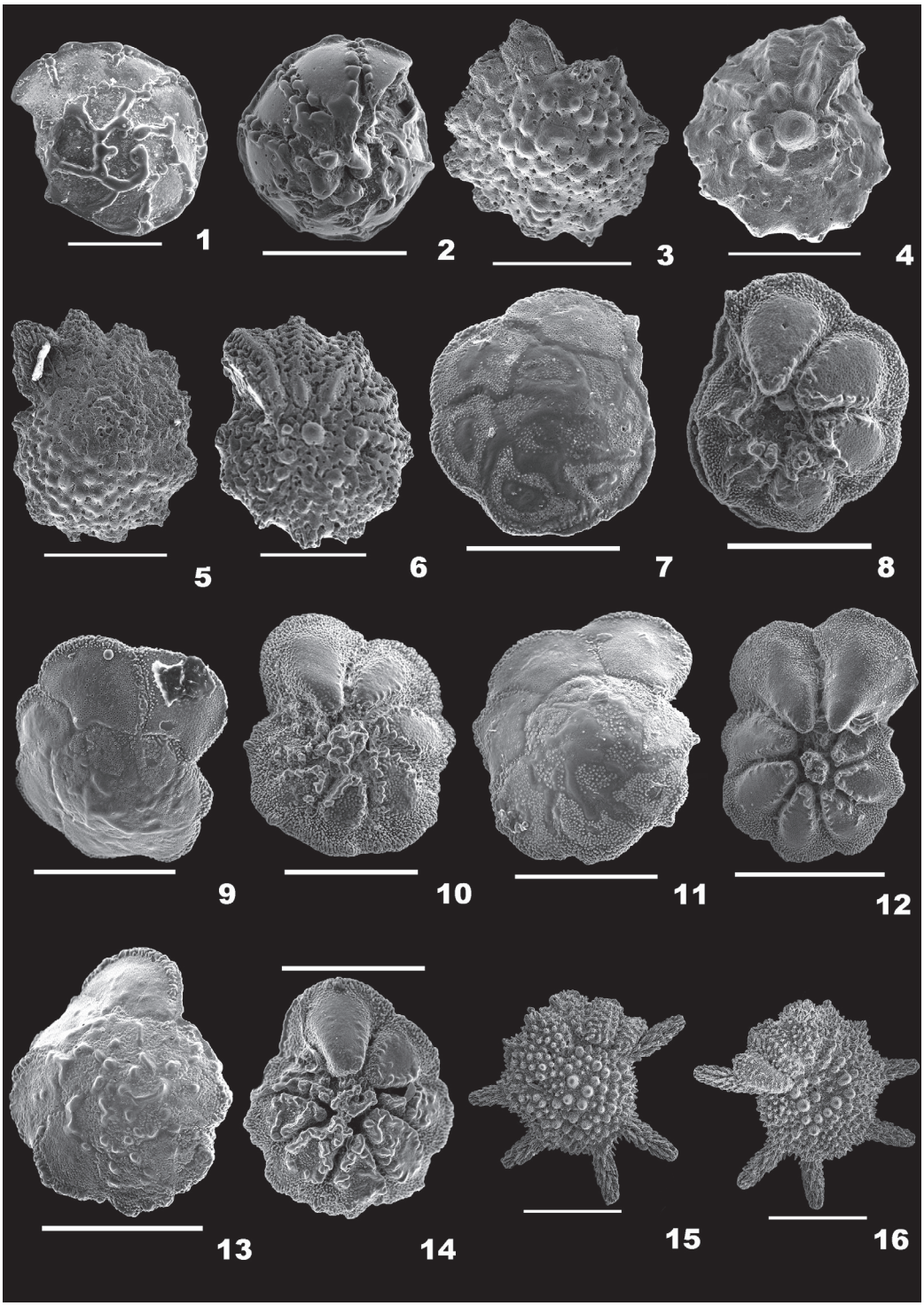

FIGURE 5. 1-2, *Rotalinoides gaimardii* (d'Orbigny, 1826) in dorsal view (scale equals 200 µm) (**1**) and in ventral view (scale equals 300 µm) (**2**). **3-6**, *Neorotalia calcar* (d'Orbigny, 1839) in dorsal view (scale equals 400 µm) (**3**); in ventral view (scale equals 300 µm) (**4**); elongate form in dorsal view (scale equals 400 µm) (**5**); and elongate form in ventral view (scale equals 400 µm) (**6**). **7-8**. *Pararotalia boltovskoyi* Jain and Bhatia, 1978 in dorsal view (scale equals 200 µm) (**7**) and in ventral view (scale equals 200 µm) (**8**). **9-10**, *Pararotalia calcariformata* McCulloch, 1977 in dorsal view (scale equals 200 µm) (**9**) and in ventral view (scale equals 200 µm) (**10**). **11-12**, *Pararotalia nipponica* Asano, 1936 in dorsal view (scale equals 200 µm) (**11**) and in ventral view (scale equals 300 µm) (**12**). **13-14**, *Pararotalia venusta* (Brady, 1884) in dorsal view (scale equals 300 µm) (**13**) and in ventral view (scale equals 300 µm) (**14**). **15-16**, *Calcarina hispida* Brady, 1876 in dorsal view (scale equals 500 µm) (**15**) and in ventral view (scale equals 500 µm) (**16**).

2014 *Asterorotalia inflata* (Millett); Panchang and Nigam, pl. 36, fig. 13a-c.

Description. Test subcircular, flat dorsal and conical ventral side, wall calcareous, thin, perforate, surface smooth; chambers trochospirally arranged, compressed on the dorsal side, inflated, triangular and convex on the ventral side; periphery broadly rounded, with short spines, sutures distinct, slightly depressed on the spiral side, radial, curved and depressed on the ventral side; aperture two narrow, subovate openings on the ventral side.

Genus ROTALIDIUM Asano, 1936
Rotalidium annectens (Parker and Jones, 1865)
Figure 4.17-18

1865 *Rotalia beccarii* (Linnaeus) var. *annectens* Parker and Jones, pp. 387, 422, pl.19, fig. 11a-c.

2008 *Rotalidium annectens* (Parker and Jones); Panchang, p. 246, pl. 37, figs. 4a-c, 5a-c.

Description. Test large, round, wall calcareous, perforate, surface smooth, umbilicus with irregular calcitic knobs; chambers compressed on the dorsal side, ventral side convex, trochospirally arranged, peripheral margin acute, periphery with an imperforate keel, dorsal sutures nearly straight and limbate, radial and very much depressed on the ventral side; aperture interiomarginal, subcircular slit-like opening.

Genus ROTALINOIDES Saidova, 1975
Rotalinoides compressiuscula (Brady, 1884)
Figure 4.19-21

1884 *Rotalia papillosa* var. *compressiuscula* Brady, p. 708, pl. 107, fig. 1.

2015 *Rotalinoides compressiuscula* (Brady); Hanagata and Nobuhara, p. 119, fig. 35.11-12.

Description. Test subcircular, wall calcareous, perforate, surface smooth; initial chambers indistinct, gradually increasing in size as added, chamber arrangement trochospiral, flattened to slightly convex on the dorsal side, triangular and convex on the ventral side; periphery lobulated with a thin keel, sutures initially beaded, arcuate on the spiral side, radial on the umbilical side; aperture narrow, slit-like openings at the basal end of the apertural face.

Rotalinoides gaimardii (d'Orbigny, 1826)
Figure 5.1-2

1826 *Rotalia (Turbinulina) gaimardii* d'Orbigny, p. 275, pl. 106.

2001 *Asterorotalia gaimardii* (d'Orbigny); Szarek, p. 148, pl. 27, figs. 7-8.

2015 *Rotalinoides gaimardii* (Fornasini); Hanagata and Nobuhara, p. 119, figs. 36. 1-2.

Description. Test planoconvex, wall calcareous, perforate, surface smooth; chambers slightly convex on the dorsal side, highly convex on the ventral side, trochospirally arranged; periphery lobulated, strongly keeled, sutures raised, limbate on the spiral side, radial, deeply sutured, beaded on the umbilical side; aperture terminal, interiomarginal opening on the ventral side.

Subfamily PARAROTALIINAE Reiss, 1963
Genus NEOROTALIA Bermúdez, 1952
Neorotalia calcar (d'Orbigny, 1839a)
Figure 5.3-6

1839a *Calcarina calcar* d'Orbigny, p. 81, pl. 5, figs. 22-24.

2012 *Neorotalia calcar* (d'Orbigny); Debaney, pp. 204-205.

Description. Test biconvex, wall calcareous, perforate, surface ornamented with distinct, round and thick pustules on the dorsal side, ridges and many umbilical knobs on the ventral side; chambers many, slightly inflated and coiling evolute on the spiral side, involute on the umbilical side, trochospirally arranged; periphery angular, star-shaped with stout spines, sutures tilted and slightly depressed on the spiral side, radial and depressed on the umbilical side; primary aperture umbilical, low-arched opening bordered by a lip, secondary apertures peripheral, bordered by a lip.

Genus PARAROTALIA Le Calvez, 1949
Pararotalia boltovskoyi Jain and Bhatia, 1978
Figure 5.7-8

1978 *Pararotalia boltovskoyi* Jain and Bhatia, p. 165, pl. 2, figs. H-I.

2007 *Pararotalia boltovskoyi* Jain and Bhatia; Talib and Farroqui, p. 19, pl. 1, fig. 22a-c.

Description. Test subcircular, biconvex, umbilicus depressed, no plug, wall calcareous, distinctly perforate, dorsal surface smooth, umbilical surface rough, with pustules; chambers slightly convex, coiling evolute on the spiral side; convex, coiling involute on the ventral side, arranged trochospirally; periphery lobulated and angular with small spines at the chamber ends, sutures curved, limbate on the spiral side, deeply depressed on the umbilical side; aperture interiomarginal, umbilical, a narrow slit-like opening.

Pararotalia calcariformata McCulloch, 1977
Figure 5.9-10

1977 *Pararotalia* aff. *P. calcariformata* McCulloch, p. 428, pl. 177, figs. 10-11.

2013 *Pararotalia calcariformata* McCulloch; Meriç, Yokes, Avsar, Kirki-Elmas, Dinçer and Karhan, p. 3, figs. 2.1-2, 3.1-12.

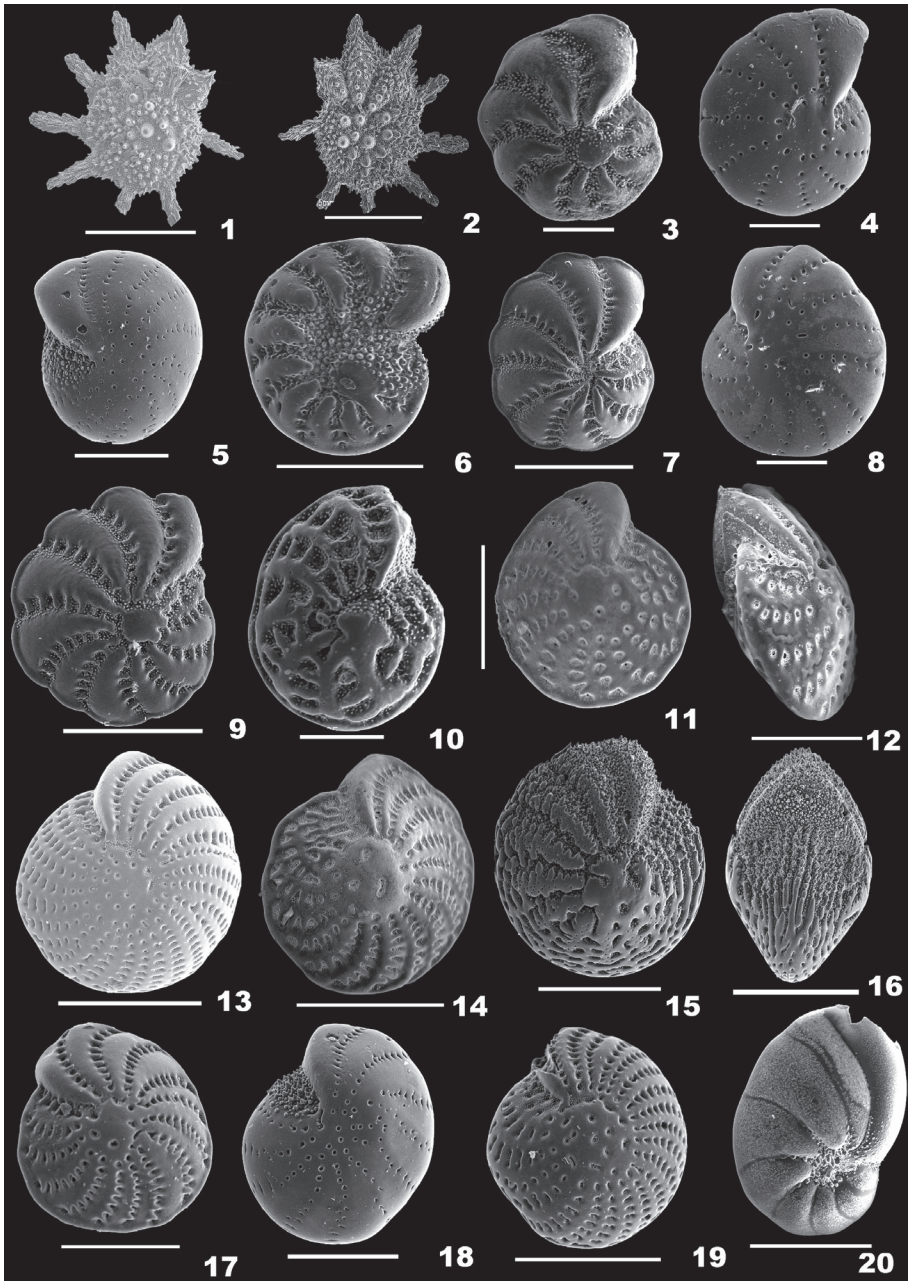

FIGURE 6. 1-2, *Calcarina spengleri* (Gmelin, 1791) in dorsal view (scale equals 500 µm) (**1**) and in ventral view (scale equals 500 µm) (**2**). **3**, *Cribroelphidium excavatum* (Terquem, 1875) in ventral view (scale equals 100 µm). **4**, *Cribroelphidium poeyanum* (d'Orbigny, 1826) in dorsal view (scale equals 100 µm). **5**, *Elphidiella hannai* (Cushman and Grant, 1927) in ventral view (scale equals 200 µm). **6**, *Elphidium advenum* subsp. *limbatum* (Chapman, 1907) in dorsal view (scale equals 200 µm). **7**, *Elphidium advenum* var. *depressulum* Cushman, 1933 in ventral view (scale equals 200 µm). **8**, *Elphidium asiaticum* Polski, 1959 in ventral view (scale equals 100 µm). **9**, *Elphidium botaniense* Albani, 1981 in ventral view (scale equals 200 µm). **10**, *Elphidium carteri* Hayward in Hayward, Hollis and Grenfell, 1997 in dorsal view (scale equals 100 µm). **11**, *Elphidium charlottense* (Vella, 1957) in dorsal view (scale equals 200 µm). **12**, *Elphidium charlottense* (Vella, 1957) in apertural view (scale equals 200 µm). **13**, *Elphidium craticulatum* (Fichtel and Moll, 1798) in dorsal view (scale equals 400 µm). **14**, *Elphidium crispum* (Linnaeus, 1758) in dorsal view (scale equals 300 µm). **15-16**, *Elphidium hispidulum* Cushman, 1936 in apertural view (scale equals 300 µm) (**15**) and in dorsal view (scale equals 300 µm) (**16**). **17**, *Elphidium macellum* (Fichtel and Moll, 1798) in dorsal view (scale equals 300 µm). **18**, *Elphidium somaense* Takayanagi, 1955 in ventral view (scale equals 200 µm). **19**, *Elphidium striatopunctatum* (Fichtel and Moll, 1798) in dorsal view (scale equals 400 µm). **20,** *Nonion fabum* (Fichtel and Moll, 1798) in dorsal view (scale equals 200 µm).

Description. Test subrounded, biconvex, umbilicus with a plug, wall calcareous, perforate on both sides, surface smooth on the dorsal side, rough with many pustules on the ventral side; chambers slightly convex, coiling evolute on the spiral side, gradually increasing in size as added; convex and involute on the ventral side, arranged trochospirally; periphery lobulated and carinate with short spines at the chamber ends, prominent hyaline spine at the upper end of each chamber in the final whorl, sutures limbate and curved on the spiral side, very much depressed, broad and radiate on the umbilical side; aperture interiomarginal, umbilical, a low arched opening bordered by a thin rim.

Pararotalia nipponica (Asano), 1936
Figure 5.11-12

1936 *Rotalia nipponica* Asano, p. 614, pl. 31, fig. 2a-c.

2012 *Pararotalia nipponica* (Asano); Debenay, p. 206.

Description. Test subrounded, biconvex, umbilicus with a plug, wall calcareous, perforate on both sides, dorsal surface smooth, ventral surface rough, with pustules; chambers slightly convex, coiling evolute on the spiral side; involute and convex on the ventral side, arranged trochospirally; periphery lobulated and angular with small spines at the chamber ends, sutures curved, limbate on the spiral side, very much depressed on the umbilical side; aperture interiomarginal, umbilical, a slit-like opening.

Pararotalia venusta (Brady, 1884)
Figure 5.13-14

1884 *Rotalia venusta* Brady, p. 708, pl. 108, fig. 2c.

2012 *Pararotalia venusta* (Brady); Culver, Mallinson, Corbett, Leorri, Rouf, Shazili, Yaacob, Whittaker, Buzas and Parham, p. 114, fig. 3.4.

Description. Test sublenticular, wall calcareous, perforate, surface rough, granular on the dorsal side, pustular on the ventral side; chambers slightly convex on the spiral side, convex on the umbilical side, coiling evolute on the spiral side, involute on the umbilical side, arranged trochospirally, umbilicus with a knob; periphery lobulated, sutures curved on the dorsal side, radial and very much depressed on the ventral side; aperture interiomarginal, an elongate slit-like opening.

Family CALCARINIDAE d'Orbigny, 1826
Genus CALCARINA d'Orbigny, 1826
Calcarina hispida Brady, 1876
Figure 5.15-16

1876 *Calcarina hispida* Brady, p. 589.

2012 *Calcarina hispida* Brady; Debenay, p. 189.

2014 *Calcarina hispida* Brady; Panchang and Nigam, pl. 37, fig. 7a-b.

Description. Test hispid, subrounded, wall calcareous, perforate, surface rough, covered with distinct, granulated, calcitic knobs, umbilical side with radial ridges; chambers evolute on the spiral side, involute on the ventral side, final chambers narrow and inflated, arranged trochospirally; peripheral margin rounded, periphery with somewhat long, hispid spines, sutures depressed in the final chambers; apertures interiomarginal, terminal, mostly not seen.

Calcarina spengleri (Gmelin, 1791)
Figure 6.1-2

1788 *Nautilus spengleri* Gmelin, p. 3371.

2005 *Calcarina spengleri* (Gmelin); Renema and Hohenegger, p. 16, pl. 1, figs. 1-10; text-fig. 1.

2014 *Calcarina spengleri* (Gmelin); Panchang and Nigam, pl. 37, figs. 9a-b, 10a-b.

Description. Test large, biconvex, side view lenticular, wall calcareous, coarsely perforate, surface ornamented with few, granulated calcitic knobs in the centre; chambers many, final chambers long, narrow and inflated, chamber arrangement trochospiral; periphery with long, tapering, blunt spines; sutures distinct only in the final chambers, slightly depressed on the spiral side, radial and depressed on the umbilical side; aperture not seen.

Family ELPHIDIIDAE Galloway, 1933
Subfamily ELPHIDIINAE Galloway, 1933
Genus CRIBROELPHIDIUM Cushman and Brönnimann, 1948
Cribroelphidium excavatum (Terquem, 1875)
Figure 6.3

1875 *Polystomella excavatum*, Terquem, p. 25, pl. 2, fig. 2a-f.

2008 *Cribroelphidium excavatum* (Terquem); Riveiros and Patterson, p. 32, fig. 14.1-5.

Description. Test free, slightly compressed, wall calcareous, surface smooth but for pustular sutures, umbilical region and apertural side, umbilicus slightly depressed, with a knob; chambers few, slightly inflated, gradually increasing in size as added, coiling involute, arranged planispirally; periphery broadly rounded, peripheral margin lobulate, sutures distinct, slightly depressed, curved backwards, each intercepted with large pores and short perpendicular sutural joints; aperture interiomarginal, multiple, a series of rounded openings on the apertural face.

Cribroelphidium poeyanum (d'Orbigny, 1839a)
Figure 6.4

1839a *Polystomella poeyana* d'Orbigny, p. 55, pl. 6, figs. 25-26.

2008 *Elphidium poeyanum* (d'Orbigny); Araújo and Machado, p. 34, pl. 2, fig. 5.

Description. Test free, slightly compressed, wall calcareous, finely perforate, surface smooth; chambers many, very slightly inflated, arranged planispirally, coiling involute; periphery rounded, margin slightly lobulate, sutures distinct, slightly depressed with very short and broad retral processes; aperture terminal, interiomarginal, series of circular openings on the apertural side.

Genus ELPHIDIELLA Cushman, 1936
Elphidiella hannai (Cushman and Grant, 1927)
Figure 6.5

1927 *Elphidium hannai* Cushman and Grant, p. 77, pl. 7, fig. 1.

2008 *Elphidiella hannai* (Cushman and Grant); Riveiros and Patterson, p. 34, figs. 15.5a-5c.

Description. Test round, wall calcareous, finely perforate, surface smooth, apertural side granular; chambers many, distinct, not inflated, arranged planispirally, coiling involute; umbilical region flattened; periphery rounded, sutures distinct, curved and limbate; aperture interiomarginal, multiple, small, round openings along the apertural face.

Genus ELPHIDIUM de Montfort, 1808
Elphidium advenum subsp. *limbatum* (Chapman, 1907)
Figure 6.6

1907 *Polystomella macellum* var. *limbatum* Chapman, p. 142, pl. 10, fig. 9.

2012 *Elphidium limbatum* (Chapman); Debenay, p. 220.

Description. Test large, wall calcareous, finely perforate, surface ornamented with granular pustules along the sutures, umbilical region and the apertural side, umbilicus with a definite boss; chambers many, increasing in size as added, final chambers more inflated, arranged planispirally; periphery rounded, margin slightly keeled, sutures distinct and curved, retral processes broad, closely spaced; aperture interiomarginal, multiple, small pores along the apertural face.

Elphidium advenum var. *depressulum* Cushman, 1933
Figure 6.7

1933 *Elphidium advenum* (Cushman) var. *depressulum* Cushman, p. 51, pl. 12, fig. 4a-b.

1939a *Elphidium advenum* (Cushman) var. *depressulum* Cushman, p. 61, pl. 17, fig.1.

Description. Test large, wall calcareous, finely perforate, surface smooth, pustular sutrues and umbilicus; chambers few, broad, inflated, planispirally arranged, coiling involute; umbilical region depressed, no definite boss, with a few large pits; periphery more lobulated, with a more prominent keel, sutures slightly curved and distinct, retral processes distinct, rod-like; aperture interiomarginal, multiple at the base of apertural face.

Elphidium asiaticum Polski, 1959
Figure 6.8

1959 *Elphidium discoidale* (d'Orbigny) var. *asiaticum* Polski, p. 585, pl. 78, fig. 2a-b.

2015 *Cibrononion asiaticum* Polski; Lei, Li, Bi, Cui, Song, Li, and Li, p. 250, pl. 1, fig. 4a-e.

Description. Test small, outline circular, wall finely perforate; surface smooth, extremely hyaline; chambers slightly inflated, gradually increasing in size, chamber arrangement planispiral, coiling involute; periphery rounded, sutures distinct and gently curved with rows of small pores; aperture interiomarginal, series of basal pores on the apertural side.

Elphidium botaniense Albani, 1981
Figure 6.9

1981 *Elphidium botaniense* Albani, p. 155, fig. 4j, n.

2012 *Elphidium botaniense* Albani; Debenay, p. 218.

Description. Test broad, large, biconvex, outline circular, wall calcareous, finely perforate, surface smooth, sutures, umbilicus and apertural area with pustules; chambers many, inflated, arranged planispirally, coiling involute; umbilicus with a roughly circular, definite boss; periphery rounded, margin more lobulated, with a very distinct keel, sutures curved, marked with distinct retral processes; aperture interiomarginal, multiple rounded openings along the apertural face.

Elphidium carteri Hayward in Hayward, Hollis, and Grenfell, 1997
Figure 6.10

1997 *Elphidium carteri* Hayward; Hayward, Hollis, and Grenfell, pp. 71-72, pl. 1, fig. 15; pl. 6, figs. 8-12.

1994 *Elphidium jenseni* (Cushman); Loeblich and Tappan, p. 169, pl. 381, figs. 4-5.

Description. Test small, slightly compressed, outline subcircular, wall calcareous, perforate, surface covered with pustules, more granulated on the apertural side; chambers many, arranged planispi-

rally; periphery rounded, margin with a distinctly rounded keel, sutures distinct, curved, slightly raised and limbate, retral processes broad; aperture interiomarginal, a series of rounded pores at the basal end of the apertural face.

Elphidium charlottense (Vella, 1957)
Figure 6.11-12

1957 *Elphidiononion charlottensis* Vella, p. 38, pl. 9, figs. 187-188.

2012 *Elphidium charlottense* (Vella); Debenay, p. 218.

Description. Test biconvex, slightly compressed, wall calcareous, finely perforate, surface with pustules along the sutures and the apertural face; umbilicus with a flat boss; chambers many, arranged planispirally, coiling involute; periphery rounded, margin very slightly lobulated, with a distinct keel, sutures slightly curved, distinct, retral processes short; aperture multiple openings at the basal end of the final chamber on the apertural side.

Elphidium craticulatum (Fichtel and Moll, 1798)
Figure 6.13

1798 *Nautilus craticulatus* Fichtel and Moll, p. 51, pl. 5, figs. h-k.

2007 *Elphidium craticulatum* (Fichtel and Moll); Talib and Farroqui, p. 21, pl. 1, fig. 24 a-b.

2012 *Elphidium craticulatum* (Fichtel and Moll); Debenay, p. 219.

2014 *Elphidium craticulatum* (Fichtel and Moll); Panchang and Nigam, pl. 38, fig. 5a-b.

Description. Test large, subglobose, strongly biconvex, wall calcareous, perforate, surface reticulate, ornamented with pustules; chambers many, slightly inflated, planispirally arranged; periphery smooth with a thin rounded keel, sutures radial; aperture interiomarginal, a row of small openings, weakly bordered by a rim.

Elphidium crispum (Linnaeus, 1758)
Figure 6.14

1758 *Nautiluscrispus* Linnaeus, p. 709, pl. 19, fig. 1d.

2001 *Elphidium crispum* (Linnaeus); Szarek, p. 150, pl. 28, fig. 3.

2006 *Elphidium crispum* (Linnaeus); Oflaz, p. 235, pl. 11, fig. 11.

2007 *Elphidium crispum* (Linnaeus); Talib and Farroqui, p. 21, pl.1, fig. 25a-b.

2012 *Elphidium crispum* (Linnaeus); Debenay, p. 216.

2012 *Elphidium crispum* (Linnaeus); Milker and Schmiedl, p. 120, fig. 27.13-14.

2014 *Elphidium crispum* (Linnaeus); Panchang and Nigam, pl. 38, figs. 6a-b, 7.

Description. Test large, lenticular, outline circular, wall calcareous, perforate, surface reticulate, ornamented with small pustules in the apertural region, umbilical boss with small, shallow pits; chambers many, narrow, final chambers inflated, chamber arrangement planispiral, coiling involute; periphery angular with thin carina, sutures strongly curved backwards; aperture interiomarginal, multiple, a series of openings bordered by a rim on the apertural face.

Elphidium hispidulum Cushman, 1936
Figure 6.15-16

1936 *Elphidium hispidulum* Cushman, p. 83, pl. 14, fig. 13a-b.

2007 *Elphidium hispidulum* Cushman; Horton, Culver, Hardbattle, Larcombe, Milne, Morigi, Whittaker, and Woodroffe, p. 58, pl. 1, fig. 9a-b.

2012 *Parrellina hispidula* Cushman; Debenay, p. 229.

Description. Test slightly compressed, circular, wall coarsely perforate, surface finely spinose, with fine rounded costae in the earlier portion; chambers indistinct, final chambers slightly inflated, planispirally arranged; umbilical area with thick spines, slightly raised; periphery rounded, sutures slightly curved and depressed; aperture multiple, small openings at the base of the apertural face, mostly obscured.

Elphidium macellum (Fichtel and Moll, 1798)
Figure 6.17

1798 *Nautilus macellus* Fichtel and Moll, p. 66, pl. 10, figs. h-k.

2002 *Elphidium macellum* (Fichtel and Moll); Kaminski, Aksu, Box, Hiscott, Filipescu, and Al-Salameen, p. 178, pl. 5, fig. 11.

2012 *Elphidium macellum* (Fichtel and Moll); Debenay, p. 220.

2012 *Elphidium macellum* (Fichtel and Moll); Milker and Schmiedl, p. 122, fig. 27.21-22.

2014 *Elphidium macellum* (Fichtel and Moll); Panchang and Nigam, pl. 38, fig. 10a-b.

Description. Test large, compressed, outline circular, wall perforate, surface reticulate, ornamented with small pustules near apertural region and the periphery, umbilical region flat; chambers many, narrow, chamber arrangement planispiral, coiling involute; periphery acute or angular with thin keel, slightly rounded in the final chambers, sutures strongly curved backwards; aperture a series of interiomarginal openings.

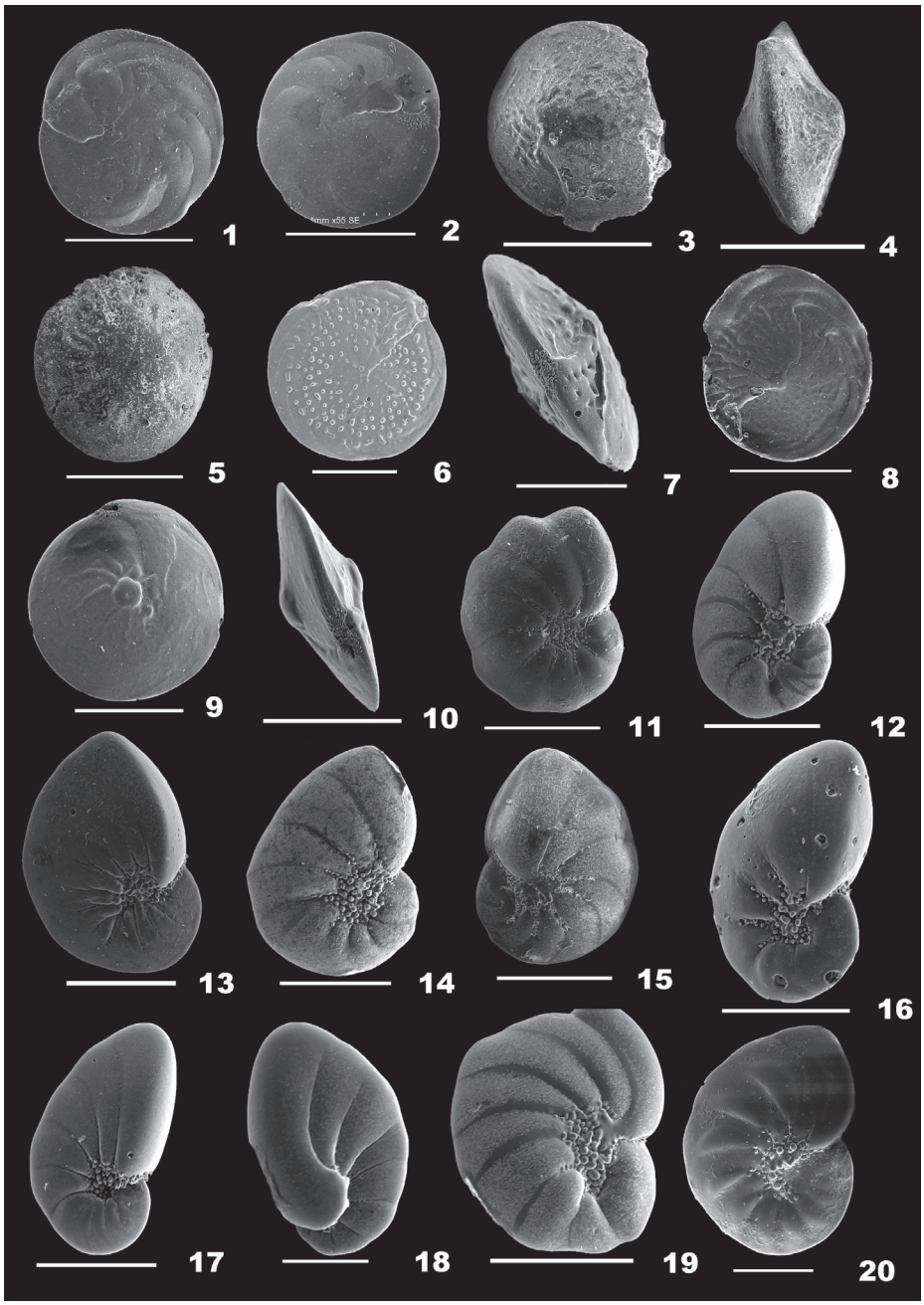

FIGURE 7. 1-2, *Amphistegina bicirculata* Larsen, 1976 in dorsal view (scale equals 1 mm) (**1**) and in ventral view (scale equals 1 mm) (**2**). **3-4**, *Amphistegina gibbosa* d'Orbigny, 1839 in dorsal view (scale equals 500 µm) (**3**) and in lateral view (scale equals 500 µm) (**4**). **5**, *Amphistegina lessonii* d'Orbigny in Guerin-Meneville, 1843 in dorsal view (scale equals 400 µm). **6-7**, *Amphistegina papillosa* Said, 1949 in dorsal view (scale equals 500 µm) (**6**) and in lateral view (scale equals 300 µm) (**7**). **8-10**, *Amphistegina radiata* (Fichtel and Moll, 1798) in dorsal view (scale equals 500 µm) (**8**); in ventral view (scale equals 500 µm) (**9**); and in lateral view (scale equals 500 µm) (**10**). **11**, *Astrononion stelligerum* (d'Orbigny, 1839) in dorsal view (scale equals 300 µm). **12**, *Nonion commune* (d'Orbigny, 1846) in dorsal view (scale equals 200 µm). **13**, *Nonion costiferum* (Cushman, 1926) in dorsal view (scale equals 200 µm). **14**, *Nonionella basispinata* (Cushman and Moyer, 1930) in dorsal view (scale equals 200 µm). **15**, *Nonionellina labradorica* (Dawson, 1860) in dorsal view (scale equals 200 µm). **16**, *Nonionoides elongatum* (d'Orbigny, 1852) in dorsal view (scale equals 200 µm). **17**, *Nonionoides grateloupii* (d'Orbigny, 1839a) in dorsal view (scale equals 200 µm). **18**, *Nonionoides turgida* (Williamson, 1858) in ventral view (scale equals 100 µm). **19**, *Nonionoides boueana* (d'Orbigny, 1846) in dorsal view (scale equals 200 µm). **20**, *Haynesina depressula* (Walker and Jacob, 1798) in dorsal view (scale equals 100 µm).

Elphidium somaense Takayanagi, 1955
Figure 6.18

1955 *Elphidium somaense* Takayanagi, p. 52, fig. 28a-b.

1999 *Elphidium somaense* Takayanagi; Nigam and Khare, p. 300, pl. 7, fig. 15.

2000 *Elphidium somaense* Takayanagi; Scott, Takayanagi, Hasegawa and Saito, p. 21, fig. 7.125-126.

Description. Test nearly circular, small, wall calcareous, perforate, surface smooth, apertural face granulated; chambers distinct, planispirally arranged, coiling involute; periphery rounded, sutures distinct with small round pores and curved; aperture interiomarginal, multiple basal pores on the apertural side.

Elphidium striatopunctatum (Fichtel and Moll, 1798)
Figure 6.19

1798 *Nautilus striato-punctatus* Fichtel and Moll, p. 61, pl. 9, figs. a-c.

2008 *Elphidium striatopunctatum* (Fichtel and Moll); Meriç, Avşar and Yokeş, p. 323, pl. 9, figs. 13-15.

2011 *Elphidium striatopunctatum* (Fichtel and Moll); Pilarczyk, Reinhardt, Boyce, Schwarcz and Donato, p. 66, pl. 1, fig. 9.

Description. Test slightly large, lenticular, wall finely perforate, surface smooth, apertural side slightly pustular; chambers many, final chambers rapidly increase in size, inflated, coiling involute; periphery broadly rounded, sutures curved and slightly depressed, retral processes short, closely spaced, rod-like; aperture multiple, a row of small openings at the base of slightly convex apertural face.

Superfamily ASTERIGERINOIDEA d'Orbigny, 1839
Family AMPHISTEGINIDAE Cushman, 1927
Genus AMPHISTEGINA d'Orbigny, 1826
Amphistegina bicirculata Larsen, 1976
Figure 7.1-2

1976 *Amphistegina bicirculata* Larsen, p. 10, pl. 2, figs. 1-5; p. 16, text-figs. 9.2, 10.2.

2002 *Amphistegina bicirculata* Larsen; Yordanova and Hohenegger, p. 178, pl. 31, figs. 9-12.

2007 *Amphistegina bicirculata* Larsen; Yordanova and Hohenegger, p. 1276, fig. 1.11.

2012 *Amphistegina bicirculata* Larsen; Debenay, p. 215.

2014 *Amphistegina bicirculata* Larsen; Hohenegger, p. 723, fig. 17.

2014 *Amphistegina bicirculata* Larsen; Panchang and Nigam, pl. 32, figs. 9a-b, 10a-b.

Description. Test flat, lenticular, unequally biconvex or slightly spiroconvex, wall calcareous, surface smooth; chambers initially radiate, later nicely curved at the periphery, chamber arrangement low trochospiral, coiling involute; peripheral margin acute, slightly keeled, sutures slightly depressed; aperture interiomarginal, a slit-like opening, surrounded by pustules, bordered by a lip.

Amphistegina gibbosa d'Orbigny, 1839b
Figure 7.3-4

1839b *Amphistegina gibbosa* d'Orbigny, p. 120, pl. 8, figs. 1-3.

2014 *Amphistegina gibbosa* d'Orbigny; Panchang and Nigam, pl. 32, fig. 11a-c.

Description. Test lenticular, strongly biconvex in the central portion, flattened at the sides, wall calcareous, surface smooth; chambers radial initially, later curved towards the periphery, chamber arrangement low trochospiral, coiling involute; peripheral margin subacute, sutures slightly depressed; aperture interiomarginal, a narrow slit, bordered by a lip.

Amphistegina lessonii d'Orbigny, 1826
Figure 7.5

1826 *Amphistegina lessonii* d'Orbigny, p. 304, pl. 17, figs. 1-4.

2002 *Amphistegina lessonii* d'Orbigny; Yordanova and Hohenegger, p. 178, pl. 31, figs. 4-8.

2003 *Amphistegina lessonii* d'Orbigny; Javaux and Scott, p. 11, fig. 2.4-6.

2007 *Amphistegina lessonii* d'Orbigny; Yordanova and Hohenegger, p. 1276, fig. 1.10.

2012 *Amphistegina lessonii* d'Orbigny; Debenay, p. 215.

2014 *Amphistegina lessonii* d'Orbigny; Hohenegger, p. 723, fig. 17.

2014 *Amphistegina lessonii* d'Orbigny; Panchang and Nigam, pl. 32, fig. 1a-c.

Description. Test lenticular, outline circular, more convex on the spiral side, wall calcareous, umbilicus transparent, imperforate, surface smooth, apertural face with pustules; chambers many, curved backwards at the periphery, chamber arrangement low trochospiral, coiling involute; periphery rounded, margin subacute, sutures slightly depressed; aperture interiomarginal, umbilical, a slit-like opening, surrounded by pustules, bordered by a narrow lip.

Amphistegina papillosa Said, 1949
Figure 7.6-7

1949 *Amphistegina radiata* (Fichtel and Moll) var. *papillosa* Said, p. 39, pl. 4, fig. 12.

2001 *Amphistegina papillosa* Said; Szarek, p. 142, pl. 23, figs. 1-2.

2002 *Amphistegina papillosa* Said; Yordanova and Hohenegger, p. 178, pl. 31, figs. 18-21.

2007 *Amphistegina papillosa* Said; Yordanova and Hohenegger, p. 1276, fig. 1.13.

2012 *Amphistegina papillosa* Said; Debenay, p. 216.

2014 *Amphistegina papillosa* Said; Hohenegger, p. 723, fig. 17.

2014 *Amphistegina papillosa* Said; Panchang and Nigam, pl. 32, figs. 3a-b, 4a-b.

Description. Test flat, biconvex, outline subcircular, wall calcareous, perforate, surface covered with raised papillae; chamber arrangement low trochospiral; periphery rounded, margin acute, sutures slightly depressed in the final chambers; aperture umbilical, small, round opening surrounded by pustules.

Amphistegina radiata (Fichtel and Moll, 1798)
Figure 7.8-10

1798 *Nautilus radiatus* Fichtel and Moll, p. 58, pl. 8, figs. a-d.

1999 *Amphistegina radiata* (Fichtel and Moll); Nigam and Khare, p. 298, pl. 6, fig. 2.

2002 *Amphistegina radiata* (Fichtel and Moll); Yordanova and Hohenegger, p. 178, pl. 31, figs. 13-17.

2007 *Amphistegina radiata* (Fichtel and Moll); Yordanova and Hohenegger, p. 1276, fig. 1.12.

2012 *Amphistegina radiata* (Fichtel and Moll); Debenay, p. 216.

2014 *Amphistegina radiata* (Fichtel and Moll); Hohenegger, p. 723, fig. 17.

2014 *Amphistegina radiata* (Fichtel and Moll); Panchang and Nigam, pl. 32, figs. 5a-c, 6a-b.

Description. Test flattened, outline circular, wall calcareous, finely perforate, surface smooth; chambers many, planispirally arranged; periphery rounded, margin slightly angular, sutures slightly raised, curved at the periphery; aperture a small slit, bordered by a thin lip, surrounded by pustules.

Superfamily NONIONOIDEA Schultze, 1854
Family NONIONIDAE Schultze, 1854
Subfamily ASTRONONIONINAE Saidova, 1981
Genus ASTRONONION Cushman and Edwards, 1937
Astrononion stelligerum (d'Orbigny, 1839b)
Figure 7.11

1839b *Nonionina stelligera* d'Orbigny, p. 128, pl. 3, figs. 1-2.

2006 *Astrononion stelligerum* (d'Orbigny); Oflaz, p. 301, pl. 9, figs. 9-10.

2012 *Astrononion stelligerum* (d'Orbigny); Milker and Schmiedl, p. 113, fig. 26.7-8.

Description. Test compressed, side view circular, umbilical area depressed, wall calcareous, finely perforate, surface smooth, umbilicus, apertural side and along the sutures covered with granular pustules; chambers distinct, elongate, narrow, slightly inflated, gradually increasing in size; periphery subrounded, margin slightly angular, sutures distinct, strongly curved, slightly depressed; aperture an interiomarginal, low arch, equatorial opening at the base of the apertural face, bordered by a rim.

Subfamily NONIONINAE Schultze, 1854
Genus NONION de Montfort, 1808
Nonion commune (d'Orbigny, 1846)
Figure 7.12

1846 *Nonionina communis* d'Orbigny, p. 106, pl. 5, figs. 7-8.

2010 *Nonion commune* (d'Orbigny); Vénec-Peyré and Poignant, p. 488, fig. 3I-J.

Description. Test elongate-ovate, compressed, umbilical area depressed, wall calcareous, finely perforate, surface smooth, umbilicus, apertural side and to a very little extent along the sutures granulated; chambers distinct, slightly inflated, increasing in size as added, final chamber elongate; periphery subacutely rounded, sutures distinct, very slightly depressed, limbate and strongly curved; aperture an interiomarginal opening at the base of the long apertural face.

Nonion costiferum Cushman, 1926
Figure 7.13

1926 *Nonionina costifera* Cushman, p. 90, pl. 13, fig. 2a-c.

2014 *Nonion costiferum* Cushman; Panchang and Nigam, pl. 33, fig. 10a-b.

Description. Test elongate, compressed, umbilical portion depressed, wall finely perforate, surface smooth, umbilicus and the apertural side covered with pustules; chambers many, distinct, not inflated, of uniform size; periphery acute, slightly keeled, sutures distinct, slightly raised and costate; aperture an interiomarginal, small, low arch opening at the basal end of the apertural face.

Nonion fabum (Fichtel and Moll, 1798)
Figure 6.20

1798 *Nautilus faba* Fichtel and Moll, p. 103, pl. 19, figs. a-c.

2010 *Nonion fabum* (Fichtel and Moll); Margreth, p. 123, pl. 36, fig. 2a-c.

2012 *Nonion fabum* (Fichtel and Moll); Milker and Schmiedl, p. 112, fig. 25.22-24.

2014 *Nonion fabum* (Fichtel and Moll); Panchang and Nigam, pl. 33, fig. 11a-b.

Description. Test ovate, compressed, wall calcareous, perforate, surface smooth, umbilici slightly depressed, ornamented with pustules; chambers many, inflated, planispirally arranged with rapid increase in size, coiling involute; periphery broadly rounded, sutures thick and curved backwards; aperture an interiomarginal slit-like opening.

Genus NONIONELLA Cushman, 1926
Nonionella basispinata (Cushman and Moyer, 1930)
Figure 7.14

1930 *Nonion pizarrensis* Berry var. *basispinata* Cushman and Moyer, p. 54, pl. 7, fig. 18.

2008 *Pseudononion basispinata* (Cushman and Moyer); Riveiros and Patterson, p. 30, fig. 12.6a-b.

2014 *Nonion basispinata* (Cushman and Moyer); Panchang and Nigam, pl. 33, fig. 8a-c.

Description. Test small, asymmetrical, wall calcareous, finely perforate, surface smooth, granular pustules filling the umbilicus, apertural side and to a little extent along the sutures; chambers slightly inflated, rapidly increasing in size, planispirally arranged, coiling involute; periphery subrounded, sutures distinct, very slightly depressed and curved; aperture an interiomarginal, narrow, equatorially placed slit at the base of the apertural face.

Genus NONIONELLINA Voloshinova, 1958
Nonionellina labradorica (Dawson, 1860)
Figure 7.15

1860 *Nonionina labradorica* Dawson, p. 191, text-fig. 4.

2008 *Nonionellina labradorica* (Dawson); Riveiros and Patterson, p. 29, fig. 12.7a-c.

2010 *Nonionellina labradorica* (Dawson); Margreth, p. 123, pl. 36, fig. 4.

2014 *Nonionellina labradorica* (Dawson); Panchang and Nigam, pl. 34, figs. 8a-c, 9a-c.

Description. Test small, symmetrical on both sides, wall calcareous, finely perforate, surface smooth, granular pustules along the sutures, apertural side and the umbilicus; chambers few, rapidly increasing in size, planispirally arranged, coiling involute; periphery subacutely rounded, sutures distinct, curved and very slightly depressed; aperture an interiomarginal, narrow slit at the base of a broadly triangular apertural face.

Genus NONIONOIDES Saidova, 1975
Nonionoides elongatum (d'Orbigny, 1852)
Figure 7.16

1852 *Nonionina elongata* d'Orbigny, p. 3, fig. 4.

1999 *Nonion elongatum* (d'Orbigny); Nigam and Khare, p. 298, pl. 6, fig. 6.

2014 *Nonion elongatum* (d'Orbigny); Panchang and Nigam, pl. 39, fig. 12a-c.

Description. Test elongate, biumbilicate, wall finely perforate, surface smooth, umbilical portion depressed, papillated, granular pustules to some extent along the sutures and the apertural face; chambers distinct, many, increasing rapidly in size as added, coiling involute; periphery broadly rounded, sutures distinct, slightly depressed and curved; aperture a interiomarginal, narrow, low arch opening on the apertural face.

Nonionoides grateloupii (d'Orbigny, 1839a)
Figure 7.17

1839a *Nonionina grateloupi* d'Orbigny, p. 46, pl. 6, figs. 6-7.

2006 *Nonionoides grateloupi* (d'Orbigny); Oflaz, p. 228, pl. 9, figs. 7-8.

2012 *Nonionoides grateloupi* (d'Orbigny); Debenay, p. 227.

2014 *Nonionoides grateloupi* (d'Orbigny); Panchang and Nigam, pl. 36, fig. 11a-c.

Description. Test elongate, symmetrical on both sides, compressed, wall calcareous, finely perforate, surface smooth, depressed umbilical area filled with granular pustules, apertural face pustular; chambers narrow, trochospirally arranged, final chambers rapidly increasing in length, coiling involute; periphery rounded, sutures distinct, slightly depressed; aperture interiomarginal, an equatorial slit.

Nonionoides turgida (Williamson, 1858)
Figure 7.18

1858 *Rotalina turgida* Williamson, p. 50, pl. 4, figs. 95-97.

2003 *Nonionella turgida* (Williamson); Murray, p. 25, fig. 9.4-5.

2012 *Nonionella turgida* (Williamson); Milker and Schmiedl, p. 113, fig. 26.1-6.

Description. Test elongate, compressed, wall calcareous, finely perforate, surface smooth, apertural side with distinct flap-like projection; chambers distinct, long and narrow, chamber arrangement trochospiral, rapidly increasing in size; periphery rounded, slightly lobulate, sutures distinct, not much depressed, aperture interiomarginal, an equatorial slit-like opening.

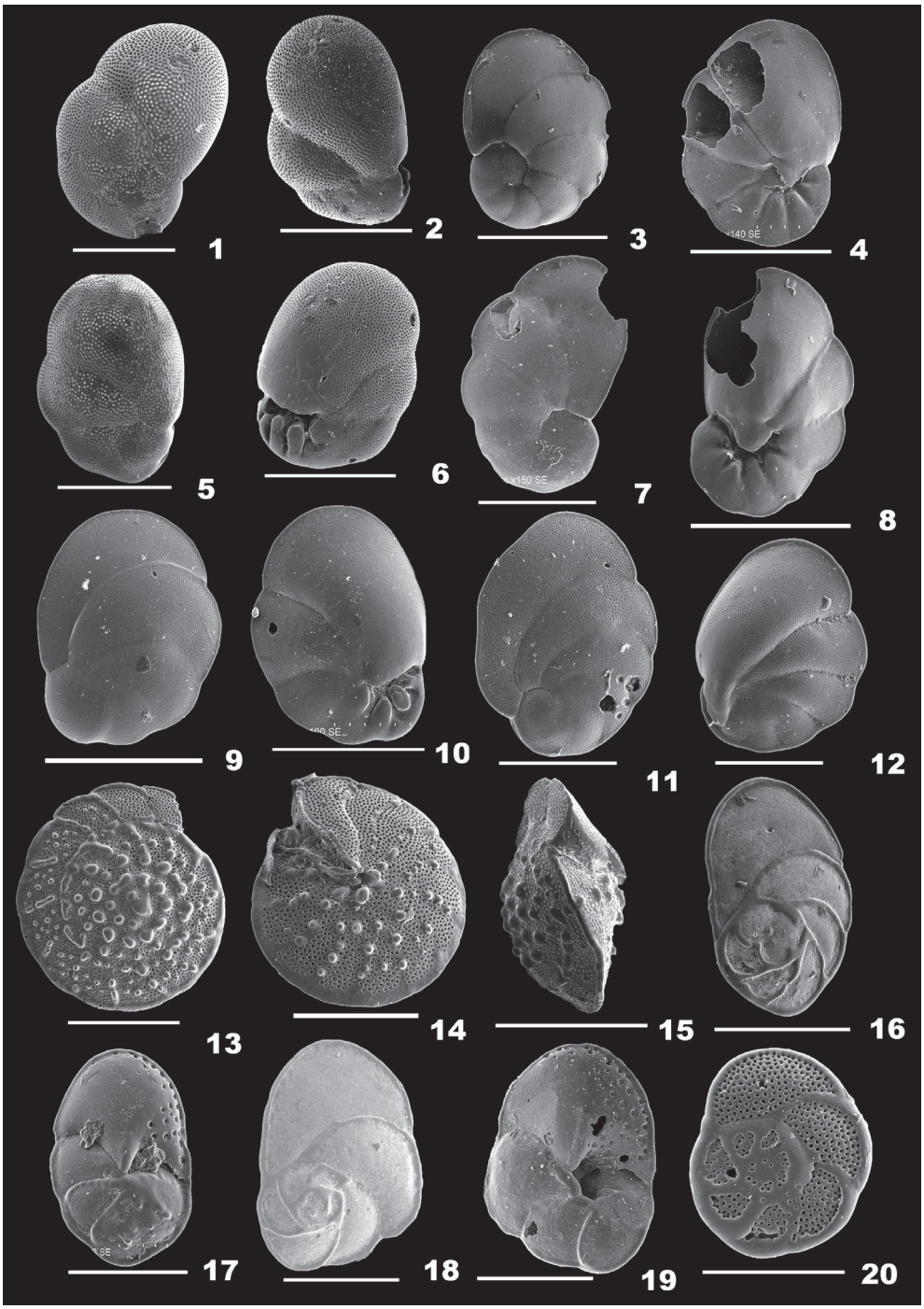

FIGURE 8. 1-2, *Baggina indica* (Cushman, 1921) in dorsal view (scale equals 200 µm) (**1**) and in ventral view (scale equals 300 µm) (**2**). **3-4**, *Cancris auriculus* (Fichtel and Moll, 1798) in dorsal view (scale equals 400 µm) (**3**) and in ventral view (scale equals 400 µm) (**4**). **5-6**, *Cancris bubnanensis* (McCulloch, 1977) in dorsal view (scale equals 300 µm) (**5**) and in ventral view (scale equals 300 µm) (**6**). **7-8**, *Cancris carinata* (Millet, 1904) in dorsal view (scale equals 300µm) (**7**) and in ventral view (scale equals 400 µm) (**8**). **9-10**, *Cancris communis* Cushman and Todd, 1942 in dorsal view (scale equals 300 µm) (**9**) and in ventral view (scale equals 300 µm) (**10**). **11-12**, *Cancris sagra* (d'Orbigny, 1839a) in dorsal view (scale equals 200 µm) (**11**) and in ventral view (scale equals 200 µm) (**12**). **13-15**, *Neoeponides margaritifer* (Brady, 1881) in dorsal view (scale equals 500 µm) (**13**); in ventral view (scale equals 400 µm) (**14**); and in apertural view (scale equals 500 µm) (**15**). **16-17**, *Eponides cribrorepandus* (Asano and Uchio, 1951) in dorsal view (scale equals 300 µm) (**16**) and in ventral view (scale equals 300 µm) (**17**). **18-19**, *Eponides repandus* (Fichtel and Moll, 1798) in dorsal view (scale equals 300 µm) (**18**) and in ventral view (scale equals 300 µm) (**19**). **20**, *Rosalina macropora* (Hofker, 1951) in dorsal view (scale equals 200 µm).

Nonionoides boueana (d'Orbigny, 1846)
Figure 7.19

1846 *Nonionina boueana* d'Orbigny, p. 108, pl. 5, figs. 11-12.

2014 *Nonionoides boueanum* (d'Orbigny); Panchang and Nigam, pl. 34, fig. 10a-c.

Description. Test broad, outline subcircular, wall calcareous, finely perforate, surface smooth, umbilical region depressed and filled with pustules; chambers many, inflated, gradually increasing in size; planispirally arranged, coiling involute; periphery slightly lobulate, sutures distinct and curved backwards, slightly depressed, limbate; aperture interiomarginal, a small, round opening at the basal end of the apertural side.

Genus HAYNESINA Banner and Culver, 1978
Haynesina depressula (Walker and Jacob, 1798)
Figure 7.20

1798 *Nautilus depressulus* Walker and Jacob, p. 641, pl. 14, fig. 33.

2006 *Nonion depressulum* (Walker and Jacob); Oflaz, p. 227, pl. 9, figs. 5-6 (not pl. 7, figs. 4-5).

2012 *Haynesina depressula* (Walker and Jacob); Debenay, p. 222.

2012 *Nonion depressulum* (Walker and Jacob); Milker and Schmiedl, p. 112, fig. 25.17-18.

Description. Test circular, biumbilicate, wall calcareous, finely perforate, surface smooth; chambers slightly inflated, planispirally arranged, gradually increasing in size, coiling involute; umbilici narrow and depressed with pustules; periphery subrounded, slightly lobulate, sutures radial, curved backwards, cut near umbilicus; aperture interiomarginal, a low arched opening.

Superfamily DISCORBOIDEA Ehrenberg, 1838
Family BAGGINIDAE Cushman, 1927
Subfamily BAGGININAE Cushman, 1927
Genus BAGGINA Cushman, 1926
Baggina indica (Cushman, 1921)
Figure 8.1-2

1921 *Pulvinulina indica* Cushman, p. 332, pl. 106, fig. 6.

1999 *Cancris indicus* (Cushman); Nigam and Khare, p. 296, pl. 5, fig. 18.

2001 *Baggina indica* (Cushman); Szarek, p. 132, pl. 19, figs. 6-7.

2014 *Baggina indica* (Cushman); Panchang and Nigam, pl. 28, fig. 26a-c.

Description. Test oblong, wall calcareous, well perforated, umbilical region imperforate, surface smooth; chambers inflated, subglobular, rapidly increasing in size, final chamber much more inflated, chamber arrangement trochospiral; periphery broadly rounded, margin lobulated, sutures slightly depressed and curved on the spiral side, radial and much depressed on the umbilical side; aperture interiomarginal, a broad opening on the umbilical side at the base of the apertural face.

Family CANCRISIDAE Chapman, Parr and Collins, 1934
Genus CANCRIS de Montfort, 1808
Cancris auriculus (Fichtel and Moll, 1798)
Figure 8.3-4

1798 *Nautilus auricula* Fichtel and Moll, p. 108, pl. 20, figs. a-c.

2001 *Cancris auriculus* (Fichtel and Moll); Szarek, p. 132, pl. 19, figs. 1-3.

2003 *Cancris auricula* (Fichtel and Moll); Murray, p. 19, fig. 6.6-7.

2010 *Cancris auriculus* (Fichtel and Moll); Margreth, p. 28, pl. 29, fig. 10a-c.

2012 *Cancris auriculus* (Fichtel and Moll); Debenay, p. 189.

2012 *Cancris auriculus* (Fichtel and Moll); Milker and Schmiedl, p. 93, fig. 21.14-15.

2014 *Cancris auriculus* (Fichtel and Moll); Panchang and Nigam, pl. 28, fig. 27a-c.

Description. Test biconvex, outline auriculate, cross section lenticular, wall calcareous, perforate, umbilical area imperforate; surface smooth; chambers rapidly increasing in size, trochospirally arranged, coiling evolute on the spiral side, involute on the umbilical side; peripheral margin carinate and acute, sutures curved and slightly depressed on the spiral side, radial and much depressed on the umbilical side; aperture an interiomarginal, umbilical, slit-like opening with a broad apertural flap.

Cancris bubnanensis McCulloch, 1977
Figure 8.5-6

1977 *Baggina bubnanensis* McCulloch, p. 342, pl. 137, fig. 2a-c.

2012 *Baggina bubnanensis* McCulloch; Debenay, p. 187.

2014 *Baggina bubnanensis* McCulloch; Panchang and Nigam, pl. 28, fig. 25a-c.

Description. Test subovate, wall calcareous, well perforated, umbilical side above the aperture imperforate, surface glassy, smooth except for prominent ridges on the apertural side beneath the aperture; chambers inflated, final chamber very much inflated, rapidly increasing in size as added, chamber arrangement low trochospiral; periphery subacutely rounded, margin lobulated, sutures curved and depressed on the spiral side, radial and

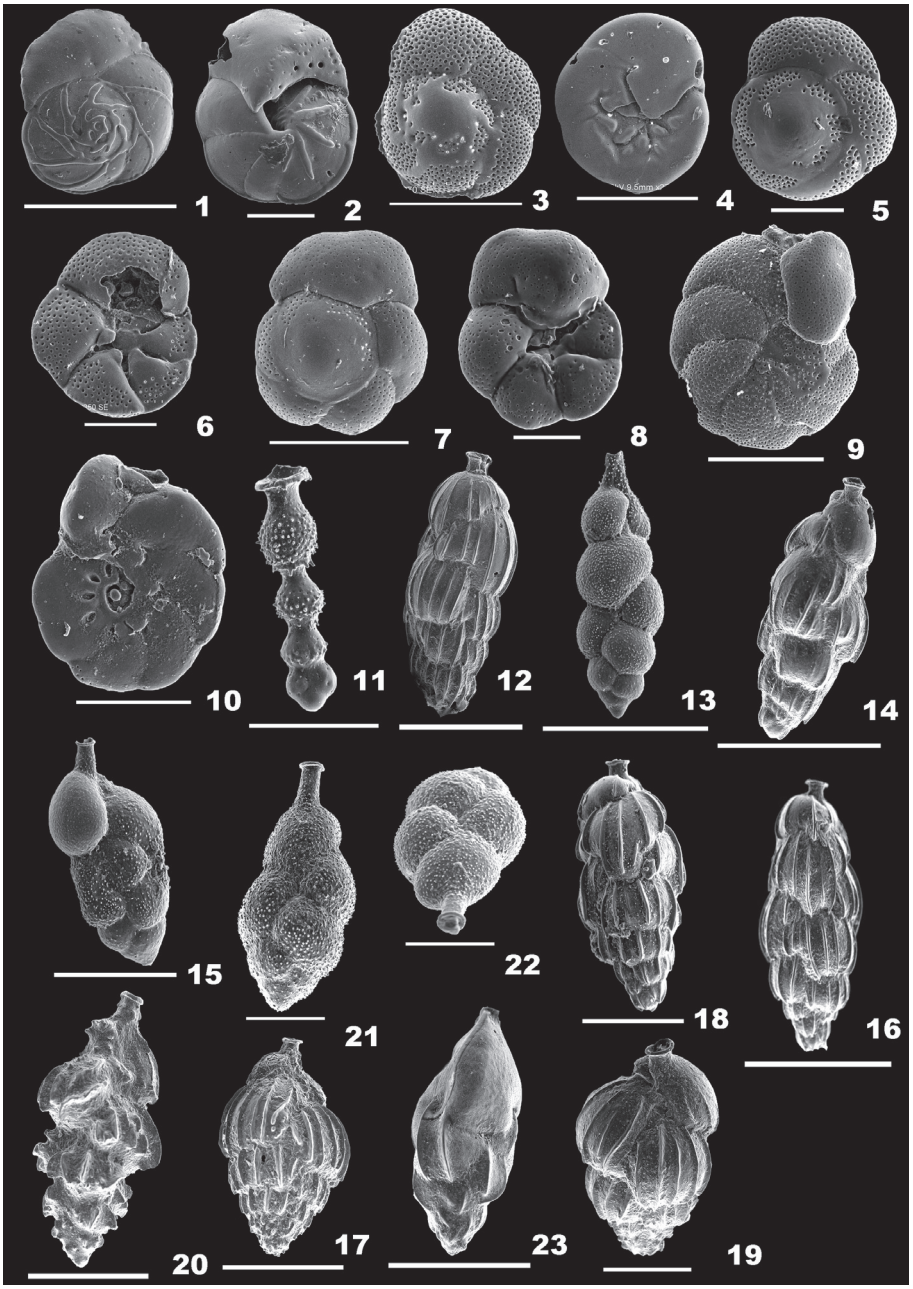

FIGURE 9. 1-2, *Poroeponides lateralis* (Terquem, 1878) in dorsal view (scale equals 1 mm) (**1**) and in ventral view (scale equals 500 µm) (**2**). **3-4**, *Rosalina bradyi* (Cushman, 1915) in dorsal view (scale equals 200 µm) (**3**) and in ventral view (scale equals 200 µm) (**4**). **5-6**, *Rosalina floridana* (Cushman, 1922a) in dorsal view (scale equals 100 µm) (**5**) and in ventral view (scale equals 100 µm) (**6**). **7-8**, *Rosalina globularis* d'Orbigny, 1826 in dorsal view (scale equals 200 µm) (**7**) and in ventral view (scale equals 100 µm) (**8**). **9-10**, *Discorbinella bertheloti* (d'Orbigny, 1839b) in dorsal view (scale equals 200 µm) (**9**) and in ventral view (scale equals 200 µm) (**10**). **11**, *Stilostomelloides virgula* (Brady, 1879b) in dorsal view (scale equals 200 µm). **12**, *Rectuvigerina phlegeri* Le Calvez, 1959 in dorsal view (scale equals 200 µm). **13**, *Uvigerina asperula* Čžjžek, 1848 in dorsal view (scale equals 300 µm). **14**, *Uvigerina akitaensis* Asano, 1950 in dorsal view (scale equals 300 µm). **15**, *Uvigerina auberiana* d'Orbigny, 1839 in dorsal view (scale equals 200 µm). **16**, *Uvigerina* ex gr. *semiornata* d'Orbigny, 1846 in dorsal view (scale equals 300 µm). **17**, *Uvigerina mediterranea* Hofker, 1932 in dorsal view (scale equals 200 µm). **18**, *Uvigerina peregrina* Cushman, 1923 in dorsal view (scale equals 200 µm). **19**, *Uvigerina pygmaea* d'Orbigny, 1826 in dorsal view (scale equals 100 µm). **20**, *Siphouvigerina porrecta* (Brady, 1879b) in dorsal view (scale equals 200 µm). **21-22**, *Siphouvigerina proboscidea* (Schwager, 1866) in dorsal view (scale equals 100 µm) (**21**) and in apertural view (scale equals 100 µm) (**22**). **23**, *Trifarina angulosa* (Williamson, 1858) in dorsal view (scale equals 200 µm).

very depressed on the umbilical side; aperture interiomarginal, umbilical, a wide opening above the ridges, at the basal end of the apertural side.

Cancris carinata (Millet, 1904)
Figure 8.7-8

1904 *Pulvinulina oblonga* (Williamson) var. *carinata* Millett, p. 498, pl. 10, fig. 3.

2001 *Cancris carinatus* (Millet); Szarek, p. 133, pl. 19, fig. 5.

2014 *Cancris carinata* (Millet); Panchang and Nigam, pl. 28, figs. 28a-c, 29a-c.

Description. Test elongate, outline auriculate, cross section lenticular, wall calcareous, perforate, umbilical side imperforate, surface smooth; chambers many, rapidly increasing in size, arranged trochospirally, spiral side evolute, umbilical side involute; periphery acute and carinate, sutures curved and slightly depressed on the spiral side, radial and much depressed on the umbilical side; aperture an interiomarginal, umbilical, opening with a distinct, projecting apertural flap.

Cancris communis Cushman and Todd, 1942
Figure 8.9-10

1942 *Cancris sagra* (d'Orbigny) var. *communis* Cushman and Todd, p. 79, pl. 19, figs. 8-11; pl. 20, fig. 1.

2014 *Cancris communis* Cushman and Todd; Panchang and Nigam, pl. 28, fig. 30a-c.

Description. Test broad, outline auriculate, cross section lenticular, wall calcareous, perforate, umbilical side above the aperture imperforate, surface smooth; chambers flat on spiral side, inflated on the umbilical side, rapidly increasing in size, arranged trochospirally, spiral side evolute, umbilical side involute; periphery acute and carinate, sutures well arched, slightly depressed and limbate in the final chambers on the spiral side, radial and depressed on the umbilical side; aperture an interiomarginal, umbilical, broad opening.

Cancris sagra (d'Orbigny, 1839a)
Figure 8.11-12

1839a *Rotalina sagra* d'Orbigny, p. 77, pl. 5, figs. 13-15.

2012 *Cancris sagrum* (d'Orbigny); Debenay, p. 189.

2014 *Cancris sagra* (d'Orbigny); Panchang and Nigam, pl. 29, fig. 8a-c.

Description. Test broad, outline subelliptical, spiral side flat to gently convex, umbilical side convex, wall transparent to opaque, perforate, a selected portion above the aperture imperforate, surface smooth; chambers roughly triangular, inflated in the umbilical side, arched in the spiral side, final chambers rapidly increasing in size as added, chamber arrangement trochospiral; peripheral margin carinate, sutures curved and slightly depressed on the dorsal side, depressed and radial on the ventral side; aperture interiomarginal, umbilical, a narrow slit, with a flap-like lamina.

Family DISCORBIDAE Ehrenberg, 1838
Genus NEOEPONIDES Reiss, 1960
Neoeponides margaritifer (Brady, 1881)
Figure 8.13-15

1881 *Truncatulina margaritifera* Brady, p. 66.

2001 *Heterolepa margaritifera* (Brady); Szarek, p. 145, pl. 25, figs. 4-7.

2012 *Heterolepa margaritifera* (Brady); Debenay, p. 199.

Description. Test biconvex, wall calcareous, well perforated, surface richly ornamented with pustules; chambers many, trochospirally arranged, coiling evolute on the spiral side, involute on the umbilical side; periphery rounded, margin subcarinate and very slightly lobulate, sutures distinct on either side, marked with pustules; aperture interiomarginal, umbilical, small slit, bordered by a lip.

Family EPONIDIDAE Hofker, 1951
Subfamily EPONIDINAE Hofker, 1951
Genus EPONIDES de Montfort, 1808
Eponides cribrorepandus (Asano and Uchio, 1951)
Figure 8.16-17

1951 *Poroeponides cribrorepandus* Asano and Uchio *in* Asano, p. 18, text-figs. 134-135.

2001 *Eponides cribrorepandus* (Asano and Uchio); Szarek, p. 133, pl. 19, fig. 12.

2014 *Eponides cribrorepandus* (Asano and Uchio); Panchang and Nigam, pl. 29, fig. 11a-c.

Description. Test elongate, spiral side nearly flat, umbilical side more convex; wall calcareous, finely perforate, surface smooth; chambers rapidly increasing in size, final chambers more elongate, arranged trochospirally; periphery subangular, carinate with imperforate keel, sutures limbate and slightly arched on the spiral side, curved and slightly depressed on the umbilical side, primary aperture single, interiomarginal, low arch opening, secondary apertures few, areal.

Eponides repandus (Fichtel and Moll, 1798)
Figure 8.18-19

1798 *Nautilus repandus* Fichtel and Moll, p. 35, pl. 3, figs. a-d.

2001 *Eponides repandus* (Fichtel and Moll); Szarek, p. 133, pl. 19, figs. 9-11.

2003 *Eponides repandus* (Fichtel and Moll); Javaux and Scott, p. 14, fig. 3.1-2.

2012 *Eponides repandus* (Fichtel and Moll); Debenay, p. 196.

2014 *Eponides repandus* (Fichtel and Moll); Panchang and Nigam, pl. 29, fig. 12a-c.

Description. Test subrounded, spiral side slightly convex, umbilical side more convex; wall calcareous, finely perforate, surface smooth; chambers rapidly increasing in size, arranged trochospirally; periphery subangular, carinate with imperforate keel, sutures limbate and curved on the spiral side, curved and slightly depressed on the umbilical side, primary aperture interiomarginal, broad, low arch opening, secondary apertures areal on the ventral side.

Genus POROEPONIDES Cushman, 1944

Poroeponides lateralis (Terquem, 1878)

Figure 9.1-2

1878 *Rosalina lateralis* Terquem, p. 25, pl. 2, fig. 11.

2007 *Poroeponides lateralis* (Terquem); Talib and Farroqui, p. 25, pl. 1, fig. 18.

2012 *Poroeponides lateralis* (Terquem); Debenay, p. 210.

Description. Test biconvex, wall calcareous, finely perforate, surface smooth; chambers rapidly increasing in size, trochospirally arranged, coiling evolute on the dorsal side; periphery with a distinct keel, sutures curved, elevated, limbate on the spiral side, radial, slightly depressed on the umbilical side; aperture interiomarginal, slit-like opening, bordered by a rim, secondary apertures areal and round openings on the apertural face.

Family ROSALINIDAE Reiss, 1963

Genus ROSALINA d'Orbigny, 1826

Rosalina bradyi (Cushman, 1915)

Figure 9.3-4

1915 *Discorbina globularis* (d'Orbigny) var. *bradyi* Cushman, p. 12, pl. 8, fig. 1a-c.

2006 *Rosalina bradyi* (Cushman); Oflaz, p. 218, pl. 7, figs. 8-9.

2010 *Rosalina bradyi* (Cushman); Margreth, p. 120, pl. 31, fig. 5a-c.

2012 *Rosalina bradyi* (Cushman); Debenay, p. 211.

2012 *Rosalina bradyi* (Cushman); Milker and Schmiedl, p. 98, fig. 22.11-14.

2014 *Rosalina bradyi* (Cushman); Panchang and Nigam, pl. 30, fig. 5a-c.

Description. Test small, spiral side convex, umbilical side nearly flattened, wall calcareous, coarsely perforated on the spiral side, smooth and imperforate on the umbilical side; chambers on the spiral side inflated and convex, very slightly inflated chambers on the umbilical side, gradually increasing in size, arrangement trochospiral; periphery rounded, sutures curved backwards and limbate; aperture interiomarginal, extraumbilical arch on the umbilical side, bordered by a narrow, thick lip.

Rosalina floridana (Cushman, 1922a)

Figure 9.5-6

1922a *Discorbis floridana* Cushman, p. 39, pl. 5, figs. 11-12.

2012 *Rosalina floridana* (Cushman); Debenay, p. 211.

Description. Test subcircular, spiral side convex, umbilical side slightly convex, wall calcareous, coarsely perforate, umbilical region concave and imperforate; chambers on the spiral side inflated, subglobular and convex, very slightly inflated and triangular chambers on the umbilical side, gradually increasing in size, arrangement trochospiral; periphery rounded, margin subacute, slightly lobulate, sutures curved backwards and limbate on the spiral side, radial and depressed on the umbilical side; aperture interiomarginal, elongate arch on the umbilical side, bordered by a thin lip.

Rosalina globularis d'Orbigny, 1826

Figure 9.7-8

1826 *Rosalina globularis* d'Orbigny, p. 271, pl. 13, figs. 1-4.

2001 *Rosalina globularis* d'Orbigny; Szarek, p. 135, pl. 20, fig. 10.

2003 *Rosalina globularis* d'Orbigny; Javaux and Scott, p. 20, fig. 5.3-4.

2010 *Rosalina globularis* d'Orbigny; Margreth, p. 120, pl. 31, fig. 4a-c.

2012 *Rosalina globularis* d'Orbigny; Debenay, p. 211.

2012 *Rosalina globularis* d'Orbigny; Milker and Schmiedl, p. 98, fig. 22.15-16.

Description. Test subrounded, biconvex, wall calcareous, perforate, umbilical region concave and imperforate, surface smooth; chambers subglobular and convex on the spiral side, slightly inflated and triangular chambers on the umbilical side, gradually increasing in size, final chamber more inflated, arrangement trochospiral; periphery rounded and lobulate, sutures curved backwards, limbate and slightly depressed on the spiral side, radial and depressed on the umbilical side; aperture interiomarginal, a low arch opening on the umbilical side, almost covered by a thin, narrow lamina.

Rosalina macropora (Hofker, 1951)
Figure 8.20

1951 *Discopulvinulina macropora* Hofker, p. 460, figs. 312-313.

2012 *Rosalina macropora* (Hofker); Milker and Schmiedl, p. 99, fig. 22.17-18.

Description. Test subrounded, spiral side convex, umbilical side flattened, umbilical region depressed, wall calcareous, perforate, surface smooth; chambers convex on the spiral side, subtriangular on the umbilical side, gradually increasing in size, arrangement trochospiral; periphery rounded with a thick imperforate keel, sutures curved backwards, limbate and slightly depressed on the spiral side, radial on the umbilical side; aperture interiomarginal, extraumbilical elongate slit on the umbilical side.

Superfamily DISCORBINELLOIDEA Sigal, 1952
Family DISCORBINELLIDAE Sigal, 1952
Subfamily DISCORBINELLINAE Sigal, 1952
Genus DISCORBINELLA Cushman and Martin, 1935
Discorbinella bertheloti (d'Orbigny, 1839b)
Figure 9.9-10

1839b *Rosalina bertheloti* d'Orbigny, p. 135, pl. 1, figs. 28-30.

2001 *Discorbinella bertheloti* (d'Orbigny); Szarek, p. 137, pl. 21, figs. 1-3.

2006 *Discorbinella bertheloti* (d'Orbigny); Oflaz, p. 223, pl. 8, figs. 5-6.

2012 *Discorbinella bertheloti* (d'Orbigny); Debenay, p. 194.

2012 *Discorbinella bertheloti* (d'Orbigny); Milker and Schmiedl, p. 104, fig. 23.29-30.

2014 *Discorbinella bertheloti* (d'Orbigny); Panchang and Nigam, pl. 31, fig. 6a-c.

Description. Test compressed, outline circular, spiral side convex, umbilical side flat, wall, calcareous, perforate, surface smooth; chambers many, inflated, arranged trochospirally; periphery rounded, lobulated, sutures distinct and depressed, curved backwards on the spiral side; aperture interiomarginal, a low opening, bordered by a lip.

Superfamily BULIMINOIDEA Jones, 1875
Family SIPHOGENERINOIDIDAE Saidova, 1981
Subfamily SIPHOGENERINOIDINAE Saidova, 1981
Genus STILOSTOMELLOIDES Ujiie and Rifardi, 1993
Stilostomelloides virgula (Brady, 1879b)
Figure 9.11

1879b *Sagrina virgula* Brady, p. 275, pl. 8, figs. 19-21.

2001 *Allassoida virgula* (Brady); Szarek, p. 127, pl. 17, fig. 14.

2012 *Allassoida virgula* (Brady); Debenay, p. 197.

2014 *Siphogenerina virgula* (Brady); Panchang and Nigam, pl. 25, fig. 32.

Description. Test long, straight, aboral end bluntly tapering, wall calcareous, perforate, surface ornamented with short, sharp spines; chambers rapidly increasing in size, chamber arrangement trochospiral initially, later chambers uniserially arranged, globular, final chamber pyriform; aperture terminal, broadly round, slightly produced, bordered by a distinctly reversed lip.

Subfamily TUBULOGENERININAE Saidova, 1981
Genus RECTUVIGERINA Mathews, 1945
Rectuvigerina phlegeri Le Calvez, 1959
Figure 9.12

1959 *Rectuvigerina phlegeri* Le Calvez in Berthois and Le Calvez, p. 363, pl. 1, fig. 11.

2002 *Rectuvigerina phlegeri* Le Calvez; Kaminski, Aksu, Box, Hiscott, Filipescu and Al-Salameen, p. 174, pl. 3, fig. 9.

2006 *Rectuvigerina phlegeri* Le Calvez; Oflaz, p. 208, pl. 6, fig. 3.

2009 *Rectuvigerina phlegeri* Le Calvez; Milker, Schmiedl, Betzler, Römer, Jaramillo-Vogel and Siccha, p. 216, pl. 2, fig. 19.

2012 *Rectuvigerina phlegeri* Le Calvez; Milker and Schmiedl, p. 86.

Description. Test elongate, wall calcareous, perforate, surface of chambers ornamented with long costae; early chambers triserially arranged, later biserial and finally unserially arranged; periphery subrounded, sutures initially inclined, later horizontal and depressed; aperture terminal, rounded on a short neck, bordered by a rim.

Family UVIGERINIDAE Haeckel, 1894
Subfamily UVIGERININAE Haeckel, 1894
Genus UVIGERINA d'Orbigny, 1826
Uvigerina asperula Czjžek, 1848
Figure 9.13

1848 *Uvigerina asperula* Czjžek, p. 146, pl. 13, figs. 14-15.

2014 *Euuvigerina asperula* Czjžek; Panchang and Nigam, pl. 26, fig. 30.

2015 *Euuvigerina asperula* Czjžek; Hanagata and Nobuhara, p. 86, fig. 26.21-22.

Description. Test long, distal end bluntly pointed, wall calcareous, perforate, surface ornamented with fine spines; chambers subglobular, biserially arranged, rapidly increasing in size; periphery lobu-

lated, sutures depressed and curved; aperture terminal, round on a cylindrical neck, bordered by a thin rim.

Uvigerina akitaensis Asano, 1950
Figure 9.14

1950 *Uvigerina akitaensis* Asano, p. 14, pl. 14, figs. 60-62.

2014 *Uvigerina akitaensis* Asano; Panchang and Nigam, pl. 27, fig. 10.

Description. Test elongate, slender, tapering aboral end, wall calcareous, perforate, surface of chambers ornamented with long costae; chambers biserially and later uniserially arranged; periphery subrounded and carinate, sutures horizontal and depressed; aperture terminal, rounded on a short neck, bordered by an everted, phialine lip.

Uvigerina auberiana d'Orbigny, 1839b
Figure 9.15

1839b *Uvigerina auberiana* d'Orbigny, p. 106, pl. 2, figs. 23-24.

2001 *Uvigerina* ex gr. *auberiana* d'Orbigny; Szarek, p. 130, pl. 18, figs. 11-12.

2010 *Uvigerina auberiana* d'Orbigny; Margreth, p. 117, pl. 29, fig. 3a-b.

2014 *Euuvigerina auberiana* d'Orbigny; Panchang and Nigam, pl. 24, figs. 32-33.

Description. Test robust, aboral end bluntly pointed, wall calcareous, perforate, surface ornamented with minute spines; chambers subglobular, somewhat compressed, earlier chambers triserially arranged, later biserially and uniserially arranged, rapidly increasing in size; periphery slightly lobulated, sutures depressed and curved; aperture terminal, round on a slightly long neck, bordered by an everted lip.

Uvigerina ex gr. *semiornata* d'Orbigny, 1846
Figure 9.16

1846 *Uvigerina semiornata* d'Orbigny, p. 189, pl. 11, figs. 23-24.

2012 *Uvigerina* ex gr. *semiornata* d'Orbigny; Nisha and Singh, p. 788, pl. 2, fig. 41.

Description. Test long, wall calcareous, perforate, surface of chambers ornamented with longitudinal costae; earlier chambers triserially and later biserially arranged; periphery carinate, sutures nearly horizontal, curved in later chambers, depressed; aperture terminal, round on a short neck, bordered by an everted lip.

Uvigerina mediterranea Hofker, 1932
Figure 9.17

1932 *Uvigerina mediterrenea* Hofker, p.118, text-fig. 32a-g.

2002 *Uvigerina mediterranea* Hofker; Kaminski, Aksu, Box, Hiscott, Filipescu and Al-Salameen, p. 174, pl. 3, fig. 10.

2010 *Uvigerina mediterranea* Hofker; Margreth, p. 117, pl. 29, fig. 1a-b.

2012 *Uvigerina mediterranea* Hofker; Milker and Schmiedl, p. 90, fig. 20.28.

Description. Test ovate, broad than long, wall calcareous, perforate, surface ornamented with long costae; chambers inflated, gradually increase in size, triserially arranged; periphery carinate, sutures distinct, slightly inclined and depressed; aperture terminal, circular opening on a short neck, bordered by a lip.

Uvigerina peregrina Cushman, 1923
Figure 9.18

1923 *Uvigerina peregrina* Cushman, p. 166, pl. 42, figs. 7-10.

2001 *Uvigerina peregrina* Cushman; Szarek, p. 130, pl. 18, fig. 13.

2010 *Uvigerina peregrina* Cushman; Margreth, p. 117, pl. 29, fig. 2a-b.

2012 *Uvigerina* cf. *U. peregrina* Cushman; Debenay, p. 184.

2012 *Uvigerina peregrina* Cushman; Milker and Schmiedl, p. 90, fig. 20.29.

2014 *Uvigerina peregrina* Cushman; Panchang and Nigam, pl. 27, fig. 17.

Description. Test subovate, slightly long, wall calcareous, perforate, surface ornamented with long costae and pustules; chambers inflated, gradually increase in size, chamber arrangement triserial; periphery carinate, sutures distinct, slightly oblique and depressed; aperture terminal, round on a short neck, bordered by a lip.

Uvigerina pygmaea d'Orbigny, 1826
Figure 9.19

1826 *Uvigerina pygmea* d'Orbigny, p. 269, pl. 12, figs. 8-9.

2010 *Uvigerina pygmea* d'Orbigny; Margreth, p. 117, pl. 29, fig. 5a-b.

2014 *Uvigerina pygmea* d'Orbigny; Panchang and Nigam, pl. 27, fig. 18.

Description. Test ovate, wall calcareous, perforate, surface ornamented with long costae; chambers inflated, rapidly increasing in size, triserially arranged; periphery carinate, sutures distinct and depressed; aperture terminal, circular opening on a short neck, bordered by a lip.

Genus SIPHOUVIGERINA Parr, 1950
Siphouvigerina porrecta (Brady, 1879b)
Figure 9.20

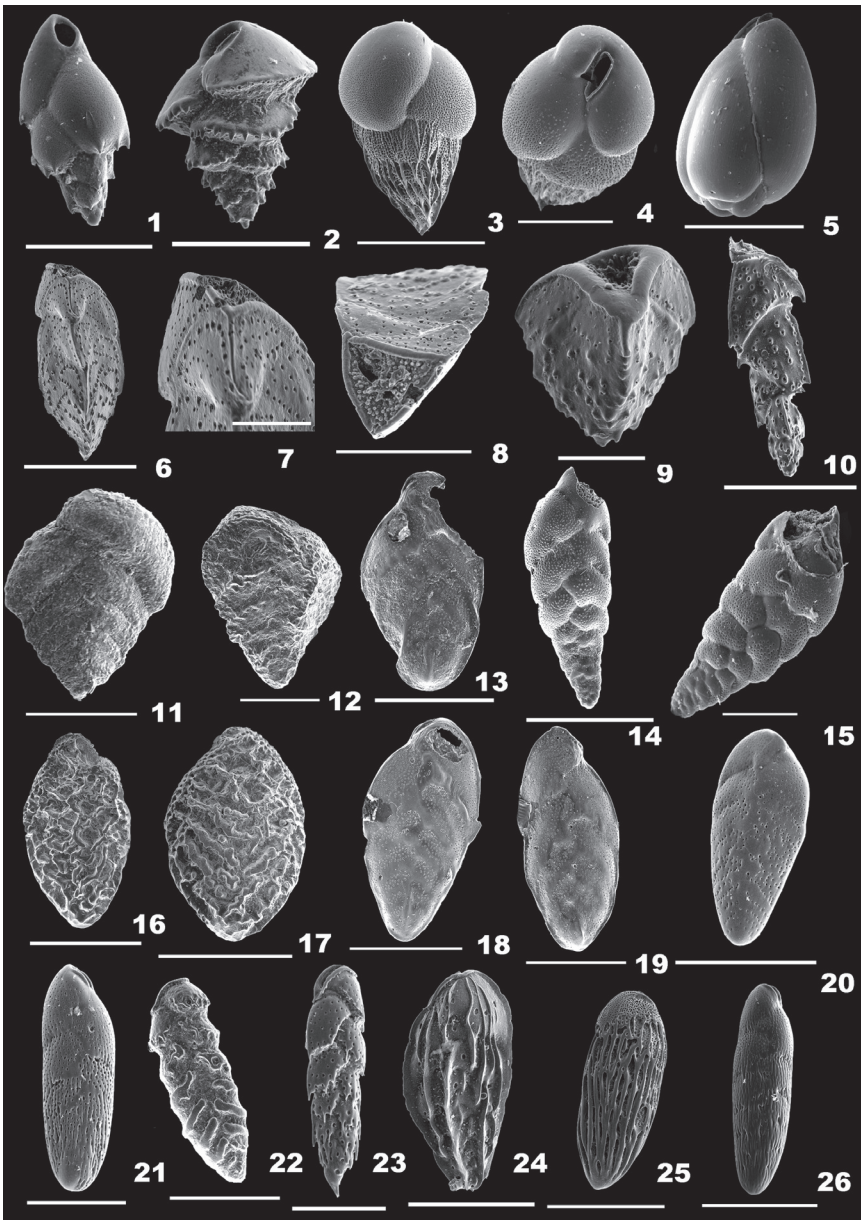

FIGURE 10. 1, *Bulimina aculeata* d'Orbigny, 1826 in dorsal view (scale equals 200 µm). **2**, *Bulimina marginata* d'Orbigny, 1826 in dorsal view (scale equals 200 µm). **3-4**, *Bulimina striata* d'Orbigny in Guérin-Méneville, 1843 in ventral view (scale equals 300 µm) (**3**) and in apertural view (scale equals 100 µm) (**4**). **5**, *Globobulimina turgida* (Bailey, 1851) in dorsal view (scale equals 400 µm). **6-8**, *Reussella haizumensis* Asano, 1950 in dorsal view (scale equals 300 µm) (**6**); in closer view (scale equals 100 µm) (**7**); and in apertural view (scale equals 200 µm) (**8**). **9**, *Reussella spinulosa* (Reuss, 1850) in dorsal view (scale equals 100 µm). **10**, *Valvobifarina mackinnonii* (Millett, 1900a) in dorsal view (scale equals 300 µm). **11**, *Bolivina obscura* He, Hu and Wang, 1965 in dorsal view (scale equals 200 µm). **12**, *Bolivina cistina* Cushman, 1936 in dorsal view (scale equals 100 µm). **13**, *Bolivina dilatata* Reuss, 1850 in dorsal view (scale equals 200 µm). **14-15**, *Bolivina kuriani* (Seibold, 1975) in ventral view (scale equals 200 µm) (**14**) and in dorsal view (scale equals 100 µm) (**15**). **16-17**, *Bolivina persiensis* Lutze, 1974 in dorsal view (scale equals 200 µm) (**16**) and in dorsal view (scale equals 200 µm) (**17**). **18-19**, *Bolivina pusilla* Schwager, 1866 in dorsal view (scale equals 200 µm) (**18**) and in ventral view (scale equals 200 µm) (**19**). **20**, *Bolivina spathulata* (Williamson, 1858) in dorsal view (scale equals 300 µm). **21**, *Bolivina striatula* Cushman, 1922a in dorsal view (scale equals 200 µm). **22**, *Pseudobrizalina lobata* (Brady, 1881) in dorsal view (scale equals 200 µm). **23**, *Sagrinella durrandii* (Millett, 1900b) in dorsal view (scale equals 100 µm). **24**, *Saidovina karreriana* (Brady, 1881) in dorsal view (scale equals 300 µm). **25**, *Loxostomina amygdalaeformis* (Brady, 1881) in dorsal view (scale equals 500 µm). **26,** *Loxostomina mayori* (Cushman, 1922) in dorsal view (scale equals 300 µm).

1879b *Uvigerina porrecta* Brady, p. 274, pl. 8, figs. 15-16.

2012 *Neouvigerina porrecta* (Brady); Debenay, p. 181.

2014 *Neouvigerina porrecta* (Brady); Panchang and Nigam, pl. 27, fig. 5.

Description. Test long, fusiform, wall calcareous, perforate, surface ornamented with prominent long costae; chambers arranged linearly, sutures distinct; aperture terminal, round at the end of a long neck, bordered by an everted lip.

Siphouvigerina proboscidea (Schwager, 1866)
Figure 9.21-22

1866 *Uvigerina proboscidea* Schwager, p. 250, pl. 7, fig. 96.

2001 *Neouvigerina proboscidea* (Schwager); Szarek, p. 130, pl. 18, fig. 10.

2012 *Neouvigerina proboscidea* (Schwager); Debenay, p. 181.

2014 *Euuvigerina proboscidea* (Schwager); Panchang and Nigam, pl. 27, figs. 1-2.

Description. Test long, wall calcareous, perforate, surface ornamented with short spines; chambers subglobular, initially triserially arranged, later biserially and uniserially arranged, periphery lobulated, sutures distinct, curved and depressed; aperture terminal, round at the end of a long, cylindrical neck, bordered by an everted phialine lip.

Subfamily ANGULOGERININAE Galloway, 1933
Genus TRIFARINA Cushman, 1923
Trifarina angulosa (Williamson, 1858)
Figure 9.23

1858 *Uvigerina angulosa* Williamson, p. 67, pl. 5, fig. 140.

2003 *Trifarina angulosa* (Williamson); Murray, p. 26, fig. 10.5.

2010 *Angulogerina angulosa* (Williamson); Margreth, p. 118, pl. 29, fig. 6a-b.

2012 *Trifarina angulosa* (Williamson); Debenay, p. 182.

2012 *Angulogerina angulosa* (Williamson); Milker and Schmiedl, p. 90, fig. 21.2-4.

2014 *Angulogerina angulosa* (Williamson); Panchang and Nigam, pl. 27, fig. 22.

Description. Test elongate, cross section triangular, wall calcareous, perforate, surface ornamented with thick, long striae; initial chamber arrangement triserial, later biserially arranged; periphery carinate, sutures limbate and depressed; aperture terminal, ovate, at the end of a short neck, bordered by a rim.

Family BULIMINIDAE Jones, 1875
Genus BULIMINA d'Orbigny, 1826

Bulimina aculeata d'Orbigny, 1826
Figure 10.1

1826 *Bulimina aculeata* d'Orbigny, p. 269, fig. 7.

2001 *Bulimina aculeata* d'Orbigny; Szarek, p. 128, pl. 17, fig. 19.

2002 *Bulimina aculeata* d'Orbigny; Kaminski, Aksu, Box, Hiscott, Filipescu, and Al-Salameen, p. 174, pl. 3, fig. 3.

2010 *Bulimina aculeata* d'Orbigny; Margreth, p. 116, pl. 27, fig. 8.

2012 *Bulimina aculeata* d'Orbigny; Milker and Schmiedl, p. 87, fig. 20.19.

Description. Test small, lateral view ovate, tapering distal end, wall calcareous, finely perforate, surface smooth, chamber ends with pseudospines; chambers inflated, rapidly increasing in size, triserially arranged; periphery rounded, sutures distinct, oblique and depressed; aperture terminal, subcircular, loop-like opening, bordered by a thick rim.

Bulimina marginata d'Orbigny, 1826
Figure 10.2

1826 *Bulimina marginata* d'Orbigny, p. 269, pl. 12, figs. 10-12.

2001 *Bulimina marginata* d'Orbigny; Szarek, p. 129, pl. 18, figs. 2-5.

2003 *Bulimina marginata* d'Orbigny; Murray, p. 27, fig. 10.7-8.

2006 *Bulimina marginata* d'Orbigny; Oflaz, p. 210 pl. 6, figs. 5-7.

2010 *Bulimina marginata* d'Orbigny; Margreth, p. 116, pl. 27, fig. 9a-b.

2012 *Bulimina marginata* d'Orbigny; Debenay, p. 179.

2012 *Bulimina marginata* d'Orbigny; Milker and Schmiedl, p. 88, fig. 20.23.

Description. Test small, outline triangular, basal end tapering sharply, wall calcareous, finely perforate, surface smooth, basal and chamber ends with short, blunt pseudospines; chambers inflated, rapidly increasing in size, triserially arranged; aperture terminal, loop-shaped opening, bordered by thick rim, with a distinct toothplate.

Bulimina striata d'Orbigny in Guérin-Méneville, 1843
Figure 10.3-4

1843 *Bulimina striata* d'Orbigny in Guérin Méneville, p. 9, pl. 2, fig. 16.

2001 *Bulimina striata* d'Orbigny; Szarek, p. 129, pl. 18, fig. 6.

2010 *Bulimina striata* d'Orbigny; Margreth, p. 116, pl. 27, fig. 10a-c.

2012 *Bulimina striata* d'Orbigny; Debenay, p. 180.

Description. Test short, outline subovate, aboral end sharply pointed, wall calcareous, finely perforate, surface smooth in the upper half, ornamented with many, long costae hanging as projections in the lower portion of the test; chambers rapidly increasing in size, final chambers more inflated, triserially arranged; sutures distinct and depressed; aperture terminal, obliquely placed, slightly wide, slit-like opening, bordered by a weakly everted lip.

Genus GLOBOBULIMINA Cushman, 1927
Globobulimina turgida (Bailey, 1851)
Figure 10.5

1851 *Bulimina turgida* Bailey, p. 12, figs. 28-31.

2010 *Globobulimina turgida* (Bailey); Margreth, p. 117, pl. 28, figs. 1a-c.

Description. Test ovate, aboral end round, broad in the middle, apertural end narrow, wall smooth, finely perforate, surface smooth; chambers distinct, inflated; periphery rounded, sutures distinct and depressed; aperture terminal, a subovate opening with a slightly raised, broad tooth, bordered by a thin lip.

Family REUSSELLIDAE Cushman, 1933
Genus REUSSELLA Galloway, 1933
Reussella haizumensis Asano, 1950
Figure 10.6-8

1950 *Reussella haizumensis* Asano, p. 12, fig. 51.

2010 *Reussella haizumensis* Asano; Kathal and Singh, p. 70, pl. 1, fig. 2a-b.

Description. Test pyramidal, cross section triangular, aboral end pointed, wall calcareous, perforate, surface ornamented with regular rows of slightly produced, small, round pores; chambers many, triserially arranged; periphery acute and carinate, sutures slightly raised and curved; aperture terminal, triangular opening, bordered by a distinct, imperforate lip, secondary openings in a large perforated toothplate.

Reussella spinulosa (Reuss, 1850)
Figure 10.9

1850 *Verneuilina spinulosa* Reuss, p. 374, pl. 47, fig. 12.

2001 *Reussella spinulosa* (Reuss); Szarek, p. 131, pl. 18, figs. 18-19.

2006 *Reussella spinulosa* (Reuss); Oflaz, p. 212, pl. 6, fig. 10.

2012 *Reussella spinulosa* (Reuss); Debenay, p. 182.

2012 *Reussella spinulosa* (Reuss); Milker and Schmiedl, p. 92, fig. 21.6-7.

2014 *Reussella spinulosa* (Reuss); Panchang and Nigam, pl. 28, figs. 8-9.

Description. Test pyramid-shaped, triangular, wall calcareous, coarsely perforate, surface ornamented with short spines at chamber margins; chambers triserially arranged, gradually increase in size; periphery acute and strongly carinate, sutures distinct, curved and thick; aperture interiomarginal, slightly concave opening, bordered by a thick, imperforate lip, with a toothplate.

Genus VALVOBIFARINA Hofker, 1951
Valvobifarina mackinnonii (Millett, 1900a)
Figure 10.10

1900a *Bifarina mackinnonii* Millet, p. 281, pl. 2, fig. 15a-b.

1951 *Valvobifarina mackinnoni* (Millett); Hofker, p. 40, figs. 16-17.

1994 *Valvobifarina mackinnoni* (Millett); Loeblich and Tappan, pl. 254, figs. 9-12.

Description. Test long, wall calcareous, surface ornamented with slightly produced circular pores and acicular spines in the final chambers; chambers initially triserially arranged, later biserially and uniserially arranged; periphery angular, sutures distinct; oblique in later chambers; aperture a broad, horizontal slit-like opening, bordered by a thick lip.

Superfamily BOLIVINITOIDEA Cushman, 1927
Family BOLIVINITIDAE Cushman, 1927
Subfamily BOLIVINITINAE Cushman, 1927
Genus BOLIVINA d'Orbigny, 1839
Bolivina obscura He, Hu, and Wang 1965
Figure 10.11

1965 *Bolivina obscura* He, Hu, and Wang, pl. 7, figs. 1-3.

2014 *Bolivina obscura* He, Hu, and Wang; Panchang and Nigam, pl. 23, fig. 5.

Description. Test broad, compressed laterally, outline V-shaped, wall calcareous, finely perforate; chambers rapidly increasing in size, final chambers more inflated, biserially arranged; periphery acute and slightly lobulate, sutures distinct, depressed; aperture low, terminal opening.

Bolivina cistina Cushman, 1936
Figure 10.12

1936 *Bolivina cistina* Cushman, p. 55, pl. 8, fig. 4.

2012 *Bolivina cistina* Cushman; Milker and Schmiedl, p. 80, fig. 19.19-20.

Description. Test triangular, compressed, wall calcareous, perforate, surface ornamented with intermittent corrugations; chambers rapidly increasing in size, biserially arranged; periphery truncate; aperture terminal, subovate opening, bordered by a lip.

Bolivina dilatata Reuss, 1850
Figure 10.13

1850 *Bolivina dilatata* Reuss, p. 381, pl. 48, fig. 15a-c.

2002 *Brizalina dilatata* Reuss; Kaminski, Aksu, Box, Hiscott, Filipescu, and Al-Salameen, p. 173, pl. 2, fig. 13.

2010 *Brizalina dilatata* Reuss; Margreth, p. 113, pl. 24, fig. 2a-c.

2012 *Brizalina dilatata* Reuss; Milker and Schmiedl, p. 81, fig. 19.30.

2014 *Bolivina dilatata* Reuss; Panchang and Nigam, pl. 23, figs. 27-28.

Description. Test subtriangular, compressed, wall calcareous, perforate, surface smooth; chambers gradually increasing in size, biserially arranged; periphery subacute, sutures inclined and slightly depressed; aperture terminal, an elongate slit-like opening, bordered by a lip, with a tooth.

Bolivina kuriani Seibold, 1975
Figure 10.14-15

1975 *Bolivina kuriani* Seibold, p.185, text-fig. 2a-b.

1999 *Bolivina kuriani* Seibold; Nigam and Khare, p. 294, pl. 4, fig. 16a-b.

Description. Test long than broad, aboral end tapering, wall calcareous, perforate, surface smooth; chambers many, gradually increasing in size, biserially arranged; periphery lobulated, sutures distinct, curved and depressed; aperture terminal, a subovate opening, bordered by a lip.

Bolivina persiensis Lutze, 1974
Figure 10.16-17

1974 *Bolivina persiensis* Lutze, p. 25, pl. 5, fig. 81.

2014 *Latibolivina persiensis* Lutze; Panchang and Nigam, pl. 24, figs. 3-4.

Description. Test robust, lateral view ovate, wall calcareous, surface ornamented with intermittent rigdes; chambers gradually increasing in size; periphery broadly rounded, sutures obscured; aperture terminal slit, bordered by a thin lip.

Bolivina pusilla Schwager, 1866
Figure 10.18-19

1866 *Bolivina pusilla* Schwager, p. 254, pl. 7, fig. 101.

2001 *Brizalina pusilla* Schwager; Szarek, p. 124, pl. 16, figs. 8-9.

Description. Test subtriangular, compressed, wall calcareous, perforate, surface smooth; chambers gradually increasing in size, biserially arranged; periphery carinate and subacute, sutures distinct and limbate; aperture terminal, slit-like opening, bordered by a lip.

Bolivina spathulata (Williamson, 1858)
Figure 10.20

1858 *Textularia variabilis* var. *spathulata* Williamson, p. 76, pl. 6, figs. 164-165.

2002 *Brizalina spathulata* (Williamson); Kaminski, Aksu, Box, Hiscott, Filipescu, and Al-Salameen, p. 172, pl. 2, fig. 9.

2003 *Brizalina spathulata* (Williamson); Murray, p. 19, fig. 6.3.

2012 *Brizalina spathulata* (Williamson); Milker and Schmiedl, p. 82, fig. 20.1-2.

2014 *Brizalina spathulata* (Williamson); Panchang and Nigam, pl. 23, figs. 42-43.

Description. Test broad, elongate and compressed, wall calcareous, perforate, more at chamber margins, surface smooth; chambers gradually increase in size, biserially arranged; periphery subacutely rounded, sutures inclined, slightly depressed in the final chambers; aperture elongate, slit-like opening, bordered by a lip.

Bolivina striatula Cushman, 1922a
Figure 10.21

1922a *Bolivina striatula* Cushman, p. 27, pl. 3, fig. 10.

2002 *Brizalina striatula* (Cushman); Kaminski, Aksu, Box, Hiscott, Filipescu, and Al-Salameen, p. 172, pl. 2, fig. 10.

2006 *Brizalina striatula* (Cushman); Oflaz, p. 203, pl. 5, fig. 14.

2010 *Bolivinellina striatula* (Cushman); Margreth, p. 114, pl. 24, fig. 5a-c.

2012 *Brizalina striatula* (Cushman); Milker and Schmiedl, p. 82, fig. 20.3.

2014 *Brizalina striatula* (Cushman); Panchang and Nigam, pl. 23, fig. 44.

Description. Test elongate, slightly compressed, wall calcareous, perforate, surface ornamented with long striae in the earlier chambers, final chambers smooth; chambers gradually increasing in size, slightly inflated, biserially arranged; periphery broadly rounded, sutures slightly depressed; aperture terminal, long, slit-like opening, bordered by a thick rim, with a tooth.

Genus PSEUDOBRIZALINA Zweig-Strykowski and Reiss, 1976

Pseudobrizalina lobata (Brady, 1881)
Figure 10.22

1884 *Bolivina lobata* Brady, p. 425, pl. 53, figs. 22-23.

2002 *Bolivina lobata* (Brady); Gandhi, Rajamanickam and Nigam, p. 56, pl. 2, fig. 5.

2012 *Pseudobrizalina lobata* (Brady); Debenay, p. 176.

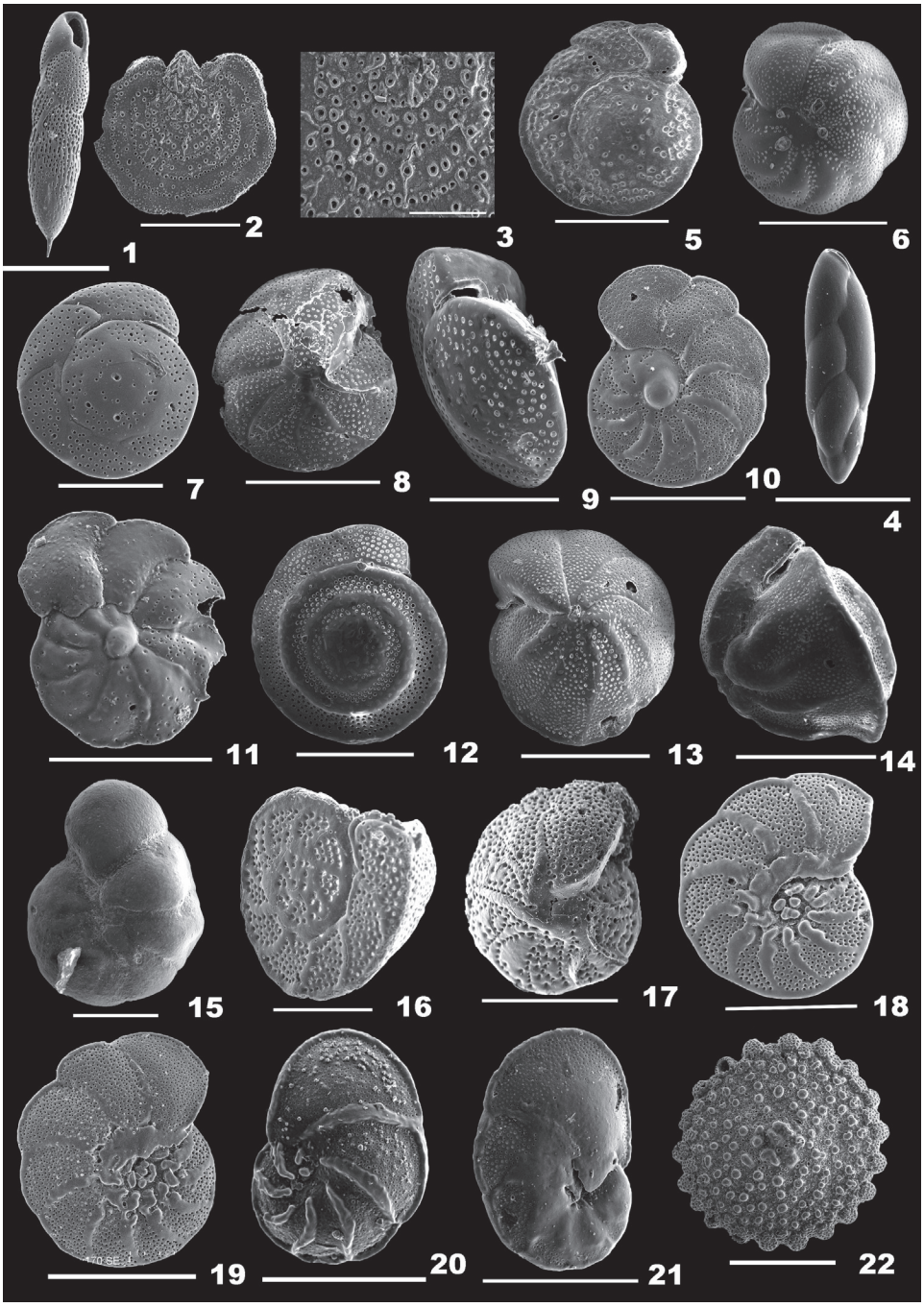

FIGURE 11. 1, *Fursenkoina hadai* Uchio, 1962 in dorsal view (scale equals 300 µm). **2-3**, *Fursenkoina pannikeri* (Seibold, 1972) in dorsal view (scale equals 300 µm) (**2**) and in closer view (scale equals 100 µm) (**3**). **4,** *Fursenkoina schreibersiana* (Cžjžek, 1848) in dorsal view (scale equals 200 µm). **5-6**, *Cibicides kullenbergi* Parker, 1953 in dorsal view (scale equals 200 µm) (**5**) and in ventral view (scale equals 200 µm) (**6**). **7-9**, *Cibicides pachyderma* (Rzehak, 1886) in dorsal view (scale equals 200 µm) (**7**); in ventral view (scale equals 300 µm) (**8**); and in apertural view (scale equals 200 µm) (**9**). **10-11**, *Cibicides patalaensis* Haque, 1956 in dorsal view (scale equals 300 µm) (**10**) and in ventral view (scale equals 300 µm) (**11**). **12-14**, *Cibicides praecinctus* (Karrer, 1868) in dorsal view (scale equals 300 µm) (**12**); in ventral view (scale equals 400 µm) (**13**); and in apertural view (scale equals 400 µm) (**14**). **15**, *Cibicides pseudolobatulus* Perelis and Reiss, 1975 in dorsal view (scale equals 100 µm). **16-17**, *Cibicides refulgens* de Montfort, 1808 in lateral view (scale equals 200 µm) (**16**) and in ventral view (scale equals 300 µm) (**17**). **18-19**, *Cibicides wuellerstorfi* (Schwager, 1866) in dorsal view (scale equals 200 µm) (**18**) and in ventral view (scale equals 200 µm) (**19**). **20-21**, *Hanzawaia nitidula* (Bandy, 1953) in dorsal view (scale equals 300 µm) (**20**) and in ventral view (scale equals 300 µm) (**21**). **22**. *Planorbulina mediterranensis* d'Orbigny, 1826 in dorsal view (scale equals 500 µm).

2014 *agrinella lobata* (Brady); Panchang and Nigam, pl. 25, fig. 23.

Description. Test elongate, wall calcareous, surface smooth; chambers gradually increasing in size, biserially arranged; periphery lobulate, sutures prominent, elevated bars; aperture terminal, elongate opening bordered by a distinct lip.

Genus SAGRINELLA Saidova, 1975

Sagrinella durrandii (Millett, 1900b)

Figure 10.23

1900b *Bolivina durrandii* Millett, p. 544, pl. 4, fig. 7a-b.

2002 *Bolivina durrandii* (Millett); Gandhi, Rajamanickam and Nigam, p. 56, pl. 2, fig. 4.

2012 *Sagrinella durrandii* (Millett); Debenay, p. 178.

Description. Test elongate, compressed, wall calcareous, perforate, surface of chamber ends ornamented with intermittent spines; chambers very slightly inflated, rapidly increasing in length; periphery acute, carinate, sutures depressed; aperture terminal, an elongate slit-like opening, bordered by a reversed lip.

Genus SAIDOVINA Haman, 1984

Saidovina karreriana (Brady, 1881)

Figure 10.24

1881 *Bolivina karreriana* Brady, p. 28.

2015 *Saidovina karreriana* (Brady); Hanagata and Nobuhara, p. 81, fig. 25.22-23.

Description. Test elongate-ovate, wall calcareous, finely perforate, surface ornamented with long costae; chambers rapidly increasing in size; periphery strongly carinate, sutures obscured; aperture a terminal opening, bordered by a lip.

Subfamily FURSENKOININAE Loeblich and Tappan, 1961

Genus FURSENKOINA Loeblich and Tappan, 1961

Fursenkoina hadai Uchio, 1962

Figure 11.1

1962 *Bolivina hadai* Uchio, pp. 368-369, pl. 18, figs. 3-4.

2014 *Cassidellina hadai* Uchio; Panchang and Nigam, pl. 25, fig. 7.

Description. Test elongate, wall calcareous, coarsely perforate, surface smooth, aboral end with a distinct basal spine; chambers of uniform size; periphery slightly lobulate, sutures limbate and oblique, slightly depressed; aperture terminal, subovate opening, bordered by a thick rim.

Fursenkoina pannikeri (Seibold, 1972)

Figure 11.2-3

1972 *Cassidella pannikeri* Seibold, p. 453.

1999 *Cassidella pannikeri* (Seibold); Nigam and Khare, p. 296, pl. 5, fig. 15.

Description. Test broad, very much compressed, outline subcircular, wall calcareous, surface ornamented with regular rows of slightly produced pores, apertural face with small pustules; chambers many, crescent-shaped; periphery rounded, sutures distinct, marked with pores.

Fursenkoina schreibersiana (Cžjžek, 1848)

Figure 11.4

1848 *Virgulina schreibersiana* Cžjžek, p. 147, pl. 13, figs. 18-21.

2006 *Fursenkoina schreibersiana* (Cžjžek); Oflaz, p. 212, pl. 6, figs. 11-12.

2012 *Fursenkoina schreibersiana* (Cžjžek); Debenay, p. 174.

Description. Test long than broad, very slightly compressed, wall calcareous, finely perforate, surface smooth; chambers slightly inflated, inclined, early chambers twisted; periphery broadly rounded, sutures distinct and depressed; aperture terminal, an elongate opening, bordered weakly by a rim.

Subfamily PARABRIZALININAE Zweig-Strykowski and Reiss, 1976

Genus LOXOSTOMINA Sellier de Civrieux, 1969

Loxostomina amygdalaeformis (Brady, 1881)

Figure 10.25

1881 *Bolivina amygdalaeformis* Brady, p. 59.

2001 *Saidovina amygdalaeformis* (Brady); Szarek, p. 127, pl. 17, figs. 11-13.

2014 *Saidovina amygdalaeformis* (Brady); Panchang and Nigam, pl. 25, figs. 24-27.

Description. Test elongate-ovate, wall calcareous, perforate, surface ornamented with thick, longitudinal costae, final chambers with depressions; chambers few; periphery strongly carinate, sutures obscured; aperture terminal, subovate opening, bordered by an everted lip.

Loxostomina mayori (Cushman, 1922a)

Figure 10.26

1922a *Bolivina mayori* Cushman, p. 27, pl. 3, figs. 5-6.

2001 *Bolivina macella* (Belford); Szarek, p. 124, pl. 16, fig. 12.

2014 *Loxostomina mayori* (Cushman); Panchang and Nigam, pl. 25, fig. 16.

Description. Test elongate, slender, wall calcareous, perforate, surface ornamented with long costae; chambers slightly inflated, biserially arranged; periphery slightly lobulate, sutures fairly distinct

and slightly depressed at the periphery; aperture terminal, an elongate slit-like opening, bordered by a lip.

Superfamily PLANORBULINOIDEA Schwager, 1877
Family CIBICIDIDAE Cushman, 1927
Subfamily CIBICIDINAE Cushman, 1927
Genus CIBICIDES de Montfort, 1808
Cibicides kullenbergi Parker, 1953
Figure 11.5-6

1953 *Cibicides kullenbergi* Parker *in* Phleger et al., p. 49, pl. 11, figs. 7-8.

2012 *Cibicides pachyderma* (Rzehak); Debenay, p. 190.

Description. Test biconvex, slightly convex on the spiral side, strongly convex on the umbilical side, wall calcareous, dorsal side coarsely perforate, ventral side moderately perforate, surface smooth; periphery subacutely rounded, sutures curved backwards, slightly elevated on spiral side, radial and depressed in the final chambers on the umbilical side; aperture an interiomarginal, equatorial arch, under a thin lamina.

Cibicides pachyderma (Rzehak, 1886)
Figure 11.7-9

1886 *Truncatulina pachyderma* Rzehak, p. 87, pl. 1, fig. 5a-c.

2010 *Cibicidoides pachyderma* Rzehak; Margreth, p. 121, pl. 33, fig. 2a-c.

Description. Test lenticular, spiral side slightly convex, umbilical side strongly convex, wall calcareous, coarsely perforate, surface smooth; periphery rounded, sutures limbate, curved backwards, slightly depressed on spiral side, radial and depressed in the final chambers on the umbilical side; aperture an interiomarginal arch, bordered by a thick, everted lip.

Cibicides patalaensis Haque, 1956
Figure 11.10-11

1956 *Cibicides patalaensis* Haque, pl. 16, fig. 6.

2014 *Cibicides patalaensis* Haque; Panchang and Nigam, pl. 31, fig. 11a-c.

Description. Test circular in outline, much compressed, wall calcareous, coarsely perforate, surface smooth; chambers slightly inflated, gradually increasing in size; periphery carinate, lobulated in the final chambers, sutures limbate, curved on the dorsal side, radial and depressed on the umbilical side; umbilical plug visible on both sides; aperture an interiomarginal opening.

Cibicides praecinctus (Karrer, 1868)
Figure 11.12-14

1868 *Rotalina praecincta* Karrer, p. 189, pl. 5, fig. 7.

2001 *Heterolepa praecincta* (Karrer); Szarek, p. 145, pl. 25, figs. 1-3.

2012 *Heterolepa praecincta* (Karrer); Debenay, p. 199.

2014 *Heterolepa praecincta* (Karrer); Panchang and Nigam, pl. 35, fig. 12a-c.

Description. Test biconvex, spiral side slightly convex, umbilical side strongly convex, wall calcareous, coarsely perforate, surface smooth; chambers arranged trochospirally, coiling evolute on the dorsal side, involute on the ventral side; periphery slightly lobulate, margin carinate, sutures limbate on both sides, elevated circular bands on the spiral side, radial and slightly depressed on the umbilical side; aperture interiomarginal, low slit-like opening, bordered by a lip.

Cibicides pseudolobatulus Perelis and Reiss, 1975
Figure 11.15

1975 *Cibicides pseudolobatulus* Perelis and Reiss, pp. 77-78, pl. 4, figs. 1-7; pl. 5, figs. 1-2.

2012 *Cibicides pseudolobatulus* Perelis and Reiss; Debenay, p. 190.

2012 *Cibicides pseudolobatulus* Perelis and Reiss; Milker and Schmiedl, p. 107, fig. 24.12-13.

Description. Test subrounded, spiral side flat, umbilical side convex, wall calcareous, perforate, surface smooth; chambers trochospirally arranged, coiling evolute on the dorsal side, involute on the ventral side; periphery rounded and slightly lobulate, sutures limbate and curved on the spiral side, radial, curved and depressed on the umbilical side; aperture interiomarginal, extraumbilical opening, bordered by a rim.

Cibicides refulgens de Montfort, 1808
Figure 11.16-17

1808 *Cibicides refulgens* de Montfort, p. 123, text-fig. 122.

2003 *Cibicides refulgens* de Montfort; Murray, p. 21, pl. 7, figs. 1-2.

2006 *Cibicides refulgens* de Montfort; Oflaz, p. 224, pl. 8, fig. 7.

2010 *Cibicides refulgens* de Montfort; Margreth, p. 122, pl. 34, fig. 4a-c.

2012 *Cibicides refulgens* de Montfort; Debenay, p. 191.

2012 *Cibicides refulgens* de Montfort; Milker and Schmiedl, p. 107, fig. 24.14-16.

Description. Test planoconvex, flat spiral side, convex umbilical side, wall calcareous, perforate on both sides, surface smooth; chambers arranged trochospirally; periphery weakly carinate, sutures

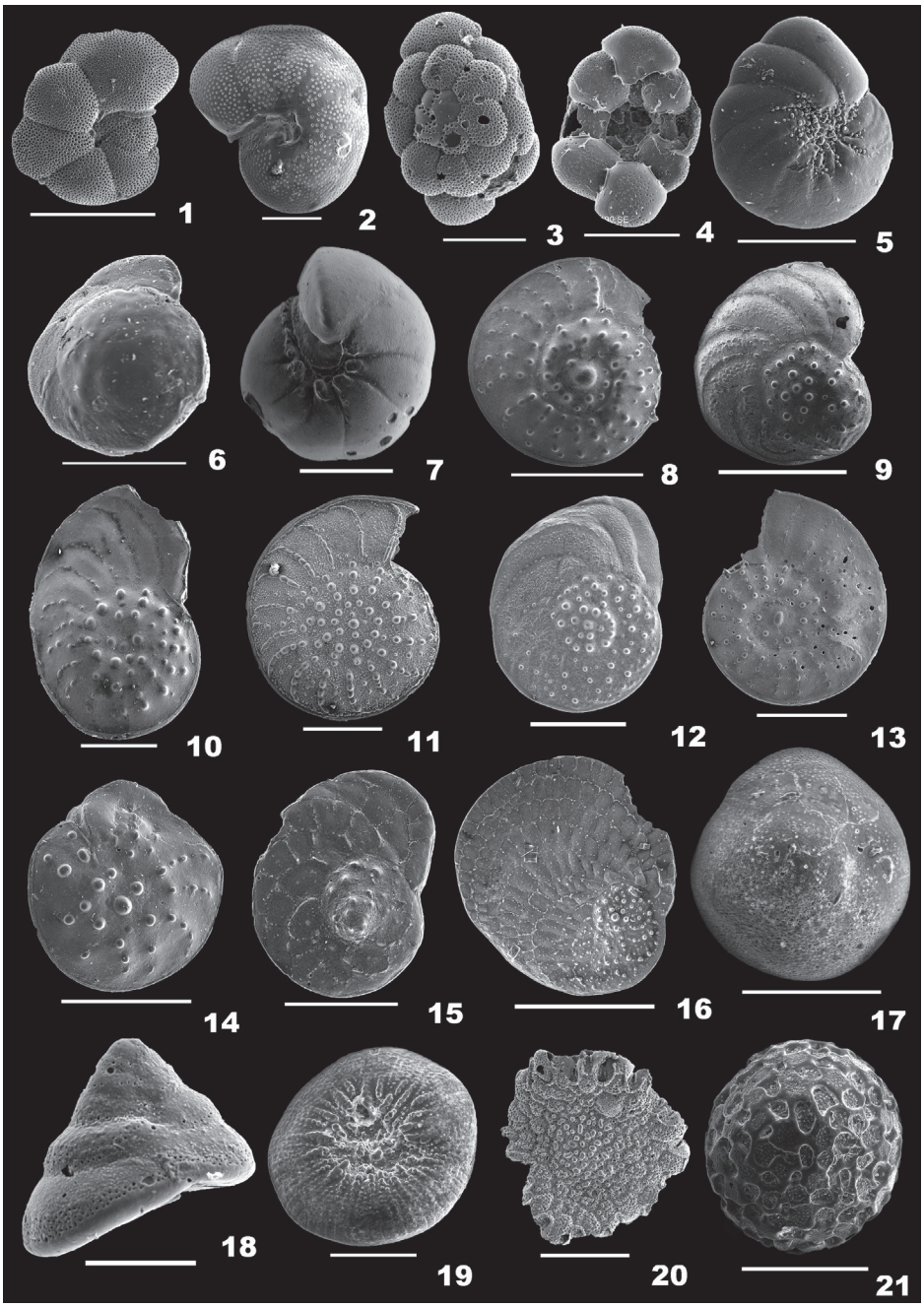

FIGURE 12. 1-2, *Lobatula lobatula* (Walker and Jacob, 1798) in dorsal view (scale equals 400 µm) (**1**) and in ventral view (scale equals 100 µm) (**2**). **3-4**, *Cymbaloporetta bradyi* (Cushman, 1915) in dorsal view (scale equals 200 µm) (**3**) and in ventral view (scale equals 300 µm) (**4**). **5**, *Riminopsis asterizans* (Fichtel and Moll, 1798) in dorsal view (scale equals 200 µm). **6-7**, *Hansenisca soldanii* (d'Orbigny, 1826) in dorsal view (scale equals 200 µm) (**6**) and in ventral view (scale equals 100 µm) (**7**). **8**, *Operculina ammonoides* (Gronovius, 1781) in dorsal view (scale equals 1 mm). **9**, *Operculina bartschi* Cushman, 1921 in dorsal view (scale equals 1 mm). **10**, *Operculina complanata* (Defrance, 1822) in dorsal view (scale equals 500 µm). **11**, Operculina *discoidalis* d'Orbigny, 1826 in dorsal view (scale equals 500 µm). **12**, *Operculina elegans* Cushman, 1921 in dorsal view (scale equals 1 mm). **13**, *Operculina granulosa* Leymerie, 1846 in dorsal view (scale equals 500 µm). **14**, *Operculina hardiei* d'Archiac and Haime, 1853 in dorsal view (scale equals 500 µm). **15**, *Heterostegina depressa* d'Orbigny, 1826 in dorsal view (scale equals 300 µm). **16**, *Planostegina operculinoides* (Hofker, 1927) in dorsal view (scale equals 1 mm). **17-19**, *Pileolina patelliformis* (Brady, 1884) in dorsal view (scale equals 200 µm) (**17**); in lateral view (scale equals 100 µm) (**18**); and in ventral view (scale equals 100 µm) (**19**). **20**, *Planogypsina acervalis* (Brady, 1884) in dorsal view (scale equals 500 µm). **21**, *Sphaerogypsina globulus* (Reuss, 1848) in dorsal view (scale equals 300 µm).

limbate and slightly elevated on the spiral side, curved and depressed on the umbilical side; aperture interiomarginal, extraumbilical opening.

Cibicides wuellerstorfi (Schwager, 1866)
Figure 11.18-19

1866 *Anomalina wuellerstorfi* Schwager, p. 258, pl. 7, figs. 105, 107.

2010 *Fontbotia wuellerstorfi* (Schwager); Margreth, p. 122, pl. 35, fig. 2a-c.

2012 *Fontbotia wuellerstorfi* (Schwager); Debenay, p. 196.

2014 *Fontbotia wuellerstorfi* (Schwager); Panchang and Nigam, pl. 31, fig. 13a-c.

Description. Test compressed, flat spiral side, convex umbilical side, wall calcareous, coarsely perforate, surface smooth; chambers many, curved and narrow; periphery acutely rounded, with a distinct keel, slightly lobulate, sutures more limbate, slightly raised and curved on the spiral side; aperture interiomarginal, an arch, bordered by a lip.

Genus HANZAWAIA Asano, 1944
Hanzawaia nitidula (Bandy, 1953)
Figure 11.20-21

1953 *Cibicidina basiloba* (Cushman) var. *nitidula* Bandy, p. 178, pl. 22, fig. 3.

1961 *Hanzawaia nitidula* (Bandy); Lehmann, p. 16, pl. 2, fig. 2a-c.

1973 *Cibicidina basiloba* var. *nitidula* (Bandy); Lankford and Phleger, p. 122, pl. 6, fig. 19.

Description. Test subovate, side view planoconvex, wall calcareous, finely perforate, surface smooth; chambers many, rapidly increasing in size, coiling involute; periphery subacute, slightly lobate, sutures arcuate, radial, strongly limbate on the spiral side, curved, limbate and slightly raised, slightly depressed in the later chambers on the umbilical side; aperture interiomarginal, a low arched opening, under a folium.

Genus LOBATULA Fleming, 1828
Lobatula lobatula (Walker and Jacob, 1798)
Figure 12.1-2

1798 *Nautilus lobatulus* Walker and Jacob, p. 642, pl. 14, fig. 36.

2003 *Cibicides lobatulus* (Walker and Jacob); Murray, p. 21, fig. 6.13-15.

2006 *Lobatula lobatula* (Walker and Jacob); Oflaz, p. 299, pl. 8, figs. 12-13.

2007 *Cibicides lobatulus* (Walker and Jacob); Talib and Farroqui, p. 19, pl.1, fig. 20a-b.

2010 *Lobatula lobatula* (Walker and Jacob); Margreth, p. 122, pl. 35, fig. 1a-c.

2012 *Lobatula lobatula* (Walker and Jacob); Debenay, p. 201.

2012 *Lobatula lobatula* (Walker and Jacob); Milker and Schmiedl, p. 107, fig. 24.17-20.

Description. Test with different morphology, planoconvex, spiral side flat, umbilical side convex, wall calcareous, perforate, surface smooth; chambers gradually increasing in size, trochospirally arranged; periphery carinate and lobulate, sutures curved backwards and slightly raised on the spiral side, radial and slightly depressed on the umbilical side; aperture interiomarginal, an equatorial arch, covered by a narrow lamina on the apertural side.

Family CYMBALOPORIDAE Cushman, 1927
Subfamily CYMBALOPORINAE Cushman, 1927
Genus CYMBALOPORETTA Cushman, 1928
Cymbaloporetta bradyi (Cushman, 1915)
Figure 12.3-4

1915 *Cymbalopora poeyi* (d'Orbigny) var. *bradyi* Cushman, p. 25, pl. 10, fig. 2; pl. 14, fig. 2.

2001 *Cymbaloporetta bradyi* (Cushman); p. 120, pl. 22, figs. 11-12.

2012 *Cymbaloporetta bradyi* (Cushman); Debenay, p. 236.

Description. Test subovate, slightly convex on the spiral side, flat umbilical side, umbilicus depressed and concave, spiral side coarsely perforate, umbilical side smooth and perforate; chambers subglobular on the dorsal side, subtriangular on the ventral side, increasing in size as added, chamber arrangement trochospiral initially, later annularly arranged; periphery round and lobulate, sutures distinct, slightly depressed; apertures three, two sutural and an umbilical opening in each chamber, bordered by a thick, everted lip.

Family PLANORBULINIDAE Schwager, 1877
Subfamily PLANORBULININAE Schwager, 1877
Genus PLANORBULINA d'Orbigny, 1826
Planorbulina mediterranensis d'Orbigny, 1826
Figure 11.22

1826 *Planorbulina mediterranensis* d'Orbigny, p. 280, pl. 14, figs. 4-6.

2002 *Planorbulina mediterranensis* d'Orbigny; Kaminski, Aksu, Box, Hiscott, Filipescu, and Al-Salameen, p. 176, pl. 4, fig. 3a-b.

2006 *Planorbulina mediterranensis* d'Orbigny; Oflaz, p. 299, pl. 8, figs. 14-15.

2012 *Planorbulina mediterranensis* d'Orbigny; Milker and Schmiedl, p. 108, fig. 24.21-14.

Description. Test attached, outline circular, slightly convex on the spiral side, flat on the umbilical side, wall calcareous, coarsely perforate, surface with pustules; chamber arrangement trochospiral initially, later arranged in a circular plan; periphery lobulated, sutures depressed on the dorsal side,

thick, imperforate and limbate on the ventral side; primary aperture interiomarginal, two openings diametrically placed on chamber ends, bordered by a lip, secondary extraumbilical openings.

Superfamily CHILOSTOMELLOIDEA Brady, 1881
Family ANOMALINIDAE Cushman, 1927
Genus RIMINOPSIS Revets, 1996
Riminopsis asterizans (Fichtel and Moll, 1798)
Figure 12.5

1798 *Nautilus asterizans* Fichtel and Moll, p. 37, pl. 3, figs. c-h.

1999 *Nonion asterizans* (Fichtel and Moll); Nigam and Khare, p. 298, pl. 6, fig. 3.

2014 *Nonion asterizans* (Fichtel and Moll); Panchang and Nigam, pl. 33, fig. 7a-b.

Description. Test symmetrical, outline circular, side view rounded, wall calcareous, finely perforate, surface smooth, umbilical region depressed, ornamented with granular pustules, pustules also along the sutures and the apertural face; chambers many, broad and low, chamber arrangement planispiral, coiling involute or slightly evolute; periphery angular, sutures distinct, slightly depressed and curved; aperture interiomarginal, short, narrow or rounded opening.

Family GAVELINELLIDAE Hofker, 1956
Subfamily GAVELINELLINAE Hofker, 1956
Genus HANSENISCA Loeblich and Tappan, 1987
Hansenisca soldanii (d'Orbigny, 1826)
Figure 12.6-7

1826 *Gyroidina soldanii* d'Orbigny, p. 278, no. 5.

2010 *Gyroidina soldanii* (d'Orbigny); Margreth, p. 125, pl. 40, fig. 1a-c.

2012 *Hansenisca soldanii* (d'Orbigny); Debenay, p. 197.

2012 *Gyroidinoides soldanii* (d'Orbigny); Milker and Schmiedl, p. 116, fig. 26.20-21.

Description. Test round in outline, flat on the spiral side, strongly convex on the umbilical side, wall calcareous, finely perforate, surface smooth; chambers arranged trochospirally, coiling evolute on the dorsal side, involute on the ventral side; periphery truncate, sutures radial, slightly curved and depressed on the umbilical side; aperture interiomarginal, an equatorial low arch opening, bordered by a lip, secondary apertures partially covered by an external flap.

Superfamily NUMMULITOIDEA de Blainville, 1827
Family NUMMULITIDAE de Blainville, 1827
Genus OPERCULINA d'Orbigny, 1826
Operculina ammonoides (Gronovius, 1781)
Figure 12.8

1781 *Nautilus ammonoides* Gronovius, p. 282, pl. 19, figs. 5-6.

2004 *Operculina ammonoides* (Gronovius); Hohenegger, p. 151, text-fig. 2.1.

2011 *Operculina ammonoides* (Gronovius); Hohenegger, p. 659, fig. 2b.

2012 *Operculina ammonoides* (Gronovius); Debenay, p. 228.

Description. Test large, planispiral, compressed, surface well-ornamented, tubercles slightly raised in the umbilical area; chambers flat, not divided, coiling evolute; periphery with a thin keel, sutures marked with pustules, slightly depressed at the periphery; aperture at the end of the apertural face.

Operculina bartschi Cushman, 1921
Figure 12.9

1921 *Operculina bartschi* Cushman, p. 376, text-fig. 13.

2012 *Operculina bartschi* Cushman; Debenay, p. 228.

Description. Test lenticular, surface ornamented with nodules in between the chambers, umbilical region with slightly raised granular knobs; chambers narrow, rapidly increasing in width, slightly inflated, not flaring, coiling evolute; periphery rounded with a thin keel, sutures distinct and depressed; aperture at the base of the apertural face.

Operculina complanata (Defrance in de Blainville, 1822)
Figure 12.10

1822 *Lenticulites complanata* Defrance, p. 453.

2004 *Operculina complanata* (Defrance); Hohenegger, p. 151, text-fig. 2.3.

2011 *Operculina complanata* (Defrance); Hohenegger, p. 659, fig. 2e.

2014 *Operculina complanata* (Defrance); Panchang and Nigam, pl. 39, fig. 3.

Description. Test thin, planispiral, surface ornamented with granular pustules in and around the umbilical region; chambers narrow, not separate, rapidly increasing in size; coiling evolute; septal flap flaring, slightly folded; periphery with a distinct keel, sutures distinct, marked with pustules initially, later faintly distinct.

Operculina discoidalis d'Orbigny, 1826
Figure 12.11

1826 *Nummulina* (*Assilina*) *discoidalis* d'Orbigny, p. 296, no. 88.

2011 *Operculina discoidalis* (d'Orbigny); Hohenegger, p. 659, fig. 2a.

2012 *Operculina discoidalis* (d'Orbigny); Debenay, p. 228.

Description. Test very flat, discoidal, wall calcareous, finely perforate, surface distinctly ornamented with granular pustules; chambers not separate; coiling involute initially, later nearly evolute; periphery rounded with a distinct keel, sutures slightly raised, limbate, marked with rows of pustules, slightly depressed at the periphery.

Operculina elegans Cushman, 1921
Figure 12.12

1921 *Operculina elegans* Cushman, p. 381, pl. 97, fig. 3.

2004 *Operculina elegans* Cushman; Hohenegger, p. 151, text-fig. 2.2.

2011 *Operculina elegans* Cushman; Hohenegger, p. 659, fig. 2d.

Description. Test compressed, wall calcareous, surface ornamented with granular pustules in and around the umbilical region, tubercles in between the chambers; coiling nearly evolute, chambers gradually increasing in width, slightly flaring, septal flap smooth; periphery rounded with a thin keel, sutures distinctly arched and depressed, marked with fine pustules in the final chambers; aperture at the basal end of the apertural face.

Operculina granulosa Leymerie, 1846
Figure 12.13

1846 *Operculina granulosa* Leymerie, p. 359, pl. 13, fig. 12a-c.

2014 *Operculina granulosa* Leymerie; Panchang and Nigam, pl. 39, fig. 4.

Description. Test large, compressed, wall calcareous, surface ornamented with more tubercles in the centre, final whorls sparsely covered by pustules; chambers narrow, coiling evolute; periphery with a distinct keel, sutures marked with pustules; aperture terminal, at the base of the apertural face.

Operculina hardiei d'Archiac and Haime, 1853
Figure 12.14

1853 *Operculina hardiei* d'Archiac and Haime, p. 346, pl. 35, fig. 6a-c.

2014 *Operculina hardiei* d'Archiac and Haime; Panchang and Nigam, pl. 39, fig. 5.

Description. Test small, wall calcareous, surface with nodules in the centre, irregularly covering the other portion, chambers high, coiling involute; periphery with distinct keel, sutures marked with pustules, aperture at the end of the apertural face.

Genus HETEROSTEGINA d'Orbigny, 1826
Heterostegina depressa d'Orbigny, 1826
Figure 12.15

1826 *Heterostegina depressa* d'Orbigny, p. 305, pl. 17, figs. 5-7.

2001 *Heterostegina depressa* d'Orbigny; Szarek, p. 151, pl. 28, fig. 5 (not fig. 6).

2008 *Heterostegina depressa* d'Orbigny; Meriç, Avşar, and Yokeş, p. 323, pl. 10, figs. 1-12.

2011 *Heterostegina depressa* d'Orbigny; Hohenegger, p. 659, fig. 2k.

Description. Test complanate, central portion thickened, wall calcareous, surface slightly rough; chambers many, elongate and curved, initial chambers undivided, thick and involute, final chambers subdivided by septa, thin and flaring; periphery thin and rounded, sutures distinct, very slightly depressed and limbate; aperture terminal, multiple openings on the apertural face.

Genus PLANOSTEGINA Banner and Hodgkinson, 1991
Planostegina operculinoides (Hofker, 1927)
Figure 12.16

1927 *Heterostegina operculinoides* Hofker, p. 67, pl. 34, figs. 2, 4, 5.

2004 *Planostegina operculinoides* (Hofker); Hohenegger, p. 151, text-fig. 2.5.

2011 *Planostegina operculinoides* (Hofker); Hohenegger, p. 659, fig. 2h.

2012 *Heterostegina operculinoides* (Hofker); Debenay, p. 222.

Description. Test very much flattened, thin, planispiral, wall calcareous, surface ornamented with granular pustules in the central portion; chambers arch-shaped, subdivided into chamberlets, rapidly increasing in size; sutures of chambers often marked with pustules, of chamberlets, distinct and depressed; aperture terminal, at the end of the apertural face.

Superfamily GLABRATELLOIDEA Loeblich and Tappan, 1964
Family GLABRATELLIDAE Loeblich and Tappan, 1964
Genus PILEOLINA Bermúdez, 1952
Pileolina patelliformis (Brady, 1884)
Figure 12.17-19

1884 *Discorbis patelliformis* Brady, p. 647, pl. 88, fig. 3a-c.

2010 *Glabratella patelliformis* (Brady); Margreth, p. 120, pl. 32, fig. 3a-c.

2012 *Pileolina patelliformis* (Brady); Debenay, p. 208.

2012 *Pileolina patelliformis* (Brady); Milker and Schmiedl, p. 102, fig. 23.16-17.

Description. Test subtriangular, planoconvex, wall calcareous, densely perforate on the spiral side and finely perforate on the umbilical side, surface rough, umbilical side depressed, ornamented with

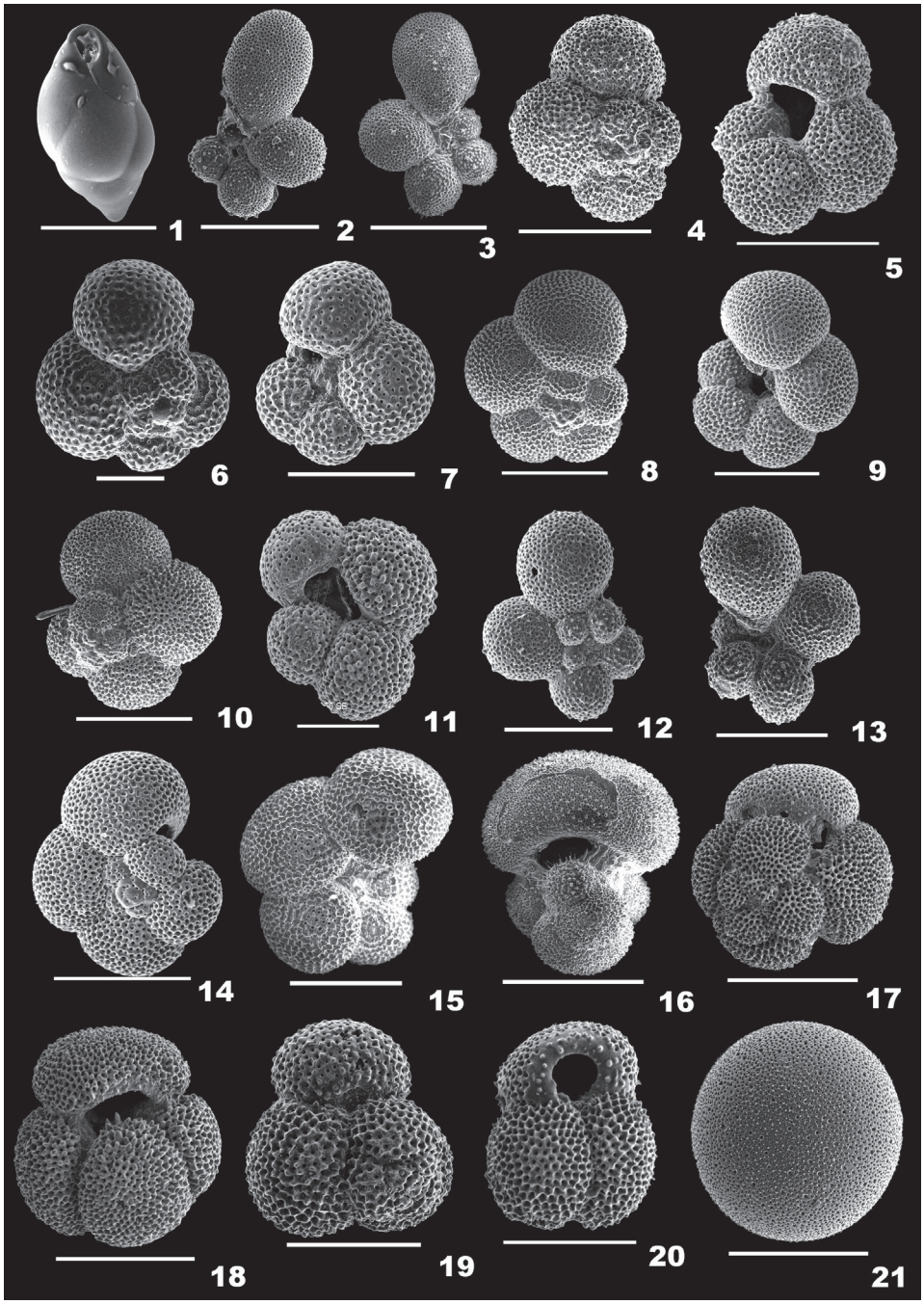

FIGURE 13. 1, *Stainforthia fusiformis* (Williamson, 1858) in dorsal view (scale equals 200 µm). **2-3**, *Beella digitata* (Brady, 1879a) in dorsal view (scale equals 300 µm) (**2**) and in ventral view (scale equals 300 µm) (**3**). **4-5**, *Globigerina bulloides* d'Orbigny, 1826 in dorsal view (scale equals 200 µm) (**4**) and in ventral view (scale equals 200 µm) (**5**). **6-7**, *Globigerina falconensis* Blow, 1959 in dorsal view (scale equals 100 µm) (**6**) and in ventral view (scale equals 200 µm) (**7**). **8-9**, *Globigerina quinqueloba* Natland, 1938 in dorsal view (scale equals 200 µm) (**8**) and in ventral view (scale equals 200 µm) (9). **10-11**, *Globigerinella calida* (Parker, 1962) in dorsal view (scale equals 200 µm) (**10**) and in ventral view (scale equals 100 µm) (**11**). **12-13**, *Globigerinella radians* (Egger, 1893) in dorsal view (scale equals 200 µm) (**12**) and in ventral view (scale equals 200 µm) (**13**). **14-15**, *Globigerinella siphonifera* (d'Orbigny, 1839) in dorsal view (scale equals 200 µm) (**14**) and in ventral view (scale equals 200 µm) (**15**). **16**, *Globigerinella siphonifera* (d'Orbigny, 1839) in apertural view (scale equals 400 µm). **17-18**, *Globigerinoides conglobata* (Brady, 1879a) in dorsal view (scale equals 400 µm) (**17**) and in ventral view (scale equals 400 µm) (**18**). **19-20**, *Globigerinoides rubra* (d'Orbigny, 1839) in dorsal view (scale equals 200 µm) (**19**) and in ventral view (scale equals 200 µm) (**20**). **21**, *Orbulina universa* d'Orbigny, 1839 in dorsal view (scale equals 400 µm).

radiating pustules; chambers long, narrow and semicircular, spiral side strongly convex, conical with a bluntly pointing apex, gradually increasing in size as added, umbilical side flattened, arranged trochospirally, coiling evolute; periphery rounded, sutures curved on the spiral side; aperture an interiomarginal, low slit-like opening.

Superfamily ACERVULINOIDEA Schultze, 1854
Family ACERVULINIDAE Schultze, 1854
Genus PLANOGYPSINA Bermúdez, 1952
Planogypsina acervalis (Brady, 1884)
Figure 12.20

1884 *Planorbulina acervalis* Brady, p. 657, pl. 92, fig. 4.

2009 *Planogypsina acervalis* (Brady); Debenay, p. 246.

Description. Test attached, large, outline nearly discoid, dorsal side slightly convex, ventral side flattened, wall coarsely perforate; chambers inflated, subglobular, evenly added, and almost equidimensional, secondary chambers added irregularly and dispersed on the entire test surface; peripheral margin cuspate, periphery lobulated; primary apertures two arched openings at the juncture of earlier chambers, bordered by a rim, secondary apertures multiple, tiny sutural openings at either side of the test, peripheral and tubular openings.

Genus SPHAEROGYPSINA Galloway, 1933
Sphaerogypsina globulus (Reuss, 1848)
Figure 12.21

1848 *Ceriopora globulus* Reuss, p. 33, pl. 5, fig. 7.

2012 *Sphaerogypsina globula* (Reuss); Debenay, p. 249.

2012 *Sphaerogypsina globula* (Reuss); Milker and Schmiedl, p. 110, fig. 25.4.

Description. Test free, outline globular, side view spherical, wall calcareous, coarsely perforate, surface with thick, raised, imperforate septa; chambers many, small and roughly polygonal, closely packed; aperture secondary, multiple, small, circular openings at the basal end of chamber walls.

Superfamily TURRILINOIDEA Cushman, 1927
Family STAINFORTHIIDAE Reiss, 1963
Genus STAINFORTHIA Hofker, 1956
Stainforthia fusiformis (Williamson, 1858)
Figure 13.1

1858 *Bulimina pupoides* var. *fusiformis* Williamson, p. 63, pl. 5, figs. 129-130.

2003 *Stainforthia fusiformis* (Williamson); Murray, p. 26, figs. 10.1-10.

2010 *Stainforthia fusiformis* (Williamson); Margreth, p. 115, pl. 27, fig. 2a-c.

Description. Test small, elongate-ovate, fusiform, tapering, wall calcareous, finely perforate, surface smooth; chambers subglobose, sutures distinct and slightly depressed; aperture terminal, semi-circular opening bordered by a thick rim.

Suborder GLOBIGERININA Delage and Hérouard, 1896
Superfamily GLOBIGERINOIDEA Carpenter, 1862
Family GLOBIGERINIDAE Carpenter, 1862
Subfamily GLOBIGERININAE Carpenter, 1862
Genus BEELLA Banner and Blow, 1960
Beella digitata (Brady, 1879a)
Figure 13.2-3

1879a *Globigerina digitata* Brady, p. 59, pl. 80, figs. 6-10.

1983 *Beella digitata* (Brady); Kennett and Srinivasan, p. 232, pl. 58, figs. 2, 6-8.

Description. Test strongly convex, wall calcareous, perforate, surface with irregular ridge-like spine bases, chambers globular initially, rapidly increasing in size as added, radially elongate and subconical final whorl, chamber arrangement trochospiral; periphery rounded, peripheral outline stellate; sutures radial, depressed; aperture umbilical, broad open arch bordered by a reverted lip, without teeth.

Genus GLOBIGERINA d'Orbigny, 1826
Globigerina bulloides d'Orbigny, 1826
Figure 13.4-5

1826 *Globigerina bulloides* d'Orbigny, p. 277, no. 1.

1983 *Globigerina bulloides* d'Orbigny; Kennet and Srinivasan, p. 36, pl. 6, figs. 4-6.

2010 *Globigerina bulloides* d'Orbigny; Ovechkina, Bylinskaya and Uken, p. 239, fig. 5G-5I.

Description. Test subglobular, wall perforate, surface smooth, with spines; chambers spherical, gradually increasing in size as added, chamber arrangement trochospiral, periphery rounded, sutures distinct and depressed; aperture high arch, umbilical, interiomarginal.

Globigerina falconensis Blow, 1959
Figure 13.6-7

1959 *Globigerina falconensis* Blow, p. 177, pl. 9, figs. 40a-c, 41.

2010 *Globigerina falconensis* Blow; Ovechkina, Bylinskaya and Uken, p. 239, fig. 6A-6C.

Description. Test small, wall coarsely perforate, surface ornamented with spines; chambers globular, increasing in size as added, chamber arrange-

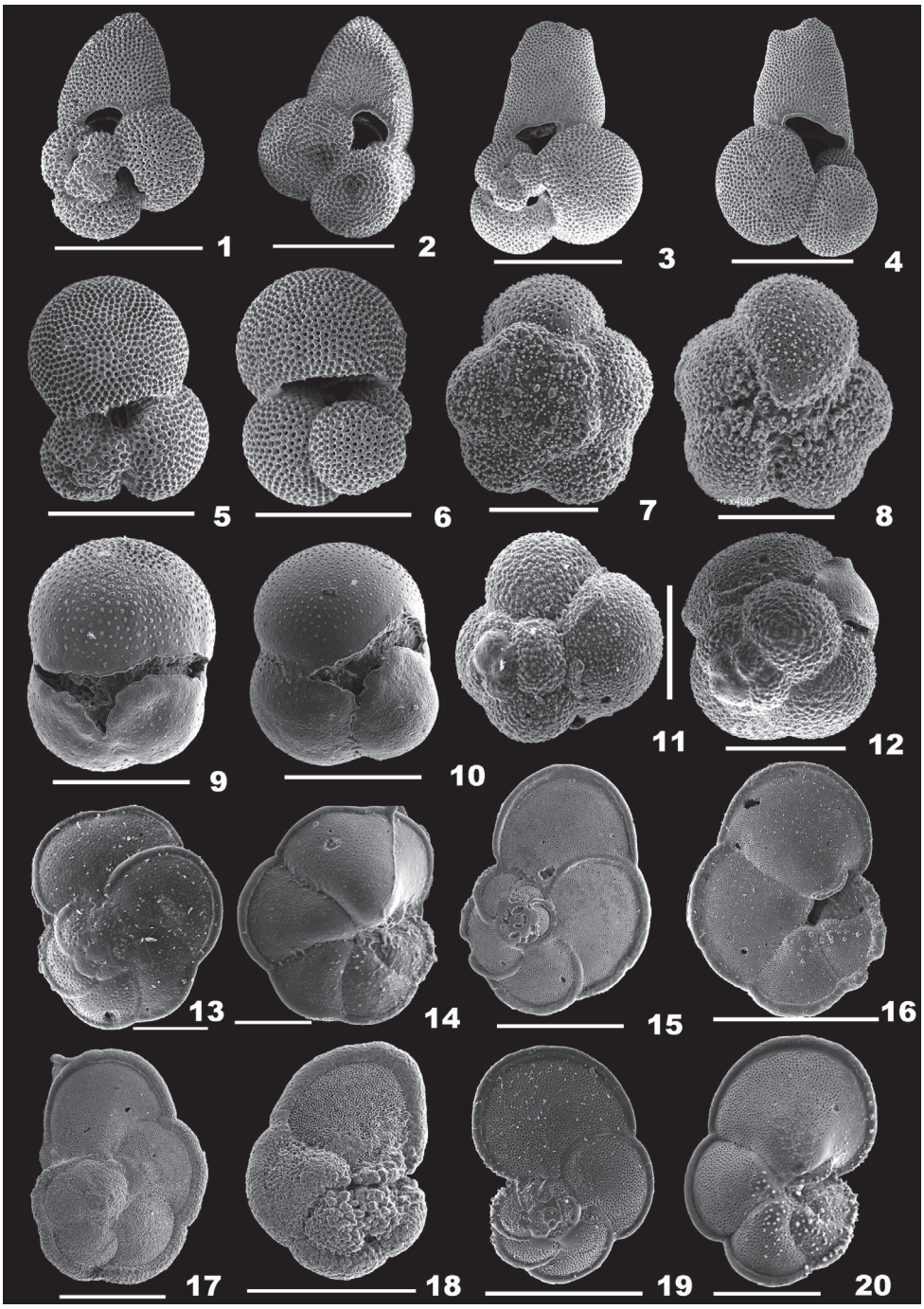

FIGURE 14. 1-4, *Globigerinoides sacculifera* (Brady, 1877) in dorsal view (scale equals 500 µm) (**1**); in ventral view (scale equals 400 µm) (**2**); in dorsal view (scale equals 500 µm) (**3**); and in ventral view (scale equals 500 µm) (**4**). **5-6**, *Globigerinoides triloba* (Reuss, 1850) in dorsal view (scale equals 400 µm) (**5**) and in ventral view (scale equals 400 µm) (**6**). **7-8**, *Globoturborotalita* sp. in dorsal view (scale equals 100 µm) (**7**) and in ventral view (scale equals 100 µm) (**8**). **9-10**, *Sphaeroidinella dehiscens* (Parker and Jones, 1865) in dorsal view (scale equals 400 µm) (**9**) and in ventral view (scale equals 400 µm) (**10**). **11**, *Candeina nitida* d'Orbigny, 1839 in dorsal view (scale equals 100 µm). **12**, *Globigerinita glutinata* (Egger, 1893) in dorsal view (scale equals 100 µm). **13-14**, *Globorotalia cultrata* (d'Orbigny, 1839) in dorsal view (scale equals 100 µm) (**13**) and in ventral view (scale equals 100 µm) (**14**). **15-16**, *Globorotalia menardii* (d'Orbigny, 1826) in dorsal view (scale equals 400 µm) (**15**) and in ventral view (scale equals 500 µm) (**16**). **17-18**, *Globorotalia tumida* (Brady, 1877) in dorsal view (scale equals 500 µm) (**17**) and in ventral view (scale equals 500 µm) (**18**). **19-20**, *Globorotalia ungulata* Bermúdez, 1961 in dorsal view (scale equals 300 µm) (**19**) and in ventral view (scale equals 200 µm) (**20**).

ment medium to low trochospiral; periphery rounded, sutures distinct, depressed; aperture umbilical, interiomarginal with a thick lip.

Turborotalia quinqueloba Natland, 1938
Figure 13.8-9

1938 *Globigerina quinqueloba* Natland, p. 149, pl. 6, fig. 7.

2017 *T urborotalita quinqueloba* (Natland); Schiebel and Hemleben, p. 50, pl. 2.16, figs. 1-17.

Description. Test small, slightly flattened, wall coarsely perforate, surface ornamentes with spines; chambers subglobular, chamber arrangement low trochospiral, periphery rounded, sutures distinct, depressed; aperture umbilical, interiomarginal, bordered by a lip.

Genus GLOBIGERINELLA Cushman, 1927
Globigerinella calida (Parker, 1962)
Figure 13.10-11

1962 *Globigerina calida* Parker, p. 221, pl. 1, figs. 9-13, 15.

1983 *Globigerinella calida* (Parker); Kennet and Srinivasan, p. 240, pl. 60, figs. 7-9.

2010 *Globigerinella calida* (Parker); Ovechkina, Bylinskaya and Uken, p. 242, fig. 6G-6I.

Description. Test trochoid, wall perforate, surface ornamented with spines; chambers spherical initially, slightly radially elongate later, increase in size as added, chamber arrangement slightly trochospiral; periphery lobulated, sutures depressed; aperture high umbilical arch, with a narrow lip.

Globigerinella radians (Egger, 1893)
Figure 13.12-13

1893 *Globigerina radians* Egger, p. 170, pl. 13, figs. 22-24.

Description. Test very lobate, flattened, wall perforate, surface ornamented with circular spines; chambers radially elongate with rounded tips, rapid increase in size as added, chamber arrangement planispiral, coiling highly evolute; aperture an equatorial, high arch.

Globigerinella siphonifera (d'Orbigny, 1839a)
Figure 13.14-16

1839a *Globigerina siphonifera* d'Orbigny, p. 83, pl. 4, figs. 15-18.

1983 *Globigerinella aequilateralis* (Brady); Kennett and Srinivasan, p. 238, pl. 59, fig. 1; pl. 60, figs. 4-6.

2010 *Globigerinella siphonifera* (d'Orbigny); Ovechkina, Bylinskaya, and Uken, p. 244, fig. 7A, 7B, 7D, 7E.

Description. Test large, wall perforate, surface ornamented with round spines; chambers spherical initially, globular or ovoid in the final stage, chamber arrangement nearly planispiral, coiling involute; periphery rounded, sutures distinct and depressed; aperture high, symmetrical, equatorial arch.

Genus GLOBIGERINOIDES Cushman, 1927
Globigerinoides conglobatus (Brady, 1879a)
Figure 13.17-18

1879a *Globigerina conglobata* Brady, p. 28B.

1983 *Globigerinoides conglobatus* (Brady); Kennett and Srinivasan, p. 58, pl. 12, figs. 4-6.

2010 *Globigerinoides conglobatus* (Brady); Ovechkina, Bylinskaya and Uken, p. 245, fig. 8A-8D.

Description. Test subquadrate, outline subglobular, wall calcareous, perforate, surface heavily cancellate, ornamented with spines; chambers subspherical, rapidly increasing in size as added, chamber arrangement medium to high trochospiral; sutures distinct; primary aperture interiomarginal, umbilical, elongate, low arch-shaped, secondary apertures small arched openings.

Globigerinoides ruber (d'Orbigny, 1839a)
Figure 13.19-20

1839a *Globigerina rubra* d'Orbigny, p. 82, pl. 4, figs. 12-14.

1983 *Globigerinoides ruber* (d'Orbigny); Kennett and Srinivasan, p. 78, pl. 10, figs. 6; pl. 17, figs. 1-3.

2010 *Globigerinoides ruber* (d'Orbigny); Ovechkina, Bylinskaya and Uken, p. 245, fig. 9A-9E.

Description. Test small, wall calcareous, coarsely perforate, surface ornamented with spines; chambers subglobular, of uniform size, chamber arrangement trochospiral; periphery rounded, sutures distinct, depressed; primary aperture semicircular, above the suture of two chambers.

Globigerinoides sacculifer (Brady, 1877)
Figure 14.1-4

1877 *Globigerina sacculifera* Brady, p. 535.

1983 *Globigerinoides sacculifer* (Brady); Kennet and Srinivasan, p. 66, pl. 14, figs. 4-6.

2010 *Globigerinoides sacculifer* (Brady); Ovechkina, Bylinskaya and Uken, p. 246, fig. 8G-8I.

Description. Test large, wall coarsely perforate, surface ornamented with spines; chambers globular, increasing in size as added, final chamber elongate, slightly flattened, chamber arrangement low trochospiral; periphery rounded, sutures well depressed; primary aperture umbilical, interiomarginal, low, wide symmetrical arch, bordered by an

imperforate lip in few, secondary apertures subelliptical.

Globigerinoides trilobus (Reuss, 1850)
Figure 14.5-6

1850 *Globigerina triloba* Reuss, p. 374, pl. 47, fig. 11a-c.

1983 *Globigerinoides triloba* (Reuss); Kennet and Srinivasan, p. 62, pl. 10, fig. 4; pl. 13, figs. 1-3.

2010 *Globigerinoides trilobus* (Reuss); Ovechkina, Bylinskaya and Uken, p. 246, fig. 8E, 8F.

Description. Test trilobate, wall coarsely perforate, surface ornamented with spines; chambers globular, increasing in size as added, chamber arrangement trochospiral; periphery rounded, sutures very distinct and depressed; primary aperture umbilical, slit-like or low, slightly wide symmetrical arch, secondary apertures subrounded.

Genus GLOBOTURBOROTALITA Hofker, 1976
Globoturborotalita sp.
Figure 14.7-8

Description. Test small, evolute, wall moderately coarse agglutinate, surface rough; chambers trochospirally arranged, gradually increase in size as added; periphery rounded, sutures radial and depressed; aperture interiomarginal.

Genus ORBULINA d'Orbigny, 1839
Orbulina universa d'Orbigny, 1839a
Figure 13.21

1839a *Orbulina universa* d'Orbigny, p. 3, pl. 1, fig. 1.

1983 *Orbulina universa* d'Orbigny; Kennet and Srinivasan, p. 86, pl. 20, figs. 4-6.

2010 *Orbulina universa* d'Orbigny; Ovechkina, Bylinskaya and Uken, p. 248, fig. 9H.

Description. Test spherical, wall calcareous, perforate, surface ornamented with many small pores interspersed amidst few larger pores; chambers many, globular, chamber arrangement trochospiral; sutures distinct and depressed; aperture interiomarginal, umbilical, bordered by an imperforate lip in juveniles, areal in adults.

Genus SPHAEROIDINELLA Cushman, 1927
Sphaeroidinella dehiscens (Parker and Jones, 1865)
Figure 14.9-10

1865 *Sphaeroidinella bulloides* d'Orbigny var. *dehiscens* Parker and Jones, p. 369, pl. 19, fig. 5a-b.

2010 *Sphaeroidinella dehiscens* (Parker and Jones); Ovechkina, Bylinskaya, and Uken, p. 248, fig. 9F, 9G.

Description. Test large, ovoid, outline weakly lobulate, wall calcareous, coarsely perforate, surface smooth and glossy in adults; chambers globular, rapidly increasing in size as added, chamber arrangement trochospiral, coiling tight, periphery broadly rounded, sutures depressed initially, later obscured by surface cortex in adults; aperture interiomarginal, umbilical in juveniles, slit-like in adults, with a continuous crenulated lip along the cortical margins.

Superfamily GLOBOROTALIOIDEA Cushman, 1927
Family CANDEINIDAE Cushman, 1927
Subfamily GLOBIGERINITINAE Bermúdez, 1961
Genus CANDEINA d'Orbigny, 1839c
Candeina nitida d'Orbigny, 1839c
Figure 14.11

1839c *Candeina nitida* d'Orbigny, p. 107, pl. 2, figs. 27-28.

1983 *Candeina nitida* d'Orbigny; Kennett and Srinivasan, p. 228, pl. 57, figs. 6-8.

Description. Test subglobular, shiny, wall calcareous, very finely perforate, surface smooth, without spines; chambers radial, coiling tight; periphery rounded, sutures distinct; aperture multiple, small circular to elongate, rimmed openings along the sutures of the final and also the penultimate chamber, in rare cases.

Genus GLOBIGERINITA Brönnimann, 1951
Globigerinita glutinata (Egger, 1893)
Figure 14.12

1893 *Globigerina glutinata* Egger, p. 371, pl. 13, figs. 19-21.

1983 *Globigerinita glutinata* (Egger); Kennet and Srinivasan, p. 224, pl. 56, figs. 1, 3-5.

2010 *Globigerinita glutinata* (Egger); Ovechkina, Bylinskaya and Uken, p. 239, figs. 5B, 5E.

Description. Test subrounded, wall calcareous; chambers spherical, of nearly uniform size, chamber arrangement trochospiral, periphery rounded, sututres distinct; primary aperture umbilical, low arch opening, bordered by a lip, umbilical side sutures covered by bulla.

Family GLOBOROTALIIDAE Cushman, 1927
Genus GLOBOROTALIA Cushman, 1927
Globorotalia cultrata (d'Orbigny, 1839a)
Figure 14.13-14

1839a *Rotalina cultrata* d'Orbigny, p. 76, pl. 5, figs. 7-9.

2010 *Globorotalia cultrata* (d'Orbigny); Ovechkina, Bylinskaya and Uken, p. 235, fig. 3A, 3D.

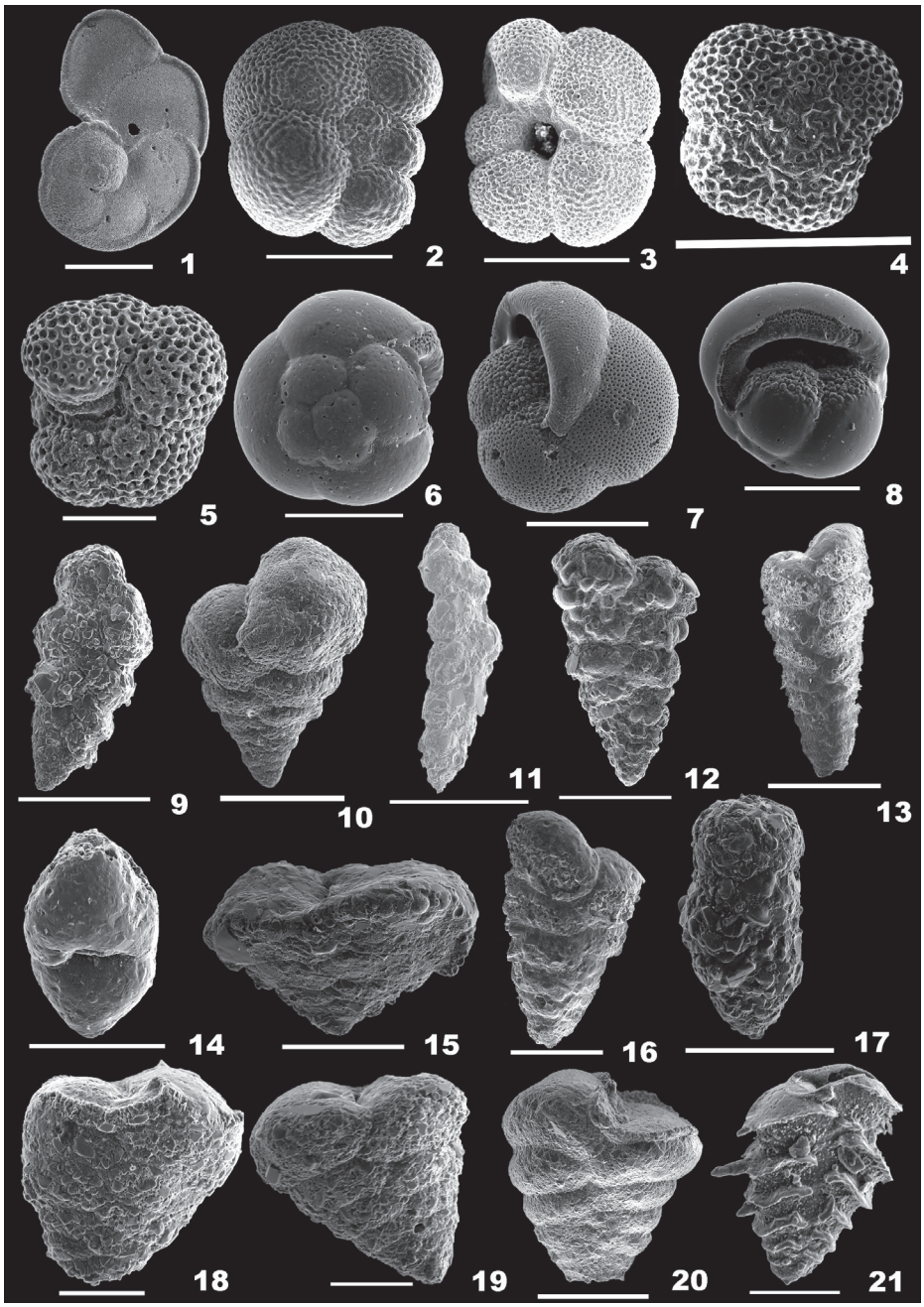

FIGURE 15. 1, *Globorotalia neoflexuosa* in dorsal view (scale equals 500 µm). **2-3**, *Neogloboquadrina dutertrei* (d'Orbigny, 1839) in dorsal view (scale equals 200 µm) (**2**) and in ventral view (scale equals 300 µm) (**3**). **4-5**, *Neogloboquadrina incompta* (Cifelli, 1961) in dorsal view (scale equals 100 µm) (**4**) and in ventral view (scale equals 100 µm) (**5**). **6-8**, *Pulleniatina obliquiloculata* (Parker and Jones in Carpenter, Parker and Jones, 1862) in dorsal view (scale equals 200 µm) (**6**); in ventral view (scale equals 200 µm) (**7**); and in apertural view (scale equals 200 µm) (**8**). **9**, *Textularia agglutinans* d'Orbigny, 1839a in dorsal view (scale equals 400 µm). **10**, *Textularia candeiana* d'Orbigny, 1839a in dorsal view (scale equals 300 µm). **11**, *Textularia earlandi* Parker 1952 in dorsal view (scale equals 1 mm). **12**, *Textularia fistula* Cushman, 1911 in dorsal view (scale equals 300 µm). **13-14**, *Textularia granulata* Costa 1855 in dorsal view (scale equals 400 µm) (**13**) and in apertural view (scale equals 200 µm) (**14**). **15**, *Textularia pala* (Czjžek, 1848) in dorsal view (scale equals 200 µm). **16**, *Textularia pseudogramen* Chapman and Parr, 1937 in dorsal view (scale equals 200 µm). **17**, *Bigenerina nodosaria* d'Orbigny, 1826 in dorsal view (scale equals 400 µm). **18**, *Sahulia conica* (d'Orbigny, 1839) in dorsal view (scale equals 100 µm). **19**, *Sahulia kerimbaensis* (Said, 1949) in dorsal view (scale equals 100 µm). **20**, *Karrerotextularia flintii* (Cushman, 1911) in dorsal view (scale equals 100 µm). **21**, *Spirorutilus carinatus* (d'Orbigny, 1846) in dorsal view (scale equals 100 µm).

Description. Test broad, biconvex, wall calcareous, perforate, surface smooth; chambers nearly flat, subrounded on the spiral side, more inflated, subtriangular on the umbilical side, rapidly increasing in size as added, chamber arrangement trochospiral; periphery keeled, sutures arcuate on the spiral side, radial on the umbilical side; aperture interiomarginal, umbilical, low arched, with a plate-like tooth.

Globorotalia menardii (d'Orbigny, 1826)
Figure 14.15-16

1826 *Rotalia menardii* d'Orbigny, p. 273.

2010 *Globorotalia menardii* (Parker, Jones and Brady, 1865); Ovechkina, Bylinskaya and Uken, p. 234, fig. 3B, 3E.

Description. Test biconvex, wall calcareous, perforate, surface smooth, no spines; chambers nearly flat, semi-circular on the spiral side, slightly inflated, subtriangular on the umbilical side, rapidly increasing in size as added, chamber arrangement trochospiral; periphery keeled, sutures curved on the spiral side, radial on the umbilical side; aperture low arch, interiomarginal, umbilical, with a plate-like tooth.

Globorotalia neoflexuosa (Srinivasan, Kenette and Bé, 1974)
Figure 15.1

1974 *Globorotalia menardii subsp. neoflexuosa* Srinivasan, Kenette and Bé, p. 322, pl. 1, figs. 1-2.

Description. Test large, compressed, peripheral view rounded, wall finely perforate, surface smooth; chambers slightly inflated, rapidly increasing in size as added, chamber arrangement low trochospiral, final chamber gently bent towards the umbilicus; periphery with imperforate keel, sutures slightly depressed on the dorsal side, depressed and nearly radial on the ventral side; aperture arch-shaped, bordered by a lip.

Globorotalia tumida (Brady, 1877)
Figure 14.17-18

1877 *Pulvinulina menardii* d'Orbigny var. *tumida* Brady, p. 535.

2010 *Globorotalia tumida* (Brady); Ovechkina, Bylinskaya and Uken, p. 236, fig. 3G, 3H.

Description. Test large, biconvex, wall thick, calcareous, perforate; chambers slightly inflated, reniform on the spiral side, subtriangular and more inflated on the umbilical side, final chamber slightly compressed, chamber arrangement trochospiral; periphery with thick keel, sutures thick, curved on the spiral side, radial on the umbilical side; aperture extraumbilical, interiomarginal with a plate-like tooth.

Globorotalia ungulata Bermúdez, 1961
Figure 14.19-20

1961 *Globorotalia ungulata* Bermúdez, p. 1304, pl. 15, fig. 6a-b.

2010 *Globorotalia ungulata* Bermúdez; Ovechkina, Bylinskaya and Uken, p. 236, figs. 3C, 3F, 3I.

Description. Test small, biconvex, wall calcareous, perforate, surface smooth; chambers flat on the spiral side, inflated and subtriangular on the ventral side, chamber arrangement trochospiral, final chamber with a large umbilical flap; periphery with thin keel, sutures curved on the spiral side, radial on the ventral side; aperture interiomarginal, umbilical, low, slit-like opening at the basal end of the large flap with a plate-like lip.

Genus NEOGLOBOQUADRINA Bandy, Frerichs and Vincent, 1967
Neogloboquadrina dutertrei (d'Orbigny, 1839a)
Figure 15.2-3

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

1983 *Neogloboquadrina dutertrei* (d'Orbigny); Kennett and Srinivasan, p. 198, pl. 48, figs. 7-9.

2010 *Neogloboquadrina dutertrei* (d'Orbigny); Ovechkina, Bylinskaya and Uken, p. 238, fig. 4E, 4F, 4H, 4I.

Description. Test robust, slightly compressed, wall calcareous, coarsely perforate, surface not ornamented with spines; chambers subglobular, gradually increasing in size as added, chamber arrangement trochospiral; periphery rounded, sutures distinct, depressed; aperture circular opening, umbilical.

Neogloboquadrina incompta (Cifelli, 1961)
Figure 15.4-5

1961 *Globigerina incompta* Cifelli, p. 83, pl. 4, figs. 1-7.

2010 *Neogloboquadrina incompta* (Cifelli); Ovechkina, Bylinskaya and Uken, p. 238, fig. 4D, 4G.

Description. Test medium, less compact, wall strongly perforate; chambers globular, chamber arrangement trochospiral; periphery rounded, sutures visible; aperture interiomarginal, umbilical, extending to the periphery, with a slightly extended lip.

Family PULLENIATINIDAE Cushman, 1927
Genus PULLENIATINA Cushman, 1927
Pulleniatina obliquiloculata (Parker and Jones in

Carpenter, Parker and Jones, 1862)
Figure 15.6-8

1865 *Pullenia sphaeroides* d'Orbigny var. *obliquiloculata* Parker and Jones, pp. 365, 368, pl. 19, fig. 4a-b.

1983 *Pulleniatina obliquiloculata* (Parker and Jones); Kennet and Srinivasan, p. 202, pl. 49, fig. 2; pl. 50, figs. 6-9.

2010 *Pulleniatina obliquiloculata* (Parker and Jones); Ovechkina, Bylinskaya and Uken, p. 238, figs. 5A, 5D.

Description. Test rounded, wall calcareous, finely perforate, surface smooth, without spines; chambers spherical, chamber arrangement trochospiral initially, later streptospiral; periphery rounded, sutures disitinct, slightly depressed; aperture low, interiomarginal arch with a thick rim.

Order TEXTULARIIDA Delage and Hérouard, 1896
Suborder TEXTULARIINA Delage and Hérouard, 1896
Superfamily TEXTULARIOIDEA Ehrenberg, 1838
Family TEXTULARIIDAE Ehrenberg, 1838
Subfamily TEXTULARIINAE Ehrenberg, 1838
Genus TEXTULARIA Defrance, 1824
Textularia agglutinans d'Orbigny, 1839b
Figure 15.9

1839b *Textularia agglutinans* d'Orbigny; p. 144, pl. 1, figs. 17-18, 32-34.

2003 *Textularia agglutinans* d'Orbigny; Javaux and Scott, p. 22, fig. 5.8-9.

2007 *Textularia agglutinans* d'Orbigny; Talib and Farroqui, p. 18, pl. 1, fig. 1.

2012 *Textularia agglutinans* d'Orbigny; Debenay, p. 95.

2012 *T* *extularia agglutinans* d'Orbigny; Milker and Schmiedl, p. 38, fig. 10.15-16.

2014 *Textularia agglutinans* d'Orbigny; Panchang and Nigam, pl. 3, fig. 14a-b.

2015 *Textularia agglutinans* d'Orbigny; Hanagata and Nobuhara, p. 18, fig. 7.3-4.

Description. Test elongate, slightly compressed, tapering, lateral view narrowly triangular, apertural view subrounded, wall coarsely agglutinated, surface smooth; final chambers slightly inflated, chambers biserially arranged, increasing in size gradually; sutures fairly distinct and slightly depressed, aperture terminal, a low arch or long slit-like depression.

Textularia candeiana d'Orbigny, 1839b
Figure 15.10

1839b Textularia *candeiana* d'Orbigny, p. 143, pl. 1, figs. 25-27.

2012 *Textularia candeiana* d'Orbigny; Debenay, p. 96.

2015 *Textularia candeiana* d'Orbigny; Hanagata and Nobuhara, p. 18, fig. 7.5.

Description. Test narrow, V-shaped, tapering rapidly to the apex, wall agglutinated, surface smooth; chambers many, much compressed in the early stage, rapidly enlarging later, final chambers much inflated; sutures fairly distinct, and depressed; apertural face broadly rounded, aperture terminal, a low arched opening at the base of the final chamber, bordered by a thin lip.

Textularia earlandi Parker, 1952
Figure 15.11

1952 *Textularia earlandi* Parker, p. 458.

2008 *Textularia earlandi* Parker; Riveiros and Patterson, p. 14, fig. 5.2a-b.

2014 *Textularia earlandi* Parker; Panchang and Nigam, pl. 3, figs. 18-19.

Description. Test elongate, much longer than broad, aboral end pointing, apertural end broad, wall agglutinated, surface rough; chambers many, biserially arranged; sutures distinct and depressed; aperture terminal, a small, slit-like depression.

Textularia fistula Cushman, 1911
Figure 15.12

1911 *Textularia agglutinans* d'Orbigny var. *fistula* Cushman, p. 10, text-fig. 11.

2012 *T* *extularia fistula* Cushman; Debenay, p. 96.

2014 *Textularia fistula* Cushman; Panchang and Nigam, pl. 3, fig. 20.

Description. Test elongate, triangular, much compressed laterally, wall coarsely agglutinated, surface irregular, rough; chambers many, increasing in size as added, biserially arranged; sutures indistinct initially, horizontal and depressed in later chambers; aperture slit-like depression on the inner margin of the final chamber.

Textularia granulata Costa, 1855
Figure 15.13-14

1855 *Textularia sagittula* Defrance var. *granulata* Costa, pl. 23, fig. 11.

2014 *T* *extularia granulata* Costa; Panchang and Nigam, pl. 3, fig. 24a-b.

Description. Test elongate, subtriangular, apertural end broadly rounded, tapering towards the aboral end, wall agglutinated, surface smooth; chambers many, gradually increasing in size as added, biserial chamber arrangement; periphery subacute, sutures slightly depressed; aperture terminal, a slit-like small opening at the centre, bordered by a lip.

Textularia pala (Čžjžek, 1848)
Figure 15.15

1848 *Textularia pala* Čžjžek, p. 148, pl. 13, figs. 25-27.

2006 *Textularia pala* Čžjžek; Oflaz, p. 135, pl. 1, fig. 5.

2012 *Textularia pala* Čžjžek; Milker and Schmiedl, p. 40, fig. 10.21-22.

Description. Test triangular, broad than long, compressed laterally, apertural end broad, aboral end tapering, wall finely agglutinated, surface smooth; chambers many, compressed, biserially arranged, rapidly increasing in size as added; periphery slightly undulate, sutures distinct, curved and slightly depressed; aperture interiomarginal, terminal, a low arched opening, bordered by a lip.

Textularia pseudogramen Chapman and Parr, 1937
Figure 15.16

1937 *Textularia pseudogramen* Chapman and Parr, p. 153.

2012 *Textularia pseudogramen* Chapman and Parr; Debenay, p. 98.

2014 *Textularia pseudogramen* Chapman and Parr; Panchang and Nigam, pl. 4, fig. 15a-b.

Description. Test large, elongate, subtriangular, wall coarsely agglutinated, surface rough except apertural face; chambers many, biserially arranged, initially increasing in size as added, final chambers of almost constant width; periphery subacute earlier, thickened later, sutures distinct, depressed; aperture terminal, a low arch opening on the apertural side.

Genus BIGENERINA d'Orbigny, 1826
Bigenerina nodosaria d'Orbigny, 1826
Figure 15.17

1826 *Bigenerina nodosaria* d'Orbigny, p. 261, pl. 11, figs. 9-12.

2001 *Bigenerina nodosaria* d'Orbigny; Szarek, p. 94, pl. 8, figs. 12-14.

2002 *Bigenerina nodosaria* d'Orbigny; Kaminski, Aksu, Box, Hiscott, Filipescu and Al-Salameen, p.170, pl. 1, fig. 9.

2003 *Bigenerina nodosaria* d'Orbigny; Murray, p. 11, fig. 2.4.

2006 *Bigenerina nodosaria* d'Orbigny; Oflaz, p. 131, pl. 1, fig. 4.

2010 *Bigenerina nodosaria* d'Orbigny; Margreth, p. 99, pl. 5, fig. 5a-c.

2012 *Bigenerina nodosaria* d'Orbigny; Debenay, p. 77.

2012 *Bigenerina nodosaria* d'Orbigny; Milker and Schmiedl, p. 36, fig. 10.10-12.

2014 *Bigenerina nodosaria* d'Orbigny; Panchang and Nigam, pl. 3, figs. 4-9.

2015 *Bigenerina nodosaria* d'Orbigny; Hanagata and Nobuhara, p. 18, fig. 7.1-2.

Description. Test elongate, wall coarsely agglutinated, surface rough, cross section circular; chambers rounded to ovate, or flattened, initial chambers arranged biserially, later uniserially arranged; sutures distinct and slightly depressed; aperture terminal, small and rounded on the apertural face.

Genus SAHULIA Loeblich and Tappan, 1985
Sahulia conica (d'Orbigny, 1839b)
Figure 15.18

1839b *Textularia conica* d'Orbigny, p. 143, pl. 1, figs. 19-20.

2001 *Sahulia conica* (d'Orbigny); Szarek, p. 94, pl. 8, figs. 19-21.

2003 *Textularia conica* (d'Orbigny); Javaux and Scott, p. 21, fig. 5.10-11.

2012 *Textularia conica* (d'Orbigny); Debenay, p. 96.

2012 *Textularia conica* (d'Orbigny); Milker and Schmiedl, p. 36, fig. 10.18.

2014 *Sahulia conica* (d'Orbigny); Panchang and Nigam, pl. 3, figs. 10a-c, 11a-c, 12a-c.

Description. Test broad than long, conical, slightly compressed, outline subtriangular, wall agglutinated, surface smooth or slightly rough; chambers low and broad, biserially arranged, rapidly increasing in size, no visible chamberlets; peripheral margin subacute, sutures nearly horizontal, slightly curved, and depressed; aperture terminal, slit-like, bordered by a lip.

Sahulia kerimbaensis (Said, 1949)
Figure 15.19

1949 *Textularia kerimbaensis* Said, p. 6, pl. 1, fig. 8.

2007 *Textularia* aff *T. kerimbaensis* (Said); Talib and Farroqui, p. 18, pl. 1, fig. 3.

2012 *Textularia kerimbaensis* (Said); Debenay, p. 97.

2012 *Sahulia kerimbaensis* (Said); Hemleben, Spindler and Anderson, p. 21, pl. 3, figs. 8-12; pl. 4, figs. 1-8.

Description. Test triangular, outline V-shaped, broad, wall composed of round arenaceous grains, surface smooth; initial chambers triserially arranged, later biserially arranged, rapidly increasing in size as added; periphery subacute, sutures horizontal, curved and depressed; aperture terminal, slit-like in the apertural face, bordered by a distinct lip.

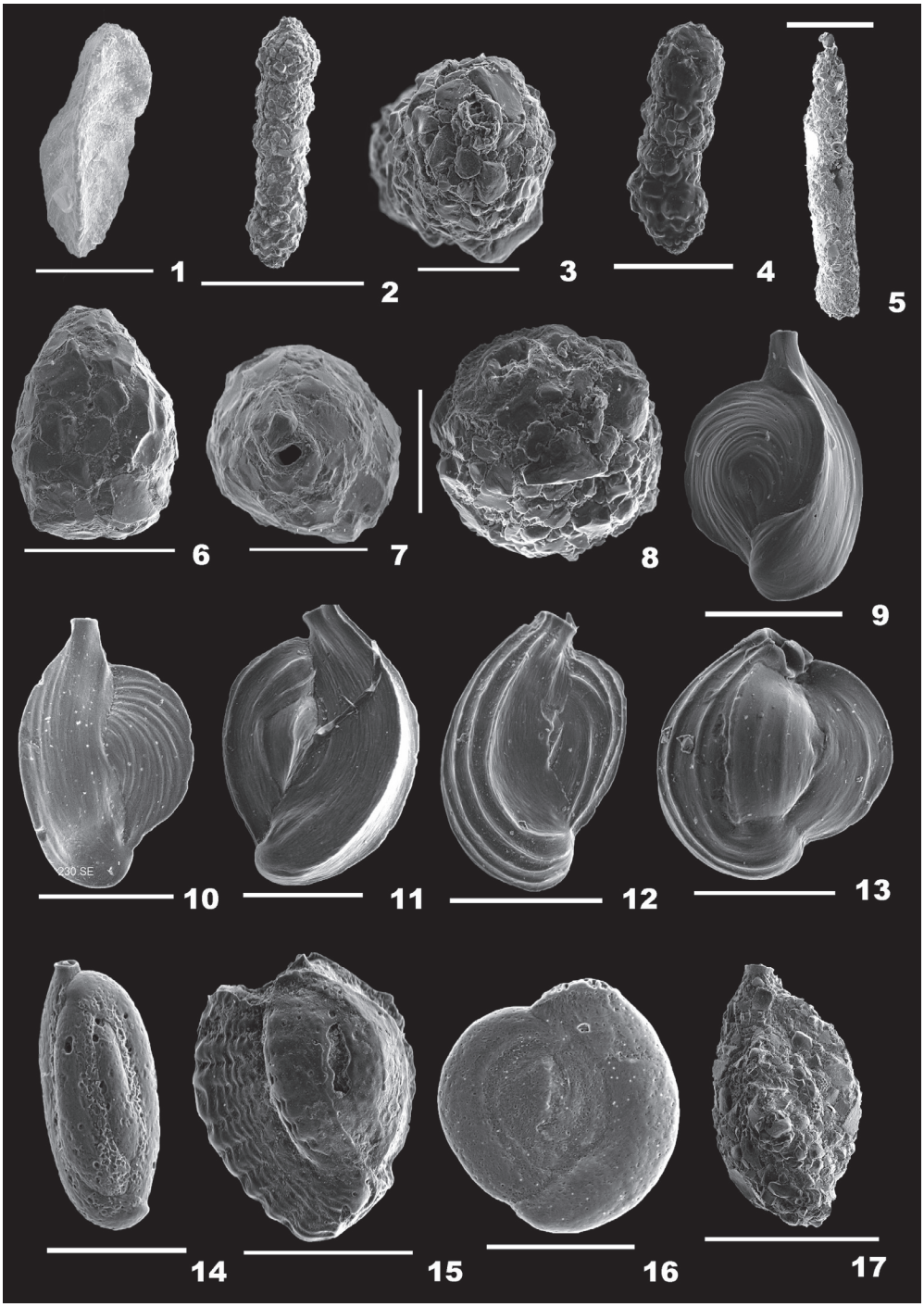

FIGURE 16. 1, *Clavulina angularis* d'Orbigny, 1826 in dorsal view (scale equals 300 µm). **2-3**, *Martinottiella cylindrica* (d'Orbigny, 1852) in dorsal view (scale equals 1 mm) (**2**) and in apertural view (scale equals 200 µm) (**3**). **4**, *Pseudoclavulina serventyi* (Chapman and Parr, 1935) in dorsal view (scale equals 500 µm). **5**, *Hyperammina friabilis* Brady, 1884 in dorsal view (scale equals 1 mm). **6-7**, *Lagenammina difflugiformis* (Brady, 1879a) in dorsal view (scale equals 300 µm) (**6**) and in apertural view (scale equals 200 µm) (**7**). **8**, *Psammosphaera fusca* Schulze, 1875 in dorsal view (scale equals 200 µm). **9-10**, *Adelosina longirostra* (d'Orbigny, 1826) in dorsal view (scale equals 200 µm) (**9**) and in ventral view (scale equals 200 µm) (**10**). **11-12**, *Adelosina pulchella* (d'Orbigny, 1826) in dorsal view (scale equals 200 µm) (**11**) and in ventral view (scale equals 300 µm) (**12**). **13**, *Cribrolinoides curta* (Cushman, 1917) in dorsal view (scale equals 200 µm). **14**, *Miliammina fusca* (Brady, 1870) in dorsal view (scale equals 200 µm). **15**, *Pseudohauerinella orientalis* (Cushman, 1946) in dorsal view (scale equals 200 µm). **16**, *Sigmoihauerina bradyi* (Cushman, 1917) in dorsal view (scale equals 200 µm). **17**, *Agglutinella arenata* (Said, 1949) in dorsal view (scale equals 500 µm).

Subfamily SIPHOTEXTULARIINAE Loeblich and Tappan, 1985
Genus KARREROTEXTULARIA Le Calvez, de Klasz, and Brun, 1974
Karrerotextularia flintii (Cushman, 1911)
Figure 15.20

1911 *Textularia flintii* Cushman, p. 21, text-fig. 36a-b.
2003 *Siphotextularia flintii* (Cushman); Murray, p. 15, fig. 3.11.
2012 *Siphotextularia flintii* (Cushman); Debenay, p. 93.
2012 *Siphotextularia flintii* (Cushman); Milker and Schmiedl, p. 40, fig. 11.1-3.

Description. Test subtriangular, compressed laterally, wall finely agglutinated, surface smooth; chambers inflated, low and broad, increasing in size gradually, arranged biserially; sutures distinct, horizontal and deep, aperture slit-like, at the basal end of the final chamber, bordered by a slightly raised lip.

Family KAMINSKIIDAE Neagu, 1999
Genus SPIRORUTILUS Hottinger, Halicz and Reiss, 1990
Spirorutilus carinatus (d'Orbigny, 1846)
Figure 15.21

1846 *Textularia carinata* d'Orbigny, p. 247, pl. 14, figs. 32-34.
2001 *Spiroplectinella pseudocarinata* (Cushman); Szarek, p. 88, pl. 6, figs. 3-6.
2014 *Textularia pseudocarinata* (Cushman); Panchang and Nigam, pl. 4, fig. 14a-b.

Description. Test triangular, flattened laterally, flanges extending at the sides, wall agglutinated, surface rough; chambers biserially arranged, rapidly increasing in size as added; periphery carinate, sutures distinct, raised ridges; aperture terminal, large, low arched opening, bordered by a rim.

Superfamily EGGERELLOIDEA Cushman, 1937
Family VALVULINIDAE Berthelin, 1880
Subfamily VALVULININAE Berthelin, 1880
Genus CLAVULINA d'Orbigny, 1826
Clavulina angularis d'Orbigny, 1826
Figure 16.1

1826 *Clavulina angularis* d'Orbigny, p. 268, pl. 12, fig. 7.
1969 *Clavulina angularis* d'Orbigny; Keller, p. E9, pl. 1, fig. 2; pl. 11, fig. 4.

Description. Test elongate, slender, sharply pointed, tricarinate, parallel sides tapering at the ends, cross section triangular, wall agglutinated, surface smoothly finished; initial chambers distinctly uniserial, final triserial chambers indistinct; periphery acute, sutures curved backwards and depressed; aperture terminal, round in the middle portion of the apertural face.

Family EGGERELLIDAE Cushman, 1937
Subfamily EGGERELLINAE Cushman, 1937
Genus MARTINOTTIELLA Cushman, 1933
Martinottiella cylindrica (d'Orbigny, 1852)
Figure 16.2-3

1852 *Clavulina cylindrica* d'Orbigny, p. 194.
2012 *Clavulina cylindrica* (Cushman); Milker and Schmiedl, p. 42, fig. 11.7.

Description. Test elongate, side view cylindrical, basal view subtriangular, wall coarsely agglutinated, surface rough; chambers triserially arranged initially, later subglobular, uniserially arranged, cylindrical in the final stage; sutures distinct, horizontal, and depressed; aperture terminal, a circular opening at the end of a short neck.

Family PSEUDOGAUDRYINIDAE Loeblich and Tappan, 1985
Subfamily PSEUDOGAUDRYININAE Loeblich and Tappan, 1985
Genus PSEUDOCLAVULINA Cushman, 1936
Pseudoclavulina serventyi (Chapman and Parr, 1935)
Figure 16.4

1935 *Clavulina serventyi* Chapman and Parr, p. 5, pl. 1, fig. 7.
2001 *Pseudoclavulina serventyi* (Chapman and Parr); Szarek, p. 97, pl. 10, figs. 16-17.
2012 *Pseudoclavulina serventyi* (Chapman and Parr); Debenay, p. 88.
2015 *Pseudoclavulina serventyi* (Chapman and Parr); Hanagata and Nobuhara, p. 20, figs. 7.14-15.

Description. Test elongate, side view subcylindrical, basal view triangular, wall composed of coarse agglutinated material, surface rough; chambers initially small, triserially arranged, later long, subglobular, uniserially arranged; sutures somewhat distinct, horizontal, and depressed; aperture terminal, a circular opening on a round apertural side.

Class MONOTHALAMEA Pawlowski, Holzmann, Berney, Fahrni, Gooday, Cedhagen, Habura, and Bowser, 2003
Order ASTRORHIZIDA Lankester, 1885
Suborder HIPPOCREPININA Saidova, 1981
Superfamily HIPPOCREPINOIDEA Rhumbler, 1895
Family HYPERAMMINIDAE Eimer and Fickert, 1899
Subfamily HYPERAMMININAE Eimer and Fickert, 1899

Genus HYPERAMMINA Brady, 1878
Hyperammina friabilis Brady, 1884
Figure 16.5

1884 *Hyperammina friabilis* Brady, p. 258, pl. 23, figs. 1-3, 5, 6.

2012 *Hyperammina friabilis* Brady; Debenay, p. 83.

Description. Test linear, elongate, subcylindrical, tapering towards the apertural side, wall thick, agglutinated but loosely cemented, surface rough; large globular proloculus followed by a long, subcylindrical, second chamber lesser in width; aperture rounded, terminal.

Suborder SACCAMMININA Lankester, 1885
Superfamily SACCAMMINOIDEA Brady, 1884
Family SACCAMMINIDAE Brady, 1884
Subfamily SACCAMMININAE Brady, 1884
Genus LAGENAMMINA Rhumbler, 1911
Lagenammina difflugiformis (Brady, 1879a)
Figure 16.6-7

1879a *Reophax difflugiformis* Brady, p. 51, pl. 4, fig. 3a-b.

2001 *Lagenammina difflugiformis* (Brady); Szarek, p. 175, pl. 1, figs. 9-10.

2005 *Lagenammina difflugiformis* (Brady); Licari and Mackensen, p. 207, pl. 1, fig. 4.

Description. Test pyriform, wall coarsely agglutinated, surface smooth; single chambered, aperture single, subrounded, terminal at the end of a short neck.

Superfamily PSAMMOSPHAEROIDEA Haeckel, 1894
Family PSAMMOSPHAERIDAE Haeckel, 1894
Subfamily PSAMMOSPHAERINAE Haeckel, 1894
Genus PSAMMOSPHAERA Schulze, 1875
Psammosphaera fusca Schulze, 1875
Figure 16.8

1875 *Psammosphaera fusca* Schulze, p. 113, pl. 2, fig. 8a-f.

2010 *Psammosphaera fusca* Schulze; Margreth, p. 129, pl. 1, fig. 5a-b (not pl. 5).

2012 *Psammosphaera fusca* Schulze; Milker and Schmiedl, p. 31, fig. 9.2-3.

Description. Test free or attached, globular, wall coarsely agglutinated, surface roughly finished; chamber single, aperture terminal.

Class TUBOTHALAMEA Pawlowski, Holzman and Tyszka, 2013
Order MILIOLIDA Delage and Hérouard, 1896
Suborder MILIOLINA Delage and Hérouard, 1896
Superfamily MILIOLOIDEA Ehrenberg, 1839
Family CRIBROLINOIDIDAE Haynes, 1981
Genus ADELOSINA d'Orbigny, 1826
Adelosina longirostra (d'Orbigny, 1826)
Figure 16.9-10

1826 *Quinqueloculina laevigata* d'Orbigny, p. 301.

2014 *Adelosina laevigata* (d'Orbigny); Panchang and Nigam, pl.5, fig. 19a-c.

Description. Test slightly elongate, central portion convex on the spiral side, wall calcareous, imperforate, surface with many visible striations; periphery carinate; aperture terminal, at the end of a somewhat longer neck, with a small bifid tooth.

Adelosina pulchella (d'Orbigny, 1826)
Figure 16.11-12

1826 *Quinqueloculina pulchella* d'Orbigny, p. 303.

2006 *Adelosina pulchella* (d' Orbigny); Oflaz, p. 149, pl. 2, figs. 8-10.

Description. Test large, side view fusiform, wall calcareous, imperforate, surface ornamented with parallel costae; chambers visible; periphery carinate, sutures distinct, slightly depressed; aperture terminal, at the end of a short neck, weakly bordered by a lip, with a small tooth slightly raised above the aperture.

Genus CRIBROLINOIDES Cushman and LeRoy, 1939
Cribrolinoides curta (Cushman, 1917)
Figure 16.13

1917 *Quinqueloculina disparilis* d'Orbigny var. *curta* Cushman, p. 49, pl. 14, fig. 2, text-fig. 30.

2012 *Cribrolinoides curtus* (Cushman); Debenay, p. 106.

2014 *Cribrolinoides curtus* (Cushman); Panchang and Nigam, pl. 4, fig. 6a-c.

Description. Test short, robust, side view subcircular, wall calcareous, imperforate, surface ornamented with longitudinal ridges; chambers visible, chamber arrangement quinqueloculine; periphery highly carinate, broadly rounded, sutures distinct; aperture subcircular, with a prominent, projected bifid tooth.

Family MILIAMMINIDAE Saidova, 1981
Genus MILIAMMINA Heron-Allen and Earland, 1930
Miliammina fusca (Brady, 1870)
Figure 16.14

1870 *Quinqueloculina fusca* Brady, p. 286, pl. 11, figs. 2-3.

2003 *Miliammina fusca* (Brady); Javaux and Scott, p. 16, fig. 6.7.

2012 *Miliammina fusca* (Brady); Debenay, p. 86.

2014 *Miliammina fusca* (Brady); Panchang and Nigam, pl. 39, fig. 10a-b.

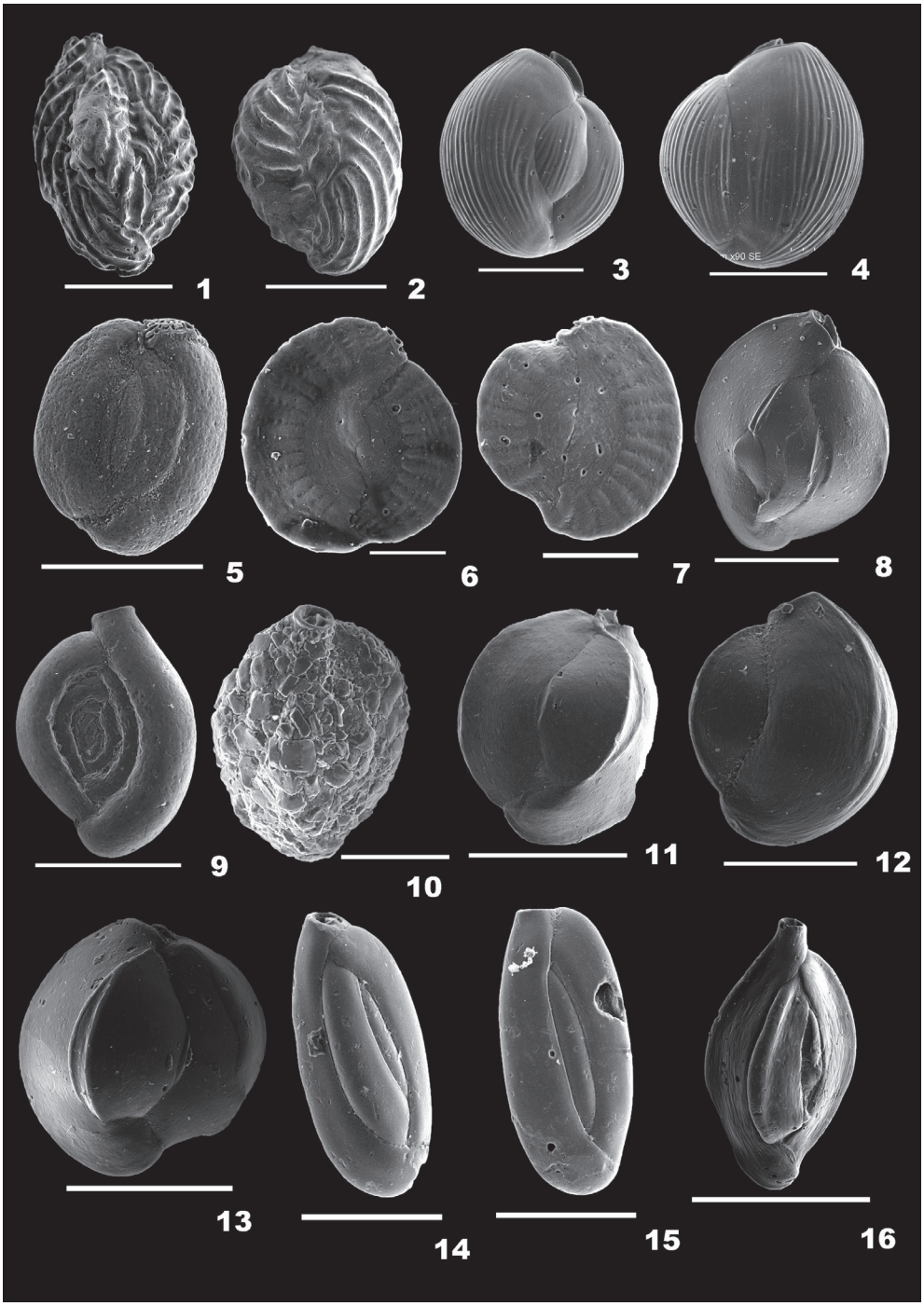

FIGURE 17. 1-2, *Cycloforina semiplicata* (McCulloch, 1977) in dorsal view (scale equals 500 µm) (**1**) and in ventral view (scale equals 500 µm) (**2**). **3-4**, *Flintina bradyana* Cushman 1921 in dorsal view (scale equals 500 µm) (**3**) and in ventral view (scale equals 500 µm) (**4**). **5**, *Hauerina earlandi* Rasheed, 1971 in dorsal view (scale equals 300 µm). **6-7**, *Hauerina ornatissima* (Karrer, 1868) in dorsal view (scale equals 100 µm) (**6**) and in ventral view (scale equals 100 µm) (**7**). **8**, *Lachlanella barnardi* (Rasheed, 1971) in dorsal view (scale equals 400 µm). **9**, *Massilina laevigata* (Cushman and Todd, 1944) in dorsal view (scale equals 500 µm). **10**, *Quinqueloculina agglutinans* d'Orbigny, 1839a in dorsal view (scale equals 100 µm). **11-12**, *Quinqueloculina auberiana* d'Orbigny, 1839a in dorsal view (scale equals 500 µm) (**11**) and in ventral view (scale equals 200 µm) (**12**). **13**, *Quinqueloculina bicarinata* d'Orbigny, 1826 in dorsal view (scale equals 400 µm). **14-15**, *Quinqueloculina bosciana* d'Orbigny, 1839a in dorsal view (scale equals 200 µm) (**14**) and in ventral view (scale equals 200 µm) (**15**). **16**, *Quinqueloculina exmouthensis* Parker, 2009 in dorsal view (scale equals 400 µm).

Description. Test agglutinated, elongate, cross section ovate, wall composed of well sorted detrital grains in an organic cement, surface rough; chamber arrangement quinqueloculine; aperture terminal, ovate with a simple tooth.

Family RIVEROINIDAE Saidova, 1981
Genus PSEUDOHAUERINELLA McCulloch, 1981
Pseudohauerinella orientalis (Cushman, 1946)
Figure 16.15

1946 *Hauerina orientalis* (Cushman); Cushman, p. 12, pl. 2, figs. 22-24.

2012 *Pseudohauerina orientalis* (Cushman); Debenay, p. 114.

Description. Test oval, wall calcareous, imperforate, surface reticulate, ornamented with transverse ribs; chambers inflated, chamber arrangement quinqueloculine, coiling partially evolute; aperture U-shaped in younger forms, cribrate, sieve-like in adults produced by the coalescence of teeth.

Family HAUERINIDAE Schwager, 1876
Subfamily SIGMOILINITINAE Łuczkowska, 1974
Genus SIGMOIHAUERINA Zheng, 1979
Sigmoihauerina bradyi (Cushman, 1917)
Figure 16.16

1917 *Hauerina bradyi* Cushman; p. 62, pl. 23, fig. 2.

2006 *Sigmoihauerina bradyi* (Cushman); Oflaz, p. 170, pl. 3, fig. 9.

Description. Test very much flattened, broadly ovate, wall calcareous, imperforate, surface strongly pitted; chambers compressed, final chambers slightly inflated, overlapping the earlier chambers, quinqueloculine chamber arrangement initially, later planispirally arranged; periphery rounded, sutures distinct, slightly depressed; aperture terminal, elliptical with a trematophore.

Subfamily SIPHONAPERTINAE Saidova, 1975
Genus AGGLUTINELLA El-Nakhai, 1983
Agglutinella arenata (Said, 1949)
Figure 16.17

1949 *Quinqueloculina anguina* Terquem var. *arenata* Said, p. 9, pl. 1, fig. 25.

1994. *Agglutinata arenata* (Said); Loeblich and Tappan, p. 306-307, pl. 69, figs. 9-11; pl. 70, figs. 10-15; pl. 74, figs. 10-13.

2002 *Agglutinata arenata* (Said); Kaminski, Aksu, Box, Hiscott, Filipescu, and Al-Salameen, p. 186.

2012 *Quinqueloculina arenata* (Said); Debenay, p. 119.

2014 *Quinqueloculina arenata* (Said); Panchang and Nigam, pl. 7, fig. 20a-b.

Description. Test elongate, wall coarsely agglutinated, surface rough; chambers broadly rounded, tapering towards the ends, chamber arrangement quinqueloculine; periphery rounded, sutures obscured by the arenaceous material; aperture terminal, round at the end of a prominent neck, with a thick, protruding tooth.

Subfamily HAUERININAE Schwager, 1876
Genus CYCLOFORINA Łuczkowska, 1972
Cycloforina semiplicata (McCulloch, 1977)
Figure 17.1-2

1977 *Quinqueloculina semiplicata* McCulloch, p. 507, pl. 217, figs. 7, 11, 13, and 17.

2014 *Cycloforina semiplicata* (McCulloch); Panchang and Nigam, pl. 7, fig. 12a-c.

Description. Test elongate, wall calcareous, imperforate, surface ornamented with many transverse, curved ribs; chambers visible, inflated, chamber arrangement quinqueloculine; sutures less distinct, depressed; aperture terminal, round at the end of a neck, bordered by a thin lip, with a small bifid tooth.

Genus FLINTINA Cushman, 1921
Flintina bradyana Cushman, 1921
Fig 17.3-4

1921 *Flintina bradyana* Cushman, p. 467, pl. 94, fig. 2, text-figs. 38-44.

2012 *Flintina bradyana* Cushman; Debenay, p. 108.

2014 *Flintina bradyana* Cushman; Panchang and Nigam, pl. 11, fig. 8a-c.

Description. Test robust, subspherical, wall porcelaneous, imperforate, surface ornamented with long striae; chambers inflated, rapidly increasing in size as added, chamber arrangement triloculine; periphery broadly rounded and highly carinate, sutures distinct, slightly depressed; aperture terminal, ovate, bordered by a thick rim, with a prominent flap-like tooth, well raised above the periphery.

Genus HAUERINA d'Orbigny, 1839
Hauerina earlandi Rasheed, 1971
Figure 17.5

1971 *Hauerina earlandi* Rasheed, p. 54, pl. 16, fig. 7.

2012 *Hauerina earlandi* Rasheed; Debenay, p. 108.

Description. Test slightly compressed or globular to subglobular, wall calcareous, imperforate, surface smooth; chamber arrangement triloculine to quinqueloculine initially, planispiral later; periphery rounded, sutures slightly depressed; aperture ter-

minal, a complex trematophore at the end of the final chamber.

Hauerina ornatissima (Karrer, 1868)
Figure 17.6-7

1868 *Quinqueloculina ornatissima* Karrer, p. 151, pl. 3, fig. 2.

1946 *Hauerina ornatissima* (Karrer); Cushman, p. 5, pl. 1, fig. 16.

2014 *Hauerina ornatissima* (Karrer); Panchang and Nigam, pl. 14, fig. 18a-b.

Description. Test oval to circular, compressed, wall calcareous, imperforate, surface of the later chambers ornamented with transverse ribs; chambers quinqueloculine initially, later planispirally arranged; peripheral margin subacute, aperture series of circular openings at the end of the final chamber, bordered by a thick rim.

Genus LACHLANELLA Vella, 1957
Lachlanella barnardi (Rasheed, 1971)
Figure 17.8

1971 *Quinqueloculina barnardi* Rasheed, pp. 26, 27, pl. 2, fig. 1.

2012 *Quinqueloculina barnardi* (Rasheed); Debenay, p. 119.

Description. Test robust, cross section triangular, side view oval, wall calcareous, imperforate, surface smooth, very finely striated; chambers visible, chamber arrangement quinqueloculine; peripheral margin acutely rounded to truncated, sutures distinct; aperture elongate, compressed, bordered by a lip, with a long simple tooth slightly raised above the aperture.

Genus MASSILINA Schlumberger, 1893
Massilina laevigata (Cushman and Todd, 1944)
Figure 17.9

1944 *Spiroloculina laevigata* Cushman and Todd, p. 67, pl. 9, figs. 26-29.

2014 *Spiroloculina laevigata* (Cushman and Todd); Panchang and Nigam, pl. 6, fig. 19a-b.

Description. Test large, robust, lateral view fusiform, wall calcareous, imperforate, surface smooth; chambers initially compressed, final chambers inflated, chamber arrangement spiroloculine, gradually increasing in size as added; periphery broadly rounded, sutures distinct and very depressed; aperture terminal, round at the end of a short neck, weakly rimmed, with a simple bifid tooth.

Genus QUINQUELOCULINA d'Orbigny, 1826
Quinqueloculina agglutinans d'Orbigny, 1839b
Figure 17.10

1839b *Quinqueloculina agglutinans* d'Orbigny, p. 195, pl. 12, figs. 11-13.

2001 *Agglutinella agglutinans* d'Orbigny; Szarek, p. 102, pl. 11, fig. 18.

2003 *Quinqueloculina agglutinans* d'Orbigny; Javaux and Scott, p. 18, fig. 4.3-4.

2006 *Siphonaperta agglutinans* d'Orbigny; Oflaz, p. 155, pl. 2, fig. 12.

2012 *Quinqueloculina agglutinans* d'Orbigny; Debenay, p. 119.

2012 *Siphonaperta agglutinans* d'Orbigny; Milker and Schmiedl, p. 51, fig. 13.18-19.

2014 *Spiroloculina laevigata* (Cushman and Todd); Panchang and Nigam, pl. 7, fig. 17a-c.

Description. Test slightly elongate, outline ovate, side view subelliptical, outer wall agglutinated, surface rough; chambers slightly inflated, chamber arrangement quinqueloculine; periphery broadly rounded, sutures visible but mostly hidden by the agglutinated material; aperture terminal, ovate, bordered by a distinct non-agglutinated lip, with a long bifid tooth.

Quinqueloculina auberiana d'Orbigny, 1839b
Figure 17.11-12

1839b *Quinqueloculina auberiana* d'Orbigny, p. 193, pl. 12, figs. 1-3.

2012 *Quinqueloculina auberiana* d'Orbigny; Debenay, p. 119.

2012 *Quinqueloculina auberiana* d'Orbigny; Milker and Schmiedl, p. 56, fig. 15.1-2.

Description. Test broad, oval-shaped, wall calcareous, imperforate, surface smooth; chambers mostly sharply angled or slightly subrounded, faintly carinate; peripheral margin carinate, sutures distinct; aperture terminal, low arch, bordered by a thick rim, with a simple tooth.

Quinqueloculina bicarinata d'Orbigny, 1826
Figure 17.13

1826 *Quinqueloculina bicarinata* d'Orbigny, p. 302, no. 35.

2001 *Quinqueloculina bicarinata* d'Orbigny; Szarek, p. 104, pl. 12, fig. 14.

2012 *Quinqueloculina bicarinata* d'Orbigny; Debenay, p. 120.

2014 *Quinqueloculina bicarinata* d'Orbigny; Panchang and Nigam, pl. 8, fig. 2a-c.

Description. Test robust, cross section triangular, side view subcircular; chambers carinate at the outer borders, chamber arrangement quinqueloculine; periphery subacute, sutures distinct; aperture terminal, ovate, slightly protruding, bordered by a weak, reversed rim, with a T-shaped tooth.

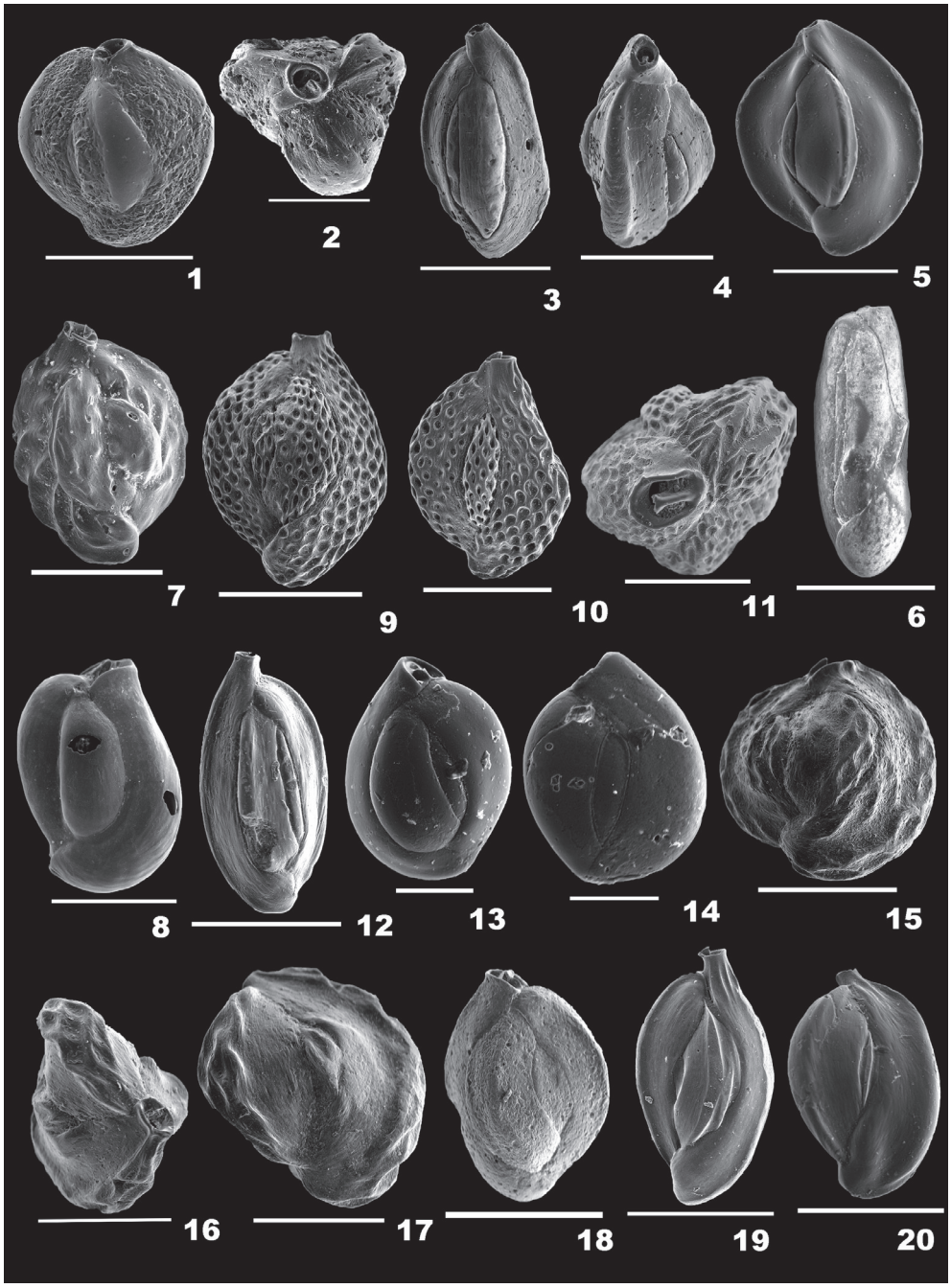

FIGURE 18. 1-2, *Quinqueloculina bubnanensis* McCulloch, 1977 in dorsal view (scale equals 400 µm) (**1**) and in apertural view (scale equals 200 µm) (**2**). **3-4**, *Quinqueloculina delicatula* Vella, 1957 in dorsal view (scale equals 400 µm) (**3**) and in apertural view (scale equals 300 µm) (**4**). **5**, *Quinqueloculina lamarckiana* d'Orbigny, 1839 in dorsal view (scale equals 200 µm). **6**, *Quinqueloculina lizardi* Baccaert, 1987 in dorsal view (scale equals 200 µm). **7,** *Quinqueloculina parkeri* (Brady, 1881) in dorsal view (scale equals 300 µm). **8**, *Quinqueloculina parvula* Schlumberger, 1894 in dorsal view (scale equals 300 µm). **9-11**, *Quinqueloculina philippinensis* Cushman, 1921 in dorsal view (scale equals 400 µm) (**9**); in ventral view (scale equals 400 µm) (**10**); and in apertural view (scale equals 500 µm) (**11**). **12**, *Quinqueloculina schlumbergeri* (Wiesner, 1923) in dorsal view (scale equals 300 µm). **13-14**, *Quinqueloculina seminula* (Linnaeus, 1758) in dorsal view (scale equals 100 µm) (**13**) and in ventral view (scale equals 100 µm) (**14**). **15-17**, *Quinqueloculina subparkeri* McCulloch, 1977 in dorsal view (scale equals 300 µm) (**15**); in apertural view (scale equals 200 µm) (**16**); and in ventral view (scale equals 200 µm) (**17**). **18**, *Quinqueloculina subpolygona* Parr, 1945 in dorsal view (scale equals 400 µm). **19-20**, *Quinqueloculina sulcata* Fornasini, 1900 in dorsal view (scale equals 500 µm) (**19**) and in ventral view (scale equals 300 µm) (**20**).

Quinqueloculina bosciana d'Orbigny, 1839b
Figure 17.14-15

1839b *Quinqueloculina bosciana* d'Orbigny, p. 191, pl. 11, figs. 22-24.

2006 *Quinqueloculina bosciana* d'Orbigny; Oflaz, pp. 160-161, pl. 11, fig. 6.

2012 *Quinqueloculina bosciana* d'Orbigny; Debenay, p. 120.

Description. Test elongate, apertural view subovaloval, apertural end truncate, aboral end round, wall calcareous, surface smooth; chambers distinct, slightly oblique, chamber arrangement quinqueloculine; periphery rounded, sutures distinct; aperture terminal, circular, on a short, broad neck, with a small bifid tooth.

Quinqueloculina bubnanensis McCulloch, 1977
Figure 18.1-2

1977 *Quinqueloculina bubnanensis* McCulloch, pl. 213, fig. 16.

2014 *Quinqueloculina bubnanensis* McCulloch; Panchang and Nigam, pl. 8, fig. 6a-c.

Description. Test broadly ovate, wall calcareous, imperforate; chambers rapidly increasing in size as added, chamber arrangement quinqueloculine; sutures distinct, depressed; aperture terminal, circular on a short neck, bordered by a distinct lip, with a short, simple tooth.

Quinqueloculina delicatula Vella, 1957
Figure 18.3-4

1957 *Quinqueloculina delicatula* Vella, p. 27, pl. 4, figs. 77-79.

2012 *Quinqueloculina delicatula* Vella; Debenay, p. 122.

Description. Test elongate, apertural end extended, truncated by a short neck, aboral end broadly rounded, surface rough, with small pits; chamber arrangement quinqueloculine; peripheral margin convex, sutures distinct, slightly depressed; aperture rounded, bordered by a thick rim and a small bifid tooth.

Quinqueloculina exmouthensis Parker, 2009
Figure 17.16

2009 *Quinqueloculina exmouthensis* Parker, p. 207, figs. 146a-h, 147a-i, 148a-i.

2012 *Quinqueloculina exmouthensis* Parker; Debenay, p. 122.

Description. Test elongate, robust, twice longer than wide, lateral view broadly oval, apertural end extended, aboral end rounded, cross section triangular, wall calcareous, surface smooth, with fine striations; chambers visible, margins slightly convex, chamber arrangement quinqueloculine; peripheral margins truncated, sutures distinct, engraved; aperture terminal, round on a long neck, with a small bifid tooth.

Quinqueloculina lamarckiana d'Orbigny, 1839b
Figure 18.5

1839b *Quinqueloculina lamarckiana* d'Orbigny, p. 189, pl. 11, figs. 14-15.

1999 *Quinqueloculina lamarckiana* d'Orbigny; Nigam and Khare, p. 290, pl. 2, fig. 4.

2003 *Quinqueloculina lamarckiana* d'Orbigny; Javaux and Scott, p. 20, fig. 4.12-13.

2014 *Quinqueloculina lamarckiana* d'Orbigny; Panchang and Nigam, pl. 9, fig. 8a-c.

Description. Test broad, flattened at the sides, apertural view triangular, wall calcareous, imperforate, surface smooth; chambers visible, chamber arrangement quinqueloculine; periphery acutely angled, sutures distinct, slightly depressed; aperture terminal, subcircular, at the end of a slightly produced neck, bordered by a rim, with a large, simple tooth.

Quinqueloculina lizardi Baccaert, 1987
Figure 18.6

1987 *Quinqueloculina oblonga* subsp. *lizardi* Baccaert, p. 100, pl. 46, fig. 6a-b; pl. 47, fig. 1.

2012 *Quinqueloculina lizardi* Baccaert; Debenay, p. 123.

Description. Test elongate, compressed laterally, side view elliptical, aboral end rounded, apertural end truncate, wall calcareous, entire surface ornamented with slit-like depressions; chambers rapidly increasing in size as added, chamber arrangement quinqueloculine; periphery broadly oblong, sutures distinct, slightly depressed; aperture terminal, subcircular, bordered by a thick rim, with a small tooth.

Quinqueloculina parkeri (Brady, 1881)
Figure 18.7

1881 *Miliolina parkeri* Brady, p. 46.

2012 *Quinqueloculina parkeri* (Brady); Debenay, p. 12.

2014 *Quinqueloculina parkeri* (Brady); Panchang and Nigam, pl. 9, fig. 13a-c.

Description. Test broadly ovate, robust, wall calcareous, imperforate, surface ornamented with prominent transverse ribs; chambers inflated, chamber arrangement quinqueloculine; peripheral margin subacute, sutures depressed; aperture terminal, circular, at the end of a short neck bordered by an everted lip, and in few *Lachlanella*-type, with a large or thickened single tooth.

Quinqueloculina parvula Schlumberger, 1894
Figure 18.8

FIGURE 19. 1-2, *Quinqueloculina undulose costata* Terquem 1882 in dorsal view (scale equals 500 µm) (**1**) and in ventral view (scale equals 500 µm) (**2**). **3-4.** *Quinqueloculina venusta* Karrer, 1868 in dorsal view (scale equals 500 µm) (**3**) and in ventral view (scale equals 400 µm) (**4**). **5**, *Quinqueloculina vulgaris* d'Orbigny, 1826 in dorsal view (scale equals 100 µm). **6-8**, *Cribromiliolinella milletti* (Cushman, 1954) in dorsal view (scale equals 500 µm) (**6**); in dorsal view (scale equals 400 µm) (**7**); and in dorsal view (scale equals 500 µm) (**8**). **9**, *Miliolinella circularis* (Bornemann, 1855) dorsal view (scale equals 300 µm). **10-11**, *Miliolinella subrotunda* (Montagu, 1803) in dorsal view (scale equals 100 µm) (**10**) and in ventral view (scale equals 200 µm) (**11**). **12-13**, *Miliolinella webbiana* (d'Orbigny, 1839b) in dorsal view (scale equals 500 µm) (**12**) and in ventral view (scale equals 500 µm) (**13**). **14-16**, *Pseudotriloculina kerimbatica* (Heron-Allen and Earland, 1939) in apertural view (scale equals 400 µm) (**14**); in dorsal view (scale equals 500 µm) (**15**); and in ventral view (scale equals 300 µm) (**16**). **17-18**, *Pseudotriloculina linneiana* (d'Orbigny, 1839a) in dorsal view (scale equals 300 µm) (**17**) and in apertural view (scale equals 200 µm) (**18**).

1894 *Quinqueloculina parvula* Schlumberger, p. 255, text-fig. 1, pl. 3, figs. 8-9.

2012 *Quinqueloculina parvula* Schlumberger; Milker and Schmiedl, p. 59, fig. 15.25-27.

Description. Test oblong, side view ovate, wall calcareous, imperforate, surface ornamented with anastomosing striae; chambers inflated, rapidly increasing in size as added, chamber margins rounded; periphery carinate, sutures distinct and depressed; aperture terminal, large, U-shaped, bordered by a thick rim, with a flap-like, bifid tooth, slightly raised above the periphery.

Quinqueloculina philippinensis Cushman, 1921
Figure 18.9-11

1921 *Quinqueloculina kerimbatica* (Heron-Allen and Earland) var. *philippinensis* Cushman, p. 438, pl. 89, figs. 2-3; text-fig. 34.

2001 *Quinqueloculina* ex gr. *philippinensis* Cushman; Szarek, p. 104, pl. 12, figs. 17-18.

2007 *Quinqueloculina pseudoreticulata* Parr; Talib and Farroqui, p. 18, pl. 1, fig. 8a-b.

2012 *Quinqueloculina pseudoreticulata* Parr; Debenay, p. 125.

2014 *Quinqueloculina philippinensis* Cushman; Panchang and Nigam, pl. 9, fig. 15a-c.

Description. Test broadly ovate, surface ornamented with regular reticulations, apertural end slightly produced, neck not reticulate; chambers inflated, chamber arrangement quinqueloculine; periphery rounded, sutures distinct; aperture terminal, oval-shaped, bordered by a phialine lip, with a long, bifid tooth.

Quinqueloculina schlumbergeri (Wiesner, 1923)
Figure 18.12

1923 *Miliolina schlumbergeri* Wiesner, p. 49, pl. 6, fig. 73.

2012 *Quinqueloculina schlumbergeri* (Wiesner); Debenay, p. 126.

2014 *Quinqueloculina schlumbergeri* (Wiesner); Panchang and Nigam, pl. 10, fig. 4a-c.

Description. Test elongate-ovate, wall porcelaneous, imperforate, surface smooth, with fine, long striae; chambers visible, chamber arrangement quinqueloculine; peripheral margins thick, acutely angled, sutures prominent; aperture terminal, rounded, bordered by a rim, with a short, bifid tooth.

Quinqueloculina seminula (Linnaeus, 1758)
Figure 18.13-14

1758 *Serpula seminulum* Linnaeus, p. 786, pl. 2, fig. 1a-c.

2003 *Quinqueloculina seminulum* (Linnaeus); Murray, p. 17, pl. 4, figs. 11-12.

2007 *Quinqueloculina seminulum* (Linnaeus); Talib and Farroqui, p. 18, pl.1, fig. 9 a-b.

2010 *Quinqueloculina seminula* (Linnaeus); Margreth, p. 101, pl. 7, fig. 8a-c.

2012 *Quinqueloculina seminula* (Linnaeus); Milker and Schmiedl, p. 57, fig. 15.30-31.

2012 *Quinqueloculina seminula* (Linnaeus); Debenay, p. 126.

Description. Test subrounded, wall calcareous, surface smooth, cross section and side view ovate, apertural end truncated, basal end rounded; chambers visible, chamber arrangement quinqueloculine; periphery rounded, sutures distinct, slightly depressed; aperture terminal, subrounded, bordered by a thick rim, with a simple tooth.

Quinqueloculina subparkeri McCulloch, 1977
Figure 18.15-17

1977 *Quinqueloculina subparkeri* McCulloch, p. 511, pl. 217, figs. 15-16; pl. 218, figs. 2-6, 12.

2012 *Quinqueloculina subparkeri* McCulloch; Debenay, p. 127.

Description. Test subcircular, compressed, apertural end truncated, aboral end rounded, wall calcareous, surface ornamented with transverse ribs; chambers visible, chamber arrangement quinqueloculine; peripheral margin undulating, periphery reticulate, sutures depressed; aperture U-shaped, bordered by a slightly everted lip, with a simple, raised tooth.

Quinqueloculina subpolygona Parr, 1945
Figure 18.18

1945 *Quinqueloculina subpolygona* Parr, p. 196, pl. 12, fig. 2a-c.

2012 *Quinqueloculina subpolygona* Parr; Debenay, p. 127.

Description. Test elongate, slightly compressed, wall calcareous, surface ornamented with strong costae; chambers distinct, chamber arrangement quinqueloculine; periphery quadrangular, sutures distinct and depressed; aperture terminal, large, bordered by a weakly everted lip, with a bifid tooth.

Quinqueloculina sulcata Fornasini, 1900
Figure 18.19-20

1900 *Quinqueloculina sulcata* Fornasini, p. 364.

2007 *Quinqueloculina sulcata* d'Orbigny; Talib and Farroqui, p. 18, pl.1, fig. 10a-b.

2012 *Quinqueloculina* cf. *Q. sulcata* d'Orbigny; Debenay, p. 127.

2013 *Quinqueloculina sulcata* d'Orbigny; Elakkiya and Manivannan, p. 885, fig. 7.11.

Description. Test elongate-oblong, wall calcareous, imperforate, surface ornamented with promi-

nent costae; chamber arrangement quinqueloculine, margins truncate; peripheral margin subacute, periphery carinate, sutures distinct, slightly depressed; aperture terminal, circular at the end of a cylindrical neck, with a bifid tooth, bordered by a distinct rim.

Quinqueloculina undulose costata Terquem 1882
Figure 19.1-2

1882 *Quinqueloculina undulose costata* Terquem, p.185, pl. 20, figs. 18-19.

2007 *Quinqueloculina undulose costata* Terquem; Talib and Farroqui, p. 18, pl. 1, fig. 11a-b.

2012 *Quinqueloculina undulose costata* Terquem; Nisha and Singh, p. 787, pl. 1, fig. 6.

Description. Test broadly ovate, wall calcareous, imperforate, entire surface ornamented with transverse ribs; chambers inflated, chamber arrangement quinqueloculine; peripheral margin carinate, periphery subrounded, sutures indistinct; aperture terminal, circular, at the end of neck, bordered by a weakly everted rim, with a short, raised bifid tooth.

Quinqueloculina venusta Karrer, 1868
Figure 19.3-4

1868 *Quinqueloculina venusta* Karrer, p. 147, pl. 2, fig. 16.

2012 *Quinqueloculina venusta* Karrer; Debenay, p. 128.

2014 *Quinqueloculina venusta* Karrer; Panchang and Nigam, pl. 10, figs. 16a-c, 17a-c.

Description. Test subovate, aboral end rounded, apertural end truncate, wall calcareous, imperforate, surface smooth; chambers flattened, chamber arrangement quinqueloculine; periphery sharply angular, sutures distinct, depressed; aperture terminal, subelliptical, bordered by a thin rim, with a simple tooth.

Quinqueloculina vulgaris d'Orbigny, 1826
Figure 19.5

1826 *Quinqueloculina vulgaris* d'Orbigny, p. 302, no. 33.

2003 *Quinqueloculina vulgaris* d'Orbigny; Javaux and Scott, p. 20, fig. 4.20-21.

2007 *Quinqueloculina vulgaris* d'Orbigny; Talib and Farroqui, p. 18, pl. 1, fig. 12a-b.

Description. Test subcircular, stout, spiral view orbicular, apertural end slightly produced, wall calcareous, imperforate, surface smooth with fine striations; chambers inflated, chamber arrangement quinqueloculine; periphery acutely angled, sutures distinct; aperture elongate, slightly compressed, bordered by a distinctly everted lip with a bifid tooth raised slightly above the periphery of the aperture.

Subfamily MILIOLINELLINAE Vella, 1957
Genus CRIBROMILIOLINELLA Saidova, 1981
Cribromiliolinella milletti (Cushman, 1954)
Figure 19.6-8

1954 *Hauerina milletti* Cushman in Cushman, Todd and Post, p. 337, pl. 84, fig. 23.

1992 *Cribromiliolinella milletti* (Cushman); Hatta and Ujiie, p. 69, pl. 9, figs. 4-5.

2012 *Edentostomina milletti* (Cushman); Debenay, p. 106.

2014 *Edentostomina milletti* (Cushman); Panchang and Nigam, pl. 5, fig. 13a-b.

Description. Test compressed, longer than width, outline ovate; chambers slightly inflated, planispirally arranged, rapidly increasing in size, one-half coil in length, periphery acute or subrounded, sutures slightly sunken; aperture simple, terminal, elongate or subelliptical at the end of a neck, bordered by a thick lip, with no tooth.

Genus MILIOLINELLA Wiesner, 1931
Miliolinella circularis (Bornemann, 1855)
Figure 19.9

1855 *Triloculina circularis* Bornemann, p. 349, pl. 19, fig. 4.

2012 *Miliolinella circularis* (Bornemann); Debenay, p. 109.

2014 *Miliolinella circularis* (Bornemann); Panchang and Nigam, pl. 11, fig. 10a-b.

Description. Test subovate to round, side view circular, wall calcareous, surface smooth; chambers inflated, three chambers visible, milioline chamber arrangement; periphery rounded, sutures distinct; aperture terminal, a large low arch opening bordered by a well-developed lip with a simple tooth.

Miliolinella subrotunda (Montagu, 1803)
Figure 19.10-11

1803 *Vermiculum subrotundum* de Montagu, p. 521, pl. 1, fig. 4.

2003 *Miliolinella subrotunda* (Montagu); Murray, p. 15, pl. 4, fig. 6.

2006 *Miliolinella subrotunda* (Montagu); Oflaz, p. 168, pl. 11, fig. 7.

2012 *Miliolinella subrotunda* (Montagu); Debenay, p. 110.

2012 *Miliolinella subrotunda* (Montagu); Milker and Schmiedl, p. 63, fig. 16.31-32.

Description. Test subcircular, wall porcelaneous, translucent sometimes, surface smooth; chambers inflated, visible, strongly overlapping previous chambers, milioline chamber arrangement, nearly planispiral arrangement in adults; periphery rounded, sutures distinct and depressed; aperture

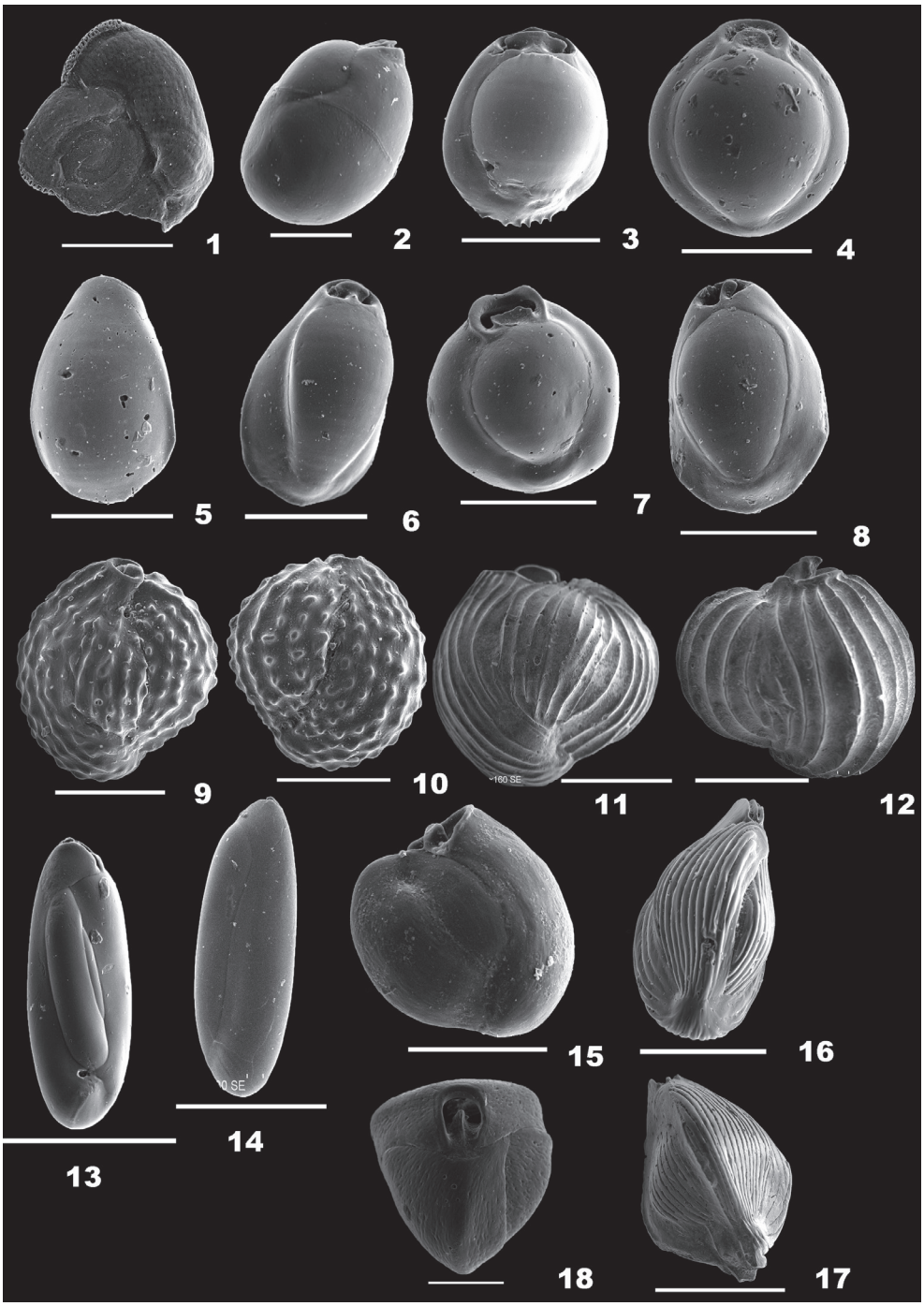

FIGURE 20. 1, *Parahauerinoides fragilissima* (Brady, 1884) in dorsal view (scale equals 300 µm). **2**, *Pseudotriloculina* sp., in dorsal view (scale equals 100 µm). **3**, *Pyrgo denticulata* (Brady, 1884) in ventral view (scale equals 500 µm). **4**. *Pyrgo inornata* (d'Orbigny, 1846) in ventral view (scale equals 300 µm). **5-6**, *Pyrgo oblonga* (d'Orbigny, 1839a) in dorsal view (scale equals 300 µm) (**5**) and in ventral view (scale equals 300 µm) (**6**). **7**, *Pyrgo* sp. in ventral view (scale equals 300 µm). **8**, *Pyrgo williamsoni* (Silvestri, 1923) in ventral view (scale equals 300 µm). **9-10**, *Triloculina echinata* d'Orbigny, 1826 in dorsal view (scale equals 200 µm) (**9**) and in ventral view (scale equals 200 µm) (**10**). **11-12**, *Triloculina insignis* (Brady, 1881) in dorsal view (scale equals 300 µm) (**11**) and in ventral view (scale equals 200 µm) (**12**). **13-14**, *Triloculina oblonga* (Montagu, 1803) in dorsal view (scale equals 300 µm) (**13**) and in ventral view (scale equals 300 µm) (**14**). **15**, *Triloculina schreiberiana* d'Orbigny, 1839a in dorsal view (scale equals 200 µm). **16-17**, *Triloculina terquemiana* (Brady, 1884) in lateral view (scale equals 400 µm) (**16**) and in dorsal view (scale equals 300 µm) (**17**). **18**, *Triloculina tricarinata* d'Orbigny, 1826 in apertural view (scale equals 200 µm).

terminal, subrounded, bordered by a distinct lip, with a low arched, broad flap-like tooth.

Miliolinella webbiana (d'Orbigny, 1839b)
Figure 19.12-13

1839b *Triloculina webbiana* d'Orbigny, p. 140, pl. 3, figs. 13-15.

2012 *Miliolinella webbiana* (d'Orbigny); Debenay, p. 110.

2012 *Miliolinella webbiana* (d'Orbigny); Milker and Schmiedl, p. 65, fig. 17.1-2.

Description. Test subcircular, wall porcelaneous, imperforate, surface fully ornamented with long costae; chambers inflated, arranged in quinqueloculine plan initially, later planispirally arranged; periphery rounded, carinate, sutures distinct, depressed; aperture terminal, large, bordered by a lip, with a big, slightly arched, flap-like tooth, slightly raised above the periphery of the aperture.

Genus PARAHAUERINOIDES McCulloch, 1977
Parahauerinoides fragilissima (Brady, 1884)
Figure 20.1

1884 *Spiroloculina fragilissima* Brady, p. 149, pl. 9, figs. 12-14.

1946 *Hauerina fragilissima* (Brady); Cushman, p. 9, pl. 2, figs. 1-6, 8.

2001 *Hauerina fragilissima* (Brady); Szarek, p. 103, pl. 12, fig. 6.

2012 *Hauerina fragilissima* (Brady); Debenay, p. 108.

Description. Test highly compressed, discoid, outline oval to rounded, wall thin, transparent, surface unevenly pitted; chambers partially involute, rapidly increasing in size as added, chamber arrangement initially quinqueloculine, later planispirally arranged; periphery rounded, sutures distinct, depressed; aperture terminal, cribrate.

Genus PSEUDOTRILOCULINA Cherif, 1970
Pseudotriloculina kerimbatica (Heron-Allen and Earland, 1939)
Figure 19.14-16

1915 *Miliolina kerimbatica* Heron-Allen and Earland, p. 574, pl. 43, figs. 13-23.

1999 *Quinqueloculina kerimbatica* (Heron-Allen and Earland); Nigam and Khare, p. 290, pl. 2, fig. 3.

2014 *Quinqueloculina kerimbatica* (Heron-Allen and Earland); Panchang and Nigam, pl. 9, figs. 4a-b, 5-6.

Description. Test subovate, broad than long, wall calcareous, imperforate, surface ornamented with transverse ribs; chambers inflated, quinqueloculine chamber arrangement; periphery highly carinate, sutures depressed; aperture terminal, circular on a short neck, bordered by a distinct rim, with a short bifid tooth.

Pseudotriloculina linneiana (d'Orbigny, 1839b)
Figure 19.17-18

1839b *Triloculina linneiana* d'Orbigny, p. 172, pl. 9, figs. 11-13.

2003 *Triloculina linneiana* (d'Orbigny); Javaux and Scott, p. 23, figs. 5.16-17.

2012 *Triloculina linneiana* (d'Orbigny); Debenay, p. 116.

Description. Test slightly elongate, tapering at both the ends, wall calcareous, imperforate, surface ornamented by long costae on the final chambers, prominent, raised ridges on the earlier chamber; chambers slightly inflated, arranged in a cryptoquinqueloculine plan; periphery slightly ovate, sutures depressed; aperture terminal, circular on a slightly produced neck, bordered by a thick rim, with a large, bifid tooth.

Pseudotriloculina sp.
Figure 20.2

Description. Test ovate, slightly compressed, wall calcareous, surface smooth and polished; chambers visible, final two nearly making up the entire test surface, cryptoquinqueloculine chamber arrangement; periphery broadly rounded, sutures distinct, slightly depressed; aperture terminal, high arch opening, bordered by a rim, with a broad flap-like tooth.

Genus PYRGO Defrance, 1824
Pyrgo denticulata (Brady, 1884)
Figure 20.3

1884 *Biloculina ringens* (Lamarck) var. *denticulata* Brady, p. 143, pl. 3, figs. 4-5.

2012 *Pyrgo denticulata* (Brady); Debenay, p. 117.

Description. Test subcircular, wall porcelaneous, surface smooth; chambers biconvex, biloculine chamber arrangement, coiling involute, peripheral margin broadly rounded, aboral margin serrated; aperture terminal, ovate, large opening, bordered by a rim, with a prominently broad T- shaped tooth.

Pyrgo inornata (d'Orbigny, 1846)
Figure 20.4

1846 *Biloculina inornata* d'Orbigny, p. 266, pl. 16, figs. 7-9.

2010 *Pyrgo inornata* (d'Orbigny); Margreth, p. 103, pl. 9, fig. 2a-c.

2012 *Pyrgo inornata* (d'Orbigny); Debenay, p. 117.

Description. Test nearly spherical, outline round, wall porcelaneous, surface smooth; chambers inflated, biconvex, coiling involute, biloculine chamber arrangement; periphery rounded; aperture ter-

minal, oval, bordered by a thick lip, with a broad, flap-like tooth.

Pyrgo oblonga (d'Orbigny, 1839b)
Figure 20.5-6

1839b *Biloculina oblonga* d'Orbigny, p. 163, pl. 8, figs. 21-23.

2012 *Pyrgo oblonga* (d'Orbigny); Debenay, p. 117.

2012 *Pyrgo oblonga* (d'Orbigny); Milker and Schmiedl, p. 66, fig. 17.13.

Description. Test elongate, outline pyriform, more tapering at the apertural end, wall porcelaneous, imperforate, surface smooth; chambers inflated, biloculine chamber arrangement, coiling involute, peripheral margin subacutely rounded; aperture terminal, ovate to subelliptical, bordered by a rim, with a broad, bifid tooth.

Pyrgo williamsoni (Silvestri, 1923)
Figure 20.8

1923 *Biloculina williamsoni* Silvestri, p. 73.

2003 *Pyrgo williamsoni* (Silvestri); Murray, p. 17, pl. 4, figs. 7-8.

2010 *Pyrgo williamsoni* (Silvestri); Margreth, p. 103, pl. 9, fig. 6a-c.

Description. Test ovate, elongate, tapering at the apertural end, aboral end broad, wall porcelaneous, imperforate, surface smooth; chambers added obliquely, biloculine chamber arrangement, coiling involute, periphery subacutely rounded, sutures distinct, slightly depressed; aperture elliptical, with a simple bifid tooth.

Pyrgo sp.
Figure 20.7

Description. Test subspherical, aboral end rounded, apertural end broadly truncate, wall porcelaneous, imperforate, surface smooth; chambers biconvex, biloculine chamber arrangement; periphery subrounded; aperture elongate, curved, with a large flat tooth, bordered by a thick lip.

Genus TRILOCULINA d'Orbigny, 1826
Triloculina echinata d'Orbigny, 1826
Figure 20.9-10

1826 *Triloculina echinata* d'Orbigny, p. 300, no. 14.

1999 *Triloculina echinata* d'Orbigny; Nigam and Khare, p. 292, pl. 3, fig. 5.

Description. Test subovate, somewhat broad than long, wall calcareous, imperforate, surface ornamented with regular rows of ridges; chambers slightly inflated, arranged in a triloculine plan; peripheral margin highly carinate, sutures slightly depressed; aperture terminal, round on a slightly produced neck, bordered by a distinct lip, with a short bifid tooth.

Triloculina insignis (Brady, 1881)
Figure 20.11-12

1881 *Miliolina insignis* Brady, p. 45.

1999 *Triloculina insignis* (Brady); Nigam and Khare, p. 292, pl. 3, fig. 4.

2014 *Triloculina insignis* (Brady); Panchang and Nigam, pl. 13, fig. 3a-c.

Description. Test subcircular, wall calcareous, imperforate, surface ornamented with many longitudinal costae; chambers inflated, arranged in a triloculine plan; peripheral margin carinate, periphery subrounded, sutures depressed; aperture terminal, circular opening on a short neck, bordered by a thin, slightly everted rim, with a prominent bifid tooth raised to be seen above the periphery of the aperture.

Triloculina oblonga (Montagu, 1803)
Figure 20.13-14

1803 *Vermiculum oblongum* de Montagu, p. 522, pl. 14, fig. 9.

2003 *Triloculina oblonga* (Montagu); Javaux and Scott, p. 23, fig. 5.16-17.

2006 *Triloculina oblonga* (Montagu); Oflaz, p. 176, pl. 4, fig. 5.

2012 *Triloculina oblonga* (Montagu); Milker and Schmiedl, p. 67, fig. 17.19-20.

Description. Test oblong, basal end broad, apertural end narrow, lateral view ovate, wall calcareous, imperforate, surface smooth; chambers inflated, arranged in a triloculine plan; periphery rounded, sutures distinct, depressed; aperture terminal, subrounded, on a slightly produced neck, bordered by a thick rim, with a simple, bifid tooth.

Triloculina schreiberiana d'Orbigny, 1839b
Figure 20.15

1839b *Triloculina schreiberiana* d'Orbigny, p. 174, pl. 9, figs. 20-22.

1997 *Triloculina schreiberiana* d'Orbigny; Cherif et al., p. 268, pl. 5, figs. 13-14.

Description. Test small, side view subovate, wall calcareous, imperforate, surface smooth; chambers distinct and broad, final chambers slightly inflated, arranged in triloculine plan; periphery broadly rounded; aperture terminal, large, subrounded opening, bordered by a slightly everted lip, with a slightly raised, short, distinct bifid tooth.

Triloculina terquemiana (Brady, 1884)
Figure 20.16-17

1884 *Miliolina terquemiana* Brady, p. 166, pl. 114, fig. 1a-b.

1999 *Triloculina terquemiana* (Brady); Nigam and Khare, p. 292, pl. 3, fig. 7.

FIGURE 21. 1, *Triloculina trigonula* (Lamarck, 1804) in dorsal view (scale equals 300 µm). **2**, *Sigmoilopsis schlumbergeri* (Silvestri, 1904) in dorsal view (scale equals 400 µm). **3-4**, *Spirosigmoilina tenuis* (Čžjžek, 1848) in dorsal view (scale equals 200 µm) (**3**) and in apertural view (scale equals 100 µm) (**4**). **5**, *Inaequalina affixa* (Terquem, 1878) in dorsal view (scale equals 400 µm). **6**, *Spiroloculina antillarum* d'Orbigny, 1839a in dorsal view (scale equals 500 µm). **7**, *Spiroloculina communis* Cushman and Todd, 1944 in dorsal view (scale equals 500 µm). **8**, *Spiroloculina costifera* Cushman, 1917 in dorsal view (scale equals 500 µm). **9**, *Spiroloculina depressa* d'Orbigny, 1826 in dorsal view (scale equals 400 µm). **10**, *Spiroloculina excavata* d'Orbigny, 1846 in dorsal view (scale equals 200 µm). **11**, *Spiroloculina eximia* Cushman, 1922a in dorsal view (scale equals 500 µm). **12**, *Spiroloculina henbesti* Petri, 1955 in dorsal view (scale equals 500 µm). **13**, *Spiroloculina indica* Cushman and Todd, 1944 in dorsal view (scale equals 500 µm). **14**, *Spiroloculina inflata* Terquem 1882 in dorsal view (scale equals 300 µm). **15**, *Spiroloculina lucida* Cushman and Todd, 1944 in dorsal view (scale equals 500 µm). **16**. *Spiroloculina neocircularis* McCulloch, 1977, dorsal view (scale equals 500 µm). **17**, *Spiroloculina nitida* d'Orbigny, 1826 in dorsal view (scale equals 500 µm). **18**, *Spiroloculina orbis* Cushman, 1921 in dorsal view (scale equals 500 µm). **19**, *Spiroloculina* sp. in dorsal view (scale equals 400 µm).

2007 *Triloculina terquemiana* (Brady); Talib and Farroqui, p. 18, pl. 1, fig. 15a-b.

2012 *Triloculina terquemiana* (Brady); Debenay, p. 138.

Description. Test elongate, side view ovate, cross section subtriangular with smooth angles, wall calcareous, imperforate, surface ornamented with long costae; chambers distinct, arranged in triloculine form; peripheral margins somewhat convex; aperture slightly produced, narrow, elongate opening, bordered by a lip, with a long tooth bifid at the tip.

Triloculina tricarinata d'Orbigny, 1826
Figure 20.18

1826 *Triloculina tricarinata* d'Orbigny, p. 299, pl. 1, fig. 8.

2010 *Triloculina trigonula* (Lamarck); Margreth, p. 103, pl. 11, fig. 2a-c.

2012 *Triloculina tricarinata* d'Orbigny; Debenay, p. 138.

2012 *Triloculina tricarinata* d'Orbigny; Milker and Schmiedl, p. 68, fig. 17.23-24.

Description. Test triangular, slightly longer than wide, wall porcelaneous, imperforate, surface smooth; chambers visible, arranged in triloculine form, peripheral margins carinate, sutures distinct; aperture subrounded, arch-shaped opening bordered by a thick rim, with a short tooth fixed at the base.

Triloculina trigonula (Lamarck, 1804)
Figure 21.1

1804 *Miliolites trigonula* Lamarck, p. 351, pl. 17, fig. 4a-c.

2006 *Triloculina trigonula* (Lamarck); Oflaz, p. 177, pl. 4, fig. 4.

2007 *Triloculina trigonula* (Lamarck); Talib and Farroqui, p. 19, pl. 1, fig. 16a-b.

2010 *Triloculina trigonula* (Lamarck); Margreth, p. 103, pl. 11, fig. 2a-c.

2012 *Triloculina trigonula* (Lamarck); Debenay, p. 138.

2014 *Triloculina trigonula* (Lamarck); Panchang and Nigam, pl. 13, fig. 7a-b.

Description. Test subtriangular, slightly longer than broad, wall calcareous, imperforate, surface smooth; chambers inflated, chamber arrangement triloculine; periphery broadly convex with smooth angles, sutures distinct; aperture terminal, narrow, elongate opening, bordered by a thick rim, with a broad, bifid tooth.

Subfamily SIGMOILOPSINAE Vella, 1957
Genus SIGMOILOPSIS Finlay, 1947

Sigmoilopsis schlumbergeri (Silvestri, 1904)
Figure 21.2

1904 *Sigmoilina schlumbergeri* Silvestri, p. 267, pl. 7, figs. 12-14; p. 481, text-fig. 6; p. 482, text-fig. 7.

2010 *Sigmoilopsis schlumbergeri* (Silvestri); Margreth, p. 104, pl. 11, fig. 5a-c.

2012 *Sigmoilopsis schlumbergeri* (Silvestri); Milker and Schmiedl, p. 69, fig. 18.7-8.

2014 *Sigmoilopsis schlumbergeri* (Silvestri); Panchang and Nigam, pl. 14, figs. 12a-c, 13a-c.

Description. Test oval, wall porcelaneous, outer layer composed of agglutinated material, surface rough; chambers obscured, chamber arrangement sigmoidal initially, later planispirally arranged; periphery broadly rounded, sutures indistinct; aperture terminal, circular on a non-agglutinated, short neck, bordered by a weak rim, with a short tooth.

Genus SPIROSIGMOILINA Parr, 1942
Spirosigmoilina tenuis (Čžjžek, 1848)
Figure 21.3-4

1848 *Quinqueloculina tenuis* Čžjžek, p. 149, pl. 13, figs. 31-34.

2014 *Sigmoilinita tenuis* (Čžjžek); Panchang and Nigam, pl. 14, fig. 3a-c.

Description. Test elongate, compressed, wall calcareous, translucent, surface smooth; chambers sigmoidal initially, later arranged in quinqueloculine plan, periphery broadly rounded, sutures very distinct and depressed; aperture terminal, small, circular at the end of a short neck.

Family SPIROLOCULINIDAE Wiesner, 1920
Genus INAEQUALINA Łuczkowska, 1971
Inaequalina affixa (Terquem, 1878)
Figure 21.5

1878 *Spiroloculina affixa* Terquem, p. 55, pl. 5, fig. 13a-c.

2012 *Inaequalina affixa* (Terquem); Debenay, p. 108.

2014 *Inaequalina affixa* (Terquem); Panchang and Nigam, pl. 6, fig. 7a-c.

Description. Test elongate, flat on one side, concave on the other, with tapering ends, surface smooth and glossy; chambers planispirally arranged, rapidly increasing in size as added; periphery carinate; aperture rectangular at the end of a flat and compressed extension of the final chamber without tooth.

Genus SPIROLOCULINA d'Orbigny, 1826
Spiroloculina antillarum d'Orbigny, 1839b
Figure 21.6

1839b *Spiroloculina antillarum* d'Orbigny, p. 166, pl. 9, figs. 3-4.

2012 *Spiroloculina antillarum* d'Orbigny; Debenay, p. 132.

Description. Test elongate, twice as long as broad, wall calcareous, imperforate, surface adorned with continuous, long costae throughout; chambers slightly biconcave, ovate in cross section; periphery carinate, sutures distinct, well depressed; aperture terminal, round on a long neck, bordered by a lip, with a small tooth.

Spiroloculina communis Cushman and Todd, 1944
Figure 21.7

1944 *Spiroloculina communis* Cushman and Todd, p. 63, pl. 9, figs. 4-5, 7-8.

1999 *Spiroloculina communis* Cushman and Todd; Nigam and Khare, p. 288, pl. 1, fig. 20.

2001 *Spiroloculina communis* Cushman and Todd; Szarek, p. 101, pl. 11, figs. 6-7.

2012 *Spiroloculina communis* Cushman and Todd; Debenay, p. 133.

2013 *Spiroloculina communis* Cushman and Todd; Elakkiya and Manivannan, p. 885, fig. 7.2-3.

2014 *Spiroloculina communis* Cushman and Todd; Gandhi and Nathan, p. 924, pl. 1, fig. 2a.

Description. Test robust, outline oval, wall porcelaneous, imperforate, surface smooth; chambers equally wide, slightly produced at both the ends; periphery convex and truncated, sutures thin, distinct and slightly depressed; aperture terminal, rounded on a small cylindrical neck, bordered by a lip, with two teeth placed opposite to each other.

Spiroloculina costifera Cushman, 1917
Figure 21.8

1917 *Spiroloculina costifera* Cushman, p. 34, pl. 6, figs. 1-3.

2014 *Spiroloculina costifera* Cushman; Babu et al., p. 79, pl. 1, fig. 6.

2014 *Spiroloculina costifera* Cushman; Gandhi and Nathan, p. 924, pl. 1, fig. 3a.

Description. Test large, subcircular, compressed laterally, wall porcelaneous, imperforate, surface smooth, final chambers ornamented with long costae; chambers arcuate, final chamber slightly detached from the earlier chambers; peripheral margin highly carinate, sutures distinct, slightly depressed; aperture terminal, rounded at the end of a carinate neck, bordered by a rim with a bifid tooth.

Spiroloculina depressa d'Orbigny, 1826
Figure 21.9

1826 *Spiroloculina depressa* d'Orbigny; p. 298, no.1.

2001 *Spiroloculina depressa* d'Orbigny; Szarek, p. 101, pl. 11, fig. 17.

2006 *Spiroloculina depressa* d'Orbigny; Oflaz, pp. 151-152, pl. 11, fig. 6.

Description. Test robust, wall porcelaneous, imperforate, surface smooth; chambers arcuate, gradually increasing in size as added, opposite sides of the chambers very concave; peripheral margin convex, sutures distinct and very much depressed; aperture terminal, circular, at the end of a thick neck, with a simple tooth, bordered by a lip.

Spiroloculina excavata d'Orbigny, 1846
Figure 21.10

1846 *Spiroloculina excavata* d'Orbigny, p. 271, pl. 16, figs. 19-21.

2002 *Spiroloculina excavata* d'Orbigny; Kaminski, Aksu, Box, Hiscott, Filipescu and Al-Salameen, p. 170, pl. 1, fig. 11.

2003 *Spiroloculina excavata* d'Orbigny; Murray, p. 17, fig. 4.13-14.

2005 *Spiroloculina excavata* d'Orbigny; Debenay, Millet and Angelidis, p. 334, pl. 2, fig. 14.

2012 *Spiroloculina excavata* d'Orbigny; Milker and Schmiedl, p. 50, fig. 13.3-4.

Description. Test subrounded, wall porcelaneous, imperforate, surface smooth; chambers strongly concave, spiroloculine chamber arrangement; peripheral margin truncate; aperture terminal, elliptical, bordered by a rim, with a short bifid tooth.

Spiroloculina eximia Cushman, 1922a
Figure 21.11

1922a *Spiroloculina eximia* Cushman, p. 61, pl. 11, fig. 2.

1999 *Spiroloculina indica* Cushman and Todd; Nigam and Khare, p. 288, pl. 1, fig. 23.

2012 *Spiroloculina eximia* Cushman; Debenay, p. 133.

Description. Test elongate, outline ellipsoidal, wall porcelaneous, surface smooth; opposite side of the chambers concave, extending towards both the ends; periphery convex, sutures distinct and depressed; aperture terminal, at the end of a cylindrical neck with a small bifid tooth.

Spiroloculina henbesti Petri, 1955
Figure 21.12

1955 *Spiroloculina henbesti* Petri, p. 82, figs. 4-6.

2002 *Spiroloculina henbesti* Petri; Gandhi, Rajamanickam and Nigam, p. 52, pl. 1, fig. 3.

Description. Test broad, subcircular, slightly compressed laterally, wall porcelaneous, imperforate, surface smooth; chambers wide, gradually increasing in size as added, final chambers inflated, coil-

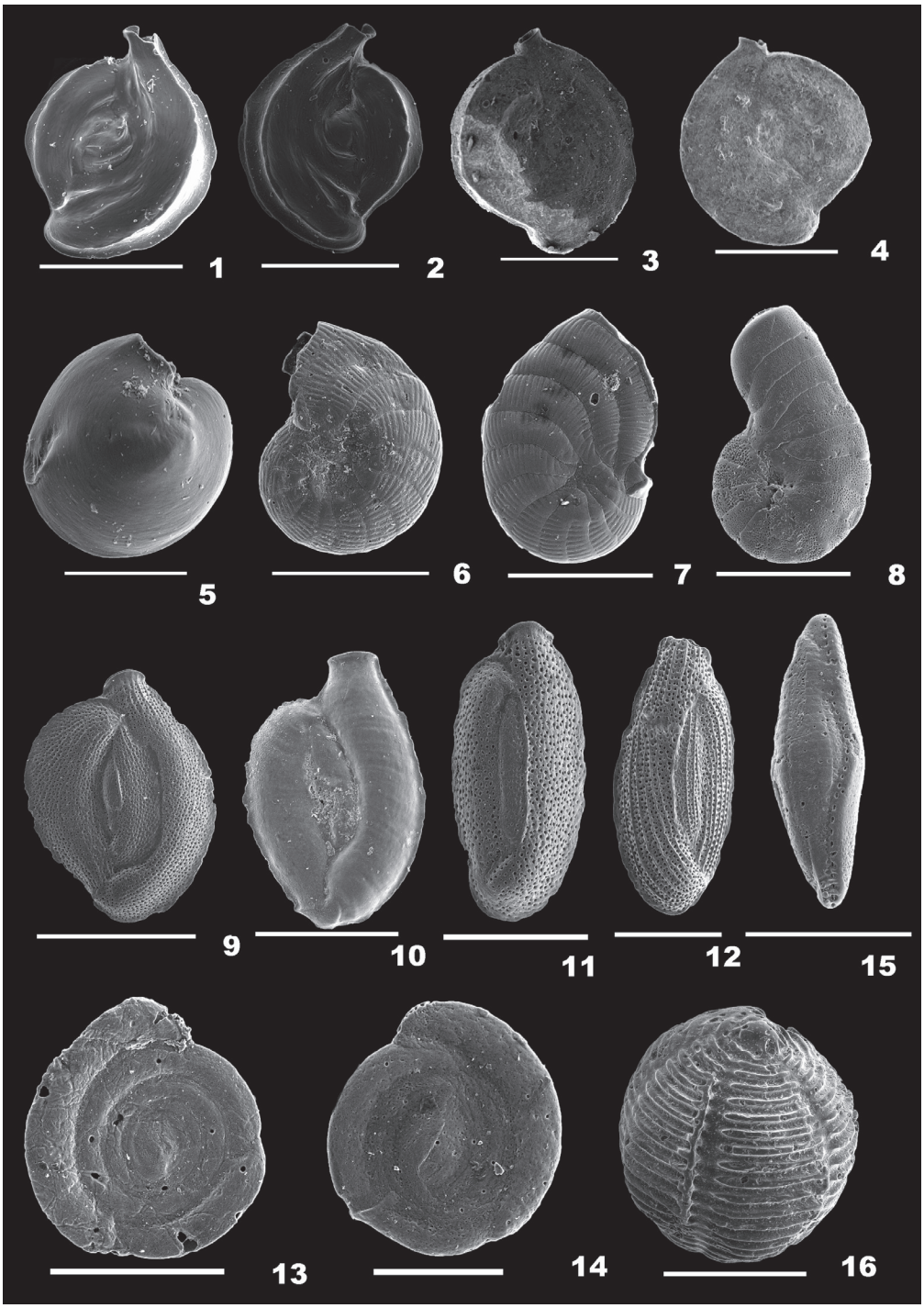

FIGURE 22. 1-2, *Spiroloculina parvula* Chapman, 1902 in dorsal view (scale equals 300 µm) (**1**); and in ventral view (scale equals 300 µm) (**2**). **3-4**, *Spiroloculina subimpressa* Parr, 1950 in dorsal view (scale equals 300 µm) (**3**) and in ventral view (scale equals 300 µm) (**4**). **5**, Miliolid sp. in dorsal view (scale equals 200 µm). **6**, *Peneroplis pertusus* (Forskål, 1775) in dorsal view (scale equals 500 µm). **7**, *Peneroplis planatus* (Fichtel and Moll, 1798) in dorsal view (scale equals 500 µm). **8**, *Monalysidium confusa* (McCulloch, 1977) in dorsal view (scale equals 500 µm). **9-10**, *Edentostomina cultrata* (Brady, 1881) in dorsal view (scale equals 1 mm) (**9**) and in ventral view (scale equals 500 µm) (**10**). **11-12**, *Edentostomina rupertiana* (Brady, 1881) in dorsal view (scale equals 500 µm) (**11**) and in dorsal view (scale equals 500 µm) (**12**). **13-14**, *Planispirinella exigua* (Brady, 1879b) in dorsal view (scale equals 500 µm) (**13**) and in ventral view (scale equals 200 µm) (**14**). **15**, *Alveolinella quoii* (d'Orbigny, 1826) in dorsal view (scale equals 500 µm). **16**, *Borelis melo* (Fichtel and Moll, 1798) in dorsal view (scale equals 300 µm).

ing evolute; periphery rounded, sutures very distinct and depressed; aperture terminal, subrounded, at the end of a very short neck, bordered by a rim, with a simple, bifid tooth.

Spiroloculina indica Cushman and Todd, 1944
Figure 21.13

1944 *Spiroloculina indica* Cushman and Todd, p. 71, pl. 9, fig. 32a-b.

1999 *Spiroloculina indica* Cushman and Todd; Nigam and Khare, p. 288, pl. 1, fig. 24.

2007 *Spiroloculina indica* Cushman and Todd; Talib and Farroqui, p. 18, pl. 1, fig. 6a-b.

Description. Test elongate, asymmetrical, slightly concavo-convex, surface ornamented by fine, longitudinal striations; chambers visible bilaterally, coiling evolute; sutures depressed; aperture round on a long neck, bordered by a rim, with a short bifid tooth.

Spiroloculina inflata Terquem, 1882
Figure 21.14

1882 *Spiroloculina inflata* Terquem, p. 193.

1987 *Spiroloculina* cf. *S. inflata* Terquem; Bhalla and Gaur, p. 123, pl. 1, fig. 5.

Description. Test robust, outline broadly oval, wall porcelaneous, imperforate, surface rough due to minute depressions; chambers inflated, final chambers broader, rapidly increasing in size as added; periphery broadly rounded, sutures distinct, depressed; aperture circular, at the end of a stout neck, bordered by a distinct rim, with a simple, bifid tooth.

Spiroloculina lucida Cushman and Todd, 1944
Figure 21.15

1944 *Spiroloculina lucida* Cushman and Todd, p. 70, pl. 9, figs. 30-31.

1961 *Spiroloculina lucida* Cushman and Todd; Huang, p. 85, pl. 2, fig. 31.

Description. Test broad, ovate, side view fusiform, wall porcelaneous, imperforate, surface smooth; chambers many, margins slightly convex, periphery broadly rounded, sutures distinct and depressed; aperture terminal, subcircular on a neck, bordered by a thick rim, with a simple bifid tooth.

Spiroloculina neocircularis McCulloch, 1977
Figure 21.16

1977 *Spiroloculina neocircularis* McCulloch, p. 544, pl. 228, fig. 14.

2012 *Spiroloculina* cf. *S. neocircularis* McCulloch; Debenay, p. 134.

Description. Test nearly circular, broader than long, wall calcareous, imperforate, surface ornamented with oblique ribs, more prominent on the final chambers and the neck; final chambers slightly inflated; periphery broadly rounded and carinate, sutures distinct, slightly depressed; aperture terminal, subrounded, with a simple tooth, bordered by a thin lip.

Spiroloculina nitida d'Orbigny, 1826
Figure 21.17

1826 *Spiroloculina nitida* d'Orbigny, p. 298.

2002 *Spiroloculina nitida* d'Orbigny; Gandhi, Rajamanickam and Nigam, p. 52, pl. 1, fig. 5.

2014 *Spiroloculina nitida* d'Orbigny; Gandhi and Nathan, p. 925, pl. 2, fig. 1a.

Description. Test ovate, side view fusiform, wall porcelaneous, imperforate, surface smooth; chambers gently concave on the inner side, periphery broadly rounded, sutures distinct and depressed; aperture terminal, circular on a neck, bordered by a thick rim, with a simple bifid tooth.

Spiroloculina orbis Cushman, 1921
Figure 21.18

1921 *Spiroloculina orbis* Cushman, p. 403, pl. 83, fig. 3.

2009 *Spiroloculina orbis* Cushman; Devi and Rajashekhar, p. 24, fig. 2j.

2013 *Spiroloculina orbis* Cushman; Elakkiya and Manivannan, p. 885, fig. 7.4-5.

2014 *Spiroloculina orbis* Cushman; Gandhi and Nathan, p. 924, pl. 1, fig. 4a.

Description. Test broadly ovate, planispiral, wall porcelaneous, imperforate, surface smooth; final chambers of uniform size overlapping the initial ones; periphery broadly rounded, peripheral margin carinate, sutures distinct, somewhat depressed, slightly arcuate; aperture terminal, round at the end of a carinate neck, bordered by a rim, with a small bifid tooth.

Spiroloculina parvula Chapman, 1902
Figure 22.1-2

1902 *Spiroloculina parvula* Chapman, pl. 36, fig. 5.

2014 *Spiroloculina parvula* Chapman; Panchang and Nigam, pl. 6, fig. 20a-b.

Description. Test large, outline ovate, wall porcelaneous, surface ornamented with prominent, long ribs; chambers slightly inflated; periphery highly carinate, sutures distinct; aperture terminal, round at the end of the neck, bordered weakly by a thin rim, with a small bifid tooth.

Spiroloculina sp.
Figure 21.19

Description. Test ovate, lateral view fusiform, wall porcelaneous, imperforate, surface smooth; chambers angular in cross section, slightly convex; peripheral margin truncate, sutures distinct and depressed; aperture terminal, round on a slightly produced neck, bordered by a distinct rim, with a bifid tooth.

Spiroloculina subimpressa Parr, 1950
Figure 22.3-4

1950 *Spiroloculina subimpressa* Parr, p. 291, pl. 6, figs. 12-13.

2012 *Spiroloculina subimpressa* Parr; Debenay, p. 135.

2013 *Spiroloculina subimpressa* Parr; Jones, p. 35, pl. 1, fig. 14.

2014 *Spiroloculina subimpressa* Parr; Panchang and Nigam, pl. 7, fig. 2a-b.

Description. Test broad, subrounded, wall porcelaneous, imperforate, surface smooth; chambers biloculine, coiling evolute; peripheral margin angular and truncated, sutures distinct; aperture terminal, round at the end of short neck, bordered by a lip, with a small bifid tooth.

Family MILIOLIDAE Ehrenberg, 1839
Miliolid sp.
Figure 22.5

2012 Miliolid sp., Milker and Schmiedl, p. 51, fig. 13.14-15.

Description. Test circular, lateral view rounded, strongly biconvex in the central portion, wall calcareous, imperforate, surface smooth with many fine striations; peripheral margin carinate, periphery rounded; aperture terminal, oval at the end of a neck, bordered by a rim, with a short, simple tooth.

Superfamily SORITOIDEA Ehrenberg, 1839
Family PENEROPLIDAE Schultze, 1854
Genus PENEROPLIS de Montfort, 1808
Peneroplis pertusus (Forskål, 1775)
Figure 22.6

1775 *Nautilus pertusus* Forskål and Niebuhr, p. 125, no. 65.

2006 *Peneroplis pertusus* (Forskål); Oflaz, p. 185, pl. 4, fig. 10; pl. 5, figs. 1-3; pl. 11, fig. 8.

2008 *Peneroplis pertusus* (Forskål); Yalçin, Meriç, Avşar, Tetiker, Barut, Yilmaz and Dinçer, p. 370, pl. 3, figs. 6-10.

2012 *Peneroplis pertusus* (Forskål); Debenay, p. 113.

2012 *Peneroplis pertusus* (Forskål); Milker and Schmiedl, p. 71, fig. 18.11-12.

2014 *Peneroplis pertusus* (Forskål); Panchang and Nigam, pl. 15, fig. 3a-b.

Description. Test flattened, umbilical area compressed, wall porcelaneous, surface ornamented with parallel costae perpendicular to the sutures; chambers many, initially planispirally arranged, later uniserially arranged, gradually increasing in size; periphery subrounded, sutures slightly depressed; aperture multiple, terminal, irregular slits in juveniles, a row of rectangular openings in adults.

Peneroplis planatus (Fichtel and Moll, 1798)
Figure 22.7

1798 *Nautilus planatus* Fichtel and Moll, p. 91, pl. 16, figs. a-c, i; p. 93, pl. 16, figs. d-f; p. 94, pl. 16, figs. g, h.

2006 *Peneroplis planatus* (Fichtel and Moll); Oflaz, p. 186, pl. 5, figs. 4-5, pl. 11, fig. 9.

2008 *Peneroplis planatus* (Fichtel and Moll); Yalçin, Meriç, Avşar, Tetiker, Barut, Yilmaz, and Dinçer, p. 370, pl. 3, figs. 11-16.

2012 *Peneroplis planatus* (Fichtel and Moll); Debenay, p. 114.

Description. Test flattened, wall calcareous, surface ornamented with numerous grooves placed at right angles to the sutures, umbilical region depressed, devoid of ornamentation; chambers distinct, coiling involute and planispiral chamber arrangement initially, final whorl spreading out later, rapidly increasing in size as added; sutures somewhat depressed; aperture a row of irregular, circular openings.

Genus MONALYSIDIUM Chapman, 1900
Monalysidium confusa (McCulloch, 1977)
Figure 22.8

1977 *Spirolina confusa* McCulloch, p. 231, pl. 100, fig. 9.

2012 *Monalysidium confusa* (McCulloch); Debenay, p. 111.

Description. Test robust, compressed, wall calcareous, surface ornamented with faint ribs, pitted in regular rows; chambers involute and planispirally arranged initially, later uncoiled, final chambers more inflated, periphery rounded, sutures radial, slightly arcuate initially, nearly horizontal later; aperture centred, areal, bordered by a lip, with teeth.

Superfamily NUBECULARIOIDEA T. R. Jones, 1854
Family OPHTHALMIDIIDAE Weisner, 1920
Genus EDENTOSTOMINA Collins, 1958
Edentostomina cultrata (Brady, 1881)
Figure 22.9-10

1881 *Miliolina cultrata* Brady, p. 45.

2006 *Edentostomina cultrata* (Brady); Oflaz, p. 144, pl. 2, fig. 3.

2012 *Edentostomina cultrata* (Brady); Debenay, p. 106.

Description. Test compressed, slender, outline ovate; chambers long and narrow, later chambers inflated, planispirally arranged, rapidly increasing in size, one-half coil in length; periphery highly carinate; aperture simple, terminal, oval at the end of a neck, rimmed by a reversed lip without a tooth.

Edentostomina rupertiana (Brady, 1881)
Figure 22.11-12

1881 *Miliolina rupertiana* Brady, p. 46.

1994 *Edentostomina rupertiana* (Brady); Jones, p. 23, pl. 7, figs. 7-12.

1994 *Rupertianella rupertiana* (Brady); Loeblich and Tappan, p. 60, pl. 106, figs. 1-14.

Description. Test elongate, compressed, wall calcareous, surface ornamented with long costae with rows of small circular openings in between; chambers visible, chamber arrangement triloculine; peripheral margin acute, sutures distinct, depressed; aperture terminal, ovate, bordered weakly by a very thin lip.

Family FISCHERINIDAE Millett, 1898
Subfamily FISCHERININAE Millett, 1898
Genus PLANISPIRINELLA Weisner, 1931
Planispirinella exigua (Brady, 1879b)
Figure 22.13-14

1879b *Hauerina exigua* Brady, p. 267.

2006 *Planispirinella exigua* (Brady); Oflaz, p. 141, pl. 1, figs. 10-11; pl. 11, fig. 3.

2012 *Planispirinella exigua* (Brady); Debenay, p. 114.

Description. Test disc-shaped, flattened, central part slightly convex, outline circular, surface smooth, slightly convex at the growth lines; chambers rapidly increasing in size as added, coiling evolute; periphery rounded, sutures depressed; aperture terminal, at the end of the tubular chamber, long, slit-like, cribate trematophore.

Superfamily ALVEOLINOIDEA Ehrenberg, 1839
Family ALVEOLINIDAE Ehrenberg, 1839
Genus ALVEOLINELLA H. Douvillé, 1907
Alveolinella quoii (d'Orbigny, 1826)
Figure 22.15

1826 *Alveolina quoii* d'Orbigny, p. 307, pl. 17, figs. 11-13.

2012 *Alveolinella quoii* (d'Orbigny); Debenay, p. 102.

Description. Test large, elongate, side view fusiform, wall calcareous, imperforate, surface adorned with numerous costae; chambers narrow, many in adults, planispirally arranged with gradual increase in size as added, thickening at both ends, coiling involute; apertural face with a series of openings placed in many rows.

Genus BORELIS de Montfort, 1808
Borelis melo (Fichtel and Moll, 1798)
Figure 22.16

1798 *Nautilus melo* Fichtel and Moll, p. 118.

2013 *Borelis melo* (Fichtel and Moll); Jones, p. 35, pl. 1, fig. 16.

Description. Test subrounded, side view spherical, wall calcareous, imperforate, surface ornamented with horizontal ribs, faint pustules in between low undulating ridges placed along the chamberlet sutures; chambers planispirally arranged, many chamberlets in adults, coiling involute; periphery rounded, sutures well depressed; aperture a series of subrounded to irregularly quadrangular openings placed in a row on the apertural face.

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