depth) off Tosa Bay. Judging from the environment of Population C in Kagoshima Bay, the above-mentioned assemblage off Tosa Bay is probably located at the boundary between the coastal water in Tosa Bay and the open-sea water of the Kuroshio Current.

(4) Population D (predominant species: *Bulimina marginata*)

Bulimina marginata is reported to occur in the coastal area and the continental shelf (about 50 to 150 m in depth) ranging from Hokkaido to Kyūshū. The occurrence of the present species in Kagoshima Bay suggests that the water in the Bay Mouth and Central Areas is strongly influenced by the open-sea water.

(5) Population E (predominant species: *Eggerella scabra*)

Eggerella scabra occurs from the southern part of Okhotsk Sea (KUWANO, 1953, 1954), off Niigata (UCHIO, 1962b), Toyama Bay (ISHIWADA, 1950) and Kamaé Bay, Ōita Prefecture (KAMEYAMA, 1984). However, in such high frequencies as in the present study (50%) in natural assemblage has never been reported. DANIELS (1970) studied the seasonal changes of living a population in Limski Canal, the northwesternmost part of Yugoslavia and reported that *Eggerella scabra* seasonally changed in frequency from 10 to 20% at Station 52 located at the innermost part of the bay. There is no distinct difference in water temperature (10-23°C), salinity (35.5-38.1‰) and pH value (8.0-8.5) between Limski Canal and Kagoshima Bay. Although there are no comment on the sea water movement, the elongate outline (11 km long and 1 km wide) of Limski Canal suggests that sea water exchange is poor similar to Kagoshima Bay. The high frequencies (around 50%) of *Eggerella scabra* seem to be realized under stagnant water conditions in conjunction with restricted sea water exchange.

Summary and Conclusion

For ecological analysis, I treated the living and dead specimens of foraminifera in the uppermost 1 cm of bottom sediment cores collected mainly in winter season. It is recognized, however, that the contents of living benthonic foraminifera in each sample is unexpectedly low (Tables 4 and 12) and judged to be insufficient for their population analysis. For the population analysis of living benthonic foraminifera, it is necessary to accumulate many more individuals of living specimens representing two to four seasons in a year. I will reserve this problem for future study.

The results of the present study are summarized in the following lines.

(1) The L/Tl value (ŌKI, 1986b) indicating the relative rate of sedimentation between two stations is useful as the criteria for the direction and strength of the bottom current if the grain size distribution in the area is taken into consideration. The ratio between the L/Tl and the L/T (PHLEGER, 1951) values indicates the approximate amount of dead tests transported from outside.

(2) In the Bay Mouth and the Central Areas, the ratios of planktonic foraminifera to the total foraminifera are directly related to water depth (Fig. 21 and 22). At the northern

part of the Central Area and the southwestern part of the Bay Head Area where the sea water exchange is restricted, the dead tests of planktonic foraminifera are rare in the bottom sediments. In the eastern half and the northwestern part of the Bay Head Area, the dead tests of planktonic foraminifera are entirely absent in the bottom sediments, probably due to the influence of the acidic water mass and partly to the restricted sea water exchange.

(3) As shown in the following table, the number of individuals of benthonic foraminifera is large in the open sea area and decrease toward the bay head. In the Bay Head Area, it is extremely small reflecting the influence of the acidic water in addition to the topographically restricted sea water exchange.

Open sea	: 767 - 13741*)
Bay Mouth Area	: 89 - 13791
Southern part of the Central Area	: 314 - 8873
Northern part of the Central Area	: 52 - 10104
Bay Head Area	: 5 - 585

(4) The number of species decreases toward the bay head and this tendency is the same as the case of the number of individuals (Table).

Open sea	: 58 - 60
Bay Mouth Area	: 49 - 72
Southern part of the Central Area	: 40 - 63
Northern part of the Central Area	: 21 - 56
Bay Head Area	: 11 - 49

(5) The frequency of the agglutinated foraminifera has a tendency to increase toward the bay head. In the open sea, the Bay Mouth and the Central Areas, it ranged from 2.2 to 14.4% and at the basin bottom except for Station 68 off Furusato Spa, it ranged from 10.4 to 34.5%. At Station 68, it reached up to 96.9%, probably under the influence of hot spring or acidic waters. In the Bay Head Area, it ranged from 7.6 to 48.8% in the southwestern part under the influence of water mass flowing in from the Central Area, and 40.9-100% in the eastern half and the northwestern part reflecting the influence of the acidic water mass.

(6) The frequency of the porcelaneous foraminifera reached up to 4.8-20.5% in the coarse-grained bottom sediments (Mdϕ: 0-3 ϕ) of the open sea area, the Bay Mouth

*) Number of individual (in 10cc)×L/Tl value

Area except for its deepest part, and in the shallow coastal area of the Central Area (including the West-Sakurajima Passage).

(7) Based on the frequency of each species, the total benthonic foraminiferal assemblage was divided into six groups and 13 subgroups through a cluster analysis.

(8) Based on the data of the oceanographic observation and the grain-size distribution of bottom sediments, five water masses different in quality were recognized to develop in Kagoshima Bay (Table 10, Fig. 34).

(9) Considering the bottom topography and the distribution pattern of foraminifera in addition to the five water masses, Kagoshima Bay was divided into seven marine environments (Table 10).

(10) In relation to the seven divisions of the marine environment, the foraminiferal assemblages in Kagoshima Bay were grouped into the following five populations:

(11) The populations predominated by *Bulimina marginata, Uvigerina vadescens* and *Globocassidulina oriangulata* (Population C) were found to occur in the vicinities of the boundary between two different water masses (Tables 9 and 10). It is probable that the

Population	Predominant Species	Distribution	Environmental Factors
A	*Cibicidoides pseudoungerianus* *Globocassidulina oriangulata* *Paracassidulina quasicarinata* *Florilus pauperatus* *Discorbis mira*	The open sea area and the eastern half of the Bay Mouth Area.	Strongly influenced by the open-sea water.
B	*Cymbaloporetta hemisphaerica* *Buliminella elegantissima* *Bolivina ordinaria* *Protelphidium schmitti* *Pseudononion japonicum*	Shallow coastal water along the coast of the Satsuma Peninsula ranging from the Central to the Bay Mouth Areas.	Showing rather low salinity reflecting the influence of river waters flowing into the northern part of the area.
C	*Uviqerina vadescens* *Bulimina marginata* *Globocassidulina oriangulata*	The deepest part of the Bay Mouth Area and the marginal part of the flat submarine terrace shallower than 100m developed off the coast between Kagoshima City and Kiiré-chō, western part of the Central Area.	Boundary area between the two water masses differnt in salinity from each other.
D	*Bulimina marginata*	The basin bottom at the central part of the Central Area.	Relatively stagnant water mass weakly mixed with the open-sea water.
E	*Eggerella scabra*	The Bay Head Area.	The water mass being stagnant throughout the year except for the coldest season and strongly restricted in exchange with the open-sea water.

occurrence of *U. vadescens* and *G. oriangulata* limited to the boundary areas between two different water masses signify their adaptation to the lowering of dissolved oxygen near the bottom of the boundary area between the water masses resulting from the consumption of oxygen through the decomposition of organic remains accumulated in this area.
(12) Abundancy of *Bulimina marginata* in the coastal water and on the continental shelf ranging from Hokkaido to Kyūshū indicates that Kagoshima Bay is influenced by the open-sea water.
(13) Although the reports on the occurrences of *Eggerella scabra* are very few, it is expected that the species inhabits the embayments and the coastal waters with poor sea water exchange in other areas of the Japanese Islands.
(14) In 1962, KUWANO reported some occurrences of benthonic foraminifera with calcareous test from the eastern half of the Bay Head Area while at present the area is barren of them. This suggests that the development of the acidic water in this area has progressed since the time of KUWANO's study (1962-1963), in other words, the submarine fumarolic activity has been increasing. At the stations close to the fumaroles, high frequencies of *Textularia kattegatensis kagoshimaensis, Ammodiscus minimus* and *Glomospira gordialis* were found.

As pointed out by MATOBA (1970), there has been some difficulty in comparing the assemblages of foraminifera in the surface layer of the bottom sediments of different areas studied by different authors. This stems from the different methods of sampling and treating samples. To avoid this difficulty in the study of foraminifera, the following methods applied by MATOBA in a series of his studies (1970, 1972 and 1976a-c) are most recommendable for the qualitative and quantitative analyses of foraminiferal assemblages.

a) The uppermost 1 cm (ca. 10cc) of the sample collected by core sampler should be used for study.

b) The sample for study should be preserved with neutralized formalin to prevent the pH value from decreasing to less than 7.0.

c) To discriminate the living specimens, the uppermost 1 cm of the sample should be dyed with Rose Bengal. The succeeding 5 cm samples should be checked as well.

d) For cleaning specimens, a 200 mesh screen should be used.

In conclusion, I would like to mention that population analyses of benthonic foraminiferal assemblages should be performed in consideration with the environmental factors such as the physico-chemical properties of the bottom sediments and the oceanographic data on the quality and structure of the sea water masses.

The accumulated information on ecology and taphonomy of the Recent benthonic foraminifera will serve as a valuable base for paleoecological studies on fossil foraminifera.

Systematic Description

Order FORAMINIFERIDA EICHWALD, 1830

Suborder TEXTULARIINA DELAGE and HÉROUARD, 1896

Superfamily AMMODISCACEA REUSS, 1862

Family SACCAMMINIDAE BRADY, 1884

Subfamily PSAMMOSPHAERINAE HAECKEL, 1894

Genus *Psammosphaera* SCHULZE, 1975

Psammosphaera fusca SCHULZE

Psammosphaera fusca SCHULZE, 1875, Comm. Wiss. Unter-suchung Deutsch. Meer in Kiel, Jahresber., Jahrg. 2-3, p. 113, pl. 2, figs. 8a-f; CUSHMAN, 1910, p. 35, figs. 25-28; CUSHMAN, 1918, p. 35, pl. 13, figs. 1-6, pl. 14, figs. 1-3; HADA, 1931, p. 51, text-fig. 2; BARKER, 1960, no. 9, p. 36, pl. 18, fig. 1; COLE, 1981, p. 12, pl. 3, fig. 4; MAIYA and INOUÉ, 1982, no. 16, p. 13, pl. 1, fig. 11.

Occurrence and Repository: Bay Head Area (Stn. 12, 22, 35, 37, 51, 53, 54: 94-144 m in depth); Central Area (Stn. 66, 69, 71, 80, 85: 88-225 m); Bay Mouth Area (Stn. 108, 118, 143: 96-120 m); ESK*) Reg. no. F-7001 - 7015.

*Geographic Distribution***): Off the west coast of Hokkaido and the northeast coast of Honshū; 5)***); 6) 610-1350 m; 18) 27.5-36.6 m; 28) 14 m.

Remarks: At the three stations (Stn. 35, 37 and 51) surrounding the An-éi rise, rather high (3-6%) frequencies were found. This species has never been reported from the Kuroshio area and seems to be widely distributed in the cold water around Japan. Outside of Japanese waters, however, HERON-ALLEN and EARLAND (1915) reported this species from the warm and shallow water of the Kerimba Archipelago.

Subfamily SACCAMMININAE BRADY, 1884

Genus *Saccammina* M. SARS in CARPENTER, 1869

Saccammina atlantica (CUSHMAN)

Pl. 1, figs. 1a-b

Proteonina atlantica CUSHMAN, 1944, Cushman Lab. Foram. Res., Spec. Publ., no. 12, p. 5, pl. 1, fig. 4; BANDY, 1953, v. 27, p. 29, pl. 21, figs. 5a-b.

Saccammina atlantica (CUSHMAN). MURRAY, 1973, p. 53, 129, 131, pl. 6, figs. 4-6; COLE, 1981, p. 13, pl. 3, fig. 2.

Occurrence and Repository: Bay Head Area (Stn. 12, 35, 37, 41, 51, 53, 58, 65: 39-182 m; living 182 m); Central Area (Stn. 73, 82, 94: 80-150 m); Bay Mouth Area (Stn. 110, 141: 60-110 m); ESK Reg. no. F-7016 - 7028; hypotype in fig. 1a, ESK Reg. no. F-7029 from Stn. 37 and in fig. 1b, ESK Reg. no. F-7027 from Stn. 110.

Remarks: Only a single, oval- or pyriform-chambered specimen without a distinct neck is in the collection. The size of clastic material is variable, but rather fine-grained

---

*) Abbreviation for the Institute of Earth Sciences, Faculty of Science, Kagoshima University.

**) The geographic distribution described here is restricted to the area around the Japanese Islands.

***) The number of the distribution areas is listed in Appendix I together with the references.

as a whole, and the surface of the test is smooth. This is the first record of the present species in the Japanese waters. In Kagoshima Bay, this species occurs in near shore areas irrespective of water depth.

Genus *Lagenammina* RHUMBLER, 1911

Lagenammina difflugiformis arenulata (SKINNER)

Reophax difflugiformis BRADY subsp. *arenulata* SKINNER, 1961, Jour. Pal., Tulsa, Okla., v. 35, no. 6, p. 1239.

Occurrence and Repository: Bay Head Area (Stn. 32, 37, 42, 61, 63: 124-170 m; living 124 m); Central Area (Stn. 67, 69, 91: 150-207 m); Bay Mouth Area (Stn. 113: 100 m); ESK Reg. no. F-7030 - 7038.

Remarks: The specimen in the collection has a single chamber and is identified with *Reophax difflugiformis arenulata* SKINNER being a single-chambered form (SKINNER, 1961). However, this subspecies, having a single chamber, should be allocated to the genus *Lagenammina*, not to the multiple-chambered genus *Reophax*. This is the first record of the present species in Japanese waters.

Lagenammina kagoshimaensis ŌKI, n. sp.

Pl. 1, figs. 2a-c

Test free, consisting of a single, oval- or pyriform- chamber with a distinct tubular neck made of very fine materials; chamber undivided; wall composed of closely cemented volcanic glasses of variable sizes; aperture simple, terminal.

Types and Dimensions: Holotype in fig. 2a, ESK Reg. no. F-7039 from Stn. 12, length 0.37 mm, breadth 0.23 mm; paratype in fig. 2b, ESK Reg. no. F-7040 from Stn. 12, length 0.37, breadth 0.28 mm; paratype in fig. 2c, ESK Reg. no. F-7041 from Stn. 113, length 0.25, breadth 0.16 mm.

Occurrence and Repository: Bay Head Area (Stn. 1, 3, 12, 17, 18, 21, 22, 32, 34, 35, 37, 42, 44, 45, 51, 53: 94-185 m; living 122-140 m); West-Sakurajima Passage (Stn. 63, 64, 65: 39-138 m; living 39-138 m); Central Area (Stn. 66, 72, 73, 75, 76, 78, 80, 81, 82, 85, 86, 87, 88, 89, 90, 91, 92, 93, 95, 96, 97, 99, 100, 101, 102, 103: 40-225 m; living 42-225 m); Bay Mouth Area (Stn. 107, 113, 118, 132: 96-101 m; living 100 m); open sea area (Stn. 144: 105 m; living); ESK Reg. no. F-7042 - 7092.

Remarks: All the specimens abundantly collected from Kagoshima Bay are single chambered. KUWANO (1962) reported *Reophax difflugiformis* BRADY from Kagoshima Bay. Judging from the figures in his paper, his specimens are also single-chambered and are hardly identified as the genus *Reophax*. The general features of KUWANO's specimens suggest the identity with the present new species. The specimen closely allied to the present new species has been reported by HADA (1931) from Mutsu Bay in Aomori Prefecture, Northeast Japan under the name of *Proteonina difflugiformis* (BRADY). It was described as single chambered, and therefore, the generic position must not be *Proteonina*, but *Lagenammina*. The specimens from Mutsu Bay are generally smaller than those from Kagoshima Bay and have tests composed of mica flakes and sand grains smoothly cemented. A detailed comparison between the Mutsu Bay and the Kagoshima

Bay specimens is necessary in the future.

Lagenammina lagenaria (BERTHELIN)

Haplophragmium lagenarium BERTHELIN, 1880, Mem. Soc. Geol. France, ser. 3, v. 1, no. 5, p. 21, pl. 4, figs. 2a-b.

Proteonina lagenaria (BERTHELIN). PHLEGER, 1954, p. 643, pl. 2, fig. 33; ISHIWADA, 1958, p. 9, pl. 1, fig. 4.

Occurrence and Repository: Bay Mouth Area (Stn. 116: 61 m; living); ESK Reg. no. F-7093.

Geographic Distribution: Ishikari Bay and Lake Hamanako; 5); 50) 1-7 m.

Genus *Pelosina* BRADY, 1879

Pelosina fusiformis (WILLIAMSON)

Pl. 1, fig. 3

Proteonina fusiformis WILLIAMSON, 1858, Recent Foraminifera of Great Britain, p. 1, pl. 1, fig. 1.

Proteonina fusiformis WILLIAMSON. BRADY, 1884, p. 289, pl. 30, fig. 11.

Reophax fusiformis (WILLIAMSON). BARKER, 1960, p. 62, pl. 30, fig. 11.

Occurrence and Repository: Central Bay (Stn. 75, 89, 97, 104: 38-170 m; living 93-95 m); ESK Reg. no. F-7094 - 7097; hypotype in fig. 3, ESK Reg. no. F-7097 from Stn. 104.

Remarks: Under the name of *Proteonina fusiformis* BRADY (1884) reported specimens having a wall composed of coarse sand from the North Atlantic and specimens having a wall composed of tiny shell fragments from the Philippine Islands. CUSHMAN (1918) also reported specimens having a wall composed of coarse sand from the Atlantic as *P. fusiformis*. The specimens collected from Kagoshima Bay have tests composed of only tiny shell fragments and closely resemble the specimens reported by BRADY from the Philippines. It seems that the two types of test material imply geographic variation or speciation between the Atlantic and the Pacific areas. This is the first record of the present species in Japanese waters.

Subfamily HEMISPHAERAMMININAE LOEBLICH and TAPPAN, 1961

Genus *Hemisphaerammina* LOEBLICH and TAPPAN, 1957

Hemisphaerammina bradyi LOEBLICH and TAPPAN

Webbinella hemisphaerica JONES, PARKER and BRADY. BRADY, 1884, Voy. Challenger, Rep., Zool., v. 9, p. 350, pl. 41, fig. 11.

Hemisphaerammina bradyi LOEBLICH and TAPPAN, 1957, U.S. Nat. Mus., Bull., no. 215, p. 224, pl. 72, figs. 2a-b; BARKER, 1960, p. 84, pl. 41, fig. 11.

Occurrence and Repository: Bay Head Area (Stn. 61, 65: 39- 138 m); Central Area (Stn. 88, 89: 78-95 m): ESK Reg. no. F-7098 - 7101.

Remarks: LOEBLICH and TAPPAN (1957) regarded the genus *Webbinella* RHUMBLER, 1904 as an attached calcareous polymorphinid. They proposed the genus *Hemisphaerammina* for agglutinated forms such as the specimen figured by BRADY, and referred to them as *H. bradyi*. The specimens in the collection are less than 0.1 mm in size and far smaller than the holotype (LOEBLICH and TAPPAN, 1957) and the specimen reported by BRADY. This is the first record of the present species in Japanese waters.

Family AMMODISCIDAE REUSS, 1862

Subfamily AMMODISCINAE REUSS, 1862

Genus *Ammodiscus* REUSS, 1862

Ammodiscus incertus (D'ORBIGNY)

Pl. 1, fig. 4

Operculina incerta D'ORBIGNY, 1839, *in* DE LA SAGRA, Hist. Fis. Pol. Nat. Cuba, "Foraminiferes", p. 49, pl. 6, figs. 16-17.

Ammodiscus incertus (D'ORBIGNY). CUSHMAN, 1918, p. 95, pl. 39, fig. 1-8; CUSHMAN, 1921, p. 62, pl. 5, figs. 1-2; CHIJI and KONDA, 1970, pl. 1, fig. 9.

Ammodiscus arenaceus (WILLIAMSON). TODD and LOW, 1967, p. A14, pl. 2, fig. 12.

Occurrence and Repository: Bay Head Area (Stn. 37, 53: 94- 124 m); Central Area (Stn. 78: 40 m; living); ESK Reg. no. F-7102 - 7104; hypotype in fig. 4, ESK Reg. no. F-7105 from Stn. 78.

Geographic Distribution: Off the north coast of Hokkaido and Toyama Bay; 1) 165-850 m; 6) 265-2285 m; 42) 142 m.

Remarks: This species has been reported from the sea around Hokkaido (KUWANO, 1953-1954; CHIJI and KONDA, 1970) and from Toyama Bay (ISHIWADA, 1950). This is the second record of the present species in the warm water area came after Toyama Bay.

Ammodiscus minimus HÖGLUND

Pl. 1, fig. 5

Ammodiscus minimus HÖGLUND, 1947, Uppsala, Univ., Zoolgiska Bidrag, v. 26, p. 124, pl. 8, figs. 5a-b, 10; p. 110, tfs. 90a-b.

Occurrence and Repository: Bay Head Area (Stn. 21, 40, 41, 42, 63: 138-228 m; living 228 m); Central Area (Stn. 68, 75, 82, 86, 88: 78-165 m; living 162-165 m); Bay Mouth Area (Stn. 113, 141: 60-100 m); ESK Reg. no. F-7106 - 7117; hypotype in fig. 5, ESK Reg. no. F-7118 from Stn. 42.

Remarks: This species is characterized by small greyish white coloured agglutinated tests. This is the first record of the present species in Japanese waters.

Genus *Glomospira* RZEHAK, 1885

Glomospira gordialis (JONES and PARKER)

Pl. 1, figs. 6a, b

Trochammina squamata JONES and PARKER var. *gordialis* JONES and PARKER, 1860, Geol. Soc. London, Quart. Jour., v. 16, p. 304.

Gordiammina gordialis (JONES and PARKER). CUSHMAN, 1910, p. 76, text-figs. 98-100.

Glomospira gordialis (JONES and PARKER). CUSHMAN, 1918, p. 99, pl. 36, figs. 7-9; HADA, 1931, p. 62, text-fig. 14; KUWANO, 1962, pl. 18, figs. 3-4.

Occurrence and Repository: Bay Head Area (Stn. 12, 21, 32, 35, 40, 41, 42, 44, 45, 53, 54: 94-228 m; living 125-228 m); Central Area (Stn. 68, 81, 85: 162-220 m; living 162-220 m); Bay Mouth Area (Stn. 144: 105 m; living); ESK Reg. no. F-7119 - 7133; hypotype in fig. 6a, ESK Reg. no. F-7134 from Stn. 42; hypotype in fig. 6b, ESK Reg. no. F-7135 from Stn. 42.

Geographic Distribution: Off the coast of North Honshū, and Tōkyō and Tanabe Bays; 18) 33 m; 23) 150-875 m, living 150-570 m); 24) 10-150 m, living 30-150 m; 27) 10-45 m; 31); 37) 52 m; 59) 2.9-8.6 m.

Subfamily TOLYPAMMININAE CUSHMAN, 1928

Genus *Ammolagena* EIMER and FICKERT, 1899

Ammolagena clavata (JONES and PARKER)

Trochammina clavata JONES and PARKER, 1860, Geol. Soc. London, Quart. Jour., v. 16, p. 304. pl. 2, figs. 5-6.
Ammolagena clavata (PARKER and JONES). BARKER, 1960, p. 84, pl. 41, figs. 12-16.
Ammolagena clavata (JONES and PARKER). BROOKS, 1973, p. 395, pl. 9, fig. 1; LEROY and HODGKINSON, 1975, p. 432, pl. 2, fig. 6; MAIYA and INOUÉ, 1982, p. 12, pl. 4, fig. 9.

Occurrence and Repository: open sea area (Stn. 144, 145: 105-155 m; living 105-155 m); ESK Reg. no. F-7136 - 7137.

Remarks: This is the first record of the present species in Japanese waters.

Superfamily LITUOLACEA DE BLAINVILLE, 1825

Family HORMOSINIDAE HAECKEL, 1894

Subfamily HORMOSININAE HAECKEL, 1894

Genus *Reophax* MONTFORT, 1808

Reophax catella HÖGLUND

Reophax catella HÖGLUND, 1947, Uppsala, Univ., Zool. Bidrag, Bd. 26, p. 97-98, tfs. 77-78.

Occurrence and Repository: Bay Head Area (Stn. 21, 42: 170-185 m; living 185 m); Central Area (Stn. 77, 79: 100-196 m; living 100 m); ESK Reg. no. F-7138 - 7141.

Remarks: This is the first record of the present species in Japanese waters.

Reophax catenata HÖGLUND

Reophax catenata HÖGLUND, 1947, Uppsala, Univ., Zool. Bidrag, Bd. 26, p. 99, p. 98, tfs. 75-76; Cole, 1981, p. 23, pl. 2, fig. 18.

Occurrence and Repository: Bay Head Area (Stn. 58: 142 m); ESK Reg. no. F-7142.

Remarks: This is the first record of the present species in Japanese waters.

Reophax gracilis (KIAER)

Pl. 1, fig. 7

Nodulina gracilis KIAER, 1900, Norweigan Fish. Mar. Invest., Rep., v. 1, no. 7, p. 24, text-figs. 1-2.
Reophax gracilis (KIAER). MATOBA, 1970, p. 60, pl. 1, fig. 2.

Occurrence and Repository: Bay Head Area (Stn. 21, 41, 42, 63: 138-185 m; living 185 m); Central Area (Stn. 68, 73, 86, 103, 105: 80-175 m); ESK Reg. no. F-7143 - 7151; hypotype in fig. 7, ESK Reg. no. F-7147 from Stn. 68.

Geographic Distribution: Off the coast of North Honshū, Ishikari Bay, Lake Hamanako, Tanabe Bay, and the Seto Inland Sea; 5); 23) 150-875 m, living 150 m; 24) 48-69 m, living 69 m; 28) 25-37 m; 29) 3.2 m; 41) 27-65 m; 50); 54) living 23 m; 56) 7-9 m; 64) 22-39 m, living 32 m.

Remarks: HADA (1931) reported *Reophax gracilis* (KIAER) from Mutsu Bay, but it should be identified as *R. scottii* judging from the original description mentioning that *R. gracilis* differs from *R. scottii* (CHASTER) in having cone-shaped chambers.

Reophax guttifer BRADY

Lituola guttifera BRADY, 1881, Quart. Jour. Micr. Sci., n.s., v. 21, p. 49.
Reophax guttifer BRADY, 1884, Voy. Challenger, Rep., Zool., v. 9, p. 295, pl. 31, figs. 5, 10-12; BARKER, 1960, p. 64, pl. 31, figs. 10-12.

Occurrence and Repository: Central Area (Stn. 79, 98: 100- 145 m; living 100 m);

ESK Reg. no. F-7152 - 7153.

Geographic Distribution: Off the northwest coast of North Honshū; 23) 48-875 m, living 150 m; 24) 100-202 m, living 120-150 m.

Reophax nana RHUMBLER

Pl. 1, fig. 8

Reophax nana RHUMBLER, 1911, Ergeb. Plankton-Exped. Humboldt-Stiftung, v. 3, pt. 1 (1909), pl. 18, figs. 6-12; MATOBA, 1970, p. 60, pl. 1, fig. 1.

Occurrence and Repository: Bay Head Area (Stn. 17, 37, 41, 42, 44, 45, 51, 54, 58, 61, 63: 124-182 m; living 138-146 m); Central Area (Stn. 66, 68, 69, 72, 76, 77, 82, 83, 85, 93, 96, 97, 101, 103, 104: 36-220 m; living 36-130 m); ESK Reg. no. F-7154 - 7179; hypotype in fig. 8, ESK Reg. no. F-7180 from Stn. 63.

Geographic Distribution: Matsushima Bay and Lake Hamanako; 29) 2.5-2.7 m; 50).

Remarks: The stations showing high frequency (4-6%) of the present species were distributed in the northeastern and the southwestern parts of the Bay Head Area.

Reophax scorpiurus MONTFORT

Pl. 1, fig. 9

Reophax scorpiurus MONTFORT, 1808, Conch. Syst., tome 1, p. 331, p. 130, tf; HADA, 1931, p. 55-56, text-fig. 6; CHIJI and KONDA, 1970, p. 49, pl. 7, fig. 2; MURRAY, 1971, p. 19, pl. 2, figs. 5-8; NOMURA, 1983, p. 226, pl. 1, fig. 2.

Occurrence and Repository: Bay Head Area (Stn. 17, 32, 35, 37: 124-156 m); Central Area (Stn. 68, 76, 82, 97, 101: 119-220 m; living 150 m); Bay Mouth Area (Stn. 124, 125, 143, 144: 20-140 m; living 96-140 m); ESK Reg. no. F-7181 - 7193; hypotype in fig. 9, ESK Reg. no. F-7185 from Stn. 68.

Geographic Distribution: Off the coast of Hokkaido, the northwest coast of North Honshū and the Pacific coast from Central Honshū to Kyūshū, and the Seto Inland Sea; 1) 168, 850 m; 5); 6) 1230 -1540 m; 11) 56 m with living specimens; 13) 84-430 m; living 430 m; 17) 985 m; 18) 7.3-60.4 m; 23) 40-150 m, living 48-73 m; 24) 94-200 m, living 94-98 m; 41) 33-63 m; 42) 142, 1203 m; 48) 40-597 m with living specimens; 51) 43-422 m with living specimens; 52) 31-585 m with living specimens; 60) 50-97.5 m; 61) 59 m; 62) 96 m with living specimens; 64) 60 m; 70) 808 m with living specimens; 77) 122 m with living specimens.

Reophax scottii CHASTER

Pl. 1, fig. 10

Reophax scottii CHASTER, 1892, Southport Soc. Nat. Sci. Rept., 1st Rept. (1890-1891), Append,. p. 57, pl. 1, fig. 1; MURRAY, 1971, p. 17, pl. 1, figs. 6-9; SEIBOLD, 1975, p. 177, pl. 2, figs. 1a-b; COLE, 1981, p. 26, pl. 2, fig. 17.

Reophax gracilis (KIAER). HADA, 1931, p. 61, text-fig. 13.

Occurrence and Repository: Bay Head Area (Stn. 1, 41, 42: 102-182 m; living 182 m); northern part of the Central Area (Stn. 70, 74: 23-28 m); southern part of the Central Area (Stn. 90, 91: 207-215 m); ESK Reg. no. F-7194 - 7200; hypotype in fig. 10, ESK Reg. no. F-7195 from Stn. 41.

Geographic Distribution: Mutsu and Tanabe Bays; 18) 33 m; 59) 2.9-8.6 m.

Remarks: In the southern part of the Central Area and the Bay Head Area, this

species is distributed on rather deep bottom, while in the northern part of the Central Area it is in the coastal shallow area influenced by drainage from the Kagoshima City area.

Reophax sp.

Occurrence and Repository: Central Area (Stn. 67, 68, 87: 162-182 m; living 162 m); ESK Reg. no. F-7201 - 7203.

Remarks: The present species is characterized by large-sized tests (length up to 1 mm) composed of coarse materials, but the number of specimens at hand is insufficient for specific identification.

Family NOURIIDAE CHAPMAN and PARR, 1936

Genus *Nouria* HERON-ALLEN and EARLAND, 1914

Nouria tenuis HADA

Nouria tenuis HADA, 1931, Tohoku Imp. Univ., Sci. Rep., 4th ser. (Biol.), v. 6, no. 1, p. 94-95, text-figs. 47a-b.

Occurrence and Repository: Bay Head Area (Stn. 3, 12, 17, 34, 37, 45, 51, 58, 63: 122-149 m; living 122 m); Central Area (Stn. 67, 68, 72, 81: 162-220 m; living 162 m); ESK Reg. no. F- 7204 - 7216.

Geographic Distribution: Off the northwest coast of North Honshū and Tokyo Bay; 18); 24) 120-150 m, living 120-135 m; 37) 18-70 m.

Remarks: The distribution of the present species is restricted to the Bay Head Area and the northeastern part of the Central Area which is less influenced by the open sea water.

Nouria textulariformis HADA

Pl. 1, fig. 11

Nouria textulariformis HADA, 1931, Tohoku Imp. Univ., Sci. Rep., 4th ser. (Biol.), v. 6, no. 1, p. 93-94, text-figs. 46a-b.

Occurrence and Repository: Bay Head Area (Stn. 15, 35, 37, 61: 124-152 m; living 140-152 m); Central Area (Stn. 85, 90, 92, 97: 170-220 m; living 170-220 m); ESK Reg. no. F-7217 - 7224; hypotype in fig. 11, ESK Reg. no. F-7220 from Stn. 61.

Geographic Distribution: Off the northwest coast of North Honshū; 18) 31.1-45.8 m; 24) 50 m with living specimens; 41) 33-50 m.

Nouria? sp.

Pl. 1, figs. 12a-b

Occurrence and Repository: Central Area (Stn. 91, 96, 103, 104: 38-207 m; living 207 m); Bay Mouth Area (Stn. 122, 125: 100- 140 m); ESK Reg. no. F-7225 - 7230; hypotype in fig. 12a, ESK Reg. no. F-7231 from Stn. 96; hypotype in fig. 12b, ESK Reg. no. F-7232 from Stn. 96.

Remarks: The specimens at hand have tests composed of coarse clastic materials with indistinct sutures. For definite identification, it is necessary to examine their internal structure.

Family RZEHAKINIDAE CUSHMAN, 1933

Genus *Spirosigmoilinella* MATSUNAGA, 1955

Spirosigmoilinella sp.

Pl. 1, figs. 13a-c

Occurrence and Repository: West-Sakurajima Passage (Stn. 64: 66 m); Central Area (Stn. 71, 72, 73, 74, 75, 79, 80, 84, 85, 86, 87, 91, 92, 96, 105: 28-225 m; living 165-225 m); Bay Mouth Area (Stn. 108, 110, 113, 118, 125, 132, 134, 136, 137, 139, 141, 143: 60-140 m; living 96 m); ESK Reg. no. F-7233 - 7260; hypotype in fig. 13a, ESK Reg. no. F-7261 from Stn. 143; hypotype in fig. 13b, ESK Reg. no. F-7262 from Stn. 139; hypotype in fig. 13c, ESK Reg. no. F-7263 from Stn. 139.

Remarks: The specimens in the collection are characterized by small agglutinated tests, and rounded, toothless apertures on the short neck. They closely resemble one of the specimens described by BRADY (1884; Plate 8, fig. 14) under the name of *Spiroloculina asperula* KARRER. However, BRADY's figure of this specimen indicates a rounded, toothless aperture on the short neck. This suggests that the generic position of this specimen should be refered to not as *Spiroloculina* but as *Spirosigmoilinella*.

Family LITUOLIDAE DE BLAINVILLE, 1825

Subfamily HAPLOPHRAGMOIDINAE MAYNC, 1952

Genus *Haplophragmoides* CUSHMAN, 1910

Haplophragmoides bradyi (ROBERTSON)

Trochammina bradyi ROBERTSON, 1891, Ann. Mag. Nat. Hist., ser. 6, v. 7, p. 388; CUSHMAN, 1920, p. 76-77, pl. 15, fig.5.

Haplophragmoides bradyi (ROBERTSON). KUWANO, 1962, p. 129, pl. 18, figs. 9a-b, 10a-b, 11; ISHIWADA, 1964, p. 34, pl. 1, fig. 1; MURRAY, 1971, p. 25, pl. 5, figs. 1-2.

Occurrence and Repository: West-Sakurajima Passage (Stn. 63: 138 m; living); Central Area (Stn. 67, 68, 81, 91, 97: 162-220 m; living 207 m); Bay Mouth Area (Stn. 134, 139, 143: 96-112 m; living 96-105 m); ESK Reg. no. F-7264 - 7272.

Geographic Distribution: Off the coast of Hokkaido and the northeast coast of North Honshū; 5); 11) 320-660 m with living specimens; 12) 56-80 m; 13) 84-640 m with living specimens; 14) living 505 m; 15) living 510 m; 17) 100 m.

Remarks: This species is characterized by 5.5 or 6 inflated chambers forming the last whorl, and by a finely arenaceous, smooth and polished wall of brownish yellow.

Genus *Cribrostomoides* CUSHMAN, 1910

Cribrostomoides jeffreysii (WILLIAMSON)

Pl. 1, figs. 14a-b

Nonionina jeffreysii WILLIAMSON, 1858, Foram. Gr. Brit., Ray Soc., p. 34, pl. 3, figs. 72-73.

Cribrostomoides jeffreysii (WILLIAMSON). MURRAY, 1973, p. 23, pl. 4, figs. 1-5; BOLTOVSKOY, GIUSSANI, WATANABE and WRIGHT, 1980, p. 25, pl. 10, figs. 4-7; FINGER and LIPPS, 1981, p. 129, pl. 1, figs. 15a-b.

Occurrence and Repository: Bay Head Area (Stn. 12, 35, 37, 41, 42, 45, 51, 53, 58, 63, 65: 39-182 m; living 39-140 m); Central Area (Stn. 66, 73, 77: 80-196 m; living 130 m); Bay Mouth Area (Stn. 124, 137, 139: 20-106 m; living 20-106 m); open sea area (Stn. 144: 105 m; living): ESK Reg. no. F-7273 - 7290; hypotype in fig. 14a, ESK Reg. no. F-7289 from Stn. 139; hypotype in fig. 14b, ESK Reg. no. F-7287 from Stn. 124.

Geographic Distribution: Off the west coast of Hokkaido and the northeast coast of

North Honshū, and Kii Strait; 6) 1240-1350 m; 28) 33-39 m; 32); 60) 50 m.

Remarks: The stations showing high frequency (2-3%) of the present species are around the An-éi rise in the Bay Head Area.

Cribrostomoides kosterensis (HÖGLUND)

Pl. 2, figs. 1a-b

Labrospira kosterensis HÖGLUND, 1947, Univ., Zool. Bidrag, Uppsala, v. 26, p. 147, pl. 11, figs. 4a-b, tfs. 130-131.

Occurrence and Repository: Bay Head Area (Stn. 3, 21, 37, 41, 42, 45, 61, 63: 124-185 m; living 124-170 m); Central Area (Stn. 66, 68, 69, 75, 77, 83, 88: 36-196 m; living 78-150 m); open sea area (Stn. 144: 105 m); ESK Reg. no. F-7291 - 7306; hypotype in fig. 1a, Reg. no. F-7307 from Stn. 69; hypotype in fig. 1b, Reg. no. F-7308 from Stn. 3.

Remarks: This is the first record of the present species in Japanese waters.

Cribrostomoides satsumaensis ŌKI, n. sp.

Pl. 2, figs. 2a-b

Test small, compressed, planispiral, evolute; chambers very inflated, four in final whorl, periphery rounded; sutures distinct, depressed; wall fine arenaceous, smooth; aperture interio-areal, upper and lower lips well developed; brown coloured. Diameter up to 0.18 mm; thickness about 1/2 of diameter.

Types and Dimensions: Holotype in fig. 2a, ESK Reg. no. F-7309 from Stn. 86, maximum diameter 0.17 mm, thickness 0.08 mm; paratype in fig. 2b, ESK Reg. no. F-7310 from Stn. 86, maximum diameter 0.14, thickness 0.07 mm.

Occurrence and Repository: Central Area (Stn. 86, 87, 88, 95, 101: 78-182 m; living 78-165 m); Bay Mouth Area (Stn. 122: 100 m); open sea area (Stn. 144, 145, 146: 105-213 m; living 105- 213 m); ESK Reg. no. F-7311 - 7319.

Remarks: The present species is distinguished from many other species of *Cribrostomoides* in having a small test composed of a few inflated chambers.

Cribrostomoides sp. 1

Pl. 2, figs. 3a-b

Occurrence and Repository: Bay Head Area (Stn. 18, 32, 35, 37, 51: 124-156 m; living 134-156 m); Central Area (Stn. 68, 75: 93-162 m); Bay Mouth Area (Stn. 137: 106 m; living); ESK Reg. no. F-7320 - 7327; hypotype in fig. 3a, ESK Reg. no. F-7328 from Stn. 37; hypotype in fig. 3b, ESK Reg. no. F-7329 from Stn. 37.

Remarks: The specimens in the collection are characterized by broad and round periphery and sutures not depressed, and a maximum diameter of 0.5 mm.

Cribrostomoides sp. 2

Pl. 2, fig. 4

Occurrence and Repository: Bay Head Area (Stn. 18: 136 m); Central Area (Stn. 99, 101, 104: 38-119 m; living 99-119 m); ESK Reg. no. F-7330 - 7333; hypotype in fig. 4, ESK Reg. no. F-7334 from Stn. 99.

Remarks: The specimens in the collection are characterized by inflated chambers and distinct sutures. The number of individuals at hand is insufficient for the specific

identification.

Cribrostomoides sp. 3

Pl. 2, fig. 5

Occurrence and Repository: Bay Head Area (Stn. 42, 44: 144-170 m; living); ESK Reg. no. F-7335 - 7336; hypotype in fig. 5, ESK Reg. no. F-7337 from Stn. 42.

Remarks: The specimens in the collection have obscure sutures and umbilicus covered with fine material. Only seven juvenile specimens are in the collection.

Genus *Recurvoides* EARLAND, 1934

Recurvoides sp.

Occurrence and Repository: Central Area (Stn. 67, 68, 69, 77, 86: 150-196 m; living 165 m); ESK Reg. no. F-7338 - 7342.

Remarks: The specimens in the collection are characterized by spherical tests composed of coarse material.

Subfamily LITUOLINAE DE BLAINVILLE, 1825

Genus *Ammomarginulina* WIESNER, 1931

Ammomarginulina catenulata (CUSHMAN and MCCULLOCH)

Pl. 2, fig. 6

Ammobaculites catenulata CUSHMAN and MCCULLOCH, 1939, Southern California, Univ., Publ., Allan Hancock Pacific Exped., v. 6, p. 90, pl. 7, figs. 11-14.

Ammobaculites catenulatus CUSHMAN and MCCULLOCH. MATSUNAGA, 1963, pl. 24, fig. 6.

Occurrence and Repository: Bay Head Area (Stn. 3, 15, 18, 35, 37: 124-152 m; living 140 m); Central Area (Stn. 70, 74, 81, 89, 90: 23-220 m; living 23-220 m); Bay Mouth Area (Stn. 118, 127, 136, 139, 143: 60-105 m; living 60-96 m); ESK Reg. no. F-7343 - 7357; hypotype in fig. 6, ESK Reg. no. F-7353 from Stn. 118.

Remarks: This is the first record of the present species in Japanese waters.

Family TEXTULARIIDAE EHRENBERG, 1838

Subfamily SPIROPLECTAMMININAE CUSHMAN, 1927

Genus *Spiroplectammina* CUSHMAN, 1927

Spiroplectammina biformis (PARKER and JONES)

Textularia agglutinans D'ORBIGNY var. *biformis* PARKER and JONES, 1865, Roy, Soc. London, Philos. Trans., v. 155, p. 370, pl. 15, figs. 23a-b, 24.

Spiroplectammina biformis (PARKER and JONES). TAKAYANAGI, 1955, table 1, pl. 1, fig. 4; LOEBLICH and TAPPAN, 1964, p. C251, fig. 163, 1a-b; CHIJI and Lopez, 1968, p. 112, pl. 6, fig. 5; MATOBA, 1970, p. 61, pl. 1, figs. 19a-c; INGLE, KELLER and KOLPACK, 1980, p. 144, pl. 5, fig. 9; FINGER and LIPPS, 1981, p. 132, pl. 1, figs. 17a-b.

Occurrence and Repository: Bay Head Area (Stn. 58: 142 m); ESK Reg. no. F-7358.

Geographic Distribution: Off the northwest coast of Hokkaido and the coast of North Honshū, and Tanabe Bay; 5); 23) 40-67 m, living 67 m; 29) 0.7 m; 31); 32); 56) 7-25 m, living 7 m.

Spiroplectammina henmii ŌKI, n. sp.

Pl. 2, figs. 7a-b

Test elongate, biserial, about two times as long as broad, the apical end triangular,

apertural end rounded or slightly angular, periphery sharp, test thickest near the middle, rhomboid in end view; chambers numerous, distinct, concave toward the inferior margin; sutures slightly depressed, wall coarsely arenaceous, roughened, especially over the sutures, united in the center to form a high ridge; aperture semicircular, at the base of the inner margin of the last-formed chamber; color grey.

Types and Dimensions: Holotype in fig. 7a, ESK Reg. no. F- 7359 from Stn. 99, length 0.92 mm, maximum breadth 0.51 mm, thichness 0.30 mm; paratype in fig. 7b, ESK Reg. no. F-7360 from Stn. 136, length 1.03 mm, maximum breadth 0.57 mm, thickness 0.34 mm.

Occurrence and Repository: Central Area (Stn. 70, 99: 23-42 m); Bay Mouth Area (Stn. 116, 125, 127, 134, 136, 137, 139, 141, 143: 60-140 m; living 60-96 m); open sea area (Stn. 144, 145, 146: 105-213 m); ESK Reg. no. F-7361 - 7372.

Remarks: The specimens in the collection resemble *Textularia sagittula* DEFRANCE var. *atrata* CUSHMAN (1911) with coarse material along the sutures, but are different therefrom in their high ridge in the center and rhomboid outline. The present species is distributed in the open sea, the Bay Mouth and the Central Areas under the influence of open-sea water.

Spiroplectammina higuchii TAKAYANAGI

Pl. 2, figs. 8a-d

Spiroplectammina higuchii TAKAYANAGI, 1953, Tohoku Univ., Inst. Geol. Pal., Short Papers, no. 5, p. 27, pl. 4, figs. 1a-b; 1955, p. 40, pl. 1, fig. 5; ISHIWADA, 1964, pl. 1, fig. 8.

Occurrence and Repository: Central Area (Stn. 99: 42 m); Bay Mouth Area (Stn. 110, 113, 127, 132: 74-110 m; living 74 m); open sea area (Stn. 145, 146: 155-213 m); ESK Reg. no. F-7373 - 7379; hypotype in fig. 8a, ESK Reg. no. F-7380 from Stn. 146; hypotype in fig. 8b, ESK Reg. no. F-7381 from Stn. 146; hypotype in fig. 8c, ESK Reg. no. F-7382 from Stn. 146; hypotype in fig. 8d, ESK Reg. no. F-7383 from Stn. 145.

Geographic Distribution: Off the northwest and southeast coasts of North Honshū and the Pacific coast from Central Honshū to Shikoku; 23) 40-50 m; 24) 14-78 m; 32); 36) living 80-276 m; 45); 68) 193 m.

Remarks: The present species is distributed along the coast of the Ōsumi Peninsula in the open sea area and the southeastern part of the Central Area, where the influence of open sea water is remarkable.

Subfamily TEXTULARIINAE EHRENBERG, 1838

Genus *Textularia* DEFRANCE in DE BLAINVILLE, 1824

Textularia bigenerinoides LACROIX

Pl. 2, figs. 9a-b

Textularia bigenerinoides LACROIX, 1932, Bull. Inst. Oceanogr. Monaco, no. 591, p. 24, figs. 27-31; KUWANO, 1962, pl. 23, fig. 5; KUWANO, 1963, fig. 12; DANIELS, 1970, p. 70, taf. 2, fig. 3.

Occurrence and Repository: Bay Head Area (Stn. 1, 3, 12, 17, 18, 21, 32, 40, 41, 42, 44, 45, 54, 58, 63: 102-228 m; living 125-182 m); Central Area (Stn. 66, 67, 68, 69, 72, 73, 77, 80, 81, 82, 85, 87, 90, 92, 93, 95, 97, 98, 101, 102: 80-228 m; living 130-220 m); ESK Reg. no. F-7384 - 7418; hypotype in fig. 9a, ESK Reg. no. F-7419 from Stn.

68; hypotype in fig. 9b, ESK no. F-7420 from Stn. 68.

Geographic Distribution: Off the Bōsō Peninsula; 36) living 208 m.

Textularia conica D'ORBIGNY

Textularia conica D'ORBIGNY, 1839, *in* DE LA SAGRA, Hist. Fis. Pol. Nat. Cuba, "Foraminiferes", p. 143, pl. 1, figs. 19-20; BARKER, 1960, p. 88, pl. 43, figs. 13a-c, 14a-b; CHIJI and LOPEZ, 1968, p. 112, pl. 6, figs. 8a-b.

Occurrence and Repository: Bay Head Area (Stn. 64: 66 m); Central Area (Stn. 71, 99: 42-88 m; living 42 m); Bay Mouth Area (Stn. 124, 136, 137, 141: 20-106 m; 20 m); open sea area (Stn. 146: 213 m); ESK Reg. no. F-7421 - 7428.

Geographic Distribution: Off the northwest coast of North Honshū, the Pacific coast from Honshū to Kyūshū and the north coast of Kyūshū, and the Seto Inland Sea; 23) 50 m; 24) 8-30 m, living 14 m; 27) about 45 m; 35); 37) 10-70 m; 38); 40); 45); 51) 43-232 m, living 43-155 m; 52) 31-80 m with living specimens; 53); 54) 23 m; 55) 20-63 m; 56) 9-38 m; 58); 60) 50-97.5 m; 61) 60 m; 62) 96 m; 63) 5-20 m; 64) 46 m with living specimens; 65) 6.5-33 m; 66) 20-25 m; 71) 17-27 m; 72); 73) less than 39 m; 76) 7-62 m.

Textularia foliacea HERON-ALLEN and EARLAND

Pl. 2, fig. 10

Textularia foliacea HERON-ALLEN and EARLAND, 1915, Zool. Soc. London, Trans., v. 20 (1912-15), pt. 17, p. 628, pl. 47, figs. 17-20.

Occurrence and Repository: Central Area (Stn. 99: 42 m); ESK Reg. no. F-7429; hypotype in fig. 10, ESK Reg. no. F-7430 from Stn. 99.

Geographic Distribution: Off the Pacific coast from Central Honshū to Kyūshū and the Seto Inland Sea; 37) 18-53 m; 48) 40 m; 51) 23-232 m, living 72-155 m; 55) 20-42 m; 56) 7-33 m; 60) 50-97.5 m; 63) 5-10 m; 64) 46 m; 70) 70 m with living specimens; 72); 77) 35 m.

Textularia goesii CUSHMAN

Pl. 3, figs. 1a-b

Textularia goesii CUSHMAN, 1911, p. 15, figs. 24a-b; BARKER, 1960, p. 90, pl. 44, figs. 1a-b, 2.

Occurrence and Repository: Open sea area (Stn. 144: 105 m); ESK Reg. no. F-7431; hypotype in fig. 1a, ESK Reg. no. F-7432 from Stn. 144; hypotype in fig. 1b, ESK Reg. no. F-7433 from Stn. 144.

Remarks: This is the first record of the present species in Japanese waters.

Textularia kattegatensis HÖGLUND

kagoshimaensis ŌKI, n. subsp.

Pl. 3, figs. 2a-b

Test small, elongate, usually straight, sometimes slightly curved, about 3 times as long as broad, oval in section, greatest breadth toward the apertural end, which is broadly rounded, gradually tapering to the pointed initial end; chambers slightly inflated, having up to eleven biserial pairs; sutures distinct, depressed; aperture interiomarginal forming a semicircular slit at the inner margin of the last chamber; test finely arenaceous, well cemented; colour brown. Length 0.10-0.31 mm; width 0.08-0.12 mm; thickness 0.06-0.10 mm.

Types and Dimensions: Holotype in fig. 2a, ESK Reg. no. F-7434 from Stn. 42,

length 0.23 mm, maximum breadth 0.09 mm, thickness 0.06 mm; paratype in fig. 2b, ESK Reg. no. F-7435 from Stn. 42, length 0.21 mm, maximum breadth 0.08 mm, thickness 0.05 mm.

Occurrence and Repository: Bay Head Area (Stn. 1, 3, 21, 22, 40, 41, 42, 44, 53, 54, 58, 61, 63, 65: 39-228 m; living 94-228 m); northern part of the Central Area (Stn. 66, 67, 68, 72, 77, 80, 82, 85: 130-225 m; living 130-225 m); southern part of the Central Area (Stn. 86, 92, 93, 95, 96, 97, 102, 104, 105: 38-188 m; living 142-165 m); ESK Reg. no. F-7436 - 7466.

Remarks: The specimens in the collection are characterized by more elongate chambers in the adult stage than those of *Textularia kattegatensis*. They are distinguishable from *T. kattegatensis* by their elongate chambers in the adult stage and brown colours.

Textularia kuwanoi ŌKI, n. sp.

Pl. 3, fig. 3

Test small, very elongate, slender, usually straight, about 2.5 times as long as broad, oval in section, greatest breadth toward the apertural end, which is broadly rounded, gradually tapering to the pointed initial end, edges straight, broadly rounded; chambers numerous, up to 8 or more pairs in a biserial arrangement, increasing in size as added; sutures distinct, the depressions filled up with very fine, secondary wall material; wall rather fine, surface smooth; aperture interio-marginal forming a semicircular slit at the inner margin of the last chamber; colour brownish grey.

Types and Dimensions: Holotype in fig. 3, ESK Reg. no. F-7467 from Stn. 15, length 0.22 mm, maximum breadth 0.10 mm, thickness 0.06 mm.

Occurrence and Repository: Bay Head Area (Stn. 1, 3, 12, 15, 17, 18, 22, 35, 37, 40, 42, 51, 54, 58, 61, 63: 102-228 m; living 125-144 m); northern part of the Central Area (Stn. 66, 67, 68, 74, 77, 80, 82: 28-225 m); southern part of the Central Area (Stn. 93, 94, 101: 105-142 m); ESK Reg. no. F-7468 - 7493.

Remarks: The specimens in the collection are identical with the ones identified as *Textularia* cf. *parvula* CUSHMAN by KUWANO (1962). But they are different from *T. parvula* in having coarse material on the test walls. *T. wiesneri* also resembles the present specimens, but the latter have the test walls composed of coarser material and depressed sutures.

Textularia wiesneri EARLAND

Pl. 3, figs. 4a-b

Textularia wiesneri EARLAND, 1933, Discovery Repts., Cambridge, v. 7, p. 95, pl. 3, figs. 18-20; FINGER and LIPPS, 1981, v. 27, no. 2, p. 132, pl. 1, fig. 18.
Textularia tenuissima EARLAND. KUWANO, 1962, pl. 23, fig. 8.

Occurrence and Repository: Bay Head Area (Stn. 1, 3, 12, 15, 17, 21, 22, 32, 35, 37, 40, 41, 42, 44, 45, 54, 58, 61, 63: 102-228 m; living 122-170 m); Central Area (Stn. 66, 67, 68, 69, 70, 72, 73, 77, 78: 23-216 m; living 23-216 m); ESK Reg. no. F-7494 - 7521; hypotype in fig. 4a, ESK Reg. no. F-7522 from Stn. 42; hypotype in fig. 4b, ESK Reg. no. F-7523 from Stn. 35.

Remarks: This species differs from *Textularia earlandi* PARKER in its brown colour

of the test without the primary spiroplectine coil. This is the first record of the present species in Japanese waters.

Textularia sp. 1

Occurrence and Repository: Bay Head Area (Stn. 12, 15, 21, 32, 34, 37, 40, 42, 44, 51, 53, 54, 58: 94-228 m; living 94-170 m); Central Area (Stn. 66, 81, 91, 92, 94, 96, 98, 102, 105: 97-220 m; living 105-220 m); Bay Mouth Area (Stn. 139: 105 m); ESK Reg. no. F-7524 - 7546.

Remarks: The present specimens resemble *T. bigenerinoides* in having very thin tests, but differ therefrom in their small and numerous chambers.

Textularia sp. 2

Occurrence and Repository: West-Sakurajima Passage (Stn. 65: 39 m); Central Area (Stn. 83, 99, 104: 36-42 m); Bay Mouth Area (Stn. 106, 107: 40-96 m; living 40 m); ESK Reg. no. F-7547- 7552.

Remarks: The specimens in the collection are characterized by relatively small tests (length up to 0.47 mm) and thick walls composed of very coarse material (more than 0.15 mm).

Textularia sp. 3

Pl. 3, figs. 5a-b

Occurrence and Repository: Bay Mouth and open sea areas (Stn. 106, 136, 146: 40-213 m); ESK Reg. no. F-7553 - 7555; hypotype in figs. 5a-b, ESK Reg. no. F-7556 from Stn. 136.

Remarks: The specimens at hand are distinguishable from all other species or specimens of *Textularia* by their flat test surface and obscure sutures.

Textularia sp. 4

Occurrence and Repository: Bay Mouth and open sea areas (Stn. 137, 143, 144, 145: 96-155 m); ESK Reg. no. F-7557 - 7560.

Remarks: The specimens in the collection are characterized by large tests (more than 1 mm), but the chambers of the adult stage of every specimen are imperfect.

Subfamily PSEUDOBOLIVININAE WIESNER, 1931

Genus *Siphotextularia* FINLAY, 1939

Siphotextularia rolshauseni PHLEGER and PARKER

otsukai ŌKI, n. subsp.

Pl. 3, figs. 6a-c

Test tapering, becoming broad in the adult, compressed, broad faces often distinctly concave; chambers low and broad, becoming inflate in the adult; sutures not distinct, slightly depressed; aperture a narrowly elliptical opening, surrounded by a raised lip, somewhat above the base of the inner wall of the chamber.

Types and Dimensions: Holotype in fig. 6a, ESK Reg. no. F-7561 from Stn. 146, length 0.37 mm, breadth 0.29, thickness 0.12 mm; paratype in fig. 6b, ESK Reg. no. F-7562 from Stn. 144, length 0.19, breadth 0.15 mm, thickness 0.06; paratype in fig. 6c, ESK Reg. no. F-7563 from Stn. 91, length 0.22, breadth 0.17 mm, thickness 0.11.

Occurrence and Repository: West-Sakurajima Passage (Stn. 65: 39 m); northern part of the Central Area (Stn. 71, 76, 78, 79, 80: 40-225 m); southern part of the Central Area (Stn. 86, 87, 91, 92, 94, 95, 97, 98, 101, 104: 38-207 m; living 165 m); Bay Mouth Area (Stn. 110, 113, 127, 132, 134, 139: 74-112 m); open sea area (Stn. 144, 146: 105-213 m); ESK Reg. no. F-7564 - 7584.

Remarks: The present specimens are similar in outline to *Siphotextularia concave* (KARRER), but differs therefrom in the coarse material composing the test walls.

Family TROCHAMMINIDAE SCHWAGER, 1877

Subfamily TROCHAMMININAE SCHWAGER, 1877

Genus *Trochammina* PARKER and JONES, 1859

Trochammina charlottensis CUSHMAN

Pl. 3, figs. 7a-d

Trochammina charlottensis CUSHMAN, 1925, Cushman Lab. Foram. Res., Sharon, Mass., v. 1, no. 11, p. 39, pl. 6, figs. 4a-b; TAKAYANAGI, 1955, pl. 1, figs. 16a-b.

Trochammina charlottensis CUSHMAN var. KUWANO, 1962, pl. 24, figs. 1a-c, 2.

Occurrence and Repository: Bay Head Area (Stn. 1, 3, 12, 15, 17, 34, 37, 40, 41, 42, 44, 51, 53, 58: 94-228 m; living 146-228 m); Central Area (Stn. 66, 69, 74, 83, 93, 94, 104: 28-150 m; living 36-130 m); Bay Mouth and open sea areas (Stn. 124, 125, 139, 144: 20-140 m; living 20-140 m); ESK Reg. no. F-7585 - 7609; hypotype in fig. 7a, ESK Reg. no. F-7610 from Stn. 40; hypotype in fig. 7b, ESK Reg. no. F-7611 from Stn. 54; hypotype in fig. 7c, ESK Reg. no. F-7612 from Stn. 54; hypotype in fig. 7d, ESK Reg. no. F-7613 from Stn. 54.

Geographic Distribution: Off the west and south coasts of Hokkaido and the northwest coast of North Honshū; 5); 6) 1230-1285 m; 12) 22-70 m; 23) 40-173 m, living 40-73 m; 24) 14-202 m, living 14-50 m.

Remarks: This species has been reported mainly from the cold water around northern Japan.

Trochammina inflata (MONTAGU)

Nautilus inflatus MONTAGU, 1808, Test. Britannica, Suppl., p. 81, pl. 18, fig. 3.

Trochammina inflata (MONTAGU). HADA, 1931, p. 90-91, text-figs. 43a-b; TAKAYANAGI, 1955, p. 42, pl. 1, figs. 19a-c; BARKER, 1960, p. 84, pl. 41, figs. 4a-c.

Occurrence and Repository: Bay Head Area (Stn. 42: 170 m); ESK Reg. no. F-7614.

Geographic Distribution: Off the north and west coasts of Hokkaido, the Pacific coast of Honshū, the north coast of Central Honshū and the northwest coast of Kyūshū, and the Seto Inland Sea; 1) 165-850 m; 5); 6) 714-1540 m; 18) 7.3-60.4 m; 29) 0.5-2.2 m; 31); 32); 37) 10-70 m; 42) 1203 m; 53); 55) 64 m; 56) 7. m; 61) 21-50 m; 65) 4.1-33 m; 66) 12-25 m; 73).

Remarks: The present species is characterized by brown tests with a dark pattern on the central portion.

Trochammina japonica ISHIWADA

Trochammina japonica ISHIWADA, 1950, Geol. Surv. Japan, Bull., v.1, no.4, p. 9-10, pl., figs.2a-c.

Occurrence and Repository: Bay Head Area (Stn. 37, 64: 66-124 m; living 66 m); open sea area (Stn. 145: 155 m; living); ESK Reg. no. F-7615 - 7617.

Geographic Distribution: Off the Pacific coast from Hokkaido to Kyūshū, the southwest coast of Hokkaido and the northwest coast of Honshū, and the Seto Inland Sea; 3) 9-17.5 m; 6) 265-2285 m; 9) 82-276 m; 10) 720-800 m; 11) 56-660 m with living specimens; 13) 54-430 m, living 84-430 m; 15) 510-840 m, living 510-695 m; 17) 100-690 m; 23) 570-875 m with living specimens; 25) 335-630 m with living specimens; 42) 468-1203 m; 43) 60-1020 m; 54) 23 m with living specimens; 62) 96 m with living specimens; 64) 22-60 m, living 22-39 m; 70) 202 m with living specimens; 77) 745 m.

Trochammina nitida BRADY

Pl. 3, figs. 8a-b

Trochammina nitida BRADY, 1881, Quart. Journ. Micr. Sci., v. 21, p. 52; 1881, Denkschr. Akad. Wiss Wien, v. 43, p. 100; 1884, p. 339, pl. 41, figs. 5-6; CUSHMAN, 1920, p. 75, pl. 15, fig. 2; BARKER, 1960, p. 84, pl. 41, figs. 5a-c, 6.

Occurrence and Repository: Bay Head Area (Stn. 44, 63: 138-144 m); Central Area (Stn. 82, 90, 94: 105-215 m; living 94 m); ESK Reg. no. F-7618 - 7622; hypotype in fig. 8a, ESK Reg. no. F-7619 from Stn. 63; hypotype in fig. 8b, ESK Reg. no. F-7622 from Stn.94.

Geographic Distribution: Off the southeast coast of Hokkaido, the northwest coast of North Honshū and the Pacific coast from Central Honshū to Shikoku; 7); 23) 69-173 m; 24) 135 m; 48) 124-235 m with living specimens; 51) 102 m; 52) 80 m; 70) 70-475 m with living specimens.

Trochammina osumiensis ŌKI, n. sp.

Pl. 3, figs. 9a-b

Test small, trochoid, usually wider than high; test composed of two or three volutions, the last formed one usually of three chambers, rapidly increasing in size progressively as added; chambers inflate; sutures not distinct, slightly depressed; wall composed of very coarse materials (maximum 0.8 mm); aperture not distinct, usually apertural area covered with fine secondary materials; color of the test brownish grey.

Types and Dimensions: Holotype in fig. 9a, ESK Reg. no. F-7623 from Stn. 75; paratype in fig. 9b, ESK Reg. no. F-7624 from Stn. 100.

Occurrence and Repository: Bay Head Area (Stn. 17, 18, 42, 53, 58, 61: 94-170 m); Central Area (Stn. 66, 67, 69, 72, 73, 74, 75, 76, 77, 83, 84, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 100, 101, 103, 104: 28-220 m; living 28-207 m); Bay Mouth and open sea areas (Stn. 107, 113, 122, 139, 145: 96-155 m; living 100-155 m); ESK Reg. no. F-7625 - 7662.

Remarks: The present species resembles *Trochammina pygmaea* in its shape and size, but differs therefrom in the coarser grains forming its tests and less inflated chamber.

Trochammina pacifica simplex CUSHMAN and MCCULLOCH

Pl. 3, figs. 10a-b

Trochammina pacifica simplex CUSHMAN and MCCULLOCH, 1939, Allan Hancock Pacific Exped., v. 6, no. 1, p.

104, pl. 11, fig. 4.

Trochammina pacifica CUSHMAN var. *simplex* CUSHMAN and MCCULLOCH. CHIJI and LOPEZ, 1968, p. 113, pl. 7, figs. 2a-b.

Trochammina pacifica CUSHMAN. ISHIWADA, 1964, pl. 2, figs. 20-21.

Trochammina sp. cf. *pacifica* CUSHMAN. UCHIO, 1962b, p. 388, pl. 18, figs. 8a-c.

Occurrence and Repository: Bay Head Area (Stn. 1, 3, 12, 18, 21, 32, 40, 41, 42, 44, 45, 54, 63, 64, 65: 39-228 m; living 39-144 m); Central Area (Stn. 68, 70, 73, 88, 98, 104: 23-162 m; living 38-162 m); Bay Mouth and open sea areas (Stn. 124, 146: 20-213 m; living); ESK Reg. no. F-7663-7685; hypotype in fig. 10a, ESK Reg. no. F-7686 from Stn. 73; hypotype in fig. 10b, ESK Reg. no. F-7671 from Stn. 42.

Geographic Distribution: Off the west coast of Hokkaido and the Seto Inland Sea; 6) 1230-1285 m; 55) 33-64 m.

Trochammina pusilla HÖGLUND

Trochammina pusilla HÖGLUND, 1947, Uppsala, Univ., Zool. Bidrag, Bd. 26, p. 201, pl. 17, figs. 4a-c; p. 200, tfs. 183-184.

Trochammina vesicularis GOES, KUWANO, 1962, pl. 24, figs. 6 and 7.

Occurrence and Repository: Bay Head Area (Stn. 37, 45, 65: 39-134 m; living 124 m); Central Area (Stn. 81: 220 m; living); Bay Mouth Area (Stn. 122: 100 m); ESK Reg. no. F-7687 - 7691.

Remarks: The specimens in the collection are identical with the ones identified as *Trochammina vesicularis* by KUWANO (1962). However, judging from HÖGLUND's original description, dimensions and figures, these specimens should be identical with *T. pusilla*. This is the first record of the present species in Japanese waters.

Trochammina pygmaea HÖGLUND

Pl. 3, figs. 11a-c

Trochammina globigeriniformis (PARKER and JONES) var. *pygmaea* HÖGLUND, 1947, Uppsala, Univ., Zool. Bidrag, Bd. 26, p. 200, pl. 17, figs. 3a-c; tf. 182.

Trochammina globigeriniformis (PARKER and JONES). KUWANO, 1962, pl. 24, figs. 3a-c.

Occurrence and Repository: Bay Head Area (Stn. 42, 51, 54, 64: 66-170 m; living 66-134 m); Central Area (Stn. 66, 71, 72, 73, 75, 76, 80, 82, 85, 86, 87: 80-225 m; living 130-220 m); ESK Reg. no. F-7692 - 7706; hypotype in fig. 11a, ESK Reg. no. F-7707 from Stn. 73; hypotype in fig. 11b, ESK Reg. no. F-7708 from Stn. 73; hypotype in fig. 11c, ESK Reg. no. F-7709 from Stn. 73.

Remarks: HÖGLUND (1947) mentioned that *Trochammina pygmaea* is 0.15-0.24 mm in diameter and can be regarded as a dwarf form of *T. globigeriniformis*. The specimens in the collection are less than 0.15 mm in diameter. This is the first record of the present species in Japanese waters.

Trochammina sp. 1

Occurrence and Repository: Bay Head Area (Stn. 22, 42, 44, 53, 54, 63: 94-170 m; living 144-170 m); Central Area (Stn. 74, 93: 28-142 m; living 28 m); ESK Reg. no. F-7710 - 7717.

Remarks: The specimens in the collection are characterized by small tests (length up to 0.1 mm) having flat surfaces on the dorsal and ventral sides.

Trochammina sp. 2

Pl. 4, figs. 1a-c

Occurrence and Repository: Central Area (Stn. 103: 175 m; open sea area (Stn. 144: 105 m); ESK Reg. no. F-7721 - 7722, hypotype in fig. 1a, ESK Reg. no. F-7722 from Stn. 144; hypotype in fig. 1b, ESK Reg. no. F-7721 from Stn. 103; hypotype in fig. 1c, ESK Reg. no. F-7723 from Stn. 144.

Remarks: The present species is characterized by walls composed of nanno-plankton tests.

Genus *Tiphotrocha* SAUNDERS, 1957

Tiphotrocha kellettae (THALMANN)

Pl. 4, fig. 2

Trochammina kellettae THALMANN, 1932, Eclog, Geol. Helv., v. 25, no. 2, p. 313; TAKAYANAGI, 1955, pl. 1, figs. 18a-b.
Tiphotrocha kellettae (THALMANN). MATOBA, 1970, p. 61, pl. 1, figs. 19a-c.

Occurrence and Repository: Bay Head Area (Stn. 1, 3: 102-130 m); southern part of the Central, Bay Mouth and open sea areas (Stn. 105, 113, 137, 144: 97-106 m; living 97-106 m); ESK Reg. no. F-7724 - 7729; hypotype in fig. 2, ESK Reg. no. F-7730 from Stn. 105.

Geographic Distribution: Off the west and south coasts of Hokkaido, the coast of North Honshū and the south coast of Central Honshū; 5); 11) 56-902 m, living 56-512 m; 13) 54-135 m, living 135 m; 14) 598-735 m, living 735 m; 15) 300-510 m; 17) 690 m; 23) 64-875 m, living 67 m; 24) 10-150 m, living 10-94 m; 28) 39 m; 29) 0.4-12.5 m, living 8.7 m; 30); 50).

Genus *Tritaxis* SCHUBERT, 1921

Tritaxis fusca (WILLIAMSON)

Rotalina fusca WILLIAMSON, 1858, Rec. Foram. Great Britain, p. 55, pl. 5, figs. 114-115.
Valvulina fusca (WILLIAMSON). CUSHMAN, 1911, p. 59, text-figs. 94, 95a-c.
Tritaxis fusca (WILLIAMSON). LOEBLICH and TAPPAN, 1964, p. C266, figs. 177, 2a-c, 3.

Occurrence and Repository: West-Sakurajima Passage (Stn. 63: 138 m); Central Area (Stn. 66: 130 m); Bay Mouth Area (Stn. 113: 100 m; living); ESK Reg. no. F-7731 - 7733.

Family ATAXOPHRAGMIIDAE SCHWAGER, 1877

Subfamily VERNEUILININAE CUSHMAN, 1911

Genus *Gaudryina* D'ORBIGNY, 1839

Gaudryina exilis CUSHMAN and BRONNIMANN

Pl. 4, figs. 3a-c

Gaudryina exilis CUSHMAN and BRONNIMANN, 1948, Cushman Lab. Foram. Res., Contr., v. 24, p. 40, pl. 7, figs. 15a-b, 16.

Occurrence and Repository: Bay Head Area (Stn. 42, 45, 51, 53, 65: 39-170 m; living 134-170 m); Central Area (Stn. 88, 104: 38-78 m; living 38 m); ESK Reg. no. F-7734 - 7740; hypotype in fig. 3a, ESK Reg. no. F-7741 from Stn. 104; hypotype in fig. 3b, ESK Reg. no. F-7742 from Stn. 65; hypotype in fig. 3c, ESK Reg. no. F-7743 from Stn.

104.

Geographic Distribution: Off the southeast coast of North Honshū; 32).

Gaudryina nitida HAQUE

Pl. 4, figs. 4a-b

Gaudryina nitida HAQUE, 1956, Pakistan, Geol. Survey, Mem., Pal., v. 1, p. 41, pl. 9, figs. 2a-d.

Occurrence and Repository: West-Sakurajima Passage (Stn. 65: 39 m); Central Area (Stn. 70, 71, 73, 75, 78, 80, 81, 83, 89, 90, 92, 99, 100, 104: 23-225 m; living 36-75 m); Bay Mouth Area (Stn. 106, 107, 110, 116, 122, 124, 127, 132, 134, 136, 139, 141: 20- 112 m; living 60-112 m); open sea area (Stn. 144, 145, 146: 105-213 m; living 155-213 m); ESK Reg. no. F-7744 - 7772; hypotype in fig. 4a, ESK Reg. no. F-7743 from Stn. 65; hypotype in fig. 4b, ESK Reg. no. F-7773 from Stn. 70.

Remarks: This species was originally described from the lower Eocene sediments in Pakistan. This is the first record of the present species in Japanese waters.

Gaudryina triangularis CUSHMAN

Gaudryina triangularis CUSHMAN, 1911, U.S. Nat. Mus., Bull., 71, pt. 2, p. 65, figs. 104a-c.

Occurrence and Repository: West-Sakurajima Passage (Stn. 65: 39 m); Central Area (Stn. 70: 23 m); ESK Reg. no. F-7774 - 7775.

Geographic Distribution: Off the south coast of Central Honshū; 48) 40-235 m, living 40 m; 51) 23 m with living specimens; 52) 31 m.

Subfamily GLOBOTEXTULARIINAE CUSHMAN, 1927

Genus *Dorothia* PLUMMER, 1931

Dorothia sp.

Occurrence and Repository: Bay Head Area (Stn. 32, 34, 35, 37, 41, 42, 44, 45, 51, 53, 54, 61, 63: 94-182 m; living 124-182 m); Central Area (Stn. 101: 119 m; living): ESK Reg. no. F-7776 - 7789.

Remarks: The number of specimens at hand is insufficient for the specific identification. The present species dominantly occurs in the southern part of the Bay Head Area.

Genus *Eggerella* CUSHMAN, 1933

Eggerella advena (CUSHMAN)

Pl. 4, fig. 5

Verneuilina advena CUSHMAN, 1922, Canada, Biol. Board, Contr., Canadian Biol. (1921), no. 9, p. 9 (141).
Eggerella advena (CUSHMAN). ISHIWADA, 1964, p. 8, pl. 1, fig. 13; DANIELS, 1970, p. 70, taf. 2, fig. 6; Cole, 1981, p. 42, pl. 6, fig. 2; MURRAY, 1973, pl. 5, fig. 7.

Occurrence and Repository: Bay Head Area (Stn. 41, 42, 44, 58: 142-182 m); Central Area (Stn. 66, 76, 100: 75-220 m; living 75 m); ESK Reg. no. F-7790 - 7796; hypotype in fig. 5, ESK Reg. no. F-7791 from Stn. 42.

Geographic Distribution: Off the coast of Northeast Japan, the south coast of Central Honshū and the south coast of Shikoku, and the Seto Inland Sea; 1) 52-158 m; 5); 9) 22-120 m; 11) 56-660 m with living specimens; 12) 19-80 m; 13) 54-640 m, living 54-430 m; 14) 598-818 m, living 598-735 m; 15) 300-695 m, living 510 m; 17) 320-496 m; 23) 56-173 m; 24) 10-148 m, living 18-100 m; 25) 8-335 m; 27) 6-49 m; 28) 14-39 m; 41) 7.8-65 m; 51) 232 m with living specimens; 54) 23 m with living specimens; 55) 13-64 m; 61)

10-74 m; 62) 96 m; 64) 22-60 m, living 22-46 m; 66) 12-33 m; 70) 808 m with living specimens.

Remarks: The present species is apt to be confused with *Eggerella scabra*. The smaller size (max. 0.25 mm), more numerous chambers and less inflated chambers even at later stages are the differences from *E. scabra*.

Eggerella minuta ŌKI, n. sp.

Pl. 4, fig. 6

Test small, pyramidal, the triserial chambers inflated; sutures not distinct, slightly depressed; the wall coarsely arenaceous; surface rough; aperture semicircular, at the base of the inner margin of the chamber; color brownish grey.

Types and Dimensions: Holotype in fig. 6, ESK Reg. no. F-7797 from Stn. 143; paratype, ESK Reg. no. F-7798 from Stn. 143.

Occurrence and Repository: Central Area (Stn. 66, 67, 69, 71, 73, 77, 81, 82, 88, 89, 90, 92, 94, 98, 100, 103: 75-220 m; living 75-220 m); Bay Mouth Area (Stn. 125, 143: 96-140 m; living); ESK Reg. no. F-7799 - 7815.

Remarks: Small tests and large sized grains forming the wall are characteristics of the present specimens and are not known in any other species of genus *Eggerella*.

Eggerella scabra (WILLIAMSON)

Pl. 4, figs. 7a-b

Bulimina scabra WILLIAMSON, 1858, Ray Soc., London, p. 65, pl. 5, figs. 136-137.
Verneuilina chijii KUWANO, 1962, pl. 24, figs. 14-16.
Eggerella scabra (WILLIAMSON). DANIELS, 1970, p. 70, abb. 46, taf. 2, fig. 5; MURRAY, 1970, p. 45, pl. 15, figs. 1-6; MURRAY, 1973, pl. 8, fig. 9.

Occurrence and Repository: Bay Head Area (Stn. 1, 3, 12, 15, 17, 18, 21, 22, 32, 34, 35, 37, 40, 41, 42, 44, 45, 51, 53, 54, 58, 61, 63: 94-228 m; living 102-228 m); Central Area (Stn. 66, 67, 68, 69, 72, 73, 75, 76, 77, 80, 81, 82, 84, 85, 86, 87, 89, 90, 96, 97, 98, 100, 101, 102, 104, 105: 38-225 m; living 38-225 m); Bay Mouth Area (Stn. 134: 112 m; living); ESK Reg. no. F-7816-7866; hypotype in fig. 7a, ESK Reg. no. F-7867 from Stn. 68; hypotype in fig. 7b, ESK Reg. no. F-7868 from Stn. 68.

Geographic Distribution: Off the northeast coast of Honshū and the east coast of Kyūshū; 1) 129-850 m; 2) 84 m; 30); 41) 39-65 m; 42) 142 m; 76) 13 m.

Subfamily VALVULININAE BERTHELIN, 1880

Genus *Clavulina* D'ORBIGNY, 1826

Clavulina cf. *parisiensis* D'ORBIGNY

Pl. 4, figs. 8a-b

Compared with:

Clavulina parisiensis D'ORBIGNY, 1826, Ann. Sci. Nat., ser. 1, tome 7, p. 268.

Occurrence and Repository: West-Sakurajima Passage (Stn. 65: 39 m); Central Area (Stn. 83: 36 m); Bay Mouth Area (Stn. 106: 40 m); ESK Reg. no. F-7869 - 7871; hypotype in fig. 8a, ESK Reg. no. F-7872 from Stn. 65; hypotype in fig. 8b, ESK Reg. no. F-7873 from Stn. 65.

Remarks: The sutures of the specimens in the collection are not depressed.

Clavulina sp.

Occurrence and Repository: Bay Mouth Area (Stn. 125, 136: 60-140 m; living 140 m); ESK Reg. no. F-7874 - 7875.

Remarks: The number of specimens in the collection is insufficient for specific identification and the chambers of the adult stage are imperfect.

Genus *Martinottiella* CUSHMAN, 1933

Martinottiella communis (D'ORBIGNY)

Clavulina communis D'ORBIGNY, 1846, Foram. Foss. Bass. Tert. Vienne, p. 196, pl. 12, figs. 1-2.
Martinottiella communis (D'ORBIGNY). MURRAY, 1971, p. 49, pl. 17, figs. 4-6.

Occurrence and Repository: Bay Mouth Area (Stn. 118, 127: 74-101 m; living 74 m); ESK Reg. no. F-7876 - 7877.

Geographic Distribution: Off the Pacific coasts of Honshū and Shikoku; 26) 146-819 m; 33) 154-1111 m; 51) 232 m; 69) 280-900 m; 70) 808 m.

Suborder MILIOLINA DELAGE and Hérouard, 1896

Superfamily MILIOLACEA EHRENBERG, 1839

Family FISCHERINIDAE MILLETT, 1898

Subfamily CYCLOGYRINAE LOEBLICH and TAPPAN, 1961

Genus *Cyclogyra* WOOD, 1842

Cyclogyra planorbis (SCHULTZE)

Pl. 4, fig. 9

Cornuspira planorbis SCHULTZE, 1854, Organisms Polythal., p. 40, pl. 2, fig. 21.
Cyclogyra planorbis (SCHULTZE). MATOBA, 1970, p. 50, pl. 2, figs. 1a-b.

Occurrence and Repository: Central Area (Stn. 70, 99: 23-42 m); Bay Mouth Area (Stn. 116, 136: 60-61 m; living 60 m); open sea area (Stn. 144, 146: 105-213 m); ESK Reg. no. F-7878 - 7883; hypotype in fig. 9, ESK Reg. no. F-7879 from Stn. 99.

Geographic Distribution: Off the northwest and southeast coasts of North Honshū, the south coast of Central Honshū and the west coast of Kyūshū; 24) 18-200 m, living 18-100 m; 29) 0.8-12.5 m, living 1.7-8.7 m; 45); 50); 76) 13-17 m.

Family NUBECULARIIDAE JONES, 1875

Subfamily OPHTHALMIDIINAE WIESNER, 1920

Genus *Wiesnerella* CUSHMAN, 1933

Wiesnerella auriculata (EGGER)

Pl. 4, fig. 10

Planispirina auriculata EGGER, 1893, K. Bayer, Akad. Will., Muenchen, Math. Phys. Cl., Abh., v. 18, pt. 2, p. 371, pl. 13, figs. 19-21.
Wiesnerella auriculata (EGGER). ASANO, 1951, p. 2, text-figs. 6-8; MATSUNAGA, 1963, pl. 30, figs. 7a-c; MATOBA, 1970, p. 63, pl. 2, figs. 2a-b; POAG, 1981, p. 88, pl. 53, fig. 4; pl. 54, figs. 4a-b.

Occurrence and Repository: Bay Mouth Area (Stn. 106, 107, 116: 40-96 m; living 61 m); ESK Reg. no. F-7884 - 7886; hypotype in fig. 10, ESK Reg. no. F-7885 from Stn. 107.

Geographic Distribution: Off the east coast of North Honshū and the south coast of Central Honshū; 28) 34 m; 29) 12.5 m; 56) 9-38 m.

Subfamily SPIROLOCULININAE WIESNER, 1920

Genus *Spiroloculina* D'ORBIGNY, 1826

Spiroloculina depressa D'ORBIGNY

Pl. 4, figs. 11a-b

Spiroloculina depressa D'ORBIGNY, 1826, Ann. Sci. Nat., ser. 1, tome 7, p. 298; BARKER,1960, p. 18, pl. 9, figs. 17a-b.

Occurrence and Repository: West-Sakurajima Passage (Stn. 64, 65: 39-66 m); Central Area (Stn. 99: 42 m; living); Bay Mouth Area (Stn. 108, 118, 125, 127, 132, 136, 137, 139, 141, 143: 60-140 m); open sea area (Stn. 144, 145: 105-155 m; living 105 m); ESK Reg. no. F-7887 - 7901; hypotype in fig. 11a, ESK Reg. no. F- 7902 from Stn. 64; hypotype in fig. 11b, ESK Reg. no. F-7903 from Stn. 137.

Geographic Distribution: Off the north coast of North Honshū and the southeast coast of Central Honshū, and the Seto Inland Sea; 18) 5-25 fms; 37)18-70 m; 66) 21 m.

Spiroloculina hadai THALMANN

Spiroloculina costata HADA (not TERQUEM), 1931, Tohoku Imp. Univ., Sci. Rep., 4th ser. (Biol.), v. 6, no. 1, p. 84, text-figs. 37a-b.

Spiroloculina hadai THALMANN, 1933, Jour. Pal., Menasha, Wis., v. 7, no. 3, p. 354.

Occurrence and Repository: Bay Mouth Area (Stn. 124: 20 m); ESK Reg. no. F-7904.

Geographic Distribution: Off the northwest coast of North Honshū, the Pacific coasts of Central Honshū and Shikoku and the north coast of Kyūshū, and the Seto Inland Sea; 18) 3-25 fms; 20) 108 m; 24) 10-58 m; 46) 165-229 m; 57) 1.5 m; 58); 63) 5-15 m; 71) 17-27 m; 73).

Genus *Planispirinoides* PARR, 1950

Planispirinoides? sp.

Occurrence and Repository: Bay Mouth and open sea areas (Stn. 127, 143: 74-96 m; living 74 m): ESK Reg. no. F-7905-7906.

Remarks: Only six specimens are in the collection and most of them are of juvenile stage.

Subfamily NODOBACULARIINAE CUSHMAN, 1927

Genus *Nodobaculariella* CUSHMAN and HANZAWA, 1937

Nodobaculariella sp.

Pl. 4, fig. 12

Occurrence and Repository: Bay Mouth Area (Stn. 118: 101 m): ESK Reg. no. F-7907.

Remarks: Only a single, imperfect specimen is in the collection.

Genus *Nodophthalmidium* MACFADYEN, 1939

Nodophthalmidium tibia (JONES and PARKER)

Pl. 4, fig. 13

Nubecularia tibia JONES and PARKER, 1860, Quart. Jour. Geol. Soc., v. 16, p. 455, pl. 20, figs. 48-51; BRADY, 1884, p. 135, pl. 1, figs. 1-4.

Nodobacularia tibia (JONES and PARKER). CUSHMAN, 1917, p. 39, pl. 8, figs. 1-2; CUSHMAN, 1929, p. 87, pl. 21, fig. 5.

Nodophthalmidium sp. BARKER, 1960, p. 2, pl. 1, figs. 1-4.

Occurrence and Repository: Central Area (Stn. 76, 91, 93: 142-220 m); Bay Mouth and open sea areas (Stn. 141, 144, 145, 146: 60-213 m; living 213 m): ESK Reg. no. F-7908 - 7914; hypotype in fig. 13, ESK Reg. no. F-7914 from Stn. 146.

Remarks: This is the first record of the present species in Japanese waters.

Genus *Vertebralina* D'ORBIGNY, 1826

Vertebralina striata D'ORBIGNY

Vertebralina striata D'ORBIGNY, 1826, Ann. Sci. Nat., ser. 1, tome 7, p. 283; ASANO, 1956, p. 81-82, pl. 9, fig. 19; BARKER, 1960, p. 24, pl. 12, figs.14, 15a-b, 16; MATSUNAGA, 1963, pl. 30, figs. 6a-b.

Occurrence and Repository: Bay Mouth Area (Stn. 127: 74 m): ESK Reg. no. F-7915.

Geographic Distribution: Off the northwest coast of North Honshū, the Pacific coast of Central Honshū and the north coast of Kyūshū, and the Seto Inland Sea; 24) 18-65 m; 45); 46) 229 m; 52) 31 m; 56) 15-33 m; 57) 1.5-1.8 m; 58); 59) 8.6 m; 60) 50-97.5 m; 63) 12 m; 67); 71) 17-27 m; 72); 73).

Family MILIOLIDAE EHRENBERG, 1839

Subfamily QUINQUELOCULININAE CUSHMAN, 1917

Genus *Quinqueloculina* D'ORBIGNY, 1826

Quinqueloculina agglutinata CUSHMAN

Pl. 5, fig. 1

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

Occurrence and Repository: Bay Mouth Area (Stn. 124: 20 m; living): ESK Reg. no. F-7916; hypotype in fig. 1, ESK Reg. no. F- 7917 from Stn. 124.

Geograpic Distribution: Off the Pacific coast of Central Honshū and the Seto Inland Sea; 37) 13-70 m); 50); 56) 33 m; 63) 12 m.

Quinqueloculina cf. *costata* D'ORBIGNY

Pl. 5, figs. 2a-b

Compared with:

Quinqueloculina costata D'ORBIGNY, 1826, Ann. Sci. Nat., v. 7, p. 301, no. 3.

Occurrence and Repository: Central Area (Stn. 99: 42 m); Bay Mouth Area (Stn. 116, 136: 60-61 m); ESK Reg. no. F-7918 - 7920; hypotype in figs. 2a-b, ESK Reg. no. F-7919 from Stn. 116.

Remarks: Only three specimens are in the collection and most of them are of juvenile stage.

Quinqueloculina elongata NATLAND

Quinqueloculina elongata NATLAND, 1938, Scripps Inst. Oceanogr., Bull., Tech. Ser., v. 4, no. 5, p. 141, pl. 4, fig. 5; MATOBA, 1970, p. 59, pl. 2, figs. 8a-b.

Occurrence and Repository: Bay Mouth Area (Stn. 106: 40 m); ESK Reg. no. F-7921.

Geographic Distribution: Off the east coast of Hokkaido, the northwest coast of North Honshū, the Pacific coast from North Honshū to Kyūshū and the north coast of Kyūshū; 5); 24) 10-65 m, living 12-65 m; 29) 0.8-12.5 m, living 0.8 m; 32); 38); 48) 74 m;

50); 52) 31-80 m; 56) 9-25 m; 61) 15-42 m; 63) 5-20 m; 65) 12.5-26 m; 66) 21-25 m; 70) 70 m with living specimens; 71) 17-27 m; 73); 76) 10-62 m.

Quinqueloculina laevigata D'ORBIGNY

Pl. 5, fig. 3

Quinqueloculina laevigata D'ORBIGNY, 1826, Ann. Sci. Nat., p. 301, no. 6; *in* BARKER WEBB and BERTHELOT, 1839, Hist. Nat. Iles Canaries, v. 2, pt. 2, Foraminiferes, p. 143, pl. 3, figs. 31, 33; HUANG, 1961, p. 85, pl. 1, figs. 20-21; PHLEGER, 1964, p. 383, pl. 1, fig. 16; CHIGI and LOPEZ, 1968, p. 110, pl. 8, figs. 12a-b, 13a-b.

Occurrence and Repository: West-Sakurajima Passage (Stn. 64: 66 m); Central Area (Stn. 70, 73, 74, 76, 83, 93, 94, 96, 100, 101: 23-220 m; living 28 m); Bay Mouth Area (Stn. 106, 110, 116, 118, 132, 137, 139, 146: 40-110 m; living 40-61 m); open sea area (Stn. 146: 213 m); ESK Reg. no. F-7922 - 7941; hypotype in fig. 3, ESK Reg. no. F-7942 from the stn. 116.

Geographic Distribution: Off the southwest coast of Central Honshū and the east coast of Kyūshū; 56) 7-38 m, living 7-9 m; 76) 17 m.

Quinqueloculina lamarckiana D'ORBIGNY

Pl. 5, figs. 4a-b

Quinqueloculina lamarckiana D'ORBIGNY, 1839, *in* DE LA SAGRA, Hist. Phys. Pol. Nat. Cuba, "Foraminiferes," p. 189, pl. 11, figs. 14-15; CUSHMAN, 1929, p. 26, pl. 2, figs. 6a-c; HADA, 1931, p. 79-80, text-figs. 32a-c; BANDY, 1953, p. 29, pl. 21, figs. 3a-c; ASANO, 1956, p. 60-61, pl. 7, fig. 17; pl. 8, figs. 14, 17; pl. 9, fig. 17; BARKER, 1960, p. 10, pl. 5, figs. 12a-c; BOLTOVSKOY, GIUSSANI, WATANABE and WRIGHT, 1980, p. 46, pl. 28, figs. 9-12.

Quinqueloculina cf. *lamarckiana* D'ORBIGNY. MATOBA, 1970, p. 59, pl. 2, figs. 7a-b.

Occurrence and Repository: West-Sakurajima Passage (Stn. 64, 65: 39-66 m); Central Area (Stn. 71, 86, 90, 99, 101, 104: 38-215 m); Bay Mouth Area (Stn. 108, 110, 113, 118, 122, 124, 125, 127, 132, 136, 137, 139: 20-140 m; living 102 m); ESK Reg. no. F-7943 - 7962; hypotype in fig. 4a, ESK Reg. no. F-7963 from Stn. 139; hypotype in fig. 4b, ESK Reg. no. F-7964 from Stn. 139.

Geographic Distribution: Off the coasts of Honshū, Shikoku and Kyūshū; 14) 70-505 m; 15) 100 m; 18) 17-25 fms; 19) 165-309 m; 21) 73-457 m; 27) 28-78 m; 35); 37) 13-70 m; 39); 44) 75-150 m; 45); 46) 126-516 m; 47) 54-292 m; 51) 23-232 m, living 23 m; 52) 31-120 m with living specimens; 54) 23 m; 55) 20-40 m; 56) 7- 31 m; 60) 97.5 m; 61) 15-74 m; 62) 96 m; 63) 5-20 m; 64) 46 m; 65) 19.5-26 m; 67) 234-349 m; 70) 70 m with living specimens; 71) 27 m; 72); 74) 132 m; 75) 90-300 m; 76) 10-79 m; 77) 122 m with living specimens.

Quinqueloculina stalkeri LOEBLICH and TAPPAN

Pl. 5, figs. 5a-c

Quinqueloculina stalkeri LOEBLICH and TAPPAN, 1953, Smithson. Misc. Coll., v. 121, no. 7, p. 40, pl. 5, figs. 5-9; BOLTOVSKOY, GIUSSANI, WATANABE and WRIGHT, 1980, p. 47, pl. 29, figs. 14-16.

Occurrence and Repository: Bay Head Area (Stn. 34, 64: 66- 149 m; living 66 m); Central Area (Stn. 83, 88, 99, 100, 104: 36- 78 m; living 38 m); Bay Mouth Area (Stn. 106, 107, 108, 113, 124, 136, 139, 143: 20-120 m; living 96-100 m); open sea area (Stn. 144, 145, 146: 105-213 m); ESK Reg. no. F-7965 - 7982; hypotype in fig. 5a, ESK Reg. no. F-7975 from Stn. 113; hypotype in fig. 5b, ESK Reg. no. F-7984 from Stn. 136;

hypotype in fig. 5c, ESK Reg. no. F-7983 from Stn. 124.

Remarks: This is the first record of the present species in Japanese waters.

Quinqueloculina vulgaris D'ORBIGNY

Pl. 5, figs. 6a-c

Quinqueloculina vulgaris D'ORBIGNY, 1826, Ann. Sci. Nat., v. 7, p. 302, no. 33; HADA, 1931, p. 76-77, text-figs. 29a-c; ASANO, 1956, p. 63, pl. 8, figs. 10a-c, 13a-c; HUANG, 1961, p. 85, pl. 1, fig. 1; MATOBA, 1970, p. 59-60, pl. 2, figs. 5a-b; HAGEMAN, 1979, p. 105, pl. 9, figs. 7a-b.

Occurrence and Repository: West-Sakurajima Passage (Stn. 64, 65: 39-66 m); Central Area (Stn. 66, 70, 71, 73, 74, 78, 83, 86, 88, 91, 99, 100, 104, 105: 23-207 m; living 40-42 m); Bay Mouth Area (Stn. 106, 107, 110, 116, 118, 124, 125, 127, 136, 137, 139, 141, 143: 20-140 m; living 20-105 m); open sea area (Stn. 144, 146: 105-213 m): ESK Reg. no. F-7985 - 8015; hypotype in fig. 6a, ESK Reg. no. F-8016 from Stn. 127; hypotype in fig. 6b, ESK Reg. no. F-8017 from Stn. 139; hypotype in fig. 6c, ESK Reg. no. F-8018 from Stn. 139.

Geographic Distribution: The seas adjacent to Japan; 1) 78-503 m; 6) 120 m; 14) 70-115 m; 15) 100 m; 18) 15 fms; 19) 165-539 m; 21) 68-187 m; 23) 40 m; 24) 8-65 m, living 8 m; 29) 1.7-12.5 m; 35); 37) 6-70 m; 38); 39); 44) 75-110 m; 46) 64-296 m; 48) 40- 74 m, living 40 m; 50); 51) 23-232 m, living 23-102 m; 52) 31-120 m, living 80-120 m; 56) 7-38 m; 60) 50-97.5 m; 61) 15-74 m; 62) 96 m; 63) 8-20 m; 65) 17.3-33 m; 66) 25 m; 67) 234 m; 71) 25-27 m; 72); 76) 17-79 m; 74) 93-194 m; 77) 35 m with living specimens.

Quinqueloculina sp.

Occurrence and Repository: West-Sakurajima Passage (Stn. 64: 66 m); Bay Mouth Area (Stn. 106, 139: 40-105 m); ESK Reg. no. F-8019 - 8021.

Remarks: The specimens in the collection resemble *Quinqueloculina bradyana* CUSHMAN in having angular chambers more or less plicated laterally and with the outer peripheral angle usually being sinuous, but are much smaller than *Q. bradyana* (less the half) and with a different aperture shape. It is probable, however, that the present specimens represent the juvenile stage of *Q. bradyana*.

Genus *Sigmoilopsis* FINLAY, 1947

Sigmoilopsis schlumbergeri (SILVESTRI)

Pl. 5, figs. 7a-b

Sigmoilina schlumbergeri SILVESTRI, 1904, Accad. Pont. Romana Nuovi Lincei, Mem., v. 22, p. 267, 269; TAKAYANAGI, 1955, pl. 1, figs. 13a-b.

Occurrence and Repository: Bay Head Area (Stn. 53: 94 m); Central Area (Stn. 86, 89, 90, 96: 95-215 m); Bay Mouth Area (Stn. 107, 110, 113, 122, 125, 127, 132, 137, 143: 74-140 m); open sea area (Stn. 146: 213 m); ESK Reg. no. F-8022 - 8036; hypotype in fig. 7a, ESK Reg. no. F-8037 from Stn. 107; hypotype in fig. 7b, ESK Reg. no. F-8038 from Stn. 113.

Geographic Distribution: Off the northeast coast of North Honshū and the north coast of Kyūshū, and the Seto Inland Sea; 19) 309 m; 32); 55) 40 m; 61) 52 m; 63) 5-15 m; 65) 12.5-26 m; 71) 17-25 m; 72); 73).

Sigmoilopsis sp.

Pl. 5, fig. 8

Occurrence and Repository: Central Area (Stn. 78, 79, 83, 84, 85, 104: 36-220 m); Bay Mouth Area (Stn. 118: 101 m); ESK Reg. no. F-8039 - 8045; hypotype in fig. 8, ESK Reg. no. F-8046 from Stn. 78.

Remarks: The neck-like projection on the aperture side of the last chamber is characteristic of the present specimens. Specific identification is impossible due to the small number of specimens.

Genus *Triloculina* D'ORBIGNY, 1826

Triloculina tricarinata D'ORBIGNY

Pl. 5, figs. 9a-c

Triloculina tricarinata D'ORBIGNY, 1826, Ann. Sci. Nat., ser. 1, v. 7, p. 299, no. 7; BARKER, 1960, p. 6, pl. 3, figs. 17a-b; HADA, 1931, p. 86-87, text-figs. 39a-b; ASANO, 1956, p. 73, pl. 8, fig. 6; MATSUNAGA, 1963, pl. 30, figs. 1a-b; CHIJI and LOPEZ, 1968, p. 113, pl. 7, figs. 11a-b; POAG, 1981, p. 84, pl. 57, fig. 3, pl. 58, 3a-b; NOMURA, 1983, p. 227, pl. 1, figs. 12a-b.

Miliolina tricarinata D'ORBIGNY. FLINT, 1975, p. 298, pl. 44, fig. 4.

Triloculina trigonula (LAMARCK). HAGEMAN, 1979, p. 107, pl. 10, figs. 4a-b.

Occurrence and Repository: Central Area (Stn. 66, 70, 83, 99: 23-130 m); Bay Mouth Area (Stn. 113, 136: 60-100 m); open sea area (Stn. 146: 213 m; living); ESK Reg. no. F-8047 - 8053; hypotype in figs. 9a-b, ESK Reg. no. F-8052 from Stn. 136; hypotype in fig. 9c, ESK Reg. no. F-8051 from Stn. 113.

Geographic Distribution: Off the coast of Honshū, Shikoku and Kyūshū, and the coastal area in Okino-erabu Island; 18) 4-18 fms; 19) 128-325 m; 21) 78-618 m; 23) 50-875 m, living 760 m; 24) 10-58 m; 32); 35); 37) 13-70 m; 38); 39); 40); 44) 75-642 m; 45); 46) 154-296 m; 55) 20-24 m; 56) 2.5-38 m; 57) 1.5-1.8 m; 58); 60) 50-97.5 m; 62) 96 m with living specimens; 63) 5-12 m; 64) 46 m; 71) 17-27 m; 72); 73); 74) 93-219 m; 75) 90-300 m; 76) 13-62 m; 79).

Triloculina trigonula (LAMARCK)

Pl. 5, fig. 10

Miliolites trigonula LAMARCK, 1804, Paris, Mus. Nat. Hist., Ann., v. 5, p. 151; LAMARCK, 1807, *ibid.*, v. 9, pl. 17, figs. 4a-c.

Triloculina trigonula (LAMARCK). CUSHMAN, 1929, p. 56, pl. 12, figs. 10-11, pl. 13, figs. 1-2; HADA, 1931, p. 85-86, text-figs. 38a-b; TAKAYANAGI, 1955, pl. 1, fig. 14; ASANO, 1956, p. 75, pl. 8, fig. 5; BARKER, 1960, p. 6, pl. 3, figs. 15a-b; HUANG, 1961, p. 86, pl. 2, fig. 15; MATSUNAGA, 1963, pl. 30, figs. 2a-b; MATOBA, 1970, p. 62, pl. 3, figs. 3a-b; BOLTOVSKOY, GIUSSANI, WATANABE and WRIGHT, 1980, p. 52, pl. 33, figs. 14-16; POAG, 1981, p. 84, pl. 57, fig. 2; pl. 58, figs. 2a-b.

Occurrence and Repository: Bay Mouth Area (Stn. 108, 124: 20-120 m; living 20 m): ESK Reg. no. F-8054 - 8055; hypotype in fig. 10, ESK Reg. no. F-8056 from Stn. 124.

Geographic Distribution: Off the coasts of Honshū, Shikoku and Kyūshū; 18) 10-23 fms; 19) 128-309 m; 21) 78 m; 24) 5-65 m, living 11 m; 27) 28-49 m; 28) 33 m; 29) 4.4 m; 32); 35); 37) 10-70 m; 38); 39); 40); 44) 110-419 m; 45); 46) 165-296 m; 48) 40 m; 49) 3.6 m; 50); 51) 23-155 m, living 43 m; 52) living 31-80 m; 56) 24-38 m; 58); 59) 7-8.6 m; 62) 96 m; 63) 5-15 m; 64) 46 m; 65) 22 m; 67) 234 m; 70) 70 m with living specimens; 71) 17-27 m; 72); 73); 74) 93 m; 75) 300 m; 76) 7-55 m; 77) 35 m with living specimens.

Subfamily MILIOLINELLINAE VELLA, 1957

Genus *Miliolinella* WIESNER, 1931

Miliolinella californica RHUMBLER

Pl. 5, figs. 11a-b

Miliolinella californica RHUMBLER, 1936, Kiel. Meeresf., Kiel, Deutschland, Bd. 1 (1936-1937), Heft 1, p. 215.

Occurrence and Repository: open sea area (Stn. 146: 213 m); hypotype in fig. 11a, ESK Reg. no. F-8057 from Stn. 146; hypotype in fig. 11b, ESK Reg. no. F-8058 from Stn. 146.

Remarks: This is the first record of the present species in Japanese waters.

Miliolinella circularis (BORNEMANN)

Pl. 5, figs. 12a-c

Triloculina circularis BORNEMANN, 1855, Deutsch. Geol. Ges., Zeitschr., v. 7, no. 2, p. 349, pl. 19, figs. 4a-c; CUSHMAN, 1929, p. 58-59, pl. 13, figs. 6-7, pl. 14, figs. 1-2.

Miliolina circularis BORNEMANN. MILLETT, 1898, p. 499, pl. 11, figs. 1, 3; FLINT, 1975, p. 298, pl. 44, fig. 1.

Miliolinella circularis (BORNEMANN). ASANO, 1956, p. 71-72, pl. 8, figs. 4, 8; CHIJI and LOPEZ, 1968, p. 108, pl. 10, figs. 3a-b, 4; MATSUNAGA, 1963, pl. 30, figs. 3a-c; MATOBA, 1970, p. 56, pl. 3, figs. 5a-b.

Occurrence and Repository: West-Sakurajima Passage (Stn. 64: 66 m; living); Central Area (Stn. 81: 220 m); Bay Mouth Area (Stn. 108, 137, 141: 60-120 m; living 60-120 m); open sea area (Stn. 146: 213 m); ESK Reg. no. F-8059 - 8064; hypotype in fig. 12a, ESK Reg. no. F-8065 from Stn. 146; hypotype in fig. 12b, ESK Reg. no. F-8066 from Stn. 137; hypotype in fig. 12c, ESK Reg. no. F-8067 from Stn. 108.

Geographic Distribution: Off the north coast of Hokkaido and the coasts of Honshū, Shikoku and Kyūshū; 1) 165-190 m; 19) 128-539 m; 21) 101-424 m; 23) 50 m; 24) 5-65 m, living 5-19 m; 29) 0.8-12.5 m; 32); 37) 13-70 m; 40); 44) 75-123 m; 45); 46) 192-229 m; 54) 23 m; 55) 33 m; 56) 15-31 m; 57) 1.5-1.8 m; 58); 59) 7-8.6 m; 60) 50-97.5 m; 62) 96 m with living specimens; 63) 5-15 m; 64) 22-46 m; 71) 17-27 m; 72); 73); 74) 110-132 m; 75) 152-353 m; 76) 10-79 m.

Miliolinella sublineata (BRADY)

Pl. 6, figs. 1a-c

Miliolina circularis (BORNEMANN) var. *sublineata* BRADY, 1884, Voy. Challenger, Rep., Zool., v. 9, p. 169, pl. 4, figs. 7a-c.

Milioninella sublineata (BRADY). ASANO, 1956, p. 73, pl. 8, fig. 16; MATOBA, 1970, p. 56, pl. 3, figs. 10a-b.

Occurrence and Repository: Bay Mouth Area (Stn. 124: 20 m); ESK Reg. no. F-8068; hypotype in fig. 1a, ESK Reg. no. F-8069; hypotype in fig. 1b, ESK Reg. no. F-8070; hypotype in fig. 1c, ESK Reg. no. F-8071.

Geographic Distribution: Off the northwest and southeast coasts of North Honshū and the Pacific coast of Central Honshū, and the Seto Inland Sea; 24) 5-65 m; 29) 3.5 m; 45); 46) 214-229 m; 60) 50 m; 63) 12 m.

Miliolinella oblonga (MONTAGU)

Vermiculum oblongum MONTAGU, 1803, Test. Brit., p. 522, pl. 14, fig. 9.

Miliolinella oblonga (MONTAGU). ASANO, 1956, p. 72-73, pl. 8, fig. 3; NOMURA, 1983, p. 226, pl. 1, figs. 10a-b.

Occurrence and Repository: Central Area (Stn. 99, 104: 38-42 m); ESK Reg. no. F-8072 - 8073.

Geographic Distribution: Off the northwest and southeast coasts of North Honshū,

the Pacific coast of Central Honshū, Shikoku and Kyūshū and the north coast of Kyūshū, and the Seto Inland Sea; 19) 165-251 m; 24) 8-65 m, living 8-49 m; 29) 0.4-12.5 m, living 0.4-0.5 m; 32); 38); 44) 455 m; 46) 126-296 m; 50); 56) 9-38 m; 62) 96 m; 64) 46 m; 65) 4.1-21 m; 72); 73); 76) 7-79 m.

Genus *Nummoloculina* STEINMANN, 1881

Nummoloculina sp.

Pl. 6, figs. 2a-f

Occurrence and Repository: Bay Mouth Area (Stn. 137, 141: 60-106 m); open sea area (Stn. 144, 145, 146: 105-213 m; living 105-155 m); ESK Reg. no. F-8074 - 8078; hypotype in fig. 2a, ESK Reg. no. F-8079 from Stn. 144; hypotype in fig. 2b, ESK Reg. no. F-8074 from Stn. 137; hypotype in fig. 2c, ESK Reg. no. F-8078 from Stn. 146; hypotype in fig. 2d, ESK Reg. no. F-8080 from Stn. 144; hypotype in fig. 2e, ESK Reg. no. F-8075 from Stn. 137; hypotype in fig. 2f, ESK Reg. no. F-8381 from Stn. 144.

Remarks: The specimens in the collection are characterized by spherical tests and a narrow slit-like aperture with lips.

Family SORITIDAE EHRENBERG, 1839

Subfamily SORITINAE EHRENBERG, 1839

Genus *Marginopora* QUOY and GAIMARD, 1830

Marginopora vertebralis QUOY and GAIMARD

Marginopora vertebralis QUOY and GAIMARD, 1930, Paris, France, F.G. Levrault, tome 60 (Zooph-zyt), p. 377.

Occurrence and Repository: Bay Mouth Area (Stn. 124: 20 m); ESK Reg. no. F-8382.

Geographic Distribution: Coastal areas at South Shikoku and the Nansei Islands; 67); 79); 80); 82).

Suborder ROTALIINA DELAGE and HÉROUARD, 1896

Superfamily NODOSARIACEA EHRENBERG, 1838

Family NODOSARIIDAE EHRENBERG, 1838

Subfamily NODOSARIINAE EHRENBERG, 1838

Genus *Amphicoryna* SCHLUMBERGER, 1881

Amphicoryna scalaris (BATSCH)

Pl. 6, figs. 3a-b

Nautilus (*Orthoceras*) *scalaris* BATSCH, 1791, Conch. Seesandes, no. 4, pl. 2, figs. 4a-b.
Nodosaria scalaris (BATSCH). CUSHMAN, 1921, p. 199, pl. 35, fig. 6.
Lagenonodosaria scalaris (BATSCH). ASANO, 1956, p. 26, pl. 6, figs. 5-7, 10; ISHIWADA, 1964, p. 14, pl. 2, fig. 29.
Nodosaria scalaris (BATSCH). HADA, 1931, p. 100, text-fig. 53.
Amphicoryna scalaris (BATSCH). BARKER, 1960, p. 134, pl. 63, figs. 28a-b, 29-31.

Occurrence and Repository: Central Area (Stn. 71, 73, 75, 79, 84, 88, 90, 93, 100, 102: 75-215 m); Bay Mouth Area (Stn. 108, 110, 113, 116, 122, 125, 132, 137: 61-140 m); ESK Reg. no. F-8083 - 8100; hypotype in fig. 3a, ESK Reg. no. F-8101 from Stn. 110; hypotype in fig. 3b, ESK Reg. no. F-8102 from Stn. 79.

Geographic Distribution: The seas adjacent to Japan; 6) 120 m; 15) 300 m; 18) 15-25 fms; 19) 128-525 m; 21) 187-439 m; 26) 81-146 m; 28) 37 m; 33) 154 m; 44) 110-642 m;

45); 46) 84-527 m; 47) 54-292 m; 48) 40-597 m, living 235 m; 51) 102-422 m, living 102-232 m; 52) 80-585 m, living 80-201 m; 60) 50-97.5 m; 61) 52-74 m; 62) 96 m; 67) 349 m; 70) 70-202 m; 70) 349 m; 74) 90-115 m; 75) 90-115 m; 76) 62 m.

Amphicoryna spicata (CUSHMAN and MCCULLOCH)

Pl. 6, figs. 4a-b

Lagena sulcata (WALKER and JACOB) var. *spicata* CUSHMAN and MCCULLOCH, 1950, Southern California, Univ., Publ., Allan Hancock Pacific Exped., v. 6, no. 6, p. 360.

Lagena striata (D'ORBIGNY) var. *strumosa* REUSS. CUSHMAN, 1913, p. 20, pl. 7, figs. 7-10; CUSHMAN, 1933, p. 32, pl. 8, figs. 2-3.

Lagena sulcata spicata CUSHMAN and MCCULLOCH. ASANO, 1951, p. 34, figs. 147, 148; ASANO, 1956, p. 37, pl. 5, figs. 32, 33; ISHIWADA, 1964, p. 14, pl. 2, fig. 28.

Occurrence and Repository: Central Area (Stn. 66, 74, 81, 84, 86, 98, 99, 101: 28-220 m; living 28-165 m); Bay Mouth Area (Stn. 106, 113, 122, 127, 137, 139: 40-106 m; living 100 m); open sea area (Stn. 145: 155 m); ESK Reg. no. F-8103 - 8117; hypotype in fig. 4a, ESK Reg. no. F-8118 from Stn. 113; hypotype in fig. 4b, ESK Reg. no. F-8119 from Stn. 113.

Geographic Distribution: Off the northwest coast of Hokkaido and the Pacific coasts of Honshū and Shikoku, and the Seto Inland Sea; 5); 26) 44-146 m; 27) 8-49 m; 32); 33) 83-154 m; 48) 74-149 m; 51) 43-422 m, living 43-232 m; 52) 80-408 m, living 80 m; 55) 13-64 m; 61) 32-60 m; 65) 19.9 m; 66) 21-27 m; 70) 202-475 m.

Genus *Dentalina* RISSO, 1826

Dentalina cf. *consobrina* D'ORBIGNY

Compared with:

Dentalina consobrina D'ORBIGNY, 1846, Foram. Foss. Vien., p. 46, pl. 2, figs. 1-3.

Dentalina cf. *consobrina* D'ORBIGNY. ASANO, 1956, p. 18, pl. 4, fig. 29

Occurrence and Repository: On the sea mountain at the Central Area (Stn. 86: 165 m); ESK Reg. no. F-8120.

Remarks: Only a single, imperfect specimen is in the collection.

Dentalina emaciata REUSS

Pl. 6, fig. 5

Dentalina emaciata REUSS, 1851, Deutsch. Geol. Ges., Zeitschr., Bd. 3, p. 63, pl. 3, fig. 9.

Dentalina consobrina D'ORBIGNY var. *emaciata* REUSS. HADA, 1931, p. 96-97, text-fig. 49: ASANO, 1956, p. 17, pl. 4, figs. 18-24.

Nodosaria consobrina D'ORBIGNY var. *emaciata* REUSS. FLINT, 1975, p. 310, pl. 56, fig. 1.

Occurrence and Repository: Central Area (Stn. 102: 162 m); Bay Mouth Area (Stn. 137, 139: 105-106 m); ESK Reg. no. F-8121 - 8123; hypotype in fig. 5, ESK Reg. no. F-8122 from Stn. 137.

Geographic Distribution: Off the northwest coast of North Honshū, the north coast of West Honshū, the Pacific coasts of Honshū and Shikoku and the north coast of Kyūshū; 18) 17-25 fms; 19) 309-349 m; 21) 214-439 m; 37) 23-53 m; 44) 139-402 m; 46) 84- 296 m; 48) 74 m with living specimens; 51) 232 m with living specimens; 52) 80-120 m with living specimens; 61) 70 m; 68) 481 m; 72); 74) 187-194 m.

Dentalina cf. *guttifera* D'ORBIGNY

Compared with:

Dentalina guttifera D'ORBIGNY, 1846, Gide et Comp., Paris, France, p. 49, pl. 2, figs. 11-13.

Occurrence and Repository: On the sea mountain at the Central Area (Stn. 86: 165 m; living); Bay Mouth Area (Stn. 118: 101 m); ESK Reg. no. F-8124 - 8125.

Remarks: The specimens in the collection are rather small in number and mostly imperfect.

Dentalina cf. *setanaensis* ASANO

Compared with:

Dentalina setanaensis ASANO, 1938, Tohoku Imp. Univ., Sci. Repts., ser. 2 (Geol.), v. 19 (1937-1938), no. 2, p. 215, pl. 30(7), figs. 9-12, 30-32.

Occurrence and Repository: Central Area (Stn. 84: 88 m); ESK Reg. no. F-8126.

Remarks: Only a single adult specimen with imperfect chambers is in the collection.

Dentalina cf. *subsoluta* (CUSHMAN)

Compared with:

Dentalina subsoluta (CUSHMAN). ASANO, 1956, Tohoku Univ., Sci. Rep. 2nd ser. (Geol.), v. 27, p. 19, pl. 4, fig. 35.

Occurrence and Repository: Central Area (Stn. 86, 88: 78-165 m); ESK Reg. no. F-8127 - 8128.

Remarks: Only a few individuals and the chambers of the adult stage are usually imperfect.

Dentalina vertebralis (BATSCH)

Pl. 6, fig. 6

Nautilus (Orthoceras) vertebralis BATSCH, Conch. des Seesandes, 1791, p. 3, no. 6, pl. 2, figs. 6a-b.
Nodosaria vertebralis (BATSCH). CUSHMAN, 1913, p. 60, pl. 32, fig. 1; CUSHMAN, 1921, p. 86-87, pl. 14, fig. 6.

Occurrence and Repository: Central Area (Stn. 87, 99: 42-182 m); Bay Mouth Area (Stn. 110, 113: 100-110 m); ESK Reg. no. F-8129 - 8132; hypotype in fig. 6, ESK Reg. no. F-8130 from Stn. 99.

Geographic Distribution: Off the southeast coast of Central Honshū and the south coast of Shikoku; 37) 23-53 m; 67) 481 m.

Remarks: The ornamentation characterizing the present species and the spines on the first chamber are clearly recognized.

Genus *Lagena* WALKER and JACOB, 1798

Lagena amphora REUSS

Pl. 6, fig. 7

Lagena amphora REUSS, 1863, K. Akad. Wiss. Wien, Math.-Naturw Cl, bd. 46, abth. 1 (1862), p. 330, pl. 4, fig. 57.
Lagena costata (WILLIAMSON) var. *amphora* REUSS. CUSHMAN, 1913, p. 21, pl. 12, fig. 2.

Occurrence and Repository: Central Area (Stn. 72: 216 m); hypotype in fig. 7, ESK Reg. no. F-8133 from Stn. 72.

Remarks: This species was originally described from an Oligocene formation. In 1913, CUSHMAN reported the Recent specimens from the North Pacific Ocean as a variety of *Lagena costata* (WILLIAMSON). This is the first record of the present species in Japanese waters.

Lagena distoma PARKER and JONES

Pl. 6, fig. 8

Lagena distoma PARKER and JONES MS., 1964, BRADY, Linn. Soc., London, Trans., v. 24, pt. 3, p. 467, pl. 48, fig. 6; BARKER, 1960, p. 119, pl. 58, figs. 11-15; TODD and LOW, 1967, p. A24, pl. 3, fig. 18; MATOBA, 1970, p. 55, pl. 3, fig. 14; FLINT, 1975, p. 306, pl. 53, fig. 5; INGLE, KELLER and KOLPACK, 1980, p. 140, pl. 4, fig. 12.

Occurrence and Repository: Central Area (Stn. 83, 84: 36-88 m; living 88 m); ESK Reg. no. F-8134 - 8135; hypotype in fig. 8, ESK Reg. no. F-8135 from Stn. 84.

Geographic Distribution: Off the coast of North Honshū and the east coast of Kyūshū, and the Seto Inland Sea; 18) 25-33 fms; 29) 2.2-5.2 m; 42) 1203 m; 66) 33 m; 76) 57 m.

Lagena elongata (EHRENBERG)

Pl. 6, fig. 9

Miliola elongata EHRENBERG, 1844, Berichte, Preuss. Akad. Wiss., Berlin, p. 274.

Lagena elongata (EHRENBERG). HADA, 1931, p. 104, text-fig. 59; BARKER, 1960, p. 116, pl. 56, figs. 27-28.

Occurrence and Repository: Central Area (Stn. 92, 95, 96, 97: 170-188 m); ESK Reg. no. F-8136 - 8139; hypotype in fig. 9, ESK Reg. no. F-8138 from Stn. 96.

Geographic Distribution: Off the Pacific coast from Honshū to Kyūshū and the north coast of Central Honshū, and the Seto Inland Sea; 15) 510-840 m; 17) 985 m; 18) 10-25 fms; 42) 633 m; 47) 290 m; 61) 65 m; 64) 32-60 m; 67) 201 m; 76) 79 m.

Lagena hispidula CUSHMAN

Pl. 6, fig. 10

Lagena hispidula CUSHMAN, 1913, U.S. Nat. Mus., Bull. 71, pt. 3, p. 14, pl. 5, figs. 2-3; BARKER, 1960, p. 114, pl. 56, figs. 10-11; COLE, 1981, p. 64, pl. 7, fig. 8.

Occurrence and Repository: Central Area (Stn. 83, 99: 36-42 m; living); ESK Reg. no. F-8140 - 8141; hypotype in fig. 10, ESK Reg. no. F-8140 from Stn. 83.

Geographic Distribution: Off the Pacific coast from the southeastern part of North Honshū to Shikoku, the northwest coast of North Honshū, the north coast of Central Honshū and the north coast of West Honshū; 19) 251-539 m; 21) 70-187 m; 37) 53 m; 44) 139 m; 46) 154-684 m; 48) 149 m; 51) 155-422 m, Living 155 m.

Lagena semilineata WRIGHT

Lagena semilineata WRIGHT, 1886, Belfast Nat. Field Club, Proc., N.S., v. 1, append. 9, p. 320, pl. 26, fig. 7; MATOBA, 1970, p. 56, pl. 3, fig. 17.

Occurrence and Repository: Bay Head Area (Stn. 22: 144 m); Central Area (Stn. 73, 75, 85, 91, 105: 80-220 m); ESK Reg. no. F-8142 - 8147.

Geographic Distribution: Matsushima and Kamaé Bays; 29) 5.2 m; 76) 57 m.

Lagena setigera MILLETT

Pl. 6, fig. 11

Lagena clavata D'ORBIGNY var. *setigera* MILLETT, 1901, Journ. R. Micr. Soc., p. 590, pl. 8, figs. 9a-b.

Occurrence and Repository: West-Sakurajima Passage (Stn. 63: 138 m); hypotype in fig. 11, ESK Reg. no. F-8148 from Stn. 63.

Remarks: This is the first record of the present species in Japanese waters.

Lagena striata (D'ORBIGNY)

Oolina striata D'ORBIGNY, 1839, Voy. Amer. Merid., Foraminiferes, v. 5, pt. 5, p. 21, pl. 5, fig. 12.
Lagena striata (D'ORBIGNY). ASANO, 1956, p. 32-34, pl. 5, figs. 28, 29.

Occurrence and Repository: Central Area (Stn. 82, 86: 150- 165 m); Bay Mouth Area (Stn. 107: 96 m); ESK Reg. no. F-8149 - 8151.

Geographic Distribution: Off the west and south coasts of Hokkaido, the Pacific coast from North Honshū to Kyūshū and the north coast of Kyūshū, and the Seto Inland Sea; 5); 6) 155 m; 12) 59 m; 13) 84-135 m; 14) 598-930 m; 15) Living 300 m; 48) 149-235 m, Living 235 m; 51) 23-232 m with living specimens; 52) 31-80 m, living 31 m; 56) 9-38 m; 61) 52-60 m; 66) 23 m; 67) 130-481 m; 72); 76) 17-79 m; 77) 745 m with living specimens.

Lagena aff. *substriata* WILLIAMSON

Pl. 7, fig. 1

Compared with:

Lagena substriata WILLIAMSON, 1848, Ann. Mag. Nat. Hist., ser. 2, v. 1, p. 15, pl. 2, fig. 12.

Occurrence and Repository: Central Area (Stn. 67, 87, 92, 102: 162-185 m); ESK Reg. no. F-8152 - 8155; hypotype in fig. 1, ESK Reg. no. F-8155 from Stn. 102.

Remarks: CUSHMAN (1913) mentioned that *Lagena substriata* has a long tapering neck, costulate surface extending up onto the neck often to its end and usually spirally arranged on the neck. Specimens from Kagoshima Bay are lacking in costulate spirally arranged on the neck.

Lagena tenuis (BORNEMANN)

Ovulina tenuis BORNEMANN, 1855, Dt. Geol. Ges., v. 7, no. 2, p. 317, pl. 12, fig. 3.
Lagena laevis (MONTAGU) forma *tenuis* BORNEMANN. BOLTOVSKOY, GIUSSANI, WATANABE and WRIGHT, 1980, p. 37, pl. 20, figs. 7-10.

Occurrence and Repository: Bay Head Area (Stn. 17: 146 m): ESK Reg. no. F-8156.

Remarks: This species is discriminated from *Lagena laevis* by its short costae on the aboral extremity.

Lagena sp. 1

Pl. 7, fig. 2

Occurrence and Repository: West-Sakurajima Passage (Stn. 63, 65: 39-138 m; living); Central Area (Stn. 72, 80, 89, 92: 95-225 m; living 225 m); Bay Mouth Area (Stn. 136: 60 m); ESK Reg. no. F-8157 - 8163; hypotype in fig. 2, ESK Reg. no. F-8160 from Stn. 92.

Remarks: The specimens in the collection are rather few and mostly imperfect.

Lagena sp. 2

Occurrence and Repository: Central Area (Stn. 74, 76: 28-220 m); ESK Reg. no. F-8164 - 8165.

Remarks: The specimens from Kagoshima Bay are similar to *Lagena substriata* WILLIAMSON having costulate spirally arranged on the neck. Every specimen has a short spine at the base, but *L. substriata* is lacking in the spine.

Genus *Lenticulina* LAMARCK, 1804

Lenticulina calcar (LINNÉ)

Pl. 7, figs. 3a-b

Nautilus calcar LINNÉ, 1758, Syst. Nat., Ed. 10, tomus 1, p. 709, pl. 1, figs. 3g-i, 4l-n.
Cristellaria calcar (LINNÉ). CUSHMAN, 1913, p. 72-73, pl. 32, fig. 4.
Robulus calcar (LINNÉ). KUWANO, 1962, p. 129, pl. 22, figs. 4a-b.
Lenticulina calcar (LINNÉ). BARKER, 1960, p. 146, pl. 70, figs. 9-12; MATOBA, 1967, p. 256, pl. 25, fig. 5.

Occurrence and Repository: Bay Head Area (Stn. 44, 63, 64: 66-144 m); Central Area (Stn. 67, 71, 72, 73, 75, 76, 79, 37, 139, 141, 143: 60-140 m); open sea area (Stn. 146: 213 m); ESK Reg. no. F-8166 - 8199; hypotype in figs. 3a-b, ESK Reg. no. F-8200 from Stn. 101.

Geographic Distribution: Off the Pacific coast from the southeastern part of Central Honshū to Kyūshū: 37) 13-53 m; 47) 81-238 m; 48) 74-235 m, living 124-235 m; 51) 43-155 m with living specimens; 52) Living 31-120 m; 61) 34-74 m; 62) 96 m with living specimens; 67) 481 m; 70) 123 m; 71) 17 m; 76) 13-55 m.

Remarks: KUWANO (1962) reported that the living specimens of this species ocurred from the five stations in the Central Area of Kagoshima Bay, ranging from 69 to 193 m in depth.

Lenticulina cultratus (MONTFORT)

Robulus cultratus MONTFORT, 1808, Conch. Syst., v. 1, p. 214, 54 genre.
Cristellaria cultrata (MONTFORT). CUSHMAN, 1913, p. 64-65, pl. 29, figs. 4a-b.

Occurrence and Repository: Central Area (Stn. 75: 93 m); Bay Mouth Area (Stn. 125: 140 m); ESK Reg. no. F-8201 - 8202.

Remarks: This is the first record of the present species in Japanese waters.

Lenticulina lucida (CUSHMAN)

Cristellaria lucida CUSHMAN, 1923, p. 111, pl. 30, fig. 2.
Robulus lucidus (CUSHMAN), MATSUNAGA, 1963, pl. 33, figs. 4a-b; ISHIWADA, 1964, p. 18, pl. 2, fig. 24.

Occurrence and Repository: West-Sakurajima Passage (Stn. 63: 138 m); Central Area (Stn. 67, 70, 100: 23-165 m): Bay Mouth Area (Stn. 107, 118, 122, 136, 139, 143: 60-105 m); open sea area (Stn. 144: 105 m); ESK Reg. no. F-8203 - 8213.

Geographic Distribution: Off the west coast of Hokkaido, the northwest and northeast coasts of North Honshū and the Pacific coasts of Central Honshū and Shikoku, and the Seto Inland Sea; 6) 120-155 m; 14) 70 m with living specimens; 24) 30-94 m; 48) 235-403 m; 51) 72-422 m, living 155-232 m; 52) 80-408 m, living 120-408 m; 61) 71 m; 63) 8 m; 70) 202 m with living specimens.

Lenticulina occidentalis (CUSHMAN)

Cristellaria occidentalis CUSHMAN, 1923, p. 102, pl. 25, fig. 2; pl. 26, figs. 1-2
Robulus occidentalis (CUSHMAN). TODD and LOW, 1967, p. A21, pl. 3, fig. 1.

Occurrence and Repository: Central Area (Stn. 94, 96: 105- 188 m); ESK Reg. no. F-8214 - 8215.

Remarks: This is the first record of the present species in Japanese waters.

Lenticulina peregrina (SCHWAGER)

Cristellaria peregrina SCHWAGER, 1866, Novara Exp., Geol. Theil, v. 2, p. 245, pl. 7, fig. 89.
Lenticulina peregrina (SCHWAGER). ASANO, 1956, p. 7, pl. 3, figs. 9, 17-18; BARKER, 1960, p. 144, pl. 68, figs.

11-16.

Occurrence and Repository: Central Area (Stn. 88: 78 m); ESK Reg. no. F-8216.

Geographic Distribution: Off the Pacific coast from the southeastern part of North Honshū to Shikoku; 19) 325 m; 46) 126- 223 m; 51) 72 m; 76) 79 m.

Lenticulina rotulata (LAMARCK)

Lenticulites rotulata LAMARCK, 1804, Ann. Mus. Nat., v. 5, p. 188, pl. 62, fig. 11.

Occurrence and Repository: Bay Mouth Area (Stn. 113, 125, 136: 60-140 m); ESK Reg. no. F-8217 - 8219.

Remarks: This is the first record of the present species in Japanese waters.

Lenticulina sagamiensis (ASANO)

Robulus sagamiensis ASANO, 1938, Sci. Rep. Tohoku Imp. Univ., 2nd ser., v. 19, no. 2, p. 201, pl. 25, fig. 6; pl. 26, figs. 11-13; pl. 28, fig. 12; pl. 29, fig. 16; ASANO, 1951, p. 7, figs. 32-33; ASANO, 1956, p. 47, pl. 1, figs. 9-11.

Occurrence and Repository: Central Area (Stn. 91: 207 m); Bay Mouth Area (Stn. 143: 96 m); ESK Reg. no. F-8220 - 8221.

Geographic Distribution: Off the Pacific coast from North Honshū to Shikoku, the north coast of Kyūshū and the north coast of West Honshū, and Yamato Bank; 19) 251-539 m; 22) 340 m; 44) 123-214 m; 46) 165-684 m; 70) 808 m with living specimens; 74) 132-146 m.

Lenticulina sp. 1

Pl. 7, fig. 4

Occurrence and Repository: Central Area (Stn. 67, 73, 93: 80-165 m); Bay Mouth and open sea areas (Stn. 139, 144: 105 m); ESK Reg. no. F-8222 - 8226; hypotype in fig. 4, ESK Reg. no. F-8227 from Stn. 144.

Remarks: The specimens at hand are similar to *Lenticulina orbicularis* (D'ORBIGNY) but their sizes are about one fifth of this species. The number of specimens in the present collection is insufficient for specific identification.

Lenticulina sp. 2

Pl. 7, figs. 5a-b

Occurrence and Repository: Central Area (Stn. 87, 89, 91: 95-207 m); open sea area (Stn. 143: 96 m); ESK Reg. no. F-8228 - 8231; hypotype in fig. 5a, ESK Reg. no. F-8229 from Stn. 89; hypotype in fig. 5b, ESK Reg. no. F-8232 from Stn. 91.

Remarks: The coiling of the present specimens loosen in the adult stage and their chambers inflate with growth.

Genus *Marginulina* D'ORBIGNY, 1826

Marginulina crepidula (FICHTEL and MOLL)

Nautilus crepidula FICHTEL and MOLL, 1803, Test. Micr., p. 107, pl. 19, figs. g-i.
Cristellaris crepidula (FICHTEL and MOLL). CUSHMAN, 1923, p. 117, pl. 35, figs. 3-4.

Occurrence and Repository: Bay Mouth Area (Stn. 137: 106 m); ESK Reg. no. F-8233.

Genus *Orthomorphina* STAINFORTH, 1952

Orthomorphina calomorpha (REUSS)

Nodosaria calomorpha REUSS, 1865, Denkschr. Akad. Wiss. Wien, v. 25, p. 129, pl. 1, figs. 15-19; BRADY, 1884, v. 9, p.497, pl. 61, fig. 7; CUSHMAN, 1923, p. 67, pl. 12, fig. 13.

Occurrence and Repository: Southern part of the Central Area (Stn. 105: 97 m; living); ESK Reg. no. F-8234.

Genus *Planularia* DEFRANCE, 1826

Planularia tricarinella (REUSS)

Cristellaria tricarinella REUSS, 1862, Sitz. Akad. Wiss. Wien, v. 46, p. 68, pl. 7, fig. 9; pl. 12, figs. 2-4.
Planularia tricarinella (REUSS). ASANO, 1956, p. 12-13, pl. 4, figs. 1-2; MATSUNAGA, 1963, pl. 32, figs. 3a-b.

Occurrence and Repository: Central Area (Stn. 79: 100 m); ESK Reg. no. F-8235.

Geographic Distribution: Off the south coast of Central Honshū; 51) 102-232 m with living specimens.

Genus *Saracenaria* DEFRANCE, 1824

Saracenaria latifrons (BRADY)

Pl. 7, fig. 6

Cristellaria latifrons BRADY, 1884, Rep. Voy. Challenger, Zool., v. 9, p. 544, pl. 68, fig. 19, pl. 113, fig. 11.
Saracenaria latifrons (BRADY). ASANO, 1956, p. 8, pl. 3, fig. 19; BARKER, 1960, p. 234, pl. 113, figs. 11a-b.

Occurrence and Repository: Central Area (Stn. 90, 96: 188- 215 m); ESK Reg. no. F-8236 - 8237; hypotype in fig. 6, ESK Reg. no. F-8237 from Stn. 96.

Geographic Distribution: Off the Pacific coast from North Honshū to Kyūshū; 19) 325 m; 46) 201-296 m; 70) 202-390 m, living 202 m; 77) 745 m.

Subfamily PLECTOFRONDICULARIINAE CUSHMAN, 1927

Genus *Plectofrondicularia* LIEBUS, 1902

Plectofrondicularia sp.

Occurrence and Repository: open sea area (Stn. 144: 105 m); ESK Reg. no. F-8238.

Remarks: Only a single, imperfect specimen is in the collection.

Family POLYMORPHINIDAE D'ORBIGNY, 1839

Subfamily POLYMORPHININAE D'ORBIGNY, 1839

Genus *Polymorphina* D'ORBIGNY, 1826

Polymorphina equalis D'ORBIGNY

Polymorphina equalis D'ORBIGNY, 1826, Ann. Sci. Nat., v. 7, p. 265, no. 13; CUSHMAN, 1923, p. 149-150, pl. 40, fig. 3.

Occurrence and Repository: West-Sakurajima Passage (Stn. 64: 66 m); ESK Reg. no. F-8239.

Polymorphina oblonga D'ORBIGNY

Polymorphina oblonga D'ORBIGNY, 1846, Gide et Comp., p. 232, pl. 12, figs. 29-31.

Occurrence and Repository: Central Area (Stn. 90: 215 m); open sea area (Stn. 146: 213 m); ESK Reg. no. F-8240 - 8241.

Genus *Guttulina* D'ORBIGNY, 1839

Guttulina communis (D'ORBIGNY)

Pl. 7, figs. 7a-b

Polymorphina (Guttuline) communis D'ORBIGNY, 1826, Ann. Sci. Nat., Paris, ser. 1, tome 7, p. 266, pl. 12, figs. 1-4; HADA, 1931, p. 111, text-fig. 68.

Occurrence and Repository: West-Sakurajima Passage (Stn. 64, 65: 39-66 m; living 66 m); Central Area (Stn. 85, 102, 104: 38- 220 m; living 162 m); Bay Mouth Area (Stn. 124: 20 m); ESK Reg. no. F-8242 - 8247; hypotype in fig. 7a, ESK Reg. no. F-8245 from Stn. 102; hypotype in fig. 7b, ESK Reg. no. F-8248 from Stn. 64.

Geographic Distribution: Mutsu and Ōmura Bays; 18) 25 fms; 73).

Guttulina pacifica (CUSHMAN and OZAWA)

Guttulina (Sigmoidina) pacifica (CUSHMAN and OZAWA). MATSUNAGA, 1963, pl. 34, figs. 1a-b; 2a-b.

Occurrence and Repository: Central Area (Stn. 88: 78 m); ESK Reg. no. F-8249.

Geographic Distribution: Off the northwest coast of Hokkaido, the northeast coast of North Honshū, the north and southwest coasts of Central Honshū, and the Seto Inland Sea; 5); 14) 115 m; 41) 7.8-64 m; 42) 142-222 m; 52) 80 m with living specimens; 61) 23-70 m; 63) 5 m; 66) 25 m.

Guttulina regina (BRADY, PARKER and JONES)

Pl. 7, fig. 8

Polymorphina regina BRADY, PARKER and JONES, 1870, Linn. Soc. London, Trans., v. 27, p. 241, pl. 41, figs. 32a-b.

Guttulina regina (BRADY, PARKER and JONES). HADA, 1931, p. 112, text-fig. 69.

Occurrence and Repository: West-Sakurajima Passage (Stn. 65: 39 m); hypotype in fig. 8, ESK Reg. no. F-8250.

Geographic Distribution: Mutsu and Ōmura Bays, and the Seto Inland Sea; 18) 10-23 fms; 55) 20 m; 63) 10-12 m; 64) 46 m with living specimens; 65) 21-26 m; 72); 73).

Guttulina sp.

Occurrence and Repository: Bay Head Area (Stn. 34: 149 m); Central Area (Stn. 88, 92, 101: 78-185 m); Bay Mouth Area (Stn. 124: 20 m; living); ESK Reg. no. F-8251 - 8255.

Remarks: The present specimens are similar to *Guttulina pacifica* but differ therefrom in having wider tests and in their outline.

Genus *Paradentalina* UCHIO, 1960

Paradentalina muraii (UCHIO)

Enantiodentalina muraii UCHIO, 1953, Japanese Jour. Geol. Geogr., Trans., v. 23, p. 152, pl. 14, figs. 1a-b, 2.

Occurrence and Repository: Bay Head Area (Stn. 34: 149 m): ESK Reg. no. F-8256.

Remarks: This species was originally described from the Pleistocene Naganuma Formation (UCHIO, 1953).

Genus *Sigmoidella* CUSHMAN and OZAWA, 1928

Sigmoidella elegantissima (PARKER and JONES)

Polymorphina elegantissima PARKER and JONES, 1870, Linn. Soc. London, Trans., v. 27, p. 231, pl. 40, figs. 15a-c.

Occurrence and Repository: West-Sakurajima Passage (Stn. 65: 39 m); ESK Reg. no. F-8257.

Genus *Sigmomorphina* CUSHMAN and OZAWA, 1928

Sigmomorphina sp. 1

Occurrence and Repository: West-Sakurajima Passage (Stn. 64: 66 m); ESK Reg. no. F-8258.

Remarks: Only a single specimen is in the collection.

Family GLANDULINIDAE REUSS, 1860

Subfamily SEABROOKIINAE REUSS, 1860

Genus *Seabrookia* BRADY, 1890

Seabrookia pellucida BRADY

Pl. 7, figs. 9a-b

Seabrookia pellucida BRADY, 1890, Roy, Micr. Soc., Jour., p. 568-569, tf. 60 (1a-c, 2); MILLETT, 1901, p. 3, pl. 1, fig. 4.

Occurrence and Repository: Central Area (Stn. 66, 71, 73, 75, 79, 82, 84, 86, 87, 94, 98, 100, 101: 75-182 m); Bay Mouth Area (Stn. 107, 113, 139: 96-105 m; living 105 m); ESK Reg. no.F-8259 - 8274; hypotype in fig. 9a, ESK Reg. no. F-8272 from Stn.107; hypotype in fig. 9b, ESK Reg. no. F-8275 from Stn. 139 .

Geographic Distribution: Off the east coast of Kyūshū; 76) 55-57 m.

Subfamily OOLININAE LOEBLICH and TAPPAN, 1961

Genus *Oolina* D'ORBIGNY, 1839

Oolina globosa (MONTAGU)

"*Serpula (Lagena) laevis globosa*" WALKER and BOYS, 1784, Test. Min., p. pl. 1, fig. 8.
Vermiculum globosum MONTAGU, 1803, Test. Brit., p. 523.
Lagena globosa (MONTAGU). CUSHMAN, 1923, p. 20, pl. 4, figs. 1-2.
Oolina globosa (MONTAGU). BARKER, 1960, p. 114, pl. 56, figs. 1-3.

Occurrence and Repository: Central Area (Stn. 75, 79, 95, 100: 75-170 m; living 75 m); ESK Reg. no. F-8276 - 8279.

Geographic Distribution: Ishikari Bay; 5).

Oolina hexagona (WILLIAMSON)

Pl. 7, fig. 10

Entosolenia squamosa (MONTAGU) var. *hexagona* WILLIAMSON, 1958, Ray Soc., p. 13, pl. 1, fig. 32.
Oolina hexagona (WILLIAMSON). TODD and LOW, 1967, p. A29, pl. 3, fig. 28; MATSUNAGA, 1963, pl. 31, fig. 29; MURRAY, 1971, p. 93, pl. 37, figs. 1-3.

Occurrence and Repository: Central Area (Stn. 76, 80, 88, 93: 78-225 m; living 225 m); Bay Mouth Area (Stn. 106, 116, 137, 139, 143: 40-106 m); ESK Reg. no. F-8280 - 8288; hypotype in fig. 10, ESK Reg. no. F-8289 from Stn. 137.

Geographic Distribution: Off the Pacific coast from North Honshū to Shikoku, the north and west coasts of Kyūshū and the north coast from West Honshū to Central Honshū; 19) 128 m; 21) 101-444 m; 28) 14-39 m; 32); 37) 18-53 m; 42) 633 m; 44) 123-402 m; 46) 126-296 m; 66) 16-17 m; 67) 234 m; 72); 73); 74) 93-115 m; 75) 90-148 m.

Oolina melo D'ORBIGNY

Pl. 7, figs. 11a-c

Oolina melo D'ORBIGNY, 1839, Strasbourg, France, Levrault, tome 5, pt. 5, p. 20, pl. 5, fig. 9; MATSUNAGA, 1963, pl. 31, fig. 30; TODD and LOW, 1967, p. A29, pl. 3, fig. 27; MATOBA, 1970, p. 57, pl. 3, fig. 19; MURRAY, 1971, p. 93, pl. 37, figs. 4-6.

Occurrence and Repository: West-Sakurajima Passage (Stn. 63, 64, 65: 39-138 m;

living 39-138 m); open sea area (Stn. 145: 155 m); ESK Reg. no. F-8290 - 8293; hypotype in fig. 11a, ESK Reg. no. F-8293 from Stn. 145; hypotype in fig. 11b-c, ESK Reg. no. F-8292 from Stn. 65.

Geographic Distribution: The seas adjacent to Japan; 5); 6) 155-220 m; 14) 115 m; 21) 187-448 m; 27) 28-49 m; 28) 30 m; 29) 2.4 m; 44) 150 -419 m; 46) 165-600 m; 48) 124-235 m; 51) 23-155 m, living 72-155 m; 52) 31-408 m, living 31 m; 58); 62) 96 m; 63) 5 m; 64) 46-60 m; 70) 70-808 m; 74) 110-194 m; 76) 17.5-62 m.

Oolina cf. *scalariformis* (WILLIAMSON)

Compared with:

Entosolenia squamosa (MONTAGU) var. *scalariformis* (WILLIAMSON), 1848, Ann. Mag. Nat. Hist., ser. 2, v. 1, p. 20, pl. 2, figs. 21-22.

Occurrence and Repository: West-Sakurajima Passage (Stn. 63: 138 m); ESK Reg. no. F-8294.

Remarks: Only a single specimen is in the collection. This species was reported under the name *Oolina scalariformis* (WILLIAMSON) by FINGER and LIPPS (1981).

Oolina squamosa (MONTAGU)

Pl. 7, fig. 12

Vermiculum squamosum MONTAGU, 1803, Testacea Britannica, p. 526, pl. 14, fig. 2.
Oolina squamosa (MONTAGU). MURRAY, 1971, p. 95, pl. 38, figs. 4-6; HAYWARD and BUZAS, 1979, p. 68, pl. 23, fig. 292.

Occurrence and Repository: Bay Mouth Area (Stn. 113: 100 m); hypotype in fig. 12, ESK Reg. no. F-8295 from Stn. 113.

Remarks: *Oolina squamosa* in Kagoshima Bay is smaller and the width of its rim is broad. This is the first record of the present species in Japanese waters.

Genus *Fissurina* REUSS, 1850

Fissurina agassizi TODD and BRONNIMANN

Pl. 8, fig. 1

Fissurina agassizi TODD and BRONNIMANN, 1957, Cushman Found. Foram. Res., Spec. Publ., no. 3, pl. 9, figs. 14a-b; TODD and LOW, 1967, p. A28, pl. 3, fig. 30.

Occurrence and Repository: Central Area (Stn. 102: 162 m); hypotype in fig. 1, ESK Reg. no. F-8296 from Stn. 102.

Remarks: This is the first record of the present species in Japanese waters.

Fissurina annectens (BURROWS and HOLLAND)

Lagena annectens BURROWS and HOLLAND, 1895, Palaeontogr. Soc., p. 203, pl. 7, figs. 11a-b.
Fissurina annectens (BURROWS and HOLLAND). BARKER, 1960, p. 122, pl. 59, fig. 15.

Occurrence and Repository: Central Area (Stn. 74, 76, 81, 85, 93, 95: 28-220 m; living 220 m); Bay Mouth and open sea areas (Stn. 137, 139, 144: 105-106 m; living 105 m); ESK Reg. no. F-8297 - 8305.

Geographic Distribution: Matsushima and Kamaé Bays; 29) 1.7-5.7 m; 76) 7-62 m.

Fissurina bisulcata (HERON-ALLEN and EARLAND)

Lagena bisulcata HERON-ALLEN and EARLAND, 1932, Discovery Repts., v. 4, p. 380, pl. 9, figs. 29-32.
Fissurina bisulcata (HERON-ALLEN and EARLAND). BOLTOVSKOY, GIUSSANI, WATANABE and WRIGHT, 1980, pl.

15, figs. 1-3.

Occurrence and Repository: Bay Mouth Area (Stn. 134: 112 m); ESK Reg. no. F-8306.

Fissurina cucurbitasema LOEBLICH and TAPPAN

Fissurina cucurbitasema LOEBLICH and TAPPAN, 1953, Smith. Misc. Coll., v. 121, no. 7, p. 76, pl. 14, figs. 10-11; TODD and LOW, 1967, p. A28, pl. 3, fig. 23; MATOBA, 1970, p. 54, pl. 3, figs. 22a-b; ŌKI, 1975, p. 40, pl. 2, fig. 1.

Occurrence and Repository: Bay Head Area (Stn. 34, 44, 63, 65: 39-149 m); Central Area (Stn. 73, 74, 104, 105: 28-97 m); Bay Mouth Area (Stn. 116, 118, 139: 61-105 m); ESK Reg. no. F-8307 - 8317.

Geographic Distribution: Lake Hamanako and Kamaé Bay; 50); 76) 57 m.

Fissurina goreaui BUZAS, SMITH and BEEM

Fissurina goreaui BUZAS, SMITH and BEEM, 1977, Smithsonian Contr. Paleobiol., Washington, D.C., no. 31, p. 71, pl. 1, figs. 17-18.

Occurrence and Repository: Central Area (Stn. 86: 165 m); Bay Mouth Area (Stn. 132: 100 m); ESK Reg. no. F-8318 - 8319.

Fissurina laevigata REUSS

Pl. 8, figs. 2a-b

Fissurina laevigata REUSS, 1850, K. Akad. Wiss. Wien, Math. -Nat. Cl., Bd. 1, p. 366, pl. 46, figs. 1a-b.

Occurrence and Repository: Central Area (Stn. 75, 79, 87, 91, 93, 97, 101, 103, 105: 93-207 m; living 142-207 m); open sea area (Stn. 144: 105 m); ESK Reg. no. F-8320 - 8329; hypotype in fig. 2a, ESK Reg. no. F-8330 from Stn. 144; hypotype in fig. 2b, ESK Reg. no. F-8331 from Stn. 144.

Geographic Distribution: Off the south coast of Hokkaido; 12) 56 m.

Fissurina lucida (WILLIAMSON)

Entosolenia marginata (MONTAGU) var. *lucida* WILLIAMSON, 1848, Ann. Mag. Nat. Hist., ser. 2, v. 1, p. 17, pl. 2, fig. 17.

Fissurina lucida (WILLIAMSON). TODD and LOW, 1967, p. A28, pl. 3, fig. 31.

Occurrence and Repository: Bay Mouth Area (Stn. 125: 140 m); ESK Reg. no. F-8332.

Geographic Distribution: Off the Pacific coasts of Honshū and Shikoku; 14) 505 m; 35); 51) 72-232 m; 56) 38 m; 58); 70) 390 m.

Fissurina marginata SEGUENZA

Fissurina marginata SEGUENZA, 1862, Messina, 1 talia, T. Capra, p. 66, pl. 2, figs. 27-28.

Occurrence and Repository: West-Sakurajima Passage (Stn. 63: 138 m); Central Area (Stn. 75: 93 m); Bay Mouth Area (Stn. 137: 106 m); ESK Reg. no. F-8333 - 8335.

Geographic Distribution: Off the west coast of Hokkaido, the coast of North Honshū, the Pacific coasts of Central Honshū and Shikoku, the north coast of Kyūshū and the north coast from Central to West Honshū; 6) 155-220 m; 20) 269 m; 21) 145-669 m; 22) 620 m; 27) 6-60 m; 28) 14-37 m; 44) 203-419 m; 46) 126-216 m; 48) 403 m; 74) 219-406 m.

Fissurina orbignyana SEGUENZA

Pl. 8, figs. 3a-b

Fissurina orbignyana SEGUENZA, 1862, Dei Terr. Terz. Messina, Pt. 2, Foram. monoth. mioc. Messina, p. 66, pl. 2, figs. 25-26: COLE, 1981, p. 82, pl. 19, figs. 26-27.

Occurrence and Repository: Central Area (Stn. 72, 86: 165- 216 m); Bay Mouth Area (Stn. 113, 137, 141: 60-106 m; living 60 m); open sea area (Stn. 145: 155 m); ESK Reg. no. F-8336 -8341; hypotype in fig. 3, ESK Reg. no. F-8338 from Stn. 113.

Geographic Distribution: Off the Pacific coast of North and Central Honshū and the Seto Inland Sea; 27) 49-60 m; 32); 48) 74- 597 m; 51) 23-232 m with living specimens; 52) 80-585 m, living 201 m; 55) 40 m; 64) 60 m.

Fissurina seguenziana (FORNASINI)

Lagena seguenziana FORNASINI, 1886, Soc. Geol. Ital., Boll., v. 5, p. 351, pl. 8, figs. 1-8.
Fissurine seguenziana (FORNASINI)?. BARKER, 1960, p. 122, pl. 59, fig. 1.
Fissurina seguenziana (FORNASINI). COLE, 1981, p. 83, pl. 19, figs. 29-30.

Occurrence and Repository: Bay Mouth Area (Stn. 134, 137, 139: 105-112 m); ESK Reg. no. F-8342 - 8344.

Fissurina semimarginata (REUSS)

Pl. 8, fig. 4

Lagena marginata SEGUENZA var. *semimarginata* REUSS, 1870, S.-B. Akad. Wiss. Wien, Math. Nat. Cl., v. 62, pt. 1, p. 468; BOLTOVSKOY, GIUSSANI, WATANABE and WRIGHT, 1980, p. 33, pl. 16, figs. 8-10.

Occurrence and Repository: Southern part of the Central Area (Stn. 104: 38 m); hypotype in fig. 4, ESK Reg. no. F-8345 from Stn. 104.

Geographic Distribution: Off the west coast of Hokkaido; 5); 6) 220 m.

Remarks: The specimen in the collection is slightly different from the specimens reported by BOLTOVSKOY *et al.* (1980) from the southwest Atlantic in ornamentation around the aperture.

Fissurina wiesneri BARKER

Pl. 8, figs. 6a-d

Fissurina wiesneri BARKER, 1960, p. 124, pl. 59, fig. 23; INGLE, KELLER and KOLPACK, 1980, p. 136, pl. 7, fig. 3.
Fissurina orbignyana SEGUENZA. HAYWARD and BUZAS, 1979, p. 57, pl. 16, fig. 208.

Occurrence and Repository: Central Area (Stn. 86, 92: 165- 185 m); Bay Mouth Area (Stn. 107, 110, 113, 127, 132, 137: 74-110 m; living 106 m); open sea area (Stn. 145, 146: 155-213 m); ESK Reg. no. F-8346 - 8355; hypotype in figs. 6a, c, ESK Reg. no. F-8350 from Stn. 113; hypotype in fig. 6b, ESK Reg. no. F-8353 from Stn. 137; hypotype in fig. 6d, ESK Reg. no. F-8355 from Stn. 146.

Remarks: This species was originally described from the early Miocene of Northern New Zealand (HAYWARD and BUZAS, 1979). This is the first record of the present species in Japanese waters.

Fissurina sp.

Pl. 8, fig. 5

Occurrence and Repository: Bay Mouth Area (Stn.141: 60 m; living); hypotype in fig. 5, ESK Reg. no. F-8356 from Stn. 141.

Remarks: The specimens in the collection are characterized by trifacial tests with

triangular apertures.

Genus *Parafissurina* PARR, 1947

Parafissurina sp.

Pl. 8, figs. 7a-b

Occurrence and Repository: Bay Mouth and open sea areas (Stn. 122, 134, 139, 145: 100-155 m; living 100-155 m); ESK Reg. no. F-8357 - 8360; hypotype in fig. 7a, ESK Reg. no. F-8360 from Stn. 145; hypotype in fig. 7b, ESK Reg. no. F-8357 from Stn. 122.

Remarks: The specimens in the collection are characterized by tests with nearly circular front views, broadly elliptical end views, and the development of carina.

Superfamily BULIMINACEA JONES, 1875

Family TURRILINIDAE CUSHMAN, 1927

Subfamily TURRILININAE CUSHMAN, 1927

Genus *Buliminella* CUSHMAN, 1911

Buliminella elegantissima (D'ORBIGNY)

Pl. 8, figs. 8a-c

Bulimina elegantissima D'ORBIGNY, 1839, Voy. Amer. Merid., Foraminiferes, v. 5, pt. 5, p. 51, pl. 7, figs. 13-14.
Buliminella elegantissima (D'ORBIGNY). COLE, 1931, p. 39, pl. 2, fig. 8; CUSHMAN, 1951, p. 39, pl. 11, fig. 20; BANDY, 1953, p. 28, pl. 24, figs. 14a-b; YOSHIDA, 1954, p. 153, pl. 1, fig. 3; PHLEGER, 1954, p. 637, pl. 1, figs. 24, 25; TAKAYANAGI, 1955, p. 43, pl. 2, fig. 1; BARKER, 1960, p. 104, pl. 50, figs. 20-22; AOKI, 1961, pl. 3, fig. 3; KUWANO, 1962, pl. 15, figs. 15-16; MATSUNAGA, 1963, pl. 39, figs. 4a-b; UJIIÉ, 1963, p. 230, pl. 1, fig. 16; ISHIWADA, 1964, p. 7, pl. 4, fig. 50; PHLEGER, 1964, p. 382, pl. 2, fig. 15; LOEBLICH and TAPPAN, 1964, p. C543, fig. 426, 3a-c; MATOBA, 1967, p. 252, pl. 25, fig. 8; TODD and LOW, 1967, p. A26, pl. 3, fig. 36; MATOBA, 1970, p. 50, pl. 3, fig. 24; MURRAY, 1971, p. 105, pl. 42, figs. 1-4; ŌKI, 1975, p. 41-42, pl. 2, fig. 2; HASEGAWA, 1979, p. 144, pl. 3, fig. 5; BOLTOVSKOY, GIUSSANI, WATANABE and WRIGHT, 1980, p. 21, pl. 6, figs. 7-10; POAG, 1981, p. 50, pl. 33, fig. 2; pl. 34, figs. 2a-b.

Occurrence and Repository: Bay Head Area (Stn. 22, 32, 34, 44, 45, 63, 65: 39-156 m; living 134-144 m); Central Area (Stn. 66, 67, 69, 70, 72, 73, 74, 75, 76, 77, 78, 79, 80, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 100, 101, 102, 104, 105: 23-225 m; living 23-215 m); Bay Mouth Area (Stn. 106, 107, 108, 116, 118, 127, 132, 134, 139: 40-120 m; living 112 m); open sea area (Stn. 145, 146: 155-213 m); ESK Reg. no. F-8361 - 8413; hypotype in fig. 8a, ESK Reg. no. F-8413 from Stn. 146; hypotype in fig. 8b, ESK Reg. no. F-8414 from Stn. 83; hypotype in fig. 8c, ESK Reg. no. F-8415 from Stn. 83.

Geographic Distribution: Off the coasts of Hokkaido and North Honshū and the coast of Central Honshū, and the Seto Inland Sea; 1) 136-580 m; 3) 9-17.5 m; 5); 7); 8); 9) 22-228 m; 11) 56-100 m, living 56 m; 12) 22-70 m; 13) 84-135 m; 14) 598 m; 15) 300 m; 17) 100-690 m; 24) 10 m with living specimens; 27) 6-78 m; 28) 14-39 m; 29) 0.8-12.5 m, living 0.8-0.9 m; 32); 41) 5.8-56 m; 42) 248 m; 48) 124 m; 50); 51) 23-72 m, living 23 m; 52) 80-120 m; 54) 23 m with living specimens; 56) 7-38 m; 59) 2.9-8.6 m; 60) 97.5 m; 64) 22-60 m, living 32-46 m; 71) 27 m.

Remarks: KUWANO (1962) pointed out the possibility that the specimens occurring in Kagoshima Bay are relics of those inhabiting the bay in the glacial age.

Buliminella milletti CUSHMAN

Pl. 8, fig. 9

Buliminella milletti CUSHMAN, 1933, Contr. Cushman Lab. Foram. Res., v. 9, pt. 4, no. 137, p. 78, pl. 8, figs. 5, 6a-b.

Occurrence and Repository: Central Area (Stn. 98, 102: 145-162 m); Bay Mouth Area (Stn. 132: 100 m); ESK Reg. no. F-8416 - 8418; hypotype in fig. 9, ESK Reg. no. F-8416 from Stn. 98.

Geographic Distribution: Coastal area at Hachijo Island; 40).

Family SPHAEROIDINIDAE CUSHMAN, 1927

Genus *Sphaeroidina* D'ORBIGNY, 1826

Sphaeroidina cf. *bulloides* D'ORBIGNY

Pl. 8, figs. 10a-b

Compared with:

Sphaeroidina bulloides D'ORBIGNY, 1826, Ann. Sci. Nat., Paris, ser. 1, v. 7, p. 267, no. 1.
Sphaeroidina cf. *bulloides* D'ORBIGNY. KUWANO, 1962, pl. 22, figs. 6a-b.

Occurrence and Repository: Central Area (Stn. 66, 67, 73, 96, 98: 80-188 m; living 80 m); Bay Mouth Area (Stn. 107, 122, 139, 143: 96-105 m; living 96 m); open sea area (Stn. 145: 155 m); ESK Reg. no. F-8419 - 8428; hypotype in fig. 10a, ESK Reg. no. F-8428 from Stn. 145; hypotype in fig. 10b, ESK Reg. no. F- 8429 from Stn. 143.

Remarks: KUWANO (1962) reported the living specimens of the present species in Kagoshima Bay off Kagoshima City at a depth of 42 m.

Sphaeroidina sp.

Pl. 8, figs. 11a-b

Sphaeroidina sp. A. Kuwano, 1962, pl. 22, figs. 7a-b.

Occurrence and Repository: Central Area (Stn. 87: 182 m); Bay Mouth Area (Stn. 108, 113, 118, 122, 132, 136, 141, 143: 60-120 m; living 120 m); open sea area (Stn. 144, 146: 105-213 m); ESK Reg. no. F-8430 - 8440; hypotype in fig. 11a, ESK Reg. no. F-8438 from Stn. 143; hypotype in fig. 11b, ESK Reg. no. F-8434 from Stn. 122.

Remarks: KUWANO (1962) reported the living specimens of the present species from two stations in Kagoshima Bay. One (92 m in depth) is located in the Bay Mouth Area and another (42 m in depth) off Kagoshima City.

Family BOLIVINITIDAE CUSHMAN, 1927

Genus *Bolivina* D'ORBIGNY, 1839

Bolivina abbreviata HERON-ALLEN and EARLAND

Pl. 8, figs. 12a-b

Bolivina limbata BRADY var. *abbreviata* HERON-ALLEN and EARLAND, 1924, Jour. Linn. Soc. Zool., v. 35, p. 622, pl. 36, figs. 25-27; ASANO, 1958, p. 18, pl. 4, fig. 5.

Occurrence and Repository: Central Area (Stn. 74, 83, 89, 91, 95, 101, 102, 104: 28-207 m; living 28-207 m); Bay Mouth Area (Stn. 106, 118, 134: 40-112 m); ESK Reg. no. F-8441 - 8451; hypotype in fig. 12a, ESK Reg. no. F-8445 from Stn. 95; hypotype in fig. 12b, ESK Reg. no. F-8442 from Stn. 83.

Remarks: This is the first record of the present species in Japanese waters.

Bolivina albatrossi CUSHMAN

Pl. 8, figs. 13a-c

Bolivina albatrossi CUSHMAN, 1922, p. 31, pl. 6, fig. 4.
Brizalina albatrossi (CUSHMAN). POAG, 1981, p. 44, pl. 23, fig. 5; pl. 24, fig. 5a-c.

Occurrence and Repository: Central Area (Stn. 76, 83, 90: 36-220 m); Bay Mouth Area (Stn. 113, 122, 134: 100-112 m; living 100 m); ESK Reg. no. F-8452 - 8457; hypotype in fig. 13a, ESK Reg. no. F-8454 from Stn. 90; hypotype in fig. 13b, ESK Reg. no. F-8457 from Stn. 134; hypotype in fig. 13c, ESK Reg. no. F-8455 from Stn. 113.

Remarks: This is the first record of the present species in Japanese waters.

Bolivina amygdalaeformis BRADY

Bolivina amygdalaeformis BRADY, 1881, Quart. Journ. Micr. Sci., v. 21, p. 59; 1884, Rep. Voy. Challenger, Zoology, v. 9, p. 426, pl. 53, figs. 28-29; CUSHMAN, 1911, p. 42 -43, figs. 69a-b; CUSHMAN, 1921, p. 133, pl. 26, fig. 3.

Occurrence and Repository: Central Area (Stn. 74, 79, 92: 28-185 m); Bay Mouth Area (Stn. 127, 132, 136, 141, 143: 60-100 m; living 100 m); open sea area (Stn. 146: 213 m); ESK Reg. no. F-8458 - 8466.

Geographic Distribution: Off the Pacific coasts of Central Honshū and Shikoku, the northwest coast of Kyūshū and the north coast of West Honshū; 44) 75-123 m; 46) 165-199 m; 61) 21-71 m; 74) 93 m; 75) 90 m.

Bolivina durrandii MILLETT

Pl. 8, figs. 14a-c

Bolivina durrandii MILLETT, 1900, Roy. Micr. Soc. London, Jour., p. 544, pl. 4, figs. 7a-b.

Occurrence and Repository: Central Area (Stn. 70, 81, 88, 92, 94, 97, 105: 23-220 m); Bay Mouth Area (Stn. 108, 110, 116, 127, 141: 60-120 m; living 60-61 m); ESK Reg. no. F-8467 - 8478; hypotype in fig. 7a, ESK Reg. no. F-8475 from Stn. 110; hypotype in fig. 7b, ESK Reg. no. F-8474 from Stn. 108; hypotype in fig. 7c, ESK Reg. no. F-8473 from Stn. 105.

Geographic Distribution: Kamaé Bay; 76) 17 m.

Bolivina hadai UCHIO

Pl. 9, fig. 1

Bolivina hadai UCHIO, 1962, p. 388-389, pl. 18, figs. 3a-b, 4a-b.

Occurrence and Repository: Central Area (Stn. 74, 78, 83, 104: 28-40 m; living 28 m); Bay Mouth Area (Stn. 132: 100 m); ESK Reg. no. F-8479 - 8483; hypotype in fig. 1, ESK Reg. no. F-8483 from Stn. 132.

Geographic Distribution: Off the west coast of North Honshū and the Seto Inland Sea; 23) 40-66 m, living 66 m; 24) 5-75 m, living 10-30 m; 25) 38 m with living specimens; 41) 34-55 m; 54) 23 m with living specimens; 62) 96 m with living specimens; 64) 22-60 m, living 46 m.

Remarks: The three stations showing high frequencies (1.9-4.0%) are distributed off the coast between Kagoshima and Kiiré.

Bolivina humilis CUSHMAN and MCCULLOCH

Pl. 9, figs. 2a-f

Bolivina seminuda CUSHMAN var. *humilis* CUSHMAN and MCCULLOCH, 1942, Southern California, Univ., Publ., Allan Hancock Pacific Exped., v. 6, no. 4, p. 211, pl. 26, figs. 1-6.

Occurrence and Repository: West-Sakurajima Passage (Stn. 65: 39 m); Central Area (Stn. 70, 73, 85, 88, 90, 92, 93, 96, 97, 98, 99, 100, 103, 104: 23-220 m; living 38-142 m); Bay Mouth Area (Stn. 106, 107, 108, 110, 113, 116, 118, 122, 124, 125, 127, 132, 136, 137, 139, 141, 143: 20-140 m; living 20-96 m); open sea area (Stn. 145, 146: 155-213 m); ESK Reg. no. F-8484 - 8517; hypotype in fig. 2a, ESK Reg. no. F-8518 from Stn. 104; hypotype in fig. 2b, ESK Reg. no. F-8519 from Stn. 104; hypotype in fig. 2c, ESK Reg. no. F-8520 from Stn. 106; hypotype in fig. 2d, ESK Reg. no. F-8521 from Stn. 141; hypotype in fig. 2e, ESK Reg. no. F-8522 from Stn. 139; hypotype in fig. 2f, ESK Reg. no. F-8523 from Stn. 139.

Bolivina karreriana BRADY

Pl. 9, figs. 3a-b

Bolivina karreriana BRADY, 1881, Quart. Jour., Micr. Sci., London, n.s., v. 21, p. 58.
Loxostomum karrerianum carinatum (MILLETT). KUWANO, 1962, pl. 19, fig. 8.

Occurrence and Repository: West-Sakurajima Passage (Stn. 63, 64, 65: 39-138 m); Central Area (Stn. 66, 70, 73, 74, 75, 78, 83, 88, 92, 99, 100, 104, 105: 23-185 m; living 28-42 m); Bay Mouth Area (Stn. 106, 110, 116, 118, 127, 134, 136, 141: 40-112 m; living 40-61 m); ESK Reg. no. F-8524 - 8547; hypotype in fig. 3a, ESK Reg. no. F-8548 from Stn. 127; hypotype in fig. 3b, ESK Reg. no. F-8549 from Stn. 99.

Geographic Distribution: Off the northwest coast of North Honshū and the Pacific coast of Central Honshū; 24) 20-75 m; 36) living 208-333 m; 37) 53-70 m; 41) 6.7-65 m; 43) 45-105 m; 46) 126 m; 47) 864-1063 m; 48) 235-597 m, living 235 m; 51) 422-665 m; 52) 201-585 m; 55) 20-42 m; 58).

Bolivina kiiensis ASANO

Pl. 9, figs. 4a-d

Bolivina kiiensis ASANO, 1958, p. 19, pl. 4, figs. 7, 8; ISHIWADA, 1964, p. 40, pl. 4, fig. 61; KUWANO, 1962, p. 132, pl. 14, fig. 12.

Occurrence and Repository: West-Sakurajima Passage (Stn. 64: 66 m); Central Area (Stn. 70, 71, 73, 98, 99, 100, 102, 103, 105: 23-175 m; living 60-175 m); Bay Mouth Area (Stn. 110, 122, 127, 136, 137, 139, 141: 60-110 m); ESK Reg. no. F-8550 - 8566; hypotype in figs. 4a-b, ESK Reg. no. F-8567 from Stn. 141; hypotype in fig. 4c, ESK Reg. no. F-8568 from Stn. 103; hypotype in fig. 4d, ESK Reg. no. F-8569 from Stn. 136..

Geographic Distribution: Off the Pacific coasts from Central Honshū to Kyūshū; 46) 126-481 m; 52) 80 m; 60) 97.5 m; 69) 56-98 m; 70) 70-390 m, living 70 m; 77) 122 m; 78) living 23-225 m.

Remarks: This species has been recorded from the coastal water influenced by the Kuroshio current along the Pacific side of the southwest islands of Japan from Shizuoka Prefecture and southwards.

Bolivina ordinaria PHLEGER and PARKER

Pl. 9, figs. 5a-d

Bolivina simplex PHLEGER and PARKER, 1950, Geol. Soc. Amer. Mem. 46, p. 14, pl. 7, figs. 4, 5a-b, 6 (emend. PHLEGER and PARKER, 1952, Cushman Found. Foram. Res., Contr., v. 3, pt. 1, p. 14, *Bolivina ordinaria*).
Bolivina robusta BRADY var. B. KUWANO, 1962, pl. 15, fig. 3.

Occurrence and Repository: Bay Head Area (Stn. 22, 32, 34, 44, 45: 134-156 m); West-Sakurajima Passage (Stn. 63, 64, 65: 39- 138 m; living 39-66 m); Central Area (Stn. 66, 67, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105: 23-225 m; living 60-140 m); Bay Mouth Area (Stn. 106, 107, 108, 110, 113, 116, 118, 122, 124, 125, 127, 132, 134, 136, 137, 139, 141, 143: 20-140 m); open sea area (Stn. 144, 145, 146: 105-213 m; living 105 m); ESK Reg. no. F-8570 - 8636; hypotype in fig. 5a, ESK Reg. no. F-8637 from Stn. 145; hypotype in fig. 5b, ESK Reg. no. F-8638 from Stn. 127; hypotype in fig. 5c, ESK Reg. no. F-8639 from Stn. 127; hypotype in fig. 5d, ESK Reg. no. F-8640 from Stn. 127.

Geographic Distribution: Off the Bōsō Peninsula; 36) living 73-118 m.

Bolivina pacifica CUSHMAN and MCCULLOCH

Pl. 9, figs. 6a-c

Bolivina acerosa CUSHMAN var. *pacifica* CUSHMAN and MCCULLOCH, 1942, Allan Hancock Pacific Exped., v. 6, no. 4, p. 181, pl. 21, figs. 2-3.
Bolivina pacifica CUSHMAN and MCCULLOCH. BANDY, 1953, v. 27, no. 2, p. 28, pl. 24, figs. 8a-b.
Bolivina acerosa pacifica CUSHMAN et MCCULLOCH. KUWANO, 1962, pl. 14, figs. 9-11.

Occurrence and Repository: Central Area (Stn. 71, 73, 79, 82, 84, 87, 88, 92, 93, 94, 95, 97, 98, 99, 100, 102, 103, 105: 42-185 m; living 88-162 m); Bay Mouth and open sea areas (Stn. 106, 108, 110, 113, 118, 122, 127, 132, 134, 136, 137, 139, 141, 143, 144: 40-120 m; living 40-105 m); ESK Reg. no. F-8641 - 8673; hypotype in fig. 6a, ESK Reg. no. F-8674 from Stn. 97; hypotype in fig. 6b, ESK Reg. no. F-8675 from Stn. 137; hypotype in fig. 6c, ESK Reg. no. F-8676 from Stn. 132..

Geographic Distribution: Off the northwest and southeast coasts of North Honshū and the Pacific coast from Central Honshū to Kyūshū, and the Seto Inland Sea; 23) 650-875 m with living specimens; 25) 230-760 m with living specimens; 30); 48) 74-403 m with living specimens; 50); 51) 72-232 m with living specimens; 52) 80-585 m, living 80-201 m; 64) 60 m; 70) 70-475 m with living specimens; 76) 7-62 m; 77) 35-122 m with living specimens.

Bolivina retia ŌKI, n. sp.

Pl. 9, figs. 7a-f

Test small, rice shaped, about twice as long as broad, periphery broadly rounded; chambers not distinct, about twice as broad as high; sutures not distinct, obliquely curved, at the periphery forming an angle of about 45° with the horizontal; wall ornamented by reticulate perforation; aperture a small, oval opening at the base of the inner margin of the chamber.

Types and Dimensions: Holotype in fig. 7a, f, ESK Reg. no. F-8677 from Stn.139, length 0.20 mm, breadth 0.10 mm, thickness 0.06 mm; paratype in fig. 7b, ESK Reg. no. F-8678 from Stn. 103, length 0.17 mm, breadth 0.09 mm, thickness 0.05 mm; paratype in fig. 7c, ESK Reg. no. F-8679 from Stn. 139, length 0.22 mm, breadth 0.11 mm, thickness 0.06 mm; paratype in fig. 7d, ESK Reg. no. F-8680 from Stn. 132, length 0.18 mm, breadth 0.09 mm, thickness 0.06 mm; paratype in fig. 7e, ESK Reg. no. F-8681

from Stn. 139, length 0.17 mm, breadth 0.09 mm, thickness 0.05 mm.

Occurrence and Repository: Central Area (Stn. 66, 71, 73, 75, 76, 77, 79, 80, 81, 82, 85, 87, 88, 89, 90, 91, 92, 93, 96, 98, 101, 103: 78-225 m; living 145 m); Bay Mouth Area (Stn. 108, 110, 116, 118, 122, 132, 134, 139: 61-120 m; living 105 m); open sea area (Stn. 144: 105 m); ESK Reg. no. F-8682 - 8712.

Remarks: This new species is distributed in the deepest part of the Bay Mouth Area and on the slope between the outer margin of the submarine terrace and the deep basin bottom in the Central Area (frequency: 1-3%).

Bolivina robusta BRADY

Pl. 10, figs. 1a-e

Bolivina robusta BRADY, 1881, Quart. Jour. Micr. Sci., London, v. 21, p. 27; HADA, 1931, p. 131-132, text-figs. 88a-b; TAKAYANAGI, 1955, p. 43, pl. 2, fig. 5; ASANO, 1958, p. 20-21, pl. 5, figs. 1-3; ISHIWADA, 1964, p. 17, 19, 24, pl. 4, fig. 63; CHIJI and LOPEZ, 1968, p. 105, pl. 10, fig. 15; MATOBA, 1970, p. 49, pl. 3, figs. 26a-b; HASEGAWA, 1979, p. 143, pl. 3, figs. 9a-b, 10a-b.

Bolivina robusta BRADY var. C. KUWANO, 1962, pl. 15, fig. 5.

Occurrence and Repository: Bay Head Area (Stn. 32, 34, 44, 45: 134-156 m); West-Sakurajima Passage (Stn. 63, 64, 65: 39-138 m; living 39 m); Central Area (Stn. 66, 67, 69, 70, 71, 73, 74, 75, 76, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 97, 98, 99, 100, 101, 102, 103, 104, 105: 23-225 m; living 28-170 m); Bay Mouth Area (Stn. 106, 107, 108, 110, 113, 116, 118, 122, 124, 125, 127, 132, 134, 136, 137, 139, 141, 143: 20-140 m; living 60-140 m); open sea area (Stn. 146: 213 m); ESK Reg. no. F-8713 - 8774; hypotype in fig. 1a, ESK Reg. no. F-8775 from Stn. 64; hypotype in fig. 1b, ESK Reg. no. F-8776 from Stn. 146; hypotype in fig. 1c, ESK Reg. no. F-8777 from Stn. 104; hypotype in fig. 1d, ESK Reg. no. F-8778 from Stn. 146; hypotype in fig. 1e, ESK Reg. no. F-8779 from Stn. 104.

Geographic Distribution: The seas adjacent to Japan; 8); 13) 135 m; 14) 598 m; 17) 100 m; 18) 18 fms; 19) 102-525 m; 21) 68- 618 m; 23) 40-95 m, living 50-80 m; 24) 5-100 m, living 30-94 m; 25) 50 m; 26) 44-135 m; 29) 0.8-4.4 m; 30); 32); 33) 83-1111 m; 34) 64-1180 m; 37) 14-70 m; 42) 83-1203 m; 43) 45-430 m; 44) 75-411 m; 46) 84-600 m; 47) 107-1488 m; 48) 40-597 m with living specimens; 49); 51) 23-665 m with living specimens; 52) 31-585 m, living 31-408 m; 53); 54) 23 m; 55) 33-64 m; 56) 15-38 m; 61) 23- 80 m; 62) 96 m with living specimens; 63) 10 m; 64) 22-60 m, living 46-60 m; 67) 201-481 m; 69) 56-900 m; 70) 70-808 m, living 70-202 m; 73); 74) 93-194 m; 75) 90-549 m; 76) 10-79 m; 77) 35- 745 m, living 35-122 m.

Bolivina spinea CUSHMAN

Pl. 10, figs. 2a-b

Bolivina spinea CUSHMAN, 1936, Cushman Lab. Foram. Res., Spec. Publ., no. 6, p. 58, pl. 8, figs. 11a-b.

Occurrence and Repository: West-Sakurajima Passage (Stn. 63: 138 m); Central Area (Stn. 74, 81, 83: 28-220 m); ESK Reg. no. F- 8780 - 8783; hypotype in fig. 2a, ESK Reg. no. F-8784 from Stn. 63; hypotype in fig. 2b, ESK Reg. no. F-8785 from Stn. 63.

Geographic Distribution: Off the south coast of Hokkaido and the northeast coast of

North Honshū; 11) 902 m with living specimens; 13) 640 m with living specimens; 15) 510-840 m with living specimens; 17) 690-985 m.

Bolivina striatula CUSHMAN

Pl. 10, figs. 3a-b

Bolivina striatula CUSHMAN, 1922, Publ. 311, Carnegie Inst. Wash., p. 27, pl. 3, fig. 10; MATOBA, 1970, p. 49, pl. 3, figs. 28a-b.

Brizalina striatula (CUSHMAN). CHIJI, 1969, fig. 4; SLITER, 1970, p. 170, pl. 7, fig. 6, pl. 8; ŌKI, 1975, p. 42, pl. 2, fig. 3.

Occurrence and Repository: Bay Head Area (Stn. 22, 63, 65: 39-144 m; living 39 m); Central Area (Stn. 67, 69, 70, 71, 73, 74, 75, 77, 78, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105: 23-225 m; living 23-170 m); Bay Mouth Area (Stn. 106, 107, 116, 118, 125, 127, 132, 134, 137, 139, 143: 40-140 m); ESK Reg. no. F-8786 - 8833; hypotype in fig. 3a, ESK Reg. no. F-8834 from Stn. 101; hypotype in fig. 3b, ESK Reg. no. F-8835 from Stn. 91.

Geographic Distribution: Off the northwest and southeast coasts of North Honshū and the south coast of Central Honshū, and the Seto Inland Sea; 23) 40-56 m, living 56 m; 24) 10-68 m, living 10-30 m; 29) 0.7-12.5 m, living 0.8-8.7 m; 50); 55) 33-64 m; 56) 9-38 m.

Bolivina striatula nishikanbaraensis MATSUNAGA

Bolivina striatula nishikanbaraensis MATSUNAGA, 1963, p. 111, pl. 40, figs. 14a-b.

Occurrence and Repository: Central Area (Stn. 74, 83, 90: 28-215 m; living 28-36 m); Bay Mouth Area (Stn. 107, 127: 74-96 m); ESK Reg. no. F-8836 - 8840.

Remarks: This species was originally described from the Pliocene Wanazu, Tsukayama and Oguni Formations in Niigata Prefecture (MATSUNAGA, 1963).

Bolivina subreticulata PARR

Pl. 10, figs. 4a-c

Bolivina reticlulata BRADY, 1884, Voy. Challenger, Rep., Zool., v. 9, p. 426, pl. 53, figs. 30-31.

Bolivina subreticulata PARR, 1932, Proc. Roy. Soc. Victoria, v. 44, p. 12, pl. 1, figs. 21a-b; CUSHMAN, 1942, p. 31, pl. 9, fig. 2; BARKER, 1960, p. 110, pl. 53, figs. 30a-b, 31.

Occurrence and Repository: Bay Mouth Area (Stn. 108, 118, 122, 143; 96-120 m); open sea area (Stn. 145, 146: 155-213 m); ESK Reg. no. F-8841 - 8846; hypotype in fig. 4a, ESK Reg. no. F-8847 from Stn. 146; hypotype in fig. 4b, ESK Reg. no. F-8841 from Stn. 108; hypotype in fig. 4c, ESK Reg. no. F-8848 from Stn. 143.

Bolivina subspinescens CUSHMAN

Pl. 10, figs. 5a-b

Bolivina spinescens CUSHMAN, 1911, U.S. Nat. Mus., Bull. 71, pt. 2, p. 46-47, figs. 76a-b; MATOBA, 1967, p. 251, pl. 25, fig. 17.

Bolivina subspinescens CUSHMAN, 1922, p. 48, pl. 7, fig. 5; COLE, 1981, p. 88, pl. 10, fig. 4.

Occurrence and Repository: Bay Head Area (Stn. 44, 45, 63, 65; 39-144 m); Central Area (Stn. 71, 73, 74, 75, 77, 79, 83, 84, 88, 91, 93, 94, 95, 96, 99, 104: 28-207 m; living 78-196 m); Bay Mouth and open sea areas (Stn. 110, 116, 118, 125, 127, 132, 134, 136, 137, 139, 141, 144: 60-140 m); ESK Reg. no. F-8849 - 8880; hypotype in fig. 5a, ESK Reg. no. F-8881 from Stn. 139; hypotype in fig. 5b, ESK Reg. no. F-8877 from Stn. 137.

Geographic Distribution: Off the northwest and southeast coasts of North Honshū and the Pacific coast from Central Honshū to Kyūshū; 23) 56-95 m, living 64 m; 30) 50-150 m; 42) 83-248 m; 48) 74-597 m, living 74-235 m; 51) 72-665 m, living 72-232 m; 52) 80-585 m with living specimens; 70) 123-808 m; 77) 122-745 m.

Bolivina variabilis (WILLIAMSON)

Pl. 10, figs. 6a-f

Textularia variabilis WILLIAMSON, 1858, Ray Soc., p. 75, pl. 6, figs. 162-163.
Bolivina plicatella mera CUSHMAN and PONTON. HAYWARD and BUZAS, 1979, p. 43, pl. 5, figs. 61-62.
Bolivina variabilis (WILLIAMSON). SLITER, 1970, p. 166, pl. 5, figs. 4a-b; pl. 6, figs. 1a-f, 2, 3a-b; pl. 8, figs. 15-16; BOLTOVSKOY, GIUSSANI, WATANABE and WRIGHT, 1980, p. 19, pl. 4, figs. 1-4.

Occurrence and Repository: Central Area (Stn. 71, 76, 85, 86, 87, 90, 91, 92, 96, 97, 98, 100, 101, 102, 103, 105: 75-220 m; living 75 m); Bay Mouth and open sea areas (Stn. 108, 110, 116, 118, 134, 136, 139, 143, 145: 60-155 m; living 105-120 m); ESK Reg. no. F-8882 - 8905; hypotype in fig. 6a, ESK Reg. no. F-8906 from Stn. 139; hypotype in fig. 6b, ESK Reg. no. F-8894 from Stn. 101; hypotype in fig. 6c, ESK Reg. no. F-8907 from Stn. 110; hypotype in fig. 6d, ESK Reg. no. F-8903 from Stn. 136 hypotype in fig. 6e, ESK Reg. no. F-8908 from Stn. 139; hypotype in fig. 6f, ESK Reg. no. F-8909 from Stn. 139.

Geographic Distribution: Tanabe Bay; 56) 9-38 m, living 9 m.

Remarks: This species was originally described from the early Miocene sediments in New Zealand.

Bolivina zanzibarica CUSHMAN

Bolivina zanzibarica CUSHMAN, 1936, Cushman Lab. Foram. Res., Spec. Publ., no. 6, p. 58, pl. 8, fig. 12.

Occurrence and Repository: Central Area (Stn. 85: 220 m; living); ESK Reg. no. F-8910.

Bolivina sp. 1

Occurrence and Repository: Central Area (Stn. 98, 99: 42-145 m); Bay Mouth Area (Stn. 107, 125, 127, 136, 143: 60-140 m; living 60 m); ESK Reg. no. F-8911 - 8917.

Remarks: The present species is distinguishable from all other species of the genus *Bolivina* by its elongate outline and coarse foramen.

Bolivina sp. 2

Occurrence and Repository: Bay Mouth Area (Stn. 134, 136: 60-112 m); ESK Reg. no. F-8918 - 8919.

Remarks: The present species is characterized by small tests (length up to 0.2 mm), inflated chambers and fine foramen.

Bolivina sp. 3

Occurrence and Repository: Bay Mouth and open sea areas (Stn. 134, 144: 105-112 m); ESK Reg. no. F-8920 - 8921.

Remarks: The specimens in the collection closely resemble *Bolivina* sp. 1 but are distinguished therefrom by having many costae.

Genus *Rectobolivina* CUSHMAN, 1927

Rectobolivina hancocki (CUSHMAN and MCCULLOCH)

Pl. 10, figs. 7a-b

Bifarina hancocki CUSHMAN and MCCULLOCH, 1942, Southern California, Univ., Publ., Allan Hancock Pacific Ecped., v. 6, no. 4, p. 225, pl. 28, figs. 13-19.

Occurrence and Repository: Central Area (Stn. 81, 104, 105: 38-220 m); Bay Mouth Area (Stn. 106, 107, 108, 110, 116, 122, 124, 127, 132, 136, 137, 139: 20-120 m); ESK Reg. no. F-8922 - 8936; hypotype in fig. 7, ESK Reg. no. F-8925 from Stn. 106.

Remarks: The specimens at Stn. 81 (220 m) are presumed to be derived from the shallow area (shallower than 120 m) by a bottom current.

Rectobolivina raphana (PARKER and JONES)

Pl. 10, figs. 8a-d

Uvigerina (Sagrina) raphanus PARKER and JONES, 1865, Roy. Soc. London, Philos. Trans., v. 155, p. 364, pl. 18, figs. 16a-b, 17.

Siphogenerina raphanus (PARKER and JONES). CUSHMAN, 1913, p. 108, pl. 46, figs. 1-5; HADA, 1931, p. 134-135, text -fig. 91; ASANO, 1950, pt. 2, p. 14, text-figs. 56-57; KUWANO, 1962, pl. 22, figs. 5a-b; MATSUNAGA, 1963, pl. 42, figs. 8a-b; ISHIWADA, 1964, p. 17, pl. 5, fig. 81.

Rectobolivina raphana (PARKER and JONES). MATOBA, 1970, p. 60, pl. 3, fig. 31; HASEGAWA, 1979, p. 154, pl. 4, figs. 1-2.

Occurrence and Repository: Bay Head Area (Stn. 32, 44, 45, 63, 64, 65: 39-156m; living 39 m); Central Area (Stn. 73, 75, 79, 80, 81, 82, 84, 85, 86, 87, 88, 89, 90, 92, 93, 94, 97, 100, 101, 103, 105: 75-225 m; living 78-220 m); Bay Mouth and open sea areas (Stn. 106, 108, 110, 113, 116, 118, 122, 125, 127, 132, 134, 136, 139, 141, 143, 144: 40-140 m; living 61-140 m); ESK Reg. no. F-8937 - 8979; hypotype in fig. 8a, ESK Reg. no. F-8980 from Stn. 88; hypotype in fig. 8b, ESK Reg. no. F-8981 from Stn. 113; hypotype in fig. 8c, ESK Reg. no. F-8977 from Stn. 141; hypotype in fig. 8d, ESK Reg. no. F-8982 from Stn. 127.

Geographic Distribution: The seas adjacent to Japan; 6) 120 m; 14) 70-598 m; 17) 100 m; 18) 17-25 fms; 19) 102-539 m; 23) 48- 760 m, living 56-95 m; 24) 10-148 m, living 40-144 m; 25) 38-150 m, living 50-117 m; 26) 81-135 m; 27) 28-78 m; 28) 25-30 m; 32); 33) 111-1111 m; 34) 64-155 m; 35); 36) living 59-333 m; 37) 18-70 m; 40); 41) 9.6-65 m; 42) 83-1203 m; 43) 45-430 m; 44) 75-348 m; 45); 46) 64-582 m; 47) 130-388 m; 48) 74-235 m with living specimens; 51) 23-232 m, living 43-102 m; 52) 80-120 m, living 80 m; 55) 20-42 m; 58); 60) 50-97.5 m; 61) 23-71 m; 62) 96 m; 64) 46-60 m; 65) 19.5-21 m; 67) 130-527 m; 69) 56-193 m; 70) 70-475 m, living 70 m; 70) 130-527 m; 72); 73); 74) 194 m; 75) 90-300 m; 77) 35-122 m with living specimens.

Remarks: At the deepest part of the Bay Mouth Area, frequency is rather high (1-3%).

Rectobolivina tonohamaensis (TAKAYANAGI)

Pl. 10, fig. 9

Bifarina tonohamaensis TAKAYANAGI, 1953, Tohoku Univ., Inst. Geol. Pal., Short Papers, no. 5, p. 32, pl. 4, figs. 8a-b.

Occurrence and Repository: Central Area (Stn. 70, 74, 78, 80, 83, 94, 103: 23-225 m); Bay Mouth Area (Stn. 106: 40 m); ESK Reg. no. F-8983 - 8990; hypotype in fig. 7a, ESK Reg. no. F-8990 from Stn. 106.

Remarks: This species was originally described from the Pliocene Ananai Formation in Kōchi Prefecture.

Family BULIMINIDAE JONES, 1875

Subfamily BULIMININAE JONES, 1875

Genus *Bulimina* D'ORBIGNY, 1826

Bulimina denudata CUSHMAN and PARKER

Pl. 11, fig. 1

Bulimina pagoda CUSHMAN var. *denudata* CUSHMAN and PARKER, 1938, Contr. Cushman Lab. Foram. Res., Sharon, Mass., U.S.A., v. 14, pt. 3, p. 57, pl. 10, figs. 1a-c; 2a-c.

Bulimina denudata CUSHMAN and PARKER. BANDY, 1953, p. 20, pl. 24, figs. 11a, b; PHLEGER, 1964, p. 382, pl. 4, fig. 4; ŌKI, 1975, p. 44, pl. 2, fig. 7.

Occurrence and Repository: Central Area (Stn. 70, 78, 88, 91, 99: 20-207 m; living 23-42 m); open sea area (Stn. 146: 213 m); ESK Reg. no. F-8991 - 8996; hypotype in fig. 1, ESK Reg. no. F-8997 from Stn. 70.

Remarks: This is the first record of the present species in Japanese waters.

Bulimina kochiensis TAKAYANAGI

Pl. 11, figs. 2a-c

Bulimina kochiensis TAKAYANAGI, 1953, Tohoku Univ., Inst. Geol. Pal., Short Papers, no. 5, p. 31, pl. 4, figs. 12a-c.

Bulimina cf. *kochiensis* TAKAYANAGI. KUWANO, 1962, p. 129, pl. 15, figs. 9, 10.

Occurrence and Repository: Bay Head Area (Stn. 34: 149 m); Central Area (Stn. 66, 67, 71, 73, 76, 84, 87, 88, 92, 93, 98, 100, 105: 75-220 m; living 75-220 m); Bay Mouth Area (Stn. 113, 139: 100-105 m; living 105 m); ESK Reg. no. F-8998 - 9013; hypotype in fig. 2a, ESK Reg. no. F-9010 from Stn. 100; hypotype in fig. 2b, ESK Reg. no. F-9012 from Stn. 113; hypotype in fig. 2c, ESK Reg. no. F-9014 from Stn. 105.

Geographic Distribution: Off the Pacific coast from Central Honshū to Kyūshū; 48) 74-597 m, living 124-149 m; 52) 31-120 m, living 31-80 m; 55) 40-64 m; 70) 70-808 m, living 123 m; 77) 122- 745 m, living 122 m.

Remarks: This species was reported from the Kuroshio area off the Pacific coast of southwest Japan, from Shizuoka Prefecture southwards.

Bulimina marginata D' ORBIGNY

Pl. 11, figs. 3a-e

Bulimina marginata D'ORBIGNY, 1826, Ann. Sci. Nat., Paris, ser. 1, v. 7, p. 269, pl. 12, figs. 10-12; CUSHMAN, 1922, p. 91, pl. 21, figs. 4-5; TAKAYANAGI, 1955, pl. 2, fig. 7; ASANO, 1958, p. 4-6, pl. 1, figs. 5, 9-11; KUWANO, 1962, pl. 15, figs. 11-14; ISHIWADA, 1964, p. 39, pl. 4, figs. 52-53; MATOBA, 1967, p. 252, pl. 25, fig. 37; MATOBA, 1970, p. 50, pl. 3, fig. 32; ŌKI, 1975, p. 45-46, pl. 2, figs. 9a-b; pl. 3, fig. 1; INOUE, 1980, pl. 27, fig. 15.

Bulimina aculeata D'ORBIGNY. HADA, 1931, p. 127-128, text -figs. 84a-b.

Occurrence and Repository: Bay Head Area (Stn. 15, 17, 18, 22, 32, 34, 41, 42, 44, 45, 53: 94-182 m; living 94-149 m); West- Sakurajima Passage (Stn. 63, 64, 65: 39-138 m; living 39 m); Central Area (Stn. 66, 67, 68, 69, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105: 28-225 m; living 28-225 m); Bay Mouth Area (Stn. 107, 108, 110, 113, 116, 118, 122, 124, 125, 127, 132, 134, 136, 137, 139, 141, 143: 20- 140 m; living 60-140 m);

open sea area (Stn. 144, 145, 146: 105-213 m); ESK Reg. no. F-9015 - 9087; hypotype in fig. 3a, ESK Reg. no. F-9088 from Stn. 146; hypotype in fig. 3b, ESK Reg. no. F-9086 from Stn. 145; hypotype in fig. 3c, ESK Reg. no. F-9089 from Stn. 143; hypotype in fig. 3d, ESK Reg. no. F-9090 from Stn. 146; hypotype in fig. 3e, ESK Reg. no. F-9091 from Stn. 146.

Geographic Distribution: The seas adjacent to Japan; 5); 6) 120 m; 13) 84 m with living specimens; 14) 115-598 m; 15) 510-695 m; 17) 100-690 m; 18) 17-33 fms; 19) 102-644 m; 21) 68-344 m; 23) 50-875 m, living 67-95 m; 24) 30-144 m, living 30-120 m; 25) 50-760 m; living 117 m; 26) 44-146 m; 27) 45-78 m; 28) 25-33 m; 30); 32); 33) 83-154 m; 34) 155-1180 m; 36) 101-289 with living specimens; 37) 13.5-70 m; 41) 15.9-65 m; 42) 83-1203 m; 43) 45- 570 m; 44) 75-402 m; 45); 46) 82-684 m; 47) 88-1887 m; 48) 40-597 m with living specimens; 50); 51) 43-665 m, living 72-665 m; 52) 31-585 m with living specimens; 55) 20-64 m; 56) 9-38 m; 58); 59) 6.4-7.0 m; 60) 50-97.5 m; 61) 23-70 m; 62) 96 m with living specimens; 64) 60 m; 65) 26 m; 68) 56-680 m; 69) 70-808 m, living 123-202 m; 70) 91-349 m; 74) 93-219 m; 75) 90-300 m; 76) 7-79 m; 77) 35-745 m; 78) living 23-225 m.

Remarks: The present species occurs very commonly throughout the bay. The specimens in the collection represent two types of tests different from each other. Most of the specimens collected from the coastal shallow water have much thinner tests than those from the basin bottom. It is still unknown whether the difference implies merely the fluctuation of this species or a speciation into subspecies or species.

Bulimina cf. *spicata* PHLEGER and PARKER

Compared with:

Bulimina spicata PHLEGER and PARKER, 1951, Geol. Soc. America, Mem. 46, pt. 2, p. 16, pl. 7, figs. 25a-c, 30, 31; BOCK, 1971, p. 17, no. 2, p. 183-184, pl. 1, fig. 3.

Occurrence and Repository: open sea area (Stn. 146: 213 m); ESK Reg. no. F-9092.

Remarks: Only two specimens are in the collection.

Bulimina spinosa (HERON-ALLEN and EARLAND)

Pl. 11, figs. 4a-b

Virgulina schreibersiana CŻJŻEK var. *spinosa* HERON-ALLEN and EARLAND, 1932, p. 352, pl. 9, figs. 3-4.
Fursenkoina spinosa (HERON-ALLEN and EARLAND). PHLEGER, 1964, p. 383, pl. 3, fig. 13.
Bulimina spinosa (HERON-ALLEN and EARLAND). MATOBA, 1982, p. 1041, pl. 2, fig. 4.

Occurrence and Repository: Bay Head Area (Stn. 17, 22, 32, 34, 44, 45, 63: 134-156 m; living 144-149 m); Central Area (Stn. 66, 67, 69, 72, 73, 75, 76, 77, 79, 80, 81, 82, 84, 85, 86, 87, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 100, 101, 102, 103, 105: 75-225 m; living 95-220 m); Bay Mouth Area (Stn. 108, 132: 100- 120 m); ESK Reg. no. F-9093 - 9132; hypotype in fig. 4a, ESK Reg. no. F-9133 from Stn. 72; hypotype in fig. 4b, ESK Reg. no. F-9134 from Stn. 72.

Geographic Distribution: Off the northwest and southeast coasts of North Honshū; 23) 95 m with living specimens; 24) 30-78 m, living 49-75 m; 25) 50-230 m, living 50-212 m; 30) 95 m with living specimens.

Bulimina sp.

Occurrence and Repository: Central Area (Stn. 70, 73, 74, 78: 23-80 m); ESK Reg. no. F-9135 - 9138.

Remarks: The present specimens are distinguished from all other species of the genus *Bulimina* by their smooth surface, slightly depressed suture and smaller number of coarse perforations.

Genus *Globobulimina* CUSHMAN, 1927

Globobulimina turgida (BAILEY)

Pl. 11, figs. 5a-c

Bulimina turgida BAILEY, 1851, Smithsonian Inst., Contr. Knowledge, v. 2, art. 3, p. 12, pl., figs. 28-31.

Globobulimina turgida (BAILEY). ASANO, 1958, p. 13, pl. 2, figs. 7-9; KUWANO, 1962, p. 133, pl. 18, fig. 2; ISHIWADA, 1964, p. 14, pl. 4, fig. 57; LOEBLICH and TAPPAN, 1964, p. C561, figs. 442, 5-6.

Occurrence and Repository: Central Area (Stn. 68, 72, 76, 77, 80, 81, 82, 85, 86, 87, 90, 91, 93, 96, 97, 98, 101: 119-225 m; living 165-225 m); ESK Reg. no. F-9139 - 9155; hypotype in figs. 5a-b, ESK Reg. no. F-9156 from Stn. 101; hypotype in fig. 5c, ESK Reg. no. F-9157 from Stn. 97.

Geographic Distribution: Off the east coast of North Honshū, the southeast coast of Central Honshū, the south coast of Shikoku, the northwest coast of Kyūshū and the north coast from West Honshū to Central Honshū; 19) 205-309 m; 21) 188-238 m; 26) 146 m; 33) 83-154 m; 36) living 208 m; 44) 411 m; 46) 201 m.

Remarks: The distribution of the present species is restricted to the basin bottom in the Central Area.

Genus *Stainforthia* HOFKER, 1956

Stainforthia complanata (EGGER)

Virgulina schreibersiana CŽJŽEK var. *complanata* EGGER, 1893, Abh. kon. bay. Akad. Wiss. Munchen, Cl. II, v. 18, p. 292, pl. 8, figs. 91-92; CUSHMAN, 1942, p. 13, pl. 4, figs. 2-5; ISHIWADA, 1950, p. 5, pl., fig. 7; ASANO, 1958, p. 14, pl. 3, fig. 8; UCHIO, 1960, p. 63, pl. 6, fig. 13.

Stainforthia complanata (EGGER). INGLE, KELLER and KOIPACK, 1980, p. 144, pl. 5, figs. 10-11.

Occurrence and Repository: Central Area (Stn. 66, 71, 72, 73, 79, 80, 87, 88, 89, 91, 92, 96, 98, 101, 102: 78-225 m; living 78-216 m); open sea area (Stn. 145: 155 m); ESK Reg. no. F-9158 - 9173.

Geographic Distribution: Off the northwest coast of North Honshū and the north and southwest coasts of Central Honshū; 42) 248-1203 m; 46) 126-481 m.

Subfamily PAVONININAE EIMER and FICKERT, 1899

Genus *Chrysalidinella* SCHUBERT, 1908

Chrysalidinella dimorpha (BRADY)

Chrysalidina dimorpha BRADY, 1881, Quart. Jour. Micr. Sci., v. 21, p. 24; MILLETT, 1900, p. 12, pl. 1, figs. 14a-b.

Chrysalidinella dimorpha (BRADY). BARKER, 1960, p. 94, 96, pl. 46, figs. 20, 21a-b; MATSUNAGA, 1963, pl. 41, figs. 14a-b; LOEBLICH and TAPPAN, 1964, p. C563, figs. 444, 7a-b, 8-9; MATOBA, 1970, p. 50, pl. 3, figs. 34a-b.

Occurrence and Repository: Central Area (Stn. 79: 100 m); ESK Reg. no. F-9174.

Geographic Distribution: Off the northwest and southeast coasts of North Honshū and the coast of Central Honshū, the Seto Inland Sea and coastal area at Hachijo Island; 21) 311 m; 24) 5-40 m; 29) 0.9-4.4 m; 32); 35); 37) 18-70 m; 38); 40); 45); 58); 60)

97.5 m; 63) 12 m; 64) 46 m.

Genus *Reussella* GALLOWAY, 1933

Reussella aculeata CUSHMAN

Pl. 11, figs. 6a-d

Reussella aculeata CUSHMAN, 1945, Cushman Lab. Forams. Res., Contr., Sharon, Mass., v. 21, p. 41, pl. 7, figs. 10-11.

Reussella spinulosa (REUSS), HAGEMAN, 1979, p. 105, pl. 9, fig. 8.

Occurrence and Repository: Bay Head Area (Stn. 17, 44, 65: 39-146 m); Central Area (Stn. 70, 72, 74, 76, 82, 83, 89, 93, 96, 99, 100: 23-220 m; living 42-74 m); Bay Mouth Area (Stn. 107, 110, 127, 136, 137: 60-110 m); ESK Reg. no. F-9175 - 9193; hypotype in fig. 6a, ESK Reg. no. F-9177 from Stn. 65; hypotype in fig. 6b, ESK Reg. no. F-9194 from Stn. 136; hypotype in fig. 6c, ESK Reg. no. F-9195 from Stn. 136; hypotype in fig. 6d, ESK Reg. no. F-9196 from Stn. 136.

Geographic Distribution: Off the northwest and east coast of North Honshū, the north coast of Central Honshū, the Pacific coast from Central Honshū to Kyūshū, the north coast of West Honshū and the northwest coast of Kyūshū, and the Seto Inland Sea; 19) 102-309 m; 21) 130-444 m; 27) 10-28 m; 28) 14-37 m; 32); 41) 5-56 m; 44) 110-150 m; 46) 84-229 m; 47) 639 m; 48) 40-149 m, living 40 m; 51) 23-232 m, living 23-155 m; 52) 31-120 m with living specimens; 55) 13-40 m; 56) 9-33 m; 58); 59) 6.4-8.6 m; 61) 21-59 m; 63) 5-20 m; 70) 70 m with living specimens; 71) 17-27 m; 72); 73); 74) 93 m; 75) 148 m; 77) 35-122 m, living 35 m.

Reussella aequa CUSHMAN and MCCULLOCH

Pl. 11, fig. 7

Reussella aequa CUSHMAN and MCCULLOCH, 1948, Southern California, Univ., Publ., Allan Hancock Pacific Exped., v. 6, no. 5, p. 251, pl. 31, fig. 7.

Reussella spinulosa (REUSS). ŌKI, 1975, p. 47, pl. 3, figs. 5a-b.

Occurrence and Repository: West-Sakurajima Passage (Stn. 65: 39 m); Central Area (Stn. 99: 42 m); Bay Mouth Area (Stn.136, 139: 60-105 m); ESK Reg. no. F-9197 - 9200; hypotype in fig. 7, ESK Reg. no. F-9201 from Stn. 136.

Geographic Distribution: Off Sōma City; 32).

Reussella hayasakai ŌKI, n. sp.

Pl. 11, figs. 8a-d

Test small, pyramidal, triangular in transverse section, angles of the test usually acute, the sides flat or slightly concave, initial end acutely pointed, initial end and angles of chambers with sharp spines; chamber slightly inflated; sutures distinct, slightly depressed; wall smooth, with definite bead-like ornamentation near the periphery of the chamber; aperture a narrow slit at the base of the inner margin of the chamber.

Types and Dimensions: Holotype in fig. 8a, ESK Reg. no. F- 9202 from Stn. 116, length 0.17 mm, breadth 0.20 mm; paratype in fig. 8b, ESK Reg. no. F-9203 from Stn. 116, length 0.13 mm, breadth 0.16 mm; paratype in fig. 8c, ESK Reg. no. F-9204 from Stn. 88, length 0.16 mm, breadth 0.19 mm; paratype in fig. 8d, ESK Reg. no. F-9205 from Stn. 101, length 0.15 mm, breadth 0.18 mm.

Occurrence and Repository: Bay Head Area (Stn. 45, 63: 134-138 m); northern part of the Central Area (Stn. 78, 83, 84: 36-88 m); southern part of the Central Area (Stn. 86, 87, 88, 89, 90, 91, 92, 94, 100, 101, 102, 104: 38-215 m); Bay Mouth Area (Stn. 106, 110, 113, 116, 118, 122, 125, 132, 134, 139, 141: 40-140 m; living 112 m); ESK Reg. no. F-9206 - 9232.

Remarks: This new species is characterized by its outline being longer than its breadth and the chambers with spines. It is mainly distributed in the southern half of the Central Area and the Bay Mouth Area.

Reussella simplex (CUSHMAN)

Pl. 11, fig. 9

Trimosina simplex CUSHMAN, 1929, Washington Acad. Sci., Jour., Baltimore, Md., v.19, no.8, p.158, tf.2a-b.

Occurrence and Repository: Central Area (Stn. 99: 42 m); open sea area (Stn. 146: 213 m); ESK Reg. no. F-9233 - 9234; hypotype in fig. 9, ESK Reg. no. F-9234 from Stn. 146.

Geographic Distribution: Off the south coast of Central Honshū and Kamaé Bay, Kyūshū; 45); 51) 665 m; 52) 408-585 m; 56) 7-25 m; 57) 1.5-1.8 m; 58); 60) 50-97.5 m; 76) 10-79 m.

Reussella spinulosa (REUSS)

Pl. 11, figs. 10a-b

Verneuilina spinulosa REUSS, 1850, K. Akad. Wiss. Wien, Math. -Nat. Cl., Denkschr., Bd. 1, p. 374, pl. 47, fig. 12.

Occurrence and Repository: West-Sakurajima Passage (Stn. 64, 65: 39-66 m); Central Area (Stn. 70, 73, 74, 93, 101: 23-142 m; living 28 m); Bay Mouth Area (Stn. 124, 136, 141: 20-60 m); open sea area (Stn. 145, 146: 155-213 m); ESK Reg. no. F-9235 - 9246; hypotype in fig. 10a, ESK Reg. no. F-9247 from Stn. 74; hypotype in fig. 10b, ESK Reg. no. F-9240 from Stn. 93.

Geographic Distribution: Off the northwest coast of North Honshū, Yamada, Toyama and Tosa Bays and coastal area at Kujūkuri-hama; 24) 10-75 m, living 19-30 m; 28) 39 m; 35); 42) 222-248 m; 67) 91 m.

Reussella sp.

Pl. 12, figs. 1a-b

Occurrence and Repository: West-Sakurajima Passage (Stn. 63, 65: 39-138 m); Central Area (Stn. 69, 74, 83, 96, 99, 104: 28-188 m); Bay Mouth Area (Stn. 106, 108, 124, 136: 20-120 m); ESK Reg. no. F-9248 - 9259; hypotype in fig. 1a, ESK Reg. no. F-9251 from Stn. 74; hypotype in fig. 1b, ESK Reg. no. F-9260 from Stn. 83.

Remarks: The specimens in the collection are characterized by inflated chambers and coarse perforations on the walls.

Genus *Trimosina* CUSHMAN, 1927

Trimosina? takayanagii ŌKI, n. sp.

Pl. 12, figs. 2a-g

Test small, generally triangular in both side and end views, slightly longer than

broad, initial end acutely pointed, initial end and angles of chambers often with spines; chambers distinct, inflated, triserial throughout, rapidly increasing in size as added; sutures distinct, depressed; wall coarsely perforate; aperture generally triangular in outline with distinct teeth (fig. 2g).

Types and Dimensions: Holotype in fig. 2a, ESK Reg. no. F- 9261 from Stn. 104, length 0.16 mm, breadth 0.14 mm; paratype in figs. 2b, g, ESK Reg. no. F-9262 from Stn. 104, length 0.13 mm, breadth 0.11 mm; paratype in fig. 2c, ESK Reg. no. F-9263 from Stn. 99, length 0.15 mm, breadth 0.10 mm.

Occurrence and Repository: Northern part of the Central Area (Stn. 73, 74, 78, 81, 83: 28-220 m; living 28-40 m); Southern part of the Central Area (Stn. 86, 87, 88, 93, 97, 98, 99, 101, 104: 38-182 m; living 38-182 m); Bay Mouth Area (Stn. 108, 125: 120-140 m); ESK Reg. no. F-9264 - 9279; hypotype in fig. 2d, ESK Reg. no. F-9276 from Stn. 101; hypotype in fig. 2e, ESK Reg. no. F-9280 from Stn. 104; hypotype in fig. 2f, ESK Reg. no. F-9281 from Stn. 93.

Remarks: The outline of the test of this new species is similar to that of the species of the genus *Trimosina*, but the feature of its aperture is quite different from the latter. Namely, it has a triangular opening on the base of the final chamber with distinct teeth, while the species of *Trimosina* have an elongate slit-like aperture in face of final chamber. The present species is distributed mainly in the shallow water off Kiiré-chō on the Satsuma Peninsula and on the slope between the coastal shallow bottom on the Ōsumi Peninsula side and the basin bottom in the Central Area.

Family UVIGERINIDAE HAECKEL, 1894

Genus *Uvigerina* D'ORBIGNY, 1826

Uvigerina bosoensis AOKI

Pl. 12, figs. 3a-b

Uvigerina bosoensis AOKI, 1965, Saitama Univ., Sci. Rep., ser. B, v. 5, no. 1, p. 55, pl. 7, figs. 13, 14.

Occurrence and Repository: Central Area (Stn. 69, 86: 150- 165 m); Bay Mouth Area (Stn. 108, 122, 125, 139: 100-140 m); open sea area (Stn. 146: 213 m); ESK Reg. no. F-9282 - 9288; hypotype in fig. 3a, ESK Reg. no. F-9284 from Stn. 108; hypotype in fig. 3b, ESK Reg. no. F-9289 from Stn. 146.

Uvigerina schencki ASANO

Pl. 12, figs. 4a-b

Uvigerina schencki ASANO, 1950, Hosokawa Print. Co., Tokyo, pt. 2, p. 17, figs. 74-75; KUWANO, 1962, p. 56, pl. 7, fig. 19; ISHIWADA, 1964, p. 18, pl. 5, fig. 79; AOKI, 1965, p. 56, pl. 7, fig. 19.

Occurrence and Repository: Central Area (Stn. 66, 69, 71, 75, 76, 79, 82, 84, 89, 92: 88-220 m; living 93-185 m); Bay Mouth Area (Stn. 107, 108, 110, 125, 132, 139: 96-140 m); ESK Reg. no. F-9290 - 9305; hypotype in fig. 4a, ESK Reg. no. F-9306 from Stn. 139; hypotype in fig. bb, ESK Reg. no. F-9307 from Stn. 139.

Geographic Distribution: Off the Pacific coast from North Honshū to Kyūshū, the north coast from Central to West Honshū, the northwest coast of Kyūshū; 19) 177-539 m; 36) 59-208 m; 46) 168-256 m; 48) 74-235 m with living specimens; 51) 43-232 m, living

43-102 m; 52) 80-201 m with living specimens; 69) 78-193 m; 70) 70-390 m with living specimens; 77) 122 m with living specimens; 78) living 41-100 m.

Remarks: Similar to the following species *Uvigerina vadescens* in distribution. The present species is distributed mainly in the deepest part of the Bay Mouth Area and on the marginal part of the flat bottom surface shallower than 100 meters on the Satsuma Peninsula side of the Central Area. These areas correspond to the boundary between the two different water masses.

Uvigerina vadescens CUSHMAN

Pl. 12, figs. 5a-b

Uvigerina proboscidea SCHWAGER var. *vadescens* CUSHMAN, 1933, Contr. Cushman Lab. Foram. Res., Sharon, Mass., v. 9, pt. 4, no. 137, p. 85, pl. 8, figs. 14, 15.
Uvigerina proboscidea vadescens CUSHMAN. KUWANO, 1962, pl. 24, fig. 9.

Occurrence and Repository: Bay Head Area and West-Sakurajima Passage (Stn. 44, 63, 64, 65: 39-144 m); Central Area (Stn. 66, 67, 69, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105: 28-225 m; living 36-165 m); Bay Mouth Area (Stn. 107, 108, 110, 113, 116, 118, 122, 124, 125, 127, 132, 134, 136, 137, 139, 141, 143: 20-140 m; living 60-112 m) ; open sea area (Stn. 144, 145, 146: 105-213 m; living 213 m); ESK Reg. no. F-9308 - 9368; hypotype in fig. 5a, ESK Reg. no. F-9369 from Stn. 110; hypotype in fig. 5b, ESK Reg. no. F-9370 from Stn. 143.

Geographic Distribution: Off the Pacific coast from Central Honshū to Kyūshū; 48) 74-597 m, living 74-235 m; 51) 43-665 m, living 43-232 m; 52) 31-585 m, living 31-120 m; 69) 78-680 m; 70) 70-808 m, living 70-123 m; 77) 35-745 m, living 35-122 m.

Genus *Hopkinsina* HOWE and WALLACE, 1932

Hopkinsina glabra (MILLETT)

Pl. 12, fig. 6

Uvigerina auberiana D'ORBIGNY var. *glabra* MILLETT, 1903, Roy. Micr. Soc. London, Jour., Part 14, p. 268, pl. 5, figs. 8a-b, 9.
Hopkinsina pacifica CUSHMAN, 1942, p. 51, pl. 15, figs. 1a-b; TAKAYANAGI, 1955, pl. 2, fig. 22; BOLTOVSKOY, GIUSSANI, WATANABE and WRIGHT, 1980, p. 36, pl. 18, figs. 18-20.
Hopkinsina glabra (MILLETT). AOKI, 1965, p. 59, pl. 7, fig. 2; ŌKI, 1975, p. 48, pl. 3, fig. 7.
Uvigerinella glabra (MILLETT). MATOBA, 1970, p. 62, pl. 3, figs. 35a-b.

Occurrence and Repository: Bay Head Area (Stn. 34, 64: 66- 149 m); Central Area (Stn. 66, 67, 69, 70, 72, 74, 75, 78, 79, 80, 82, 83, 84, 85, 86, 87, 89, 90, 91, 92, 93, 94, 95, 97, 98, 101, 102, 105: 23-225 m; living 28-150 m); Bay Mouth Area (Stn. 139: 105 m); ESK Reg. no. F-9371 - 9401; hypotype in fig. 6, ESK Reg. no. F-9402 from Stn. 90.

Geographic Distribution: Off the northwest and southeast coasts of North Honshū and the Seto Inland Sea; 24) 10-75 m, living 10-68 m; 29) 0.7-5.7 m, living 0.9-2.7 m; 30); 54) 23 m with living specimens; 64) 22-60 m, living 32 m.

Hopkinsina kuwanoi ŌKI, n. sp.

Pl. 12, figs. 7a-c

Test elongate, early stage triserial, later biserial, apical end rounded with two or more small spines; chambers comparatively few, inflated; suture much depressed; wall

ornamented by longitudinal raised costae, occasionally branching or anastomosing, and continuing on to the last-formed chamber; aperture broadly oval, subterminal, bordered with a raised lip; color white.

Types and Dimensions: Holotype in fig. 7a, ESK Reg. no. F- 9403 from Stn. 92, length 0.20 mm, breadth 0.10 mm, thickness 0.06 mm; paratype in fig. 7b, ESK Reg. no. F-9404 from Stn. 102, length 0.20 mm, breadth 0.10 mm, thickness 0.06 mm; paratype in fig. 7c, ESK Reg. no. F-9405 from Stn. 139, length 0.28, breadth 0.14, thickness 0.09 mm.

Occurrence and Repository: Central Area (Stn. 79, 86, 87, 91, 92, 99, 101, 102: 42-207 m; living 182 m); Bay Mouth Area (Stn. 118, 132, 134, 137, 139, 143: 96-112 m; living 100 m); open sea area (Stn. 144, 145: 105-155 m); ESK Reg. no. F-9406 - 9421.

Remarks: The specimens in the collection are identical to *Hopkinsina japonica* (MS) reported by KUWANO (1962) from Kagoshima Bay. But no description of this species was given by KUWANO.

Genus *Sagrina* D'ORBIGNY, 1839

Sagrina breviata (SAID)

Bitubulogenerina breviata SAID, 1949, Cushman Lab. Foram. Res., Spec. Publ., Sharon, Mass, no. 26, p. 30, pl. 3, fig. 16.

Occurrence and Repository: Central Area (Stn. 78, 102: 40- 162 m; living); ESK Reg. no. F-9422 - 9423.

Genus *Siphogenerina* SCHLUMBERGER, 1882

Siphogenerina columellaris (BRADY)

Pl. 12, figs. 8a-b

Sagrina columellaris BRADY, 1881, Quart. Jour. Micr. Sci., v. 21, p. 64; 1884, Rep. Voy. Challenger, Zool., v. 9, p. 581, pl. 75, figs. 15-17.
Siphogenerina columellaris (BRADY). ASANO, 1958, p. 30, pl. 7, figs. 14-15.

Occurrence and Repository: West-Sakurajima Passage (Stn. 64: 66 m); Bay Mouth Area (Stn. 137, 141: 60-106 m); ESK Reg. no. F-9424 - 9426; hypotype in fig. 8, ESK Reg. no. F-9425 from Stn. 137.

Geographic Distribution: Off the south coast of Shikoku and the northwest coast of Kyūshū, and the Seto Inland Sea; 46) 165-199 m; 55) 63 m; 65) 19.9-26 m; 74) 110 m.

Genus *Siphouvigerina* PARR, 1950

Siphouvigerina fimbriata (SIDEBOTTOM)

Pl. 12, fig. 9

Uvigerina porrecta BRADY var. *fimbriata* SIDEBOTTOM, 1918, Journ. Roy. Micr. Soc., p. 147, pl. 5, fig. 23.
Siphouvigerina fimbriata (SIDEBOTTOM). LOEBLICH and TAPPAN, 1964, p. C571, fig. 449.

Occurrence and Repository: Central Area (Stn. 87, 92: 182- 185 m; living 182 m); Bay Mouth and open sea areas (Stn. 139, 144: 105m; living); ESK Reg. no. F-9427 - 9430; hypotype in fig. 9, ESK Reg. no. F-9429 from Stn. 139.

Genus *Trifarina* CUSHMAN, 1923

Trifarina angulosa (WILLIAMSON)

pl. 12, figs. 10a-b

Uvigerina angulosa WILLIAMSON, 1858, Rec. Foram. Gr. Brit., Ray Soc., p. 67, pl. 5, fig. 140.
Angulogerina angulosa (WILLIAMSON). KUWANO, 1962, pl. 14, figs. 1-2.
Angulogerina angulosa angulosa (WILLIAMSON). BOLTOVSKOY, GIUSSANI, WATANABE and WRIGHT, 1980, p. 16, pl. 1, figs. 13-16.
Trifarina angulosa (WILLIAMSON). LOEBLICH and TAPPAN, 1964, p. C571, figs. 450, 1a-b, 2a-b, 3; MURRAY, 1970, p. 485, pl. 1, fig. 13; FINGER and LIPPS, 1981, p. 134, pl. 2, fig. 9.

Occurrence and Repository: Central Area (Stn. 80, 86, 91, 96, 102, 103, 105: 97-225 m; living 97-165 m); Bay Mouth Area (Stn. 116, 118, 139, 143: 61-105 m; living 61-101 m); open sea area (Stn. 144, 146: 105-213 m); ESK Reg. no. F-9431 - 9443; hypotype in fig. 10, ESK Reg. no. F-9444 from Stn. 146.

Geographic Distribution: Off the west coast of Hokkaido and Suruga Bay; 6) 155-1230 m; 47) 88-1040 m.

Trifarina occidentalis (CUSHMAN)

Pl. 12, figs. 11a-c

Uvigerina angulosa CUSHMAN, 1922, Publ. 311, Carnegie Inst. Washington, p. 34, pl. 5, figs. 3-4.
Uvigerina occidentalis CUSHMAN, 1923, p. 169-170.
Angulogerina angulosa occidentalis (CUSHMAN). BOLTOVSKOY, GIUSSANI, WATANABE and WRIGHT, 1980, pl. 1, figs. 17-18.

Occurrence and Repository: Bay Head Area (Stn. 44, 63: 138-144 m); Central Area (Stn. 67, 78, 84, 90, 93, 99, 100: 40-215 m); Bay Mouth Area (Stn. 106, 116, 118, 122, 127, 136, 141, 143: 40-101 m; living 40-60 m); open sea area (Stn. 146: 213 m); ESK Reg. no. F-9445 - 9462; hypotype in fig. 11a, ESK Reg. no. F-9463 from Stn. 136; hypotype in figs. 11b-c, ESK Reg. no. F-9464 from Stn. 146.

Superfamily DISCORBACEA EHRENBERG, 1838

Family DISCORBIDAE EHRENBERG, 1838

Subfamily DISCORBINAE EHRENBERG, 1838

Genus *Discorbis* LAMARCK, 1804

Discorbis candeiana (D'ORBIGNY)

Pl. 12, figs. 12a-d

Rosalina candeiana D'ORBIGNY, *in* DE LA SAGARA, Hist. Fis. Pol. Nat. Cuba, "Foraminiferes," p. 97, pl. 4, figs. 2-4.
Discorbis candeiana (D'ORBIGNY). CUSHMAN, 1931, p. 19, pl. 7, figs. 4a-c.

Occurrence and Repository: West-Sakurajima Passage (Stn. 64: 66 m); southern part of the Central Area (Stn. 104: 38 m); Bay Mouth Area (Stn. 106, 116, 118, 132, 134, 136: 40-112 m); open sea area (Stn. 145: 155 m; living); ESK Reg. no. F-9465 - 9473; hypotype in fig. 12a, ESK Reg. no. F-9474 from Stn. 64; hypotype in fig. 12b, ESK Reg. no. F-9465 from Stn. 104; hypotype in fig. 12c, ESK Reg. no. F-9475 from Stn. 64; hypotype in fig. 12d, ESK Reg. no. F-9473 from Stn. 145.

Discorbis mira CUSHMAN

Pl. 13, figs. 1a-h

Discorbis mira CUSHMAN, 1922, Carnegie Inst. Washington, Publ. no. 311 (Dept. Marine Biol., Papers, v. 17), p. 39, pl. 6, figs. 10-11; CUSHMAN, 1931, p. 25, pl. 5, figs. 5, 6a-c.

Occurrence and Repository: Bay Head Area (Stn. 34, 64, 65: 39-149 m; living 39 m); Central Area (Stn. 66, 69, 70, 71, 73, 74, 75, 76, 78, 79, 80, 83, 85, 86, 87, 89, 91, 93,