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THE FORAMINIFERA OF THE TROPICAL PACIFIC COLLECTIONS OF THE "ALBATROSS," 1899-1900

PART 4.—ROTALIFORM FAMILIES AND PLANKTONIC FAMILIES

[End of Volume]

BY
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By Ruth Todd

INTRODUCTION

This paper is the fourth and final part of a work the intent of which is to describe and illustrate the Foraminifera of the tropical Pacific collected in 1899 and 1900 by the United States Bureau of Fisheries steamer *Albatross*, together with certain other related material from shallow water of the same region.

The route of the expedition, shown in the first part of this work (Cushman, 1932, fig. 1), extended southwest and south from San Francisco to the Marquesas and Paumotu Islands, thence west through the Society and Cook Islands and Tonga group to Fiji, then northward across the Equator to the Marshalls, and finally west and northwestward to the Marianas. Most of the samples were from around the Paumotus.

Only selected samples from the many taken by the expedition are included in the present study. This final and fourth part includes the same samples as those studied in the earlier three parts. A few localities have discrepancies in spelling, such as "Port Lotten, Kersail," for Port Lottin, Kusaie.

Previous parts of this work were published between 1932 and 1942 (Cushman, 1932; 1933a; 1942) and dealt in systematic order with the families Astrorhizidae to Trochamminidae (Part 1), Lagenidae to Alveolinellidae (Part 2), and Heterohelicidae and Buliminidae (Part 3). The present subdivision (Part 4) of the study includes all the remaining groups that comprise the calcareous coiled genera and the planktonics.

The first three parts of this work were done by Joseph A. Cushman. Before he died in 1949, he had completed the identification of most of the species included in this fourth part. Many of the species were

[1] Publication authorized by the Director, U.S. Geological Survey.

illustrated by Miss Ann Shepard (plates 1–4, 7, 10, 16, 17, 21, 27, and 28) between 1936 and 1940.

The completion of the task of identification, together with the verification of all identifications, the writing of the text, and the compiling of distribution and abundance tables, has been done by me. In this task I have had the able assistance of Doris Low in compiling tables and of Lawrence B. Isham, Scientific Illustrator, U.S. National Museum, in illustrating the remaining species (plates 5, 6, 8, 9, 11–15, 18–20, 22–26). I also gratefully acknowledge the many helpful suggestions received from various reviewers of the manuscript, in particular those from Frances L. Parker of Scripps Institution of Oceanography.

In presenting the data in this final part, I have found it more appropriate not to follow precisely the method used for the other three parts. Because nearly all the species discussed are well known, I have omitted formal descriptions of most of the species and have included only brief comments on distinguishing characters, diagnostic features, variability, probable ecologic, geographic, and stratigraphic distributions, and sometimes phylogenetic relationships.

Some of the species included here were described originally from these same *Albatross* collections (Cushman, 1933b). For many of these species the original figure is included on the present plates.

In the intervening years since the publication of the third part of this work, various circumstances have stimulated interest in the Foraminifera of the tropical Pacific as well as in the classification of the Order Foraminifera. There have resulted many changes in concepts of generic relationships and in nomenclature. No effort is made to conform precisely with any existent classification. The sequence of genera is approximately that followed by the Cushman (1948) classification, with some minor exceptions occasioned by the separation of the planktonic from the benthonic groups, and the separation of the aragonitic from the calcitic groups. The families are grouped in two main subdivisions: benthonic and planktonic. The benthonic families are grouped into two subdivisions: calcitic and aragonitic. The calcitic families include most of the genera.

Another natural subdivision of the species included in this study is whether or not the specimen was presumed to have been attached during life. But such a natural subdivision is not capable of being followed in arrangement of genera because it does not fall along generic lines, nor even always along specific lines. This feature of probable attachment is not always positively determinable but is subject to interpretation. Most specimens of species belonging in the genera *Patellina*, *Rosalina*, *Neoconorbina*, *Cibicides*, *Planorbulina*, *Planorbulinella*, and *Acervulina* were very likely attached during some part of their life. However, there are exceptions. For example, in certain species, such as *Cibicides lobatulus* (Walker and Jacob) or *Eponides repandus* (Fichtel and Moll), one finds some specimens showing clear evidence of attachment and others whose shape suggests they lived as free individuals on the bottom.

In general, more attached Foraminifera are to be expected in relatively shallow water than in deep water. This is not to imply that deeper waters (down to the maximum depths at which Foraminifera occur) are free of attached specimens. Wherever the surface of the sea floor is rocky, affording a foothold for attached individuals, some would likely be found.

Unlike the method used in the first three parts, wherein a separate table is included for each species to show the number of specimens from each station, as well as the locality, depth, temperature, and character of the bottom, respectively, I have presented the distribution and abundance data in five tables. The records of the benthonic species for all the samples studied are combined in tables 1–4. In instances where a sample consists of one or very few species, such as Apotaki with only *Amphistegina madagascariensis*, the sample is included on each of the four tables although on one or more no species are recorded from it. The records of the planktonic species from all the samples in which they were found are included on table 5.

The numbers on the tables indicate the actual numbers of specimens mounted from each station. The designation 10+, indicating that more than 10 were mounted, is not precisely quantitative, but only approximately so, because sizes of original samples from which the specimens were picked varied from sample to sample. This method of indicating relative abundance is followed in this fourth part in order that the results may be comparable with those presented in the first three parts.

The arrangement of the samples in the tables is for convenience in locating a given sample. The unnumbered samples, all from relatively shallow depths (none greater than 50 fathoms) and all from near islands or atolls, are listed first in order from east to west. The numbered dredging samples (prefixed by D) follow in numerical order, and finally the numbered hydrographic samples (prefixed by H) in numerical order. The numbered samples are all from greater depths (ranging from 112 to 2,882 fathoms) than the unnumbered ones, but many of the numbered samples are close to (offshore from) islands or atolls as may be observed by reference to the complete dredging records for this expedition (Townsend, 1901). Data regarding locality, depth, temperature, and character of bottom for any particular *Albatross* sample are obtainable also by reference to Townsend (1901).

A few species included in this collection, although found in Recent dredgings, are almost certainly of pre-Recent age. This phenomenon (fossil Foraminifera found in Recent ocean sediments) is encountered often, particularly in areas where manganese nodules or other evidences of nondeposition are found. These fossil species are *Hofkerina semiornata* (Howchin), *Ehrenbergina bicornis* Brady, and *Globigerinoides sacculifer* (Brady) *fistulosa* (Schubert). In addition, several other species, such as *Bueningia creeki* Finlay and *Cassidulina moluccensis* Germeraad, although undoubtedly of Recent origin in the present collections, were described first from Tertiary rocks.

Altogether, 139 species (3 indeterminate) and 6 subspecies are included in the present study. They are grouped in 70 genera and 14 families.

BENTHONIC FAMILIES

Family SPIRILLINIDAE

Genus SPIRILLINA Ehrenberg, 1843

SPIRILLINA DENTICULOGRANULATA Chapman

Spirillina denticulo-granulata Chapman, 1907, Journ. Quekett Micr. Club, ser. 2, vol. 10, p. 133, pl. 10, fig. 6; 1909, Subantarctic Islands of New Zealand, p. 354, pl. 17, fig. 3.—Graham and Militante, 1959, Stanford Univ. Publ., Geol. Sci., vol. 6, no. 2, p. 102, pl. 16, fig. 3.—Todd, 1961 (1962), U.S. Geol. Surv. Prof. Paper 354–H, p. 179 (table 1), pl. 23, fig. 5.

A single specimen from 40–50 fathoms, off Fiji, appears to belong in this rather distinctive species in which the edges of the coils are marked by high, sharp, limbate, outward-flaring ridges with the intervening channels ornamented by transverse grooves. The opposite face of the test is slightly concave and filled with papillae and is indistinguishable from that of *Spirillina inaequalis*.

SPIRILLINA INAEQUALIS Brady

Spirillina inaequalis Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 631, pl. 85, figs. 8–11.—Rhumbler, 1906, Zool. Jahrb., Abt. Syst., vol. 24, p. 34, pl. 2, fig. 12.—Cushman, 1933, Cushman Lab. Foram. Res. Spec. Publ. 5, pl. 29, fig. 4 [view c is reversed with respect to views a and b].

Spirillina limbata H. B. Brady var. *denticulata* H. B. Brady.—Cushman, 1915, U.S. Nat. Mus. Bull. 71, pt. 5, p. 5, pl. 3, figs. 1, 2; 1931, U.S. Nat. Mus. Bull. 104, pt. 8, p. 8, pl. 2, figs. 4, 5.

Spirillina tuberculato-limbata Chapman, 1899, Journ. Linnean Soc. London, Zoology, vol. 28, p. 11, pl. 1, fig. 8.

This is the best represented species of *Spirillina* and the only one found to any extent in deep as well as shallow water. The species appears to have a worldwide distribution.

Its specific name is singularly appropriate, being applicable to its unequal faces. On its flat face, by which presumably it is attached temporarily during life, the convolutions are clearly visible, the whorls being separated from each other by a raised limbate ridge representing the former periphery of the test. Between the ridges, the slightly depressed channels are dotted thickly by perforations, light-colored dots on a dark background. From this side the test is scarcely distinguishable from tests of *Spirillina limbata* Brady. The opposite face of the test presents a wholly different appearance. The periphery slopes inward, in some specimens steeply, in others so gently that the sloping periphery occupies as much as one-third the diameter of the test. The surface of this face is concave inside the inward-sloping periphery, and the central part is covered more or less thickly by knobs and pustules of shell material, thus obscuring or obliterating the individual convolutions of the test.

There is great variation in this species, particularly in the degree of slope of the periphery and in the development of the beaded covering of the concave face of the test.

SPIRILLINA INAEQUALIS SEMIDECORATA Heron-Allen and Earland

Spirillina semidecorata Heron-Allen and Earland, 1915, Trans. Zool. Soc. London, vol. 20, p. 685, pl. 51, figs. 26–31.

Because of its plano-concave shape with inward-sloping periphery, this form seems related to *Spirillina inaequalis* Brady. It differs in the fine transverse fluting present over the whorls of the concave face and down over the sloping periphery. Only five specimens were found.

This form, here regarded as a subspecies of *S. inaequalis*, was described originally from the Kerimba Archipelago as a distinct species.

SPIRILLINA LIMBATA Brady

Spirillina limbata Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 632, pl. 85, figs. 18–21.—Flint, 1899, Ann. Rep. U.S. Nat. Mus. for 1897, p. 326, pl. 71, fig. 5.

This symmetrical and biconcave species is represented by rare specimens in only three samples. It is characterized by its truncated periphery and its channelled surface, each coil being marked by a raised limbate ridge that represents the former periphery of the test. Between the consecutive rings of this limbate spiral, the wall is distinctly but finely perforate. No other ornamentation decorates the test.

SPIRILLINA SPINIGERA Chapman

Spirillina spinigera Chapman, 1899, Journ. Linn. Soc. London, Zoology, vol. 28, p. 10, pl. 1, fig. 7; 1900, op. cit., vol. 28, p. 188, pl. 19, figs. 9, 10.—Rhumbler, 1911, Foram. Plankton-Exped., pt. 1, pp. 119, 150, pl. 7, figs. 3–8; 1913, pt. 2, p. 433.—Cushman, 1924, Carnegie Instit. Washington, Publ. 342, p. 32, pl. 9, figs. 6, 7.

Spirillina decorata Brady, var.—Sidebottom, 1908, Mem. Proc. Manchester Lit. Philos. Soc., vol. 52, no. 13, p. 8, pl. 2, fig. 6.—Cushman, Todd, and Post, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 357, pl. 88, fig. 35.

A single specimen from 21 fathoms, Guam Anchorage, Ladrone [Marianas] Islands, shows the spinose periphery typical of this species.

This rare species is probably widespread in shallow warm waters, having been reported from the Mediterranean as well as several Pacific localities.

SPIRILLINA VIVIPARA Ehrenberg

Spirillina vivipara Ehrenberg.—Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 630, pl. 85, figs. 1–5.—Egger, 1893, Abh. kön. bay. Akad. Wiss., München, Cl. II, vol. 18, p. 394, pl. 18, figs. 56–58.—Flint, 1899, Ann. Rep. U.S. Nat. Mus. for 1897, p. 326, pl. 71, fig. 4.—Cushman, 1924, Carnegie Instit. Washington, Publ. 342, p. 30, pl. 9, figs. 1, 2.—Cushman and Valentine, 1930, Contr. Dept. Geol. Stanford Univ., vol. 1, no. 1, p. 22, pl. 6, fig. 4.—Cushman, 1931, U.S. Nat. Mus. Bull. 104, pt. 8, p. 3, pl. 1, figs. 1–4.—Phleger and Parker, 1951, Geol. Soc. Amer. Mem. 46, pt. 2, p. 25, pl. 13, figs. 3, 4.—Parker, 1958, Rep. Swedish Deep-Sea Exped., vol. 8, Sediment Cores, no. 4, p. 264, pl. 3, fig. 4.

Spirillina vivipara var. *densepunctata* Cushman.—Cushman, Todd, and Post, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 357, pl. 88, fig. 31.

This widespread species is distinguished from other species of this genus by its rounded instead of truncate periphery. Except for its conspicuous pores, appearing as white dots in the dark transparent wall, it is unornamented. Its coiling is planispiral and the test is very slightly depressed in the center of both sides. The later coils do not overlap the earlier ones and the spiral suture is distinct and slightly depressed. The density of the pores is variable and is usually greater in the later than in the earlier coils.

The form described as the variety *densepunctata* Cushman appears, from re-examination of the holotype and two other identified specimens, to be synonymous with the subspecies *revertens* Rhumbler, which is separated from the typical form of the species by the inward turning of the end of the coil and by its trochoid instead of planispiral coiling.

The above synonymy lists only a few of the many records of this species and indicates that it probably has a worldwide distribution in shallow waters.

SPIRILLINA VIVIPARA REVERTENS Rhumbler

Spirillina vivipara var. *revertens* Rhumbler, 1906, Zool. Jahrb., Abt. Syst., vol. 24, p. 32, pl. 2, figs. 8–10; 1911, Foram. Plankton-Exped., pt. 1, pl. 5, fig. 8; pl. 6, figs. 7–10; 1913, pt. 2, p. 430.—Cushman, Todd, and Post, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 357, pl. 88, fig. 30.—Todd, 1957, U.S. Geol. Surv. Prof. Paper 280–H, p. 290 (table 4), pl. 90, fig. 2.

Spirillina vivipara Ehrenberg var. *densepunctata* Cushman, 1931, U.S. Nat. Mus. Bull. 104, pt. 8, p. 4, pl. 1, fig. 5.—Cushman and Parker, 1931, Proc. U.S. Nat. Mus., vol. 80, art. 3, p. 18, pl. 4, fig. 1.

Rare specimens of this distinctive form of *Spirillina vivipara* are found in the shallow water around several of the islands and atolls.

Specimens are characterized by their smaller-than-average size for this genus, their nearly transparent wall, and their concavo-convex shape with the end of the coil turned inward onto the concave side.

Their relationship to the typical form of *S. vivipara* seems to be subspecific rather than varietal.

Genus CONICOSPIRILLINA Cushman, 1927

CONICOSPIRILLINA SEMIINVOLUTA Cushman

Conicospirillina semi-involuta Cushman, 1933, Contr. Cushman Lab. Foram. Res., vol. 9, p. 86, pl. 8, fig. 19.—Cushman, Todd, and Post, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 357, pl. 88, fig. 38.

This rare and distinctively ornamented species has thus far been recorded only from off Fiji and from inside the lagoon at Rongerik Atoll in the Marshalls.

Rare specimens were found at 269 fathoms, *Albatross* station H3875, in the Paumotu Islands.

CONICOSPIRILLINA sp.

Conicospirillina sp. Cushman, Todd, and Post, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 357, pl. 88, fig. 39.

Two single specimens, one each from 21 fathoms at Guam Anchorage in the Ladrone [Marianas] Islands and from *Albatross* station H3807 (112 fathoms, entrance Avatoru Pass, Rahiroa Atoll, S. ½ mi.), are identical with this apparently undescribed species known from a short core inside Bikini Atoll. It is a simple unornamented coil, with the flattened whorls considerably overlapping on the dorsal side, resulting in a flat-domed test, depressed in the center of the opposite side and very thin along the periphery.

Family DISCORBIDAE

Genus PATELLINA Williamson, 1858

PATELLINA ADVENA Cushman

Plate 1, Figure 2

Patellina advena Cushman, 1922, U.S. Geol. Surv. Prof. Paper 129–F, p. 135, pl. 31, fig. 9; 1924, Carnegie Instit. Washington, Publ. 342, p. 32.—Cushman and Herrick, 1945, Contr. Cushman Lab. Foram. Res., vol. 21, p. 67, pl. 11, fig. 1.

Patellina corrugata Williamson var. *formosa* Heron-Allen and Earland, 1932, *Discovery* Reps., vol. 4, p. 406, pl. 13, figs. 23–25.

Although it is probably not true that the distinction between *Patellina advena* and *P. corrugata* coincides with the distinction between Pacific and Atlantic specimens, as was suggested by Cushman (1930, p. 16), *P. advena* appears to be more characteristic of the Pacific than does *P. corrugata*. Moreover, the only records of *P. advena* from the

Atlantic realm are as Tertiary fossils: the Oligocene of Mississippi and the Eocene of Georgia.

As compared with *P. corrugata* Williamson from off the British Isles, the test of *P. advena* is lower and is more nearly dome shaped than peaked, and the septa are much more lobed and complex. In addition, the dorsal sutures are nearly indistinguishable in *P. advena*, whereas in *P. corrugata* they are distinct and sometimes even slightly limbate.

Comparison with unfigured types of *P. corrugata* var. *formosa* from 118 meters, Burdwood Bank in the Falkland Islands, sent by Mr. Earland (Cushman Coll. 14605), leads me to include this form in the synonymy of *P. advena*.

PATELLINA ADVENA ALTIFORMIS Cushman

Plate 1, Figure 1

Patellina advena Cushman var. *altiformis* Cushman, 1933, Contr. Cushman Lab. Foram. Res., vol. 9, p. 87, pl. 9, fig. 8.—Cushman, Todd, and Post, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 357, pl. 89, fig. 1.

This high-spired form of *Patellina advena* seems better regarded as a subspecies than a variety. It is less rare than the typical form and is found in some of the same samples, all but one in relatively shallow water.

The circumstance of a subspecies occurring in the same sample with the typical form of a species leads one to question how this can be when a subspecies is thought of as a geographically defined (or possibly ecologically defined) subdivision of a species. Because of the probably very minute geographic area occupied by an individual foraminifer, or even by whole populations of Foraminifera, one subspecies may live in what would appear to be rather close geographic proximity to another subspecies yet still be within a geographically defined area. The movement of empty tests of Foraminfera over the sea floor by currents or activity of other benthonic organisms increases or entirely changes the apparent geographic distribution of a species or subspecies and serves to obscure the exact geographic area in which any such group actually lived.

Because of these considerations, it is difficult, if not impossible, to determine accurately whether slight morphologic differences within species correspond to, or are independent of, geographic or ecologic restriction of the living animals. Thus, determination of subspecific relationships in instances such as this are subjective matters. And it is, moreover, not to be unexpected that two or more subspecies would be found in a single sample.

Genus PATELLINELLA Cushman, 1928

PATELLINELLA CARINATA Collins

PLATE 1, FIGURES 5, 6

Patellinella carinata COLLINS, 1958, Brit. Mus. (Nat. Hist.) Great Barrier Reef Exped. 1928–29, Sci. Rep., vol. 6, no. 6, Foraminifera, p. 407, pl. 5, fig. 8.
Patellinella jugosa H. B. BRADY.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 358, pl. 89, fig. 3.

This species, described from 600 meters off the Great Barrier Reef, is distinguished by its angular and serrate, instead of rounded and smooth, periphery. The wall is thin, smooth, and nearly transparent, bearing only a few coarse pores, mostly along the slightly indented suture lines.

A single specimen from Rongerik Atoll in the Marshall Islands was misidentified as *Patellinella jugosa* although at the time it was noted as possibly a new species. *P. carinata* is represented by more specimens in the present material than is *P. inconspicua.*

By contrast with other species of this genus (e.g., its type species, *P. inconspicua*), *P. carinata* appears to stand as a transition form between *Patellinella* and *Bolivina.*

PATELLINELLA FIJIANA Cushman

PLATE 1, FIGURE 4

Patellinella fijiana CUSHMAN, 1933, Contr. Cushman Lab. Foram. Res., vol. 9, p. 87, pl. 9, fig. 7.

This species appears to be represented by only a single specimen, the holotype from near Nairai, Fiji. Rare specimens from the Marshall Islands placed in this species (Cushman, Todd, and Post, 1954, p. 358, pl. 89, fig. 2), now seem to belong in *Patellinella jugosa* (Brady).

The wall is decorated by rather coarse rugosities that effectively hide the suture lines. The wall of the apertural face, however, is smooth and polished.

PATELLINELLA INCONSPICUA (Brady)

PLATE 1, FIGURE 3

Textularia inconspicua BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 357, pl. 42, fig. 6.—MILLETT, 1898, Journ. Roy. Micr. Soc., p. 557, pl. 7, fig. 1.
Patellinella inconspicua (H. B. BRADY).—CUSHMAN 1928, Contr. Cushman Lab. Foram. Res., vol. 4, p. 5, pl. 1, fig. 8.—PARR and COLLINS, 1930, Proc. Roy. Soc. Victoria, vol. 43, p. 92, pl. 4, fig. 7.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 358, pl. 89, fig. 4.—TODD, 1957, U.S. Geol. Surv. Prof. Paper 280–H, p. 290 (tbl. 4), pl. 90, fig. 3.

A few specimens of this minute species were found in 21 fathoms at Guam Anchorage in the Ladrone [Marianas] Islands, and a single specimen (figured) came from *Albatross* station H3905 (425 fathoms, northwest point Hao Atoll, SE. ½ mi.). The latter specimen is abnormal in possessing a basal spine set at nearly right angles to the plane of compression of the test. In general, this species is smoothly rounded and shows neither peripheral angularity nor depression of sutures although both these features are subject to variation.

Genus ROSALINA d'Orbigny, 1826

ROSALINA CONCINNA (Brady)

PLATE 4, FIGURE 3

Discorbina concinna BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 646, pl. 90, figs. 7, 8.

Discorbis concinna (H. B. BRADY).—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260-H, p. 358, pl. 89, figs. 12, 13.—BANDY, 1956, U.S. Geol. Surv. Prof. Paper 274-G, p. 193, pl. 31, fig. 4.

Rosalina concinna appears to be a cosmopolitan species in warm, shallow waters of the equatorial regions. Its best distinguishing characteristics are its nearly circular outline and its concavo-convex shape with rounded (not sharp) periphery. Three or four crescent-shaped chambers comprise the final whorl but, if the dorsal suture lines are obscured, it is not possible to determine by any peripheral indentations where the dorsal sutures are located. The wall is thin, translucent, and fairly coarsely and densely perforated on both dorsal and ventral surfaces. The early whorl, usually orange, is easily observed at the crest of the flat dome of the dorsal surface. In well-preserved specimens the aperture near the center of the depressed ventral surface can be seen to be protected by a projecting lip. In a large proportion of the specimens, however, the ventral wall is broken or partially dissolved away.

ROSALINA FLORIDANA (Cushman)

PLATE 3, FIGURES 1, 3; PLATE 4, FIGURE 5

Discorbis floridana CUSHMAN, 1922, Carnegie Instit. Washington, Publ. 311, p. 39, pl. 5, figs. 11, 12.—CUSHMAN and PARKER, 1931, Proc. U.S. Nat. Mus., vol. 80, art. 3, p. 18, pl. 4, fig. 5.—CUSHMAN, 1931, U.S. Nat. Mus. Bull. 104, pt. 8, p. 21, pl. 4, figs. 7, 8.—PARKER, 1948, Bull. Mus. Comp. Zool., vol. 100, p. 238 (list), pl. 5, fig. 23.—PHLEGER and PARKER, 1951, Geol. Soc. Amer. Mem. 46, pt. 2, p. 20, pl. 10, fig. 4.—PHLEGER, 1954, Bull. Amer. Assoc. Petr. Geol., vol. 38, no. 4, p. 638, pl. 1, figs. 30, 33, 34.—DROOGER and KAASSCHIETER, 1958, Verh. Kon. Nederl. Akad. Wetensch., Afd. Natuurk., ser. 1, vol. 22, p. 42, pl. 2, fig. 6.

Rosalina floridana (CUSHMAN).—PARKER, 1954, Bull. Mus. Comp. Zool., vol. 111, no. 10, p. 524, pl. 8, figs. 19, 20.—TODD and BRONNIMANN, 1957, Cushman Found. Foram. Res. Spec. Publ. 3, p. 36, pl. 9, figs. 16-21.

Discorbis opima CUSHMAN, 1933, Contr. Cushman Lab. Foram. Res., vol. 9, p. 88, pl. 9, fig. 3.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260-H, p. 358, pl. 89, figs. 10, 11.—TODD, 1957, U.S. Geol. Surv. Prof. Paper 280-H, p. 290 (tbl. 4), pl. 90. fig. 11.

Rosalina opima (Cushman).—Todd, 1958, Rep. Swedish Deep-Sea Exped., vol. 8, Sediment Cores, no. 3, p. 196, pl. 1, fig. 16.
Discorbis candeiana (d'Orbigny).—Phleger and Parker, 1951, Geol. Soc. Amer. Mem. 46, pt. 2, p. 20, pl. 10, fig. 3.—Todd, 1957, U.S. Geol. Surv. Prof. Paper 280–H, p. 290 (tbl. 4), pl. 90, fig. 9.—Graham and Militante 1959, Stanford Univ. Publ., Geol. Sci., vol. 6, no. 2, p. 93, pl. 13, fig. 22.

This species was described from shallow water of the Dry Tortugas off Florida. It appears to be very widely distributed in warm shallow waters of both the Atlantic and Pacific Oceans, being recorded from many areas under several names, only a few of which are included above. It is probably the same species as that described and named by d'Orbigny from Cuban sands, *Rosalina candeiana* (d'Orbigny, 1839, p. 97, pl. 4, figs. 2–4). Banner and Blow (1960a, p. 37), however, found that the only two syntypes of *Rosalina candeiana* in existence are a bolivinid and a polymorphinid. Moreover, the subsequently described species, *Discorbis floridana* Cushman and *Discorbis opima* Cushman, are better illustrated and more widely used in the literature than *Rosalina candeiana* has been, and the concept of both these species is more stable than has been the concept of *Rosalina* (or *Discorbis*) *candeiana*. I follow, therefore, the commendable suggestion of Banner and Blow (1960a, p. 37) that *Rosalina candeiana* be considered a nomen dubium and be abandoned.

In the present material from the tropical Pacific, *Rosalina floridana* is well represented, particularly in the samples from the shallower water, and is probably attached to seaweed during life. Because of its habit of attachment, it is quite variable in form.

Average size of specimens is slightly larger than that of *R. micens*, and the outline of the test is less likely to be circular and is often elongate. The distinction between the wall of the opposite sides is characteristic of this species; the dorsal surface is rather coarsely and densely punctate, whereas the ventral surface is glassy and shows no noticeable punctation. The periphery is angled bluntly and the ventral surface is slightly concave. But, contrasted with the smoothly concave ventral surface of *R. micens*, the ventral surface is irregular and undulating and, in some specimens, has several blunt knobs extending inward toward the central (umbilical) part of the test.

ROSALINA GLOBULARIS d'Orbigny

Plate 3, Figure 4

Rosalina globularis d'Orbigny, 1826, Ann. Sci. Nat., vol. 7, p. 271, no. 1, pl. 13, figs. 1–4; Modèles No. 69, IIIe livr.

Rare specimens found in a few of the shallower samples appear to belong in this common attached species that serves as the type species for *Rosalina*.

The present specimens are thin-walled and nearly transparent, with the pores appearing as white dots on the wall. The periphery is lobulate and rounded, with no trace of a keel and no difference in porosity between dorsal and ventral surfaces. The spire is small and not raised above the surface of the dorsal side, and the umbilicus is open.

ROSALINA MICENS (Cushman)

PLATE 4, FIGURE 2

Discorbis micens CUSHMAN, 1933, Contr. Cushman Lab. Foram. Res., vol. 9, p. 89, pl. 9, fig. 5.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 358, pl. 89, figs. 8, 9.—TODD, 1957, U.S. Geol. Surv. Prof. Paper 280–H, p. 290 (tbl. 4), pl. 90, fig. 7.

Rosalina micens has been reported thus far only from the Pacific—in the Paumotu Islands, the Marshalls, and at Saipan. It seems to be closely related to *R. concinna*, their separation being based on only two transitional features: (a) in *R. concinna*, the outline is essentially circular but, in *R. micens*, the circularity is indented where the final chamber meets the previous whorl; (b) in *R. concinna*, the chamber shape is a thin crescent but, in *R. micens*, it is a thick crescent with a distinct angle in the middle of the concave side of the crescent. Further study of these two forms is needed to determine whether or not they are biologically distinct or merely forms of a single species. In any case, it is a convenience to have separate names by which to differentiate them.

In the present material, *R. micens* is fairly well distributed, more abundantly around the islands and atolls than in the deeper water samples.

ROSALINA RUGOSA d'Orbigny

PLATE 4, FIGURE 1

Rosalina rugosa D'ORBIGNY, 1839, Voy. Amér. Mérid., vol. 5, pt. 5, "Foraminifères," p. 42, pl. 2, figs. 12–14.

Discorbis rugosa (D'ORBIGNY).—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 359, pl. 89, fig. 14.—TODD, 1957, U.S. Geol. Surv. Prof. Paper 280–H, p. 290 (tbl. 4), pl. 90, fig. 10.—GRAHAM and MILITANTE, 1959, Stanford Univ. Publ., Geol. Sci., vol. 6, no. 2, p. 94, pl. 14, figs. 1, 2.

Rare specimens from only a few samples are referable to this species. It is characterized by its coarse pores and by its chambers becoming progressively more inflated as added, so that the periphery is lobulated and the sutures slightly indented. The aperture is rather widely open beneath a projecting lip and extends from the umbilicus to the periphery. Immature individuals show the characteristic coarse pores, white in the dark translucent wall, but the inflation of the chambers is absent or only slightly developed.

ROSALINA SUBBERTHELOTI (Cushman)

Plate 4, Figure 4

Discorbis subbertheloti Cushman, 1924, Publ. 342, Carnegie Instit. Washington, p. 33, pl. 10, fig. 1.

This species was described from Samoa. Despite the inclusion of Brady's "*Discorbina bertheloti* d'Orbigny sp." in this species by Cushman, it seems unlikely that they are the same. *Rosalina subbertheloti* has a less regular sutural pattern on its concave surface, in this respect resembling *R. floridana*, whereas Brady's illustrated specimen is more like *R. micens* although not the same. *R. subbertheloti* is larger and proportionally flatter than the other species of this genus in the present material.

It is represented rarely and found in only a few samples.

ROSALINA VILARDEBOANA d'Orbigny

Plate 3, Figures 2, 5

Rosalina vilardeboana d'Orbigny, 1839, Voy. Amér. Mérid., vol. 5, pt. 5, "Foraminifères," p. 44, pl. 6, figs. 13–15.

Test of average size for the genus, slightly compressed, biconvex, usually more convex ventrally than dorsally, umbilicus large and open, periphery angular, marked by a faint limbate band, outline slightly lobulate around the last 2 or 3 chambers; chambers distinct, coiled in a flat coil of about 2½ whorls, 5 or 6 chambers comprising the adult whorl, chambers not inflated dorsally, becoming progressively more inflated ventrally as growth proceeds; sutures distinct, gently curved, slightly depressed on dorsal surface, more deeply incised between the inflated chambers on the ventral surface; wall calcareous, smooth, dotted by the coarse perforations appearing white on the nearly transparent wall, early chambers on the dorsal side lacking the coarse pores in some specimens; aperture a low opening into the umbilicus under the projecting edge of the final chamber, extending nearly out to the periphery.

Diameter about 0.35 mm., thickness about 0.20 mm.

The original description of *Rosalina vilardeboana*, a species described from around the Falkland Islands, mentions several features characteristic of the present specimens: the russet tint of the early chambers, as compared with the white color of the later ones, and the spire more projecting and the wall less copiously perforated than in the related species, *R. globularis*.

This species is unlike other described species of *Rosalina* in that the convexity is usually greater on the ventral than on the dorsal side. That this difference in convexity might be a result of an accident of attachment, rather than a true specific difference, has been considered. Perhaps these specimens were attached by their dorsal surfaces (as

Cibicides is), thus allowing expansion in size only on the opposite (ventral) surface. But not all specimens are inflated ventrally and, moreover, it seems most unlikely that an open umbilicus would be present on the exposed surface of any test.

This species, found at only a few of the nearshore and shallower stations, was fairly common in several of the samples.

Genus DISCORBIS Lamarck, 1804

DISCORBIS SUBVESICULARIS Collins

Discorbis subvesicularis Collins, 1958, Brit. Mus. (Nat. Hist.), Great Barrier Reef Exped. 1928–29, Sci. Rep., vol. 6, no. 6, Foraminifera, p. 401, pl. 5, fig. 5.

A single specimen from Port Lottin, Kusaie, Caroline Islands, seems identical with this species described from a channel into a mangrove swamp on the Great Barrier Reef. Except for the umbilical flaps and consequent complication of the apertural openings, this species would be regarded as a simple *Rosalina*.

DISCORBIS? AGUAYOI Bermudez

Discorbis aguayoi Bermudez, 1935, Mem. Soc. Cubana Hist. Nat., vol. 9, p. 204, pl. 15, figs. 10–14.—Boltovskoy, 1959, Argentina Serv. Hidro. Naval, Publ. H1005, p. 90, pl. 12, fig. 22.

Discorbis? aguayoi Bermudez.—Todd and Bronnimann, 1957, Cushman Found. Foram. Res. Spec. Publ. 3, p. 37, pl. 9, fig. 24.

Discorinopsis aguayoi (Bermudez).—Phleger, Parker, and Peirson, 1953, Cushman Found. Foram. Res. Spec. Publ. 2, p. 7, pl. 4, figs. 23, 24.—Arnold, 1954, Contr. Cushman Found. Foram. Res., vol. 5, pp. 4–12, pls. 1, 2.

Rare specimens were found in three of the atoll samples. This species was described from off Cuba and has been reported from off southern Brazil, the Gulf of Paria, and the coast of Texas. It is apparently characteristic of nearshore and brackish environments.

A similar, if not identical, species has been described as *Discorinopsis tropica* (Collins, 1958, p. 406, pl. 5, fig. 7) from a mangrove swamp on the Great Barrier Reef.

Genus SVRATKINA Pokorny, 1956

SVRATKINA AUSTRALIENSIS (Chapman, Parr, and Collins)

Discorbis tuberculata (Balkwill and Wright) var. *australiensis* Chapman, Parr, and Collins, 1934, Journ. Linn. Soc., Zool., vol. 38 (no. 262), p. 563, pl. 8, fig. 9.

Svratkina aff. *australiensis* Chapman, Parr and Collins.—Pokorny, 1956, Univ. Carolina [Prague], Geol., vol. 2, no. 3, p. 259, text figs. 1–3.

Epistominella sp. D. Todd, 1957, U.S. Geol. Surv. Prof. Paper 280–H, tbl. 4, pl. 92, fig. 2.

Svratkina sp. A. Todd and Low, 1960, U.S. Geol. Surv. Prof. Paper 260–X, p. 840.

This distinctive species occurs rarely but is found in a good many of the deep-water samples. It seems to have a long range, at least from upper Eocene to Recent, and a worldwide distribution. It was originally described from the Miocene and Recent of Australia. Other records include the upper Eocene of Czechoslovakia, Recent of Saipan, and the Miocene of Eniwetok.

Its distinguishing characteristics are the exceptionally coarse pores that are largely restricted to the dorsal surface, being arranged in crude rows paralleling the curved dorsal sutures, the indentation of the aperture into the apertural face, and the smoothly oval shape of the entire test.

Genus NEOCONORBINA Hofker, 1951

NEOCONORBINA CRUSTATA (Cushman)

PLATE 2, FIGURES 2, 3

Discorbis crustata Cushman, 1933, Contr. Cushman Lab. Foram. Res., vol. 9, p. 88, pl. 9, fig. 4.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 358, pl. 89, fig. 6.

This low, scalelike species occurs rarely in a few of the samples. The dorsal surface is unornamented except for the slightly limbate sutures. The chambers are crescent-shaped, each one extending more than half way around the circumference of the test. The initial chambers make a small peaked area in the center of the dorsal side. The ventral side is umbilicate at the center with the apertures of the last several chambers opening into the depressed umbilicus. Dorsally, the wall is finely perforate, but the ventral wall is distinctly perforate.

NEOCONORBINA FLORIDENSIS (Cushman)

PLATE 2, FIGURE 4

Discorbis bertheloti (D'ORBIGNY) var. *floridensis* CUSHMAN, 1931, U.S. Nat. Mus. Bull. 104, pt. 8, p. 17, pl. 3, figs. 3–5.

Discorbis floridensis CUSHMAN.—PHLEGER and PARKER, 1951, Geol. Soc. Amer. Mem. 46, pt. 2, p. 20, pl. 10, figs. 5–7.

Rosalina floridensis (CUSHMAN).—PARKER, 1954, Bull. Mus. Comp. Zool., vol. 111, no. 10, p. 525, pl. 8, figs. 28, 29.

In the present material this species is found at only one locality, Mokaujar Anchorage, Fiji, where it occurs fairly commonly.

Specimens are not entirely typical, differing in the following respects: (a) more highly peaked at the center rather than flat-domed; (b) sutures more heavily limbate; (c) chambers more elongate and arched, resulting in a more nearly circular outline; (d) wall of the early whorls having areas of clear unperforated shell parallel to the sutures, these areas giving the central part of the test a more glassy appearance. Despite these differences, all slight in degree, the present specimens are believed to be referable to *Neoconorbina floridensis,* which was described from off Florida and which has been reported thus far only from the West Indian region.

In the Pacific, another species, bearing considerable resemblance to the present specimens, was described as *Discorbis globularis* (d'Orbigny) var. *bradyi* (Cushman, 1915, p. 12) and reported from off Japan and off Hong Kong. It differs, however, in the final whorl being composed of 5 or 6 chambers that are not elongate and arcuate in shape. As a result, the tests are elongate in outline, not circular as are those of the present specimens.

NEOCONORBINA FRUSTATA (Cushman)

PLATE 1, FIGURE 7

Discorbis frustata CUSHMAN, 1933, Contr. Cushman Lab. Foram. Res., vol. 9, p. 88, pl. 9, fig. 2.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260-H, p. 358, pl. 89, fig. 5.

This conical species is distinguished by the upturned outer edges of the chambers, which look like a series of ruffles around the dorsal surface. The species is very rare.

NEOCONORBINA PATELLIFORMIS (Brady)

PLATE 2, FIGURE 1

Discorbina patelliformis BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 647, pl. 88, fig. 3; pl. 89, fig. 1.

Discorbis patelliformis (H. B. BRADY).—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260-H, p. 359, pl. 89, fig. 7.—TODD, 1957, U.S. Geol. Surv. Prof. Paper 280-H, p. 290 (tbl. 4), pl. 91, fig. 1.

This species has a high conical form with the concave basal part ornamented by fine striations radiating out from the central umbilicus.

Specimens are rare and found only in samples from around the atolls.

NEOCONORBINA TERQUEMI (Rzehak)

PLATE 5, FIGURE 6

Discorbina terquemi RZEHAK, 1888, Austria Geol. Reichsanst., Verh., p. 228.

Neoconorbina terquemi (RZEHAK).—TODD, 1958, Rep. Swedish Deep-Sea Exped., vol. 8, Sediment Cores, no. 3, p. 196.—PARKER, 1958, op. cit., no. 4, p. 267, pl. 3, figs. 26, 27.

Rosalina orbicularis TERQUEM, 1876 (not D'ORBIGNY, 1850), Animeaux sur la Plage de Dunkerque, p. 75, pl. 9, fig. 4.

Discorbina orbicularis TERQUEM, sp.—BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 647, pl. 88, figs. 4–8.

Discorbis orbicularis (TERQUEM).—CUSHMAN, 1931, U.S. Nat. Mus. Bull. 104, pt. 8, p. 27, pl. 6, fig. 3.—RHUMBLER, 1938, Kieler Meeresforschungen, band 2, p. 205, text figs. 56–58.—VOORTHUYSEN, 1951, Med. Geol. Stichting, new ser., no. 5, p. 24 (list), pl. 2, fig. 1.—BOLTOVSKOY, 1954, Rev. Instit. Nac. Invest. Ciencias Nat. y Mus. Argentino, Ciencias Geol., vol. 3, no. 3, p. 201, pl. 15, fig. 5.—TODD, 1957, U.S. Geol. Surv. Prof. Paper 280-H, p. 290 (tbl. 4), pl. 90, fig. 12.

Conorbina orbicularis (Terquem).—Parker, 1954, Bull. Mus. Comp. Zool., vol. 111, no. 10, p. 522, pl. 8, figs. 13, 14.

Neoconorbina orbicularis (Terquem).—Hofker, 1956, Skrift. Univ. Zool. Mus., København, vol. 15, p. 171, pl. 26, figs. 4–8.

This species appears, from its many records, of which only a few have been listed above, to be a cosmopolitan species. Its relationship to *Rosalina concinna* (Brady) may be much closer than their placement in different genera would suggest. Both are nearly circular in outline with long crescentic chambers. They differ in that *R. concinna* has a rounded periphery with the dorsal surface bulging up steeply from the periphery, as if the test were nearly half of a sphere, and that *Neoconorbina terquemi* has a pinched-together, angular periphery with the dorsal surface sloping very gradually upward from it, as if the test were only a small tangential slice of a much larger sphere.

The only specimens found in the present collections were from around the islands and atolls.

NEOCONORBINA TUBEROCAPITATA (Chapman)

Plate 1, Figures 8, 9

Discorbina tuberocapitata Chapman, 1899, Journ. Linn. Soc., Zoology, vol. 28, p. 11, pl. 1, fig. 9.

Discorbis tuberocapitata (Chapman).—Cushman, Todd, and Post, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 359, pl. 89, fig. 16.—Todd, 1957, U.S. Geol. Surv. Prof. Paper 280–H, p. 290 (tbl. 4), pl. 91, fig. 2.

Described from Funafuti in the Ellice Islands and also reported from the Marshalls and from Saipan in the Marianas, this species occurs in the present material fairly commonly off Fiji, 40–50 fathoms, and rarely in several other samples from near islands or atolls. It is characterized by its prominent glassy knob that occupies the center of the dorsal surface and, indeed, constitutes the major part of the test. The species is to be expected in relatively shallow warm water and probably in both eastern and western hemispheres.

A similar, perhaps identical, species occurs off Cuba, reported as *Discorbis orbicularis* (Terquem) var. *antillea* Bermudez (1935, p. 205, pl. 16, figs. 11–13).

Genus HANZAWAIA Asano, 1944

HANZAWAIA CONCENTRICA (Cushman)

Truncatulina concentrica Cushman, 1918, U.S. Geol. Surv. Bull. 676, p. 64, pl. 21, fig. 3.

Cibicides concentrica (Cushman).—Cushman, 1930, Florida State Geol. Surv., Bull. 4, p. 61, pl. 12, fig. 4.—Cushman, 1931, U.S. Nat. Mus. Bull. 104, pt. 8, p. 120, pl. 21, figs. 4, 5; pl. 22, figs. 1, 2.

Cibicides concentricus (Cushman).—Phleger and Parker, 1951, Geol. Soc. Amer. Mem. 46, pt. 2, p. 29, pl. 15, figs. 14, 15.—Parker, 1952, Bull. Mus. Comp. Zool., vol. 106, no. 10, p. 445, pl. 5, fig. 10.

Hanzawaia concentrica (Cushman).—Puri, 1953, Florida Geol. Surv., Geol. Bull. 36, p. 140, pl. 12, figs. 7–9.—McLean, 1956, Bull. Amer. Pal., vol. 36, no. 160, p. 367, pl. 49, figs. 4–6.—Sabol, 1960, Bull. Amer. Pal., vol. 41, no. 191, p. 233, pl. 27, figs. 7, 8.

Cibicidina concentrica (Cushman).—Parker, 1954, Bull. Mus. Comp. Zool., vol. 111, no. 10, p. 544, pl. 13, figs. 7, 10.

This plano-convex species is recorded widely from Miocene to Recent, mostly in shallow or only moderately deep water. Rare specimens were found in four samples.

Family ROTALIIDAE

Genus GAVELINOPSIS Hofker, 1951

GAVELINOPSIS PRAEGERI (Heron-Allen and Earland)

Plate 8, Figure 1

Discorbina praegeri Heron-Allen and Earland, 1913, Proc. Roy. Irish Acad., vol. 31, pt. 64, p. 122, pl. 10, figs. 8–10.

Discorbis(?) *praegeri* (Heron-Allen and Earland).—Cushman, 1931, U.S. Nat. Mus. Bull. 104, pt. 8, p. 30, pl. 6, fig. 4.

Gavelinopsis praegeri (Heron-Allen and Earland).—Hofker, 1951, *Siboga*-Exped., Mon. IVa, pt. III, p. 486, text figs. 332–334.—Parker, 1958, Rep. Swedish Deep-Sea Exped., vol. 8, Sediment Cores, no. 4, p. 264, pl. 3, figs. 24, 25.

Discorbina isabelleana d'Orbigny, sp.—Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 646, pl. 88, fig. 1.

Discorbis lobatulus Parr, 1950, B.A.N.Z. Antarctic Res. Exped. 1929–1931 Rep., ser. B, vol. 5, pt. 6, Foraminifera, p. 354, pl. 13, figs. 23–25.

Described from around the British Isles, this species seems to have a worldwide distribution. It occurs in both shallow and deep-water samples of the present collection but never more than rarely.

The umbilical plug of shell material, although variable in size, is the distinguishing feature. The dorsal surface is smooth and glassy, less distinctly punctate than the ventral surface, and ranges from conical to nearly flat.

Genus ROTORBINELLA Bandy, 1944

ROTORBINELLA MIRA (Cushman)

Plate 8, Figure 2

Discorbis mira Cushman, 1922, Carnegie Instit. Washington, Publ. No. 311, p. 39, pl. 6, figs. 10, 11; 1931, U.S. Nat. Mus. Bull. 104, pt. 8, p. 25, pl. 5, figs. 5, 6.—Bermudez, 1935, Mem. Soc. Cubana Hist. Nat., vol. 9, p. 205, pl. 15, figs. 1–5.—Todd, 1957, U.S. Geol. Surv. Prof. Paper 280–H, p. 290 (tbl. 4), pl. 90, fig. 5.

Discorbis mirus Cushman.—Graham and Militante, 1959, Stanford Univ. Publ., Geol. Sci., vol. 6, no. 2, p. 93, pl. 13, fig. 23.

Discorbina turbo d'Orbigny, sp.—Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 642, pl. 87, fig. 8.

Rare specimens in four of the shallow-water samples belong in this distinctive species, which was described from the West Indies but probably has a worldwide distribution in the equatorial regions. It can be distinguished by the neat pattern of coarse wall perforations outlining the chambers on the dorsal surface.

Genus GYROIDINA d'Orbigny, 1826

GYROIDINA GEMMA Bandy

Gyroidina gemma Bandy, 1953, Journ. Paleont., vol. 27, p. 179, pl. 23, fig. 4.—Uchio, 1960, Cushman Found. Foram. Res. Spec. Publ. 5, pl. 8, figs. 19–21.

Rare specimens from a few deep-water samples appear to belong to this species, which was described and has been reported thus far only from off southern California.

The species is distinguishable from *Gyroidina soldanii* d'Orbigny by its more acutely angled periphery. The specimens resemble *Eponides* more than they do *Gyroidina* because of the triangular rather than quadrangular shape of the apertural face. The dorsal surface is smooth and slightly convex. The ventral surface is rather evenly conical with the small umbilicus at the apex of the cone. The aperture is a small rimmed opening about halfway between the umbilicus and the periphery.

GYROIDINA LAMARCKIANA (d'Orbigny)

Plate 6, Figure 3

Rotalina lamarckiana d'Orbigny, 1839, *in* Barker-Webb and Berthelot, Hist. Nat. Iles Canaries, Paris, vol. 2, pt. 2, Foraminifères, p. 131, pl. 2, figs. 13–15.

Gyroidina lamarckiana (d'Orbigny).—Phleger, Parker, and Peirson, 1953, Rep. Swedish Deep-Sea Exped., vol. 7, Sediment Cores, no. 1, p. 41, pl. 8, figs. 33, 34.

Gyroidina soldanii d'Orbigny.—Cushman (part), 1931, U.S. Nat. Mus. Bull. 104, pt. 8, p. 38, pl. 8, fig. 3 (not figs. 4–8).

A few specimens appear to belong in this species described from off the Canary Islands.

The species is rather compressed for *Gyroidina*. Number of chambers per final whorl ranges from 6 to 10.

GYROIDINA SOLDANII d'Orbigny

Plate 6, Figure 4

Gyroidina soldanii d'Orbigny, 1826, Ann. Sci. Nat., vol. 7, p. 276, no. 5; Modèles no. 36, IIe livr.—Cushman (part), 1931, U.S. Nat. Mus. Bull. 104, pt. 8, p. 38, pl. 8, figs. 4–8 (not fig. 3).

Rotalia soldanii d'Orbigny.—Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 706, pl. 107, figs. 6, 7.

Gyroidina neosoldanii Brotzen, 1936, Sver. Geol. Under., ser. C, no. 396, p. 158.—Parker, 1954, Bull. Mus. Comp. Zool., vol. 111, no. 10, p. 528, pl. 9, figs. 9, 10.

This well-known and probably cosmopolitan species is represented by rare specimens in the present material.

The umbilicus is more or less open, and the final chamber is more or less ventrally inflated toward its umbilical part so that the apertural face of the final chamber stands up prominently on the ventral side of the test.

Discussions (Parker, 1958, p. 265, 266) under the several species of *Gyroidina* that were found in the eastern Mediterranean point out some of the problems connected with naming this species of *Gyroidina*. The name *G. neosoldanii* was proposed because it was believed that the Pacific specimens illustrated by Brady (1884, pl. 107, figs. 6, 7) did not belong in d'Orbigny's original *Gyroidina soldanii*. Parker (1958, p. 265) states, furthermore, that it is likely that Brady's two specimens (Brady, 1884, figs. 6, 7) represent two different species, one having oblique sutures and the other radiating sutures. It seems to me, however, that the angle of sutures is not of specific importance and, moreover, that both of Brady's specimens should be included in d'Orbigny's original species, *Gyroidina soldanii;* therefore, I am regarding the present specimens as also belonging in *G. soldanii*.

Genus EPONIDES Montfort, 1808

EPONIDES REPANDUS (Fichtel and Moll)

Plate 7, Figures 3, 4

Eponides repandus (Fichtel and Moll).—Cushman and Kellett, 1929, Proc. U.S. Nat. Mus., vol. 75, p. 11, pl. 4, fig. 7.—Cushman and Todd, 1947, Cushman Lab. Foram. Res. Spec. Publ. 21, p. 22, pl. 4, fig. 3.—Phleger and Parker, 1951, Geol. Soc. Amer. Mem. 46, pt. 2, p. 21, pl. 11, figs. 5, 6.—Parker, 1954, Bull. Mus. Comp. Zool., vol. 111, p. 529, pl. 9, figs. 27, 28.—Tinoco, 1955, Div. Geol. Min., Rio de Janeiro, bol. no. 159, p. 37, pl. 4, fig. 6.—Walton, 1955, Journ. Paleont., vol. 29, no. 6, p. 1008, pl. 103, figs. 8, 9.—Drooger and Kaasschieter, 1958, Verh. Kon. Nederl. Akad. Wetensch., Afd. Natuurk., ser. 1, vol. 22, p. 46, pl. 2, figs. 8, 9.—Graham and Militante, 1959, Stanford Univ. Publ., Geol. Sci., vol. 6, no. 2, p. 95, pl. 14, fig. 5.—Resig, 1962, Contr. Cushman Found. Foram. Res., vol. 13, p. 55, pl. 14, figs. 1–9.

Pulvinulina repanda Fichtel and Moll.—Brady, 1844, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 684, pl. 104, fig. 18.

Poroeponides repandus (Fichtel and Moll).—Miller, 1953, Contr. Cushman Found. Foram. Res., vol. 4, p. 59, pl. 10, fig. 1.

Rosalina lateralis Terquem, 1878, Mém. Soc. Géol. France, ser. 3, vol. 1, mém. 3, p. 25, pl. 2, fig. 11.

Pulvinulina lateralis Terquem, sp.—Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 689, pl. 106, figs. 2, 3.

Eponides (?) *lateralis* (Terquem).—Cushman, 1931, U.S. Nat. Mus. Bull. 104, pt. 8, p. 47, pl. 10, fig. 5.

Poroeponides lateralis (Terquem).—Cushman, 1944, Cushman Lab. Foram. Res. Spec. Publ. 12, p. 34, pl. 4, fig. 23.—Parker, 1948, Bull. Mus. Comp. Zool., vol. 100, p. 239 (list), pl. 1, fig. 17.—Said, 1949, Cushman Lab. Foram. Res. Spec. Publ. 26, p. 36, pl. 4, fig. 3.—Parker, 1952, Bull. Mus. Comp.

Zool., vol. 106, p. 453, pl. 5, fig. 6.—BANDY, 1954, U.S. Geol. Surv. Prof. Paper 254-F, p. 137, pl. 30, fig. 1.—BHATIA, 1956, Contr. Cushman Found. Foram. Res., vol. 7, p. 23, pl. 3, figs. 3-5.—BOLTOVSKOY, 1957, Rev. Instit. Nac. Invest. Ciencias Nat. y Mus. Argentino, Ciencias Geol., vol. 6, no. 1, p. 59, pl. 10, fig. 5; 1959, Argentina Serv. Hidro. Naval, Publ. H1005, p. 91, pl. 13, fig. 4.—GRAHAM and MILITANTE, 1959, Stanford Univ. Publ., Geol. Sci., vol. 6, no. 2, p. 96, pl. 14, fig. 9.—ANDERSEN, 1961, Louisiana Dept. Cons., Geol. Bull. No. 35, pt. 2, p. 106, pl. 22, figs. 5, 6.—TODD and LOW, 1961, Contr. Cushman Found. Foram. Res., vol. 12, p. 18, pl. 2, figs. 14, 15.

Poroeponides cribrorepandus ASANO and UCHIO (ms.).—UCHIO, 1952, Jap. Journ. Geol. Geogr., vol. 22, p. 157.—BANDY, 1953, Journ. Paleont., vol. 27, p. 173, pl. 24, fig. 1.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260-H, p. 360, pl. 89, figs. 24, 25.—TAKAYANAGI, 1955, Contr. Instit. Geol. Paleo., Tohoku Univ., no. 45, pl. 2, fig. 19—TODD, 1957, U.S. Geol. Surv. Prof. Paper 280-H, p. 290 (tbl. 4), pl. 93, fig. 9.—GRAHAM and MILITANTE, 1959, Stanford Univ. Publ., Geol. Sci., vol. 6, no. 2, p. 96, pl. 14, fig. 8.

Sestronophora arnoldi Loeblich and Tappan, 1957, U.S. Nat. Mus. Bull. 215, p. 229, pl. 73, fig. 5.

This cosmopolitan species has been known under several names. The above synonymy includes some of the Recent records of this widely reported species that is known from at least as far back as the Miocene.

The species exists in two different forms that can be seen to be related through a gradual transition from one to another as Resig (1962) has so clearly illustrated. The two figured specimens show the extremes of this transitional series.

Specimens are rare in the present material and many of them show evidence of wear or breakage. In most of the flat, wide-spreading specimens typical of "*Rosalina lateralis*," one can observe the compact "*repandus*"-form within the early whorls of the "*lateralis*"-form. In both forms the dorsal surface is usually marked by limbate and raised sutures.

EPONIDES TUMIDULUS (Brady)

PLATE 7, FIGURE 1

Truncatulina tumidula BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 666, pl. 95, fig. 8.

Eponides tumidulus (H. B. BRADY).—PHLEGER and PARKER, 1951, Geol. Soc. Amer. Mem. 46, pt. 2, p. 21, pl. 11, figs. 7, 8.—PARKER, 1954, Bull. Mus. Comp. Zool., vol. 111, no. 10, p. 529, pl. 9, figs. 19, 24.

A single typical specimen of this minute species was found at *Albatross* station H3791, 2287 fathoms, near the Marquesas Islands. It is a high-spired form, having 5 chambers in the final whorl. The chambers are inflated ventrally and the umbilicus is deeply depressed.

Genus CANCRIS Montfort, 1808

CANCRIS AURICULUS (Fichtel and Moll)

Plate 5, Figure 5

Cancris auriculus (Fichtel and Moll).—Cushman and Todd, 1942, Contr. Cushman Lab. Foram. Res., vol. 18, p. 74, pl. 18, figs. 1–11; pl. 23, fig. 6.

This species, having a worldwide distribution in Recent seas and also probably ranging back into the Miocene, is common in several of the shallower samples. Specimens show considerable variation in proportional width and in lobulation of the periphery.

Genus BAGGINA Cushman, 1926

BAGGINA INDICA (Cushman)

Pulvinulina indica Cushman, 1921, U.S. Nat. Mus. Bull. 100, p. 332.
Cancris indicus (Cushman).—Cushman and Todd, 1942, Contr. Cushman Lab. Foram. Res., vol. 18, p. 91, pl. 23, fig. 7; pl. 24, figs. 1, 2.
Baggina indica (Cushman).—Graham and Militante, 1959, Stanford Univ. Publ., Geol. Sci., vol. 6, no. 2, p. 91, pl. 13, fig. 17.
Pulvinulina hauerii d'Orbigny, sp.—Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 690, pl. 106, fig. 6 (not fig. 7).

Three immature specimens from two of the atoll samples appear to belong in this Indo-Pacific species.

Genus VALVULINERIA Cushman, 1926

VALVULINERIA GLABRA Cushman

Plate 8, Figure 3

Valvulineria vilardeboana (d'Orbigny) var. *glabra* Cushman, 1927, Bull. Scripps Instit. Oceanography, Tech. Ser., vol. 1, no. 10, p. 161, pl. 4, figs. 5, 6.
Valvulineria glabra Cushman.—Uchio, 1960, Cushman Found. Foram. Res. Spec. Publ. 5, pl. 8, figs. 6, 7.

Single specimens were found at *Albatross* stations H3838 and H3859, at 2224 and 666 fathoms, respectively, in the Tuamotu Islands. The species was described from off the coast of Central America and has been reported from off California.

Genus SIPHONINA Reuss, 1850

SIPHONINA TUBULOSA Cushman

Plate 15, Figure 4

Siphonina tubulosa Cushman, 1924, Carnegie Instit. Washington, Publ. 342, p. 40, pl. 13, figs. 1, 2.

This species, described from Samoa, is represented by very few specimens in the present material, all from near islands or atolls. The species is distinguished by the small tubules that project outward around the periphery and are seen occasionally on the otherwise smooth dorsal and ventral surfaces.

Genus SIPHONINOIDES Cushman, 1927

SIPHONINOIDES ECHINATUS (Brady)

PLATE 15, FIGURES 5, 6

Planorbulina echinata BRADY, 1879, Quart. Journ. Micr. Sci., vol. 19, p. 283, pl. 8, fig. 31.

Truncatulina echinata BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 670, pl. 96, figs. 9–14.

Siphoninoides echinata (H. B. BRADY).—CUSHMAN, 1927, Contr. Cushman Lab. Foram. Res., vol. 3, p. 77, pl. 16, fig. 12; 1927, Proc. U.S. Nat. Mus., vol. 72, art. 20, p. 13, pl. 4, figs. 7, 8.—SAID, 1949, Cushman Lab. Foram. Res. Spec. Publ. 26, p. 38, pl. 4, fig. 6.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 361, pl. 89, figs. 31, 32.—TODD, 1957, U.S. Geol. Surv. Prof. Paper 280–H, p. 290 (tbl. 4), pl. 91, fig. 7.—GRAHAM and MILITANTE, 1959, Stanford Univ. Publ., Geol. Sci., vol. 6, no. 2, p. 102, pl. 16, fig. 2.

This cosmopolitan species is found rarely in only a very few of the shallow-water samples.

Genus ORIDORSALIS Andersen, 1961

ORIDORSALIS UMBONATUS (Reuss)

PLATE 6, FIGURE 2

Rotalina umbonata REUSS, 1851, Zeitschr. Deutsch. Geol. Gesell., vol. 3, p. 75, pl. 5, fig. 35.

Eponides umbonata (REUSS).—CUSHMAN, 1929, Contr. Cushman Lab. Foram. Res., vol. 5, p. 98, pl. 14, fig. 8; 1931, U.S. Nat. Mus. Bull. 104, pt. 8, p. 52, pl. 11, figs. 1–3; 1936, Bull. Geol. Soc. Amer., vol. 47, p. 424, pl. 3, fig. 4.—CUSHMAN and HENBEST, 1940, U.S. Geol. Surv. Prof. Paper 196–A, pl. 10, fig. 1.—CUSHMAN, 1941, Amer. Journ. Sci., vol. 239, pl. 5, figs. 20–22.—PARKER, 1948, Bull. Mus. Comp. Zool., vol. 100, p. 238 (list), pl. 6, fig. 1.—PHLEGER and PARKER, 1951, Geol. Soc. Amer. Mem. 46, pt. 2, p. 22, pl. 11, figs. 10, 13, 14.

Pseudoeponides umbonatus (REUSS).—UCHIO, 1953, Jap. Journ. Geol. Geogr., vol. 23, p. 157, pl. 14, fig. 7.—PARKER, 1954, Bull. Mus. Comp. Zool., vol. 111, no. 10, p. 530, pl. 9, figs. 20, 21.

Truncatulina tenera BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 665, pl. 95, fig. 11.

Eponides tenera (H. B. BRADY).—CUSHMAN, STEWART, and STEWART, 1930, Trans. San Diego Soc. Nat. Hist., vol. 6, p. 72, pl. 6, fig. 3.

Eponides tener (BRADY).—MARTIN, 1952, Contr. Cushman Found. Foram. Res., vol. 3, p. 124, pl. 19, fig. 7.—BANDY, 1953, Journ. Paleont., vol. 27, no. 2, p. 172, pl. 23, fig. 3.

Examination of a topotype of *Rotalina umbonata* Reuss from the Oligocene of Hermsdorf near Berlin, Germany, leads me to conclude that this species belongs in the recently erected genus *Oridorsalis*. Even though Uchio (1953, p. 157, pl. 14, fig. 7) included this species in his genus *Pseudoeponides*, it now seems better to separate the species *umbonatus* from the several species that are closely similar to *Pseudoeponides japonicus* (type species of *Pseudoeponides*) and place it in the genus *Oridorsalis*. The genus *Oridorsalis* is separated from *Pseudoeponides* in lacking the ventral accessory apertures. Andersen (1961, p. 107–109) leaves open the question of relationship between Reuss' Oligocene species *Rotalina umbonata* and the genus *Oridorsalis*. Assuming the assignment of *umbonata* to *Oridorsalis* can be confirmed, it is likely that *Oridorsalis westi* Andersen (the type species of *Oridorsalis*) will fall into synonymy with *Oridorsalis umbonatus*.

This long-ranging and cosmopolitan deep-water species occurs in many of the samples but not more than rarely. Preservation is generally not good and the dorsal apertures are obscured in most of the specimens. As in *Gyroidina soldanii*, variation in size is considerable. The wall is smooth and shiny and usually opaque, and the sutures are indistinct.

Genus STOMATORBINA Dorreen, 1948

STOMATORBINA CONCENTRICA (Parker and Jones)

Plate 16, Figures 1, 2

Pulvinulina concentrica Parker and Jones, *in* Brady, 1864, Trans. Linn. Soc. London, vol. 24, p. 470, pl. 48, fig. 14.—Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 686, pl. 105, fig. 1.

Eponides concentrica Cushman, 1931, U.S. Nat. Mus. Bull. 104, pt. 8, p. 43, pl. 9, figs. 4, 5.—Chapman, Parr, and Collins, 1934, Journ. Linn. Soc., Zool., vol. 38 (no. 262), p. 565, pl. 9, fig. 17.—Colom, 1942, Instit. Español Oceanografia, Notas y Resúmenes, ser. 2, no. 108, p. 39, pl. 7, figs. 136, 137.—Parr, 1945, Proc. Roy. Soc. Victoria, vol. 56 (new ser.), pt. 2, p. 213, pl. 11, fig. 6.

Mississippina concentrica (Parker and Jones).—Said, 1949, Cushman Lab. Foram. Res., Spec. Publ. 26, p. 37, pl. 4, fig. 1.—Uchio, 1952, Trans. Proc. Paleont. Soc. Japan, new ser., no. 7, p. 197, pl. 18, figs. 1, 3–5.—Cushman, Todd, and Post, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 360, pl. 89, fig. 27.—Colom, 1956, Mem. Real Acad. Ciencias Artes Barcelona, vol. 32, no. 5, p. 79, pl. 12, figs. 39, 40.

Stomatorbina concentrica (Parker and Jones).—Phleger and Parker, 1951, Geol. Soc. Amer. Mem. 46, pt. 2, p. 22, pl. 12, fig. 2.—Gianotti, 1953, Riv. Ital. Pal. Stratig., Mem. 6, p. 278, pl. 17, fig. 2.—Kaasschieter, 1955, Verh. Kon. Nederl. Akad. Wetensch., Afd. Natuurk., ser. 1, vol. 21, no. 2, p. 87, pl. 9, fig. 4.—Carter, 1958, Geol. Surv. Victoria, Bull. No. 55, p. 40, pl. 4, figs. 37–39; pl. 7, fig. 75.—Boltovskoy, 1959, Argentina Serv. Hidro. Naval, Publ. H1005, p. 97, pl. 15, fig. 8.

This widely recorded and probably cosmopolitan deep-water species is found in four of the present samples, but only rarely. The broad, curved opaque bands on the ventral side, parallel with the periphery, are its chief distinguishing characteristic.

The genera *Stomatorbina* and *Mississippina* are quite similar in appearance but seem to be morphologically distinct. *Stomatorbina* has broad raised limbate bands marking the dorsal sutures, whereas in *Mississippina* the dorsal sutures are depressed. In both genera the main aperture is ventral and underneath the edge of the final chamber, and both genera have what have been called supplementary apertures. These are sealed over by shell material and appear as spirally elongate bands just inside the perphery. In *Mississippina* these darkened bands are present on both dorsal and ventral sides; in *Stomatorbina* they are present only on the ventral side.

Genus PAUMOTUA Loeblich, 1952

PAUMOTUA TEREBRA (Cushman)

PLATE 16, FIGURES 3, 4

Eponides terebra CUSHMAN, 1933, Contr. Cushman Lab. Foram. Res., vol. 9, p. 89, pl. 10, fig. 1.

Paumotua terebra (CUSHMAN).—LOEBLICH, 1952, Journ. Washington Acad. Sci., vol. 42, no. 6, p. 193, text fig. 1.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 361, pl. 89, fig. 28.

Described from the Paumotu Islands, this species is very rare. It has also been reported from off Bikini and from the Pliocene Bodjong beds in West Java.

It is distinctive in having a series of openings on the ventral surface, one to each chamber. The openings often are partially or wholly sealed over.

Genus EPISTOMAROIDES Uchio, 1952

EPISTOMAROIDES POLYSTOMELLOIDES (Parker and Jones

PLATE 10, FIGURES 5, 6

Discorbina polystomelloides PARKER and JONES, 1865, Philos. Trans., p. 421, pl. 19, fig. 8.—BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 652, pl. 91, fig. 1.—HERON-ALLEN and EARLAND, 1915, Trans. Zool. Soc. London, vol. 20, p. 698, pl. 52, figs. 19–23.

Epistomaroides polystomelloides (PARKER and JONES).—UCHIO, 1952, Jap. Journ. Geol. Geogr., vol. 22, p. 158, pl. 7, figs. 1–3.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 360, pl. 89, fig. 26.—TODD, 1957, U.S. Geol. Surv. Prof. Paper 280–H, p. 290 (tbl. 4), pl. 93, fig. 10.

Rare specimens occur in three of the shallow-water samples. They are large for Foraminifera (up to 1.4 mm.) and strikingly beautiful. The coarse and densely set pores in the otherwise nearly transparent wall give a sparkling appearance to this species. It seems to have been reported only from the Pacific.

Genus OSANGULARIA Brotzen, 1940

OSANGULARIA CULTER (Parker and Jones)

PLATE 15, FIGURE 1

Planorbulina culter PARKER and JONES, 1865, Philos. Trans., p. 421, pl. 19, fig. 1.

Truncatulina culter PARKER and JONES.—BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 668, pl. 96, fig. 3.

Pulvinulinella culter (Parker and Jones).—Cushman, 1927, Bull. Scripps Instit. Oceanography, Tech. Ser., vol. 1, no. 10, p. 164, pl. 5, figs. 8, 9.

Parrella culter (Parker and Jones).—Hofker, 1951, *Siboga*-Exped., Mon. IVa, pt. III, p. 336, text figs. 229–232.—Phleger and Parker, 1951, Geol. Soc. Amer. Mem. 46, pt. 2, p. 23, pl. 12, fig. 3.

Osangularia cultur [sic] (Parker and Jones).—Phleger, Parker, and Peirson, 1953, Rep. Swedish Deep-Sea Exped., vol. 7, Sediment Cores, no. 1, p. 42, pl. 9, figs. 11, 16.—Parker, 1954, Bull. Mus. Comp. Zool., vol. 111, no. 10, p. 530, pl. 9, figs. 29, 30.

Anomalina bengalensis Schwager, 1866, *Novara*-Exped., Geol. Theil, vol. 2, p. 259, pl. 7, fig. 111.

Pulvinulinella bengalensis (Schwager).—Cushman, 1934, B. P. Bishop Mus., Bull. 119, p. 131, pl. 17, fig. 6.

Osangularia bengalensis (Schwager).—Cushman, Todd, and Post, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 360, pl. 89, fig. 21.—Todd, 1957, U.S. Geol. Surv. Prof. Paper 280–H, p. 274 (tbl. 2), p. 278 (tbl. 3), pl. 77, fig. 1.

As indicated earlier by Cushman (1921, p. 320), there seems to be no specific difference between the species described under the names *culter* (from the tropical Atlantic) and *bengalensis* (from the Pliocene of Kar Nicobar [Car Nicobar Island]).

The species is distinguished by its sharp and serrated keel and its characteristic aperture in the form of an elongate narrow opening set at right angles to the base of the apertural face. Number of chambers per final whorl varies between 7 and 11 with most specimens having 9 to 11.

The species occurs rarely and is found only in the deeper samples.

Genus LAMARCKINA Berthelin, 1881

LAMARCKINA sp.

Plate 5, Figure 4

A single specimen, here illustrated, was found at *Albatross* station H3798, 687 fathoms, in the Marquesas Islands. Since it appears not to fit any described species, it is left unidentified. Compared with most other specimens in this genus, it is compressed and the dorsal surface is nearly flat and very little arched. The sutures are indistinct, and the umbilicus is broad and deeply depressed.

Genus HERONALLENIA Chapman and Parr, 1931

HERONALLENIA LINGULATA (Burrows and Holland)

Plate 5, Figure 3

Discorbina lingulata Burrows and Holland, *in* Jones, 1896, Foram. Crag, pt. 3, p. 297, pl. 7, fig. 33.

Heronallenia lingulata (Burrows and Holland).—Chapman, Parr, and Collins, 1934, Journ. Linn. Soc., Zool., vol. 38, no. 262, p. 564, pl. 8, fig. 11.—Todd and Bronnimann, 1957, Cushman Found. Foram. Res. Spec. Publ. 3, p. 37, pl. 11, figs. 7, 8.—Carter, 1958, Geol. Surv. Victoria, Bull. No. 55, p. 42, pl. 5, figs. 40–42.

Only four small specimens were found. The species is characterized by its compressed and plane, not arched, shape and the presence of small knobs projecting forward from about the midpoint of each dorsal suture.

Genus BRONNIMANNIA Bermudez, 1952

BRONNIMANNIA HALIOTIS (Heron-Allen and Earland)

PLATE 5, FIGURE 2

Discorbina haliotis HERON-ALLEN and EARLAND, 1924, Journ. Roy. Micr. Soc., p. 173, pl. 13, figs. 99–101.

Bronnimannia haliotis (HERON-ALLEN and EARLAND).—COLLINS, 1958, Brit. Mus. (Nat. Hist.), Great Barrier Reef Exped. 1928–29, Sci. Rep., vol. 6, no. 6, Foraminifera, p. 406.

This beautiful and distinctive species was originally described from the Miocene of Victoria, Australia. Other records are from the Pliocene, Pleistocene, and Recent of Australia. The type species of the genus, *Discorbis palmerae* Bermudez from off Cuba, is very similar to, if not identical with, *Bronnimannia haliotis*, differing only in its proportionally thicker test.

The test is biconcave, progressively more so toward the last-formed chambers, and the outline smoothly oval. One side of the test is dotted with thickly set punctae, whereas the wall of the opposite surface is nearly transparent. On this opposite surface the initial coil of chambers appears to stand apart from the final whorl of chambers, leaving open sinuses in the places normally occupied by the inner ends of the sutures.

In the present material, the species is represented best around the islands, but there are a few specimens from the deeper water.

Genus PLANULINOIDES Parr, 1941

PLANULINOIDES BICONCAVUS (Jones and Parker)

PLATE 5, FIGURE 1

Discorbina biconcava JONES and PARKER, *in* CARPENTER, PARKER and JONES, 1862, Introd. Foraminifera, p. 201, text figs. 32G.—PARKER and JONES, 1865, Philos. Trans., pp. 385, 422, pl. 19, fig. 10.—BRADY (part), 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 653, pl. 91, fig. 2 (not fig. 3).—EGGER, 1893, Abh. kön. bay. Akad. Wiss., München, Cl. II, vol. 18, p. 393, pl. 18, figs. 45–47.

Planulinoides biconcavus (JONES and PARKER).—PARR, 1941, Mining and Geol. Journ., Mines Dept., Victoria, vol. 2, no. 5, p. 305, text figs. a–c.

Discorbinella biconcava (JONES and PARKER).—PARR, 1945, Proc. Roy. Soc. Victoria, vol. 56 (new ser.), pt. 2, p. 211.

This species superficially resembles various species of *Planulina* but is distinguished easily by its elongate aperture set at an angle between the two limbate borders of the truncate periphery. In that the wall is finely, rather than coarsely, perforate on both ventral and dorsal surfaces, this genus is more closely related to the family Rotaliidae than to the Anomalinidae.

Parr (1945, p. 211) gave as his reason for suppressing *Planulinoides* as a synonym of *Discorbinella* Cushman and Martin, 1935, his recognition in some specimens of the normal discorbine aperture in addition to the peripheral one. Most specimens are thinner-walled on the ventral than on the dorsal side, and small openings are found broken through into the interior of the test from the ventral side. In well-preserved specimens, however, I have been unable to confirm the existence of the discorbine aperture under a flap on the ventral side of this species. I am, therefore, reassigning this species to Parr's genus, which was set up for it.

Planulinoides biconcavus occurs rarely in scattered deep-water samples.

Genus BUENINGIA Finlay, 1939

BUENINGIA CREEKI Finlay

Plate 8, Figure 4

Büningia creeki Finlay, 1939, Trans. Roy. Soc. New Zealand, vol. 69, pt. 1, p. 123, pl. 14, figs. 82–84.

Cibicidina sp. Cushman, Todd, and Post, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 372, pl. 91, fig. 32.

This species was described first from the lower Miocene of New Zealand. A few specimens, recorded under the name of *Cibicidina* sp. from some of the deep-water samples around Bikini, seem to be the first record of it from the Recent. In the present collections it is very rare, but it has been found in a number of the deeper water samples.

The species is a beautiful and quite distinctive one, hemispherical in shape. The flat (or slightly concave) dorsal side has an open umbilicus at its center, and the aperture extends from the umbilicus out to the periphery under a projecting flap. The chambers on the ventral side are inflated strongly, each subsequent one more so than the preceding, so that the final two chambers make up over half the test; five chambers compose the final whorl. The sutures on the dorsal side are limbate but consist only of depressed lines between the inflated chambers on the ventral side. The wall is smooth, clear, and thick, perforated by distinct but fine pores that, because of the thickness of the wall, show up as irregular lines on the wall surface, somewhat as they do in the genus *Sphaeroidinella*. The periphery is marked by a distinct limbate keel, best developed around the earlier chambers and becoming nonexistent around the final chamber.

Genus PARAROTALIA Le Calvez, 1949

PARAROTALIA OZAWAI (Asano)

PLATE 9, FIGURES 1, 2

Rotalia ozawai ASANO, 1951, Illustr. Cat. Japanese Tert. Smaller Foram., pt. 14, Rotaliidae, p. 15, figs. 115–117.
"Rotalia" ozawai ASANO.—GRAHAM and MILITANTE, 1959, Stanford Univ. Publ., Geol. Sci., vol. 6, no. 2, p. 100, pl. 15, figs. 6–8.

This species, described and reported from the Pliocene to Recent of Japan and the Recent of the Philippines, is found in shallow water at Levuka and Viva, Fiji, and at Rotonga.

Two specimens are illustrated to show the extremes of variability from specimens with pointed chambers ending in spines to those with a nearly entire periphery and no spines. The dorsal surface is nearly flat and the ventral surface convex. The ventral sutures are incised. In most specimens the spines are poorly developed and inconspicuous, and their position has no precise relationship with the sutures that separate the chambers. The aperture is that typical of the genus *Pararotalia*. Figure 1*c* shows the opening into an earlier chamber, where the two latest chambers have been broken away, and figure 2*c* shows the normal unbroken condition.

Genus STREBLUS Fischer, 1817

STREBLUS BECCARII TEPIDA (Cushman)

PLATE 6, FIGURE 1; PLATE 7, FIGURE 2

Rotalia beccarii (LINNÉ) var. *tepida* CUSHMAN, 1926, Carnegie Instit. Washington, Publ. 344, p. 79, pl. 1.
Rotalia cf. *R. beccarii* var. *tepida* CUSHMAN.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260–H p. 360, pl. 89, fig. 22.
Streblus beccarii (LINNÉ) var. *tepida* (CUSHMAN).—TODD, 1957, U.S. Geol. Surv. Prof. Paper 280–H, p. 290 (tbl. 4), pl. 91, fig. 5.—TODD and BRONNIMANN, 1957, Cushman Found. Foram. Res., Spec. Publ. 3, p. 38, pl. 10, figs. 5–11.
Streblus beccarii tepida (CUSHMAN).—TODD and LOW, 1961, Contr. Cushman Found. Foram. Res., vol. 12, p. 18, pl. 2, figs. 16, 17.

This well-known and widely distributed species is found (but only in the form of its small and delicate subspecies *tepida*) in many of the shallower samples taken from near islands and atolls.

Genus NUTTALLIDES Finlay, 1939

NUTTALLIDES UMBONIFERUS (Cushman)

PLATE 11, FIGURE 1

Pulvinulinella umbonifera CUSHMAN, 1933, Contr. Cushman Lab. Foram. Res., vol. 9, p. 90, pl. 9, fig. 9.
Eponides bradyi EARLAND, 1934, *Discovery* Rep., vol. 10, p. 187, pl. 8, figs. 36–38.
Truncatulina pygmaea HANTKEN.—BRADY, 1884, Rep. Voy. *Challenger*, vol. 9, p. 666, pl. 95, figs. 9, 10.

This species was described from *Albatross* station H3833, one of the samples belonging in the present lot of material. The species is probably to be expected only in deeper water samples. The other two records in the above synonymy are from off the Falklands and from the North Atlantic.

The specimens exhibit considerable variation in size, thickness, lobulation of the periphery, number of chambers, relative prominence of umbilical plug, degree to which an infolding of the wall extends into the apertural face, and smoothness and transparency of the wall.

The chief distinguishing characteristics of the species seem to be presence of the umbilical stud of solid shell material, the position of the apertural opening (not extending into the apertural face parallel with the periphery as in *Epistominella*), and usually the appearance of a crimped or crinkled periphery, resulting from the concentration of coarse pores or tubules along the periphery.

Number of chambers per final whorl is usually 6 but may be as high as 9. The apertural opening is not clearly visible on the holotype. Another specimen, therefore, is illustrated, showing that the aperture is located beneath a narrow lip and that it extends part way along the base of the apertural face but not into the apertural face. A groove or infolding of the apertural face parallel with, and just ventral to, the periphery tends to give the impression of an *Epistominella*-type of aperture, especially in specimens where the aperture is obscured by sediment.

NUTTALLIDES? RUGOSUS (Phleger and Parker)

Plate 11, Figure 2

Pseudoparrella (?) *rugosa* Phleger and Parker, 1951, Geol. Soc. Amer. Mem. 46, pt. 2, p. 28, pl. 15, figs. 8, 9.

Epistominella rugosa (Phleger and Parker).—Parker, 1954, Bull. Mus. Comp. Zool., vol. 111, no. 10, p. 533, pl. 10, figs. 24, 25.

Single specimens were found in four samples from deep water. The species is distinctive in its finely rugose surface, the slight forward indentation of the wall above the aperture just inside the periphery, and in the fact that the ventral sutures fail to meet owing to the presence of a small umbilical plug of solid shell material.

Genus EPISTOMINELLA Husezima and Maruhasi, 1944

EPISTOMINELLA EXIGUA (Brady)

Plate 10, Figure 1

Pulvinulina exigua Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 696, pl. 103, figs. 13, 14.

Pseudoparrella exigua (H. B. Brady).—Phleger and Parker (part), 1951, Geol. Soc. Amer. Mem. 46, pt. 2, p. 28, pl. 15, fig. 6 (not fig. 7).

Epistominella exigua (H. B. BRADY).—PHLEGER, PARKER, and PEIRSON, 1953, Rep. Swedish Deep-Sea Exped., vol. 7, Sediment Cores, no. 1, p. 43, pl. 9, figs. 35, 36.—PARKER, 1954, Bull. Mus. Comp. Zool., vol. 111, no. 10, p. 533, pl. 10, figs. 22, 23.

This species is found rarely in many of the deeper water samples. It is about equally biconvex with an entire periphery that is bluntly angled. The sutures are straight, tangential, and flush on the dorsal side and radial and slightly indented on the ventral. The wall is smooth, highly polished, in some specimens nearly transparent, and lacks ornamentation of any kind.

It has been pointed out to me by Frances L. Parker (in litt., Feb. 5, 1962) that this deep-water species is distinguishable from its shallow-water counterpart, *Epistominella vitrea* Parker, in the following respects: 5 to 5½ instead of 6 to 6½ chambers per final whorl, entire and more nearly angled periphery instead of rounded and slightly lobulate periphery, and dorsal sutures straight, oblique, and flush instead of slightly curved and slightly depressed as in *E. vitrea*.

EPISTOMINELLA PULCHRA (Cushman)

PLATE 10, FIGURES 3, 4

Pulvinulinella pulchra CUSHMAN, 1933, Contr. Cushman Lab. Foram. Res., vol. 9, p. 92, pl. 9, fig. 10.

This small and beautiful species was described originally from off Nairai, Fiji, where it was found commonly. Its only other occurrences in the present material are both very rare: 21 fathoms, Guam Anchorage in the Ladrone [Marianas] Islands, and 18 fathoms, Vavau Anchorage. In addition, it has been reported from Eniwetok, both in the Recent and in the Miocene.

The species superficially resembles species of *Siphonina*. The coarse pores and the small tubules radiating outward around the periphery, making an impression of a crinkled periphery, suggest the genus *Siphonina*, but the position of the aperture places the species in *Epistominella*.

EPISTOMINELLA TUBULIFERA (Heron-Allen and Earland)

PLATE 10, FIGURE 2

Truncatulina tubulifera HERON-ALLEN and EARLAND, 1915, Trans. Zool. Soc. London, vol. 20, p. 710, pl. 52, figs. 37–40.—CUSHMAN, 1924, Carnegie Instit. Washington, Publ. 342, p. 38, pl. 11, fig. 8.

Epistominella tubulifera (HERON-ALLEN and EARLAND).—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 365, pl. 90, fig. 20.—TODD, 1957, U.S. Geol. Surv. Prof. Paper 280–H, p. 292 (tbl. 4), pl. 92, fig. 1.—GRAHAM and MILITANTE, 1959, Stanford Univ. Publ., Geol. Sci., vol. 6, no. 2, p. 110, pl. 18, fig. 8.

This rather bizarrely ornamented species appears, by the position of its aperture, to belong in this genus. The last several chambers, but not the final one, possess open, flaring, backward-extending tubes or slits on their dorsal surfaces and toward their peripheral edges. In general, the wall on the dorsal surface is rather coarsely punctate whereas that on the ventral surface is not visibly punctate.

This species thus far has been reported only in the Pacific.

Family PEGIDIIDAE

Genus HOFKERINA Chapman and Parr, 1931

HOFKERINA SEMIORNATA (Howchin)

PLATE 18, FIGURE 3

Pulvinulina semiornata HOWCHIN, 1889, Trans. Proc. Roy. Soc. So. Australia, vol. 12, p. 14, pl. 1, fig. 12.

Hofkerina semiornata (HOWCHIN).—CHAPMAN and PARR, 1931, Proc. Roy. Soc. Victoria, vol. 43, pt. 2, p. 237, pl. 9, figs. 1–5.—CRESPIN, 1936, Palaeont. Bull., no. 2, Australia, p. 6, pl. 1, fig. 3.—CARTER, 1958, Geol. Surv. Victoria, Bull. No. 55, p. 58, pl. 9, figs. 88–90.—GLAESSNER and WADE, 1959, Micropaleontology, vol. 5, no. 2, p. 203, pl. 1, figs. 12–14.

This species was described and subsequently recorded from the Miocene of Australia. A single typical specimen was found at *Albatross* station H3942 (142 fathoms, northwest point Mehetia Island, S. ⅓ mi.), where the bottom is volcanic rock and coarse coral sand. So far as I know, there is no verification of Recent existence of this species, and I doubt that this single specimen is of Recent origin.

The species is large for Foraminifera, the present specimen measuring nearly 2 mm. in greater diameter. The final whorl is composed of 3½ chambers that are separated by depressed sutures on the ventral side but are obscured by the papillose surface ornamentation on the dorsal side. The inner parts of the chambers on the ventral side are punctured by coarse pores, but the wall itself is very finely and densely porous with the pores visible as fine white radial lines extending through the translucent wall.

Genus PEGIDIA Heron-Allen and Earland, 1928

PEGIDIA DUBIA (d'Orbigny)

PLATE 18, FIGURE 5

Rotalia dubia D'ORBIGNY, 1826, Ann. Sci. Nat., vol. 7, p. 274.—FORNASINI, 1908, Mem. Rend. Accad. Sci. Istit. Bologna, ser. 6, vol. 5, p. 46, pl. 1, fig. 14.

Pegidia dubia (D'ORBIGNY).—HERON-ALLEN and EARLAND, 1928, Journ. Roy. Micr. Soc., vol. 48, p. 290, pl. 1, figs. 8–15.

Rare typical specimens were found in the material from Rutavu, Rangiroa, and the beach at Hereheretue Atoll.

Genus SPHAERIDIA Heron-Allen and Earland, 1928

SPHAERIDIA PAPILLATA Heron-Allen and Earland

Sphaeridia papillata HERON-ALLEN and EARLAND, 1928, Journ. Roy. Micr. Soc., vol. 48, p. 294, pl. 2, figs. 27–33; pl. 3, figs. 34–37.

A single specimen, about 0.5 mm. in diameter, was found in the sample from 40–50 fathoms off Fiji.

Family AMPHISTEGINIDAE

Genus AMPHISTEGINA d'Orbigny, 1826

AMPHISTEGINA LESSONII d'Orbigny

PLATE 11, FIGURE 4

Amphistegina lessonii D'ORBIGNY, 1826, Ann. Sci. Nat., vol. 7, p. 304, pl. 17, figs. 1–4; Modèles No. 98, IV^{e} livr.—PHLEGER and PARKER, 1951, Geol. Soc. Amer. Mem. 46, pt. 2, p. 26, pl. 13, figs. 13, 14; pl. 14, fig. 1.

This large and beautiful species, originally described from Mauritius, was not found in the *Albatross* collections from the southeastern Pacific. It is included here only for comparison with the other two species of *Amphistegina* that make up a rather conspicuous part of the assemblages from the present collections.

Judging from recorded occurrences, *Amphistegina lessonii* seems to be much less abundant than either *A. madagascariensis* or *A. radiata*. The only Pacific occurrence of *A. lessonii* that I know of is at Kapingamarangi in the western Pacific, northeast of New Guinea, where it dominates one of the facies. Study of the sedimentary belts within this small atoll (McKee, Chronic, and Leopold, 1959) revealed the restricted occurrence of *Amphistegina lessonii* between approximately 120 and 210 feet in the central part of the lagoon (idem, p. 526–527).

At lesser depths within the same atoll a different species of *Amphistegina* is found. *Amphistegina madagascariensis*, together with *Marginopora vertebralis*, dominates the shallowest sedimentary belt just inside the reef, being found mostly no deeper than 25 feet.

These two species, living in mutually exclusive ecologic provinces within an area of about 6 by 8 miles, are clearly distinct without any transitional forms connecting them. *A. lessonii* is white and flat with numerous (25–30) chambers that are clearly visible on the surface. *A. madagascariensis* is orange, thick (with thickness equal nearly to diameter), and the sutures so indistinct that the number of chambers cannot be determined from the surface. In *A. madagascariensis* the biconvexity is unequal, the dorsal side slightly less raised than the ventral.

AMPHISTEGINA MADAGASCARIENSIS d'Orbigny

Plate 11, Figure 3; Plate 12, Figures 1, 2

Amphistegina madagascariensis d'Orbigny, 1826, Ann. Sci. Nat., vol. 7, p. 304.—Fornasini, 1903, Rend. Accad. Sci. Istit. Bologna, vol. 7, p. 3, pl. 2, fig. 5.—Cushman, Todd, and Post, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 362, pl. 90, figs. 1, 2.—Todd, 1957, U.S. Geol. Surv. Prof. Paper 280–H, p. 296, pl. 93, fig. 13.—Graham and Militante, 1959, Stanford Univ. Publ., Geol. Sci., vol. 6, no. 2, p. 104, pl. 16, figs. 9–11.

This species was described from Madagascar and probably has a worldwide distribution in the equatorial belt. It is characteristic of the littoral and shallow-water regions but exhibits a considerable range of variation, dependent probably upon depth and turbulence of water, with many transitional forms connecting the several variants.

In the *Albatross* collections, the heavy-shelled, thick, usually orange tests with blunt periphery and indistinguishable sutures (pl. 11, fig. 3) are found most abundantly in the beach sands and in the near-shore sediments. From farther out or deeper, the tests, though similar in form, are smaller, white, and less abundant. Another variant (pl. 12, figs. 1, 2), typical of lagoonal environments, trends toward a large, white test with a more pinched-together periphery bordered by a slightly limbate keel, and with the sutures fairly visible on both sides of the test.

The number of chambers per final whorl in *Amphistegina madagascariensis* varies from about 9 to 15 or more. The supplementary chambers on the ventral side are slender and curved backward at their outer ends, which fail to reach to the periphery. Sutures on both sides of the test are strongly curved but not characteristically angled as they are in *A. radiata*. The raised umbilical areas on both dorsal and ventral sides are transparent, permitting a view into the interior of the test, sometimes a view of the proloculus.

AMPHISTEGINA RADIATA (Fichtel and Moll)

Plate 13, Figures 1–3; Plate 14, Figures 1–3

Nautilus radiatus Fichtel and Moll, 1798, Testacea microscopica, p. 58, pl. 8, figs. a–d.

Amphistegina radiata (Fichtel and Moll).—Cushman, 1924, Carnegie Instit. Washington, Publ. 342, p. 49, pl. 17, figs. 1, 2.—Said, 1949, Cushman Lab. Foram. Res., Spec. Publ. 26, p. 38, pl. 4, fig. 10.—Cushman, Todd, and Post, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 362, pl. 90, fig. 3.

This is the deep-water species of *Amphistegina*, originally described from the Red Sea. It is nowhere found abundantly in the present collections, but it seems to be well distributed in the deeper samples and is present in several variable forms.

In its most typical form this species is distinguishable from *A. madagascariensis* by its flatter and more equally biconvex test, by its angled rather than curved sutures, and by the greater distinctness of its sutures owing to the limbate ridges of clear shell material and to the addition of glassy knobs between the sutures.

The sutures extend out almost radially or even slightly forward for about half the distance from umbilicus to periphery, then angle sharply backward at about a 90° angle and continue backward until they merge into the periphery. The inner ends of the sutures usually are irregular in pattern whereas the outer parts form a smooth curve (pl. 14, fig. 3). As a result of this suture pattern, characteristic of the species, some of the individuals (pl. 14, figs. 1–3) take on the appearance of being partially evolute, particularly on their ventral sides. The evolute appearance of some specimens (pl. 14, fig. 2) may be attributed partly to the transparency of the shell material with which each whorl covers the previous whorls.

The supplementary chambers that extend outward from the central area on the ventral side are shaped quite differently in *A. radiata* from the way they are in *A. madagascariensis*. In *A. radiata* the peripheral extensions of the supplementary chambers are so constricted in most specimens that they appear as little more than thickened suture lines, and it may be difficult to determine just how far out the supplementary chambers extend.

The umbilical areas on both dorsal and ventral sides are occupied by a more or less conspicuous and raised glassy knob. In many individuals this glassy knob serves as a window through which the interior of the test may be viewed (pl. 14, fig. 3). In rare individuals the knob is so large and high it stands up as a transverse stud projecting from the center of the test (pl. 13, fig. 1).

Degree of ornamentation of the surface of the test varies from smooth to densely papillate. In the more heavily ornamented species, chambers and sutures are totally obscured. Number of chambers per adult whorl ranges from about 9 to 15. Flatness of the test is likewise a variable feature.

Some of these variants are illustrated (pls. 13 and 14). Others have been described and illustrated elsewhere. Some have been given varietal names—var. *papillosa* Said and var. *venosa* (Fichtel and Moll). It seems likely that these variations are not determined ecologically but rather that the species is naturally variable.

Family CALCARINIDAE

Genus CALCARINA d'Orbigny, 1826

CALCARINA HISPIDA Brady

Plate 9, Figure 3

Calcarina hispida Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 713, pl. 108, figs. 8, 9.—Cushman, 1919, U.S. Nat. Mus. Bull. 100, vol. 1, pt. 6, p. 365, pl. 44, fig. 4.—Cushman, Todd, and Post, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 363, pl. 90, figs. 9–12.—Graham and Militante, 1959, Stanford Univ. Publ., Geol. Sci., vol. 6, no. 2, p. 106, pl. 17, figs. 5–7.

Calcarina mayori Cushman, 1924, Carnegie Instit. Washington, Publ. 342, p. 44, pl. 14, figs. 4–7.—Hofker, 1927, *Siboga*-Exped., Mon. IV, p. 44, pl. 20, figs. 1–12.

This small delicate species is the only representative of this genus found in the present material from this particular part of the southeastern Pacific. It is to be expected that no specimens of the heavy, robust species, *Calcarina spengleri* (Gmelin), which forms such a prominent constituent of reef and beach sands in the central and western Pacific, would be found in the eastern Pacific, east of 170° W. longitude (Todd, 1960).

Calcarina hispida was described from the Loo Choo [Ryukyu] Islands and appears to be distributed widely in the central and western Pacific, probably mostly as an inhabitant of the quieter waters inside lagoons. *C. mayori*, described from Samoa, seems to be indistinguishable and is thus included as a synonym.

Specimens in the present material are from Aloji Niue, Vavau in the Tonga group, various localities around Fiji, Rongelap in the Marshall Islands, and Guam Anchorage.

Genus BACULOGYPSINA Sacco, 1893

BACULOGYPSINA SPHAERULATA (Parker and Jones)

Plate 9, Figure 4

Tinoporus bacculatus De Montfort.—Carpenter (part), 1861, Philos. Trans., vol. 150, p. 557, pl. 18, figs. 2–6 (not figs. 7–10).—Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 716, pl. 101, figs. 4–7.

Orbitolina sphaerulata Parker and Jones, 1860, Ann. Mag. Nat. Hist., ser. 3, vol. 6, p. 33–34, no. 8.

Baculogypsina sphaerulata Sacco, 1893, Bull. Soc. Belge Géol. Pal. Hydr., vol. 7, p. 206.—Cushman, 1919, U.S. Nat. Mus. Bull. 100, pt. 6, p. 366, pl. 44, fig. 6.—Cushman, 1942, Rep. Great Barrier Reef Comm., vol. 5, p. 112 (lists), pl. 12, fig. 11.—Todd, 1957, U.S. Geol. Surv. Prof. Paper 280–H, p. 292 (tbl. 4), pl. 91, fig. 13; pl. 93, fig. 14.—Graham and Militante, 1959, Stanford Univ. Publ. Geol. Sci., vol. 6, no. 2, p. 105, pl. 17, fig. 1.—Todd, 1960, Sci. Rep. Tohoku Univ., ser. 2 (Geol.), spec. vol. no. 4, p. 101, pl. 10, figs. 2, 5–7.—Todd, 1961 (1962), U.S. Geol. Surv. Prof. Paper 354–H, p. 179 (tbl. 1), pl. 25, figs. 1, 2.

As is to be expected from the already-recorded restriction of this reef-dwelling genus to the area west of about 170° W. longitude (Todd, 1960), this species does not occur in most of the area covered by the present collections. It was found only at Aloji Niue, and at Kambara beach, Fiji, in both instances occurring in a fresh and unworn state.

Family CYMBALOPORIDAE

Genus CYMBALOPORETTA Cushman, 1928

CYMBALOPORETTA BRADYI (Cushman)

PLATE 19, FIGURES 1–4; PLATE 20, FIGURE 4

Cymbalopora poeyi (D'ORBIGNY) var. *bradyi* CUSHMAN, 1915, U.S. Nat. Mus. Bull. 71, pt. 5, p. 25, pl. 10, fig. 2; pl. 14, fig. 2.

Cymbalopora bradyi CUSHMAN, 1924, Carnegie Instit. Washington, Publ. 342, p. 34, pl. 10, figs. 2–4.

Cymbaloporetta bradyi (CUSHMAN).—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260-H, p. 364, pl. 90, figs. 13, 14.—TODD, 1957, U.S. Geol. Surv. Prof. Paper 280-H, p. 292 (tbl. 4), pl. 91, fig. 12.—TODD and BRONNIMANN, 1957, Cushman Found. Foram. Res., Spec. Publ. 3, p. 37, pl. 11, fig. 9.—GRAHAM and MILITANTE, 1959, Stanford Univ. Publ., Geol. Sci., vol. 6, no. 2, p. 108, pl. 18, fig. 2.

Cymbalopora poeyi var. BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 637, pl. 102, fig. 14.

This species, which is widespread in warm shallow water, is distributed widely and is usually common in the present collections, being found even in the deeper-water samples, where probably it was washed out from near-shore areas.

It shows an extreme variability in shape, as is typical of attached species. From *Cymbaloporetta squammosa* it is separated on the basis of its flatter and spreading form, its usually more numerous and more irregular lobes on the ventral side, its flattened initial stage, and its thinner and more delicate wall. The central area on the ventral side is open, not covered by a porous plate as in *C. squammosa*. A few initial chambers on the dorsal surface are sometimes orange but the remainder of the dorsal surface as well as the entire ventral surface is usually colorless. The wall is densely and rather coarsely perforate on the dorsal surface, but these coarse perforations gradually disappear as the wall is bent inward to form the ventral surface. The periphery is rounded in edge view. The open ventral umbilicus is not present in all specimens. Whether it is open or closed may depend on the stage of development that had been reached when the protoplasm left the test.

The relationships between this species and *C. squammosa* are not clear; surely they are very close. Moreover, the relationships between the genera *Cymbaloporetta, Tretomphalus,* and *Rosalina* are also not clear. Biological study of species in these genera may be expected to show that the "genera" are merely stages that the species pass through in their life cycles.

CYMBALOPORETTA SQUAMMOSA (d'Orbigny)

PLATE 20, FIGURE 3

Rosalina squammosa D'ORBIGNY, 1839, *in* DE LA SAGRA, Hist. Physiq. Pol. Nat. Cuba, Foraminifères, p. 91, pl. 3, figs. 12–14.

Cymbalopora squammosa (D'ORBIGNY).—CUSHMAN, 1922, Carnegie Instit. Washington, Publ. 311, p. 41, pl. 6, figs. 4–6.

Cymbaloporetta squammosa (D'ORBIGNY).—CUSHMAN, 1931, U.S. Nat. Mus. Bull. 104, pt. 8, p. 83, pl. 16, fig. 4.—BERMUDEZ, 1949, Cushman Lab. Foram. Res. Spec. Publ. 25, p. 266, pl. 19, figs. 40–42.—GRAHAM and MILITANTE, 1959, Stanford Univ. Publ., Geol. Sci., vol. 6, no. 2, p. 108, pl. 18, fig. 3.

Rosalina poeyi D'ORBIGNY, 1839, *in* DE LA SAGRA, Hist. Physiq. Pol. Nat. Cuba, Foraminifères, p. 92, pl. 3, figs. 18–20.

Cymbalopora poeyi D'ORBIGNY.—BRADY, 1884, Rep. Voy. *Challenger,* Zoology, vol. 9, p. 636, pl. 102, fig. 13.—FLINT, 1899, U.S. Nat. Mus. Ann. Rep. for 1897, p. 326, pl. 72, fig. 1.

This species probably has a worldwide distribution in warm shallow water. In life it apparently is attached lightly to seaweed and other objects that project above the sea bottom.

It has not been determined whether this is a biologically separate species from *Cymbaloporetta bradyi* or whether the two may be forms of the same species. Pending such determination the two are separated on a morphologic basis. *C. squammosa* has a high-spired, nearly plano-convex test. There are fewer lobes (usually about seven) visible on its ventral surface than on that of *C. bradyi,* and the central area is covered by an irregular coarsely porous plate. The apex of the dorsal surface tends to appear as if the shell wall were thickened, and the shell material is customarily purplish brown or orange brown on the dorsal side in contrast to its white or clear appearance on the ventral side.

In the present material this species is much less widely distributed than is *C. bradyi* although it occurs commonly at Hereheretue.

Genus CYMBALOPORELLA Cushman, 1927

CYMBALOPORELLA TABELLAEFORMIS (Brady)

PLATE 19, FIGURE 5

Cymbalopora tabellaeformis BRADY, 1884, Rep. Voy. *Challenger,* Zoology, vol. 9, p. 637, pl. 102, figs. 15–18.—CUSHMAN, 1924, Carnegie Instit. Washington, Publ. 342, p. 35, pl. 10, figs. 5–7.

Cymbaloporella tabellaeformis (H. B. BRADY).—CUSHMAN, 1927, Contr. Cushman Lab. Foram. Res., vol. 3, pt. 1, p. 81, pl. 17, fig. 7.—GRAHAM and MILITANTE, 1959, Stanford Univ. Publ., Geol. Sci., vol. 6, no. 2, p. 107, pl. 18, fig. 1.

Two typical specimens were found in 21 fathoms, Guam Anchorage, Ladrone [Marianas] Islands.

This genus appears to be very close to *Pyropilus* Cushman, as was pointed out at the time of erection of *Pyropilus*, which is distinguished by its later growth being outward in only one direction, resulting in an oblong test with the initial chambers nearer one end. *Cymbaloporella* likewise has an oblong outline but the initial chambers are located centrally and obscured usually by a thickened or bubbly coating over the dorsal surface.

Genus TRETOMPHALUS Moebius, 1880

TRETOMPHALUS CONCINNUS (Brady)

Discorbina concinna Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 646, pl. 90, figs. 7, 8.

Tretomphalus concinnus (Brady).—Cushman, 1934, Contr. Cushman Lab. Foram. Res., vol. 10, pt. 4, p. 96, pl. 11, figs. 8, 9; pl. 12, figs. 13–15.—Parr, 1945, Proc. Roy. Soc. Victoria, vol. 56 (new ser.), pt. 2, p. 212, pl. 11, figs. 4, 5.—Todd, 1957, U.S. Geol. Surv. Prof. Paper 280–H, p. 292 (tbl. 4), pl. 92, fig. 4.

This is the perfect example of a species that finds itself classified in different genera depending upon its life cycle. With the balloon chamber, it is *Tretomphalus;* without the balloon chamber, it is *Rosalina.*

As a *Tretomphalus* it is characterized by the very neat, circular caplike *Rosalina* stage with the suture between the *Rosalina* stage and the balloon chamber (as observed from the side) being a straight line.

Tretomphalus concinnus is found around Fiji and at Port Lottin and Guam Anchorage.

TRETOMPHALUS MILLETTI (Heron-Allen and Earland)

Plate 18, Figure 2

Cymbalopora bulloides d'Orbigny.—Millett, 1903, Journ. Roy. Micr. Soc., p. 697, pl. 7, fig. 4.

Cymbalopora milletti Heron-Allen and Earland, 1915, Trans. Zool. Soc. London, vol. 20, p. 689, pl. 51, figs. 32–35.

Tretomphalus milletti (Heron-Allen and Earland).—Cushman, 1924, Carnegie Instit. Washington, Publ. 342, p. 36, pl. 11, fig. 4.—Cushman, 1934, Contr. Cushman Lab. Foram. Res., vol. 10, pt. 4, p. 87, pl. 11, figs. 4, 5; pl. 12, figs. 1–5.

Cymbalopora (*Tretomphalus*) *bulloides* d'Orbigny, sp.—Brady (part), 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 638, pl. 102, fig. 9 (not figs. 7, 8, 10–12).

This distinctive species of *Tretomphalus* was described from the Kerimba Archipelago off southeastern Africa and apparently has a wide, though probably scattered, distribution in the Pacific. In the present samples it is found in both shallow and deep water.

The *Rosalina* stage is rather high spired for this genus, and the balloon chamber is rough surfaced and slightly crinkled. The separate chambers of the *Rosalina* stage are small and numerous and slightly bulging. The wall is orange brown in the initial chambers and more finely perforate than that of *T. planus*.

TRETOMPHALUS PLANUS Cushman

PLATE 18, FIGURE 1

Tretomphalus bulloides (d'ORBIGNY) var. *plana* CUSHMAN, 1924, Carnegie Instit. Washington, Publ. 342, p. 36, pl. 10, fig. 8.

Tretomphalus planus CUSHMAN, 1934, Contr. Cushman Lab. Foram. Res., vol. 10, pt. 4, p. 94, pl. 11, fig. 11; pl. 12, figs. 18–22.

This species was described from Samoa and is apparently to be expected in shallow water around various Pacific islands. It is characterized by its usually broad and flattened balloon chamber and by the low flat cone of the *Rosalina* stage with its more coarsely perforate wall. In addition, the chambers of the *Rosalina* stage are small and inclined to be individually bulging so that from the dorsal side the specimens resemble *Cymbaloporetta* more than *Rosalina*.

Family CASSIDULINIDAE

Genus CASSIDULINA d'Orbigny, 1826

CASSIDULINA ANGULOSA Cushman

PLATE 17, FIGURE 2

Cassidulina angulosa CUSHMAN, 1933, Contr. Cushman Lab. Foram. Res., vol. 9, pt. 4, p. 93, pl. 10, fig. 6.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 365, pl. 90, fig. 22.

This compressed species with elongate chambers and a lobulated, almost serrate, periphery was described from a deep-water sample off the Marshall Islands and has been recorded only from the area of the Marshalls. Specimens have never been found to occur commonly and are restricted to deep water.

CASSIDULINA CARINATA Silvestri

PLATE 17, FIGURE 4

Cassidulina laevigata D'ORBIGNY var. *carinata* A. SILVESTRI, 1896, Accad. Pont. Nuovi Lincei, Mem. 12, p. 104, pl. 2, fig. 10 (*C. laevigata* in explanation of plate).

Cassidulina carinata A. SILVESTRI.—PHLEGER, PARKER, and PEIRSON, 1953, Rep. Swedish Deep-Sea Exped., vol. 7, Sediment Cores, no. 1, p. 44, pl. 9, figs. 32, 37.—PARKER, 1954, Bull. Mus. Comp. Zool., vol. 111, no. 10, p. 535, pl. 10, fig. 30.—PARKER, 1958, Rep. Swedish Deep-Sea Exped., vol. 8, Sediment Cores, no. 4, p. 271, pl. 4, fig. 15.

Cassidulina laevigata d'Orbigny var. *carinata* Cushman, 1922, U.S. Nat. Mus. Bull. 104, pt. 3, p. 124, pl. 25, figs. 6, 7.

Cassidulina neocarinata Thalmann, 1950, Contr. Cushman Found. Foram. Res., vol. 1, p. 44.—Parker, 1954, Bull. Mus. Comp. Zool., vol. 111, no. 10, p. 536, pl. 11, fig. 3.

Cassidulina laevigata d'Orbigny.—Nørvang, 1958, Vidensk. Medd. Dansk naturh. Foren., vol. 120, p. 38, pl. 9, figs. 27–31.

Cassidulina carinata appears to be a cosmopolitan species but is represented by only rare individuals in the present collections. It is about equally biconvex with an angled and, in some specimens, keeled periphery. Four pairs of chambers compose the final whorl and the aperture is an elongate narrow slit parallel to the suture that separates the final two chambers. The outline of the test is slightly lobulated.

After examination of the types of "*Cassidulina laevigata* var. *carinata* Cushman," described from off Florida, and comparison of them with the original figure of *Cassidulina carinata* Silvestri from the Pliocene of Italy, as well as with specimens illustrated under that name (see synonymy above), I conclude that the two forms should not be separated specifically. As pointed out by Phleger, Parker, and Peirson (1953, p. 44), in the Florida form the aperture is longer than in the Italian one. Moreover, the Italian form is reported (loc. cit.) to have a broader apertural face, to be less compressed, and to be more coarsely perforate. Inasmuch as these and other features appear not to hold true but to be transitional, I interpret these two forms as one and use Silvestri's earlier name.

As to the relationship between this form and d'Orbigny's *Cassidulina laevigata*, that question must remain open because the source of the species, "ballast sand," is indeterminable. *Cassidulina laevigata* is shown as similar to the present species in its angular periphery but has no keel. It differs from the present species in its short bulimine apertural opening set at an angle to the suture line. As *C. laevigata* is type species of the genus, its loss into limbo might be interpreted by some as equivalent to loss of the genus *Cassidulina;* however, the morphology of the test is delineated clearly by the original figure and the model and has long been universally understood. In the interest of stability of nomenclature, the generic name should not be abandoned because the specific character of its type species is indeterminable.

CASSIDULINA COSTATULA Cushman

Plate 17, Figure 8

Cassidulina costatula Cushman, 1933, Contr. Cushman Lab. Foram. Res., vol. 9, pt. 4, p. 94, pl. 10, fig. 7.—Cushman, Todd, and Post, 1954, U.S. Geol. Surv. Prof. Paper 260-H, p. 365, pl. 90, fig. 24.

This species, described from deep water in the Paumotu Islands, is the only one of this genus in the present collections that has surface ornamentation. It is represented rather widely and more commonly in the deep water surrounding the Bikini and Eniwetok Atolls in the Marshall Islands.

The ornamentation consists of short and irregular raised costae, like ruffles, best developed over the peripheral parts of the test, leaving the area around the aperture smooth. The typical shape of the test is globular, but rare individuals, somewhat compressed with angled periphery, may be recognized by their ruffled ornamentation as belonging in the species.

CASSIDULINA DELICATA Cushman

PLATE 17, FIGURES 6, 7

Cassidulina delicata CUSHMAN, 1927, Bull. Scripps Instit. Oceanography, Tech. Ser., vol. 1, no. 10, p. 168, pl. 6, fig. 5.—CUSHMAN and MOYER, 1930, Contr. Cushman Lab. Foram. Res., vol. 6, pt. 3, p. 61, pl. 8, fig. 16.—CROUCH, 1952, Bull. Amer. Assoc. Petr. Geol., vol. 36, no. 5, p. 838, pl. 6, fig. 7.—BANDY, 1953, Journ. Paleont., vol. 27, no. 2, p. 182, pl. 25, fig. 4.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260-H, p. 365, pl. 90, fig. 25.—WALTON, 1955, Journ. Paleont., vol. 29, no. 6, p. 1004, pl. 103, figs. 28, 29.—UCHIO, 1960, Cushman Found. Foram. Res. Spec. Publ. 5, p. 68, pl. 9, fig. 17.

This species was described from deep water (428 fathoms) off Panama. Its other records are mostly from off the west coast of North America. In the central Pacific it has been reported from the Marshall Islands, and it is widely represented in the present collections.

Cassidulina delicata is distinguished by its more or less compressed test and by the elongate and narrowly open aperture that occupies nearly the entire length of the suture separating the final two chambers at the top of the test. There is no internal tooth. The periphery usually is nearly smooth and entire but may be lobulated slightly in the less compressed and larger individuals. From each side the chambers from the opposite side show only as very small triangles. From the ventral side the face of the final chamber, as it curves down toward the aperture, is wrinkled transversely.

CASSIDULINA GEMMA Todd

Cassidulina gemma TODD, *in* CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260-H, p. 366, pl. 90, figs. 26, 27.

This species, described from deep water (835 fathoms) off Bikini in the Marshall Islands, is represented only rarely in the present collections. It is a rather distinctive species in this genus, being characterized by its bulging chambers and depressed limbate sutures, which result in a lobulated outline of the test, and by its clear to translucent wall, in which the perforations are usually visible distinctly as they are in *Cassidulina patula.* The apertural face of the final chamber is often broader than high and sometimes appears to overhang the rest of the test.

Some of the immature specimens are hard to distinguish from *C. subglobosa.* In general, the separation is based on the more smoothly rounded test of *C. subglobosa* and the greater inflation of the individual chambers in *C. gemma.*

CASSIDULINA MINUTA Cushman

PLATE 17, FIGURE 3

Cassidulina minuta CUSHMAN, 1933, Contr. Cushman Lab. Foram. Res., vol. 9, pt. 4, p. 92, pl. 10, fig. 3.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 366, pl. 90, fig. 35.

This species seems to be the only shallow-water species of this genus. It occurs fairly commonly in the shallower samples of the present collections and less frequently in the deeper samples.

Besides its small size, this species is characterized by its compressed test with smooth, not lobulated, periphery and the chambers which, from the opposite sides, show only as small triangles. The aperture is an elongate slit parallel to the suture, as in *Cassidulina delicata,* but with its outer end continuing into a loop-shaped opening extending into the apertural face as in *C. subglobosa.*

CASSIDULINA MOLUCCENSIS Germeraad

PLATE 15, FIGURE 2

Cassidulina moluccensis GERMERAAD *in* RUTTEN and HOTZ, 1946, Geol., Petrogr. and Paleont. Results of Explor. Island of Ceram, ser. 3, Geol., no. 2, p. 72, pl. 2, figs. 29–32.

This species was described from "Young-Neogene" *Globigerina*-bearing sediments of central Seran, D.E.I. It is distinctive in its involute test; only the final four chambers make up the exterior surface of the test. The outline of the test is broad at the base and bluntly pointed at the top. The test is slightly compressed but not angled on the periphery, and the apertural face is flattened or concave. The aperture is large, broad, and loop-shaped, extending nearly vertically into the apertural face. The wall is smooth and finely punctate and the sutures are distinct and slightly depressed.

Rare but typical specimens were found in four of the deep-water samples.

CASSIDULINA PACIFICA Cushman

Cassidulina pacifica CUSHMAN, 1925, Contr. Cushman Lab. Foram. Res., vol. 1, pt. 3, p. 53, pl. 9, figs. 14–16.—PARR, 1950, B.A.N.Z. Antarctic Res. Exped. 1929–1931 Rep., ser. B, vol. 5, pt. 6, Foraminifera, p. 343, pl. 12, fig. 23.

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Cassidulina calabra SEGUENZA, sp.—BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 431, pl. 113, fig. 8.

In this globular species the nearly spherical shape is interrupted only by the low, broad, and depressed apertural face. The aperture is curved typically so that its outermost part is approximately parallel with the periphery of the test, rather than at an angle to it as in *Cassidulina subglobosa*. The test is composed of about five pairs of chambers per whorl with the greatest breadth of the test across the final pair of chambers. The sutures are nearly horizontal on the dorsal surface and not very sloping as in *C. subglobosa*. The sutures are virtually indistinguishable except when the test is moistened.

Cassidulina pacifica occurs rarely in scattered deep-water samples in the present collections.

CASSIDULINA PATULA Cushman

PLATE 17, FIGURE 5

Cassidulina patula CUSHMAN, 1933, Contr. Cushman Lab. Foram. Res., vol. 9, pt. 4, p. 92, pl. 10, fig. 2.

This species, described from 486 fathoms off Pinaki Atoll in the Paumotu Islands, is well represented in the present collections. Its distinguishing features are its elongate but rather widely open aperture and the few chambers of which its test is composed. Its wall is smooth and polished but shows distinct and widely spaced perforations, giving a characteristic speckled appearance to the surface.

Because of the few chambers in *Cassidulina patula*, the ventral surface is bisected by a vertical suture that meets the aperture at about its midpoint. The dorsal surface is bisected by a horizontal suture dividing that surface approximately in half, the top half constituting the last-formed chamber. By these features, as well as by the more widely open aperture, specimens of *C. patula* are separated easily from the thicker specimens of *C. delicata*, which they otherwise resemble.

CASSIDULINA cf. C. SPINIFERA Cushman and Jarvis

Cassidulina cf. *C. spinifera* CUSHMAN and JARVIS.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 366, pl. 90, fig. 34.

Another single specimen, identical with the one from deep water off Bikini, was found at *Albatross* station H3997 off Arhno atoll in the southeastern Marshalls, at a depth of 1,253 fathoms. These specimens may prove to be modern descendants of the spinose Oligocene species *Cassidulina spinifera*, thus far reported only from the West Indies.

CASSIDULINA SUBGLOBOSA Brady

Plate 16, Figure 7

Cassidulina subglobosa Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 430, pl. 54, fig. 17.—Cushman, Todd, and Post, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 367, pl. 90, figs. 30–32.—Parker, 1954, Bull. Mus. Comp. Zool., vol. 111, no. 10, p. 536, pl. 11, figs. 4–9.—Norvang, 1958, Vidensk. Medd. Dansk naturh. Foren., vol. 120, p. 36, pl. 8, figs. 18, 19.

Cassidulina subglobosa appears to be a widely distributed species in both the Pacific and Atlantic and is well represented in the present collections.

It is characteristically a smoothly rounded species without individually bulging chambers, although in some specimens the sutures are rather deeply incised, particularly on the ventral side of the test.

In well-preserved individuals the aperture can be seen to consist of two parts: an elongate opening along the suture, and a more or less straight bulimine slit set at right angles to it and extending directly into the apertural face. In most specimens the slit extending into the apertural face is all that can be observed of the aperture.

Considerable variability is shown by the present specimens. The test may vary from a nearly spherical form with indistinguishable sutures to a somewhat compressed and elongate form with incised sutures. The wall may vary from thick and opaque to translucent with the pores slightly visible.

Cassidulina subglobosa differs from *C. pacifica*, the only other nearly spherical species found in the present collections, in having an apertural end that may be slightly protruding whereas *C. pacifica* has a broad, low, almost overhanging apertural face. Also, in *C. pacifica* the sutures are nearly parallel and more closely spaced as they cross the dorsal area.

CASSIDULINA SUBTUMIDA Cushman

Plate 16, Figures 5, 6; Plate 17, Figure 1

Cassidulina subtumida Cushman, 1933, Contr. Cushman Lab. Foram. Res., vol. 9, pt. 4, p. 93, pl. 10, fig. 5.

Cassidulina rarilocula Cushman, 1933, Contr. Cushman Lab. Foram. Res., vol. 9, pt. 4, p. 93, pl. 10, fig. 4.

This species was described from the present collections, the type being from *Albatross* station H3920 off the Paumotu Islands in 2,284 fathoms. It occurs rarely and was found in only a few of the samples. It is distinguished by its indented periphery and the few chambers of which the test is composed. The central part of the test is inflated whereas the outer part is compressed, giving the impression of being pinched together around the periphery; however, the periphery is not keeled. The aperture is rather large and extends into the apertural face, rather than along it as in *Cassidulina delicata* and *C. angulosa*.

In its indented periphery *C. subtumida* tends toward *C. angulosa*, but the angularity of the chambers is much less, the test is more bulging in the middle, and the aperture is in a different position.

Re-examination of the holotype and seven paratypes of *C. rarilocula* Cushman has led me to regard them as immature specimens of *C. subtumida*. The differences between these forms seem to be so slight, and mostly a matter of degree, that I find it impossible to maintain the two as distinct species.

Genus ISLANDIELLA Nørvang, 1958

This genus was erected to permit the separation of two kinds of cassidulinids. Those in which the aperture is a tripartite opening with two platelike lips attached to the inward-bent wall, partly obstructing the apertural opening, remain in *Cassidulina*. Those in which the aperture consists of a large basal rounded triangular opening with an internal tooth and a free, projecting tongue partly closing the opening are placed in *Islandiella*. A corresponding separation of wall type—granular in *Cassidulina* and radiate fibrous in *Islandiella*—is said to fall along the line of the separation based on the nature of the aperture (Nørvang, 1958, p. 25).

ISLANDIELLA sp.

PLATE 15, FIGURE 3

Rare specimens were found in only a few of the samples.

The species is shiny, white, and smoothly globular except for the slightly protruding apertural end. Chambers and sutures are very indistinct, but it appears that the test surface is composed of few chambers. The aperture is relatively large, curved, crescent shaped, with the edge of its outer curve bent smoothly inward and the edge of its inner curve marked by a raised bladelike tooth. Greater diameter 0.45–0.55 mm., lesser diameter 0.35–0.45 mm.

Genus CASSIDULINOIDES Cushman, 1927

CASSIDULINOIDES TENUIS Phleger and Parker

PLATE 17, FIGURE 9

Cassidulinoides tenuis PHLEGER and PARKER, 1951, Geol. Soc. Amer. Mem. 46, pt. 2, p. 27, pl. 14, figs. 14–17.—PARKER, 1954, Bull. Mus. Comp. Zool., vol. 111, no. 10, p. 537, pl. 11, fig. 14.—PARKER, 1958, Rep. Swedish Deep-Sea Exped., vol. 8, Sediment Cores, no. 4, p. 272, pl. 4, figs. 18, 19.

This slender, arcuate species was described from the Gulf of Mexico and also reported from the Mediterranean. Rare specimens are present in two samples near the Paumotu Islands.

Genus EHRENBERGINA Reuss, 1850

EHRENBERGINA ALBATROSSI Cushman

PLATE 21, FIGURES 2, 3

Ehrenbergina albatrossi CUSHMAN, 1933, Contr. Cushman Lab. Foram. Res., vol. 9, p. 94, pl. 10, fig. 8.

This rare, compressed species has been found in only five samples (*Albatross* stations H3870, H3873, H3900, H3913, and H3937). The surface is somewhat roughened over the early part of the test. The species is distinguished by its heavy and widely spaced lateral spines extending outward in a nearly horizontal direction.

EHRENBERGINA BICORNIS Brady

PLATE 21, FIGURE 1

Ehrenbergina bicornis BRADY, 1888, Quart. Journ. Geol. Soc., vol. 44, p. 5, pl. 1, fig. 3.—CUSHMAN, 1934, B. P. Bishop Mus. Bull. 119, p. 133, pl. 16, figs. 10, 11.

A single specimen of this unique species was found at *Albatross* station H3984. It has not been reported previously from the Recent and, indeed, its Recent origin here is by no means certain. Its previous records are the Pleistocene and Pliocene of Fiji and a "White Chalk" from the island of New Ireland in the Bismarck Archipelago. This chalky deposit from New Ireland is now regarded as of late Cenozoic age because it contains such late-appearing species as *Globigerinoides sacculifer* and *Globorotalia tumida.* Glaessner (1943, p. 68) has regarded *Ehrenbergina bicornis* as an index species for the Miocene.

This species constitutes a transitional form between *Ehrenbergina* and *Cassidulina*. *Ehrenbergina bicornis* might be considered either a tightly coiled *Ehrenbergina* or a *Cassidulina* with the addition of axial spines.

EHRENBERGINA HYSTRIX Brady

Ehrenbergina hystrix BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 434, pl. 55, figs. 8–11.

A single specimen (with apertural end broken) was found at station H3926. The species is distinguished by its inflated form and coarsely bearded ornamentation.

EHRENBERGINA PACIFICA Cushman

PLATE 20, FIGURE 1

Ehrenbergina pacifica CUSHMAN, 1927, Proc. U.S. Nat. Mus., vol. 70, art. 16, p. 5, pl. 2, fig. 2.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 367, pl. 90, fig. 36.

Two specimens from *Albatross* station H3984 and one from H3899 appear to belong in this species, widely distributed in the Pacific, which is characterized by its triangular cross section and its closely spaced horizontal spines along the lateral peripheries.

EHRENBERGINA RETICULATA Cushman

PLATE 21, FIGURES 4, 5

Ehrenbergina reticulata CUSHMAN, 1933, Contr. Cushman Lab. Foram. Res., vol. 9, p. 94, pl. 10, fig. 9.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260-H, p. 367, pl. 90, fig. 37.

This beautifully ornamented deep-water species has thus far been found only near the Marshall Islands. It was described off Jaluit Atoll (*Albatross* station H3974) and also was found off Bikini Atoll.

EHRENBERGINA TRIGONA Goës

PLATE 20, FIGURE 2

Ehrenbergina trigona GOËS.—PHLEGER, PARKER, and PEIRSON, 1953, Rep. Swedish Deep-Sea Exped., vol. 7, Sediment Cores, no. 1, p. 46, pl. 10, figs. 12, 13.

A single specimen of this species was found at *Albatross* station H3873. It appears to have a worldwide distribution but is found only rarely. The reference above elucidates its rather complicated taxonomic history.

Family CHILOSTOMELLIDAE

Genus PULLENIA Parker and Jones, 1862

PULLENIA BULLOIDES (d'Orbigny)

PLATE 18, FIGURE 6

Pullenia bulloides (D'ORBIGNY).—CUSHMAN and TODD, 1943, Contr. Cushman Lab. Foram. Res., vol. 19, p. 13, pl. 2, figs. 15–18.—CROUCH, 1952, Bull. Amer. Assoc. Petr. Geol., vol. 36, no. 5, p. 841, pl. 7, figs. 2, 3.

This well-known cosmopolitan species occurs rarely in many of the deep-water samples. It is distinctive in its globular and compact test with flush sutures and a very low apertural face. Four chambers comprise the final whorl.

PULLENIA QUINQUELOBA (Reuss)

PLATE 18, FIGURE 7

Pullenia quinqueloba (REUSS).—CUSHMAN and TODD, 1943, Contr. Cushman Lab. Foram. Res., vol. 19, p. 10, pl. 2, fig. 5; pl. 3, fig. 8.—PHLEGER and PARKER, 1951, Geol. Soc. Amer. Mem. 46, pt. 2, p. 29, pl. 15, figs. 12, 13.—CROUCH, 1952, Bull. Amer. Assoc. Petr. Geol., vol. 36, p. 841, pl. 7, fig. 4.

This species is found in fewer samples than is *Pullenia bulloides*. Like *P. bulloides*, it is probably a cosmopolitan species in Recent oceans as well as a species that is widely distributed in the Tertiary. It is easily distinguished from *P. bulloides* by its compressed test with a higher apertural face and 5 or 5½ chambers per final whorl. Although compressed in shape, its periphery is rounded and not angled as in *P. salisburyi* R. E. and K. C. Stewart and some other species.

Genus SPHAEROIDINA d'Orbigny, 1826

SPHAEROIDINA BULLOIDES d'Orbigny

PLATE 18, FIGURE 4

Sphaeroidina bulloides D'ORBIGNY.—CUSHMAN and TODD, 1949, Contr. Cushman Lab. Foram. Res., vol. 25, p. 13, pl. 3, figs. 8–11.

This probably long-ranging species occurs rarely in a few of the deep-water samples.

Its wall is thin and translucent and the aperture, when unbroken, is a small semicircular opening filled by a tooth.

SPHAEROIDINA COMPACTA Cushman and Todd

Sphaeroidina compacta CUSHMAN and TODD, 1949, Contr. Cushman Lab. Foram. Res., vol. 25, p. 19, pl. 4, fig. 14.—PARKER, 1954, Bull. Mus. Comp. Zool., vol. 111, no. 10, p. 539, pl. 11, fig. 19.

This species, described and subsequently recorded from the Gulf of Mexico, has also been found around the Marshalls (Cushman, Todd, and Post, 1954, p. 367). A few typical specimens were found in three samples in the present collections.

This is a larger, more robust species than *Sphaeroidina bulloides*, with a thicker and nearly opaque wall. The aperture is large, widely open, with incurved edges and only a slight tooth, if any. The area around the aperture is roughened slightly by a granular deposit on the wall.

Family ANOMALINIDAE

Genus ANOMALINA d'Orbigny, 1826

There has been little consistency in the concept of this genus as it has been recognized in the past. Its type species, *Anomalina punctulata* d'Orbigny, described from Recent material from off Mauritius, needs to be understood. Until the characteristics of this species are known, the genus will probably remain, as it has been, a dumping-ground for species whose overall characteristics are similar to those of *Cibicides*, differing only in being nearly involute on the dorsal side as well as on the ventral.

The species here placed under this genus are done so on the basis of past usage, but with reservations, pending the clearing up of the problem.

ANOMALINA GLABRATA Cushman

Anomalina glabrata CUSHMAN, 1924, Carnegie Instit. Washington, Publ. 342, p. 39, pl. 12, figs. 5–7.

This species described from Samoa occurs abundantly at 24 fathoms off Nairai, Fiji; it was found rarely in only two other samples of the present collections. Specimens are recognized by their nearly planispiral coiling, evolute on one side and involute with a deep, open umbilicus on the other. The dense punctation distributed equally on both dorsal and ventral sides also serves to distinguish the species.

ANOMALINA SEMIPUNCTATA Bailey

Rotalina semipunctata BAILEY, 1851, Smithsonian Contr., vol. 2, art. 3, p. 11, pl. 1, figs. 17–19.

Anomalina semipunctata (BAILEY).—CUSHMAN, 1931, U.S. Nat. Mus. Bull. 104, pt. 8, p. 106, pl. 18, figs. 1, 2.

Anomalina polymorpha COSTA, 1856, Atti Accad. Pontaniana, vol. 7, pt. 2, p. 252, pl. 21, figs. 7–9.—BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 676, pl. 97, figs. 3–7.—FLINT, 1899, U.S. Nat. Mus. Ann. Rep. for 1897, p. 336, pl. 79, fig. 3.—CUSHMAN, 1915, U.S. Nat. Mus. Bull. 71, pt. 5, p. 47, pl. 19, figs. 3, 4.—CUSHMAN, 1921, U.S. Nat. Mus. Bull. 100, vol. 4, p. 324. pl. 61, fig. 3.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 370, pl. 91, fig. 22.

Only rare specimens were found in two of the samples (*Albatross* stations H3816 and H3914). The species is apparently a deep-water species and probably has a cosmopolitan distribution.

The species is easily recognizable by its coarsely porous wall on the one (convex) side and the smooth and very finely punctate wall on the other (flat or concave) side. The smooth-walled side clearly shows signs of attachment. One or several irregular spinelike protruding extensions of the chambers are usually present.

ANOMALINA? MACULOSA Todd

Anomalina? maculosa TODD, 1957, U.S. Geol. Surv. Prof. Paper 280–H, p. 296, pl. 92, fig. 12.

This species was described from shallow water around Saipan. Only single specimens were found at Mokaujar Anchorage, Fiji, and Guam Anchorage, Ladrone [Marianas] Islands.

Genus ANOMALINELLA Cushman, 1927

ANOMALINELLA ROSTRATA (Brady)

PLATE 21, FIGURES 7-10

Truncatulina rostrata BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 668, pl. 94, fig. 6.—HERON-ALLEN and EARLAND, 1915, Trans. Zool. Soc. London, vol. 20, p. 709, pl. 52, figs. 33–36.—CUSHMAN, 1924, Publ. 342, Carnegie Instit. Washington, p. 38, pl. 11, figs. 6, 7.

Anomalinella rostrata (BRADY).—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 371, pl. 91, fig. 24.—GRAHAM and MILITANTE, 1959, Stanford Univ. Publ., Geol. Sci., vol. 6, no. 2, p. 115, pl. 19, fig. 9.—HOFKER, 1960, Contr. Cushman Found. Foram. Res., vol. 11, pt. 2, p. 49, text fig. 9.

This is apparently a cosmopolitan species in warm and relatively shallow waters. It is distinguished easily by its coarsely punctate wall and equally biconvex test with supplementary apertural slits along, but just to one side of, the periphery. The major aperture is a small arched opening at the base of the apertural face, rimmed at the top by a conspicuous lip. The supplementary slits along the periphery are inconspicuous and the earlier ones are progressively more sealed over, leaving only the one on the final chamber fully open.

In the present collections this species is fairly well represented in the samples from near the islands and atolls but less so in the deeper samples.

Genus LATICARININA Galloway and Wissler, 1927

LATICARININA PAUPERATA (Parker and Jones)

PLATE 21, FIGURE 6

Laticarinina pauperata (PARKER and JONES).—CUSHMAN and TODD, 1941, Contr. Cushman Lab. Foram. Res., vol. 17, pt. 4, pp. 103–105, pl. 24, figs. 10–12; 1942, vol. 18, pt. 1, p. 15, pl. 4, figs. 1–6.

Rare and small examples of this species are found in a few samples of the present collections. The species is probably a cosmopolitan one in deep waters.

Genus PLANULINA d'Orbigny, 1826

PLANULINA WUELLERSTORFI (Schwager)

PLATE 23, FIGURES 3–5

Anomalina wüllerstorfi SCHWAGER, 1866, *Novara*-Exped., Geol. Theil, vol. 2, p. 258, pl. 7, figs. 105, 107.

Truncatulina wuellerstorfi SCHWAGER, sp.—BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 662, pl. 93, figs. 8, 9.

Planulina wuellerstorfi (SCHWAGER).—CUSHMAN, 1929, Contr. Cushman Lab. Foram. Res., vol. 5, pt. 4, p. 104, pl. 15, figs. 1, 2.

This well-known and widely distributed species is fairly well represented in the present collections. As interpreted here it includes some smaller-than-average specimens that are regarded as juveniles but that ultimately may prove to belong elsewhere (pl. 23, figs. 3, 4).

In typical form the species is more or less plano-convex. The flat side is partially but not completely evolute and is more coarsely porous than the other side. The convex side is involute and the center of the cone or dome is occupied by a solid plug of shell material that forms the greatest thickness of the test. The number of chambers per final whorl is about 10 in the typical specimens and about 14 in the smaller (juvenile) ones. In all specimens the chambers are strongly curved backward, especially at their outer ends, and the sutures are heavily limbate. The aperture is inconspicuous but in the typical position, i.e., extending from the ventral side over the periphery onto the dorsal side and having a small protective rim above it.

Because of Barker's assignment (1960, p. 192, pl. 93, fig. 8) of one of Brady's figures of "*Truncatulina wuellerstorfi*" to *Planulina bradii* Tolmachoff with *Cibicides rugosa* Phleger and Parker as a synonym, I have considered the inclusion of both *P. bradii* from the Miocene of Colombia and *C. rugosa* from the Recent of the northwestern Gulf of Mexico. Both are surely related morphologically but seem to be separable from the present specimens.

Genus CIBICIDES Montfort, 1808

CIBICIDES CICATRICOSUS (Schwager)

Plate 22, Figure 3

Anomalina cicatricosa Schwager, 1866, *Novara*-Exped., Geol. Theil, vol. 2, p. 260, pl. 7, figs. 108, 4.—Cushman, 1939, Journ. Geol. Soc. Japan, vol. 46, no. 546, p. 153 (43), pl. 10 (6), fig. 19.

Cibicides cicatricosa (Schwager).—Cushman, 1934, B. P. Bishop Mus. Bull. 119, p. 137, pl. 18, fig. 1.—Cushman, Todd, and Post, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 371, pl. 91, figs. 25, 26.—Todd, 1957, U.S. Geol. Surv. Prof. Paper 280–H, p. 279 (tbl. 3), pl. 80, fig. 8.

This species, described from the Pliocene of Kar Nicobar [Car Nicobar Island], is characterized by its coarse pores, usually less well developed on the convex (ventral) side than on the flat (dorsal) side.

The species is found in the present collections but not commonly.

CIBICIDES FLORIDANUS (Cushman)

Plate 22, Figure 6

Truncatulina floridana Cushman, 1918, U.S. Geol. Surv. Bull. 676, p. 62, pl. 19, fig. 2.

Cibicides floridana (Cushman).—Cushman, 1931, U.S. Nat. Mus. Bull. 104, pt. 8, p. 122, pl. 23, figs. 3–5.

Rare specimens are referred to this widely recorded species, which was first described from the Miocene of Florida.

By comparison with other species of the genus, this species is flatter and has a sharper yet not keeled periphery. Like *Cibicides cicatricosus*, it is rather coarsely porous on the flat (dorsal) side and only finely porous on the opposite side.

CIBICIDES LOBATULUS (Walker and Jacob)

Plate 22, Figure 1

Nautilus lobatulus Walker and Jacob, 1798, Adams' Essays, Kanmacher's ed., p. 642, pl. 14, fig. 36.

Truncatulina lobatula d'Orbigny, 1846, Foraminifères fossiles du bassin tertiaire de Vienne, p. 168, pl. 9, figs. 18–23.

Cibicides lobatulus CUSHMAN, 1931, U.S. Nat. Mus. Bull. 104, pt. 8, p. 118, pl. 21, fig. 3.—PARKER, 1952, Bull. Mus. Comp. Zool., vol. 106, no. 9, p. 422, pl. 6, fig. 26; no. 10, p. 446, pl. 5, fig. 11.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 371, pl. 91, figs. 27, 28.

Truncatulina lobata D'ORBIGNY (*in* BARKER-WEBB and BERTHELOT), 1839, Hist. nat. des Îles Canaries, tome 2, pt. 2, Foraminifères, p. 134, pl. 2, figs. 22–24.

This well-known species is found in many of the samples of the present collections. It has a worldwide distribution and is found in almost any kind of environment, except possibly brackish or extremely deep conditions.

Morphologically it is simple, evolute on one side and involute on the other, with the aperture on the periphery and extending over onto the evolute side, resulting in incomplete closure of the flat evolute (dorsal) surface. The wall is densely and rather coarsely perforate, usually equally so on both dorsal and ventral sides although, if punctation is unequal, it is the ventral side that lacks the coarse pores. The species exhibits great variability in shape, some of it dependent on attachment by the flat dorsal surface. Some specimens appear not to have been attached. Some are thick, rounded on the periphery, and have individually bulging chambers. Others are much compressed with a sharp and serrate periphery, resembling an attached, irregularly spreading scale. Degree of limbation of sutures and of periphery is likewise a highly variable feature.

CIBICIDES MAYORI (Cushman)

PLATE 22, FIGURE 7

Truncatulina mayori CUSHMAN, 1924, Carnegie Instit. Washington, Publ. 342, p. 39, pl. 12, figs. 3, 4.

Cibicides mayori (CUSHMAN).—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 371, pl. 91, figs. 29, 30.—TODD, 1957, U.S. Geol. Surv. Prof. Paper 280–H, p. 292 (tbl. 4), pl. 92, fig. 10.

Typical specimens of this flat attached species occur in a few of the samples and are more common in the shallower ones. The species seems to be related to *Cibicides lobatulus* but is distinguished by its more compressed test, irregular periphery with a roughly fimbriate keel, and the presence of openings into the dorsal (flattened) surface, resulting from the open dorsal portions of previous apertures.

CIBICIDES REFULGENS Montfort

Cibicides refulgens MONTFORT, 1808, Conch. Syst., vol. 1, p. 123, fig.—CUSHMAN, 1931, U.S. Nat. Mus. Bull. 104, pt. 8, p. 116, pl. 21, fig. 2.—COLOM, 1952, Bol. Instit. Español Oceanografía, no. 51, p. 38, pl. 4, figs. 27–31; pl. 7, figs. 24, 25.

Truncatulina refulgens MONTFORT, sp.—BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 659, pl. 92, figs. 7–9.

Only rare specimens from four deep-water samples were found. The species appears to be distinguished by the limbate sutures on the flat (dorsal, attached) side as well as by the conical shape of the opposite (ventral) side. Punctation of the wall is coarse and conspicuous on the flat (dorsal) side and finer and inconspicuous on the conical (ventral) side.

CIBICIDES ROBERTSONIANUS (Brady)

Plate 22, Figure 4

Truncatulina robertsoniana Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 664, pl. 95, fig. 4.

Cibicides robertsoniana (H. B. Brady).—Cushman, 1931, U.S. Nat. Mus. Bull. 104, pt. 8, p. 121, pl. 23, fig. 6.—Phleger and Parker, 1951, Geol. Soc. Amer. Mem. 46, pt. 2, p. 31, pl. 16, figs. 10–13.

Rare specimens of this species were found in a very few samples. The test is about equally biconvex and bluntly angled on the periphery. There are about 10 or more noninflated chambers per adult whorl; hence, the periphery is not indented. The sutures are distinctly limbate and strongly curved backward. The wall is coarsely punctate on the dorsal side but has only scattered coarse pores on the ventral side.

Genus CIBICIDELLA Cushman, 1927

CIBICIDELLA VARIABILIS (d'Orbigny)

Truncatulina variabilis d'Orbigny.—Sidebottom, 1909, Mem. Proc. Manchester, Lit. Philos. Soc., vol. 53, no. 21, p. 2, pl. 1, figs. 5, 6; pl. 2, figs. 1–3.—Heron-Allen and Earland, 1922, Bull. Soc. Sci. Hist. Nat. Corse, p. 137, pl. 1, figs. 38, 39.

Cibicidella variabilis (d'Orbigny).—Colom, 1935, Bull. Instit. Catalana Hist. Nat., vol. 35, p. 8, pl. 7, fig. 3; text figs. 6, 7.—Cushman, Todd, and Post, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 372, pl. 82, fig. 13.—Graham and Militante, 1959, Stanford Univ. Publ., Geol. Sci., vol. 6, no. 2, p. 116, pl. 19, fig. 10.

This form of *Cibicides*, having one of several irregularly shaped or irregularly placed chambers, is referred to traditionally as *Cibicidella variabilis* and is found usually in moderately shallow water. Rare specimens occur in the present material, mostly from around the islands.

Family PLANORBULINIDAE

Genus PLANORBULINA d'Orbigny, 1826

PLANORBULINA ACERVALIS Brady

Plate 22, Figure 2

Planorbulina acervalis Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 657, pl. 92, fig. 4.—Cushman, Todd, and Post, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 372, pl. 82, fig. 14; pl. 91, figs. 34–36.

Typical specimens are found in several of the shallower samples. The species is characterized by its knobby top surface and the coarse punctation of its wall.

Genus PLANORBULINELLA Cushman, 1927

PLANORBULINELLA LARVATA (Parker and Jones)

Planorbulina larvata PARKER and JONES, 1865, Philos. Trans., p. 380, pl. 19, fig. 3.—BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 658, pl. 92, figs. 5, 6.

Planorbulinella larvata (PARKER and JONES).—GRAHAM and MILITANTE, 1959, Stanford Univ. Publ., Geol. Sci., vol. 6, no. 2, p. 118, pl. 19, fig. 17.

This is a form of *Planorbulina acervalis* in which the central part of the dorsal side is broken up into small protruding knobs whereas the peripheral part of the test retains normal-sized chambers. Only three specimens were found.

Genus ACERVULINA Schultze, 1854

ACERVULINA INHAERENS Schultze

Acervulina inhaerens SCHULTZE.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260-H, p. 372, pl. 91, figs. 37, 38.—TODD, 1957, U.S. Geol. Surv. Prof. Paper 280-H, p. 292 (tbl. 4), pl. 93, fig. 15.

This attached species is characteristic of warm shallow waters. A few typical specimens were found in several of the samples taken near islands.

As compared with *Planorbulina acervalis*, the wall of this species is less coarsely punctate and the individual chambers are less individually inflated. On the other hand, the chambers appear to be irregularly spreading outward over each other, and the top surface, consequently, is smoother.

Genus GYPSINA Carter, 1877

GYPSINA GLOBULA (Reuss)

PLATE 22, FIGURE 5

Gypsina globulus REUSS, sp.—BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 717, pl. 101, fig. 8.

Gypsina globula (REUSS).—SAID, 1949, Cushman Lab. Foram. Res. Spec. Publ. 26, p. 44, pl. 4, fig. 24.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260-H, p. 373, pl. 91, fig. 39.—GRAHAM and MILITANTE, 1959, Stanford Univ. Publ., Geol. Sci., vol. 6, no. 2, p. 117, pl. 19, fig. 15.

Gypsina vesicularis PARKER and JONES.—BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 718, pl. 101, figs. 9-12.

Gypsina vesicularis (PARKER and JONES).—PHLEGER and PARKER, 1951, Geol. Soc. Amer. Mem. 46, pt. 2, p. 33, pl. 19, fig. 4.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260-H, p. 373, pl. 82, fig. 12.—PARKER, 1954, Bull. Mus. Comp. Zool., vol. 111, no. 10, p. 545, pl. 13, fig. 12.—TODD, 1957, U.S. Geol. Surv. Prof. Paper 280-H, p. 292 (tbl. 4), pl. 93, fig. 17 (not fig. 16).

The separation of specimens into two species or two genera on the basis of shape of test (globular in *Gypsina* (or *Sphaerogypsina*) *globula* and hemispherical in *Gypsina vesicularis*) and size of areolae (small in the former and large in the latter) seems unjustified; therefore, I am including the two forms under the earlier name, as indicated by the above synonymy. Moreover, as has been demonstrated by Nyholm (1962), the genus itself is a resting stage of *Cibicides* and, thus, the recognition of species within it is wholly artificial. Nevertheless, it is convenient to have a name by which to refer to these more or less globular masses of piled-together, coarsely perforate chambers. By the same token, it may be convenient to retain the means of distinguishing between the globular ones with small areolae and the attached hemispherical ones with larger areolae. If so, then the two names, *Gypsina globula* and *G. vesicularis*, should be retained.

Specimens in the present collections are rare and belong mostly to the globular form with small areolae. They do not occur in the deep-water samples but only in those from around the islands.

Family CERATOBULIMINIDAE

Genus HOEGLUNDINA Brotzen, 1948

HOEGLUNDINA ELEGANS (d'Orbigny)

PLATE 23, FIGURE 2

"*Nautili Ammoniformes*, sive *trochiformes*," SOLDANI, 1780, Saggio orittografico, etc., appendix, p. 99, pl. 2, fig. 13 (Q, R).

Rotalia (*Turbinulina*) *elegans* D'ORBIGNY, 1826, Ann. Sci. Nat., vol. 7, p. 276, no. 54.

Pulvinulina elegans D'ORBIGNY, sp.—BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 699, pl. 105, figs. 4-6.

Epistomina elegans (D'ORBIGNY).—CUSHMAN, 1927, Contr. Cushman Lab. Foram. Res., vol. 3, pt. 4, p. 182, pl. 31, figs. 1–6; pl. 32, figs. 1–8.—CUSHMAN, 1931, U.S. Nat. Mus. Bull. 104, pt. 8, p. 65, pl. 13, fig. 6.

Höglundina elegans (D'ORBIGNY).—BROTZEN, 1948, Sver. Geol. Under., ser. C, no. 493, p. 92, pl. 17, figs. 7, 8.—PHLEGER and PARKER, 1951, Geol. Soc. Amer. Mem. 46, pt. 2, p. 22, pl. 12, fig. 1.—PHLEGER, PARKER, and PEIRSON, 1953, Rep. Swedish Deep-Sea Exped., vol. 7, Sediment Cores, no. 1, p. 43, pl. 9, figs. 24, 25.—WALTON, 1955, Journ. Paleont., vol. 29, no. 6, p. 1009, pl. 103, figs. 5, 14.—BOLTOVSKOY, 1959, Argentina Serv. Hidro. Naval, Publ. H1005, p. 92, pl. 13, fig. 6.

Pulvinulina partschiana D'ORBIGNY, sp.—BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 699, pl. 105, fig. 3.

Epistomina partschiana (D'ORBIGNY).—CUSHMAN, 1927, Bull. Scripps Instit. Oceanography, Tech. Ser., vol. 1, no. 10, p. 163, pl. 5, figs. 4, 5.

Epistomina bradyi GALLOWAY and WISSLER, 1927, Journ. Paleont., vol. 1, p. 60, pl. 10, fig. 1.

Epistomina flinti GALLOWAY and WISSLER, 1927, Journ. Paleont., vol. 1, p. 61, pl. 9, fig. 16.

This is apparently a cosmopolitan species in deep water. It is recognized easily by its clear wall showing the cloudy mottling that is characteristic of aragonitic species. In the present collection the species is distributed widely but never abundantly.

Genus CERATOBULIMINA Toula, 1915

CERATOBULIMINA PACIFICA Cushman and Harris

Plate 23, Figure 1

Ceratobulimina pacifica Cushman and Harris, 1927, Contr. Cushman Lab. Foram. Res., vol. 3, pt. 4, p. 176, pl. 29, fig. 9.—LeRoy, 1941, Colorado Sch. Mines Quart., vol. 36, no. 1, pt. 1, p. 42, pl. 1, figs. 30–32; pt. 2, p. 85, pl. 4, figs. 34, 35; 1944, vol. 39, no. 3, pt. 2, p. 89, pl. 7, figs. 7, 8.—Hofker, 1951, *Siboga*-Exped., Mon. IVa, pt. III, p. 316, text figs. 214–218.—Sacal and Debourle, 1957, Soc. Géol. France, Mém. No. 78, p. 46, pl. 20, fig. 5.

This species was described from off the Philippines in 494 fathoms. It is rare but present in numerous deep-water samples of the present collections.

The specimens of *Ceratobulimina* that have been separated into species are very similar in appearance; a monographic study of the genus undoubtedly would result in the combining of some that are now regarded as specifically distinct. Nevertheless, *C. pacifica* is, for the present at least, regarded as distinguishable by its more globular and inflated test with individually bulging chambers and by its distinct and elongate aperture that extends as a straight slit into the apertural face. Among the 22 specimens found in the present collections, all were coiled dextrally. This feature seems, from the published illustrations, to be true of all but a few Eocene specimens in this genus.

In addition to its Recent occurrences, the species has been recorded from the Miocene of the Dutch East Indies and France.

Genus GEMINOSPIRA Makiyama and Nakagawa, 1941

GEMINOSPIRA CONVOLUTA (Williamson)

Bulimina pupoides var. *convoluta* Williamson, 1858, Recent Foraminifera of Great Britain, p. 63, pl. 5, figs. 132, 133.

Bulimina convoluta Williamson.—Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 409, pl. 113, fig. 6.

Pseudobulimina convoluta (Williamson).—Said, 1949, Cushman Lab. Foram. Res. Spec. Publ. 26, p. 26, pl. 4, fig. 4.

Geminospira simaensis Makiyama and Nakagawa, 1941, Journ. Geol. Soc. Japan, vol. 48, no. 572, p. 39, text figs. 3–5.

Pseudobulimina simaensis (Makiyama and Nakagawa).—Asano, 1950, Illustr. Cat. Japanese Tert. Smaller Foram., pt. 2, Buliminidae, p. 2, figs. 5–7; 1958, Sci. Rep. Tohoku Univ., ser. 2 (Geol.), vol. 29, p. 13, pl. 3, figs. 14, 15.

Geminospira bradyi Bermudez, 1952, Minist. Minas e Hidrocarburos Bol. Geol., vol. 2, no. 4, p. 178, pl. 13, fig. 7.—Graham and Militante, 1959, Stanford Univ. Publ., Geol. Sci., vol. 6, no. 2, p. 90, pl. 13, fig. 16.

Pseudobulimina sp.—Cushman, Todd, and Post, 1954, U.S. Geol. Surv. Prof. Paper 260-H, p. 350, pl. 87, fig. 20.

Three small (about 0.25 mm. in length) specimens were found at *Albatross* station H3798, 687 fathoms, in the Marquesas Islands.

The nomenclature of this form is complicated by several factors. In the first place, it is not generally agreed but is a matter of opinion and judgment that species described under the names of *convoluta*, *simaensis*, and *bradyi* are all the same species. To me it seems likely that they are. This opinion is based on the observed variability among specimens from individual samples where the genus has been found.

In the second place, the assignment of this species to the little-known and little-used genus *Geminospira*, instead of to *Pseudobulimina*, is necessary in view of the fact that the type species of *Pseudobulimina* (*Bulimina chapmani* Heron-Allen and Earland) and *Ceratobulimina* (*Rotalina contraria* Reuss) seem to be generically indistinguishable, and thus *Pseudobulimina* Earland, 1934, falls into synonymy with *Ceratobulimina* Toula, 1915. Although probably belonging in the family Ceratobuliminidae by virtue of its aragonitic wall, *Geminospira* is clearly distinct from the genus *Ceratobulimina*, which is a close-coiled form without supplementary chambers.

Incidentally, another genus, *Cerobertina* Finlay, 1939, is involved in this problem. Judged only on the basis of descriptions and illustrations, *Cerobertina* may be a prior synonym of *Geminospira*. If so, the former would supercede the latter; however, until this can be determined, it seems preferable to use the generic name *Geminospira*.

This species apparently has a worldwide distribution. Records represented by the above synonymy include areas off the British Isles, the Red Sea, the Pliocene to Recent of Japan, Torres Straits, off the Philippines, and in the Marshall Islands.

PLANKTONIC FAMILIES

Family GLOBIGERINIDAE

Genus GLOBIGERINA d'Orbigny, 1826

GLOBIGERINA BULLOIDES d'Orbigny

Plate 24, Figure 1

Globigerina bulloides d'Orbigny, 1826, Ann. Sci. Nat., vol. 7, p. 277; 1826, Modèles' nos. 17 (young) and 76 (adult).—Cushman, 1941, Contr. Cushman Lab' Foram. Res., vol. 17, p. 38, pl. 10, figs. 1–13.—Bradshaw, 1959, Contr' Cushman Found. Foram. Res., vol. 10, p. 33, pl. 6, figs. 1–4.

This cosmopolitan species is represented only by scarce individuals at a few stations. The specimens have 4 chambers per final whorl, and the chambers are nearly globular in shape with little increase in size as added. The sutures are indented and the periphery lobulate. The aperture is rather wide, opening into the umbilicus, often with the apertures of previous chambers still visible within the umbilicus.

Rare specimens of *Globigerina hexagona* Natland are similar to *G. bulloides* and can be confused with it, but they are separable on the basis of a coarsely cancellate wall surface.

GLOBIGERINA CONGLOMERATA Schwager

Plate 24, Figure 3

Globigerina conglomerata Schwager, 1866, *Novara*-Exped., Geol. Theil, vol. 2, p. 255, pl. 7, fig. 113.—Galloway and Morrey, 1929, Bull. Amer. Paleont., vol. 15, p. 9, pl. 3, fig. 7.—Beckmann, 1954, Eclogae Geol. Helvetiae, vol. 46, no. 2, 1953, p. 391, pl. 25, figs. 6–9; text fig. 15.—Kleinpell, 1954, B. P. Bishop Mus. Bull. 211, p. 70, pl. 9, fig. 10.—Colom and Muraour, 1955, Publ. Serv. Carte Géol. Algérie (new ser.), bull. no. 5, p. 265, pl. 2, figs. 1-6; pl. 4, figs. 7-9.—Colom, 1956, Real Acad. Ciencias Artes Barcelona Mem., vol. 32, no. 5, p. 90, pl. 16, figs. 4–10.—Hagn, 1956, Palaeontographica, vol. 107, pt. A, p. 171, pl. 16, figs. 12, 13.—Bradshaw, 1959, Contr. Cushman Found. Foram. Res., vol. 10, p. 33, pl. 6, figs. 6, 7.—Banner and Blow, 1960, Contr. Cushman Found. Foram. Res., vol. 11, p. 7, pl. 2, fig. 3.—Todd, 1964, U.S. Geol. Surv. Prof. Paper 260–CC, p. 1080, pl. 291, figs. 8, 9.

Globoquadrina conglomerata (Schwager).—Parker, 1962, Micropaleontology, vol. 8, p. 240, pl. 6, figs. 11–18.

Globigerina venezuelana Hedberg, 1937, Journ. Paleont., vol. 11, p. 681, pl. 92, fig. 7.—Cushman and Stainforth, 1945, Cushman Lab. Foram. Res. Spec. Publ. 14, p. 67, pl. 12, fig. 13.—Stainforth, 1948, Journ. Paleont., vol. 22, p. 119, pl. 25, figs. 26–28.—Bermudez, 1949, Cushman Lab. Foram. Res. Spec. Publ. 25, p. 280, pl. 21, figs. 39, 40.—de Gaona and Colom, 1950, Instit. Invest. Geol., "Lucas Mallada," Madrid, p. 379, text fig. 4, figs. 31-35; text fig. 13, figs. 57, 58.—Beckmann, 1954, Eclogae Geol. Helvetiae, vol. 46, no. 2, 1953, p. 392, pl. 25, figs. 12, 13; text fig. 17.—Hamilton, 1953, Journ. Paleont., vol. 27, p. 223, pl. 30, fig. 31.—Phleger, Parker, and Peirson, 1953, Rep. Swedish Deep-Sea Exped., vol. 7, Sediment Cores, no. 1, p. 14, pl. 1, figs. 24, 25.—Colom, 1954, Instit. Geol. Min. España Bol., vol. 66, p. 208, pl. 11, figs. 24–28.—Weiss, 1955, Micropaleontology, vol. 1, p. 310, pl. 2, figs. 18–20.—Drooger, 1956, Micropaleontology, vol. 2, p. 190, pl. 1, fig. 13.—Bolli, 1957, U.S. Nat. Mus. Bull. 215, p. 110, pl. 23, figs. 6-8; p. 164, pl. 35, figs. 16, 17.—Becker and Dusenbury, 1958, Cushman Found. Foram. Res. Spec. Publ. 4, p. 44, pl. 6, fig. 1.—Drooger and Magné, 1959, Micropaleontology, vol. 5, p. 277, pl. 1, fig. 3.—Hamilton and Rex, 1959, U.S. Geol. Surv. Prof. Paper 260–W, p. 792, pl. 253, figs. 15, 16.

Globigerina eximia Todd, 1957, U.S. Geol. Surv. Prof. Paper 280–H, p. 300, pl. 78, fig. 8.

Globigerina altispira Cushman and Todd (not Cushman and Jarvis), 1954, Cushman Lab. Foram. Res. Spec. Publ. 15, p. 66, pl. 11, figs. 11, 12.

This distinctive species occurs in only a few of the deeper samples from the southwest Pacific. The species is characterized by its relatively large size, compact form, and coarsely cancellated wall. As has been previously discussed (Todd, 1964, p. 1080), the separation between *Globigerina conglomerata* and *G. venezuelana* Hedberg seems a haphazard and artificial one, based chiefly on whether the adult whorl is composed of 3 or 4 chambers; therefore, I believe it best to combine them as one species under the earlier name.

G. conglomerata, described from the Pliocene of Kar Nicobar [Car Nicobar Island], has been found in plankton tows in the Pacific and, as a fossil, appears to extend back into the Eocene. It seems to have a worldwide distribution in the equatorial belt.

GLOBIGERINA DIGITATA Brady

Globigerina digitata Brady (part), 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 599, pl. 80, figs 6–10 (not pl. 82, figs. 6, 7).—Phleger, Parker, and Peirson, 1953, Rep. Swedish Deep-Sea Exped., vol. 7, Sediment Cores, no. 1, p. 12, pl. 1, figs. 9, 10.—Parker, 1958, Rep. Swedish Deep-Sea Exped., 1947–48, vol. 8, fasc. 2, no. 4, p. 276, pl. 5, fig. 8.

Hastigerinella digitata (Brady).—Bolli, Loeblich, and Tappan, 1957, U.S. Nat. Mus. Bull. 215, p. 32, pl. 5, fig. 3.

Globorotalia (*Hastigerinella*) *digitata* (Brady).—Banner and Blow, 1959, Paleontology, vol. 2, pt. 1, p. 16, text fig. 4e.

Globorotalia (*Beella*) *digitata* (Brady).—Banner and Blow, 1960, Micropaleontology, vol. 6, no. 1, p. 26, text fig. 11.

This is apparently a rare but cosmopolitan species in the equatorial regions of the oceans. It is not easily confused with other species, being recognized by its rather high-spired coiling on one side, while on the other side its rather large and high-arched aperture extends to and beyond the peripheral plane so that the aperture is often visible as a sharp indentation into the outline of the test.

Only single specimens of this distinctive species were found in seven of the present samples.

GLOBIGERINA EGGERI Rhumbler

Plate 24, Figure 2

Globigerina eggeri Rhumbler, 1901, Nordische Plankton, pt. 14, Foraminiferen, p. 19, text fig. 20.—Bradshaw, 1959, Contr. Cushman Found. Foram. Res., vol. 10, p. 35, pl. 6, figs. 5, 8–10.—Banner and Blow, 1960, Contr. Cushman Found. Foram. Res., vol. 11, p. 11, pl. 2, fig. 4.

Globigerina dubia Brady (not Egger), 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 595, pl. 79, fig. 17.

Globigerina cretacea Brady (not d'Orbigny), 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 596, pl. 82, fig. 10.

Globigerina subcretacea Lomnicki, 1901, Akad. Umiej. Krakowie, part 2, p. 57.—Cushman, Todd, and Post, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 368, pl. 91, fig. 1.

Globigerina subcretacea CHAPMAN, 1902, Journ. Linnean Soc., Zoology, vol. 28, p. 404 (list); p. 410, pl. 36, fig. 16.

This cosmopolitan species occurs at numerous stations but is never very common. Its chief distinguishing feature is its cancellated wall. The number of chambers per final whorl varies between 5 and 7. The inner coil of earlier chambers is low and inconspicuous. The whole test presents a robust and compact appearance. The umbilicus is open and deep with the aperture opening into it but obscured by the edge of the final chamber extending over it. The final chamber is characteristically smaller than the others in the adult whorl and somewhat projecting downward and inward over the umbilicus. As adults there is not much likelihood of confusion between this species and others that occur with it.

GLOBIGERINA HEXAGONA Natland

Globigerina hexagona NATLAND, 1938, Scripps Instit. Oceanography Bull., Tech. Ser., vol. 4, no. 5, p. 149, pl. 7, fig. 1.—PHLEGER, PARKER, and PEIRSON, 1953, Rep. Swedish Deep-Sea Exped., vol. 7, Sediment Cores, no. 1, p. 12, pl. 1, figs. 13, 14.—BRADSHAW, 1959, Contr. Cushman Found. Foram. Res., vol. 10, p. 36, pl. 6, figs. 11–15.

This species, originally described from deep water off southern California, has been reported also from deep-sea cores in the North Atlantic and from plankton tows in the Pacific. It is known also as a fossil under the names of *Globorotaloides suteri* Bolli and possibly *G. variabilis* Bolli (1957a, p. 117, pl. 27, figs. 9–20; 1957b, p. 166, pl. 37, figs. 10–12), probably extending back as far as the Eocene. It seems never to occur more than rarely.

In the present material, rare specimens were found in eight of the samples. Their distinguishing characteristics are the flat dorsal surface, strongly lobulated periphery, and the coarsely cancellated wall.

GLOBIGERINA RUBESCENS Hofker

Globigerina rubescens HOFKER, 1956, Skrift. Univ. Zool. Mus., København, vol. 15, p. 234, pl. 35, figs. 18–21.

This minute species undoubtedly is represented more abundantly and widely in the southeastern Pacific than the few present records would indicate. Because of its small size (maximum diameter about 0.25 mm), it is overlooked frequently or even lost during the preparation process.

Globigerina rubescens was described from the eastern part of the Malayan Archipelago. It is distinguished by its simple structure with high-arched and proportionally large aperture. It is typically but not invariably pink.

Genus GLOBIGERINOIDES Cushman, 1927

GLOBIGERINOIDES CONGLOBATUS (Brady)

Plate 25, Figure 3

Globigerina conglobata Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 603. pl. 80, figs. 1–5; pl. 82, fig. 5.—Banner and Blow, 1960, Contr. Cushman Found. Foram. Res., vol. 11, p. 6, pl. 4, fig. 4.

Globigerinoides conglobatus (Brady).—Bradshaw, 1959, Contr. Cushman Found. Foram. Res., vol. 10, p. 40, pl. 7, figs. 5, 6.

This cosmopolitan species is well represented in the present material and is found abundantly in a number of the samples.

Globigerinoides conglobatus is characterized by the flattening of its chambers, resulting in an approximately cubical shape of the test, and by its deeply incised sutures, resulting in a more or less fissured appearance to the test, in some instances reminiscent of the genus *Sphaeroidinella*. The apertures of *Globigerinoides conglobatus*, unlike those of *G. ruber* and *G. elongatus*, are low slits opening into the fissures rather than high arched openings that are clearly visible from the exterior.

A few specimens (inappropriately few and almost too large to be sure they are immature stages), nevertheless, are included here as immature stages of *G. conglobatus*. They are coiled in a flat coil, and the dorsal apertures, if any, are quite inconspicuous. The umbilical side of the test shows a widely open umbilicus, but the aperture is very small, low and slitlike, not large and arched as in *Globigerina bulloides*. Presumably, if these can be regarded as immature stages, the final chamber would have been added directly over this open umbilical area, to appear flattened and beret-like on top, and with several apertures around its edge. The specimens illustrated as *Globigerinoides* sp. from Pacific plankton samples (Bradshaw, 1959, p. 42, pl. 7, figs. 16, 17) seem to represent these immature, or (perhaps better) incompleted, individuals of *G. conglobatus*. This possibility was suggested by Bradshaw (idem, pp. 40, 42) in his discussion of *G. conglobatus*.

GLOBIGERINOIDES ELONGATUS (d'Orbigny)

Globigerina elongata d'Orbigny, 1826, Ann. Sci. Nat., vol. 7, p. 277.—Fornasini, 1899, Mem. Accad. Sci. Istit. Bologna, ser. 5, vol. 7, p. 583, pl. 3, figs. 8–10.—Banner and Blow, 1960, Contr. Cushman Found. Foram. Res., vol. 11, p. 12, pl. 3, fig. 10.

Globigerinoides elongata (d'Orbigny).—Cushman, 1941, Contr. Cushman Lab. Foram. Res., vol. 17, p. 40, pl. 10, figs. 20–23; pl. 11, fig. 3.—Cushman, Todd, and Post, 1954, U.S. Geol. Surv. Prof. Paper 260–H, p. 368, pl. 91, fig. 5.—AGIP Mineraria, 1957, Foraminiferi Padani, Milan, pl. 46, fig. 2.

A few specimens occurring together with the other planktonics are placed in this species, which was described from the Adriatic Sea near Rimini.

In size it is similar to *Globigerinoides ruber* but differs in its flattened chambers and its consequently compact and inconspicuous spire. In its rough wall surface and in the flattening of its chambers, it is similar to *G. conglobatus* but from this species it is distinguished easily by its high-arched apertures and its significantly smaller size. The height of its spire is variable and, as Banner and Blow (1960a, p. 13) have pointed out, is probably of neither taxonomic nor stratigraphic value. What characterizes the species is the appearance of asymmetry in the position of the aperture, the asymmetry being a result of the flattening of the chambers.

GLOBIGERINOIDES RUBER (d'Orbigny)

PLATE 25, FIGURE 6

Globigerina rubra D'ORBIGNY, 1839, *in* DE LA SAGRA, Hist. Physiq. Pol. Nat. Cuba, Foraminifères, p. 82, pl. 4, figs. 12–14.—BANNER and BLOW, 1960, Contr. Cushman Found. Foram. Res., vol. 11, p. 19, pl. 3, fig. 8.

Globigerinoides rubra (D'ORBIGNY).—CUSHMAN, 1945, Contr. Cushman Lab. Foram. Res., vol. 21, p. 75, pl. 12, figs. 6, 9.—BRADSHAW, 1959, Contr. Cushman Found. Foram. Res., vol. 10, p. 42, pl. 7, figs. 12, 13.

This species, like most of the planktonics, is also a cosmopolitan one in the warmer waters of the oceans. It is found in many of the samples studied but is usually not very common.

It is characterized by a spinose rather than cancellated wall, by rounded rather than flattened chambers, and by high-arched and symmetrically placed apertures. Its spire is variable in height, and its average size is relatively smaller than the other species in this genus: *Globigerinoides sacculifer*, *G. conglobatus*, and *G. elongatus*.

GLOBIGERINOIDES SACCULIFER (Brady)

PLATE 26, FIGURE 4

Globigerina sacculifera BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 604, pl. 80, figs. 11–17; pl. 82, fig. 4.—BANNER and BLOW, 1960, Contr. Cushman Found. Foram. Res., vol. 11, p. 21, pl. 4, figs. 1, 2.

Globigerinoides sacculifer (BRADY).—BRADSHAW, 1959, Contr. Cushman Found. Foram. Res., vol. 10, p. 42, pl. 7, figs. 14, 15, 18.

One of the best-known and most easily recognized of the cosmopolitan planktonic species, *Globigerinoides sacculifer* is found in most of the samples studied and is common to abundant in most of them. Specimens are typical, having the distinctive cancellated surface by which this species is best recognized. In samples where the species is abundant, individual specimens can be found that are representative of nearly every degree of development in this species. Moreover, because of its open coiling, one can observe clearly what the appearance of any individual specimen would have been before its last, its penultimate, its third-from-last, its fourth-from-last, etc., chamber was added. In so doing, one sees the sequence from *Globigerinoides* *trilobus* (Reuss) (essentially rectangular and 3-lobed, with the sutures at right angles and with the supplementary dorsal and ventral apertures at their junctions) through the progressive stages as the final chamber is slightly elongated, is slightly flattened, and is set at a slight angle (downward) from the dorsal surface. In addition to observing these progressive stages in a single individual, one finds (as if they were incomplete individuals) examples of each of these various stages. It would seem inappropriate to separate them as subspecies, and they are regarded, therefore, as merely forms of the species *Globigerinoides sacculifer*.

GLOBIGERINOIDES SACCULIFER FISTULOSA (Schubert)

PLATE 26, FIGURE 3

Globigerina fistulosa SCHUBERT, 1910, Verh. Geol. Reichs., no. 14, p. 324, text fig. 2.—SCHUBERT, 1911, Abh. Geol. Reichs., vol. 20, pt. 4, p. 100, text fig. 13.

Globigerinoides sacculifera (H. B. BRADY) var. *fistulosa* (SCHUBERT).—CUSHMAN, 1933, Cushman Lab. Foram. Res. Spec. Publ. 5, pl. 34, fig. 6.—BOOMGAART, 1949, Thesis, Univ. Utrecht, p. 141, pl. 10, fig. 7.—CUSHMAN, TODD, and POST, 1954, U.S. Geol. Surv. Prof. Paper 260-H, p. 369, pl. 91, fig. 13.—HAMILTON and REX, 1959, U.S. Geol. Surv. Prof. Paper 260-W, p. 792, pl. 254, fig. 14.

Globigerinoides sacculifer fistulosa (SCHUBERT).—TODD, 1964, U.S. Geol. Surv. Prof. Paper 260-CC, p. 1084, pl. 290, fig. 6.

Only six specimens of this distinctive subspecies of *Globigerinoides sacculifer* were found in the present material. The four *Albatross* samples in which they occur are all suspect as to their strictly Recent origin; three of them contain manganese and the fourth volcanic particles.

The most abundant recorded occurrence of this subspecies seems to be in a short deep-sea core taken off Eniwetok in the Marshall Islands, where the *fistulosa*-bearing section was interpreted to be of Pliocene or Pleistocene age.

Specimens of *G. sacculifer* showing fistulose outgrowths on their final chambers have never been reported from plankton and there have been no verified Recent occurrences of this form. It is, therefore, believed to have been a short-lived offshoot from *G. sacculifer* s.s., which may prove to be a useful marker in the late Cenozoic or Quaternary.

Genus GLOBIGERINELLA Cushman, 1927

GLOBIGERINELLA AEQUILATERALIS (Brady)

PLATE 25, FIGURES 4, 5

Globigerina aequilateralis BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 605, pl. 80, figs. 18–21.

Globigerinella aequilateralis (Brady).—Bradshaw, 1959, Contr. Cushman Found. Foram. Res., vol. 10, p. 38, pl. 7, figs. 1, 2.—Todd, 1964, U.S. Geol. Surv. Prof. Paper 260–CC, p. 1086, pl. 290, fig. 5.

Globorotalia obesa Bolli, 1957, U.S. Nat. Mus. Bull. 215, p. 119, pl. 29, figs. 2, 3.—Blow, 1959, Bull. Amer. Paleont., vol. 39, no. 178, p. 218, pl. 19, fig. 124.—Hamilton and Rex, 1959, U.S. Geol. Surv. Prof. Paper 260–W, p. 791 (ftn.), pl. 253, fig. 14.—Jenkins, 1960, Micropaleontology, vol. 6, p. 364, pl. 5, fig. 2.

Globigerina obesa (Bolli).—Todd, 1964, U.S. Geol. Surv. Prof. Paper 260–CC, p. 1079, pl. 292, fig. 4.

Hastigerina (*Hastigerina*) *siphonifera* (d'Orbigny).—Banner and Blow, 1960, Micropaleontology, vol. 6, p. 22, text figs. 2, 3.

Globigerinella siphonifera (d'Orbigny).—Parker, 1962, Micropaleontology, vol. 8, p. 228, pl. 2, figs. 22–28.

This well-known and widely distributed species occurs in most of the deeper-water samples and is common or abundant in many of them.

The wall is densely hispid. The coiling is planispiral in the adult with some tests so loosely coiled that the umbilical area appears open from side view and with other tests so tightly coiled that the aperture virtually is obscured by the inflated final chamber. In some specimens, it is possible to observe the initial coiling on one side within the depressed umbilicus. And in a few individuals, the test is clearly evolute on one side with the coil of early chambers raised above the plane of coiling. The identity of these specimens, formerly separated as *Globorotalia* (and *Globigerina*) *obesa*, with *Globigerinella aequilateralis* can be seen by the densely hispid wall and the low slitlike aperture extending into the umbilicus on the involute side, as well as by the presence of individuals showing all gradations between the two forms (see Parker, 1962, pl. 2, figs. 22–28). *Globorotalia obesa*, described from the Miocene of Trinidad and recorded from the Miocene and Pliocene of Venezuela and the Miocene of Australia and of Sylvania Guyot in the Central Pacific, is regarded, therefore, as a synonym of *Globigerinella aequilateralis*.

The more tightly coiled specimens in this species have been separated under the name var. *involuta* by various authors. The validity of this distinction has been discussed (Todd, 1964, p. 1086); it seems to be not worthy of taxonomic recognition.

GLOBIGERINELLA ADAMSI (Banner and Blow)

Plate 26, Figures 1, 2

Hastigerina (*Bolliella*) *adamsi* Banner and Blow, 1959, Palaeontology, vol. 2, pt. 1, p. 13, text figs. 4a–d.—Banner and Blow, 1960, Micropaleontology, vol. 6, no. 1, p. 24, text figs. 4a–c.

Globigerina digitata Brady (part), 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 599, pl. 82, figs. 6, 7 (not pl. 80, figs. 6–10).

Hastigerinella digitata (Brady).—Cushman, Todd, and Post, 1954, U.S. Geol. Surv. Prof. Paper 260-H, p. 369, pl. 91, figs. 9, 10.

Globigerinella sp.—Bradshaw, 1959, Contr. Cushman Found. Foram. Res., vol. 10, pt. 2, p. 38, pl. 7, figs. 3, 4.

This species is found rarely at a few of the deep-water stations. It seems related to *Globigerinella aequilateralis* in its planispiral coiling but is distinguished by the radial elongation of chambers, becoming progressively greater as the chambers are added, so that the final several chambers may be as much as three times as long as wide and in some instances may be pointed at their outer ends.

Genus GLOBIGERINITA Bronnimann, 1951

GLOBIGERINITA GLUTINATA (Egger)

Globigerina glutinata Egger, 1893, Abhandl. Akad. Wiss. München, Math.-naturhist. Abt., Cl. 2, vol. 18, p. 371, pl. 13, figs. 19–21.—Rhumbler, 1911, Ergebnisse Plankton-Exped. Humboldt-Stiftung, vol. 3, p. 148–149, pl. 29, figs. 14–26.

Globigerinita glutinata (Egger).—Phleger, Parker, and Peirson, 1953, Rep. Swedish Deep-Sea Exped., vol. 7, Sediment Cores, no. 1, p. 16, pl. 2, figs. 12–15.—Bradshaw, 1959, Contr. Cushman Found. Foram. Res., vol. 10, p. 40, pl. 7, figs. 7, 8.

A more complete synonymy may be found in Todd (1964, U.S. Geol. Surv. Prof. Paper 260–CC, p. 1085).

Rare specimens of this well-known and widely distributed species are found in a few of the samples. The species is distinguished by its more finely spinose wall, low-arched apertural openings, and smaller-than-average size for planktonic Foraminifera.

GLOBIGERINITA HUMILIS (Brady)

Plate 25, Figures 1, 2

Truncatulina humilis Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 665, pl. 94, fig. 7.

Valvulineria cf. *humilis* (H. B. Brady).—Phleger and Parker, 1951, Geol. Soc. Amer. Mem. 46, pt. 2, p. 25, pl. 13, figs. 9, 10.

Valvulineria humilis (H. B. Brady).—Phleger, Parker, and Peirson, 1953, Rep. Swedish Deep-Sea Exped., vol. 7, Sediment Cores, no. 1, p. 40, pl. 8, figs. 31, 32.

Globigerina lamellosa Terquem.—Rhumbler, 1911, Ergebnisse Plankton-Exped. Humboldt-Stiftung, vol. 3, p. 149, pl. 30, figs. 1–6.

Globigerinita parkerae Loeblich and Tappan, 1957, Journ. Washington Acad. Sci., vol. 47, no. 4, p. 113, text fig. 1.

This minute species (greater dimension about 0.2 mm.) appears to be a cosmopolitan species in the deeper water of the oceans. Probably overlooked often because of its small size, it is found in most of the present samples and is abundant in many of them.

Number of chambers per final whorl is 6 or 7 (rarely 8), and the periphery is either smooth or slightly lobulated toward the last-formed chambers. The test is flattened. The dorsal and ventral surfaces are slightly and about equally convex, the dorsal spire being low and indistinct and the ventral digitate lobes extending inward to cover the umbilical region. The wall is neither spinose nor smooth and polished but has a rather roughened surface, giving it a sugary texture.

Genus ORBULINA d'Orbigny, 1839

ORBULINA UNIVERSA d'Orbigny

Orbulina universa d'Orbigny, 1839, *in* Barker-Webb and Berthelot, Hist. Nat. Îles Canaries, Paris, vol. 2, pt. 2, Foraminifères, p. 123, pl. 1, fig. 1.—Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 608, pl. 78; pl. 81, figs. 8–26; pl. 82, figs. 1–3.—Bradshaw, 1959, Contr. Cushman Found. Foram. Res., vol. 10, p. 49, pl. 8, figs. 17, 18.

This well-known cosmopolitan species is found in most of the deep-water samples, usually fairly commonly. The diameter of the adults is about 0.8 mm. No bilocular individuals were noted.

Genus PULLENIATINA Cushman, 1927

PULLENIATINA OBLIQUILOCULATA (Parker and Jones)

Plate 27, Figures 2–4

Pullenia obliquiloculata Parker and Jones, 1865, Philos. Trans., p. 368, pl. 19, fig. 4.

Pulleniatina obliquiloculata (Parker and Jones).—Bradshaw, 1959, Contr. Cushman Found. Foram. Res., vol. 10, p. 49, pl. 8, figs. 19, 20.—Todd, 1964, U.S. Geol. Surv. Prof. Paper 260–CC, p. 1089, pl. 289, figs. 2, 3.

This well-known and cosmopolitan species occurs in association with the other planktonics in many of the deep-water samples and is common or abundant in many of them.

Its highly polished wall is one of its distinguishing characteristics. Immature individuals often lack this smooth surface, however, and in those specimens the distinguishing feature seems to be the broad low aperture with inward-curved lips.

Genus SPHAEROIDINELLA Cushman, 1927

SPHAEROIDINELLA DEHISCENS (Parker and Jones)

Plate 26, Figures 5, 6

Sphaeroidina dehiscens Parker and Jones, 1865, Philos. Trans., p. 369, pl. 19, fig. 5.—Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 621, pl. 84, figs. 8–11.

Sphaeroidinella dehiscens (Parker and Jones).—Bradshaw, 1959, Contr. Cushman Found. Foram. Res., vol. 10, p. 49, pl. 8, figs. 21–23.

Sphaeroidina bulloides d'Orbigny var. *dehiscens* Parker and Jones.—Banner and Blow, 1960, Contr. Cushman Found. Foram. Res., vol. 11, p. 35, pl. 7, fig. 3.

Like the planktonics with which it is associated in these samples, this is a cosmopolitan species in the deeper water of the world's oceans. It is distinguished by its fissured appearance and its smooth surface with translucent wall, through which the coarsely perforate and cancellated surface of the immature stages are visible.

The degree of fissuring (widely open or barely fissured) and the shape of the whole test (smoothly spherical, nearly bispherical, or slightly bulging) shows a wide range of variability in the present material.

Genus CANDEINA d'Orbigny, 1839

CANDEINA NITIDA d'Orbigny

PLATE 27, FIGURE 1

Candeina nitida D'ORBIGNY, 1839, *in* DE LA SAGRA, Hist. Physiq. Pol. Nat. Cuba, Foraminifères, p. 108, pl. 2, figs. 27, 28.—BRADSHAW, 1959, Contr. Cushman Found. Foram. Res., vol. 10, p. 32, pl. 7, fig. 19.

This species occurs in a few samples, sometimes rather commonly. Orthodox specimens are coiled in a high spire but in many of the present specimens the spire is obscure and the whole test rather abnormally shaped. The wall is characteristically smooth, thin, and translucent, and in the adult the aperture consists of the sutural pores.

Genus HASTIGERINA Thomson, 1876

HASTIGERINA PELAGICA (d'Orbigny)

PLATE 26, FIGURE 7

Nonionina pelagica D'ORBIGNY, 1839, Voy. Amér. Mérid., vol. 5, pt. 5, Foraminifères, p. 27, pl. 3, figs. 13, 14.

Hastigerina pelagica D'ORBIGNY, sp.—BRADY (part), 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 613, pl. 83, figs. 1–4, 6 (not figs. 5, 7, 8).—BRADSHAW, 1959, Contr. Cushman Found. Foram. Res., vol. 10, p. 47, pl. 8, figs. 14, 15.

Hastigerina (*Hastigerina*) *pelagica* (D'ORBIGNY) emended.—BANNER and BLOW, 1960, Micropaleontology, vol. 6, p. 20, text fig. 1.

Hastigerina murrayi THOMSON, 1876, Proc. Roy. Soc. London, vol. 24, p. 534, pls. 22, 23.—BOLLI, LOEBLICH, and TAPPAN, 1957, U.S. Nat. Mus. Bull. 215, p. 29, pl. 3, figs. 1–3.

Single specimens were found in *Albatross* stations H3823, H3919, and H3937, in the Tuamotu Archipelago, at depths of 782, 1,494, and 1,688 fathoms respectively. The species appears to be distributed widely but nowhere abundantly.

Banner and Blow (1960b, pp. 25–26) discuss the distinctions between this species and the closely related species *Hastigerinella digitata* (Rhumbler), concluding that the distinctions are of generic importance. Although I regard this conclusion as subject to considerable doubt, solution of this question is not of immediate concern. It is sufficient here to say that the three specimens from the present material fall into the group of specimens not showing bifurcation of chambers or bifocal concentration of spines.

Family GLOBOROTALIIDAE

Genus GLOBOROTALIA Cushman, 1927

GLOBOROTALIA (TURBOROTALIA) FIJIANA (Cushman)

Plate 27, Figure 5

Eponides fijiana Cushman, 1933, Contr. Cushman Lab. Foram. Res., vol. 9, p. 89, pl. 9, fig. 6.

This species is represented by only six specimens (four from the type locality, 12 fathoms at Nairai, Fiji, and two from 7 fathoms at Rotonga), but all are alike and quite distinctive.

None of the specimens show the apertural opening clearly; the scalloped apertural edge originally described cannot now be confirmed. It appears more likely that the aperture is a narrow elongate opening extending from umbilicus to periphery.

The distinct porosity and thinness of the wall of the entire test suggests a planktonic rather than benthonic habit. It seems unlikely that it will be found in the oceanic planktonic assemblages, but it may be a floating form, like species of *Tretomphalus*, inhabiting protected areas within atolls or behind coral reefs.

The chambers are less globular than in *Globigerina* and more so than in *Globorotalia.* The species is placed in the subgenus *Turborotalia,* which stands in the hiatus between these two planktonic genera. The umbilicus is open and slightly depressed. The ventral sutures are somewhat indented. The dorsal sutures are slightly limbate, especially toward the center, and the outer whorl of chambers tends to stand up around the central part of the dorsal surface. The peripheral spines are little more than pinched-together, drawn-out portions of the final whorl of chambers.

GLOBOROTALIA HIRSUTA (d'Orbigny)

Plate 27, Figure 6

Rotalina hirsuta d'Orbigny, 1839, *in* Barker-Webb and Berthelot, Hist. Nat. Îles Canaries, Paris, vol. 2, pt. 2, Foraminifères, p. 131, pl. 1, figs. 37–39.

Globorotalia hirsuta (d'Orbigny).—Cushman, 1931, U.S. Nat. Mus. Bull. 104, pt. 8, p. 99, pl. 17, fig. 6.—Phleger, Parker, and Peirson, 1953, Rep. Swedish Deep-Sea Exped., vol. 7, Sediment Cores, no. 1, p. 19, pl. 4, figs. 1–4.

Pulvinulina canariensis d'Orbigny, sp.—Brady, 1884, Rep. Voy. *Challenger,* Zoology, vol. 9, p. 692, pl. 103, figs. 8, 9.

Rare specimens referable to this species were found at only a few isolated stations. They are distinguishable from *Globorotalia punctulata,* their closest relative, in their flattened and biconvex (rather than planoconvex) test, and in their sutures being slightly more curved. The outline of the test is rounded and lobulated rather than squarish. In addition, this species seems never to develop as coarse a granulation on the wall as does *G. punctulata.*

GLOBOROTALIA CRASSAFORMIS (Galloway and Wissler)

Globigerina crassaformis GALLOWAY and WISSLER, 1927, Journ. Paleont., vol. 1, p. 41, pl. 7, fig. 12.

Globorotalia crassaformis (GALLOWAY and WISSLER).—PARKER, 1962, Micropaleontology, vol. 8, p. 235, pl. 4, figs. 17, 18, 20, 21.

Pulvinulina crassa D'ORBIGNY, sp.—BRADY, 1884, Rep. Voy. *Challenger,* Zoology, vol. 9, p. 694, pl. 103, figs. 11, 12.

Globorotalia punctulata (D'ORBIGNY).—PHLEGER, PARKER, and PEIRSON, 1953, Rep. Swedish Deep-Sea Exped., vol. 7, Sediment Cores, no. 1, p. 20, pl. 4, figs. 8–12.

This species apparently has a worldwide distribution although it is never found abundantly. In the present material it is found in about a quarter of the deep-water samples.

Specimens exhibit considerable variation: from ones that are compact and highly conical, as high as broad, with heavy encrustations of calcareous beading that obscure all perforations of the wall, to ones that are thinner-walled and flatter, in which the perforations are clearly visible on the smooth wall. Four chambers make up the adult whorl, and the sutures on the ventral side are indented deeply and are nearly straight. The periphery is deeply lobulated on the flatter specimens but nearly squarish on the thick, compact specimens, and the edge of the periphery is bluntly rounded and not as sharply angled as in *Globorotalia hirsuta.*

GLOBOROTALIA MENARDII (d'Orbigny)

PLATE 28, FIGURES 2, 4

Rotalia menardii D'ORBIGNY, 1826, Ann. Sci. Nat., vol. 7, p. 273; Modèles, no. 10.

Pulvinulina menardii D'ORBIGNY, sp.—BRADY, 1884, Rep. Voy. *Challenger,* Zoology, vol. 9, p. 690, pl. 103, figs. 1, 2.

Globorotalia menardii (D'ORBIGNY).—BRADSHAW, 1959, Contr. Cushman Found. Foram. Res., vol. 10, p. 44, pl. 8, figs. 3, 4.

Rotalia menardii PARKER, JONES, and BRADY, 1865.—BANNER and BLOW, 1960, Contr. Cushman Found. Foram. Res., vol. 11, p. 31, pl. 6, fig. 2.

This well-known species is not represented abundantly in the present material, being found in relatively fewer samples than is *G. tumida,* although commonly in some of them.

The species is characteristically flat and compressed, in contrast with *Globorotalia tumida* (Brady), with which it is associated and to which it may be transitional morphologically, if not also biologically. The present specimens tend to be more heavily limbate around the periphery than is typical of this species, and the ventral sutures are distinctly incised. The apertural lip is limbate and, in some specimens, encrusted with small knobs. The umbilicus is open and the aperture rather widely open.

Found with these more typical specimens are others that may be separated on the basis of their thicker tests, lower apertural opening, and smaller size. There is some variation in outline of test: from circular, with lobulated periphery, to elongate, with nearly smooth periphery. The number of chambers in the final whorl is five or six as it is in the typical form of *G. menardii.* One of these variants, having the coarsely spinose ornamentation characteristic of the variety *fimbriata,* is illustrated (pl. 28, fig. 2). On this specimen, the spinosity extends beyond the limbate keel, to which it is usually restricted, and is scattered over the chamber walls as well.

GLOBOROTALIA MENARDII UNGULATA Bermudez

Plate 28, Figure 3

Globorotalia ungulata Bermudez, 1960, Venezuela: Ministerio de Minas e Hidrocarburos, Bol. Geol., Publ. Espec. No. 3, p. 1304, pl. 15, fig. 6.

Globorotalia cf. *G. menardii* (d'Orbigny).—Bradshaw, 1959, Contr. Cushman Found. Foram. Res., vol. 10, p. 44, pl. 8, figs. 10–12.

This form was described originally from 615 fathoms off the coast of Cuba and was stated to be distinct from *Globorotalia tumida* in its more delicate construction, thinner wall, and more inflated and angular ventral face of the final chamber. It seems to be related more closely to *G. menardii* than to *G. tumida* and, thus, is regarded as a subspecies of *G. menardii.* In the present material, it is at least as frequently found as the typical form, and there are a few transitional forms connecting the two.

This subspecies is distinguished easily from the typical form and is characterized by its thinner and clearer wall, curved dorsal surface, and peaked appearance of the inner ends of the chambers on the ventral side. Specimens are usually smaller than the typical forms, and the encrustation of a crystalline deposit around the apertural area is much finer than on the typical form.

The subspecies has already been found and illustrated from plankton tows in the Pacific (Bradshaw, 1959, p. 44, pl. 8, figs. 10–12) and may be found to be nearly as cosmopolitan as the typical form.

GLOBOROTALIA TUMIDA (Brady)

Plate 28, Figure 1

Pulvinulina menardii d'Orbigny var. *tumida* Brady, 1877, Geol. Mag. [Great Britain], decade 2, vol. 4, p. 535.—Banner and Blow, 1960, Contr. Cushman Found. Foram. Res., vol. 11, p. 26, pl. 5, fig. 1.

Pulvinulina tumida Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 692, pl. 103, figs. 4–6.

Globorotalia tumida (BRADY).—BRADSHAW, 1959, Contr. Cushman Found. Foram. Res., vol. 10, p. 47, pl. 8, figs. 9, 13.

This cosmopolitan species is one of the most widely represented and most abundant of the planktonics in the deeper-water samples of the present material.

Its thick, rather heavy-walled test is also distinctive in being dorsally bulging and somewhat elongated in the direction of the last-formed chamber. The test is thick in the center, rounded around the periphery of the early part of the final whorl, but compressed to a blunt bladelike edge around the final one or two chambers. The dorsal sutures are curved, slightly depressed, and usually indistinct; on some specimens they are scarcely visible. The ventral sutures usually are incised deeply, particularly at their inner ends. The periphery is edged by a thick and heavy limbate keel. The aperture is protected normally by a rather prominent tonguelike projection extending forward (in the direction of coiling) above it. The surface of the wall has a characteristic sugary texture, rarely smooth and polished or translucent as in *Globorotalia menardii*. The sugary texture increases in graininess toward the umbilical area, where the wall seems to be actually ornamented by a dense concentration of short pillars and blunt spines.

GLOBOROTALIA TRUNCATULINOIDES (d'Orbigny)

PLATE 27, FIGURE 7

Rotalina truncatulinoides D'ORBIGNY, 1839, *in* BARKER-WEBB and BERTHELOT, Hist. Nat. Îles Canaries, Paris, vol. 2, pt. 2, Foraminifères, p. 132, pl. 2, figs. 25–27.

Globorotalia truncatulinoides (D'ORBIGNY).—CUSHMAN, 1941, Amer. Journ. Sci., vol. 239, pl. 4, fig. 1.—BOLLI, LOEBLICH, and TAPPAN, 1957, U.S. Nat. Mus. Bull. 215, p. 41, pl. 10, fig. 3.—BRADSHAW, 1959, Contr. Cushman Found. Foram. Res., vol. 10, p. 44, pl. 8, figs. 7, 8.

This cosmopolitan species is found rarely and in only a few samples of the present material. Its occurrence suggests the possibility of local restriction in the southeastern Pacific. Most of the specimens are found in samples from west of the Tuamotu Archipelago; the species is almost unknown from areas covered by the remaining samples.

Its distinguishing characteristics are the smoothly rounded, not angled, outline of the test and its high conical form with open umbilicus. Its wall is generally less coarsely rugose than that of *Globorotalia punctulata*, with which it might be confused.

TABLES

TABLE 1.—*Occurrence and abundance of benthonic Foraminifera—part 1: Spirillinidae and Discorbidae*

(Samples, such as Apotaki, are included though the only species found in them are recorded on one or more of the other three tables of benthonic species.)

	Spirillina denticulogranulata	*Spirillina inaequalis*	*Spirillina inaequalis semidecorata*	*Spirillina limbata*	*Spirillina spinigera*	*Spirillina vivipara*	*Spirillina vivipara revertens*	*Conicospirillina semiinvoluta*	*Conicospirillina* sp.	*Patellina advena*	*Patellina advena altiformis*	*Patellinella carinata*	*Patellinella fijiana*	*Patellinella inconspicua*	*Rosalina concinna*	*Rosalina floridana*
Unnumbered stations																
Rangiroa	--	7	3	--	--	----	--	--	--	--	----	--	--	--	----	10+
Off Niau	--	----	--	--	--	----	--	--	--	--	----	--	--	--	----	10+
Niau Lagoon	--	----	--	--	--	----	--	--	--	--	----	--	--	--	----	10+
Apotaki																
Makemo																
Makemo Lagoon	--	----	--	--	--	1	--	--	--	--	----	--	--	--	----	7
Makemo Beach																
Pinaki outer beach	--	----	--	--	--	----	--	--	--	--	----	--	--	--	----	2
Pinaki Atoll, inside lagoon	--	----	--	--	--	----	1	--	--	--	----	--	--	--	----	10+
Pinaki Island																
Hereheretue																
Hereheretue Beach, off wharf																
Rutavu	--	----	--	--	--	----	--	--	--	--	----	--	--	--	----	4
Niue																
Aloji Niue																
Rotonga, 7 fms	--	----	--	--	--	----	2	--	--	--	----	--	--	--	3	3
Vavau Anchorage, 18 fms	--	----	--	--	--	1	--	--	--	--	----	--	--	--	1	5
Vavau	--	----	--	--	--	----	--	--	--	--	----	--	--	--	1	-----
Fiji, 40–50 fms	1	10+	--	4	--	1	1	3	--	1	10+	1	--	--	----	-----
Kambara Beach																
Levuka, 12 fms	--	1	--	--	--	5	6	--	--	1	--	1	--	--	10+	10+
Mokaujar Anchorage	--	----	--	--	--	3	--	--	--	--	----	6	--	--	1	9
Nairai, 12 fms	--	----	--	--	--	5	1	--	--	--	----	--	--	--	8	1
Nairai, 24 fms	--	----	--	--	--	----	1	--	--	--	----	--	--	--	3	-----
Near Nairai	--	----	--	--	--	4	1	--	--	2	2	--	1	--	4	-----
Viva Anchorage, 3 fms																
Rongelab	--	1	--	--	--	----	1	--	--	--	----	--	--	--	3	10+
Port Lottin, Kusaie	--	----	--	--	--	10+	3	--	--	--	----	2	--	--	----	10+
Guam Anchorage, 21 fms	--	----	--	--	1	10+	2	--	1	1	2	--	--	6	8	10
Dredging stations																
D3681																
D3684																
D3686																
D3688	--	1	--	--	--	----	--	--	--	--	----	--	--	--	----	-----
D3689	--	1	--	--	--	----	--	--	--	--	----	--	--	--	----	-----
D3690																
D3691																
Hydrographic stations																
H3787																
H3789																
H3790																
H3791																
H3793																
H3794																
H3795																

TABLE 1.—*Occurrence and abundance of benthonic Foraminifera—part 1: Spirillinidae and Discorbidae*—Continued

(Samples, such as Apotaki, are included though the only species found in them are recorded on one or more of the other three tables of bethonic species.)

	Rosalina globularis	*Rosalina micens*	*Rosolina rugosa*	*Rosalina subbertheloti*	*Rosalina vilardeboana*	*Discorbis subvesicularis*	*Discorbis? aguayoi*	*Svratkina australiensis*	*Neoconorbina crustata*	*Neoconorbina floridensis*	*Neoconorbina frustata*	*Neoconorbina patelliformis*	*Neoconorbina terquemi*	*Neoconorbina tuberocapitata*	*Hanzawaia concentrica*
Unnumbered stations															
Rangiroa	----	4	--	2	----	--	--	--	2	----	--	--	----	----	---
Off Niau	----	--	--	--	----	--	4	--	--	----	--	--	----	----	---
Niau Lagoon															
Apotaki															
Makemo															
Makemo Lagoon	----	2	--	3	----	--	--	--	--	----	--	--	----	----	---
Makemo Beach															
Pinaki outer beach	----	--	--	--	----	--	1	--	--	----	--	--	----	----	---
Pinaki Atoll, inside lagoon	----	--	1	--	----	--	1	--	--	----	--	--	----	----	---
Pinaki Island															
Hereheretue															
Hereheretue Beach, off wharf	----	--	1	--	----	--	--	--	--	----	--	--	----	1	---
Rutavu	----	--	--	--	----	--	--	--	--	----	--	--	----	----	1
Niue															
Aloji Niue															
Rotonga, 7 fms	10+	4	--	--	----	--	--	--	--	----	--	--	----	----	---
Vavau Anchorage, 18 fms	----	1	--	3	3	--	--	--	3	----	--	--	1	1	---
Vavau	----	6	--	--	----	--	--	--	--	----	--	--	----	----	---
Fiji, 40–50 fms	----	--	4	2	----	--	--	--	8	----	1	1	----	10+	---
Kambara Beach															
Levuka, 12 fms	3	4	--	--	10+	--	--	--	--	----	--	1	7	----	---
Mokaujar Anchorage	1	--	2	--	6	--	--	--	--	10+	--	7	10+	----	---
Nairai, 12 fms	----	3	--	--	10+	--	--	--	--	----	--	1	9	----	---
Nairai, 24 fms	8	--	1	--	1	--	--	--	--	----	--	1	----	----	---
Near Nairai	----	8	--	--	9	--	--	--	--	----	1	--	6	----	1
Viva Anchorage, 3 fms	4	7	1	--	1	--	--	--	--	----	--	--	----	----	---
Rongelab	----	3	--	--	----	--	--	--	--	----	--	--	2	----	---
Port Lottin, Kusaie	----	3	--	--	----	1	--	--	--	----	--	--	----	1	---
Guam Anchorage, 21 fms	----	8	--	6	----	--	--	1	--	----	1	--	4	2	1
Dredging stations															
D3681															
D3684															
D3686															
D3688															
D3689	----	--	--	1	----	--	--	--	--	----	--	--	----	----	---
D3690															
D3691															
Hydrographic stations															
H3787															
H3789															
H3790															
H3791															
H3793															
H3794															
H3795															

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TABLE 1.—*Occurrence and abundance of benthonic Foraminifera—part 1: Spirillinidae and Discorbidae*—Continued

	Spirillina denticulogranulata	*Spirillina inaequalis*	*Spirillina inaequalis semidecorata*	*Spirillina limbata*	*Spirillina spinigera*	*Spirillina vivipara*	*Spirillina vivipara revertens*	*Conicospirillina semiinvoluta*	*Conicospirillina* sp.	*Patellina advena*	*Patellina advena altiformis*	*Patellinella carinata*	*Patellinella fijiana*	*Patellinella inconspicua*	*Rosalina concinna*	*Rosalina floridana*
Hydrographic stations—Con.																
H3796																
H3798																
H3800																
H3801																
H3804																
H3807	--	----	--	--	--	----	--	--	1	--	----	--	--	--	----	-----
H3808																
H3809																
H3810																
H3812																
H3813	--	1	--	1	--	----	--	--	--	--	----	--	--	--	----	-----
H3814																
H3815	--	1	--	--	--	----	--	--	--	--	----	--	--	--	----	-----
H3816																
H3818																
H3819																
H3820																
H3822																
H3823																
H3824																
H3825																
H3826																
H3827	--	5	--	--	--	----	--	--	--	--	----	--	--	--	----	-----
H3828																
H3829																
H3830																
H3831																
H3832																
H3833																
H3834																
H3835																
H3836																
H3837																
H3838																
H3840																
H3841																
H3843																
H3845																
H3847																
H3848	--	1	--	--	--	----	--	--	--	--	----	--	--	--	----	-----
H3849	--	1	--	--	--	----	--	--	--	--	----	--	--	--	----	-----
H3850																
H3851																
H3852																
H3853																
H3855	--	2	--	--	--	----	--	--	--	--	----	--	--	--	----	-----
H3856																
H3857	--	1	--	--	--	----	--	--	--	--	----	--	--	--	----	2

TABLE 1.—*Occurrence and abundance of benthonic Foraminifera—part 1: Spirillinidae and Discorbidae*—Continued

	Rosalina globularis	*Rosalina micens*	*Rosalina rugosa*	*Rosalina subbertheloti*	*Rosalina vilardeboana*	*Discorbis subvesicularis*	*Discorbis? aguayoi*	*Svratkina australiensis*	*Neoconorbina crustata*	*Neoconorbina floridensis*	*Neoconorbina frustata*	*Neoconorbina patelliformis*	*Neoconorbina terquemi*	*Neoconorbina tuberocapitata*	*Hanzawaia concentrica*
Hydrographic stations—Con.															
H3796															
H3798															
H3800															
H3801															
H3804	----	--	--	--	----	--	--	1	--	----	--	--	----	----	---
H3807															
H3808															
H3809	----	--	--	1	----	--	--	--	--	----	--	--	1	----	---
H3810	----	2	--	--	----	--	--	--	--	----	--	--	----	----	---
H3812															
H3813															
H3814															
H3815	----	--	--	--	----	--	--	1	--	----	--	--	----	----	---
H3816	----	1	--	--	----	--	--	--	--	----	--	--	----	----	---
H3818															
H3819															
H3820															
H3822															
H3823															
H3824															
H3825															
H3826	----	1	--	--	----	--	--	1	--	----	--	--	----	----	---
H3827															
H3828															
H3829	----	1	--	--	----	--	--	2	--	----	--	--	----	----	---
H3830															
H3831															
H3832															
H3833															
H3834															
H3835															
H3836															
H3837															
H3838															
H3840															
H3841	----	--	--	--	----	--	--	1	--	----	--	--	----	----	---
H3843															
H3845															
H3847															
H3848	----	--	--	--	1	--	--	1	2	----	--	--	----	--	---
H3849															
H3850															
H3851	----	1	--	--	----	--	--	--	--	----	--	--	----	----	---
H3852															
H3853	----	7	--	--	----	--	--	--	--	----	--	--	----	----	---
H3855	----	--	--	--	----	--	--	3	--	----	--	--	----	----	---
H3856															
H3857	----	--	--	1	----	--	--	--	--	----	--	--	----	----	---

TABLE 1.—*Occurrence and abundance of benthonic Foraminifera—part 1: Spirillinidae and Discorbidae*—Continued

	Spirillina denticulogranulata	*Spirillina inaequalis*	*Spirillina inaequalis semidecorata*	*Spirillina limbata*	*Spirillina spinigera*	*Spirillina vivipara*	*Spirillina vivipara revertens*	*Conicospirillina semiinvoluta*	*Conicospirillina* sp.	*Patellina advena*	*Patellina advena altiformis*	*Patellinella carinata*	*Patellinella fijiana*	*Patellinella inconspicua*	*Rosalina concinna*	*Rosalina floridana*
Hydrographic stations—Con.																
H3858	--	2	--	1	--	----	--	--	--	--	----	--	--	--	--	1
H3859	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3860																
H3862																
H3863																
H3864																
H3865																
H3866																
H3867																
H3868																
H3869																
H3870																
H3871																
H3873	--	----	--	--	--	----	--	--	--	--	----	--	--	--	----	-----
H3874																
H3875	--	1	--	--	--	----	--	2	--	--	----	--	--	--	----	-----
H3876	--	2	--	--	--	----	--	--	--	--	----	--	--	--	----	-----
H3878																
H3879																
H3881																
H3882																
H3883																
H3884	--	----	--	--	--	----	--	--	--	--	----	--	--	--	----	-----
H3885	--	3	--	--	--	----	--	--	--	--	----	--	--	--	----	-----
H3887	--	1	--	--	--	----	--	--	--	--	----	--	--	--	----	-----
H3888																
H3889	--	----	--	--	--	----	--	--	--	--	----	--	--	--	----	-----
H3890																
H3891	--	5	--	--	--	----	--	--	--	--	----	--	--	--	----	-----
H3892																
H3893																
H3894																
H3895																
H3896	--	----	--	--	--	----	--	--	--	--	----	--	--	--	----	-----
H3897																
H3898	--	9	1	--	--	1	--	--	--	--	----	--	--	--	----	-----
H3899	--	3	--	--	--	----	--	--	--	--	----	--	--	--	----	-----
H3900																
H3901																
H3902																
H3903																
H3904																
H3905	--	----	--	--	--	----	--	--	--	--	----	--	--	1	----	1
H3909	--	----	--	--	--	----	--	--	--	--	----	--	--	--	----	1
H3910	--	4	1	--	--	----	--	--	--	--	----	--	--	--	----	2
H3911																
H3912																
H3913																

TABLE 1.—*Occurrence and abundance of benthonic Foraminifera—part 1: Spirillinidae and Discorbidae*—Continued

	Rosalina globularis	*Rosalina micens*	*Rosalina rugosa*	*Rosalina subberthelotii*	*Rosalina vilardeboana*	*Discorbis subvesicularis*	*Discorbis? aguayoi*	*Svratkina australiensis*	*Neoconorbina crustata*	*Neoconorbina floridensis*	*Neoconorbina frustata*	*Neoconorbina patelliformis*	*Neoconorbina terquemi*	*Neoconorbina tuberocapitata*	*Hanzawaia concentrica*
Hydrographic stations—Con.															
H3858	----	1	--	1	----	--	--	--	--	----	--	--	----	----	---
H3859	----	4	--	1	----	--	--	--	--	----	--	--	----	----	---
H3860															
H3862															
H3863															
H3864															
H3865															
H3866															
H3867															
H3868															
H3869															
H3870															
H3871															
H3873	----	2	--	--	----	--	--	1	--	----	--	--	----	----	---
H3874															
H3875	----	--	--	--	----	--	--	--	--	----	--	--	----	2	---
H3876	----	--	--	--	----	--	--	--	--	----	--	--	----	----	---
H3878															
H3879															
H3881															
H3882															
H3883															
H3884	----	--	--	--	----	--	--	1	--	----	--	--	----	----	---
H3885	----	--	--	--	----	--	--	--	--	----	--	--	----	----	---
H3887	----	--	--	--	----	--	--	--	--	----	--	--	----	----	---
H3888															
H3889	----	3	--	--	----	--	--	1	--	----	--	--	----	----	---
H3890															
H3891	----	2	3	--	----	--	--	--	--	----	--	--	----	----	---
H3892															
H3893															
H3894															
H3895															
H3896	----	5	2	--	----	--	--	--	--	----	--	--	----	----	---
H3897															
H3898	----	3	--	1	----	--	--	--	1	----	--	--	----	----	---
H3899	----	1	--	--	----	--	--	--	--	----	--	--	----	----	---
H3900															
H3901															
H3902															
H3903															
H3904															
H3905	----	--	--	--	----	--	--	--	--	----	--	--	----	----	---
H3909	----	--	--	--	----	--	--	--	--	----	--	--	----	----	---
H3910	----	--	2	--	----	--	--	2	--	----	--	--	----	----	---
H3911															
H3912															
H3913															

TABLE 1.—*Occurrence and abundance of benthonic Foraminifera—part 1: Spirillinidae and Discorbidae*—Continued

	Spirillina denticulogranulata	*Spirillina inaequalis*	*Spirillina inaequalis semidecorata*	*Spirillina limbata*	*Spirillina spinigera*	*Spirillina vivipara*	*Spirillina vivipara revertens*	*Conicospirillina semiinvoluta*	*Conicospirillina* sp.	*Patellina advena*	*Patellina advena altiformis*	*Patellinella carinata*	*Patellinella fijiana*	*Patellinella inconspicua*	*Rosalina concinna*	*Rosalina floridana*
Hydrographic stations—Con.																
H3914	--	----	--	--	--	----	--	--	--	--	----	--	--	--	----	
H3915																
H3916	--	----	--	--	--	----	--	--	--	--	----	--	--	--	----	1
H3918																
H3919																
H3920																
H3921																
H3922																
H3923																
H3924	--	2	--	--	--	----	--	--	--	--	----	--	--	--	----	5
H3925																
H3926	--	2	--	--	--	----	--	--	--	--	----	--	--	--	----	-----
H3927																
H3928	--	5	--	--	--	----	--	--	--	--	----	--	--	--	----	-----
H3929																
H3930	--	5	--	--	--	--	--	--	--	--	----	--	--	--	----	2
H3931	--	3	--	--	--	----	--	--	--	--	----	--	--	--	----	3
H3932																
H3934																
H3935	--	5	--	--	--	----	--	--	--	--	1	--	--	--	----	1
H3936	--	1	--	--	--	----	--	--	--	--	----	--	--	--	----	1
H3937																
H3938																
H3940																
H3941																
H3942																
H3944																
H3945	--	----	--	--	--	----	--	--	--	--	----	--	--	--	----	-----
H3947																
H3948																
H3954	--	1	--	--	--	----	--	--	--	--	----	--	--	--	----	-----
H3959																
H3960																
H3961																
H3964																
H3965																
H3967	--	----	--	--	--	----	--	--	--	--	----	--	--	--	----	-----
H3968																
H3969																
H3970																
H3971																
H3974																
H3976																
H3977																
H3978																
H3979																
H3980																
H3981																

Table 1.—*Occurrence and abundance of benthonic Foraminifera—part 1: Spirillinidae and Discorbidae*—Continued

	Rosalina globularis	*Rosalina micens*	*Rosalina rugosa*	*Rosalina subbertheloti*	*Rosalina vilardeboana*	*Discorbis subvesicularis*	*Discorbis? aguayoi*	*Svratkina australiensis*	*Neoconorbina crustata*	*Neoconorbina floridensis*	*Neoconorbina frustata*	*Neoconorbina patelliformis*	*Neoconorbina terquemi*	*Neoconorbina tuberocapitata*	*Hanzawaia concentrica*
Hydrographic stations—Con.															
H3914	----	--	--	--	----	--	--	2	--	----	--	--	----	----	---
H3915															
H3916	----	--	--	1	----	--	--	--	--	----	--	--	----	----	---
H3918															
H3919															
H3920															
H3921															
H3922															
H3923															
H3924	----	--	--	--	----	--	--	--	2	----	--	--	----	----	---
H3925															
H3926	----	--	1	--	----	--	--	--	--	----	--	--	----	----	---
H3927															
H3928	----	--	--	--	----	--	--	--	--	----	--	--	----	----	---
H3929															
H3930	----	2	--	--	----	--	--	--	--	----	1	--	----	----	---
H3931	----	--	--	--	----	--	--	--	--	----	--	--	----	----	---
H3932															
H3934															
H3935	----	4	2	--	----	--	--	1	--	----	--	--	----	----	---
H3936	----	--	--	--	----	--	--	--	--	----	--	--	----	----	---
H3937															
H3938															
H3940															
H3941															
H3942															
H3944															
H3945	----	--	--	--	----	--	--	2	--	----	--	--	----	----	---
H3947															
H3948															
H3954	----	10	--	--	----	--	--	--	--	----	--	--	----	----	1
H3959															
H3960															
H3961															
H3964															
H3965															
H3967	----	--	--	--	----	--	--	1	--	----	--	--	----	----	---
H3968															
H3969															
H3970															
H3971															
H3974															
H3976															
H3977															
H3978															
H3979															
H3980															
H3981															

TABLE 1.—*Occurrence and abundance of benthonic Foraminifera—part 1: Spirillinidae and Discorbidae*—Continued

	Spirillina denticulogranulata	*Spirillina inaequalis*	*Spirillina inaequalis semidecorata*	*Spirillina limbata*	*Spirillina spinigera*	*Spirillina vivipara*	*Spirillina vivipara revertens*	*Conicospirillina semiinvoluta*	*Conicospirillina* sp.	*Patellina advena*	*Patellina advena altiformis*	*Patellinella carinata*	*Patellinella fijiana*	*Patellinella inconspicua*	*Rosalina concinna*	*Rosalina floridana*
Hydrographic stations—Con.																
H3983	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
H3984	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
H3986																
H3989																
H3991																
H3992																
H3993																
H3996																
H3997																
H4004																

TABLE 2.—*Occurrence and abundance of benthonic Foraminifera—part 2: Rotaliidae*

(Samples, such as Niau Lagoon, are included even though the only species found in them are recorded on one or more of the other three tables of benthonic species.)

	Gavelinopsis praegeri	*Rotorbinella mira*	*Gyroidina gemma*	*Gyroidina lamarckiana*	*Gyroidina soldanii*	*Eponides repandus*	*Eponides tumidulus*	*Cancris auriculus*	*Baggina indica*	*Valvulineria glabra*	*Siphonina tubulosa*	*Siphoninoides echinatus*	*Oridorsalis umbonatus*	*Stomatorbina concentrica*	*Paumotua terebra*
Unnumbered stations															
Rangiroa	--	--	--	--	--	1	--	--	--	--	3	--	--	--	--
Off Niau															
Niau Lagoon															
Apotaki															
Makemo															
Makemo Lagoon	--	--	--	--	--	1	--	--	--	--	2	--	--	--	--
Makemo Beach															
Pinaki outer beach	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--
Pinaki Atoll, inside lagoon															
Pinaki Island															
Hereheretue	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--
Hereheretue Beach, off wharf															
Rutavu	2	--	--	--	--	8	--	--	--	--	--	--	--	--	--
Niue															
Aloji Niue															

TABLE 1.—*Occurrence and abundance of benthonic Foraminifera—part 1: Spirillinidae and Discorbidae*—Continued

	Rosalina globularis	*Rosalina micens*	*Rosalina rugosa*	*Rosalina subbertheloti*	*Rosalina vilardeboana*	*Discorbis subvesicularis*	*Discorbis? aguayoi*	*Svratkina australiensis*	*Neoconorbina crustata*	*Neoconorbina floridensis*	*Neoconorbina frustata*	*Neoconorbina patelliformis*	*Neoconorbina terquemi*	*Neoconorbina tuberocapitata*	*Hanzawaia concentrica*
Hydrographic stations—Con.															
H3983	-----	1	--	--	----	--	--	1	--	----	--	--	----	----	---
H3984	-----	--	--	1	----	--	--	--	--	----	--	--	----	----	---
H3986															
H3989															
H3991															
H3992															
H3993															
H3996															
H3997															
H4004															

TABLE 2.—*Occurrence and abundance of benthonic Foraminifera—part 2: Rotaliidae*—Continued

(Samples, such as Niau Lagoon, are included even though the only species found in them are recorded on one or more of the other three tables of benthonic species.)

	Epistomaroides polystomelloides	*Osangularia cultur*	*Lamarckina* sp.	*Heronallenia lingulata*	*Bronnimannia haliotis*	*Planulinoides biconcavus*	*Bueningia creeki*	*Pararotalia ozawai*	*Streblus beccarii tepida*	*Nuttallides umboniferus*	*Nuttallides? rugosus*	*Epistominella exigua*	*Epistominella pulchra*	*Epistominella tubulifera*
Unnumbered stations														
Rangiroa	--	--	--	--	7	--	--	----	----	----	--	----	----	---
Off Niau	--	--	--	--	----	--	----	--	1	----	--	----	----	---
Niau Lagoon														
Apotaki														
Makemo														
Makemo Lagoon	--	--	--	--	----	--	--	----	----	----	--	----	----	2
Makemo Beach														
Pinaki outer beach														
Pinaki Atoll, inside lagoon														
Pinaki Island														
Hereheretue														
Hereheretue Beach, off wharf														
Rutavu														
Niue														
Aloji Niue														

TABLE 2.—*Occurrence and abundance of benthonic Foraminifera—part 2: Rotaliidae*—Continued

	Gavelinopsis praegeri	*Rotorbinella mira*	*Gyroidina gemma*	*Gyroidina lamarckiana*	*Gyroidina soldanii*	*Eponides repandus*	*Eponides tumidulus*	*Cancris auriculus*	*Baggina indica*	*Valvulineria glabra*	*Siphonina tubulosa*	*Siphoninoides echinatus*	*Oridorsalis umbonatus*	*Stomatorbina concentrica*	*Paumotua terebra*
Unnumbered stations—Continued															
Rotonga, 7 fms	1	--	--	--	--	--	--	----	--	--	--	--	----	--	---
Vavau Anchorage, 18 fms	2	6	--	--	--	1	--	----	--	--	--	--	----	--	---
Vavau															
Fiji, 40–50 fms	----	1	--	--	--	4	--	----	--	--	--	8	----	--	---
Kambara Beach															
Levuka, 12 fms	3	5	--	--	--	3	--	1	--	--	--	3	----	--	---
Mokaujar Anchorage	10+	5	--	--	--	--	--	----	--	--	1	--	----	--	---
Nairai, 12 fms	8	--	--	--	--	9	--	9	2	--	--	2	----	--	---
Nairai, 24 fms	10+	--	--	1	--	1	--	10+	--	--	--	--	----	--	---
Near Nairai	2	--	--	--	--	--	--	10+	--	--	--	--	----	--	---
Viva Anchorage, 3 fms	----	--	--	--	--	--	--	10+	--	--	--	--	----	--	---
Rongelab	----	--	--	--	--	--	--	----	--	--	--	1	----	--	---
Port Lottin, Kusaie	----	--	--	--	--	1	--	----	1	--	--	1	----	--	---
Guam Anchorage, 21 fms	----	--	--	--	--	1	--	1	--	--	--	3	----	--	---
Dredging stations															
D3681															
D3684	----	--	2	--	--	--	--	----	--	--	--	--	----	--	---
D3686															
D3688	1	--	--	--	--	--	--	----	--	--	--	--	----	--	---
D3689	1	--	--	--	--	--	--	----	--	--	--	--	2	--	---
D3690															
D3691															
Hydrographic stations															
H3787	----	--	--	1	--	--	--	----	--	--	--	--	3	--	---
H3789															
H3790															
H3791	----	--	--	--	1	--	1	----	--	--	--	--	----	--	---
H3793															
H3794															
H3795	2	--	--	--	--	--	--	----	--	--	--	--	1	--	---
H3796	----	--	--	--	1	--	--	----	--	--	--	--	1	--	---
H3798	6	--	--	--	2	--	--	----	--	--	--	--	----	--	---
H3800															
H3801															
H3804	----	--	--	1	--	--	--	----	--	--	--	--	----	--	---
H3807	----	--	--	--	--	--	--	1	--	--	--	--	----	--	---
H3808															
H3809	----	--	--	1	--	--	--	----	--	--	--	--	----	--	---
H3810	1	--	--	1	--	--	--	----	--	--	--	--	----	--	---
H3812	3	--	--	--	--	--	--	----	--	--	--	--	----	--	---
H3813	----	--	--	--	--	4	--	----	--	--	--	--	1	--	---
H3814	----	--	--	--	--	--	--	----	--	--	--	--	1	1	---
H3815	1	--	--	--	3	1	--	----	--	--	--	--	----	--	---
H3816	----	--	--	--	1	--	--	----	--	--	--	--	----	--	---
H3818	7	--	--	--	--	1	--	----	--	--	--	--	1	--	---
H3819															
H3820	1	--	--	--	--	--	--	----	--	--	--	--	----	--	---
H3822	----	--	--	--	2	--	--	----	--	--	--	--	----	--	---
H3823	4	--	--	--	1	--	--	----	--	--	--	--	----	--	---

TABLE 2.—*Occurrence and abundance of benthonic Foraminifera—part 2: Rotaliidae*—Continued

	Epistomaroides polystomelloides	*Osangularia culter*	*Lamarckina* sp.	*Heronallenia lingulata*	*Bronnimannia haliotis*	*Planulinoides biconcavus*	*Bueningia creeki*	*Pararotalia ozawai*	*Streblus beccarii tepida*	*Nuttallides umboniferus*	*Nuttallides? rugosus*	*Epistominella exigua*	*Epistominella pulchra*	*Epistominella tubulifera*
Unnumbered stations—Continued														
Rotonga, 7 fms	--	--	--	--	----	--	--	10+	10+	----	--	----	----	---
Vavau Anchorage, 18 fms	1	--	--	--	----	--	--	----	1	----	--	----	1	3
Vavau	--	--	--	--	----	--	--	----	10+	----	--	----	----	---
Fiji, 40–50 fms	--	--	--	--	10+	--	--	----	----	----	--	----	----	---
Kambara Beach														
Levuka, 12 fms	3	--	--	--	1	--	--	3	10+	----	--	----	----	---
Mokaujar Anchorage	9	--	--	--	----	--	--	----	10+	----	--	----	----	---
Nairai, 12 fms	--	--	--	--	----	--	--	----	10+	----	--	----	----	---
Nairai, 24 fms	--	--	--	--	----	--	--	----	----	----	--	----	1	---
Near Nairai	--	--	--	--	----	--	--	----	1	----	--	----	10+	---
Viva Anchorage, 3 fms	--	--	--	--	----	--	--	1	10+	----	--	----	----	---
Rongelab														
Port Lottin, Kusaie	--	--	--	--	1	--	--	----	1	----	--	----	----	---
Guam Anchorage, 21 fms	--	--	--	1	----	--	--	----	2	----	--	----	3	4
Dredging stations														
D3681	--	--	--	--	----	--	--	----	----	----	1	----	----	---
D3684	--	--	--	--	----	--	--	----	----	10+	--	----	----	---
D3686														
D3688	--	1	--	--	----	--	--	----	----	----	--	----	----	---
D3689	--	1	--	--	----	--	1	----	----	----	--	----	----	1
D3690														
D3691	--	--	--	--	----	--	--	----	----	5	--	----	----	---
Hydrographic stations														
H3787	--	--	--	--	----	--	--	----	----	6	--	3	----	---
H3789	--	--	--	--	----	--	--	----	----	1	--	----	----	---
H3790	--	--	--	--	----	--	--	----	----	3	--	2	----	1
H3791	--	--	--	--	----	--	--	----	----	2	--	4	----	---
H3793	--	--	--	--	----	--	--	----	----	1	--	----	----	---
H3794	--	--	--	--	----	--	--	----	1	----	--	----	----	---
H3795	--	1	--	1	----	--	--	----	----	----	1	1	----	---
H3796														
H3798	--	--	1	--	----	--	--	----	----	----	--	----	----	---
H3800														
H3801														
H3804	--	--	--	--	----	--	2	----	----	----	--	----	----	---
H3807														
H3808														
H3809	--	2	--	--	----	--	3	----	----	----	--	----	----	---
H3810	--	1	--	--	----	--	1	----	----	----	--	----	----	---
H3812	--	5	--	--	----	--	--	----	----	----	--	----	----	---
H3813														
H3814														
H3815	--	--	--	--	1	--	1	----	----	----	--	----	----	---
H3816	--	1	--	--	----	--	--	----	----	----	--	----	----	---
H3818														
H3819	--	1	--	--	----	--	--	----	----	----	--	----	----	---
H3820														
H3822														
H3823	--	--	--	--	----	--	1	----	----	----	--	----	----	---

TABLE 2.—*Occurrence and abundance of benthonic Foraminifera—part 2: Rotaliidae*—Continued

	Gavelinopsis praegeri	*Rotorbinella mira*	*Gyroidina gemma*	*Gyroidina lamarckiana*	*Gyroidina soldanii*	*Eponides repandus*	*Eponides tumidulus*	*Cancris auriculus*	*Baggina indica*	*Valvulineria glabra*	*Siphonina tubulosa*	*Siphoninoides echinatus*	*Oridorsalis umbonatus*	*Stomatorbina concentrica*	*Paumotua terebra*
Hydrographic stations—Con.															
H3824	1	--	--	--	--	--	--	----	--	--	--	--	4	--	---
H3825	7	--	--	--	--	--	--	----	--	--	--	--	5	--	---
H3826	2	--	--	--	--	--	--	----	--	--	--	--	----	--	---
H3827	----	--	--	--	1	--	--	----	--	--	--	--	1	--	---
H3828															
H3829	4	--	--	--	--	--	--	----	--	--	--	--	----	--	---
H3830	2	--	--	--	--	--	--	----	--	--	--	--	1	--	---
H3831	2	--	--	--	--	--	--	----	--	--	--	--	1	--	---
H3832	1	--	--	--	--	--	--	----	--	--	--	--	----	--	---
H3833															
H3834															
H3835															
H3836	----	--	--	--	--	--	--	----	--	--	--	--	3	--	---
H3837	----	--	--	--	--	--	--	----	--	--	--	--	3	--	---
H3838	----	--	1	--	--	--	--	----	--	1	--	--	----	--	---
H3840	----	--	--	--	2	--	--	1	--	--	--	--	----	--	---
H3841	8	--	--	3	2	--	--	----	--	--	--	--	10+	--	---
H3843															
H3845															
H3847	1	--	--	--	--	--	--	----	--	--	--	--	3	--	---
H3848															
H3849	----	--	--	--	--	1	--	----	--	--	--	--	----	--	---
H3850															
H3851															
H3852	----	--	--	--	--	1	--	----	--	--	--	--	----	--	---
H3853	1	--	--	--	1	--	--	----	--	--	--	--	----	--	---
H3855	----	--	--	--	1	--	--	----	--	--	--	--	----	--	---
H3856	2	--	--	--	--	--	--	----	--	--	--	--	----	--	---
H3857	1	--	--	--	--	2	--	----	--	--	--	--	----	--	---
H3858	2	--	--	--	1	--	--	----	--	--	--	--	1	4	---
H3859	3	--	--	--	1	--	--	----	--	1	--	--	1	--	---
H3860	----	--	--	--	5	--	--	----	--	--	--	--	2	1	---
H3862	2	--	--	--	--	--	--	----	--	--	--	--	----	--	---
H3863	----	--	--	--	--	--	--	----	--	--	--	--	1	--	---
H3864															
H3865															
H3866	2	--	--	--	1	--	--	----	--	--	--	--	3	--	---
H3867															
H3868															
H3869															
H3870	3	--	--	--	--	--	--	----	--	--	--	--	2	--	---
H3871	----	--	--	--	1	--	--	----	--	--	--	--	----	--	---
H3873	7	--	--	--	--	--	--	----	--	--	--	--	6	--	---
H3874	----	--	--	--	--	--	--	----	--	--	--	--	1	--	---
H3875	----	--	--	--	--	4	--	----	--	--	--	--	----	--	---
H3876	----	--	--	--	--	2	--	----	--	--	--	--	----	4	---
H3878	1	--	--	--	--	--	--	----	--	--	--	--	3	--	---
H3879	3	--	--	--	--	--	--	----	--	--	--	--	4	--	---
H3881															

TABLE 2.—*Occurrence and abundance of benthonic Foraminifera—part 2: Rotaliidae*—Continued

	Epistomaroides polystomelloides	*Osangularia culter*	*Lamarckina* sp.	*Heronallenia lingulata*	*Bronnimannia haliotis*	*Planulinoides biconcavus*	*Bueningia creeki*	*Pararotalia ozawai*	*Streblus beccarii tepida*	*Nuttallides umboniferus*	*Nuttallides? rugosus*	*Epistominella exigua*	*Epistominella pulchra*	*Epistominella tubulifera*
Hydrographic stations—Con.														
H3824	--	--	--	--	--	1	--	--	--	--	--	--	--	--
H3825	--	3	--	--	--	1	--	--	--	--	--	--	--	--
H3826														
H3827	--	--	--	1	--	--	--	--	--	--	--	--	--	1
H3828														
H3829														
H3830	--	1	--	--	--	--	--	--	--	--	--	--	--	--
H3831														
H3832	--	--	--	--	--	--	--	--	--	3	--	9	--	--
H3833	--	--	--	--	--	--	--	--	--	4	--	--	--	--
H3834	--	--	--	--	--	--	1	--	--	--	--	--	--	--
H3835														
H3836	--	--	--	--	--	--	--	--	--	3	--	1	--	--
H3837	--	--	--	--	--	--	--	--	--	8	--	10+	--	--
H3838	--	--	--	--	--	--	--	--	--	1	1	2	--	--
H3840	--	--	--	--	--	--	--	--	1	--	--	--	--	--
H3841	--	--	--	--	--	--	2	--	--	--	--	1	--	--
H3843	--	--	--	--	--	--	--	--	--	--	--	1	--	--
H3845														
H3847	--	--	--	--	--	1	1	--	--	--	--	--	--	--
H3848	--	--	--	--	1	--	1	--	--	--	--	--	--	--
H3849														
H3850	--	--	--	--	--	--	1	--	--	--	--	--	--	--
H3851	--	1	--	--	--	--	--	--	--	--	--	--	--	--
H3852														
H3853														
H3855	--	--	--	--	1	--	--	--	--	--	--	--	--	--
H3856														
H3857	--	--	--	--	--	--	--	--	--	--	--	--	--	--
H3858	--	--	--	--	1	--	1	--	--	--	--	--	--	--
H3859	--	2	--	--	--	--	--	--	--	--	1	--	--	--
H3860														
H3862														
H3863														
H3864														
H3865														
H3866	--	5	--	--	--	1	--	--	--	--	--	--	--	--
H3867														
H3868														
H3869														
H3870	--	2	--	--	--	--	1	--	1	--	--	--	--	--
H3871														
H3873	--	5	--	--	--	--	--	--	--	--	--	--	--	--
H3874														
H3875														
H3876														
H3878														
H3879	--	2	--	--	--	1	--	--	--	--	--	--	--	--
H3881	--	--	--	--	--	--	--	--	--	1	--	--	--	--

TABLE 2.—*Occurrence and abundance of benthonic Foraminifera—part 2: Rotaliidae*—Continued

	Gavelinopsis praegeri	*Rotorbinella mira*	*Gyroidina gemma*	*Gyroidina lamarckiana*	*Gyroidina soldanii*	*Eponides repandus*	*Eponides tumidulus*	*Cancris auriculus*	*Baggina indica*	*Valvulineria glabra*	*Siphonina tubulosa*	*Siphoninoides echinatus*	*Oridorsalis umbonatus*	*Stomatorbina concentrica*	*Paumotua terebra*
Hydrographic stations—Con.															
H3882	1	--	--	--	--	--	--	----	--	--	--	--	2	--	---
H3883	4	--	--	--	1	--	--	----	--	--	--	--	2	--	---
H3884															
H3885	----	--	--	--	--	4	--	----	---	---	--	--	----	--	---
H3887	2	--	--	--	--	--	--	----	--	--	--	--	----	--	---
H3888	1	--	--	--	--	--	--	----	--	--	--	--	----	--	---
H3889	1	--	--	--	--	--	--	----	--	--	--	--	----	--	---
H3890	2	--	--	--	--	--	--	----	--	--	--	--	----	--	---
H3891	----	--	--	--	--	1	--	----	--	--	--	--	----	--	---
H3892	----	--	--	--	--	1	--	----	--	--	--	--	----	--	---
H3893															
H3894	1	--	--	--	--	--	--	----	--	--	--	--	1	--	---
H3895	4	--	--	--	--	--	--	----	--	--	--	--	1	--	---
H3896	4	--	--	--	--	--	--	----	--	--	--	--	3	--	---
H3897															
H3898	----	--	--	--	--	3	--	----	--	--	--	--	----	--	---
H3899	1	--	--	--	--	--	--	----	--	--	--	--	1	--	---
H3900	3	--	--	--	--	---	---	----	--	--	--	--	2	--	---
H3901	2	--	--	--	--	--	--	----	--	--	--	--	----	--	---
H3902															
H3903															
H3904	----	--	--	--	--	--	--	----	--	--	--	--	1	--	---
H3905	----	--	--	--	1	4	--	----	--	--	--	--	----	--	1
H3909	----	--	--	--	--	--	--	----	--	--	--	--	2	--	---
H3910	----	--	--	--	--	3	--	----	--	--	--	--	----	--	1
H3911															
H3912															
H3913															
H3914															
H3915															
H3916	1	--	--	--	--	--	--	----	--	--	--	--	----	--	1
H3918															
H3919															
H3920	----	--	1	--	--	--	--	----	--	--	--	--	----	--	---
H3921															
H3922	----	--	1	--	--	--	--	----	--	--	--	--	1	--	---
H3923	----	--	1	--	--	--	--	----	--	--	--	--	5	--	---
H3924															
H3925															
H3926															
H3927	----	--	--	--	--	--	--	----	--	--	--	--	----	--	1
H3928															
H3929	1	--	--	--	--	--	--	----	--	--	--	--	----	--	---
H3930	----	--	--	--	--	3	--	----	--	--	--	--	----	--	---
H3931	----	--	--	--	--	1	--	----	--	--	--	--	----	--	1
H3932	----	--	--	--	--	--	--	----	--	--	--	--	-- 2	--	---
H3934	----	--	--	--	--	--	--	----	--	--	--	--	2	--	---
H3935	----	--	--	--	--	1	--	----	--	--	--	--	----	--	---
H3936	----	--	--	--	--	4	--	----	--	--	--	--	----	--	---

TABLE 2.—*Occurrence and abundance of benthonic Foraminifera—part 2: Rotaliidae*—Continued

	Epistomaroides polystomelloides	*Osangularia cutter*	*Lamarckina* sp.	*Heronallenia lingulata*	*Bronnimannia haliotis*	*Planulinoides biconcavus*	*Bueningia creeki*	*Pararotalia ozawai*	*Streblus beccarii tepida*	*Nuttallides umboniferus*	*Nuttallides? rugosus*	*Epistominella exigua*	*Epistominella pulchra*	*Epistominella tubulifera*
Hydrographic stations—Con.														
H3882														
H3883	--	1	--	--	----	--	--	----	----	1	--	----	----	---
H3884														
H3885														
H3887	--	1	--	--	----	--	--	----	----	----	--	----	----	1
H3888														
H3889	--	4	--	--	----	--	--	----	----	----	--	----	----	---
H3890														
H3891														
H3892														
H3893														
H3894														
H3895														
H3896	--	--	--	--	----	3	--	----	----	----	--	----	----	---
H3897														
H3898	--	--	--	--	2	--	--	----	----	----	----	----	----	1
H3899														
H3900														
H3901														
H3902														
H3903	--	--	--	--	----	--	--	----	----	7	--	----	----	---
H3904														
H3905														
H3909														
H3910	--	--	--	--	----	--	--	----	----	2	--	----	----	---
H3911														
H3912														
H3913														
H3914	--	--	--	--	----	1	--	----	----	----	--	----	----	---
H3915														
H3916														
H3918	--	--	--	1	----	--	--	----	----	2	----	1	----	---
H3919	--	--	--	--	----	1	--	----	----	2	--	----	----	---
H3920	--	--	--	--	----	--	--	----	----	5	--	----	----	---
H3921														
H3922	--	--	--	--	----	--	--	----	----	9	--	1	----	---
H3923	--	--	--	--	----	--	--	----	----	1	--	1	----	---
H3924														
H3925														
H3926														
H3927	--	--	--	--	----	--	--	----	----	10+	--	1	--	---
H3928														
H3929	--	--	--	--	----	--	--	----	----	1	--	----	----	---
H3930														
H3931														
H3932	--	--	--	--	----	--	--	----	----	9	--	----	----	---
H3934	--	--	--	--	----	--	--	----	----	1	--	----	----	---
H3935														
H3936														

TABLE 2.—*Occurrence and abundance of benthonic Foraminifera—part 2: Rotaliidae*—Continued

	Gavelinopsis praegeri	*Rotorbinella mira*	*Gyroidina gemma*	*Gyroidina lamarckiana*	*Gyroidina soldanii*	*Eponides repandus*	*Eponides tumidulus*	*Cancris auriculus*	*Baggina indica*	*Valvulineria glabra*	*Siphonina tubulosa*	*Siphoninoides echinatus*	*Oridorsalis umbonatus*	*Stomatorbina concentrica*	*Paumotua terebra*
Hydrographic stations—Con.															
H3937	----	--	--	--	--	--	--	----	--	--	1	--	----	--	---
H3938															
H3940															
H3941															
H3942															
H3944															
H3945	----	--	--	--	2	2	--	----	--	--	--	--	--	--	---
H3947															
H3948															
H3954	1	--	--	--	--	--	--	----	--	--	--	--	----	--	---
H3959															
H3960															
H3961	3	--	--	--	--	--	--	----	--	--	--	--	----	--	---
H3964															
H3965															
H3967															
H3968															
H3969															
H3970															
H3971	----	--	1	--	--	--	--	----	--	--	--	--	----	--	---
H3974	----	--	--	--	--	--	--	----	----		--	--	1	--	---
H3976															
H3977															
H3978															
H3979															
H3980	1	--	--	--	--	--	--	----	--	--	--	--	----	--	---
H3981															
H3983	----	--	--	--	--	--	--	----	--	--	--	--	1	--	---
H3984															
H3986	----	--	--	--	--	--	--	----	--	--	--	--	5	--	---
H3989	2	--	--	--	--	--	--	----	--	--	--	--	----	--	---
H3991	4	--	--	--	--	--	--	----	--	--	--	--	----	--	---
H3992	----	--	--	--	--	1	--	----	--	--	--	--	----	--	---
H3993	----	--	--	--	--	--	--	----	--	--	--	--	3	--	---
H3996	1	--	--	--	--	--	--	----	--	--	--	--	----	--	---
H3997	2	--	--	--	--	--	--	----	--	--	--	--	----	--	---
H4004															

TABLE 2.—*Occurrence and abundance of benthonic Foraminifera—part 2: Rotaliidae*—Continued

	Epistomaroides polystomelloides	*Osangularia culter*	*Lamarckina* sp.	*Heronallenia lingulata*	*Bronnimannia haliotis*	*Planulinoides biconcavus*	*Bueningia creeki*	*Pararotalia ozawai*	*Streblus beccarii tepida*	*Nuttallides umboniferus*	*Nuttallides? rugosus*	*Epistominella exigua*	*Epistominella pulchra*	*Epistominella tubulifera*
Hydrographic stations—Con.														
H3937	--	--	--	--	----	--	--	----	----	2	--	----	----	---
H3938	--	--	--	--	----	--	--	----	----	3	--	----	----	---
H3940														
H3941														
H3942														
H3944														
H3945	--	1	--	--	----	--	--	----	----	----	--	----	----	---
H3947														
H3948														
H3954														
H3959														
H3960														
H3961	--	--	--	--	----	5	--	----	1	----	--	----	----	1
H3964														
H3965														
H3967	--	1	--	--	----	--	--	----	----	----	--	----	----	1
H3968														
H3969														
H3970	--	--	--	--	----	--	--	----	----	----	--	1	----	---
H3971	--	--	--	--	----	--	--	----	----	----	--	5	----	---
H3974														
H3976														
H3977	--	--	--	--	----	--	--	----	----	1	--	----	----	---
H3978	--	--	--	--	----	--	--	----	----	----	--	1	----	---
H3979														
H3980	--	--	--	--	----	--	--	----	----	----	--	----	----	1
H3981														
H3983	--	--	--	--	----	--	--	----	----	----	--	1	----	---
H3984	--	1	--	--	----	--	--	----	----	----	--	----	----	---
H3986	--	--	--	--	----	--	--	----	----	10+	--	10+	----	---
H3989	--	--	--	--	----	--	1	----	----	----	--	----	----	1
H3991	--	--	--	--	----	--	--	----	----	2	--	----	----	---
H3992														
H3993	--	--	--	--	----	--	--	----	----	----	--	----	----	1
H3996	--	1	--	--	----	--	--	----	----	----	--	----	----	---
H3997														
H4004														

Table 3.—*Occurrence and abundance of benthonic Foraminifera—part 3: Pegidiidae to Chilostomellidae*

(Samples, such as Vavau, are included even though the only species found in them are recorded on one or more of the other three tables of benthonic species.)

	Hofkerina semiornata	*Pegidia dubia*	*Sphaeridia papillata*	*Amphistegina madagascariensis* (orange form)	*Amphistegina madagascariensis* (white form)	*Amphistegina radiata*	*Calcarina hispida*	*Baculogypsina sphaerulata*	*Cymbaloporetta bradyi*	*Cymbaloporetta squammosa*	*Cymbaloporella tabellaeformis*	*Tretomphalus concinnus*	*Tretomphalus milletti*	*Tretomphalus planus*	*Cassidulina angulosa*	*Cassidulina carinata*	*Cassidulina costatula*
Unnumbered stations																	
Rangiroa	--	1	--	----	10+	----	----	----	10+	----	--	----	----	1	--	--	---
Off Niau	--	--	--	----	----	----	----	----	10	----	--	----	----	--	--	--	---
Niau Lagoon	--	--	--	----	----	----	----	----	2	----	--	----	----	--	--	--	---
Apotaki	--	--	--	10+	----	----	----	----	----	----	--	----	----	--	--	--	---
Makemo	--	--	--	3	----	----	----	----	1	----	--	----	----	--	--	--	---
Makemo Lagoon	--	--	--	1	10+	----	----	----	7	3	--	----	1	--	--	--	---
Makemo Beach	--	--	--	10+	----	----	----	----	----	----	--	----	----	--	--	--	---
Pinaki outer beach	--	--	--	10+	----	----	----	----	6	----	--	----	----	--	--	--	---
Pinaki Atoll, inside lagoon	--	--	--	1	----	----	----	----	10	3	--	----	----	--	--	--	---
Pinaki Island	--	--	--	10+	8	----	----	----	2	8	--	----	----	--	--	--	---
Hereheretue	--	--	--	1	1	----	----	----	2	10+	--	----	----	---	---	--	---
Hereheretue Beach, off wharf	--	2	--	2	-----	----	----	----	1	10+	--	----	----	--	--	--	---
Rutavu	--	6	--	10+	----	----	----	----	10	10+	--	----	----	--	--	--	---
Niue	--	--	--	10+	----	----	----	----	----	----	--	----	----	--	--	--	---
Aloji Niue	--	--	--	4	----	----	5	10+	----	----	--	----	----	--	--	--	---
Rotonga, 7 fms	--	--	--	----	----	----	----	----	10+	----	--	----	----	--	--	--	---
Vavau Anchorage, 18 fms	--	--	--	----	2	1	10+	----	10+	----	--	----	----	--	--	--	---
Vavau																	
Fiji, 40–50 fms	--	--	1	----	----	----	10+	----	1	----	--	1	----	--	--	--	---
Kambara Beach	--	--	--	4	----	----	2	10+	----	----	--	----	----	--	--	--	---
Levuka, 12 fms	--	--	--	----	10+	----	5	----	10+	3	--	4	10+	1	--	--	---
Mokaujar Anchorage	--	--	--	----	10+	----	10+	----	10+	----	--	----	----	--	--	--	---
Nairai, 12 fms	--	--	--	----	2	----	10+	----	10+	1	--	2	1	3	--	--	---
Nairai, 24 fms	--	--	--	----	----	----	1	----	10+	----	--	----	2	1	--	--	---
Near Nairai	--	--	--	----	----	----	3	----	10+	----	--	10+	10	2	--	--	---
Viva Anchorage, 3 fms	--	--	--	----	----	----	----	----	10+	----	--	----	----	--	--	--	---
Rongelab	--	--	--	----	1	1	9	----	9	----	--	----	----	--	--	--	---
Port Lottin, Kusaie	--	--	--	----	----	----	----	----	10+	----	--	2	----	--	--	--	---
Guam Anchorage, 21 fms	--	--	--	----	----	----	1	----	10+	----	2	3	1	5	--	--	---
Dredging stations																	
D3681																	
D3684	--	--	--	----	----	----	----	----	----	----	--	----	----	--	--	--	---
D3686																	

TABLE 3.—*Occurrence and abundance of benthonic Foraminifera—part 3: Pegidiidae to Chilostomellidae*—Continued

Samples, such as Vavau, are included even though the only species found in them are recorded on one or more of the other three tables of benthonic species.)

	Cassidulina delicata	*Cassidulina gemma*	*Cassidulina minuta*	*Cassidulina moluccensis*	*Cassidulina pacifica*	*Cassidulina patula*	*Cassidulina* cf. *C. spinifera*	*Cassidulina subglobosa*	*Cassidulina subtumida*	*Islandiella* sp.	*Cassidulinoides tenuis*	*Ehrenbergina albatrossi*	*Ehrenbergina bicornis*	*Ehrenbergina hystrix*	*Ehrenbergina pacifica*	*Ehrenbergina reticulata*	*Ehrenbergina trigona*	*Pullenia bulloides*	*Pullenia quinqueloba*	*Sphaeroidina bulloides*	*Sphaeroidina compacta*
Unnumbered stations																					
Rangiroa																					
Off Niau																					
Niau Lagoon																					
Apotaki																					
Makemo																					
Makemo Lagoon																					
Makemo Beach																					
Pinaki outer beach																					
Pinaki Atoll, inside lagoon																					
Pinaki Island																					
Hereheretue																					
Hereheretue Beach, off wharf																					
Rutavu																					
Niue																					
Aloji Niue																					
Rotonga, 7 fms	--	--	1	--	--	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
Vavau Anchorage, 18 fms																					
Vavau																					
Fiji, 40–50 fms																					
Kambara Beach																					
Levuka, 12 fms	--	--	10+	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
Mokaujar Anchorage	--	--	10+	--	--	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
Nairai, 12 fms	--	--	8	--	--	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
Nairai, 24 fms																					
Near Nairai	--	--	2	--	--	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
Viva Anchorage, 3 fms	--	--	5	--	--	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
Rongelab	--	--	4	--	--	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
Port Lottin, Kusaie																					
Guam Anchorage, 21 fms																					
Dredging stations																					
D3681																					
D3684	--	--	----	--	--	----	--	--	--	--	--	--	--	--	--	--	--	3	--	--	---
D3686																					

TABLE 3.—*Occurrence and abundance of benthonic Foraminifera—part 3: Pegidiidae to Chilostomellidae*—Continued

	Hofkerina semiornata	*Pegidia dubia*	*Sphaeridia papillata*	*Amphistegina madagascariensis* (orange form)	*Amphistegina madagascariensis* (white form)	*Amphistegina radiata*	*Calcarina hispida*	*Baculogypsina sphaerulata*	*Cymbaloporetta bradyi*	*Cymbaloporetta squammosa*	*Cymbaloporella tabellaeformis*	*Tretomphalus concinnus*	*Tretomphalus milletti*	*Tretomphalus planus*	*Cassidulina angulosa*	*Cassidulina carinata*	*Cassidulina costatula*
Dredging stations—Continued																	
D3688	--	--	--	1	9	--	--	--	1	--	--	--	--	--	--	--	--
D3689	--	--	--	3	--	10+	--	--	10	--	--	--	--	--	--	--	--
D3690	--	--	--	--	10	2	--	--	1	--	--	--	--	--	--	--	--
D3691																	
Hydrographic stations																	
H3787	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
H3789																	
H3790	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
H3791	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
H3793																	
H3794	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
H3795	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--
H3796	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
H3798	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
H3800																	
H3801																	
H3804	--	--	--	--	10+	4	--	--	5	--	--	--	--	--	--	--	--
H3807	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--
H3808	--	--	--	2	8	1	--	--	--	--	--	--	--	--	--	--	--
H3809	--	--	--	--	6	7	--	--	2	--	--	--	9	--	--	--	--
H3810	--	--	--	--	1	--	--	--	3	--	--	--	--	--	--	--	--
H3812	--	--	--	--	1	1	--	--	4	--	--	--	--	--	--	1	--
H3813	--	--	--	--	8	3	--	--	5	--	--	--	--	--	--	--	--
H3814	--	--	--	--	10+	2	--	--	2	--	--	--	--	--	--	--	--
H3815	--	--	--	4	7	4	--	--	5	--	--	--	1	--	--	--	--
H3816	--	--	--	5	--	--	--	--	4	1	--	--	--	--	--	--	--
H3818	--	--	--	--	--	--	--	--	4	--	--	--	1	--	--	--	--
H3819	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
H3820	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
H3822	--	--	--	10+	3	7	--	--	--	--	--	--	--	--	--	--	--
H3823	--	--	--	9	--	1	--	--	2	--	--	--	--	--	--	--	--
H3824	--	--	--	--	--	7	--	--	3	--	--	--	--	--	--	--	--
H3825	--	--	--	7	--	1	--	--	1	--	--	--	--	--	--	--	--
H3826	--	--	--	1	5	5	--	--	4	--	--	--	--	--	--	--	--
H3827	--	--	--	--	10	4	--	--	2	--	--	--	--	--	--	--	--
H3828	--	--	--	10+	3	2	--	--	--	--	--	--	--	--	--	--	--
H3829	--	--	--	7	--	2	--	--	4	--	--	--	2	--	--	--	--
H3830	--	--	--	--	6	2	--	--	--	--	--	--	--	--	--	--	--
H3831	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
H3832	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
H3833	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
H3834	--	--	--	10+	--	1	--	--	--	--	--	--	--	--	--	--	--
H3835	--	--	--	3	--	--	--	--	--	--	--	--	--	--	--	--	--
H3836	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
H3837	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
H3838	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6	--
H3840	--	--	--	--	7	--	--	--	--	--	--	--	--	--	--	9	--

TABLE 3.—*Occurrence and abundance of benthonic Foraminifera—part 3: Pegidiidae to Chilostomellidae*—Continued

	Cassidulina delicata	*Cassidulina gemma*	*Cassidulina minuta*	*Cassidulina moluccensis*	*Cassidulina pacifica*	*Cassidulina patula*	*Cassidulina cf. C. spinifera*	*Cassidulina subglobosa*	*Cassidulina subtumida*	*Islandiella sp.*	*Cassidulinoides tenuis*	*Ehrenbergina albatrossi*	*Ehrenbergina bicornis*	*Ehrenbergina hystrix*	*Ehrenbergina pacifica*	*Ehrenbergina reticulata*	*Ehrenbergina trigona*	*Pullenia bulloides*	*Pullenia quinqueloba*	*Sphaeroidina bulloides*	*Sphaeroidina compacta*
Dredging stations—Con.																					
D3688	6	--	----	--	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	---
D3689	3	--	----	--	10	1	--	--	--	--	--	--	--	--	--	--	--	1	1	--	---
D3690	--	--	----	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
D3691																					
Hydrographic stations																					
H3787	--	--	----	--	--	----	--	--	--	--	--	--	--	--	--	--	--	1	1	--	---
H3789																					
H3790	--	--	----	--	--	----	--	--	--	--	--	--	--	--	--	--	--	2	--	--	---
H3791	--	--	----	--	--	----	--	--	--	--	--	--	--	--	--	--	--	--	2	--	---
H3793																					
H3794	--	--	3	--	--	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3795	1	--	10+	--	--	----	--	2	--	--	--	--	--	--	--	--	--	--	--	--	---
H3796	--	3	8	--	2	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3798	--	1	----	1	2	----	--	3	--	--	--	--	--	--	--	--	--	--	--	1	---
H3800																					
H3801																					
H3804	2	--	3	--	--	1	--	--	1	1	--	--	--	--	--	--	--	--	--	--	---
H3807																					
H3808	--	--	----	--	--	----	--	--	--	--	--	--	--	--	--	--	--	1	--	--	---
H3809	5	--	1	--	--	1	--	2	--	--	--	--	--	--	--	--	--	1	2	1	---
H3810	--	--	2	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	1	1	3
H3812	--	--	4	--	--	----	--	1	2	--	--	--	--	--	--	--	--	1	2	--	---
H3813																					
H3814																					
H3815	1	--	2	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3816																					
H3818	--	--	1	--	--	----	--	--	--	--	--	--	--	--	--	--	--	1	--	--	---
H3819	--	--	----	--	--	2	--	2	--	--	--	--	--	--	--	--	--	--	--	--	---
H3820	2	--	----	--	--	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3822	1	--	1	--	--	----	--	2	--	--	--	--	--	--	--	--	--	--	--	--	---
H3823	4	--	3	--	3	1	--	--	1	--	--	--	--	--	--	--	--	--	--	--	---
H3824	4	1	4	--	--	1	--	2	--	--	--	--	--	--	--	--	--	--	--	--	---
H3825	--	--	6	--	5	----	--	2	2	--	--	--	--	--	--	--	--	--	--	--	---
H3826	4	--	----	--	6	----	--	3	--	--	--	--	--	--	--	--	--	--	--	--	---
H3827	6	--	2	--	3	2	--	2	2	--	--	--	--	--	--	--	--	--	--	--	---
H3828	--	--	----	--	1	----	--	--	--	4	--	--	--	--	--	--	--	--	--	--	---
H3829	4	--	----	--	1	----	--	--	1	--	--	--	--	--	--	--	--	--	--	--	---
H3830	3	--	----	--	1	1	--	1	--	1	--	--	--	--	--	--	--	--	--	--	---
H3831	2	--	----	--	--	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3832	--	--	----	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	4	--	---
H3833	--	--	----	--	--	----	--	--	--	--	--	--	--	--	--	--	--	2	6	--	---
H3834	1	--	----	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3835	2	--	----	--	--	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3836	--	2	----	--	--	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3837	--	--	----	--	--	----	--	2	--	--	--	--	--	--	--	--	--	--	3	--	---
H3838	1	--	----	1	--	----	--	3	--	--	3	--	--	--	--	--	--	1	3	--	---
H3840	4	--	----	--	--	1	--	1	--	2	2	--	--	--	--	--	--	1	2	--	---

TABLE 3.—*Occurrence and abundance of benthonic Foraminifera—part 3: Pegidiidae to Chilostomellidae*—Continued

	Hofkerina semiornata	*Pegidia dubia*	*Sphaeridia papillata*	*Amphistegina madagascariensis* (orange form)	*Amphistegina madagascariensis* (white form)	*Amphistegina radiata*	*Calcarina hispida*	*Baculogypsina sphaerulata*	*Cymbaloporetta bradyi*	*Cymbaloporetta squammosa*	*Cymbaloporella tabellaeformis*	*Tretomphalus concinnus*	*Tretomphalus milletti*	*Tretomphalus planus*	*Cassidulina angulosa*	*Cassidulina carinata*	*Cassidulina costatula*
Hydrographic stations—Con.																	
H3841	--	--	--	----	5	2	----	----	----	----	--	1	----	--	--	2	---
H3843	--	--	--	----	8	----	----	----	----	----	--	----	----	--	--	1	---
H3845																	
H3847	--	--	--	----	----	----	----	----	----	----	--	----	----	--	--	--	---
H3848	--	--	--	2	10	----	----	----	2	----	--	----	----	--	--	--	---
H3849	--	--	--	5	4	7	----	----	----	----	--	----	----	--	--	--	---
H3850	--	--	--	----	10+	4	----	----	1	----	--	----	----	--	--	--	---
H3851	--	--	--	----	10+	----	----	----	3	----	--	----	5	--	--	--	---
H3852																	
H3853	--	--	--	9	7	4	----	----	10+	----	--	----	----	--	--	--	---
H3855	--	--	--	2	10+	8	----	----	9	----	--	----	----	--	--	--	---
H3856	--	--	--	----	----	----	----	----	1	----	--	----	----	--	--	--	---
H3857	--	--	--	10+	2	3	----	----	5	----	--	----	----	--	--	--	---
H3858	--	--	--	1	10+	----	----	----	10+	----	--	----	2	--	--	--	---
H3859	--	--	--	1	10	3	----	----	10+	----	--	----	----	--	--	--	---
H3860	--	--	--	6	3	7	----	----	2	----	--	----	----	--	--	--	---
H3862	--	--	--	----	3	----	----	----	4	----	--	----	----	--	--	--	---
H3863																	
H3864																	
H3865																	
H3866	--	--	--	----	----	----	----	----	2	----	--	----	----	--	--	--	---
H3867																	
H3868	--	--	--	4	4	2	----	----	----	----	--	----	----	--	--	--	---
H3869	--	--	--	----	----	1	----	----	----	----	--	----	----	--	--	--	---
H3870	--	--	--	1	7	----	----	----	1	----	--	----	----	--	--	--	---
H3871																	
H3873	--	--	--	3	6	----	----	----	10+	----	--	----	----	--	--	--	---
H3874	--	--	--	----	----	----	----	----	1	----	--	----	----	--	--	--	---
H3875	--	--	--	7	10+	4	----	----	----	----	--	----	----	--	--	--	---
H3876	--	--	--	3	9	8	----	----	3	----	--	----	----	--	--	--	---
H3878	--	--	--	----	----	----	----	----	2	----	--	----	----	--	--	--	---
H3879	--	--	--	----	----	----	----	----	1	----	--	----	----	--	--	--	---
H3881	--	--	--	----	----	----	----	----	1	----	--	----	----	--	--	--	---
H3882																	
H3883	--	--	--	1	4	1	----	----	----	----	--	----	----	--	--	--	---
H3884	--	--	--	10+	5	1	----	----	1	----	--	----	----	--	--	--	---
H3885	--	--	--	2	8	6	----	----	----	----	--	----	----	--	--	--	---
H3887	--	--	--	----	10	5	----	----	1	----	--	----	----	--	--	--	---
H3888																	
H3889	--	--	--	----	----	----	----	----	4	----	--	----	----	--	--	--	---
H3890	--	--	--	----	4	----	----	----	3	----	--	----	----	--	--	--	---
H3891	--	--	--	7	10+	3	----	----	5	----	--	----	----	2	--	--	---
H3892	--	--	--	6	----	2	----	----	----	----	--	----	----	--	--	--	---
H3893	--	--	--	----	----	----	----	----	1	----	--	----	----	--	--	--	---
H3894																	
H3895																	
H3896	--	--	--	----	5	----	----	----	9	----	--	----	----	--	--	--	1
H3897																	

TABLE 3.—*Occurrence and abundance of benthonic Foraminifera—part 3: Pegidiidae to Chilostomellidae*—Continued

	Cassidulina delicata	*Cassidulina gemma*	*Cassidulina minuta*	*Cassidulina moluccensis*	*Cassidulina pacifica*	*Cassidulina patula*	*Cassidulina* cf. *C. spinifera*	*Cassidulina subglobosa*	*Cassidulina subtumida*	*Islandiella* sp.	*Cassidulinoides tenuis*	*Ehrenbergina albatrossi*	*Ehrenbergina bicornis*	*Ehrenbergina hystrix*	*Ehrenbergina pacifica*	*Ehrenbergina reticulata*	*Ehrenbergina trigona*	*Pullenia bulloides*	*Pullenia quinqueloba*	*Sphaeroidina bulloides*	*Sphaeroidina compacta*
Hydrographic stations—Con.																					
H3841	4	--	3	--	--	1	--	9	--	--	--	--	--	--	--	--	--	--	--	1	---
H3843	3	--	----	--	--	----	--	--	--	--	--	--	--	--	--	--	--	2	1	--	---
H3845																					
H3847	--	--	----	--	2	----	--	--	--	--	--	--	--	--	--	--	--	1	--	--	---
H3848	--	--	----	--	2	----	--	--	--	--	--	--	--	--	--	--	--	--	1	--	---
H3849	1	--	----	--	1	----	--	--	2	--	--	--	--	--	--	--	--	--	--	--	---
H3850	2	--	----	--	--	----	--	2	--	--	--	--	--	--	--	--	--	--	--	--	---
H3851	--	--	----	--	--	----	--	--	--	--	--	--	--	--	--	--	--	1	--	--	---
H3852																					
H3853	--	--	----	--	--	2	--	--	--	--	--	--	--	--	--	--	--	1	--	1	---
H3855	--	--	----	--	--	3	--	1	--	5	--	--	--	--	--	--	--	--	--	--	---
H3856	--	--	----	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3857	2	--	----	--	--	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3858	4	--	2	--	--	10+	--	3	--	--	--	--	--	--	--	--	--	--	2	--	---
H3859	--	--	----	--	5	2	--	2	1	--	--	--	--	--	--	--	--	1	1	--	2
H3860	--	--	----	--	--	4	--	3	--	--	--	--	--	--	--	--	--	--	--	--	1
H3862	--	--	----	--	--	5	--	1	--	--	--	--	--	--	--	--	--	1	--	--	---
H3863																					
H3864																					
H3865																					
H3866	3	--	1	--	2	----	--	1	1	1	--	--	--	--	--	--	--	--	--	--	---
H3867																					
H3868																					
H3869																					
H3870	9	--	----	--	3	----	--	3	1	--	--	1	--	--	--	--	--	--	--	--	---
H3871																					
H3873	2	--	----	--	2	3	--	1	--	1	--	1	--	--	--	--	1	4	--	--	---
H3874	--	--	1	--	--	----	--	1	--	--	--	--	--	--	--	--	--	--	--	--	---
H3875	4	--	----	--	--	----	--	1	--	--	--	--	--	--	--	--	--	--	--	--	---
H3876	4	--	1	--	--	----	--	1	--	--	--	--	--	--	--	--	--	--	--	--	---
H3878	--	--	----	--	--	1	--	1	--	--	--	--	--	--	--	--	--	--	1	1	---
H3879	1	--	----	--	--	4	--	--	--	--	--	--	--	--	--	--	--	1	--	--	---
H3881	--	--	----	--	--	----	--	--	--	--	--	--	--	--	--	--	--	1	--	--	---
H3882	--	--	1	--	--	----	--	1	--	--	--	--	--	--	--	--	--	1	--	--	---
H3883	9	--	----	--	--	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3884	--	--	----	--	--	----	--	2	--	--	--	--	--	--	--	--	--	--	--	--	---
H3885																					
H3887	2	--	1	--	3	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3888	1	--	1	--	--	2	--	--	--	--	--	--	--	--	--	--	--	1	3	--	---
H3889	1	--	----	--	1	1	--	--	2	--	--	--	--	--	--	--	--	--	--	--	---
H3890	5	--	----	--	--	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3891	--	--	----	--	--	----	--	2	1	--	--	--	--	--	--	--	--	--	--	--	---
H3892	1	--	----	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3893	--	--	----	--	2	5	--	--	--	--	--	--	--	--	--	--	--	1	--	--	---
H3894	1	--	1	--	--	----	--	1	--	--	--	--	--	--	--	--	--	--	--	--	---
H3895	--	--	----	--	--	----	--	1	--	--	--	--	--	--	--	--	--	--	--	--	---
H3896	7	--	----	--	--	----	--	1	3	--	--	--	--	--	--	--	--	2	--	--	---
H3897																					

TABLE 3.—*Occurrence and abundance of benthonic Foraminifera—part 3: Pegidiidae to Chilostomellidae*—Continued

	Hofkerina semiornata	*Pegidia dubia*	*Sphaeridia papillata*	*Amphistegina madagascariensis* (orange form)	*Amphistegina madagascariensis* (white form)	*Amphistegina radiata*	*Calcarina hispida*	*Baculogypsina sphaerulata*	*Cymbaloporetta bradyi*	*Cymbaloporetta squammosa*	*Cymbaloporella tabellaeformis*	*Tretomphalus concinnus*	*Tretomphalus milletti*	*Tretomphalus planus*	*Cassidulina angulosa*	*Cassidulina carinata*	*Cassidulina costatula*
Hydrographic stations—Con.																	
H3898	--	--	--	----	10+	1	----	----	4	----	--	----	----	--	--	--	---
H3899	--	--	--	----	10+	3	----	----	10	----	--	----	----	--	--	--	---
H3900	--	--	--	----	4	----	----	----	1	----	--	----	----	--	--	--	---
H3901	--	--	--	----	2	----	----	----	----	----	--	----	----	--	--	--	---
H3902	--	--	--	----	1	----	----	----	----	----	--	----	----	--	--	--	---
H3903	--	--	--	----	----	----	----	----	1	----	--	----	----	--	--	--	---
H3904																	
H3905	--	--	--	4	9	7	----	----	1	----	--	----	----	--	--	--	---
H3909	--	--	--	----	1	----	----	----	----	----	--	----	----	--	--	2	---
H3910	--	--	--	----	----	3	----	----	4	----	--	----	----	--	--	--	---
H3911	--	--	--	6	----	1	----	----	----	----	--	----	----	--	--	--	---
H3912																	
H3913	--	--	--	----	----	----	----	----	----	----	--	----	----	--	--	1	---
H3914	--	--	--	1	10+	2	----	----	3	----	--	----	----	--	--	--	---
H3915																	
H3916	--	--	--	7	3	9	----	----	10+	----	--	----	----	--	--	--	---
H3918																	
H3919																	
H3920																	
H3921																	
H3922																	
H3923																	
H3924	--	--	--	2	4	3	----	----	9	----	--	----	----	--	--	--	---
H3925																	
H3926	--	--	--	----	----	----	----	----	1	----	--	----	----	--	--	--	---
H3927	--	--	--	5	----	6	----	----	3	----	--	----	----	--	--	--	---
H3928	--	--	--	2	7	3	----	----	1	----	--	----	----	--	--	--	---
H3929																	
H3930	--	--	--	2	----	7	----	----	----	----	--	----	----	--	--	1	---
H3931	--	--	--	6	4	3	----	----	5	----	--	----	----	--	--	2	---
H3932																	
H3934																	
H3935	--	--	--	1	----	----	----	----	5	----	--	----	----	--	--	--	1
H3936	--	--	--	----	1	1	----	----	----	1	--	----	----	--	--	--	---
H3937	--	--	--	1	----	----	----	----	----	----	--	----	----	--	--	3	---
H3938																	
H3940																	
H3941																	
H3942	1	--	--	----	----	----	----	----	----	----	--	----	----	--	--	--	---
H3944																	
H3945	--	--	--	----	----	6	----	----	2	----	--	----	----	--	--	--	---
H3947																	
H3948																	
H3954	--	--	--	----	----	----	----	----	3	----	--	----	----	--	--	--	---
H3959																	
H3960																	
H3961																	
H3964																	

TABLE 3.—*Occurrence and abundance of benthonic Foraminifera—part 3: Pegidiidae to Chilostomellidae*—Continued

	Cassidulina delicata	*Cassidulina gemma*	*Cassidulina minuta*	*Cassidulina moluccensis*	*Cassidulina pacifica*	*Cassidulina patula*	*Cassidulina* cf. *C. spinifera*	*Cassidulina subglobosa*	*Cassidulina subtumida*	*Islandiella* sp.	*Cassidulinoides tenuis*	*Ehrenbergina albatrossi*	*Ehrenbergina bicornis*	*Ehrenbergina hystrix*	*Ehrenbergina pacifica*	*Ehrenbergina reticulata*	*Ehrenbergina trigona*	*Pullenia bulloides*	*Pullenia quinqueloba*	*Sphaeroidina bulloides*	*Sphaeroidina compacta*
Hydrographic stations—Con.																					
H3898	3	--	3	--	--	----	--	2	--	--	--	--	--	--	--	--	--	--	--	--	---
H3899	1	--	----	--	--	1	--	2	--	--	--	--	--	--	1	--	--	--	--	--	---
H3900	6	--	----	--	--	2	--	1	--	--	--	1	--	--	--	--	--	1	1	--	---
H3901	9	--	----	2	--	3	--	--	--	--	--	--	--	--	--	--	--	1	--	--	---
H3902																					
H3903	--	--	----	--	--	----	--	--	--	--	--	--	--	--	--	--	--	2	3	--	---
H3904																					
H3905	1	--	----	--	--	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3909	1	--	4	--	--	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3910	2	--	4	--	--	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3911	6	--	1	--	--	2	--	1	--	--	--	--	--	--	--	--	--	--	--	--	---
H3912	--	--	----	--	--	----	--	1	--	--	--	--	--	--	--	--	--	--	--	--	---
H3913	4	1	----	--	--	2	--	--	2	--	--	1	--	--	--	--	--	1	--	--	---
H3914	6	--	----	--	1	1	--	5	--	--	--	--	--	--	--	--	--	--	--	--	---
H3915	5	--	----	--	--	3	--	1	--	--	--	--	--	--	--	--	--	--	--	--	---
H3916	6	--	----	--	--	1	--	--	1	--	--	--	--	--	--	--	--	--	--	--	---
H3918	--	--	----	--	--	----	--	1	--	--	--	--	--	--	--	--	--	--	1	--	---
H3919	1	--	----	--	1	2	--	--	--	--	--	--	--	--	--	--	--	2	--	--	---
H3920	1	4	----	--	--	2	--	--	1	--	--	--	--	--	--	--	--	--	2	--	---
H3921																					
H3922																					
H3923	--	5	----	--	--	----	--	--	--	--	--	--	--	--	--	--	--	1	2	--	---
H3924	4	--	----	--	--	2	--	2	--	2	--	--	--	--	--	--	--	--	--	--	---
H3925																					
H3926	3	1	----	--	2	2	--	--	--	--	--	--	--	1	--	--	--	--	--	--	---
H3927	1	--	----	--	--	----	--	1	--	--	--	--	--	--	--	--	--	--	--	--	---
H3928	7	--	----	--	1	----	--	2	--	--	--	--	--	--	--	--	--	--	--	--	---
H3929	4	1	----	--	--	2	--	--	--	--	--	--	--	--	--	--	--	1	--	--	---
H3930	1	--	1	--	1	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3931	4	--	----	--	--	----	--	4	--	--	--	--	--	--	--	--	--	--	--	--	---
H3932	--	--	1	--	--	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3934	4	--	----	--	--	4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3935	4	3	2	--	--	1	--	2	--	--	--	--	--	--	--	--	--	--	--	--	---
H3936	--	--	----	--	--	----	--	1	--	--	--	--	--	--	--	--	--	--	--	--	---
H3937	6	--	----	--	--	----	--	1	6	--	--	2	--	--	--	--	--	--	1	--	---
H3938	--	--	----	--	--	----	--	--	--	--	--	--	--	--	--	--	--	1	--	--	---
H3940	1	--	----	--	--	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3941																					
H3942																					
H3944	--	--	----	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3945	4	--	10+	--	--	----	--	2	--	--	--	--	--	--	--	--	--	--	--	1	---
H3947																					
H3948																					
H3954	1	--	----	--	--	1	--	2	--	--	--	--	--	--	--	--	--	--	--	--	---
H3959																					
H3960																					
H3961	7	--	----	--	--	----	--	7	--	--	--	--	--	--	--	--	--	--	--	2	---
H3964																					

TABLE 3.—*Occurrence and abundance of benthonic Foraminifera—part 3: Pegidiidae to Chilostomellidae*—Continued

	Hofkerina semiornata	*Pegidia dubia*	*Sphaeridia papillata*	*Amphistegina madagascariensis* (orange form)	*Amphistegina madagascariensis* (white form)	*Amphistegina radiata*	*Calcarina hispida*	*Baculogypsina sphaerulata*	*Cymbaloporetta bradyi*	*Cymbaloporetta squammosa*	*Cymbaloporella tabellaeformis*	*Tretomphalus concinnus*	*Tretomphalus milletti*	*Tretomphalus planus*	*Cassidulina angulosa*	*Cassidulina carinata*	*Cassidulina costatula*
Hydrographic stations—Con.																	
H3965																	
H3967	--	--	--	----	6	10	----	----	----	----	--	----	1	--	--	--	---
H3968																	
H3969																	
H3970																	
H3971																	
H3974																	
H3976																	
H3977																	
H3978	--	--	--	----	----	3	----	----	----	----	--	----	----	--	--	--	---
H3979																	
H3980	--	--	--	1	2	----	----	----	----	----	--	----	----	--	--	--	---
H3981																	
H3983	--	--	--	----	10+	2	----	----	2	----	--	----	2	--	--	--	---
H3984	--	--	--	1	10+	1	----	----	2	----	--	----	8	--	1	--	---
H3986																	
H3989	--	--	--	----	10+	2	----	----	----	----	--	----	----	--	1	--	---
H3991																	
H3992	--	--	--	----	5	8	----	----	----	----	--	----	1	--	--	--	---
H3993																	
H3996																	
H3997																	
H4004																	

TABLE 4.—*Occurrence and abundance of benthonic Foraminifera—part 4: Anomalinidae to Ceratobuliminidae*

(Samples, such as Niau Lagoon, are included even though the only species found in them are recorded on one or more of the other three tables of benthonic species.)

	Anomalina glabrata	*Anomalina semipunctata*	*Anomalina? maculosa*	*Anomalinella rostrata*	*Laticarinina pauperata*	*Planulina wuellerstorfi*	*Cibicides cicatricosus*	*Cibicides floridanus*	*Cibicides lobatulus*	*Cibicides mayori*
Unnumbered stations										
Rangiroa	----	----	----	----	----	1	----	----	8	-----
Off Niau										
Niau Lagoon										
Apotaki										
Makemo										

TABLE 3.—*Occurrence and abundance of benthonic Foraminifera—part 3: Pegidiidae to Chilostomellidae*—Continued

	Cassidulina delicata	*Cassidulina gemma*	*Cassidulina minuta*	*Cassidulina moluccensis*	*Cassidulina pacifica*	*Cassidulina patula*	*Cassidulina* cf. *C. spinifera*	*Cassidulina subglobosa*	*Cassidulina subtumida*	*Islandiella* sp.	*Cassidulinoides tenuis*	*Ehrenbergina albatrossi*	*Ehrenbergina bicornis*	*Ehrenbergina hystrix*	*Ehrenbergina pacifica*	*Ehrenbergina reticulata*	*Ehrenbergina trigona*	*Pullenia bulloides*	*Pullenia quinqueloba*	*Sphaeroidina bulloides*	*Sphaeroidina compacta*
Hydrographic stations—Con.																					
H3965	--	--	2	--	--	----	--	1	--	1	--	--	--	--	--	--	--	--	--	--	---
H3967	--	--	----	--	--	----	--	4	--	--	--	--	--	--	--	--	--	--	--	--	---
H3968																					
H3969																					
H3970																					
H3971	--	--	----	--	--	----	--	--	--	--	--	--	--	--	--	--	--	1	--	--	---
H3974	2	--	----	--	--	1	--	1	--	--	--	--	--	--	--	1	--	--	--	--	---
H3976	--	--	----	--	--	----	--	1	--	--	--	--	--	--	--	--	--	--	--	--	---
H3977	--	--	1	--	1	----	--	--	--	--	--	--	--	--	--	--	--	--	1	--	---
H3978	--	--	5	--	--	----	--	4	--	--	--	--	--	--	--	--	--	--	--	--	---
H3979	--	--	----	--	1	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3980																					
H3981																					
H3983	--	--	10+	--	--	----	--	2	--	--	--	--	--	--	--	--	--	--	--	--	---
H3984	1	--	----	--	--	1	--	2	--	--	--	--	1	--	2	--	--	--	--	--	---
H3986	--	--	----	--	--	----	--	1	--	--	--	--	--	--	--	--	--	--	1	--	---
H3989	--	--	----	--	--	----	--	2	--	--	--	--	--	--	--	--	--	--	--	--	---
H3991	1	--	----	--	--	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3992	--	--	10+	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3993	--	--	10+	--	--	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3996	3	1	----	1	--	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
H3997	--	--	----	--	--	----	1	1	--	--	--	--	--	--	--	--	--	--	--	--	---
H4004																					

TABLE 4.—*Occurrence and abundance of benthonic Foraminifera—part 4: Anomalinidae to Ceratobuliminidae*—Continued

(Samples, such as Niau Lagoon, are included even though the only species found in them are recorded on one or more of the other three tables of benthonic species.)

	Cibicides refulgens	*Cibicides robertsonianus*	*Cibicidella variabilis*	*Planorbulina acervalis*	*Planorbulinella larvata*	*Acervulina inhaerens*	*Gypsina globula*	*Hoeglundina elegans*	*Ceratobulimina pacifica*	*Geminospira convoluta*
Unnumbered stations										
Rangiroa	----	----	2	----	----	----	----	----	----	-----
Off Niau	----	----	3	----	----	----	----	----	----	-----
Niau Lagoon										
Apotaki										
Makemo										

TABLE 4.—*Occurrence and abundance of benthonic Foraminifera—part 4: Anomalinidae to Ceratobuliminidae*—Continued

	Anomalina glabrata	*Anomalina semipunctata*	*Anomalina? maculosa*	*Anomalinella rostrata*	*Laticarinina pauperata*	*Planulina wuellerstorfi*	*Cibicides cicatricosus*	*Cibicides floridanus*	*Cibicides lobatulus*	*Cibicides mayori*
Unnumbered stations—Continued										
Makemo Lagoon	----	----	----	3	----	----	----	----	10	-----
Makemo Beach										
Pinaki outer beach										
Pinaki Atoll, inside lagoon										
Pinaki Island										
Hereheretue										
Hereheretue Beach, off wharf										
Rutavu	----	----	----	----	----	----	1	----	5	-----
Niue										
Aloji Niue										
Rotonga, 7 fms	----	----	----	----	----	1	----	----	----	-----
Vavau Anchorage, 18 fms	----	----	----	2	----	2	----	----	6	3
Vavau										
Fiji, 40–50 fms	1	----	----	----	----	6	2	----	10+	1
Kambara Beach										
Levuka, 12 fms	----	----	----	----	----	10+	----	----	10+	3
Mokaujar Anchorage	----	----	1	1	----	----	----	----	10+	-----
Nairai, 12 fms	----	----	----	1	----	10+	----	----	10+	3
Nairai, 24 fms	10+	----	----	10+	----	----	2	----	3	-----
Near Nairai	----	----	----	10+	----	10+	----	----	9	-----
Viva Anchorage, 3 fms	----	----	----	----	----	7	----	----	8	-----
Rongelab	----	----	----	----	----	----	----	----	10+	8
Port Lottin, Kusaie	----	----	----	----	----	----	----	----	10+	-----
Guam Anchorage, 21 fms	----	----	1	----	----	3	----	1	5	10+
Dredging stations										
D3681										
D3684										
D3686										
D3688	----	----	----	2	----	----	----	----	3	1
D3689	----	----	----	----	----	----	----	----	6	-----
D3690	----	----	----	2	----	----	----	----	2	-----
D3691										
Hydrographic stations										
H3787	----	----	----	----	----	1	----	----	----	-----
H3789										
H3790										
H3791										
H3793										
H3794										
H3795	----	----	----	----	1	2	----	----	----	-----
H3796										
H3798	----	----	----	----	----	----	----	----	6	-----
H3800										
H3801	----	----	----	----	----	5	----	----	----	-----
H3804	----	----	----	----	----	1	----	----	9	1
H3807										
H3808	----	----	----	----	----	3	----	1	1	-----
H3809	----	----	----	----	----	6	1	----	7	-----
H3810	----	----	----	----	----	9	5	----	----	-----
H3812	----	----	----	----	----	10+	----	----	1	-----
H3813	----	----	----	1	----	1	----	----	----	1

TABLE 4.—*Occurrence and abundance of benthonic Foraminifera—part 4: Anomalinidae to Ceratobuliminidae*—Continued

	Cibicides refulgens	*Cibicides robertsonianus*	*Cibicidella variabilis*	*Planorbulina acervalis*	*Planorbulinella larvata*	*Acervulina inhaerens*	*Gypsina globula*	*Hoeglundina elegans*	*Ceratobuliminia pacifica*	*Geminospira convoluta*
Unnumbered stations—Continued										
Makemo Lagoon	----	----	----	----	----	----	2	----	----	-----
Makemo Beach										
Pinaki outer beach										
Pinaki Atoll, inside lagoon										
Pinaki Island										
Hereheretue										
Hereheretue Beach, off wharf	----	----	----	----	----	1	1	----	----	-----
Rutavu	----	----	----	----	----	----	2	----	----	-----
Niue										
Aloji Niue	----	----	----	----	----	----	7	----	----	-----
Rotonga, 7 fms	----	----	1	----	----	----	----	----	----	-----
Vavau Anchorage, 18 fms	----	----	2	5	1	2	3	----	----	-----
Vavau										
Fiji, 40-50 fms	----	----	----	2	----	----	1	----	----	-----
Kambara Beach										
Levuka, 12 fms	----	----	3	2	----	4	6	----	----	-----
Mokaujar Anchorage	----	1	----	4	----	----	4	----	----	-----
Nairai, 12 fms	----	----	1	----	----	5	9	----	----	-----
Nairai, 24 fms										
Near Nairai	----	----	----	----	----	----	2	----	----	-----
Viva Anchorage, 3 fms										
Rongelab	----	----	----	10	----	----	----	----	----	-----
Port Lottin, Kusaie										
Guam Anchorage, 21 fms	----	----	1	10+	2	3	4	----	----	-----
Dredging stations										
D3681										
D3684										
D3686										
D3688										
D3689	----	----	----	----	----	----	----	10+	----	-----
D3690										
D3691										
Hydrographic stations										
H3787										
H3789										
H3790										
H3791										
H3793										
H3794										
H3795	----	----	----	----	----	----	----	1	----	-----
H3796										
H3798	----	----	----	----	----	----	----	4	----	3
H3800	----	----	----	----	----	----	----	1	----	-----
H3801										
H3804										
H3807										
H3808	----	----	----	----	----	----	----	----	1	-----
H3809	----	----	----	----	----	----	----	----	4	-----
H3810	----	----	----	----	----	----	----	5	3	-----
H3812	----	----	----	----	----	----	----	3	1	-----
H3813	----	----	----	----	----	----	----	3	----	-----

Table 4.—*Occurrence and abundance of benthonic Foraminifera—part 4: Anomalinidae to Ceratobuliminidae*—Continued

	Anomalina glabrata	*Anomalina semipunctata*	*Anomalina? maculosa*	*Anomalinella rostrata*	*Laticarinina pauperata*	*Planulina wuellerstorfi*	*Cibicides cicatricosus*	*Cibicides floridanus*	*Cibicides lobatulus*	*Cibicides mayori*
Hydrographic stations—Continued										
H3814	----	----	----	2	----	----	2	----	4	----
H3815	----	----	----	2	----	2	----	----	7	----
H3816	----	2	----	----	----	2	----	----	1	----
H3818	----	----	----	----	----	4	----	----	----	----
H3819	----	----	----	----	----	1	----	----	----	----
H3820	----	----	----	----	----	1	----	----	----	----
H3822	----	----	----	----	----	2	1	----	----	----
H3823	----	----	----	----	----	1	----	----	3	----
H3824	----	----	----	----	----	4	----	----	----	----
H3825	----	----	----	----	1	8	----	----	----	----
H3826	----	----	----	----	----	3	1	1	----	----
H3827	----	----	----	1	----	----	----	----	3	----
H3828	----	----	----	----	----	1	----	----	----	----
H3829	----	----	----	----	----	1	----	----	----	----
H3830	----	----	----	----	----	2	----	----	1	----
H3831										
H3832										
H3833	----	----	----	----	----	1	----	----	----	----
H3834	----	----	----	2	----	----	----	----	----	----
H3835										
H3836										
H3837	----	----	----	----	----	6	----	----	----	----
H3838	----	----	----	----	----	----	----	----	1	----
H3840	----	----	----	----	----	1	1	5	----	----
H3841	----	----	----	----	----	----	----	----	8	----
H3843	----	----	----	----	----	2	----	----	1	----
H3845										
H3847	----	----	----	----	----	4	----	----	----	----
H3848	----	----	----	1	----	2	----	----	----	1
H3849	----	----	----	1	----	1	----	----	1	----
H3850	----	----	----	----	----	3	----	----	1	----
H3851	----	----	----	----	----	1	----	----	1	----
H3852										
H3853	----	----	----	1	----	3	4	----	1	----
H3855	----	----	----	9	----	3	----	----	5	----
H3856	----	----	----	----	----	----	----	----	----	1
H3857	----	----	----	6	----	----	----	----	5	----
H3858	----	----	----	1	----	5	1	7	10+	3
H3859	----	----	----	----	----	10+	10+	----	1	----
H3860	----	----	----	1	----	7	----	----	1	----
H3862	----	----	----	----	1	2	----	----	----	----
H3863	----	----	----	----	----	1	----	----	----	----
H3864										
H3865										
H3866	----	----	----	----	----	----	----	----	----	----
H3867	----	----	----	----	----	1	----	----	----	----
H3868										
H3869	----	----	----	----	----	----	----	----	1	----
H3870	----	----	----	----	----	1	1	1	6	----
H3871										
H3873	----	----	----	----	----	10+	1	----	3	----

TABLE 4.—*Occurrence and abundance of benthonic Foraminifera—part 4: Anomalinidae to Ceratobuliminidae*—Continued

	Cibicides refulgens	*Cibicides robertsonianus*	*Cibicidella variabilis*	*Planorbulina acervalis*	*Planorbulinella larvata*	*Acervulina inhaerens*	*Gypsina globula*	*Hoeglundina elegans*	*Ceratobulimina pacifica*	*Geminospira convoluta*
Hydrographic stations—Continued										
H3814										
H3815	----	----	----	----	----	----	----	1	----	-----
H3816	----	----	----	----	----	----	----	3	----	-----
H3818	----	----	----	----	----	----	----	1	----	-----
H3819	----	----	----	----	----	----	----	----	1	-----
H3820	----	1	----	----	----	----	----	1	----	-----
H3822	----	----	----	----	----	----	----	1	----	-----
H3823	----	----	----	----	----	----	----	1	----	-----
H3824	----	----	----	----	----	----	----	4	----	-----
H3825	----	----	----	----	----	----	----	7	----	-----
H3826	----	----	----	----	----	----	----	5	----	-----
H3827	----	----	----	----	----	----	----	1	----	-----
H3828	----	----	----	----	----	----	----	2	----	-----
H3829	----	----	----	----	----	----	----	2	1	-----
H3830	----	----	----	----	----	----	----	----	1	-----
H3831										
H3832										
H3833										
H3834	----	----	----	----	----	----	----	1	----	-----
H3835										
H3836										
H3837										
H3838										
H3840	----	1	----	----	----	----	----	1	----	-----
H3841	----	1	----	----	----	----	----	2	----	-----
H3843	----	----	----	----	----	----	----	1	----	-----
H3845										
H3847	----	----	----	----	----	----	----	4	1	-----
H3848	----	----	----	----	----	----	----	7	1	-----
H3849	----	----	----	----	----	----	----	3	----	-----
H3850	----	----	----	----	----	----	----	3	----	-----
H3851	----	----	2	----	----	----	----	2	----	-----
H3852	----	----	----	----	----	----	----	1	----	-----
H3853	----	----	----	----	----	----	----	1	1	-----
H3855	----	----	----	----	----	----	----	1	----	-----
H3856										
H3857	----	----	----	----	----	----	----	2	----	-----
H3858	----	----	----	----	----	----	----	3	----	-----
H3859	----	----	----	----	----	----	----	10+	2	-----
H3860	----	----	----	----	----	----	----	10+	1	-----
H3862	----	----	----	----	----	----	----	----	----	-----
H3863	----	----	----	----	----	----	----	----	----	-----
H3864										
H3865										
H3866	----	----	----	----	----	----	----	9	----	-----
H3867	----	----	----	----	----	----	----	2	----	-----
H3868										
H3869	----	----	----	----	----	----	----	----	----	-----
H3870	2	----	----	----	----	----	----	1	----	-----
H3871										
H3873	----	----	1	----	----	----	----	8	----	-----

TABLE 4.—*Occurrence and abundance of benthonic Foraminifera—part 4: Anomalinidae to Ceratobuliminidae*—Continued

	Anomalina glabrata	*Anomalina semipunctata*	*Anomalina? maculosa*	*Anomalinella rostrata*	*Laticarinina pauperata*	*Planulina wuellerstorfi*	*Cibicides cicatricosus*	*Cibicides floridanus*	*Cibicides lobatulus*	*Cibicides mayori*
Hydrographic stations—Continued										
H3874	----	----	----	----	----	----	----	----	----	----
H3875	----	----	----	10	----	1	----	----	6	----
H3876	----	----	----	3	----	2	----	----	4	----
H3878	----	----	----	----	3	----	----	----	----	----
H3879	----	----	----	----	1	2	----	----	----	----
H3881	----	----	----	----	----	1	----	----	----	----
H3882	----	----	----	----	1	1	----	----	----	----
H3883	----	----	----	----	----	1	----	----	3	----
H3884	----	----	----	----	----	----	----	----	----	----
H3885	----	----	----	2	----	----	----	----	----	----
H3887	----	----	----	1	----	----	1	----	2	----
H3888	----	----	----	----	----	----	----	----	----	----
H3889	----	----	----	----	----	2	----	----	3	----
H3890	----	----	----	----	----	----	----	----	4	----
H3891	----	----	----	4	----	----	----	----	1	----
H3892	----	----	----	----	----	1	----	----	----	----
H3893										
H3894	----	----	----	----	----	2	----	----	----	----
H3895	----	----	----	----	----	6	----	----	----	----
H3896	----	----	----	----	----	1	----	----	3	----
H3897										
H3898	----	----	----	3	----	2	1	----	9	2
H3899	2	----	----	2	----	----	1	----	7	----
H3900	----	----	----	----	----	----	----	----	2	----
H3901	----	----	----	----	----	----	----	----	3	----
H3902										
H3903	----	----	----	----	1	----	----	----	----	----
H3904										
H3905	----	----	----	1	----	4	----	----	4	----
H3909	----	----	----	----	----	----	----	----	1	1
H3910	----	----	----	1	----	----	----	----	1	----
H3911	----	----	----	1	----	1	----	----	1	----
H3912	----	----	----	----	----	----	2	----	----	----
H3913	----	----	----	----	----	----	----	----	1	----
H3914	----	2	----	----	----	2	----	----	4	----
H3915	----	----	----	----	----	----	----	----	1	----
H3916	----	----	----	4	----	----	----	1	4	----
H3918										
H3919										
H3920	----	----	----	----	----	1	----	----	----	----
H3921										
H3922										
H3923	----	----	----	----	----	1	1	----	----	----
H3924	----	----	----	----	----	----	----	----	3	----
H3925										
H3926	----	----	----	----	----	1	----	----	2	----
H3927										
H3928	----	----	----	----	----	1	----	----	1	----
H3929										
H3930	----	----	----	1	----	----	----	----	1	----
H3931	----	----	----	----	----	1	----	----	5	----

TABLE 4.—*Occurrence and abundance of benthonic Foraminifera—part 4: Anomalinidae to Ceratobuliminidae*—Continued

	Cibicides refulgens	*Cibicides robertsonianus*	*Cibicidella variabilis*	*Planorbulina acervalis*	*Planorbulinella larvata*	*Acervulina inhaerens*	*Gypsina globula*	*Hoeglundina elegans*	*Ceratobulimina pacifica*	*Geminospira convoluta*
Hydrographic stations—Continued										
H3874	----	----	----	----	----	----	----	1	----	----
H3875	----	----	----	----	----	----	----	2	----	----
H3876	1	----	----	----	----	----	----	4	----	----
H3878	----	1	----	----	----	----	----	1	----	----
H3879	----	2	----	----	----	----	----	1	----	----
H3881	----	1	----	----	----	----	----	----	----	----
H3882	----	2	----	----	----	----	----	----	1	----
H3883	----	2	----	----	----	----	----	----	----	----
H3884	----	----	----	----	----	----	----	2	1	----
H3885	----	----	----	----	----	----	----	----	----	----
H3887	----	----	----	----	----	----	----	2	1	----
H3888	----	----	----	----	----	----	----	2	----	----
H3889	----	----	----	----	----	----	----	----	----	----
H3890	----	1	----	----	----	----	----	----	----	----
H3891	----	----	----	----	----	----	----	5	----	----
H3892	----	----	----	----	----	----	----	----	----	----
H3893										
H3894	----	----	----	----	----	----	----	----	1	----
H3895	----	----	----	----	----	----	----	----	----	----
H3896	----	1	----	----	----	----	----	----	----	----
H3897										
H3898	1	----	----	----	----	----	----	----	----	----
H3899	----	----	----	----	----	----	----	1	----	----
H3900	----	----	----	----	----	----	----	----	----	----
H3901	----	----	----	----	----	----	----	2	----	----
H3902										
H3903	----	----	----	----	----	----	----	----	----	----
H3904										
H3905	----	----	----	----	----	----	----	2	----	----
H3909	----	----	----	----	----	----	----	----	----	----
H3910	----	----	----	----	----	----	----	----	----	----
H3911	----	----	----	----	----	----	----	----	----	----
H3912	----	----	----	----	----	----	----	----	----	----
H3913	----	----	----	----	----	----	----	----	----	----
H3914	1	----	----	----	----	----	----	2	----	----
H3915	----	----	----	----	----	----	----	1	----	----
H3916	----	----	----	----	----	----	----	2	----	----
H3918										
H3919										
H3920	----	----	----	----	----	----	----	----	----	----
H3921										
H3922										
H3923	----	----	----	----	----	----	----	----	----	----
H3924	----	----	----	----	----	----	----	2	----	----
H3925										
H3926	----	----	----	----	----	----	----	2	----	----
H3927										
H3928	----	----	----	----	----	----	----	4	----	----
H3929										
H3930	----	----	----	----	----	----	----	----	----	----
H3931	----	----	----	----	----	----	----	2	----	----

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TABLE 4.—*Occurrence and abundance of benthonic Foraminifera—part 4: Anomalinidae to Ceratobuliminidae*—Continued

	Anomalina glabrata	*Anomalina semipunctata*	*Anomalina? maculosa*	*Anomalinella rostrata*	*Laticarinina pauperata*	*Planulina wuellerstorfi*	*Cibicides cicatricosus*	*Cibicides floridanus*	*Cibicides lobatulus*	*Cibicides mayori*
Hydrographic stations—Continued										
H3932	----	----	----	----	----	1	----	----	----	----
H3934	----	----	----	----	----	----	----	----	----	----
H3935	----	----	----	----	----	1	----	----	2	1
H3936	----	----	----	1	----	----	----	----	4	----
H3937	----	----	----	----	----	----	----	----	2	----
H3938										
H3940										
H3941	----	----	----	----	----	----	1	----	1	----
H3942										
H3944										
H3945	----	----	----	----	----	4	----	----	2	----
H3947										
H3948										
H3954	----	----	----	----	----	4	1	----	2	----
H3959										
H3960										
H3961	----	----	----	----	----	2	----	4	----	----
H3964										
H3965										
H3967	----	----	----	----	----	2	----	----	6	----
H3968										
H3969										
H3970										
H3971	----	----	----	----	----	8	----	----	----	----
H3974	----	----	----	----	----	2	----	----	3	----
H3976										
H3977	----	----	----	----	----	----	----	----	1	----
H3978	----	----	----	----	----	5	----	----	1	----
H3979										
H3980	----	----	----	----	----	----	----	----	1	----
H3981										
H3983	----	----	----	----	----	----	----	2	4	3
H3984	----	----	----	----	----	----	----	3	----	1
H3986	----	----	----	----	----	----	----	----	1	----
H3989	----	----	----	----	----	1	----	----	1	----
H3991	----	----	----	----	1	----	----	----	----	----
H3992	----	----	----	----	----	----	----	----	1	----
H3993	----	----	----	----	----	1	----	1	6	3
H3996										
H3997										
H4004										

TABLE 4.—*Occurrence and abundance of benthonic Foraminifera—part 4: Anomalinidae to Ceratobuliminidae*—Continued

	Cibicides refulgens	*Cibicides robertsonianus*	*Cibicidella variabilis*	*Planorbulina acervalis*	*Planorbulinella larvata*	*Acervulina inhaerens*	*Gypsina globula*	*Hoeglundina elegans*	*Ceratobulimina pacifica*	*Geminospira convoluta*
Hydrographic stations—Continued										
H3932	----	----	----	----	----	----	----	----	----	-----
H3934	----	----	----	----	----	----	----	1	----	-----
H3935	----	----	----	1	----	----	----	----	----	-----
H3936	----	----	----	----	----	----	----	----	----	-----
H3937	----	----	----	----	----	----	----	2	----	-----
H3938										
H3940										
H3941	----	----	1	----	----	----	----	----	----	-----
H3942										
H3944										
H3745	----	----	----	----	----	----	----	3	----	-----
H3947										
H3948										
H3954	----	----	----	----	----	----	----	1	----	-----
H3959										
H3960										
H3961	----	----	----	----	----	----	----	----	----	-----
H3964										
H3965										
H3967	----	----	----	----	----	----	----	2	----	-----
H3968										
H3969										
H3970										
H3971	----	----	----	----	----	----	----	----	----	-----
H3974										
H3976										
H3977										
H3978	----	----	----	----	----	----	----	2	----	-----
H3979										
H3980										
H3981										
H3983										
H3984										
H3986	----	2	----	----	----	----	----	----	----	-----
H3989										
H3991										
H3992										
H3993	----	----	----	----	----	----	----	1	----	-----
H3996	----	----	----	----	----	----	----	----	1	-----
H3997										
H4004										

TABLE 5.—*Occurrence and abundance of planktonic Foraminifera*

	Globigerina bulloides	*Globigerina conglomerata*	*Globigerina digitata*	*Globigerina eggeri*	*Globigerina hexagona*	*Globigerina rubescens*	*Globigerinoides conglobatus*	*Globigerinoides elongatus*	*Globigerinoides ruber*	*Globigerinoides sacculifer*	*Globigerinoides sacculifer fistulosa*	*Globigerinella aequilateralis*	*Globigerinella adamsi*	*Globigerinita glutinata*
Unnumbered stations														
Rangiroa	--	--	--	--	--	--	--	--	1	1	--	--	--	--
Makemo Lagoon	--	--	--	--	--	--	--	--	2	--	--	--	--	--
Rotonga, 7 fms	--	--	--	--	--	--	--	--	4	--	--	--	--	1
Vavau Anchorage, Tonga, 18 fms	--	--	--	--	--	--	--	--	--	10+	--	1	--	--
Fiji, 40–50 fms		--	--	--	--	--	--	--	1	2	--	--	--	1
Levuka, Fiji, 12 fms	--	--	--	--	--	--	--	--	--	4	--	--	--	--
Mokaujar Anchorage	--	--	--	--	--	--	--	--	--	3	--	--	--	--
Nairai, 12 fms	--	--	--	--	--	--	--	1	--	2	--	--	--	--
Nairai, 24 fms	--	--	--	--	--	--	--	--	1	2	--	--	--	2
Near Nairai	--	--	--	--	--	--	--	--	--	4	--	--	--	1
Viva Anchorage, 3 fms	--	--	--	--	--	--	--	--	9	--	--	--	--	--
Rongelab	--	--	--	--	--	--	--	--	--	2	--	--	--	--
Port Lottin, Kusaie	--	--	--	--	--	--	--	--	2	5	--	1	--	4
Guam Anchorage, 21 fms	--	--	--	--	--	--	--	--	--	4	--	--	--	1
Dredging stations														
D3681	--	--	--	--	--	--	--	--	1	--	--	--	--	--
D3684	--	--	--	5	--	--	--	--	--	--	--	--	--	--
D3686														
D3687	--	--	--	--	--	--	--	--	--	--	--	--	--	1
D3688	--	--	--	--	--	1	5	3	6	7	--	8	--	--
D3689	--	--	--	--	--	--	10+	1	6	10+	--	10+	--	--
D3690	--	--	--	--	--	--	4	2	10	3	--	3	1	1
Hydrographic stations														
H3787	--	--	--	4	--	--	--	--	--	--	--	--	--	--
H3790	--	10	--	--	1	--	1	--	--	9	--	10+	--	--
H3791	1	8	--	3	--	--	--	--	--	--	--	2	--	--
H3793	--	2	--	1	--	--	--	--	--	3	--	--	--	--
H3794	1	--	--	--	--	--	--	4	--	10+	--	--	--	--
H3795	--	1	--	--	--	--	--	--	--	8	--	2	--	--
H3796	--	3	--	--	--	--	3	--	--	8	--	3	--	--
H3798	1	--	--	--	--	--	--	--	3	7	--	2	--	2
H3800	1	2	--	--	--	--	--	--	--	4	--	--	--	--
H3801	--	--	--	1	--	--	--	--	--	4	--	2	--	--
H3804	--	--	--	--	--	--	2	--	--	5	--	1	--	--
H3807	--	--	--	--	--	--	--	--	3	--	--	1	--	--
H3808	--	--	--	--	--	--	--	--	1	4	--	1	--	--
H3809	--	--	--	--	--	--	--	--	8	4	--	3	--	--
H3810	--	--	--	--	--	--	3	--	10+	4	--	1	1	--
H3812	--	--	--	--	--	--	--	--	--	4	--	2	1	--
H3813	--	--	--	--	--	--	1	--	6	--	--	2	--	--
H3814	--	--	--	--	--	--	--	--	6	6	--	1	--	--
H3815	--	--	--	--	--	--	1	--	3	2	--	3	--	1
H3816	--	--	--	--	--	--	--	--	10+	4	--	1	--	3
H3818	--	--	--	--	--	--	1	1	5	6	--	3	1	1
H3819	--	--	--	--	--	1	8	--	4	10	--	3	--	--
H3820	--	--	--	--	--	--	3	--	5	4	--	--	--	--
H3822	--	--	--	1	--	--	4	2	9	10	--	3	--	--
H3823	--	--	--	--	--	1	4	--	5	5	--	2	1	1
H3824	--	--	--	--	--	1	4	--	10+	4	--	2	--	--
H3825	--	--	--	--	--	--	--	--	7	9	--	2	2	--
H3826	--	--	--	--	--	--	--	--	--	10	--	3	3	--
H3827	--	--	--	--	--	--	--	--	4	--	--	1	--	--
H3828	--	--	--	--	--	--	10+	--	--	6	--	--	--	--
H3829	--	--	--	--	--	--	2	--	2	10+	--	5	--	--
H3830	--	--	--	--	--	--	--	--	4	4	--	8	1	1

TABLE 5.—*Occurrence and abundance of planktonic Foraminifera*—Continued

	Globigerinita humilis	*Orbulina universa*	*Pulleniatina obliquiloculata*	*Sphaeroidinella dehiscens*	*Candeina nitida*	*Hastigerina pelagica*	*Globorotalia (Turborotalia) fijiana*	*Globorotalia hirsuta*	*Globorotalia crassaformis*	*Globorotalia menardii*	*Globorotalia menardii ungulata*	*Globorotalia tumida*	*Globorotalia truncatulinoides*
Unnumbered stations													
Rangiroa													
Makemo Lagoon													
Rotonga, 7 fms	----	----	----	----	----	----	2	----	----	----	----	----	----
Vavau Anchorage, Tonga, 18 fms													
Fiji, 40–50 fms													
Levuka, Fiji, 12 fms	----	----	----	----	----	----	----	----	----	----	1	----	----
Mokaujar Anchorage	----	----	----	----	----	----	----	----	----	1	----	----	----
Nairai, 12 fms	----	----	----	----	----	----	4	----	----	----	1	----	----
Nairai, 24 fms													
Near Nairai													
Viva Anchorage, 3 fms													
Rongelab													
Port Lottin Kusaie	----	----	----	----	----	----	----	----	----	----	10	----	----
Guam Anchorage, 21 fms													
Dredging stations													
D3681													
D3684	----	----	1	----	----	----	----	----	----	----	----	8	----
D3686	----	----	----	5	----	----	----	----	----	----	----	----	----
D3687													
D3688	10+	----	----	1	1	----	----	----	----	----	----	1	----
D3689	9	5	1	10+	6	----	----	----	4	----	1	9	----
D3690	2	----	----	----	----	----	----	----	----	----	----	----	----
Hydrographic stations													
H3787	----	----	1	----	----	----	----	----	----	----	----	10+	----
H3790	10+	----	10+	10	----	----	----	----	----	10+	----	10+	----
H3791	----	----	10+	1	----	----	----	1	----	5	1	10+	----
H3793	----	----	1	----	----	----	----	----	----	1	----	10+	----
H3794	10+	----	10+	----	----	----	----	----	----	10	10+	10+	----
H3795	10+	----	10+	----	----	----	----	----	----	8	10+	10+	----
H3796	10+	----	10+	1	----	----	----	1	----	2	9	10+	----
H3798	----	----	5	----	----	----	----	----	----	----	3	2	----
H3800													
H3801	----	----	10+	----	----	----	----	----	----	----	----	4	----
H3804	----	4	----	----	----	----	----	----	----	----	1	1	----
H3807													
H3808	----	2	----	1	----	----	----	----	----	----	----	----	----
H3809	----	6	----	4	----	----	----	----	----	----	----	3	----
H3810	6	7	1	3	----	----	----	----	----	----	----	3	----
H3812	8	2	2	4	1	----	----	----	----	----	----	8	----
H3813	----	----	----	----	1	----	----	----	----	----	----	----	----
H3814													
H3815	----	2	----	----	----	----	----	----	----	----	----	----	----
H3816	----	2	----	1	----	----	----	----	----	----	----	----	----
H3818	4	4	1	4	----	----	----	----	1	----	----	7	----
H3819	8	2	----	6	----	----	----	----	----	----	----	2	----
H3820	10+	----	----	3	----	----	----	----	----	----	----	4	----
H3822	----	----	----	2	----	----	----	----	----	----	----	2	----
H3823	10+	10+	----	2	2	1	----	----	----	----	----	1	----
H3824	10+	9	5	7	----	----	----	1	----	3	----	10+	----
H3825	10+	----	2	5	7	----	----	----	----	----	4	10+	----
H3826	10+	10+	2	7	5	----	----	----	----	----	----	2	1
H3827	7	----	----	2	----	----	----	----	----	----	----	----	----
H3828	----	3	10	4	----	----	----	----	----	1	----	10+	----
H3829	10+	10+	2	8	8	----	----	----	----	----	1	10+	----
H3830	10+	10+	1	2	3	----	----	----	1	----	8	4	----

TABLE 5.—*Occurrence and abundance of planktonic Foraminifera*—Continued

	Globigerina bulloides	*Globigerina conglomerata*	*Globigerina digitata*	*Globigerina eggeri*	*Globigerina hexagona*	*Globigerina rubescens*	*Globigerinoides conglobatus*	*Globigerinoides elongatus*	*Globigerinoides ruber*	*Globigerinoides sacculifer*	*Globigerinoides sacculifer fistulosa*	*Globigerinella aequilateralis*	*Globigerinella adamsi*	*Globigerinita glutinata*
Hydrographic stations—Con.														
H3831	--	--	--	--	--	1	2	2	6	10	----	2	2	1
H3832	--	--	--	--	--	--	2	----	1	3	----	1	----	-----
H3833	--	--	--	--	--	--	2	----	1	4	----	1	----	-----
H3834	--	--	--	--	--	--	3	----	6	1	----	2	----	-----
H3835	--	--	--	--	--	--	1	1	1	3	----	1	----	-----
H3836	--	--	--	--	--	--	1	----	----	----	----	2	----	-----
H3837	--	--	--	--	--	--	7	4	----	----	----	----	----	-----
H3838	--	--	--	--	--	--	2	----	3	7	----	1	----	-----
H3840	--	--	--	--	--	--	1	----	4	3	----	3	----	-----
H3841	--	--	--	--	--	--	3	----	3	10+	----	1	----	-----
H3843	--	--	--	--	--	--	1	1	5	2	----	----	----	-----
H3845	1	--	--	--	--	--	1	8	----	1	----	----	----	2
H3847	--	--	1	--	--	--	2	2	1	10+	----	2	----	-----
H3848	--	--	--	--	--	--	----	----	10+	4	----	1	----	-----
H3849	--	--	--	--	--	--	2	3	1	2	----	----	----	1
H3850	1	--	--	--	--	--	2	2	3	3	----	1	----	-----
H3851	--	--	--	--	--	1	----	3	6	7	----	2	1	-----
H3852	--	--	--	--	--	3	2	----	5	----	----	----	----	-----
H3853	1	--	--	--	--	1	----	1	5	4	----	2	----	-----
H3855	--	--	--	--	--	--	1	----	8	4	----	4	----	-----
H3856	--	--	1	--	--	--	----	----	4	6	----	2	1	-----
H3857	1	--	--	--	--	--	3	----	3	10	----	4	----	-----
H3858	--	--	--	--	--	--	1	----	5	4	----	4	----	1
H3859	--	--	--	--	--	--	2	----	5	7	----	1	----	1
H3860	--	--	--	--	--	--	6	----	1	6	----	----	----	-----
H3862	--	--	--	--	--	--	6	----	1	7	----	1	1	-----
H3863	--	--	--	--	--	--	5	----	----	5	----	----	1	-----
H3864	--	--	--	--	1	--	2	----	----	----	----	1	----	-----
H3865														
H3866	--	--	1	--	--	--	1	2	2	10	2	2	1	-----
H3867	--	--	--	--	--	2	1	----	5	3	----	3	----	-----
H3868	--	--	--	--	--	--	1	1	6	4	----	1	----	-----
H3869	--	--	--	--	--	--	----	----	1	----	----	----	----	-----
H3870	--	--	--	--	--	--	5	2	10	10	----	1	----	-----
H3871	--	--	--	--	--	--	----	3	----	6	----	1	----	-----
H3873	--	--	--	--	--	--	2	----	4	10+	----	3	----	-----
H3874	--	--	--	--	--	1	4	----	10+	1	----	----	----	2
H3876	--	--	--	--	--	--	1	----	7	3	----	1	----	-----
H3878	--	--	1	--	--	2	2	1	10+	10+	1	----	----	2
H3879	--	--	1	--	--	--	1	----	3	10+	----	9	1	4
H3881	--	--	--	1	--	--	2	----	----	10+	2	1	1	-----
H3882	--	1	--	--	--	--	2	1	5	10+	----	5	----	1
H3883	--	--	--	--	--	--	2	----	10+	10+	----	1	----	1
H3884	--	--	--	--	--	--	3	----	3	3	----	1	1	-----
H3885	--	--	--	--	--	--	3	----	2	4	----	1	----	-----
H3887	--	--	--	--	--	--	----	----	10	10+	----	----	----	-----
H3888	1	--	1	--	--	--	5	----	4	10+	----	9	2	2
H3889	--	--	--	--	--	--	----	----	10	1	----	5	----	2
H3890	--	--	--	--	--	--	2	----	7	9	----	6	----	1
H3891	--	--	--	--	--	--	----	1	8	2	----	3	----	-----
H3892	--	--	--	--	--	--	----	----	----	----	----	1	----	-----
H3893	--	--	--	--	--	--	5	4	9	10+	----	2	1	1
H3894	--	--	--	--	--	--	4	4	8	9	----	1	----	-----
H3895	--	1	--	--	--	--	5	3	9	8	----	8	----	-----
H3896	--	--	--	--	--	1	1	----	7	10+	----	2	1	3
H3898	--	--	--	--	--	--	----	4	10+	5	----	2	----	-----

TABLE 5.—*Occurrence and abundance of planktonic Foraminifera*—Continued

	Globigerinita humilis	*Orbulina universa*	*Pulleniatina obliquiloculata*	*Sphaeroidinella dehiscens*	*Candeina nitida*	*Hastigerina pelagica*	*Globorotalia (Turborotalia) fijiana*	*Globorotalia hirsuta*	*Globorotalia crassaformis*	*Globorotalia menardii*	*Globorotalia menardii ungulata*	*Globorotalia tumida*	*Globorotalia truncatulinoides*
Hydrographic stations—Con.													
H3831	10+	6	----	----	1	----	----	----	2	----	6	----	----
H3832	10+	1	----	1	----	----	----	----	----	----	----	4	----
H3833	10+	----	1	----	----	----	----	----	----	----	----	2	----
H3834	----	6	----	----	----	----	----	----	----	----	----	----	----
H3835	10+	----	----	----	----	----	----	----	----	----	----	----	----
H3836	10+	----	----	----	----	----	----	----	----	----	----	4	----
H3837	10+	----	----	----	----	----	----	----	----	----	----	2	----
H3838	10+	8	----	----	----	----	----	----	1	----	----	----	----
H3840	6	8	----	3	2	----	----	----	----	----	----	----	1
H3841	5	8	----	3	4	----	----	----	----	----	----	----	----
H3843	----	----	----	----	----	----	----	----	----	----	----	----	----
H3845	----	----	----	----	----	----	----	----	----	----	----	----	----
H3847	10+	1	----	----	----	----	----	----	----	----	----	----	----
H3848	3	----	----	1	----	----	----	----	----	----	----	----	----
H3849	4	1	----	4	----	----	----	----	----	----	----	----	----
H3850	6	3	----	----	----	----	----	----	----	----	1	4	----
H3851	10+	5	1	----	----	----	----	----	----	----	----	1	----
H3852	6	----	----	----	----	----	----	----	----	----	----	----	----
H3853	6	2	----	1	----	----	----	----	----	----	----	1	----
H3855	----	4	----	----	----	----	----	----	----	----	----	1	----
H3856	9	10	----	----	6	----	----	----	1	----	10+	2	----
H3857	7	8	----	1	----	----	----	----	----	----	----	----	----
H3858	2	2	----	1	----	----	----	----	----	----	----	----	----
H3859	2	8	----	6	3	----	----	1	----	----	----	10	----
H3860	1	10+	----	8	----	----	----	----	----	----	----	5	----
H3862	10+	1	2	5	3	----	----	2	----	----	7	3	----
H3863	10+	1	1	----	----	----	----	----	----	----	----	1	----
H3864													
H3865	8	----	----	----	----	----	----	----	----	----	----	----	----
H3866	10	----	1	3	4	----	----	----	5	1	4	7	----
H3867	10+	----	----	2	----	----	----	----	1	----	----	3	----
H3868	8	----	----	----	----	----	----	----	----	----	----	----	----
H3869													
H3870	10+	----	----	1	4	----	----	----	----	----	----	3	----
H3871	10	----	----	----	----	----	----	----	----	----	----	----	----
H3873	10+	8	3	7	2	----	----	----	2	----	2	10+	----
H3874	1	----	----	----	----	----	----	----	----	----	----	----	----
H3876	2	----	----	----	----	----	----	----	----	----	----	----	----
H3878	10+	2	1	5	----	----	----	----	----	----	1	2	----
H3879	10+	8	----	5	9	----	----	----	4	----	10	5	----
H3881	10+	10	1	6	7	----	----	----	4	----	8	5	----
H3882	10+	7	3	5	8	----	----	----	----	----	----	10	----
H3883	10+	3	2	10+	3	----	----	----	----	----	----	2	----
H3884	----	1	----	----	----	----	----	----	----	----	----	----	----
H3885	1	----	----	2	----	----	----	----	----	----	----	----	----
H3887	5	----	----	1	----	----	----	----	----	----	----	----	----
H3888	10+	6	1	7	8	----	----	----	----	----	2	1	----
H3889	10+	----	----	----	1	----	----	----	----	----	----	----	----
H3890	10	1	----	2	1	----	----	----	----	----	----	----	----
H3891	6	----	----	2	----	----	----	----	----	----	----	----	----
H3892	3	----	----	----	----	----	----	----	----	----	----	----	----
H3893	10+	2	----	4	----	----	----	----	----	----	----	----	----
H3894	10+	3	1	3	----	----	----	----	1	----	----	5	----
H3895	10+	3	----	6	1	----	----	----	1	1	3	10+	----
H3896	10+	----	----	5	1	----	----	----	1	----	----	----	----
H3898	1	----	----	2	----	----	----	----	----	----	----	----	----

TABLE 5.—*Occurrence and abundance of planktonic Foraminifera*—Continued

	Globigerina bulloides	*Globigerina conglomerata*	*Globigerina digitata*	*Globigerina eggeri*	*Globigerina hexagona*	*Globigerina rubescens*	*Globigerinoides conglobatus*	*Globigerinoides elongatus*	*Globigerinoides ruber*	*Globigerinoides sacculifer*	*Globigerinoides sacculifer fistulosa*	*Globigerinella aequilateralis*	*Globigerinella adamsi*	*Globigerinita glutinata*
Hydrographic stations—Con.														
H3899	--	--	--	--	--	--	----	----	----	7	----	7	----	-----
H3900	--	--	--	--	--	--	----	----	6	10+	----	3	----	-----
H3901	1	--	--	--	--	1	3	----	10	10+	----	7	1	1
H3902	--	--	--	--	--	--	----	----	7	1	----	----	----	-----
H3903	--	--	--	--	1	--	10+	----	4	10+	----	8	----	1
H3904	--	--	1	--	--	--	8	----	7	10+	----	10+	4	-----
H3905	--	--	--	--	--	--	2	----	8	4	----	7	----	-----
H3909	1	--	--	1	--	--	10+	----	10+	10+	----	10+	----	-----
H3910	--	--	--	--	--	--	1	----	9	1	----	----	----	-----
H3911	--	2	--	--	--	--	8	2	5	10+	----	10+	----	1
H3912	--	--	--	--	--	--	----	----	4	----	----	1	----	-----
H3913	--	--	--	1	1	--	10+	----	8	10+	----	10+	----	-----
H3914	--	--	--	--	--	--	7	----	9	10+	----	10+	----	-----
H3915	--	--	--	--	--	1	8	2	10+	8	----	10	1	-----
H3916	--	--	--	--	--	--	5	1	5	7	----	10	----	1
H3918	--	2	--	--	--	--	3	----	----	----	----	2	----	-----
H3919	--	--	--	--	--	--	5	1	4	10+	1	10+	----	-----
H3920	--	--	--	--	--	--	4	1	----	6	----	6	----	-----
H3921														
H3922														
H3923	--	--	--	--	--	1	9	----	----	9	----	3	----	-----
H3924	--	--	--	--	--	--	5	----	2	10+	----	10+	----	-----
H3926	--	--	--	--	--	1	3	1	9	10+	----	10+	----	-----
H3927	--	--	--	--	--	--	10+	----	3	9	----	5	----	-----
H3928	--	--	--	--	--	--	6	----	1	10+	----	5	----	-----
H3929	--	--	--	--	--	3	9	2	6	10+	----	10+	----	-----
H3930	--	--	--	--	--	--	----	----	10+	2	----	2	----	-----
H3931	--	--	--	--	--	--	7	9	----	10+	----	8	----	-----
H3932	--	--	--	--	--	--	10+	----	----	10+	----	1	----	-----
H3934	--	--	--	--	--	1	10+	----	----	10+	----	10+	----	-----
H3935	--	--	--	--	--	--	1	1	9	4	----	4	----	-----
H3936	--	--	--	--	--	--	1	1	7	6	----	9	----	-----
H3937	--	--	--	--	--	--	10	1	10+	10+	----	10+	----	-----
H3938	--	--	--	--	--	--	10	----	----	----	----	----	----	-----
H3940	--	--	--	--	--	--	----	----	----	----	----	3	----	-----
H3941	--	--	--	--	--	--	----	----	----	2	----	----	----	-----
H3944	--	--	--	--	--	--	1	1	6	4	----	1	----	1
H3945	--	--	--	--	--	--	----	----	5	2	----	2	----	-----
H3947														
H3954	--	--	--	--	--	--	2	1	1	10+	----	----	----	-----
H3959														
H3960	2	6	--	--	--	1	3	----	7	10+	----	10+	----	6
H3961	--	4	--	1	--	1	4	1	10+	10+	----	10+	----	2
H3964	--	--	--	--	1	--	----	----	----	----	----	----	----	-----
H3965	--	1	--	--	--	--	----	----	8	10	----	10+	----	-----
H3967	--	2	--	1	1	--	1	1	4	10+	----	2	----	1
H3968														
H3969	--	6	--	2	--	--	----	4	6	10+	----	10+	----	-----
H3970	--	1	--	--	--	--	2	----	----	6	----	2	----	-----
H3971	--	1	--	--	1	--	1	----	----	3	----	1	----	-----
H3974	--	--	--	--	--	--	----	----	4	10+	----	6	1	-----
H3976														
H3977	--	1	--	4	--	2	5	3	4	10+	----	4	1	1
H3978	--	3	--	1	--	--	1	----	10	10+	----	7	----	-----
H3979	--	1	--	2	--	--	4	----	2	4	----	----	----	-----
H3980	--	4	--	--	--	--	4	----	3	10+	----	1	----	-----

TABLE 5.—*Occurrence and abundance of planktonic Foraminifera*—Continued

	Globigerinita humilis	*Orbulina universa*	*Pulleniatina obliquiloculata*	*Sphaeroidinella dehiscens*	*Candeina nitida*	*Hastigerina pelagica*	*Globorotalia (Turborotalia) fijiana*	*Globorotalia hirsuta*	*Globorotalia crassaformis*	*Globorotalia menardii*	*Globorotalia menardii ungulata*	*Globorotalia tumida*	*Globorotalia truncatulinoides*
Hydrographic stations—Con.													
H3899	3	3	----	1	----	----	----	----	----	----	1	----	-----
H3900	10+	----	----	4	5	----	----	----	2	----	----	3	-----
H3901	10+	3	----	1	10+	----	----	----	2	----	3	2	-----
H3902	2	----	----	----	----	----	----	----	----	----	----	----	-----
H3903	10+	----	1	5	----	----	----	----	1	----	1	7	-----
H3904	10+	10+	1	6	10	----	----	----	5	4	----	7	1
H3905	2	----	----	1	----	----	----	----	----	----	----	----	-----
H3909	10+	2	----	5	6	----	----	----	2	----	1	10+	1
H3910													
H3911	10+	3	----	----	----	----	----	----	2	1	1	4	1
H3912	10+	----	----	----	----	----	----	----	----	----	----	----	-----
H3913	10+	----	3	10	3	----	----	----	8	----	----	10+	-----
H3914	2	2	----	3	----	----	----	----	----	----	----	----	1
H3915	10+	----	----	2	2	----	----	----	7	1	----	1	-----
H3916	3	4	----	2	----	----	----	----	----	----	----	----	-----
H3918	10	----	----	1	----	----	----	----	----	----	----	1	-----
H3919	10+	7	----	5	10+	1	----	----	6	----	----	1	4
H3920	10+	----	1	3	----	----	----	1	5	----	1	2	-----
H3921	1	----	----	----	----	----	----	----	----	----	----	----	-----
H3922	2	----	----	----	----	----	----	----	----	----	----	1	-----
H3923	10+	1	----	3	----	----	----	----	4	----	----	2	1
H3924	----	10+	----	5	3	----	----	----	1	----	----	----	4
H3926	7	1	----	2	1	----	----	----	5	----	----	----	-----
H3927	1	10	----	5	1	----	----	----	----	----	----	1	2
H3928	----	5	----	4	----	----	----	----	1	----	----	----	-----
H3929	8	4	----	3	4	----	----	----	10+	1	2	----	-----
H3930													
H3931	----	3	----	6	----	----	----	----	3	----	----	----	1
H3932	10+	----	----	----	----	----	----	----	3	----	----	2	2
H3934	10+	9	----	8	8	----	----	----	10	5	----	1	3
H3935	1	----	----	----	2	----	----	----	1	----	----	----	-----
H3936	----	1	----	1	----	----	----	----	2	----	----	----	-----
H3937	10+	5	----	9	4	1	----	----	2	2	----	----	4
H3938	10+	----	----	1	----	----	----	----	----	----	----	----	-----
H3940	1	----	----	----	----	----	----	----	----	----	----	----	-----
H3941													
H3944	2	----	----	----	----	----	----	----	----	----	----	----	-----
H3945	8	----	----	----	----	----	----	----	----	----	----	----	1
H3947	----	----	----	----	1	----	----	----	----	----	----	----	-----
H3954	9	2	----	----	----	----	----	----	6	2	1	2	-----
H3959	----	10	----	----	----	----	----	----	----	----	----	----	-----
H3960	10+	----	10+	2	----	----	----	----	----	5	----	10+	-----
H3961	10+	----	10+	3	----	----	----	----	1	3	----	10+	-----
H3964													
H3965	10+	2	10+	2	----	----	----	----	----	----	----	1	-----
H3967	7	----	10+	----	----	----	----	----	----	1	----	2	-----
H3968	----	----	----	1	----	----	----	----	----	----	----	1	-----
H3969	10+	----	10+	3	----	----	----	----	1	6	2	10+	-----
H3970	10+	----	10+	2	----	----	----	----	----	----	----	10+	-----
H3971	2	----	10+	3	----	----	----	----	----	----	----	10+	-----
H3974	9	4	10+	4	1	----	----	----	----	9	4	6	-----
H3976	----	----	5	4	----	----	----	----	----	2	----	6	-----
H3977	10+	----	10+	7	1	----	----	----	1	9	5	5	-----
H3978	10+	----	10+	2	----	----	----	----	----	10+	1	3	-----
H3979	7	1	10+	----	----	----	----	----	----	2	----	7	1
H3980	4	----	10+	1	----	----	----	----	----	7	----	1	-----

TABLE 5.—*Occurrence and abundance of planktonic Foraminifera*—Continued

	Globigerina bulloides	*Globigerina conglomerata*	*Globigerina digitata*	*Globigerina eggeri*	*Globigerina hexagona*	*Globigerina rubescens*	*Globigerinoides conglobatus*	*Globigerinoides elongatus*	*Globigerinoides ruber*	*Globigerinoides sacculifer*	*Globigerinoides sacculifer fistulosa*	*Globigerinella aequilateralis*	*Globigerinella adamsi*	*Globigerinita glutinata*
Hydrographic stations—Con.														
H3983	--	--	--	--	--	--	3	----	8	9	----	1	----	-----
H3984	--	--	--	--	--	--	1	----	1	10+	----	3	1	-----
H3986	--	--	--	7	--	--	----	----	----	3	----	1	----	-----
H3989	--	1	--	1	--	--	4	1	2	10	----	2	----	-----
H3991	--	4	--	1	--	--	6	----	----	10+	----	10+	2	-----
H3992	--	--	--	--	--	--	2	----	2	8	----	----	----	-----
H3993	1	--	--	--	2	--	2	----	----	5	----	2	----	1
H3996	--	4	--	5	--	--	2	----	6	10+	----	10+	4	-----
H3997	--	--	--	4	--	1	3	----	----	10+	----	6	----	-----
H4004	--	--	--	1	--	--	----	----	2	----	----	1	----	1

TABLE 5.—*Occurrence and abundance of planktonic Foraminifera*—Continued

	Globigerinita humilis	*Orbulina universa*	*Pulleniatina obliquiloculata*	*Sphaeroidinella dehiscens*	*Candeina nitida*	*Hastigerina pelagica*	*Globorotalia (Turborotalia) fijiana*	*Globorotalia hirsuta*	*Globorotalia crassaformis*	*Globorotalia menardii*	*Globorotalia menardii ungulata*	*Globorotalia tumida*	*Globorotalia truncatulinoides*
Hydrographic stations—Con.													
H3983	3	----	----	4	1	----	----	----	----	2	----	----	-----
H3984	----	1	6	2	1	----	----	----	----	1	----	1	-----
H3986	----	----	1	2	----	----	----	1	----	1	----	10+	-----
H3989	4	----	1	1	----	----	----	----	----	----	----	1	-----
H3991	10+	8	10	6	1	----	----	----	----	7	2	9	-----
H3992	----	1	2	1	----	----	----	----	----	----	----	----	-----
H3993	----	3	5	2	1	----	----	----	----	3	----	2	-----
H3996	10+	10	10+	5	6	----	----	1	----	10+	2	6	-----
H3997	10+	1	10+	3	----	----	----	1	----	10+	----	7	-----
H4004	----	----	1	----	----	----	----	----	----	1	----	----	-----

Literature Cited

Andersen, H. V.

1961. Genesis and paleontology of the Mississippi River mudlumps, part 2: Foraminifera of the mudlumps, Lower Mississippi River Delta. Louisiana Dept. Conserv. Geol. Bull., no. 35, pt. 2, pp. 1-208, pls. 1–29, figs. 1, 2.

Banner, F. T., and Blow, W. H.

1960a. Some primary types of species belonging to the superfamily Globigerinaceae. Contr. Cushman Found. Foram. Res., vol. 11, pp. 1–41, pls. 1-8, figs. 1, 2.

1960b. The taxonomy, morphology, and affinities of the genera included in the subfamily Hastigerininae. Micropaleontology, vol. 6, pp. 19–31, text figs. 1–11.

Barker, R. W.

1960. Taxonomic notes on the species figured by H. B. Brady in his Report on the Foraminifera dredged by H.M.S. *Challenger* during the years 1873–1876. Soc. Econ. Paleontologists and Mineralogists, spec. publ. 9, 238 pp., 115 pls.

Bermudez, P. J.

1935. Foraminíferos de la costa norte de Cuba. Mem. Soc. Cubana Hist. Nat., vol. 9, no. 3, pp. 129–224, pls. 10–17, text figs. 1-3, map.

Bolli, H. M.

1957a. Planktonic Foraminifera from the Oligocene-Miocene Cipero and Lengua formations of Trinidad, B.W.I. U.S. Nat. Mus. Bull. 215, pp. 97–123, pls. 22–29, text figs. 17–21.

1957b. Planktonic Foraminifera from the Eocene Navet and San Fernando formations of Trinidad, B.W.I. U.S. Nat. Mus. Bull. 215, pp. 155–172, pls. 35-39, text figs. 25, 26.

Bradshaw, J. S.

1959. Ecology of living planktonic Foraminifera in the north and equatorial Pacific Ocean. Contr. Cushman Found. Foram. Res., vol. 10, pp. 25-64, pls. 6–8, text figs. 1–42.

Brady, H. B.

1884. Report on the Foraminifera dredged by H.M.S. *Challenger*, during the years 1873–1876. Vol. 9 *of* Zoology *in* Report . . . voyage . . . *Challenger*, xxii +814 pp., 115 pls.

Collins, A. C.

1958. Foraminifera. No. 6 *in* vol. 6 *of* British Museum (Natural History) Great Barrier Reef Expedition 1928–29, Scientific Reports, pp. 335–437, pls. 1–5, figs. 1–3.

Cushman, J. A.

1915. A monograph of the Foraminifera of the North Pacific Ocean, part 5: Rotaliidae. U.S. Nat. Mus. Bull. 71, pt. 5, pp. 1–87, pls. 1–31, text figs. 1–62.

1921. Foraminifera of the Philippine and adjacent seas. U.S. Nat. Mus. Bull. 100, vol. 4, 608 pp., 100 pls., 52 figs.

1930. Some notes on the genus *Patellina*. Contr. Cushman Lab. Foram. Res., vol. 6, pp. 11–17, pl. 3 (part).

CUSHMAN, J. A.
1932. The Foraminifera of the tropical Pacific collections of the "Albatross," 1899–1900, part 1: Astrorhizidae to Trochamminidae. U.S. Nat. Mus. Bull. 161, pt. 1, pp. 1–88, pls. 1–17.
1933a. The Foraminifera of the tropical Pacific collections of the "Albatross," 1899–1900, part 2: Lagenidae to Alveolinellidae. U.S. Nat. Mus. Bull. 161, pt. 2, pp. 1–79, pls. 1–19.
1933b. Some new Recent Foraminifera from the tropical Pacific. Contr. Cushman Lab. Foram. Res., vol. 9, pp. 77-95, pls. 8, 9, 10 (part).
1942. The Foraminifera of the tropical Pacific collections of the "Albatross," 1899–1900, part 3: Heterohelicidae and Buliminidae. U.S. Nat. Mus. Bull. 161, pt. 3, pp. 1–67, pls. 1–15.
1948. Foraminifera. Their classification and economic use, Harvard Univ. Press, Cambridge, Mass., 4th ed., 605 pp., 86 pls., 9 text figs.

CUSHMAN, J. A.; TODD, RUTH; and POST, R. J.
1954. Recent Foraminifera of the Marshall Islands. U.S. Geol. Surv. Prof. Paper 260–H, pp. 319–384, pls. 82–93, figs. 116–118.

GLAESSNER, M. F.
1943. Problems of stratigraphic correlation in the Indo-Pacific region. Proc. Roy. Soc. Victoria, vol. 55 (new ser.), pt. 1, pp. 41–80, chart.

McKEE, E. D.; CHRONIC, JOHN; and LEOPOLD, E. B.
1959. Sedimentary belts in lagoon of Kapingamarangi Atoll. Bull. American Assoc. Petroleum Geologists, vol. 43, no. 3, pt. 1, pp. 501–562, pl. 1, figs. 1–21, tables 1–10.

NØRVANG, AKSEL
1958. *Islandiella* n.g. and *Cassidulina* d'Orbigny. Vidensk. Medd. Dansk naturh. Foren., vol. 120, pp. 25–41, pls. 6–9.

NYHOLM, KARL-GEORG
1962. A study of the foraminifer *Gypsina*. Zool. Bidrag från Uppsala, vol. 33, pp. 201–206, pls. 1, 2, figs. 1, 2.

d'ORBIGNY, A. D.
1839. Foraminifères. *In* Ramon de la Sagra, Histoire physique, politique et naturelle de l'île de Cuba, 224 pp., 12 pls.

PARKER, F. L.
1958. Eastern Mediterranean Foraminifera. No. 4 *in* Sediment cores from the Mediterranean Sea and the Red Sea (vol. 8 *of* Reports of the Swedish Deep-Sea Expedition), pp. 217–283, pls. 1–6, text figs. 1–6, tables 1–20.
1962. Planktonic foraminiferal species in Pacific sediments. Micropaleontology, vol. 8, pp. 219–254, pls. 1–10.

PARR, W. J.
1945. Recent Foraminifera from Barwon Heads, Victoria. Proc. Roy. Soc. Victoria, vol. 56 (new ser.), pt. 2, pp. 189–227, pls. 8–12, figs. 1, 2 (maps).

PHLEGER, F. B.; PARKER, F. L.; and PEIRSON, J. F.
1953. North Atlantic Foraminifera. No. 1 *in* Sediment cores from the North Atlantic Ocean (vol. 7 *of* Reports of the Swedish Deep-Sea Expedition), pp. 1–122, pls. 1–12, text figs. 1–26.

RESIG, J. M.
1962. The morphological development of *Eponides repandus* (Fichtel and Moll), 1798. Contr. Cushman Found. Foram. Res., vol. 13, pp. 55–57, pl. 14.

TODD, RUTH

1960. Some observations on the distribution of *Calcarina* and *Baculogypsina* in the Pacific. Sci. Rep. Tohoku Univ., ser. 2. (Geol.), spec. vol. no. 4, pp. 100–108, pl. 10, fig. 1, tables 1, 2.

1964. Planktonic Foraminifera from deep-sea cores off Eniwetok Atoll. U.S. Geol. Surv. Prof. Paper 260–CC, pp. 1067–1098, pls. 289–295.

TOWNSEND, C. H.

1901. Dredging and other records of the United States Fish Commission Steamer *Albatross* with bibliography relative to the work of the vessel. U.S. Fish Comm. Rep. for 1900, pp. 387–562, pls. 1–7.

UCHIO, TAKAYASU

1953. On some foraminiferal genera in Japan. Japanese Journ. Geol. Geogr., vol. 23, pp. 151–162, pl. 14.

EXPLANATION OF PLATES

Plate 1

Figure 1. *Patellina advena altiformis* Cushman. Holotype, Cushman Coll. 18995. × 100. *a*, Side view; *b*, basal view. Off Fiji, 40–50 fms.

2. *Patellina advena* Cushman. Cushman Coll. 18998. × 115. Near Nairai, Fiji.

3. *Patellinella inconspicua* (Brady). USNM 27691. × 115. *Albatross* H3905.

4. *Patellinella fijiana* Cushman. Holotype, Cushman Coll. 17554. × 115. *a*, Side view; *b*, top view. Off Nairai, Fiji.

5, 6. *Patellinella carinata* Collins. × 115. 5, USNM 641024. *a*, Side view; *b*, top view. Levuka, Fiji, 12 fms. 6, Cushman Coll. 18997. Port Lottin, Kusaie, Caroline Islands.

7. *Neoconorbina frustata* (Cushman). Holotype, Cushman Coll. 19286. × 100. *a*, Dorsal view; *b*, ventral view; *c*, peripheral view. Off Fiji, 40–50 fms.

8, 9. *Neoconorbina tuberocapitata* (Chapman). × 62. *a*, *a*, Dorsal views; *b*, *b*, ventral views; *c*, *c*, peripheral views. 8, Cushman Coll. 47230. Hereheretue, beach off wharf. 9, Cushman Coll. 47231. Off Fiji, 40–50 fms.

Plate 2

(*a*, Dorsal view; *b*, ventral view; *c*, peripheral view)

Figure 1. *Neoconorbina patelliformis* (Brady). Cushman Coll. 47225. × 105. Mokaujar Anchorage, Fiji.

2, 3. *Neoconorbina crustata* (Cushman). 2, Holotype, Cushman Coll. 19288. × 56. Off Nairai, Fiji, 24 fms. 3, Cushman Coll. 47259. × 100. Off Fiji, 40–50 fms.

4. *Neoconorbina floridensis* (Cushman). Cushman Coll. 47287. × 56. Mokaujar Anchorage, Fiji.

Plate 3

(*a*, Dorsal view; *b*, ventral view; *c*, peripheral view)

Figures 1, 3. *Rosalina floridana* (Cushman). × 72. 1, USNM 641025. Levuka, Fiji, 12 fms. 3, Cushman Coll. 47292. Nairai, Fiji, 12 fms.

2, 5. *Rosalina vilardeboana* d'Orbigny. × 72. 2, Cushman Coll. 47293. Levuka, Fiji, 12 fms. 5, USNM 641032. Nairai, Fiji, 12 fms.

4. *Rosalina globularis* d'Orbigny. Cushman Coll. 47294. × 100. Rotonga, 7 fms.

Plate 4

(*a*, Dorsal view; *b*, ventral view; *c*, peripheral view)

Figure 1. *Rosalina rugosa* d'Orbigny. Cushman Coll. 47306. × 72. Hereheretue, beach off wharf.

2. *Rosalina micens* (Cushman). Holotype, USNM 26159. × 100. *Albatross* H3851.
3. *Rosalina concinna* (Brady). Cushman Coll. 47273. × 130. Guam Anchorage, Ladrone Islands, 21 fms.
4. *Rosalina subbertheloti* (Cushman). USNM 27807. × 100. *Albatross* H3809.
5. *Rosalina floridana* (Cushman). Cushman Coll. 19287. Holotype of *Discorbis opima* Cushman. × 100. Off Nairai, Fiji, 24 fms.

Plate 5

(*a*, Dorsal view; *b*, ventral view; *c*, peripheral view)

Figure 1. *Planulinoides biconcavus* (Jones and Parker). USNM 641050. × 36. Off Poor Knights Island, New Zealand, 60 fms.
2. *Bronnimannia haliotis* (Heron-Allen and Earland). USNM 641021. × 75. Off Fiji, 40–50 fms.
3. *Heronallenia lingulata* (Burrows and Holland). USNM 641043. × 120. Guam Anchorage, Ladrone Islands, 21 fms.
4. *Lamarckina* sp. USNM 641058. × 75. *Albatross* H3798.
5. *Cancris auriculus* (Fichtel and Moll). USNM 641034. × 60. Near Nairai, Fiji.
6. *Neoconorbina terquemi* (Rzehak). USNM 641060. × 120. *Albatross* H3809.

Plate 6

(*a*, Dorsal view; *b*, ventral view; *c*, peripheral view)

Figure 1. *Streblus beccarii tepida* (Cushman). USNM 641026. × 120. Levuka, Fiji, 12 fms.
2. *Oridorsalis umbonatus* (Reuss). USNM 641103. × 52. *Albatross* H3923.
3. *Gyroidina lamarckiana* (d'Orbigny). USNM 641033. × 60. Off Nairai, Fiji, 24 fms.
4. *Gyroidina soldanii* d'Orbigny. USNM 641078. × 60. *Albatross* H3860.

Plate 7

(*a*, Dorsal view; *b*, ventral view; *c*, peripheral view)

Figure 1. *Eponides tumidulus* (Brady). USNM 27869. × 115. *Albatross* H3791.
2. *Streblus beccarii tepida* (Cushman). USNM 641030. × 130. Mokaujar Anchorage, Fiji.
3, 4. *Eponides repandus* (Fichtel and Moll). × 32. Extremes of a transitional series connecting the typical form with the "*Rosalina lateralis*"—form. 3, USNM 27876. *Albatross* H3875. 4, Cushman Coll. 47309. Nairai, Fiji, 12 fms.

Plate 8

(*a*, Dorsal view; *b*, ventral view; *c*, peripheral view)

Figure 1. *Gavelinopsis praegeri* (Heron-Allen and Earland). USNM 641071. × 60. *Albatross* H3841.
2. *Rotorbinella mira* (Cushman). USNM 641029. × 72. Mokaujar Anchorage, Fiji.
3. *Valvulineria glabra* Cushman. USNM 641076. × 72. *Albatross* H3859.
4. *Bueningia creeki* Finlay. USNM 641086. × 120. *Albatross* H3875.

Plate 9

(Unless otherwise indicated, *a*, dorsal view; *b*, ventral view; *c*, peripheral view)

Figures 1, 2. *Pararotalia ozawai* (Asano). To illustrate extremes of variability. 1, USNM 641019. × 52. Rotonga, 7 fms. 2, USNM 641041. × 56. Viva Anchorage, Fiji, 3 fms.

3. *Calcarina hispida* Brady. USNM 641044. × 24. Guam Anchorage, Ladrone Islands, 21 fms.

4. *Baculoqypsina sphaerulata* (Parker and Jones). USNM 641017. × 24. Aloji Niue. *a, b*, Opposite sides.

Plate 10

(*a*, Dorsal view; *b*, ventral view; *c*, peripheral view)

Figure 1. *Epistominella exiqua* (Brady). USNM 641118. × 72. *Albatross* H3986.

2. *Epistominella tubulifera* (Heron-Allen and Earland). USNM 641045. × 52. Guam Anchorage, Ladrone Islands, 21 fms.

3, 4. *Epistominella pulchra* (Cushman). × 100. 3, Paratype, USNM 641035. 4, Holotype, Cushman Coll. 18999. Near Nairai, Fiji.

5, 6. *Epistomaroides polystomelloides* (Parker and Jones). 5, USNM 641020. × 56. Vavau Anchorage, 18 fms. 6, USNM 641031. × 40. Mokaujar Anchorage, Fiji.

Plate 11

(*a*, Dorsal view; *b*, ventral view; *c*, peripheral view)

Figure 1. *Nuttallides umboniferus* (Cushman). USNM 641105. × 72. *Albatross* H3927.

2. *Nuttallides*? *rugosus* (Phleger and Parker). USNM 641077. × 120. *Albatross* H3859.

3. *Amphistegina madagascariensis* d'Orbigny. USNM 641014. × 32. Beach sand, Pinaki.

4. *Amphistegina lessonii* d'Orbigny. USNM 641051. × 16. Kapingamarangi Atoll, sample 99.

Plate 12

(*a*, Dorsal view; *b*, ventral view; *c*, peripheral view)

Figures 1, 2. *Amphistegina madagascariensis* d'Orbigny. × 36. 1, USNM 641087. *Albatross* H3875. 2, USNM 641027. Levuka, Fiji, 12 fms.

Plate 13

(*a*, Dorsal view; *b*, ventral view; *c*, peripheral view)

Figures 1–3. *Amphistegina radiata* (Fichtel and Moll), variant forms. × 36. 1, USNM 641121. *Albatross* H3992. 2, USNM 641101. *Albatross* H3916. 3, USNM 641102. *Albatross* H3916.

Plate 14

(*a*, Dorsal view; *b*, ventral view; *c*, peripheral view)

Figures 1–3. *Amphistegina radiata* (Fichtel and Moll), variant forms. × 36. 1, USNM 641064. *Albatross* H3815. 2, USNM 641104. *Albatross* H3924. 3, USNM 641111. *Albatross* H3967.

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Plate 15

(Unless otherwise indicated, *a*, dorsal view; *b*, ventral view; *c*, peripheral view)

Figure 1. *Osangularia culter* (Parker and Jones). USNM 641088. × 60. *Albatross* H3879.

2. *Cassidulina moluccensis* Germeraad. USNM 641059. × 72. *Albatross* H3798.

3. *Islandiella* sp. USNM 641074. × 72. *Albatross* H3855.

4. *Siphonina tubulosa* Cushman. USNM 641107. × 120. *a*, *b*, Opposite sides; *c*, peripheral view. *Albatross* H3937.

5, 6. *Siphoninoides echinatus* (Brady). × 75. Off Fiji, 40–50 fms. 5, USNM 641022. Side view. 6, USNM 641023. Top view.

Plate 16

(Unless otherwise indicated, *a*, dorsal view; *b*, ventral view; *c*, peripheral view)

Figures 1, 2. *Stomatorbina concentrica* (Parker and Jones). × 40. 1, USNM 27813. *a*, Dorsal view; *b*, peripheral view. 2, USNM 27812. Ventral view of another specimen. *Albatross* H3878.

3, 4. *Paumotua terebra* (Cushman). × 48. 3, Holotype, USNM 26160. *Albatross* H3931. 4, USNM 26161. *Albatross* H3910.

5, 6. *Cassidulina subtumida* Cushman. Paratypes of *Cassidulina rarilocula* Cushman, USNM 26158. × 100. *Albatross* H3827.

7. *Cassidulina subglobosa* Brady. USNM 641110. × 56. *Albatross* H3965.

Plate 17

Figure 1. *Cassidulina subtumida* Cushman. Holotype, USNM 26163. × 56. *a*, ventral view; *b*, peripheral view. *Albatross* H3920.

2. *Cassidulina angulosa* Cushman. USNM 641116. × 72. *a*, Ventral view; *b*, peripheral view. *Albatross* H3984.

3. *Cassidulina minuta* Cushman. Holotype, USNM 26156. × 105. *a*, Dorsal view; *b*, ventral view; *c*, peripheral view. *Albatross* H3825.

4. *Cassidulina carinata* Silvestri. USNM 641069. × 100. *a*, Ventral view; *b*, peripheral view. *Albatross* H3840.

5. *Cassidulina patula* Cushman. Holotype, USNM 26155. × 56. *a*, Dorsal view; *b*, ventral view; *c*, peripheral view. *Albatross* H3916.

6, 7. *Cassidulina delicata* Cushman. USNM 641083. 6, × 56. *a*, Ventral view; *b*, peripheral view. 7, × 100. Ventral view. *Albatross* H3870.

8. *Cassidulina costatula* Cushman. Holotype, USNM 26165. × 56. *a*, Ventral view; *b*, peripheral view. *Albatross* H3935.

9. *Cassidulinoides tenuis* Phleger and Parker. USNM 641070. × 100. *a*, Ventral view; *b*, peripheral view. *Albatross* H3870.

Plate 18

(Unless otherwise indicated, *a*, dorsal view; *b*, ventral view; *c*, peripheral view)

Figure 1. *Tretomphalus planus* Cushman. USNM 641047. × 56. Guam Anchorage, Ladrone Islands, 21 fms.

2. *Tretomphalus milletti* (Heron-Allen and Earland). USNM 641036. × 56. Near Nairai, Fiji.

3. *Hofkerina semiornata* (Howchin). USNM 641108. × 12. *Albatross* H3942.
4. *Sphaeroidina bulloides* d'Orbigny. USNM 641061. × 56. *Albatross* H3810.
5. *Pegidia dubia* (d'Orbigny). USNM 641016. × 52. Rutavu.
6. *Pullenia bulloides* (d'Orbigny). USNM 641095. × 56. *a*, Side view; *b*, front view. *Albatross* H3896.
7. *Pullenia quinqueloba* (Reuss). USNM 641075. × 56. *a*, Side view; *b*, front view. *Albatross* H3858.

PLATE 19

(*a*, Dorsal view; *b*, ventral view; *c*, peripheral view)

Figures 1–4. *Cymbaloporetta bradyi* (Cushman). × 60. 1, USNM 641052. *Albatross* D3688. 2, 4, USNM 641089. *Albatross* H3881. 3, USNM 641084. *Albatross* H3873.

5. *Cymbaloporella tabellaeformis* (Brady). USNM 641046. × 52. Guam Anchorage, Ladrone Islands, 21 fms.

PLATE 20

Figure 1. *Ehrenbergina pacifica* Cushman. USNM 641096. × 75. *a*, Front view; *b*, side view; *c*, top view. *Albatross* H3899.

2. *Ehrenbergina trigona* Goës. USNM 641085. × 75. *a*, Front view; *b*, side view; *c*, top view. *Albatross* H3873.
3. *Cymbaloporetta squammosa* (d'Orbigny). USNM 641015. × 28. *a*, Dorsal view; *b*, ventral view; *c*, peripheral view. Hereheretue Island.
4. *Cymbaloporetta bradyi* (Cushman). USNM 641042. × 60. *a*, Dorsal view; *b*, ventral view; *c*, peripheral view. Port Lottin, Kusaie, Caroline Islands.

PLATE 21

Figure 1. *Ehrenbergina bicornis* Brady. USNM 641117. × 56. *a*, Front view; *b*, top view. *Albatross* H3984.

2, 5. *Ehrenbergina albatrossi* Cushman. × 40. 2, Holotype, USNM 26166. *a*, Front view; *b*, top view. 5, Paratype, USNM 26167. Rear view. *Albatross* H3873.

3, 4. *Ehrenbergina reticulata* Cushman. × 40. 3, Holotype, USNM 26168 *a*, Front view; *b*, top view. 4, Paratype, USNM 26169. Front view. *Albatross* H3974.

6. *Laticarinina pauperata* (Parker and Jones). USNM 641056. × 40. *a*, *b*, Opposite sides; *c*, peripheral view. *Albatross* H3795.

7–10. *Anomalinella rostrata* (Brady). Near Nairai, Fiji. 7. USNM 641037. 8, USNM 641038. 9, USNM 641039. 10, USNM 641040. 7, 8, 10, × 56. 9, × 40. *a*, Side view; *b*, peripheral view.

PLATE 22

(Unless otherwise indicated, *a*, dorsal view; *b*, ventral view; *c*, peripheral view)

Figure 1. *Cibicides lobatulus* (Walker and Jacob). USNM 641028. × 36. Levuka, Fiji, 12 fms.

2. *Planorbulina acervalis* Brady. USNM 641049. × 36. Guam Anchorage, Ladrone Islands, 21 fms.

3. *Cibicides cicatricosus* (Schwager). USNM 641062. × 36. *Albatross* H3810.
4. *Cibicides robertsonianus* (Brady). USNM 641090. × 36. *Albatross* H3882.
5. *Gypsina globula* (Reuss). USNM 641018. × 12. *a*, Top view; *b*, peripheral view. Aloji Niue.
6. *Cibicides floridanus* (Cushman). USNM 641072. × 72. *Albatross* H3848.
7. *Cibicides mayori* (Cushman). USNM 641048. × 36. Guam Anchorage, Ladrone Islands, 21 fms.

Plate 23

(*a*, Dorsal view; *b*, ventral view; *c*, peripheral view)

Figure 1. *Ceratobulimina pacifica* Cushman and Harris. USNM 25021. × 36. *Albatross* H3830.
2. *Hoeglundina elegans* (d'Orbigny). USNM 641065. × 36. *Albatross* H3816.
3–5. *Planulina wuellerstorfi* (Schwager). × 36. 3, USNM 641055. *Albatross* H3795. 4, USNM 641063. *Albatross* H3812. 5, USNM 641112. *Albatross* H3974.

Plate 24

(*a*, Dorsal view; *b*, ventral view; *c*, peripheral view)

Figure 1. *Globigerina bulloides* d'Orbigny. USNM 641073. × 52. *Albatross* H3853.
2. *Globigerina eggeri* Rhumbler. USNM 641115. × 52. *Albatross* H3978.
3. *Globigerina conglomerata* Schwager. USNM 641053. × 52. *Albatross* H3790.

Plate 25

Figures 1, 2. *Globigerinita humilis* (Brady). × 120. 1, USNM 641113. 2, USNM 641114. *a*, *a*, Dorsal views; *b*, *b*, ventral views; *c*, *c*, peripheral views. *Albatross* H3977.
3. *Globigerinoides conglobatus* (Brady). USNM 641079. × 24. *a*, *b*, Opposite sides. *Albatross* H3860.
4, 5. *Globigerinella aequilateralis* (Brady). 4, USNM 641092. × 52. 5, USNM 641093. × 36. *a*, *a*, Side views; *b*, *b*, peripheral views. *Albatross* H3888.
6. *Globigerinoides ruber* (d'Orbigny). USNM 641066. × 56. *a*, Side view; *b*, top view. *Albatross* H3822.

Plate 26

Figures 1, 2. *Globigerinella adamsi* (Banner and Blow). × 24. *a*, *a*, Side views; *b*, *b*, peripheral views. 1, USNM 641068. *Albatross* H3826. 2, USNM 641091. *Albatross* H3884.
3. *Globigerinoides sacculifer fistulosa* (Schubert). USNM 641081. × 36. *a*, Dorsal view; *b*, ventral view; *c*, peripheral view. *Albatross* H3866.
4. *Globigerinoides sacculifer* (Brady). USNM 641109. × 24. *Albatross* H3960.

5, 6. *Sphaeroidinella dehiscens* (Parker and Jones). × 24. 1, USNM 641119. 2, USNM 641120. *Albatross* H3991.

7. *Hastigerina pelagica* (d'Orbigny). USNM 641067. × 52. *a*, Side view; *b*, peripheral view. *Albatross* H3823.

PLATE 27

(Unless otherwise indicated, *a*, dorsal view; *b*, ventral view; *c*, peripheral view)

Figure 1. *Candeina nitida* d'Orbigny. USNM 641097. × 56. *a*, Top view; *b*, side view. *Albatross* H3904.

2–4. *Pulleniatina obliquiloculata* (Parker and Jones). × 40. *Albatross* H3960. 2, USNM 641098. 3, USNM 641099. 4, USNM 641100. 2, 3, 4*b*, Peripheral views, showing aperture. 4*a*, Dorsal view.

5. *Globorotalia* (*Turborotalia*) *fijiana* (Cushman). Holotype, Cushman Coll. 19400. × 105. Nairai, Fiji, 12 fms.

6. *Globorotalia hirsuta* (d'Orbigny). USNM 641080. × 48. *Albatross* H3862.

7. *Globorotalia truncatulinoides* (d'Orbigny). USNM 641106. × 48. *Albatross* H3927.

PLATE 28

(*a*, Dorsal view; *b*, ventral view; *c*, peripheral view)

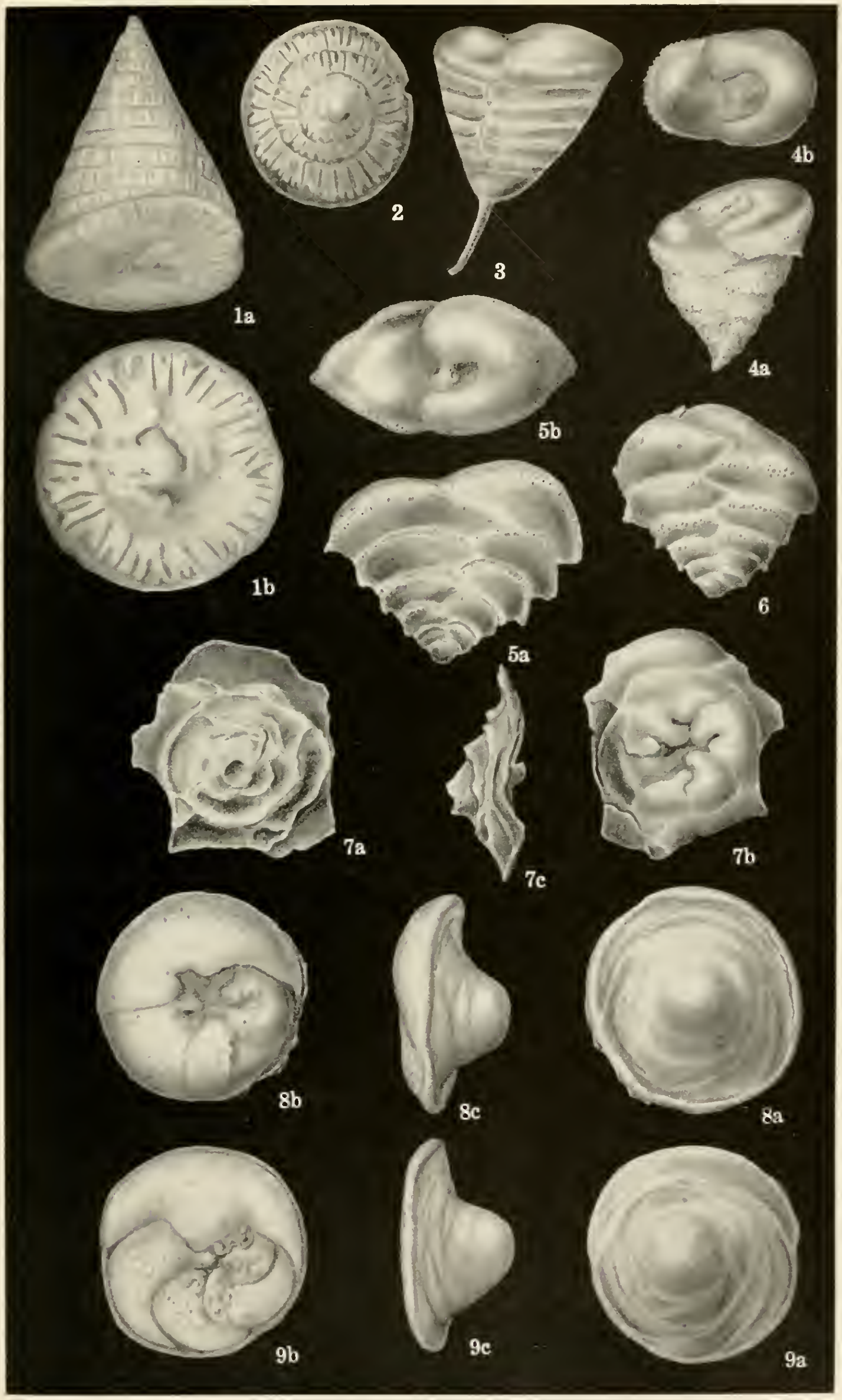
Figure 1. *Globorotalia tumida* (Brady). USNM 641054. × 32. *Albatross* H3791.

2. *Globorotalia menardii* (d'Orbigny) var. *fimbriata* (Brady). USNM 641082. × 40. *Albatross* H3866.

3. *Globorotalia menardii ungulata* Bermudez. USNM 641094. × 48. *Albatross* H3888.

4. *Globorotalia menardii* (d'Orbigny). USNM 641057. × 32. *Albatross* H3795.

PLATES



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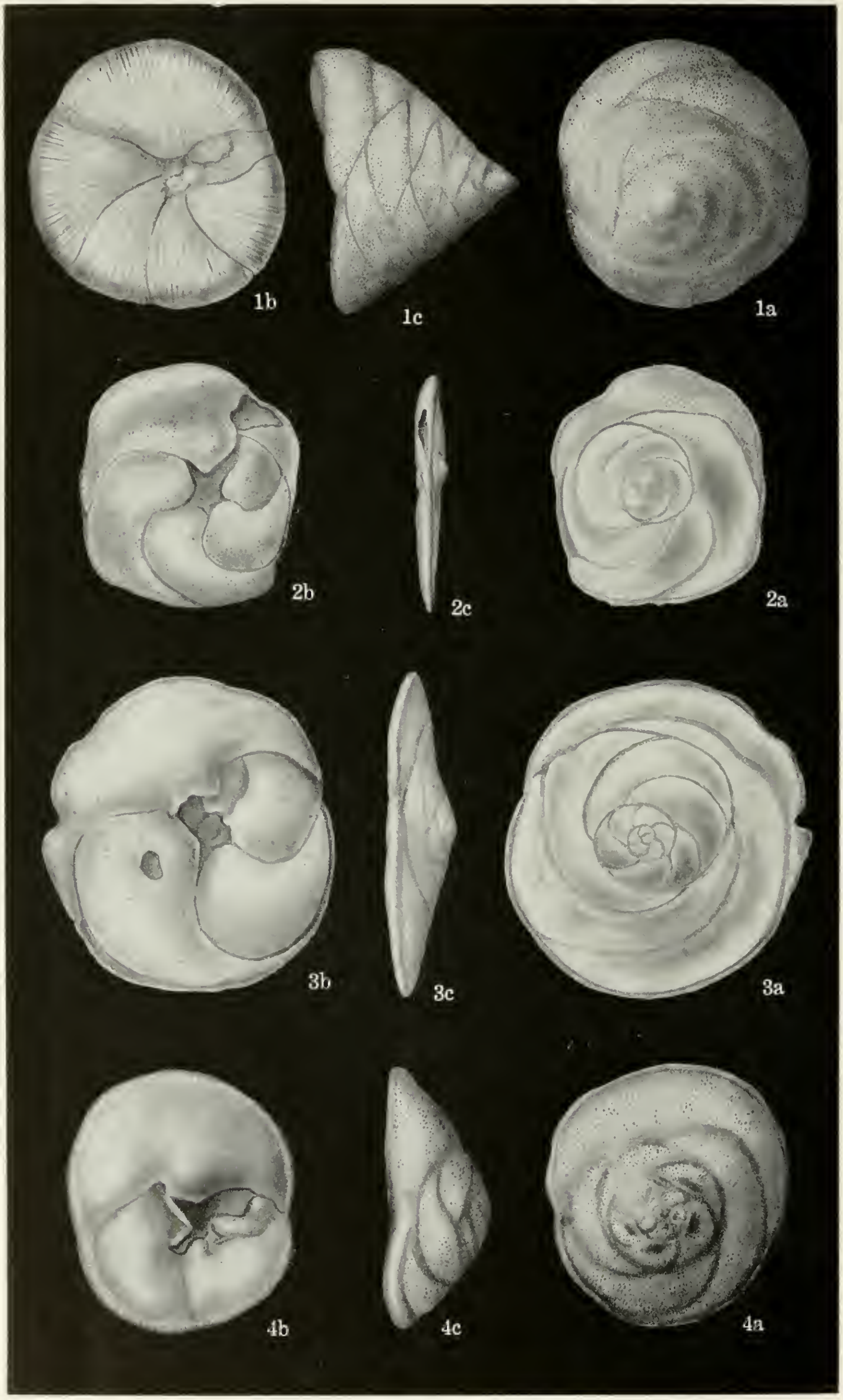

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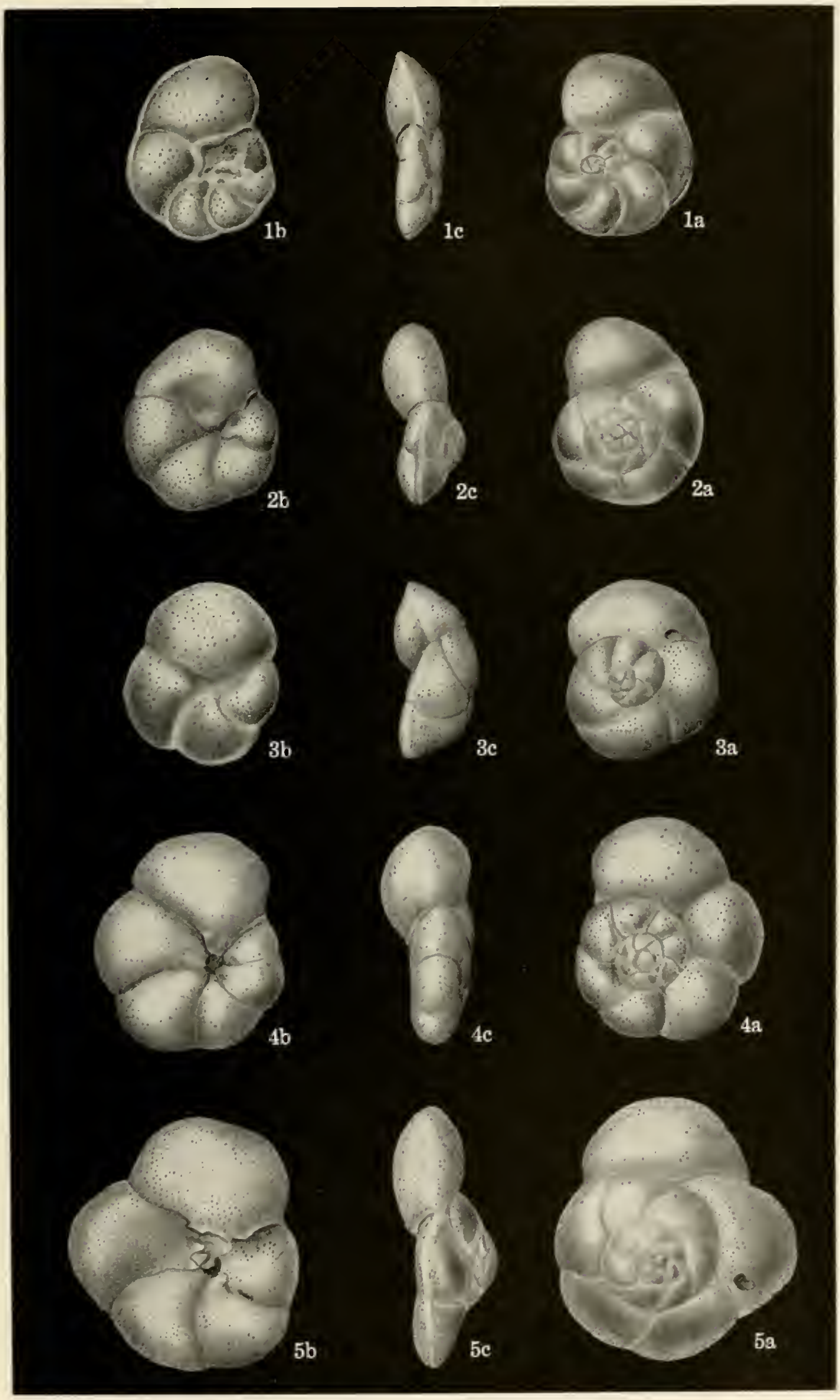

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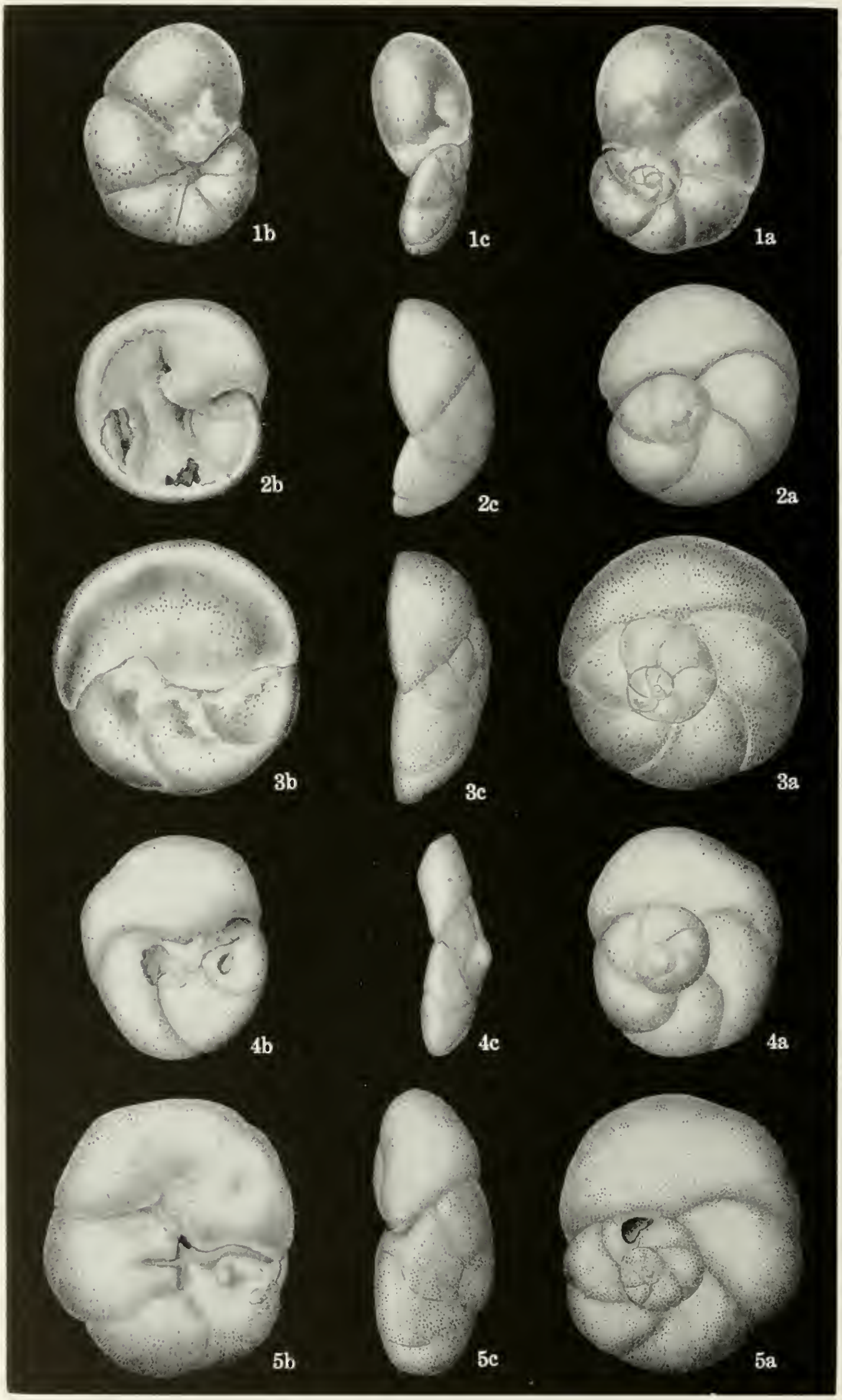

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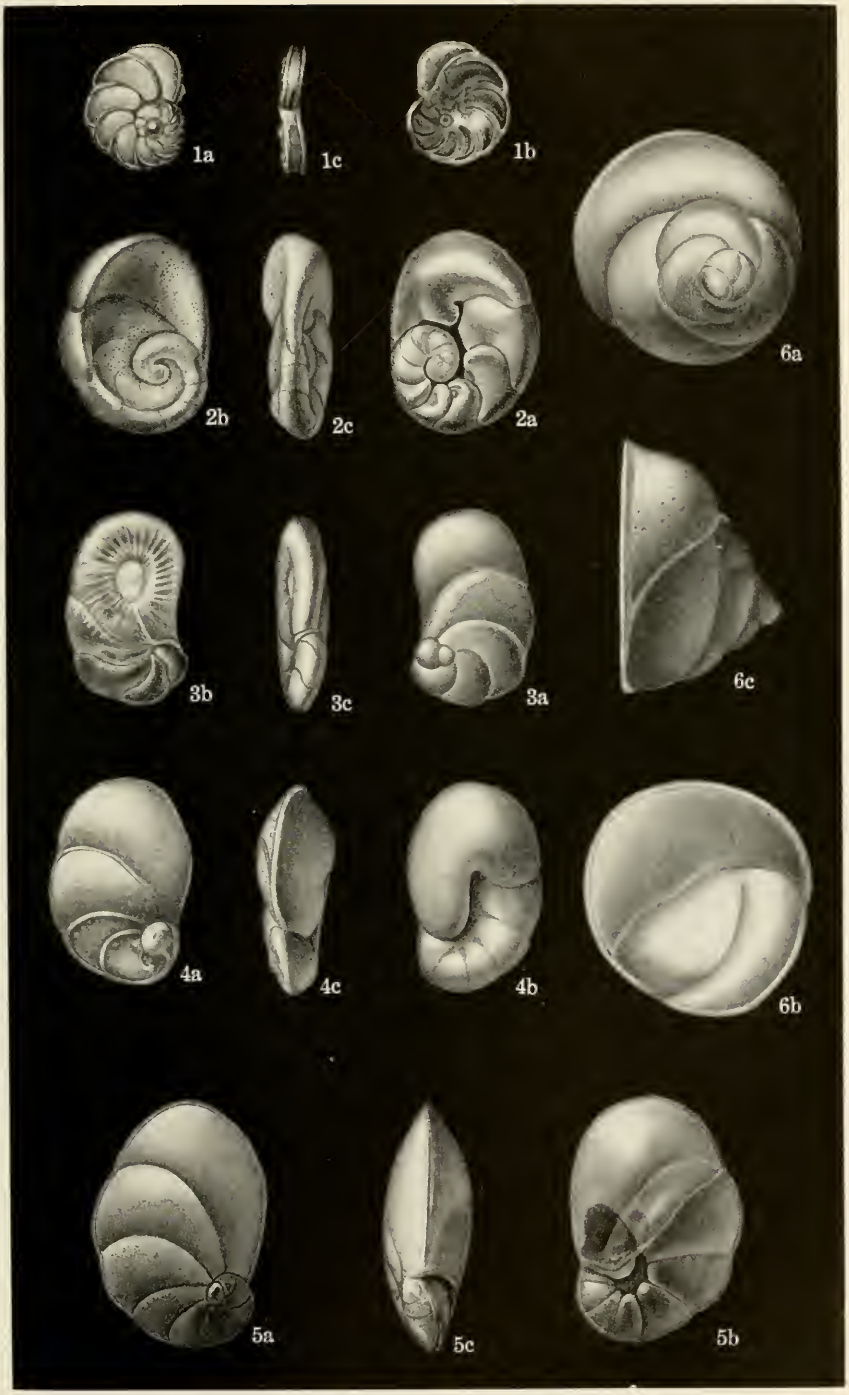

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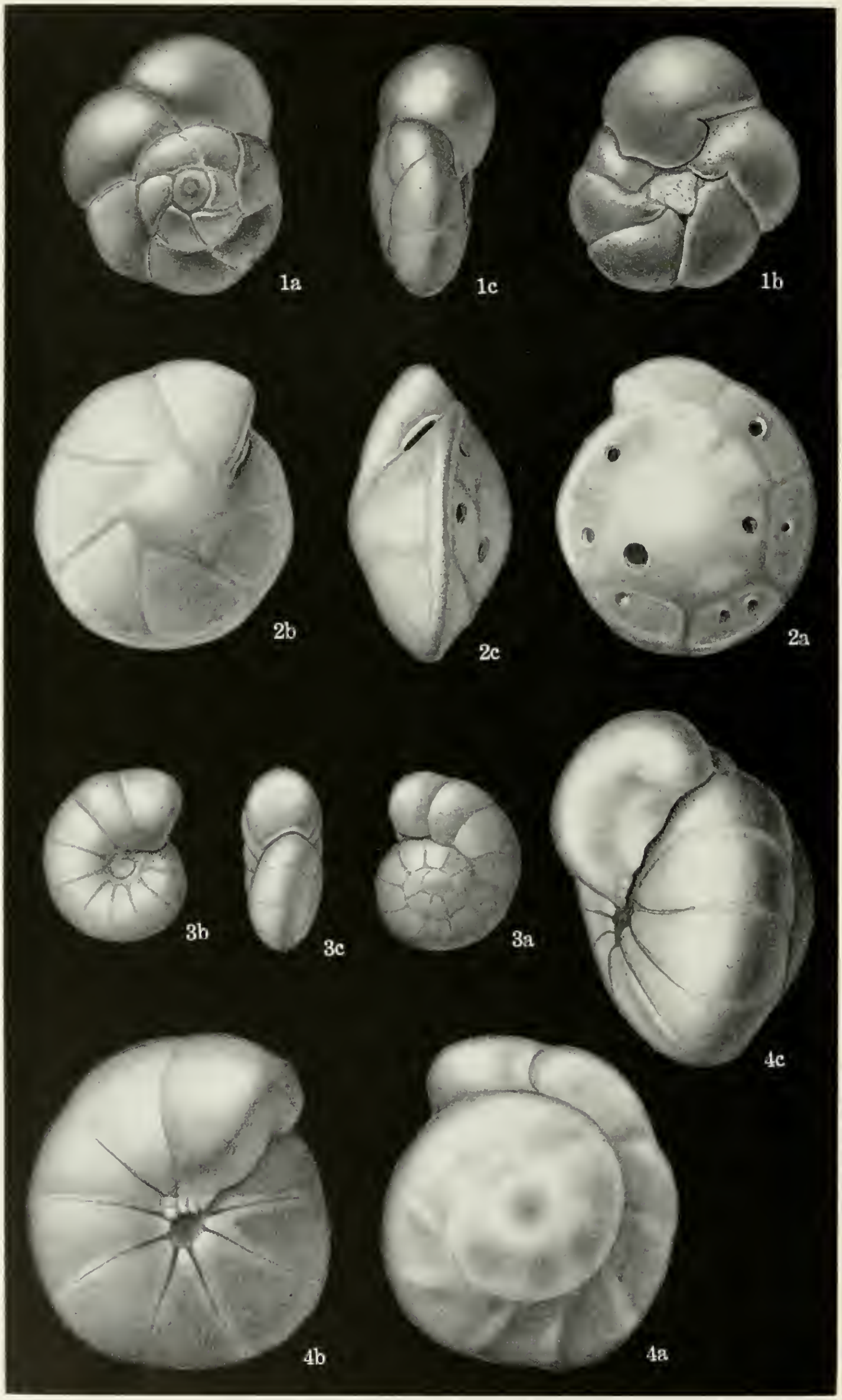

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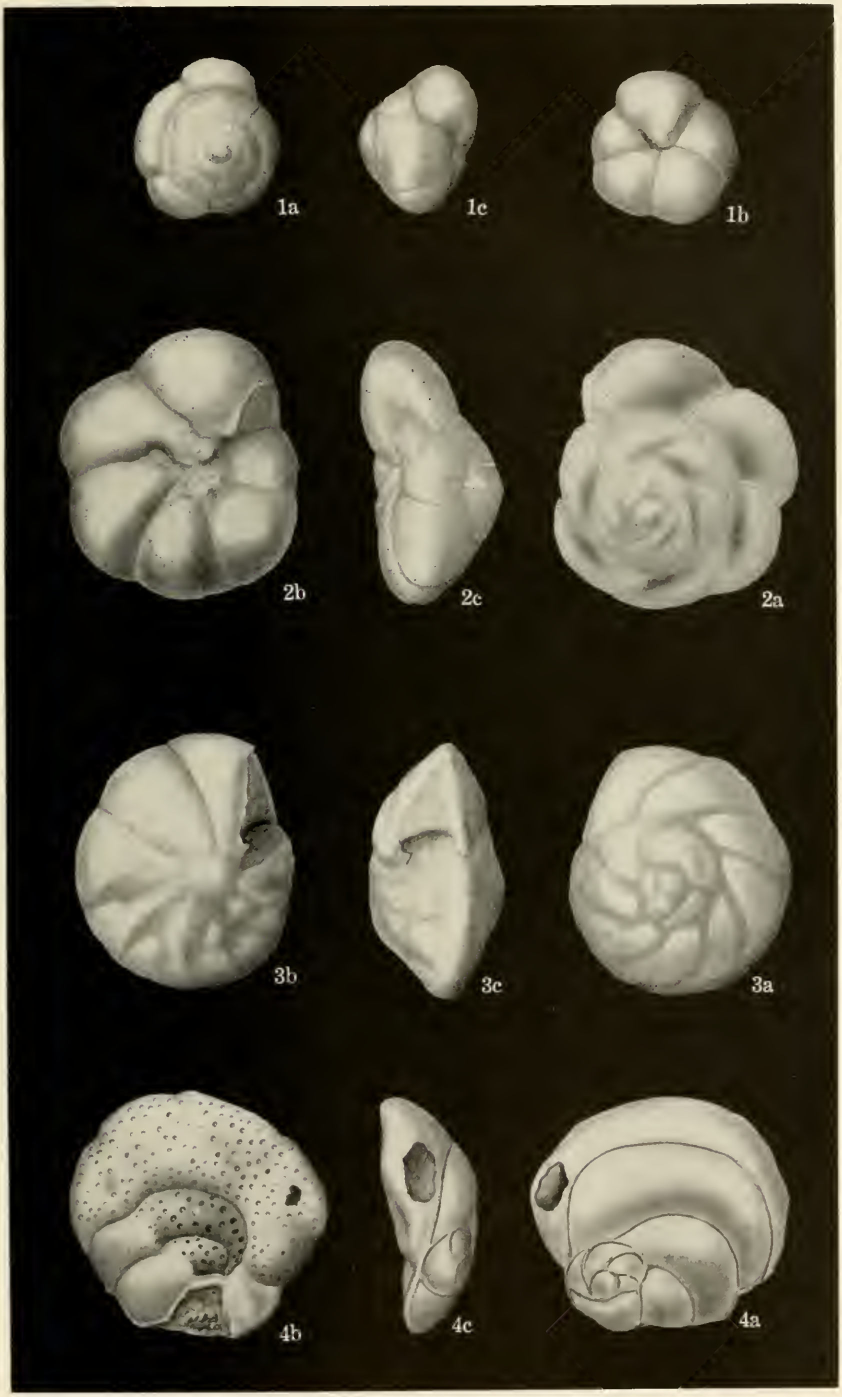

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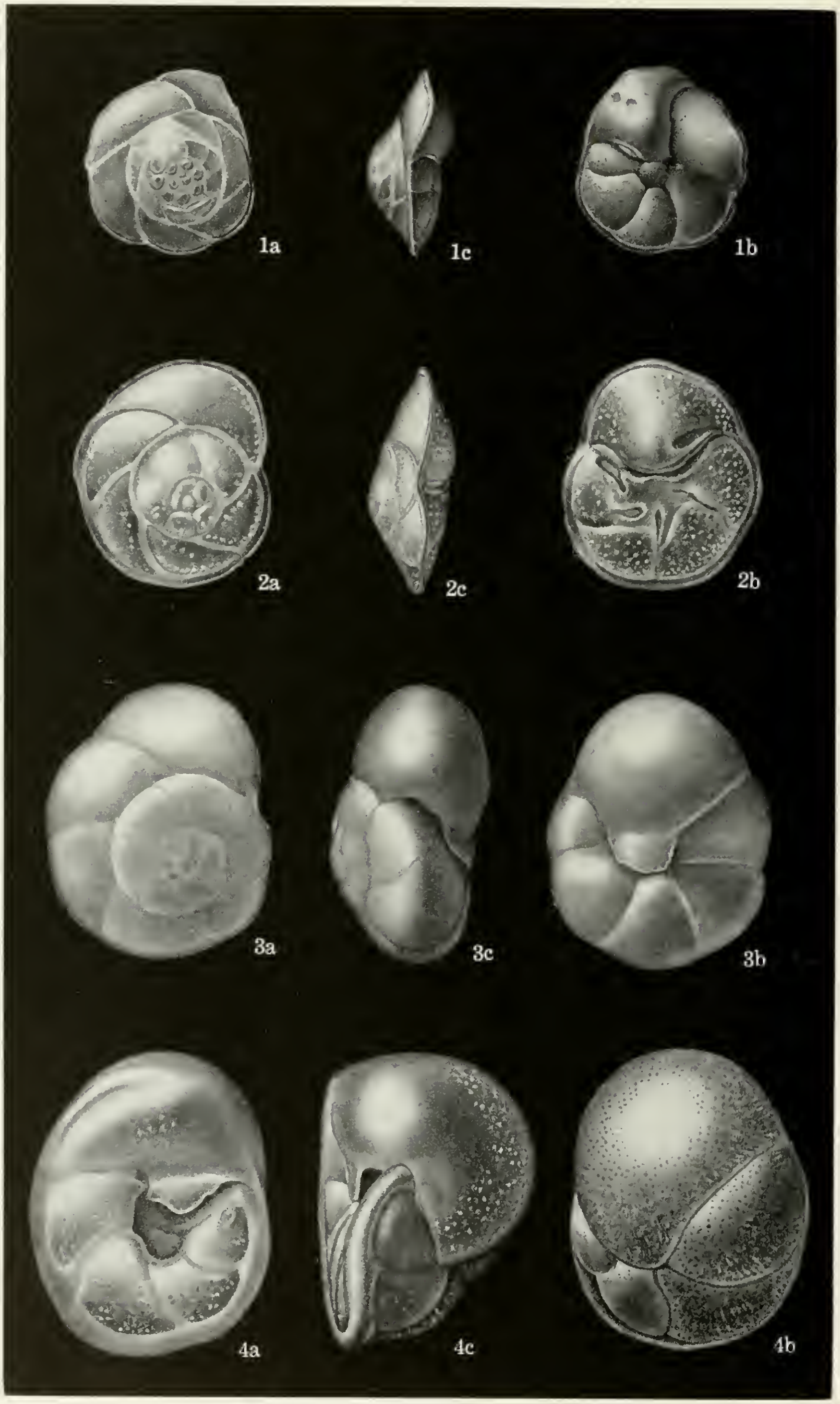

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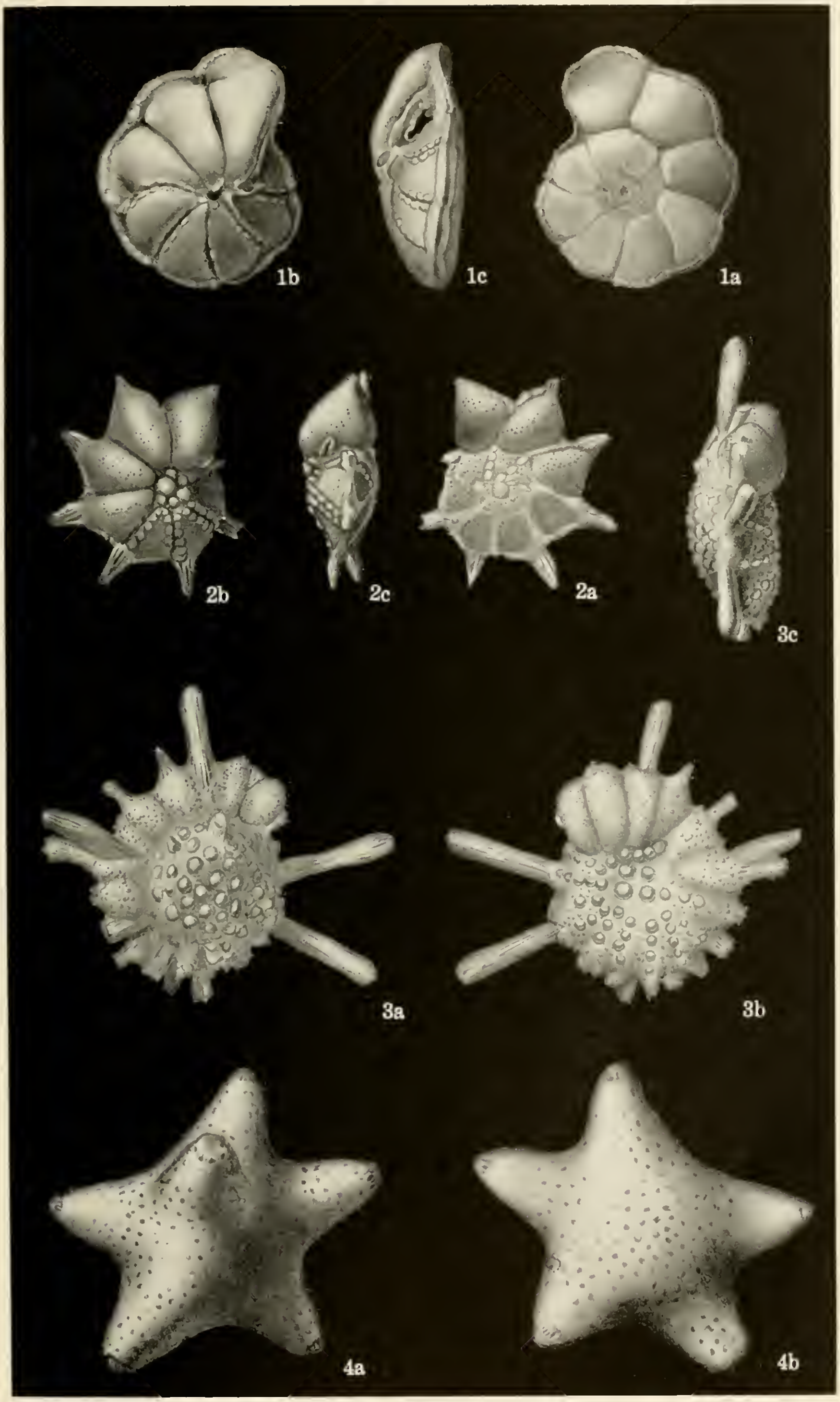

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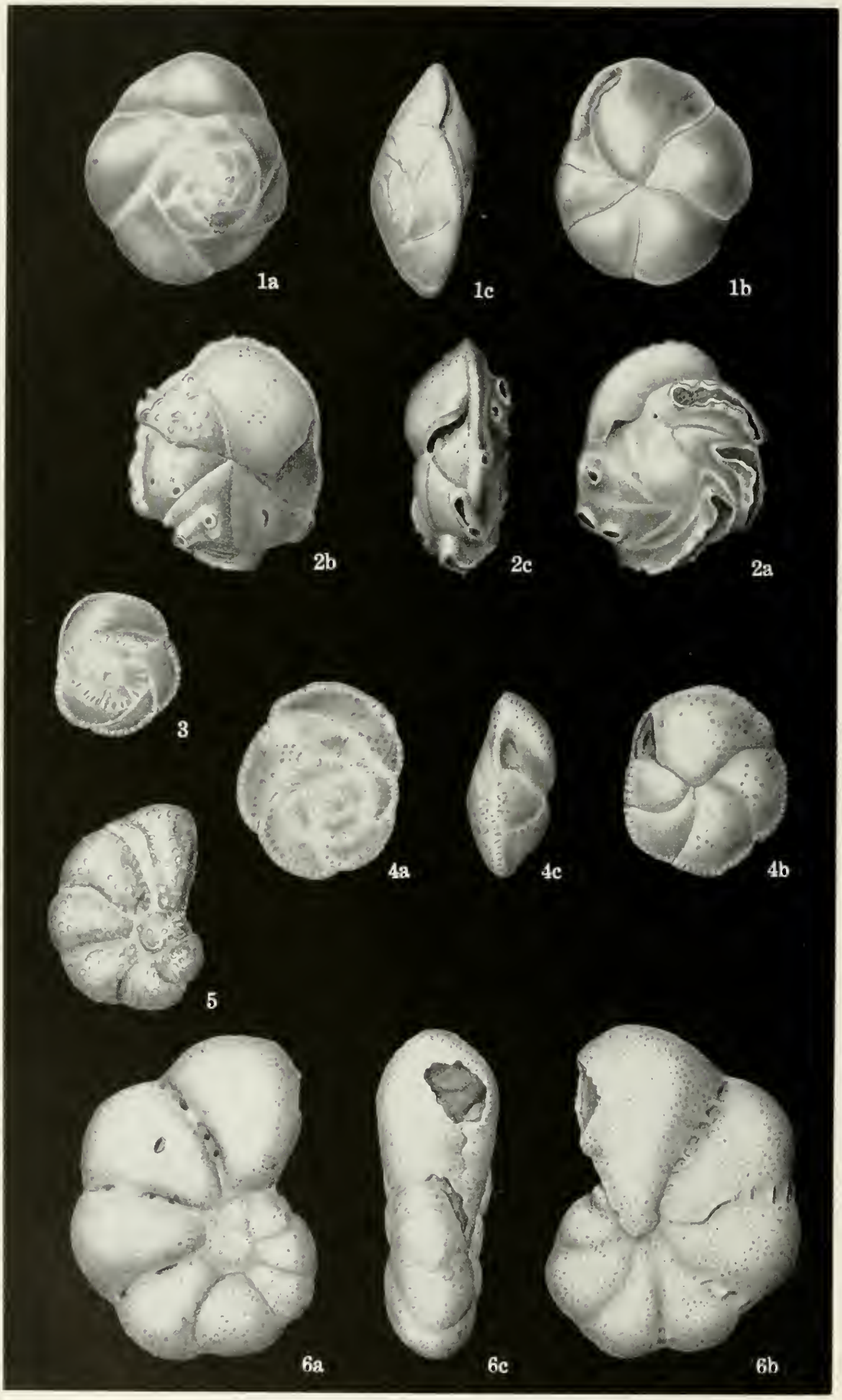

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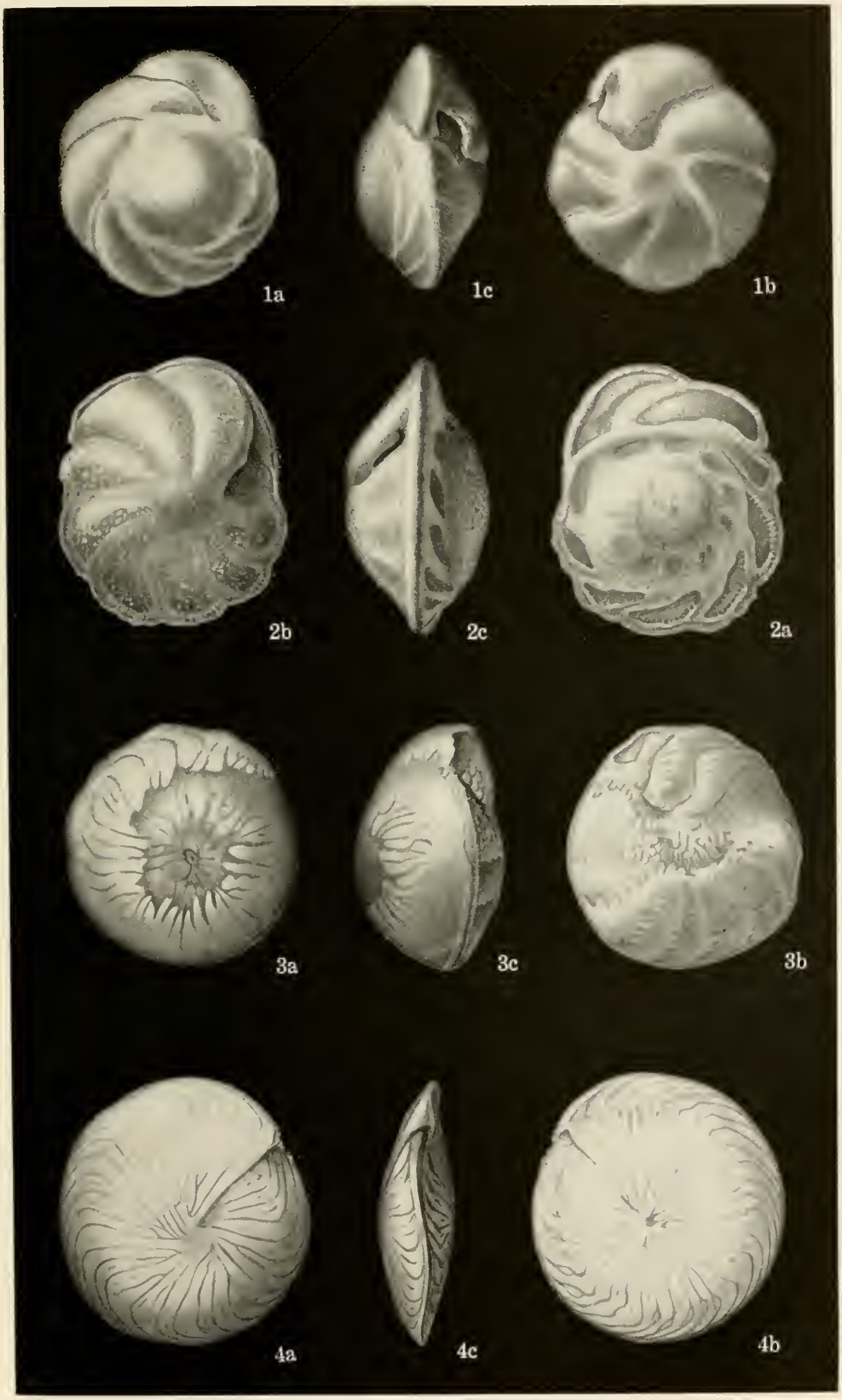

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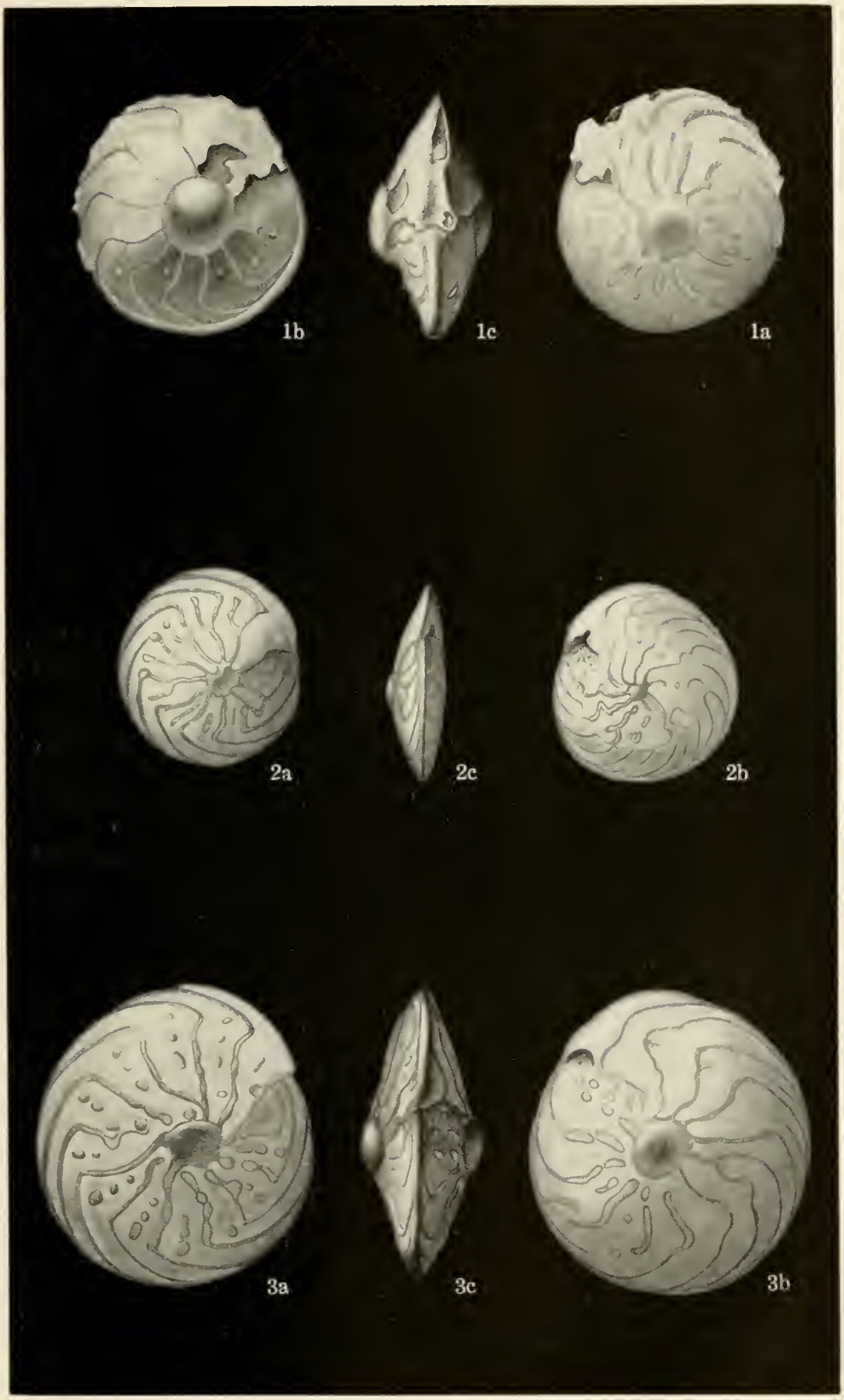

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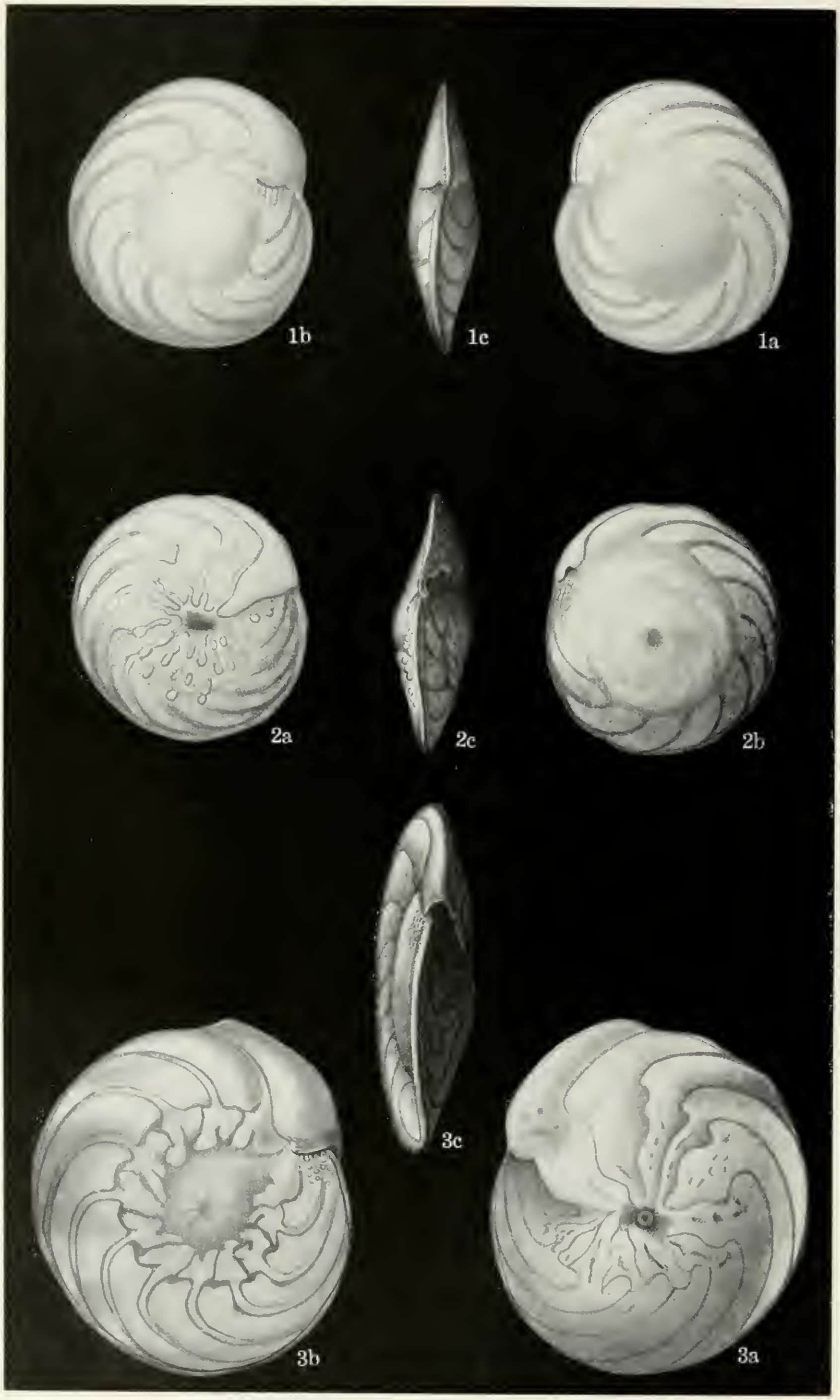

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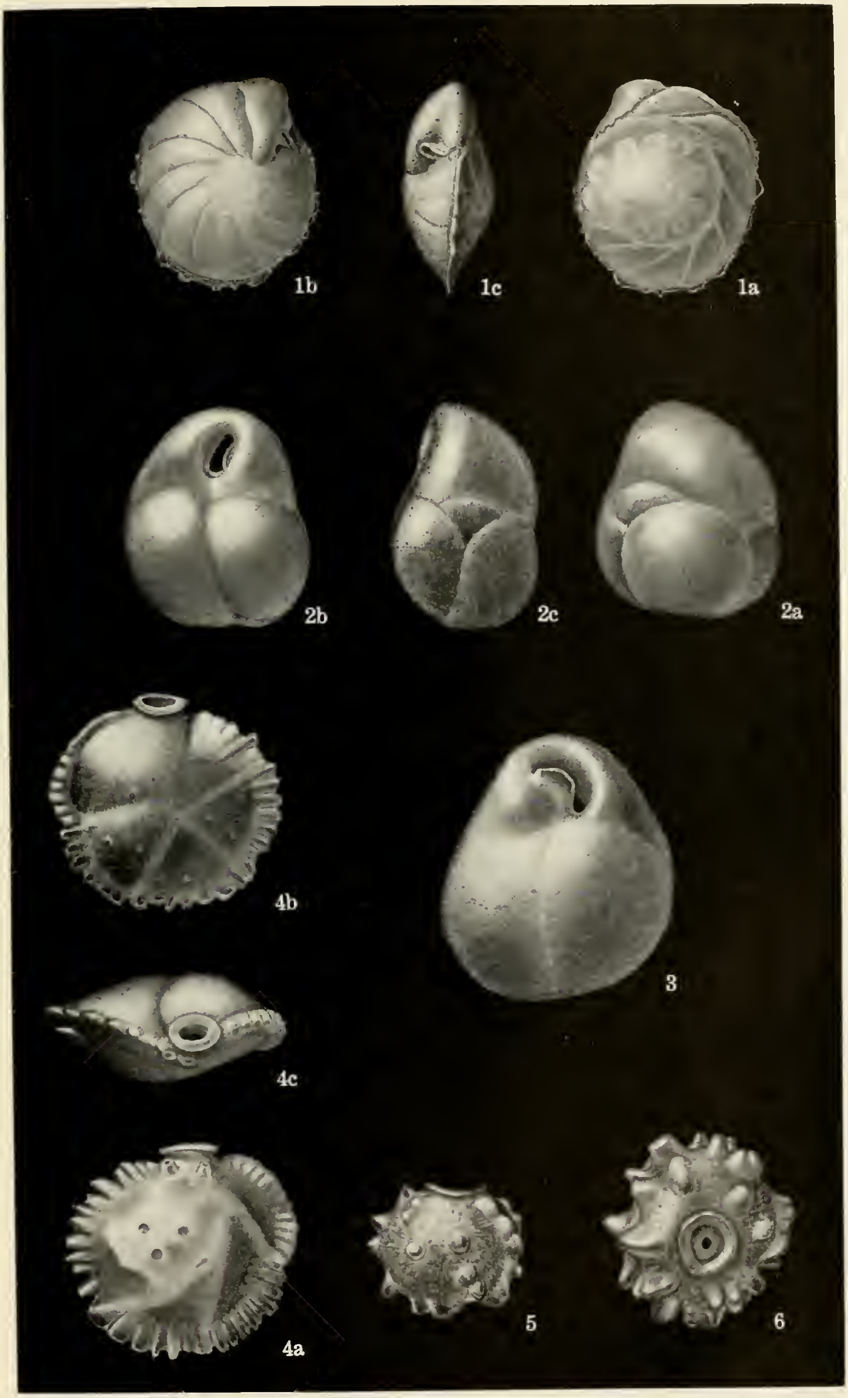

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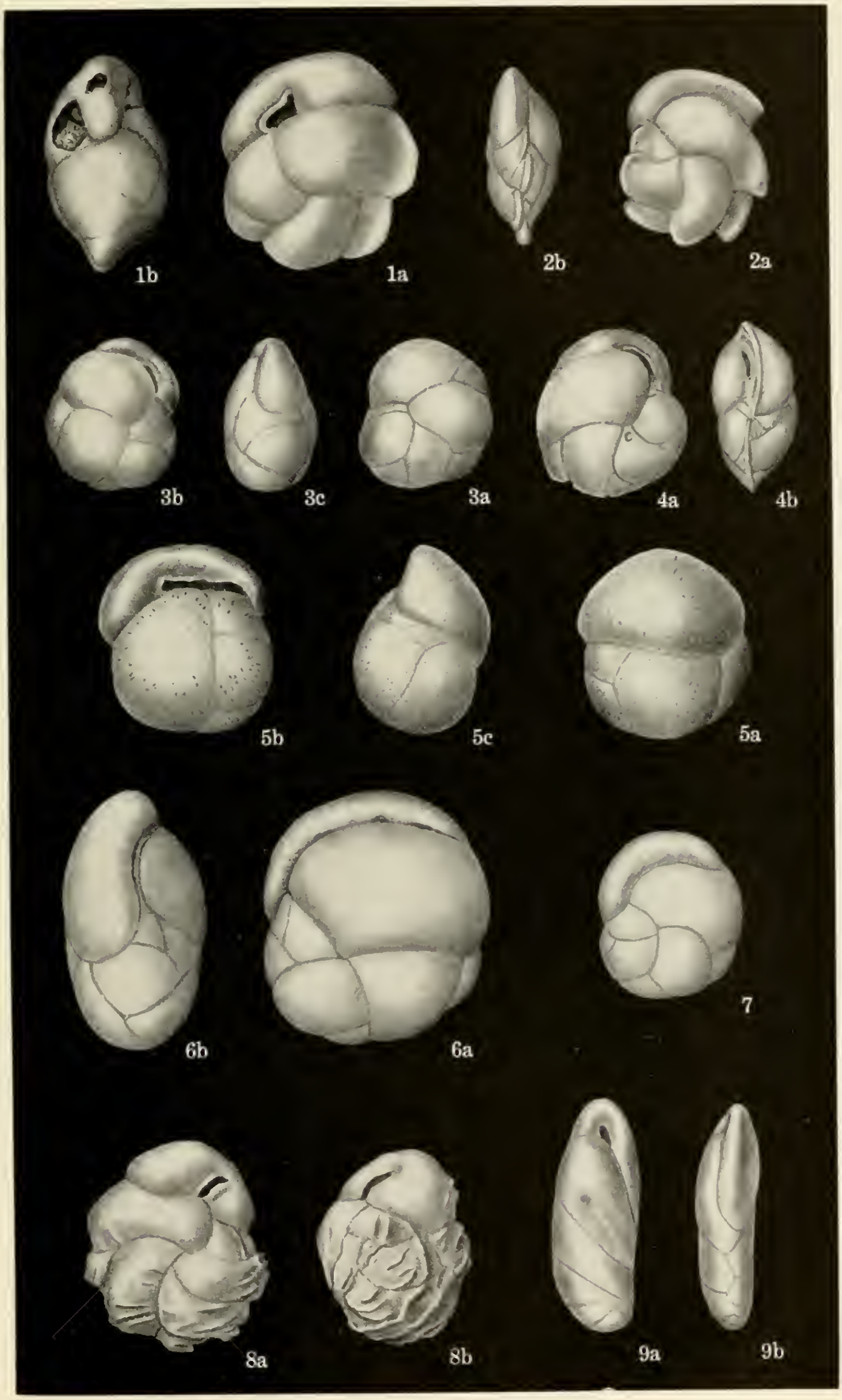

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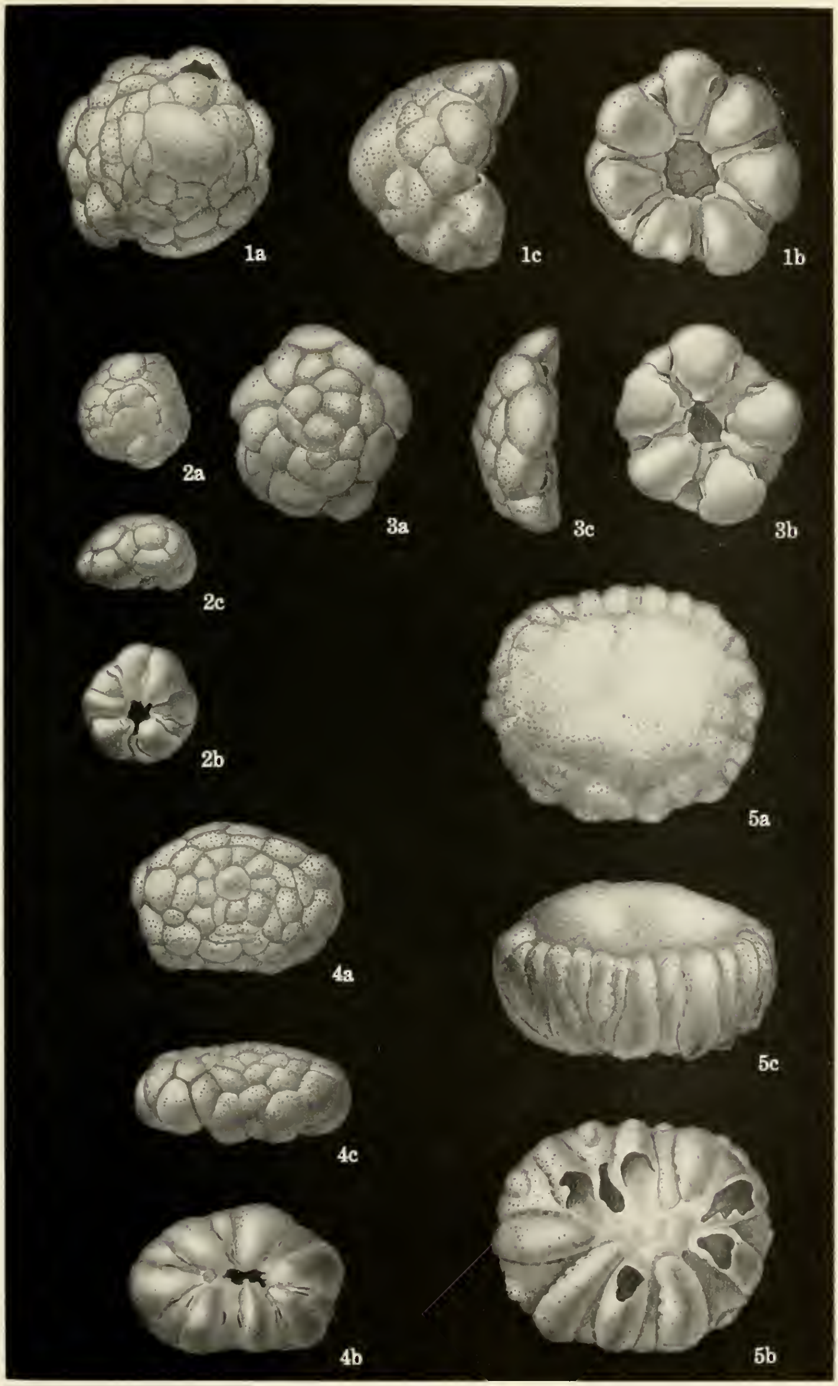

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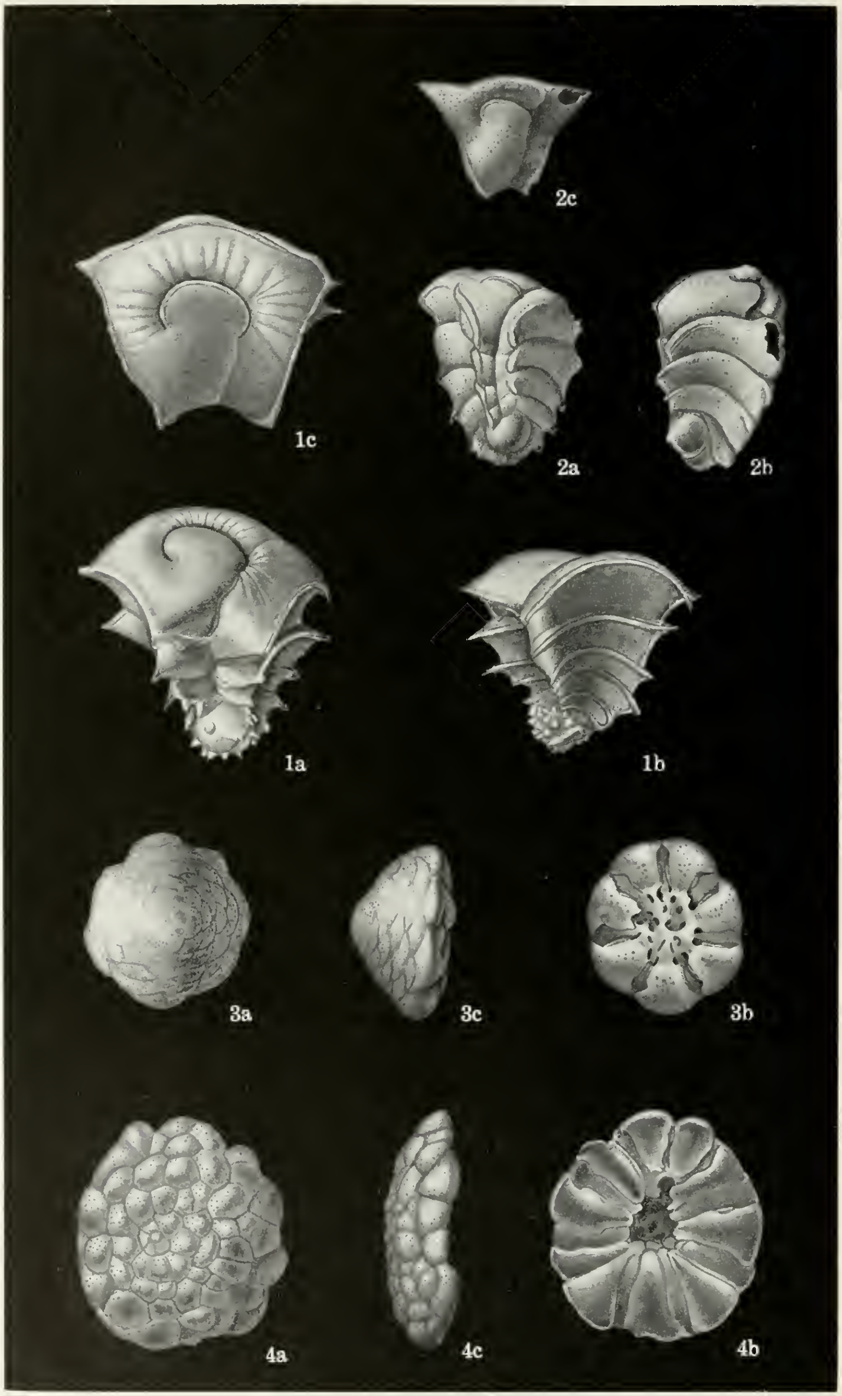

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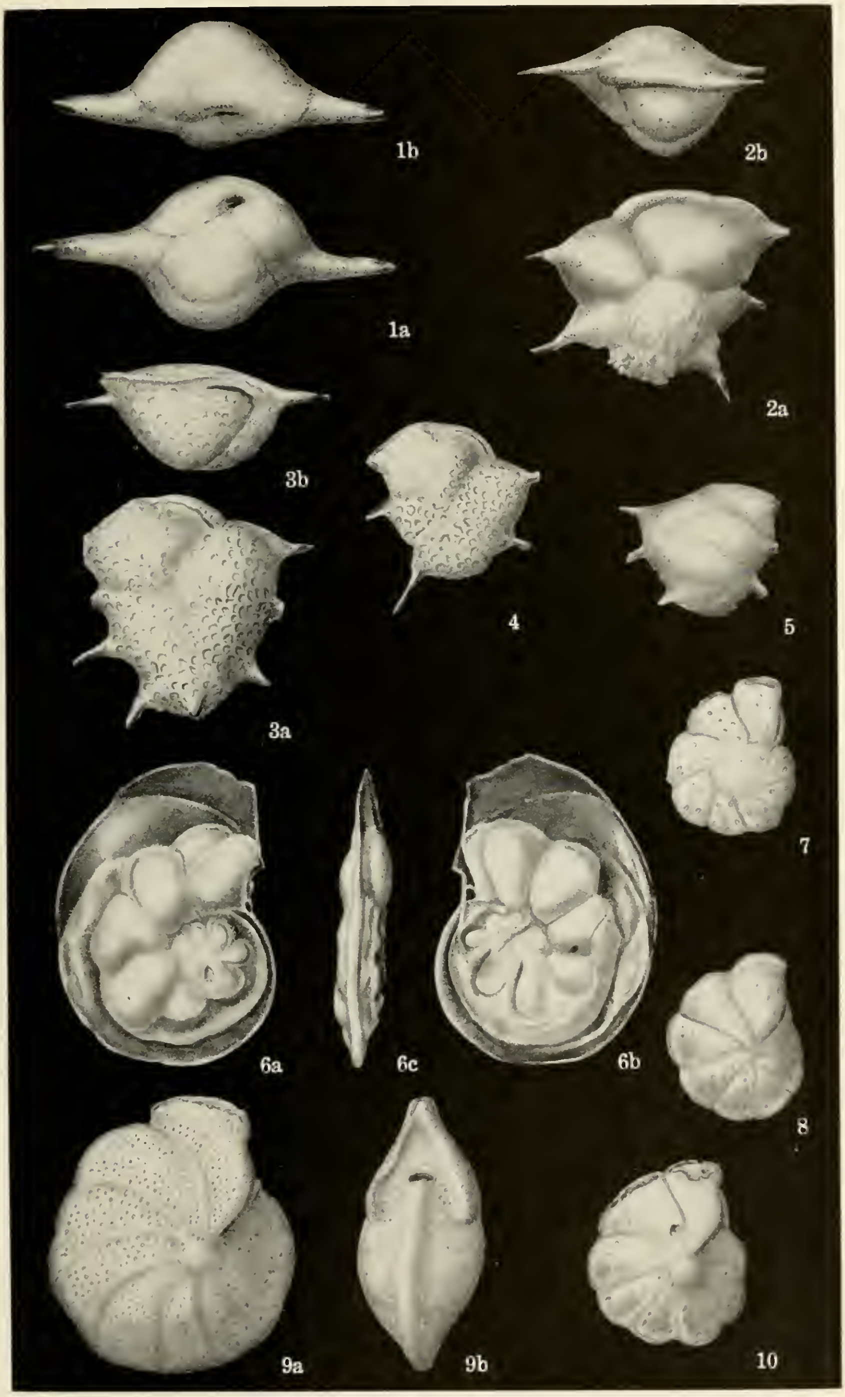

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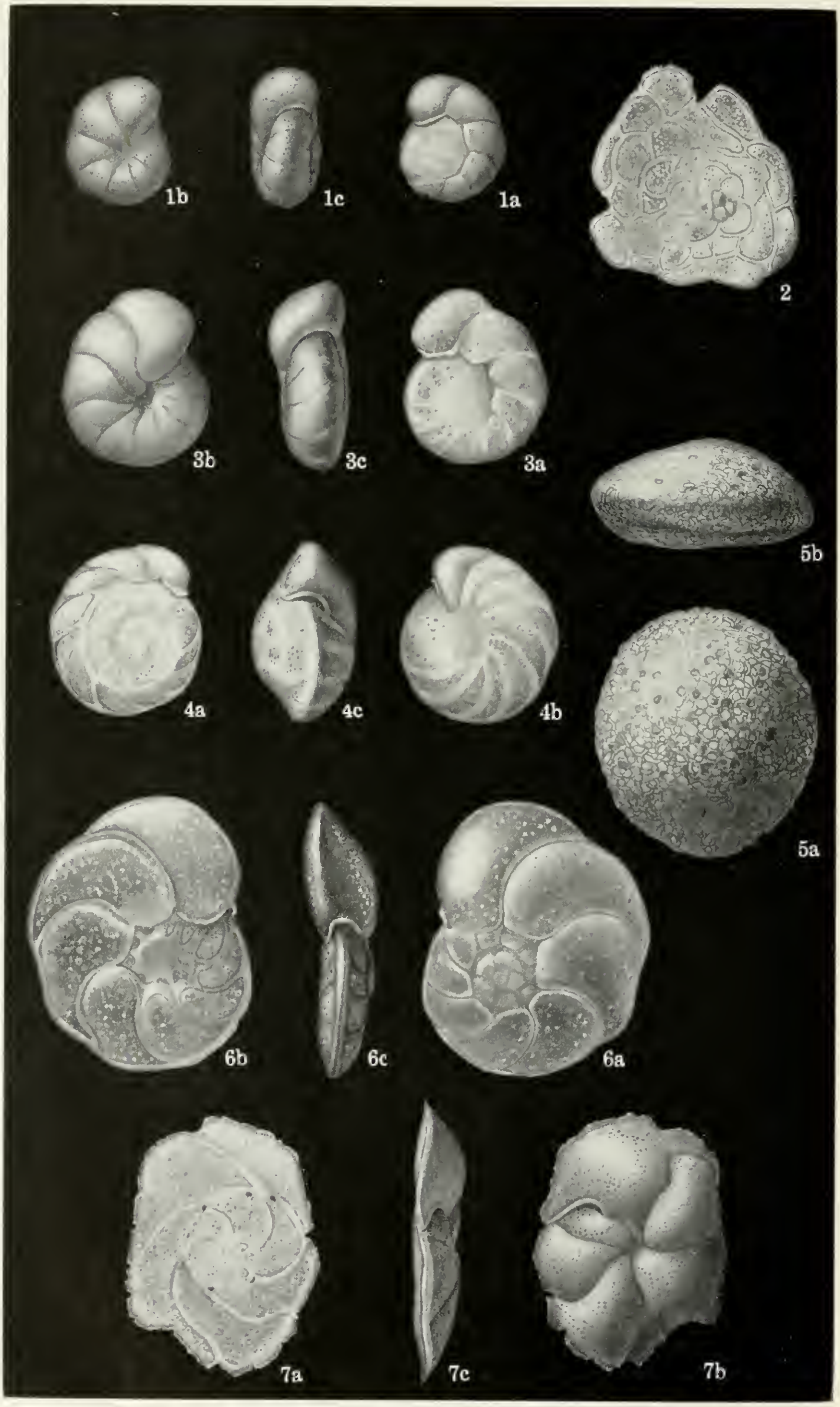

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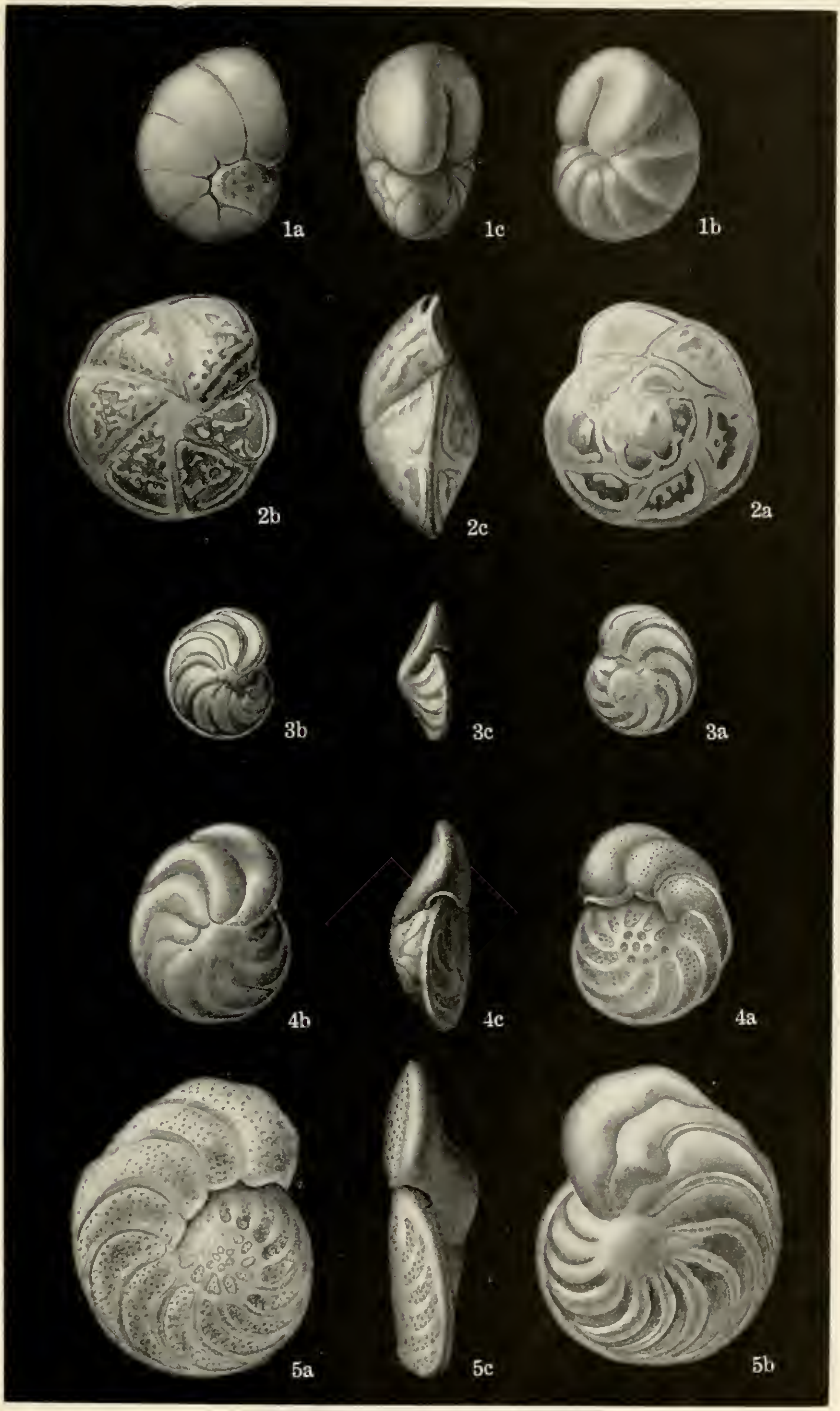

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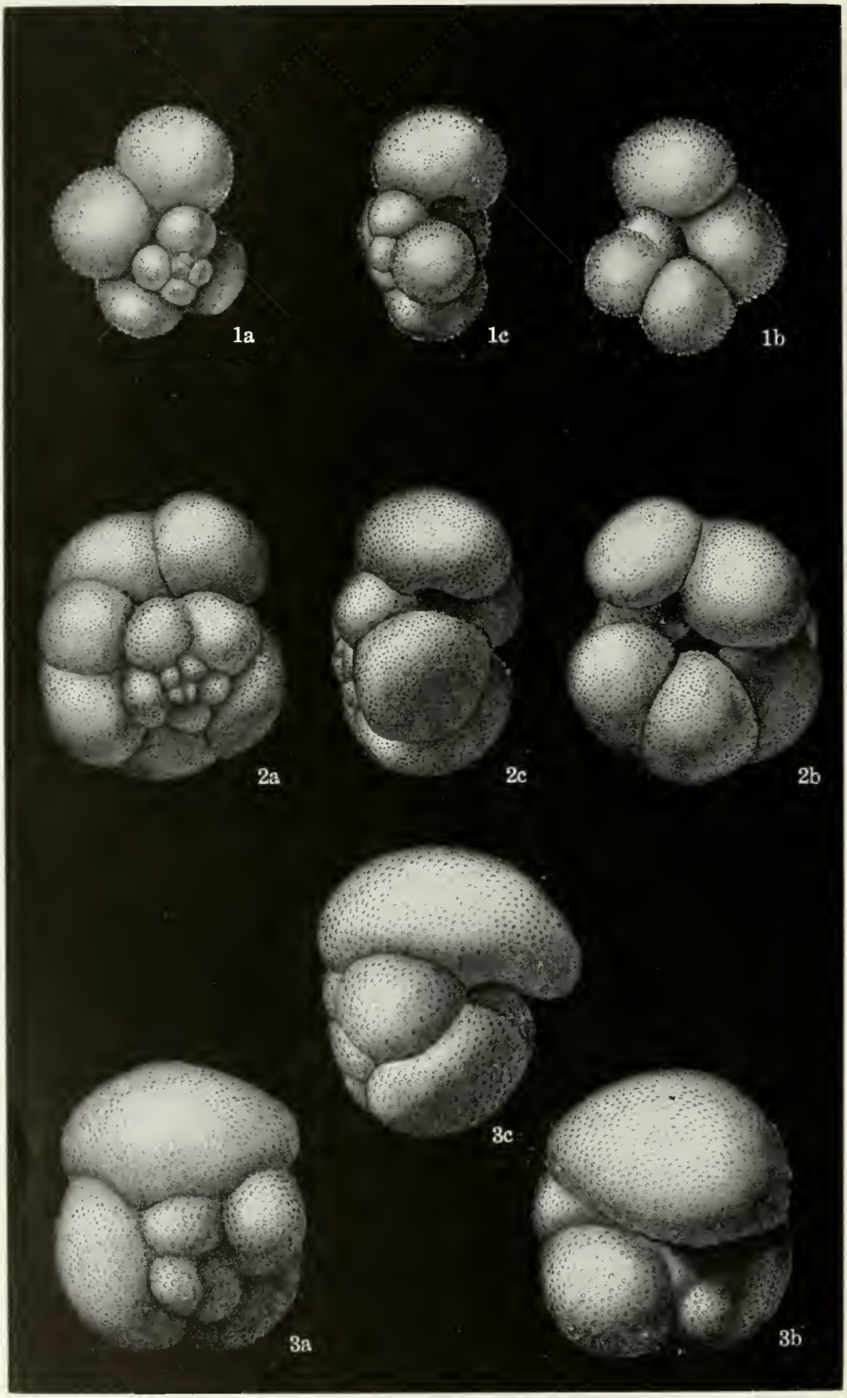

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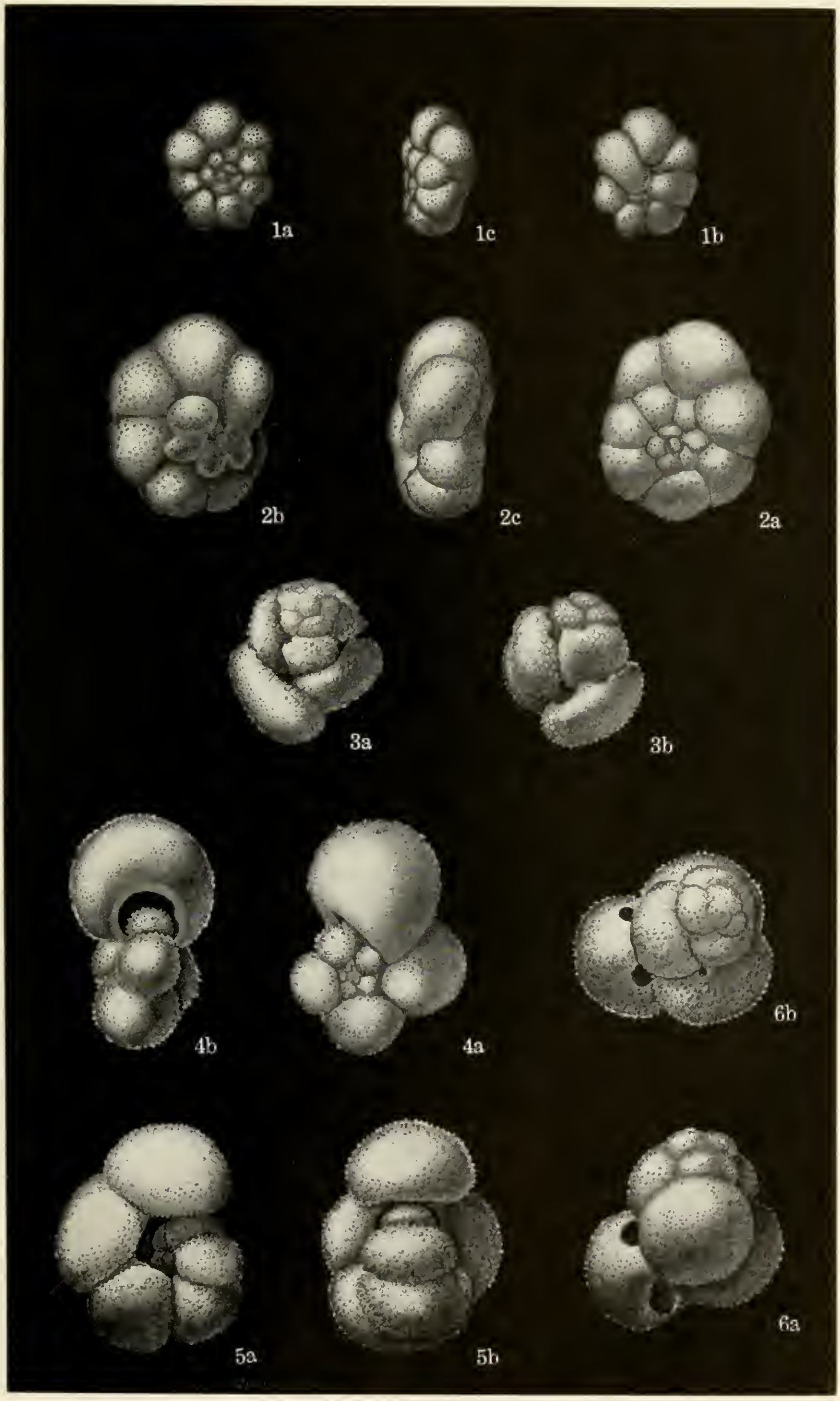

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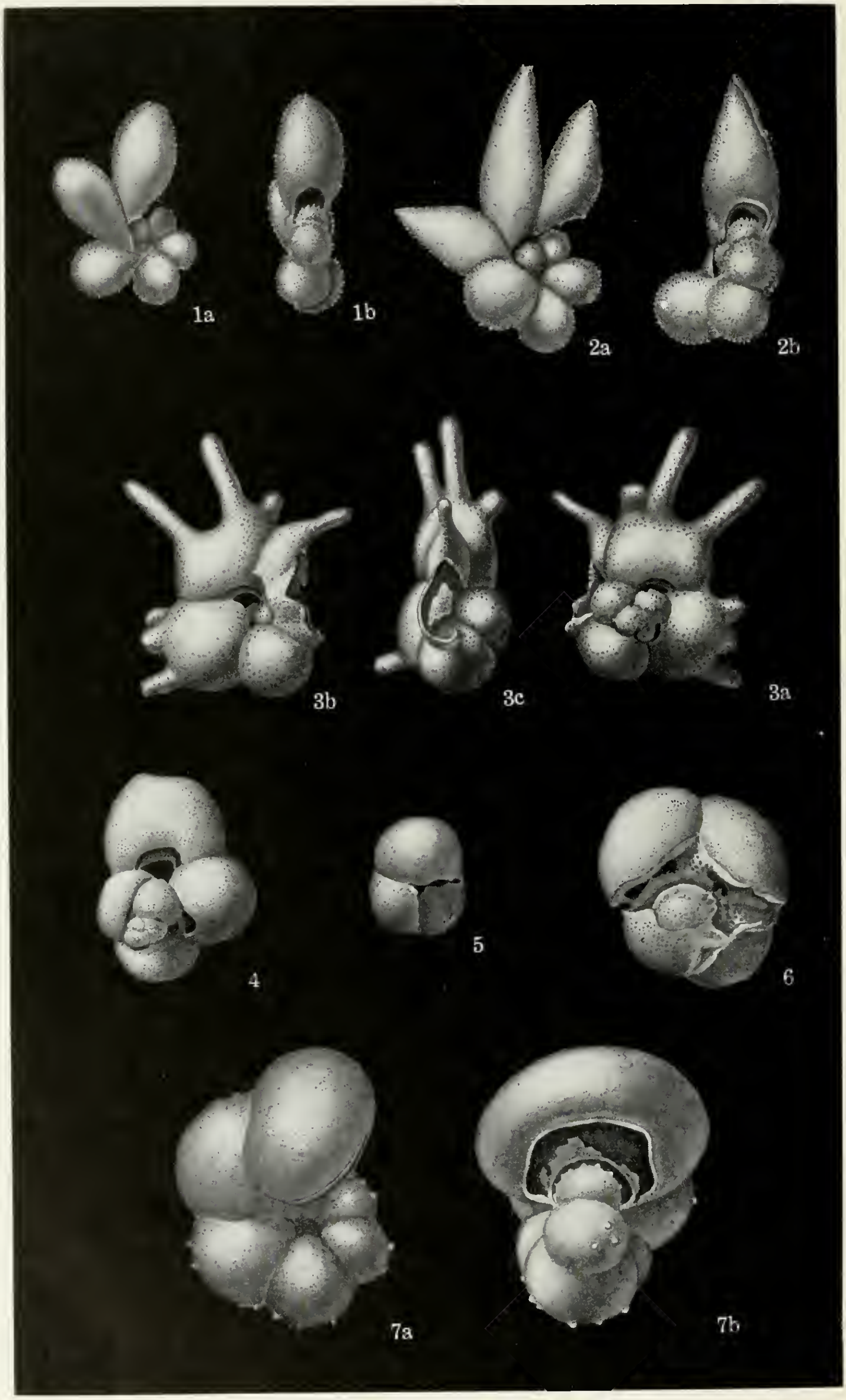

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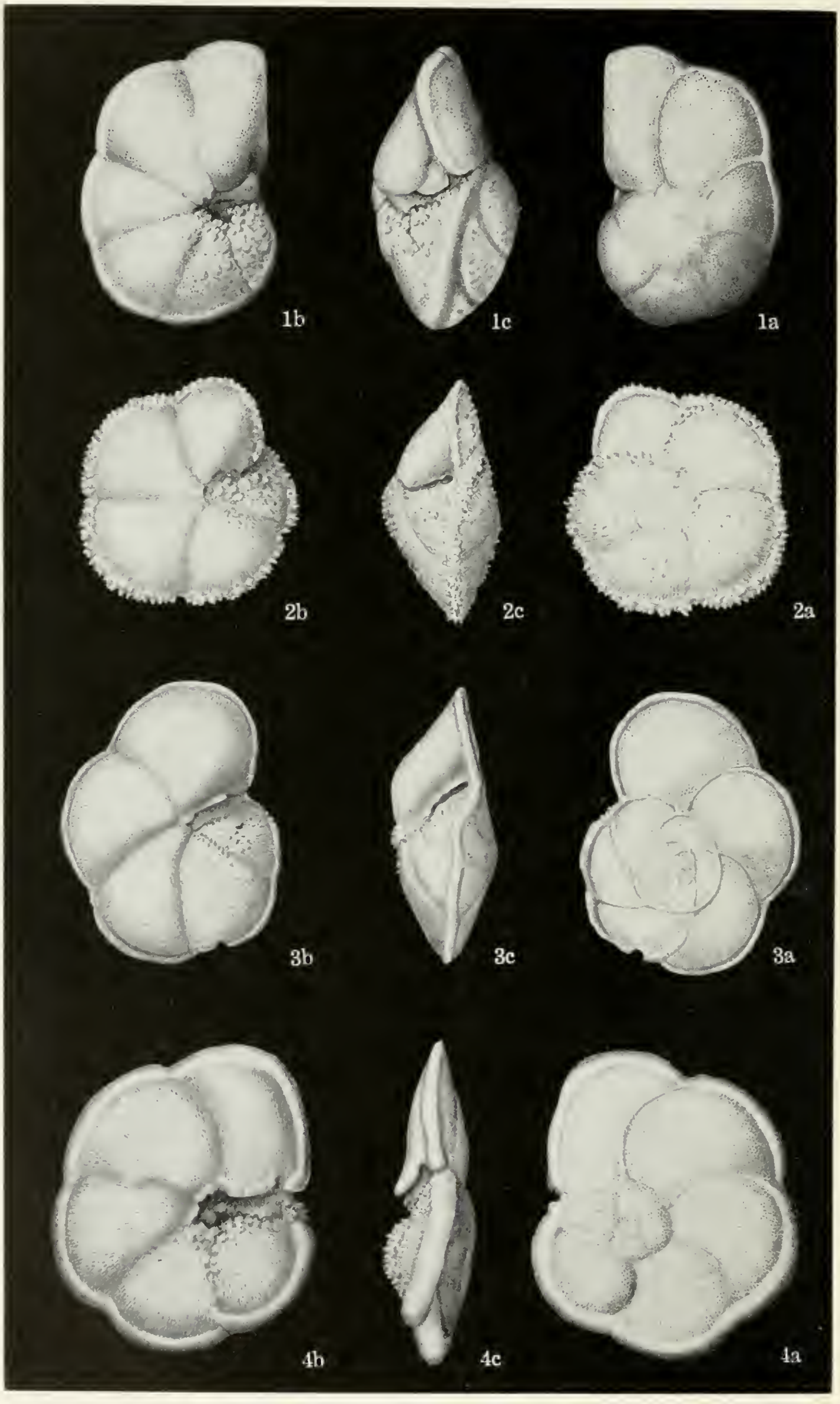

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