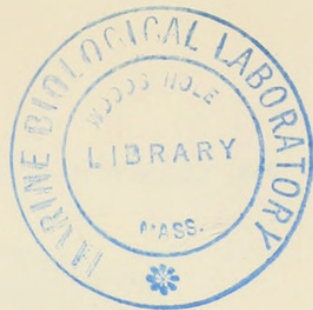




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SHALLOW WATER FORAMINIFERA FROM
CAPE SAN LUCAS, LOWER CALIFORNIA

By

Clifford C. Church

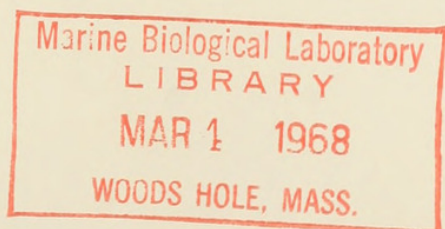
The Foraminifera described in this paper were secured from coarse sand and shell debris dredged in water from 2 to 8 fathoms deep off Cape San Lucas, Baja California.

The collection was made by G D. Hanna and the late Eric K. Jordan during the cruise of the U.S.S. *Ortolan* on an expedition to the Revillagigedo Islands, Mexico, in 1925. The expedition was sponsored by Dr. Barton W. Evermann, then Director of the Museum of the California Academy of Sciences, and was made possible through the cooperation of the Hon. Curtis D. Wilbur, Secretary of the Navy and his department. At the direction of the Secretary, the mine sweeper *Ortolan* was detached from the main fleet and placed at the disposal of the expedition authorities.

The fauna is a shallow-water, open-ocean type, with a number of pelagic species included with the benthonics. The area is just within the northern limits of tropical waters which, however, do extend farther north within the Gulf of California. A shallow water foraminiferal fauna collected off the east shore of Maria Madre Island during the same expedition, is very similar to the Cape San Lucas fauna. This island is the largest of the Tres Marias Islands which lie 250 miles southeast of Cape San Lucas and about 60 miles west of the mainland of Mexico.

Since 1930 many papers concerning the ecology of Foraminifera from the littoral zone outward into the deep basins in the gulf of California and north and south of Cape San Lucas, have appeared. These have been consulted and are listed in the bibliography. In this study I have made an earnest attempt to see and review all of the papers pertinent to this area and general environment and if any have been overlooked it is unintentional and no reflection on their worth.

[357]



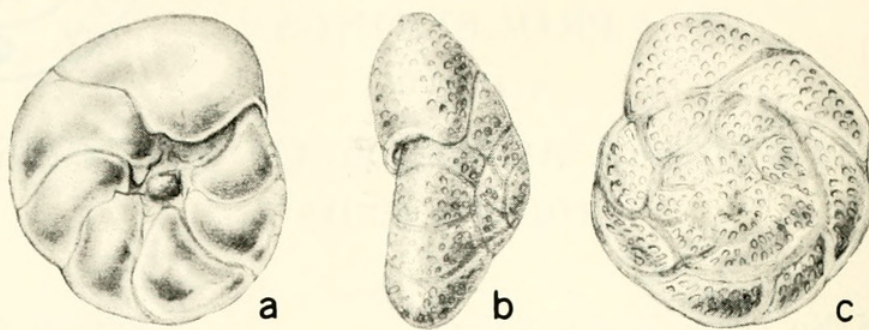


FIGURE 1 (a-c). *Discorbis hannai* Church, new species. Holotype no. 13034 (CAS). a, ventral view; b, apertural view; c, dorsal view.

As an example, some excellent work has been done by graduate students in universities as theses for advanced degrees. These have not been referred to because of their general unavailability.

Among the described foraminiferal faunas of this area, one from Carmen Island and vicinity, in the lower half of the Gulf, by M. L. Natland, closely resembles the Cape fauna. This fauna was extracted from sediments of Pliocene and Pleistocene age collected by Drs. C. A. Anderson and J. Wyatt Durham of the University of California in the 1940 *E. W. Scripps* Cruise to the Gulf of California. Some of the species are also described or listed by Cushman and McCulloch (1939-1948). Other papers on the ecology of the area by O. L. Bandy, F. B. Phleger, J. J. Bradshaw, Frances L. Parker, T. Uchio, and O. L. Bandy and R. E. Arnal, have greatly extended our knowledge and understanding of the Foraminifera of the Gulf and coastal area. In Dr. Bandy's (1961) paper, 17 separate foraminiferal faunas from nine biofacies are recognized and illustrated. Dr. Phleger (1964), in a similar paper, described the variations of foraminiferal populations and he figured or listed a large number of species, many of which are represented in the more open ocean, shallow water fauna of the Cape.

In this study I have been aided by the loan of comparative specimens, and suggestions on the identification of questionable species, by M. L. Natland of the Richfield Oil Corporation, Los Angeles, and by Frances L. Parker and Jean P. Hosmer of Scripps Institution of Oceanography, La Jolla, California. To these people I wish to express my thanks for their generous cooperation.

For assistance in obtaining important papers relative to this study, I am indebted to Dr. G. D. Hanna, California Academy of Sciences; Andrew W. Marianos, Humble Oil Company, Bakersfield, California; R. Stanley Beck, consultant at Bakersfield, and of the Standard Oil Company Laboratory, Oildale, California. For the excellent illustrations I am indebted to the accomplished illustrator of Foraminifera, Mrs. Margaret M. Hanna of the California Academy of Sciences, San Francisco, California.

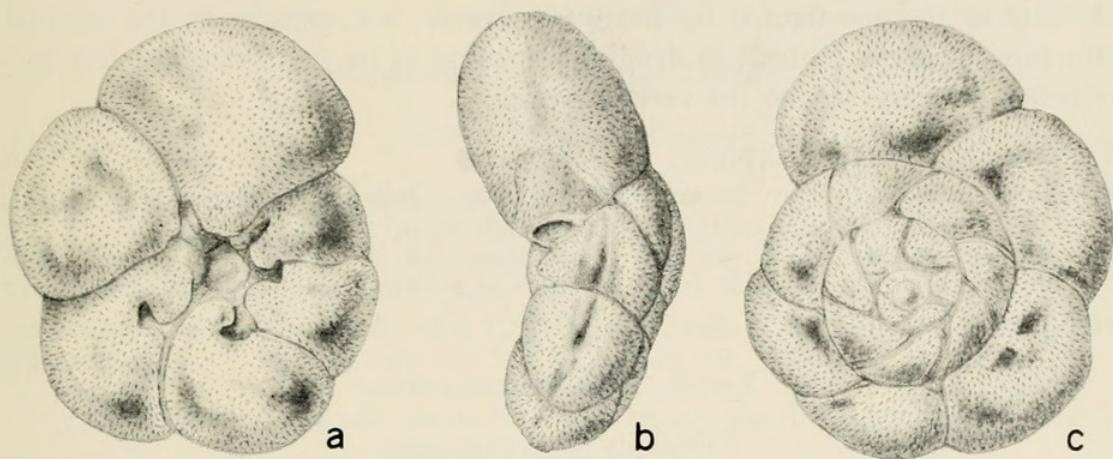


FIGURE 2 (a-c). *Rosalina natlandi* Church, new species. Holotype no. 13035 (CAS). a, ventral view; b, apertural view; c, dorsal view.

The material which forms the basis of this report was studied many years ago. Species were picked out, slides were prepared, and tentative identifications were made. All of this, together with an introduction similar to the above, was sent to Dr. Joseph A. Cushman of Sharon, Massachusetts, with the understanding that a joint paper would result. This was in accordance with a procedure he often followed. Dr. Cushman died before he was able to even acknowledge the receipt. The material was discovered by Miss Ruth Todd among his collections and papers after their receipt in Washington. It is through her interest that the present paper has resulted.

SYSTEMATIC DESCRIPTIONS

Family TEXTULARIIDAE

Subfamily TEXTULARIINAE

Genus *Textularia* Defrance in de Blainville

Textularia agglutinans d'Orbigny.

Textularia agglutinans d'Orbigny, Brady, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 363, pl. 43, figs. 1-3. CUSHMAN, U.S. Nat. Mus., Bull. 71, pt. 2, 1911, p. 9, fig. 10.

This species, which is common in the Cape San Lucas material, is as much as 1 mm. or more in length.

Textularia agglutinans var. *porrecta* Brady.

Textularia agglutinans var. *porrecta* BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 364, pl. 43, figs. 4a, b.

The species of *Textularia* from Cape San Lucas which is referred to this variety may belong to another species as it is extremely small and not as

elongate as the one figured by Brady. However, not considering the internal structure, which is difficult to determine because of its small size, the test corresponds in every way to the variety named.

Textularia gramen d'Orbigny.

Textularia gramen d'Orbigny, BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 365, pl. 43, figs. 9, 10. CUSHMAN, U.S. Nat. Mus., Bull. 71, pt. 2, 1911, p. 8, figs. 6-8.

This is a highly variable form in the Cape San Lucas material and fairly abundant.

Family ATAXOPHRAGMIIDAE

Subfamily VALVULININAE

Genus **Goesella** Cushman

Goesella parva Cushman and McCulloch.

Goesella parva CUSHMAN and MCCULLOCH, 1939, Allan Hancock Pac. Exped., Univ. South. Calif., vol. 6, no. 1, p. 98, pl. 10, figs. 13, 14.

The smallness of the test of this species renders it very inconspicuous in a fauna of larger forams and it might easily be overlooked. It is listed as occurring at a number of places along the coast of Baja California and Mexico. The type is from near Magdalena Bay, Mexico in 19 fathoms.

Family TROCHAMMINIDAE

Genus **Trochammina** Parker and Jones

Trochammina inflata (Montagu).

Trochammina inflata (Montagu), BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 338, pl. 41, figs. 4a-c. CUSHMAN, 1910, U.S. Nat. Mus., Bull. 71, pt. 1, p. 121, fig. 188.

Several good specimens of this species were found but it could not be considered common.

Family LITUOLIDAE

Genus **Haplophragmoides** Cushman

Haplophragmoides canariensis (d'Orbigny).

Nonionina canariensis D'ORBIGNY, 1839, Barker-Webb and Berthelot, Hist. Nat. Iles Canaries, vol. 2, pt. 2, Foraminifères, p. 128, pl. 2, figs. 33, 34.

Haplophragmium canariensis (d'Orbigny), SIDDALL and BRADY, 1879, Cat. Brit. Rec. Foram., p. 4. BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 310, pl. 35, figs. 1-5.

Haplophragmoides canariensis (d'Orbigny), CUSHMAN, 1910, U.S. Nat. Mus. Bull. 71, pt. 1, p. 101, fig. 149.

This is a very rare species in this fauna.

Family MILIOLIDAE

Subfamily QUINQUELOCULININAE

Genus **Pyrgo** Defrance

Pyrgo denticulata (Brady).

Biloculina ringens Lamarck var. *denticulata* BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 143, pl. 3, figs. 4, 5.

Biloculina denticulata CUSHMAN, 1917, U.S. Nat. Mus., Bull. 71, pt. 6, p. 80, pl. 33, fig. 1.

Pyrgo denticulata CUSHMAN, 1929, U.S. Nat. Mus., Bull. 104, pt. 6, p. 69, pl. 18, figs. 3, 4.

This species is relatively scarce here but exhibits the distinguishing features of the species as figured by Cushman (1910-1917).

Pyrgo subsphaerica d'Orbigny.

Biloculina subsphaerica d'ORBIGNY, 1839, De la Sagra. Hist. Fis. Pol. Nat. Cuba, "Foraminifères," p. 162, pl. 8, figs. 25-27.

Pyrgo subsphaerica d'Orbigny, CUSHMAN, 1929, U.S. Nat. Mus., Bull. 104, pt. 6, p. 68, pl. 18, figs. 1, 2.

Among the few specimens of this species found there is considerable variation in size.

Genus **Triloculina** d'Orbigny

Triloculina inflata d'Orbigny.

Triloculina inflata d'ORBIGNY, 1836, Ann. Sci. Nat., Paris, Ser. 1, tome 7, p. 300. NATLAND, 1950, Geol. Soc. America, Mem. 42, pt. 4, p. 10, pl. 3, figs. 11 a-c.

Several specimens of this robust species were found. What appears to be a variation of the form has a sharp angle on one or both sides of the larger chamber and in a few, a similar angle on the side of the smaller chamber.

Triloculina oblonga Montagu.

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

Triloculina oblonga d'ORBIGNY, 1826, Sci. Nat. Paris, vol. 7, p. 300, no. 16, Modeles no. 95; in De la Sagra, Hist. Fis. Pod. Cuba, 1839, "Foraminifères," p. 175, pl. 10, figs. 3-5.

Trioculina oblonga (Montagu), CUSHMAN and VALENTINE, 1930, Dept. Geol. Stanford Univ., vol. 1, no. 1, p. 16, pl. 4, figs. 5a, b, c, 6a, b, c.

Triloculina circularis Bornemann.

Triloculina circularis BORNEMANN, 1855, Zeitschr. deutsch. geol. Ges., vol. 7, p. 349. CUSHMAN, 1917, U.S. Nat. Mus., Bull. 71, pt. 6, p. 67, pl. 25, fig. 4; pl. 26, fig. 1. CUSHMAN and VALENTINE, 1930, Contrib. Dept. Geol. Stanford Univ., vol. 1, no. 1, p. 15, pl. 4, figs. 4a, b, c.

This is one of the less common species in this fauna.

Triloculina sidebottomi Martinotti.

Miliolina subrotunda SIDEBOTTOM, 1904, Manchester Lit. Phil. Soc., vol. 6, no. 5, p. 8, text fig. 2, pl. 3, figs. 1-7.

Sigmoilina sidebottomi MARTINOTTI, 1920, Atti. Soc. Ital. Sci. Nat., vol. 59, pl. 2, fig. 29; text figs. 59-61.

Triloculina sidebottomi (Martinotti), PARKER, PHLEGER, and PEIRSON, 1953, Cush. Found. Foram. Res. Spec. Pub. no. 2, p. 14, pl. 2, figs. 25-28.

Only a few specimens of this species were found.

Genus *Quinqueloculina* d'Orbigny***Quinqueloculina agglutinata* Cushman.**

Quinqueloculina agglutinata CUSHMAN, 1917, U.S. Nat. Mus., Bull. 71, pt. 6, p. 43, pl. 9, fig. 2. CUSHMAN and VALENTINE, 1930, Contrib. Dept. Geol. Stanford Univ., vol. 1, no. 1, p. 9, pl. 1, figs. 7a, b, c.

This is one of the rare species at this locality.

***Quinqueloculina seminula* (Linnaeus).**

Quinqueloculina seminula (Linnaeus), CUSHMAN and VALENTINE, 1930, Contrib. Dept. Geol. Stanford Univ., vol. 1, no. 1, p. 10, pl. 1, figs. 8a, b, c.

This highly polished species appears to have a wide range along the Pacific Coast. It is one of the common species at Cape San Lucas.

***Quinqueloculina compta* Cushman.**

Quinqueloculina compta CUSHMAN, 1947, Contrib. Cushman Lab. Foram. Res., vol. 23, pt. 4, art. no. 302, p. 87, pl. 19, fig. 2a, b, c. PHLEGER, 1964, In Mem. 3, Am. Assoc. Petrol. Geol., Ed. by Van Andel and Shor, p. 383, pl. 1, fig. 17.

This is one of the common species at Cape San Lucas and wherever it has been listed in the papers concerning the ecology of the Gulf of California Foraminifera it is listed as a very shallow-water form. What is probably the same species was figured by Bandy (1961). He listed it as *Q. angulosa* d'Orbigny.

This is a highly variable species, ranging between the more elongate type as figured by Bandy to very short robust forms with most characters accentuated but retaining the dull, granular surface throughout its variations.

***Quinqueloculina lamarckiana* d'Orbigny.**

Quinqueloculina lamarckiana D'ORBIGNY, 1839, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, "Foraminifères," p. 189, pl. 11, figs. 14, 15. CUSHMAN and VALENTINE, 1930, Contrib. Dept. Geol. Stanford Univ., vol. 1, no. 1, p. 10, pl. 1, figs. 9a, b, c, and 10a, b, c.

Not a common form here but well defined. Only the larger ones appear to be typical.

Quinqueloculina flexuosa d'Orbigny.

Quinqueloculina flexuosa D'ORBIGNY, 1839, Voy. Am. Merid., "Foraminiférés," p. 73, pl. 4, figs. 4-6. CUSHMAN and VALENTINE, 1930, Contrib. Dept. Geol. Stanford Univ., vol. 1, no. 1, p. 11, pl. 2, figs. 3a, b, c. NATLAND, 1950, Geol. Soc. America, Mem. no. 43, pt. 4, p. 7, pl. 1, figs. 6a, b, c.

This is one of the commoner forms here and one which is fairly constant in character.

Quinqueloculina costata d'Orbigny.

Quinqueloculina costata d'Orbigny, CUSHMAN, 1917, U.S. Nat. Mus., Bull. 71, pt. 6, p. 49, pl. 15, fig. 1. CUSHMAN 1922, Carnegie Inst. Washington, vol. 17, publ. 311, p. 66, pl. 11, fig. 5. NATLAND, 1950, Geol. Soc. America, no. 43, pt. 4, p. 8, pl. 2, figs. 4a, b, c.

A common form at Cape San Lucas, many specimens were found.

Quinqueloculina catalinensis Natland.

Quinqueloculina catalinensis NATLAND, 1938, Calif. Univ., Scripps Inst. Oceanogr., Bull. Tech. Ser., vol. 4, no. 5, p. 142, pl. 4, fig. 3a, b, c. BANDY, 1961, Micropaleo. vol. 7, no. 1, p. 16, pl. 2, fauna 2, figs. 12a, b, c.

This is quite a common but highly variable species here. The more mature ones have 14 to 16 transverse, sinuous, ripple-like ridges or welts, some branching or discontinuous with many continuing over the usually acute angle of the test, rounding it off. This more highly ornamented type of the species might easily be considered a different species but the less ornate ones, which are associated with them, are like the typical *Q. catalinensis*.

Quinqueloculina species.

Test elongate, more than twice as long as broad, compressed, surface dull white, rough and pitted, short neck and phialine lip, aperture oval. A number of specimens were found, most of them perfectly preserved.

Subfamily NODOBACULARIINAE

Genus **Vertebralina** d'Orbigny**Vertebralina striata** d'Orbigny.

Vertebralina striata d'Orbigny, BRADY, 1884, Rep. Voy. Challenger, Zoology, vol. 9, p. 187, pl. 12, figs. 14-16. CUSHMAN, 1917, U.S. Nat. Mus., Bull. 71, pt. 6, p. 38, pl. 22, figs. 3, 4.

Of fairly common occurrence here at Cape San Lucas.

Vertebralina insignis Brady.

Vertebralina insignis Brady, FLINT, 1899, U. S. Nat. Mus., Rept., p. 302, pl. 47, fig. 4.

Only a few of this species were found in the Cape San Lucas collection.

Subfamily TUBINELLINAE Rhumbler

Genus **Parrina** Cushman**Parrina bradyi** (Millett).

Nubecularia inflata BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 135, pl. 1, figs. 5-8.
Parrina bradyi (Millett), CUSHMAN, Contrib. Cush. Lab. Foram. Res., vol. 7, pt. 1, p. 20.

This rather small form is variable in shape, number, and type of apertures. It is of the porcelaneous variety and quite abundant in the Cape San Lucas dredging.

Subfamily MILIOLINAE

Genus **Hauerina** d'Orbigny in De la Sagra**Hauerina bradyi** Cushman.

Hauerina compressa BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 190, pl. 11, figs. 12, 13.
Hauerina bradyi CUSHMAN, 1917, U.S. Nat. Mus., Bull. 71, pt. 6, p. 62, pl. 23, fig. 2.

This is one of the more common forms at Cape San Lucas.

Family SORITIDAE

Subfamily PENEROPLINAE

Genus **Spirolina** Lamarck**Spirolina arietina** (Batsch).

Nautilus (Lituus) *arietinus* BATSCH (part), 1791, Conch. Seesandes, p. 4, pl. 6, fig. 15c.
Peneroplis arietinus PARKER, JONES and BRADY, 1865, Ann. Mag. Nat. Hist., ser. 3, vol. 16, p. 26, pl. 1, fig. 18.
Peneroplis pertusus var. *arietinus* WOODWARD, 1893, The *Observer*, vol. 4, p. 77. CUSHMAN, 1917, U.S. Nat. Mus., Bull. 71, pt. 6, p. 88, pl. 36, fig. 2; 37, fig. 5.
Spirolina arietinus (Batsch), CUSHMAN, 1930, U.S. Nat. Mus., Bull. 104, pt. 7, p. 43, pl. 15, figs. 4, 5.

This species is fairly abundant here and quite variable in form.

Subfamily SORITINAE

Genus **Amphisorus** Ehrenberg**Amphisorus hemprichii** Ehrenberg.

Amphisorus hemprichii EHRENBURG, 1838, Abhandl. k. Akad. Wiss. Berlin, p. 134, pl. 3, fig. 3.
Orbitolites duplex CARPENTER, 1883, Rep. Voy. *Challenger*, Zoology, pt. 21, p. 25, pl. 3, figs. 8-14; pl. 4, figs. 6-10; pl. 5, figs. 1-13.
Amphisorus hemprichii Ehrenberg, CUSHMAN, 1930, U.S. Nat. Mus., Bull. 104, pt. 7, p. 51, pl. 18, figs. 5-7.

Of occasional occurrence here with a variety of growth stages.

Family NONIONIDAE Schultze

Subfamily NONIONINAE

Genus **Florilus** de Montfort

Florilus japonicus (Asano) var. **mexicanus** (Cushman and McCulloch).

Pseudononion japonicum ASANO, 1936, Jour. Geol. Soc. Japan, vol. 43 (512), p. 347, figs. a-c.
Nonionella japonica (Asano) var. *mexicana* (CUSHMAN and McCULLOCH), 1940, Allan Hancock Pac. Exped., vol. 6, no. 3, p. 160, pl. 17, fig. 10.

This is one of the less common species found here.

Florilus pizarrensis (Berry) var. **basispinatus** CUSHMAN and MOYER.

Nonion pizarrense (Berry) var. *basispinatum* CUSHMAN and MOYER, 1930, Contrib. Cush. Lab. Foram Res., vol. 6, pt. 3, p. 54, pl. 7, figs. 18a, b.

Not of common occurrence in this fauna.

Genus **Cushmanella** Palmer and Bermudez

Cushmanella primitiva Cushman and McCulloch.

Cushmanella primitiva CUSHMAN and McCULLOCH, 1940, Allan Hancock Pac. Exped., vol. 6, no. 3, p. 163, pl. 18, figs. 6-10.

One of the rare species in this varied fauna.

Genus **Elphidium** Montfort

Elphidium articulatum (d'Orbigny).

Elphidium articulatum (d'Orbigny), CUSHMAN and VALENTINE, 1930, Contrib. Dept. Geol. Stanford Univ., vol. 1, no. 1, p. 21, pl. 5, figs. 10a, b.

This is one of the common forms in the Cape San Lucas material.

Elphidium crispum (Linnaeus).

Polystomella crispa (Linnaeus), BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 736, pl. 110, figs. 6, 7. CUSHMAN, 1914, U.S. Nat. Mus., Bull. 71, pt. 4, p. 32, pl. 18, fig. 1.

Only a few individuals of this species were found.

Superfamily BULIMINACEA Jones

Family TURRILINIDAE Cushman

Subfamily TURRILININAE Cushman

Genus **Buliminella** Cushman

Buliminella parallela Cushman and Parker.

Buliminella parallela CUSHMAN and PARKER, 1931, U.S. Nat. Mus., Proc., Washington, D.C., vol. 80, no. 2903, art. 3, p. 13, pl. 3, fig. 15. CUSHMAN and McCULLOCH, 1948, Allan Hancock Pac. Exped., vol. 6, no. 5, p. 239, pl. 29, figs. 7a, b, c.

Only a few of this species were found here.

Genus **Buliminoides** Cushman**Buliminoides williamsoniana** CUSHMAN.

Buliminoides williamsoniana BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 408, pl. 51, figs. 16, 17.

Buliminoides williamsoniana CUSHMAN, 1911, U.S. Nat. Mus., Bull. 71, pt. 2, p. 90, fig. 144 (text).

This is a very rare species here.

Family BULIMINIDAE Jones

Subfamily PAVONININAE Eimer and Fickert

Genus **Reussella** Galloway**Reussella aequa** Cushman and McCulloch.

Reussella aequa CUSHMAN and MCCULLOCH, 1948, Allan Hancock Pac. Exped., vol. 6, no. 5, p. 251, pl. 31, figs. 7 a-d.

This species occurs rather sparingly but is by no means rare.

Genus **Chrysalidinella** Schubert**Chrysalidinella spectabilis** CUSHMAN and McCULLOCH.

Chrysalidinella spectabilis CUSHMAN and MCCULLOCH, 1948, Allan Hancock Pac. Exped., vol. 6, no. 5, p. 256, pl. 32, figs. 1-7.

The vertical striations are very faint and not discernible on some specimens. It is a rare species here.

Family UVIGERINIDAE

Genus **Trifarina** Cushman**Trifarina** species.

This small, variable species does not appear to have been described or it may be a variant of *Angulogerina occidentalis* (Cushman).

Genus **Siphogenerina** Schlumberger**Siphogenerina costata** Schlumberger.

Siphogenerina costata SCHLUMBERGER, 1883, Feuille. Jeunes Nat., ann. 13, p. 117, text fig. B (Recent Gulf of Gascony) = *Uvigerina (Sagrina) raphanus*. PARKER and JONES, 1865, Phil. Trans. Roy. Soc. London, vol. 155, p. 346, pl. 18, figs. 16, 17.

Siphogenerina raphanus CUSHMAN, 1913, U.S. Nat. Mus., Bull. 71, pt. 3, p. 108, pl. 46, figs. 1-5.

Siphogenerina costata and *S. raphanus* have been placed in synonymy by Galloway, Cushman, and more recently, Bandy. This synonymy is discussed by Loeblich and Tappan in the Treatise (pt. C, Protista 2, vol. 2, p. C571) as follows, "We examined the types of *S. raphanus* in the British Museum (Natural

History), and regard it as distinct from *S. costata*. *Siphogenerina* is here regarded as including only species which are triserial in the microspheric early stage and biserial in the megalospheric stage. As *S. raphanus* is biserial to uniserial in the microspheric form and only uniserial in the megalospheric stage it has been transferred to *Rectobolivina*."

Since the Cape San Lucas species is triserial, it would have to be considered as *Siphogenerina* but as *S. raphanus* is now classed as *Rectobolivina* our present species would more logically be called *S. costata*.

Superfamily NODOSARIACEA

Family NODOSARIIDAE

Subfamily NODOSARIINAE

Genus **Dentalina** Risso

Dentalina communis (d'Orbigny).

Nodosaria communis d'Orbigny, BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 504, pl. 62, figs. 21, 22. CUSHMAN, 1913, U.S. Nat. Mus., Bull. 71, pt. 3, p. 54, pl. 28, figs. 1, 2.

Very rare, only one perfect specimen found.

Genus **Lagen**a Walker and Jacob

Lagena hexagona (Williamson).

*Lagen*a hexagona (Williamson), BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 472, pl. 58, figs. 32, 33. CUSHMAN, 1913, U.S. Nat. Mus., Bull., 71, pt. 3, p. 17, pl. 6, figs. 2, 3.

This is one of the very rare forms in this fauna.

Family GLANDULINIDAE

Subfamily OOLININAE

Genus **Fissurina** Reuss

Fissurina lacunata (Burrows and Holland).

*Lagen*a castrensis BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 485, pl. 60, figs. 1, 2. *Lagen*a orbignyana (Seguenza) var. *lacunata* (Burrows and Holland), CUSHMAN, 1913, U.S. Nat. Mus., Bull. 71, pt. 3, p. 43, pl. 20, fig. 1.

Fissurina lacunata (Burrows and Holland), PARR, 1945, Proc. Roy. Soc. Victoria, n.s., vol. 56, p. 203.

This very small form is most nearly like the variety figured by Cushman but differs from it in the surface pitting which is limited to the convex portion of either face, and in having more abbreviated tricarinate edges. In this variety the carinae are nothing more than raised edges, the neck only slightly expressed. This is a rare form in the Cape San Lucas dredgings and its small dimensions (.2 mm to .25 mm.) render it somewhat inconspicuous.

Family CASSIDULINIDAE

Genus *Cassidulina* d'Orbigny*Cassidulina* species.

This very small (.2 mm.) and transparent form is scattered very sparingly through the finer material. It could not be identified with any of the described species from this general area.

Superfamily MILIOLACEA

Subfamily CYCLOGYRINAE

Genus *Cyclogyra* Wood*Cyclogyra involvens* (Reuss).

Cornuspira involvens (Reuss), BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 200, pl. 11, figs. 1-3. CUSHMAN, 1917, U.S. Nat. Mus., Bull. 71, pt. 6, p. 25, pl. 1, fig. 2; pl. 2, fig. 2.

Loeblich and Tappan have indicated in the Treatise (1964), that the genus *Cyclogyra* has precedence over *Cornuspira*.

The specimens referred to here, while exhibiting the true characteristics of the species, are somewhat smaller than usual, ranging in size from .21 mm. to .27 mm. in diameter. Only a few were found.

Superfamily SPIRILLINACEA

Family SPIRILLINIDAE

Subfamily SPIRILLININAE

Genus *Spirillina* Ehrenberg*Spirillina denticulata* Brady.

Spirillina limbata var. *denticulata* BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 632, pl. 85, fig. 17.

Spirillina denticulata Brady, PARR, 1950, Brit. Antarct. New Zealand Antarctic Res. Expend. 1929-31, Rept. Ser. B, vol. 5, pt. 6, p. 351.

Not a common species here.

Spirillina vivipara Ehrenberg.

Spirillina vivipara Ehrenberg, BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 630, pl. 85, figs. 1-5. CUSHMAN, 1915, U.S. Nat. Mus., Bull. 71, pt. 5, 1915, p. 3, pl. 1, figs. 1-2; in text, fig. 1.

The few specimens of this species found in the Cape San Lucas dredgings are characteristically hyaline and porous. The larger one measures .3 mm. in diameter.

Family BOLOVINITIDAE

Genus **Brizalina** Costa

Brizalina paula (Cushman and Cahill).

Bolivina paula Cushman and Cahill MS., CUSHMAN and PONTON, 1932, Florida State Geol. Surv., Bull. 9, p. 84, pl. 12, figs. 6a, b. CUSHMAN and McCULLOCH, 1942, Allan Hancock Exped., vol. 6, no. 4, p. 202, pl. 24, figs. 9-12.

In this fauna there are a number of specimens which correspond to the figures in the Cushman and McCulloch paper but there are others which might more correctly be called *B. striatula* Cushman and it appears to be an intergrading series.

Brizalina compacta (Sidebottom).

Bolivina robusta Brady, var. *compacta* SIDEBOTTOM, 1905, Mem. Proc. Manchester Lit. Philos. Soc., vol. 49, no. 5, pl. 3, fig. 7.

Bolivina compacta CUSHMAN, 1911, U.S. Nat. Mus., Bull. 71, pt. 2, p. 36, text fig. 58.

Bolivina compacta SIDEBOTTOM, CUSHMAN, and McCULLOCH, 1942, Allan Hancock Pac. Exped., vol. 6, no. 4, p. 190, pl. 23, fig. 4.

There are a number of specimens which are, with some hesitation, referred to this species but they are included with a few which appear to definitely belong here.

Genus **Bolivina** d'Orbigny

Bolivina pseudoplicata Heron-Allen and Earland.

Bolivina pseudoplicata HERON-ALLEN and EARLAND, 1930, Roy. Micros. Soc. Jour., London, pt. 1, ser. 3, vol. 50, p. 51, pl. 3, figs. 36-40. CUSHMAN and McCULLOCH, 1942, Allan Hancock Pac. Exped., vol. 6, no. 4, p. 204, pl. 25, figs. 4-7.

A few well preserved specimens of this species were found.

Bolivina torqueta Cushman and McCulloch.

Bolivina torqueta CUSHMAN and McCULLOCH, 1942, Allan Hancock Pac. Exped., vol. 6, no. 4, p. 215, pl. 27, figs. 5, 6.

A half dozen of this very distinctive species were found, all well preserved. The species was reported from a number of stations off the Mexican coast and the Galápagos Islands by the Allan Hancock Expedition.

Family ANOMALINIDAE

Subfamily ANOMALININAE

Genus **Hanzawaia** Asano

Hanzawaia nitidula (Bandy).

Cibicidena basiloba (Cushman) var. *nitidula* BANDY, 1953, Jour. Paleo., vol. 27, no. 2, p. 178, pl. 22, fig. 3.

Hanzawaia nitidula (Bandy), 1961, Micropaleo., vol. 7, no. 1, p. 16, pl. 2, fig. 2a, b, c.

This is one of the less common forms in this material. It was listed by Bandy as one of the characteristic species of the inner shelf biofacies.

Family GLOBOROTALIIDAE

Subfamily GLOBOROTALIINAE

Genus **Globorotalia** Cushman

Globorotalia menardii (d'Orbigny).

Pulvinulina menardii (d'Orbigny), BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 690, pl. 103, figs. 1, 2. CUSHMAN, 1921, U.S. Nat. Mus., Bull. 100, vol. 4, p. 333, pl. 6, figs. 1 a-c.

Globorotalia menardii CUSHMAN, 1927, Bull. Scripps Inst. Ocean. Tech. Ser., vol. 1, p. 176.

This is one of the more common and well defined species here and one that is generally wide spread in this tropical Pacific Coast area.

Superfamily ROTALIACEA

Family ROTALIIDAE

Subfamily ROTALIINAE

Genus **Rotalia** Lamarck

Rotalia avalonensis Natland.

Rotalia depressa NATLAND, 1938, Bull. Scripps Inst. Ocean. La Jolla, Calif., Tech. Ser., vol. 4, no. 5, p. 147, pl. 5, figs. 15a, b, c.

Rotalia avalonensis NATLAND, new name, 1950, Geol. Soc. America, Mem. 43, 1940 E. W. Scripps Cruise Gulf Calif., pt. 4, p. 30, pl. 8, figs. 4 a-c.

The small species which I have referred to the above name appears to be the same as that figured by Natland from the Carmen Island locality. Only a few were found at Cape San Lucas.

Superfamily DISCORBACEA

Family DISCORBIDAE

Subfamily DISCORBINAE

Genus **Rosalina** d'Orbigny

Rosalina obtusa d'Orbigny (?).

Rosalina obtusa D'ORBIGNY, 1826, Ann. Sci. Nat. Paris, ser. 1, vol. 7.

Discorbis obtusa (d'Orbigny) (?), CUSHMAN, 1931, U.S. Nat. Mus., Bull. 104, pt. 8, p. 27, pl. 6, figs. 2a, b, c.

This is one of the commoner forms found at the Cape.

Genus **Discorbis** Lamarck**Discorbis nitida** (Williamson).*Rosalina nitida* WILLIAMSON, 1858, Rec. Foram. Great Britain, p. 54, pl. 4, figs. 106-108.*Rotalia nitida* BRADY, 1864, Trans. Linn. Soc. Zool., vol. 24, p. 474.*Discorbina nitida* WRIGHT, 1889, Ann. Mag. Nat. Hist., ser. 6, vol. 4, p. 449.*Discorbis nitida* (Williamson), CUSHMAN, 1931, U.S. Nat. Mus., Bull. 104, pt. 8, p. 26, pl. 6, figs. 1a, b, c.

Only a few of this species were found here.

Discorbis hannae Church, new species.

Test rotaliform, calcareous, perforate, plano-convex, coarsely perforate on dorsal, convex side, smooth, translucent and finely perforate on the flattened, ventral side, sutures directed back in gentle curves, slightly indented near the umbilicus, sutures on the dorsal side, narrow, dark lines flush with the surface and extending back at a steep angle of more than 50 degrees, outer edge acutely angled but rounded and only slightly thickened, no carina, seven chambers in the final whorl, all visible on the dorsal side, only those of the last formed whorl visible from the ventral side, the dorsal side elevated into a short, rounded, nipple-like cone somewhat thickened near the apex and projecting above the lower angled final whorl as a more steeply angled knob, color dark brown in top part of spire and fading to a pale brown in last whorl, aperture a low arch or slit at the base of the last formed chamber and extending from the periphery to the small umbilicus which is partially filled with a small depressed plug of dark, clear shell material, the inner points of the chambers project as thin, pointed teeth, partially concealing the opening and plug.

Height of type .28 mm., breadth .25 mm., thickness .15 mm.

HOLOTYPE no. 13034, California Academy of Sciences, Department of Geology Type Collection, from Locality 1309 (CAS), dredged from 28 fathoms off Cape San Lucas, Baja California, Mexico.

The generic designation of this species is somewhat doubtful as it has characters common to both *Discorbis* and *Rosalina*. It is a fairly common species at Cape San Lucas. It is named in honor of Mrs. Margaret M. Hanna, illustrator of many Foraminifera.

Discorbis species.

A few specimens of this unidentified species were found. It has very coarse but few scattered pores over the dorsal chambers where the test is thick and rugose and practically none on the ventral side where the test wall is thinner and of clear shell material. The umbilical area is very slightly depressed and obscured by a thin over-growth.

Discorbis rosea (d'Orbigny).

Rotalia rosea D'ORBIGNY, 1826, Ann. Sci. Nat., vol. 7, p. 272, no. 7, Modeles, no. 35. CUSHMAN, 1931, U.S. Nat. Mus., Bull. 104, pt. 8, p. 62, pl. 13, figs. 5 a-c.

Truncatulina rosea (d'Orbigny), CUSHMAN, 1922, Publ. 311, Carnegie Inst., Washington, D.C., p. 46, pl. 14, figs. 3-5.

Discorbina rosea (d'Orbigny), BARKER, 1960, "Taxonomic Notes," on Brady's *Challenger* Report of 1884. Soc. Econ. Paleon. Min., Spec. Pub. no. 9, p. 198, pl. 96, fig. 1.

Three good specimens were found and like those figured from the Atlantic Ocean by Cushman, they have numerous, short spines or tubercles over most of the highly domed dorsal side but more pronounced toward the base. All specimens have the delicate pink color characteristic of the species.

Discorbis isabelleana d'Orbigny.

Discorbis isabelleana d'Orbigny, CUSHMAN and VALENTINE, 1930, Contrib. Dept. Geol. Stanford Univ., vol. 1, no. 1, p. 23, pl. 6, figs. 6; 7 a-c; 8 a-c.

This is one of the less common species here.

Genus Neoconorbina Hofker**Neoconorbina concinna** (Brady).

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

Tretomphalus concinnus (Brady), CUSHMAN, 1934, Contrib. Cushman Lab. Foram. Res., vol. 10, pt. 4, no. 149, p. 96, pl. 12, figs. 13-15.

Rosalina concinna (Brady), BARKER, 1960, Spec. Publ. no. 9, Soc. Econ. Paleon. Min., Taxonomic Notes in Brady, Rep. Voy. *Challenger*, pl. 90, figs. 7, 8.

This small species is quite common at Cape San Lucas.

Neoconorbina rosacea (d'Orbigny).

Rotalia rosacea D'ORBIGNY, 1826, Ann. Sci. Nat., vol. 7, p. 273, no. 15; Modeles no. 15; Modeles no. 39.

Discorbis rosacea BRADY, 1864, Trans. Linnean Soc. London, vol. 25, p. 473, no. 69; 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 644, pl. 87, fig. 1 (4 ?).

Discorbis rosacea CUSHMAN, 1915, U.S. Nat. Mus., Bull. 71, pt. 5, p. 13, figs. 13a, b, c (in text).

Neoconorbina terquemi (Rzehak).

Rosalina orbicularis TERQUEM, 1876, Essai Class., Anim. Dunkerque, pt. 2, p. 166, pl. 9, figs. 4 a-b.

Discorbina orbicularis (Terquem), BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 647, pl. 88, figs. 4-8.

Discorbina terquemi RZEHAK, new name, 1888, Geol. Reichsanst., Verh., Wien, p. 228.

Discorbis orbicularis (Terquem), CUSHMAN, 1915, U.S. Nat. Mus., Bull. 71, pt. 5, p. 16, text figs. 18 a-c, pl. 11, figs. 1 a-c.

Rosalina terquemi (Rzehak), GRAHAM and MILITANTE, 1959, Stanford Univ. Pub. Geol. Sci., vol. 6, no. 2, p. 98, pl. 14, figs. 13, 14a, b, c.

Neoconorbina terquemi (Rzehak), BARKER, 1960, Taxonomic Notes on species figured by Brady, *Challenger* Rep. 1884, Soc. Econ. Paleon. Min., Spec. Rep. no. 9, p. 182, pl. 88, figs. 4-8.

This is one of the commoner species found in the Cape San Lucas material as is *Neoconorbina rosacea* (d'Orbigny) and it requires careful examination to distinguish one from the other.

Genus *Tretomphalus* Möbius

Tretomphalus bulloides (d'Orbigny).

Cymbalopora bulloides (d'Orbigny), BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 638, pl. 102, figs. 7-12; text figs. 20 a-c.

Tretomphalus bulloides (d'Orbigny), CUSHMAN, 1915, U.S. Nat. Mus., Bull. 71, pt. 5, p. 26, pl. 14, figs. 3, 4.

This is one of the more common forms in the Cape San Lucas fauna.

Rosalina natlandi Church, new species.

Test rotaliform, plano-convex, calcareous, all chambers visible from the dorsal side, only those of the final whorl visible from the ventral side, dorsal side rounded into a low arch, ventral side concave in the umbilical area, six moderately inflated chambers on the final whorl, test uniformly thin, transparent, with very fine, uniformly distributed pores on both sides, all chambers equally inflated, the sutures moderately incised, gently curved on the dorsal side, less so on the ventral side, chambers enlarge rather rapidly and evenly, outer edge of test gently rounded without a carina or any noticeable thickening, aperture a low arch at the base of the last formed chamber about half way between the umbilicus and the periphery of the test and extending into the umbilicus, a thin, transparent plate extending from the inner margin of each chamber into the umbilical opening but not so far as to close it, the secondary sutural openings are not fully developed. Dimensions: maximum diameter .35 mm.; thickness .18 mm.

HOLOTYPE no. 13035, California Academy of Sciences, Department of Geology Type Collection, from Locality 1309 (CAS), dredged in from 2 to 8 fathoms off Cape San Lucas, Baja California, Mexico.

This species differs from *Ammonia beccarii* (Linné), to which it has been compared, in having fewer, broader and more inflated chambers, more deeply incised sutures with less apparent thickening on the dorsal side and without dendritic development on the ventral side, test more compressed and more concave on the ventral side, aperture open, without umbilical plug, pillars or granules.

This species is named in honor of Dr. M. L. Natland, author of many papers on the living and Tertiary Foraminifera of this area.

Family ACERVULINIDAE

Genus *Acervulina* Schultze*Acervulina inhaerens* Schultze.

Acervulina inhaerens SCHULTZE, 1854, Organismus Polythal., p. 68, pl. 6, fig. 12.

Gypsina inhaerens BRADY, 1884, Rep. Voy. Challenger, Zoology, vol. 9, p. 718, pl. 102, figs. 1-6.

Acervulina inhaerens SCHULTZE, GALLOWAY, and WISSLER, 1927, Jour. Paleo., vol. 1, no. 1, p. 67, pl. 11, fig. 3.

This encrusting species takes many shapes depending on the shape of the object to which it attaches itself. It is quite common at this locality.

Family CYMBALOPORIDAE

Genus *Cymbaloporetta* Cushman*Cymbaloporetta squamosa* (d'Orbigny).

Rotalia squamosa D'ORBIGNY, 1826, Ann. Sci. Nat., vol. 7, p. 272, no. 8.

Cymbaloporetta squamosa CUSHMAN, 1922, Carnegie Inst., Washington, D.C., Publ. 311, p. 41, pl. 6, figs. 4-6.

A number of this species were found so it is not uncommon in the Cape San Lucas dredgings.

Subfamily BAGGININAE

Genus *Cancris* de Montfort*Cancris aricula* (Fichtel and Moll).

Nautilus auricula var. A, FICHTEL and MOLL, 1803, Test. Micr., p. 108, pl. 20, figs. a-c; var. B, pl. 20, figs. d-f.

Cancris auricula (Fichtel and Moll), CUSHMAN, 1931, U.S. Nat. Mus., Bull. 104, pt. 8, p. 72, pl. 15, figs. 1 a-c. NATLAND, 1950, Geol. Soc. America, Mem. 43, pt. 4, p. 32, pl. 8, figs. 7 a-c.

This is one of the rare species in this fauna.

Family GLABRATELLIDAE

Genus *Glabratella* Dorreen*Glabratella pulvinata* (Brady).

Discorbina pulvinata BRADY, 1884, Rep. Voy. Challenger, Zoology, vol. 9, p. 650, pl. 88, figs. 10 a-b.

Discorbis pulvinata (Brady), CUSHMAN, 1915, U.S. Nat. Mus., Bull. 71, pt. 5, p. 19, pl. 7, fig. 2; in text, fig. 22.

Cushman described this species as having a diameter of .28 mm., those from Cape San Lucas are about the same size, ranging from .24 mm. to .32 mm. in diameter. They are quite common here.

Family CIBICIDIDAE

Subfamily CIBICIDINAE

Genus **Cibicides** de Montfort

Cibicides mayori Cushman.

Truncatulina mayori Cushman, 1924, Carnegie Inst. pub. 342, p. 39, pl. 12, figs. 3, 4.

Only one specimen was found here.

Cibicides conoideus Galloway and Wissler.

Cibicides conoideus Galloway and Wissler, 1927, Jour. Paleo., vol. 1, no. 1, p. 63, pl. 10, figs. 7a, b, c.

Only the small specimens from the type material compare with our present living examples.

Cibicides concentrica (Cushman).

Truncatulina concentrica CUSHMAN, 1918, U.S. Geol. Surv., Bull. 676, p. 64, pl. 21, fig. 3 a-c.
Cibicides concentrica (CUSHMAN), 1931, U.S. Nat. Mus., Bull. 104, pt. 8, p. 120, pl. 21, figs. 4, 5; plate 22, figs. 1, 2.

This is a rare species in the Cape San Lucas fauna but the few found are well preserved. They are most like the one figured by Cushman on plate 21, in Bulletin 104 of the U.S. National Museum.

Cibicides species.

This is a rather large, coarsely perforate species of which only two specimens were found. It appears not to have been described.

Genus **Dyocibicides** Cushman and Valentine

Dyocibicides biserialis CUSHMAN and VALENTINE.

Dyocibicides biserialis CUSHMAN and VALENTINE, 1930, Contrib. Dept. Geol. Stanford Univ., vol. 1, no. 1, p. 31, pl. 10, figs. 1, 2a, 2b.

Numerous good specimens of this highly variable species were found.

Family HANTKENINIDAE

Subfamily HASTIGERININAE

Genus **Hastigerina** Thomson

Hastigerina murrayi Thomson.

Hastigerina murrayi THOMSON, 1876, Proc. Roy. Soc. London, vol. 24, p. 534. BOLLI, LOEBLICH, and TAPPAN, 1957, U.S. Nat. Mus., Bull. 215, p. 29, pl. 3, figs. 1-4b.

This is one of the less common species in the Cape San Lucas material.

Family GLOBIGERINIDAE

Subfamily GLOBIGERININAE

Genus **Globigerina** d'Orbigny**Globigerina bulloides** d'Orbigny.

Globigerina bulloides d'Orbigny, BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 593, pl. 77; pl. 79, figs. 3-7. CUSHMAN, 1914, U.S. Nat. Mus., Bull. 71, pt. 4, p. 5, pl. 2, figs. 7-9; pl. 9.

This worldwide species is not a common form at this locality.

Globigerina inflata d'Orbigny.

Globigerina inflata d'Orbigny BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 601, pl. 79, figs. 8-10. CUSHMAN, 1914, U.S. Nat. Mus., Bull. 71, pt. 4, p. 8, pl. 4, figs. 4-8.

This species is classified as *Globorotalia inflata* (d'Orbigny) by Frances L. Parker (Jour. Paleo., 1964).

It is quite rare in the Cape San Lucas fauna as only two were found and while they are not typical they have been referred to this species.

Globigerina quinqueloba Natland.

Globigerina quinqueloba NATLAND, 1938, Bull. Scripps Inst. Ocean., La Jolla, Tech. ser., vol. 4, no. 5, p. 149, pl. 6, figs. 7a, b, c. PARKER, 1964, Jour. Paleo., vol. 38, no. 4, p. 630, pl. 101, figs. 15, 16.

This is one of the rarer species in this fauna.

Globigerina conglomerata Schwager.

Globigerina conglomerata SCHWAGER, 1866, Novara, Exped., Theil., pt. 2, p. 255, pl. 7, fig. 113.

CUSHMAN, 1927, Bull. Scripps Inst. Oceanog., Tech. Ser., vol. 1, no. 10, p. 172. NATLAND, 1950, Geol. Soc. America, Mem. 43, pt. 4, p. 36, pl. 10, figs. 1 a-c.

Globigerina eggeri Rhumbler, BRANDT, 1901, K. Nordischis Plankton, Lief. 1, Nr. 14, p. 19, 20, tf. 20.

Natland considered *G. conglomerata* and *G. eggeri* to be equivalent species.

This is a fairly common species here and a number of the specimens have thin bullae covering the apertures on which younger specimens are attached as if budding off from the parent test. Others are normally open at the umbilicus but there are indications that such bullae may have been present and later resorbed.

Genus **Globigerinoides** Cushman**Globigerinoides conglobata** (Brady).

Globigerina conglobata BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 603, pl. 80, figs. 1-5; pl. 82, fig. 5. CUSHMAN, 1914, U.S. Nat. Mus., Bull. 71, pt. 4, p. 10, pl. 3, figs. 3-5; pl. 10, figs. 1, 6.

Globigerinoides conglobata (Brady), CUSHMAN, 1927, Bull. Scripps Inst. Ocean., Tech. Ser., vol. 1, no. 10, p. 173.

This species, while quite common in the Cape San Lucas material, is much smaller than the usual occurrence and the final chambers are not so flattened as some of the larger specimens from other localities.

Globigerinoides sacculiferus (Brady).

Globigerina sacculifera BRADY, 1884, Rep. Voy. *Challenger*, Zoology, vol. 9, p. 604, pl. 80, figs. 11-17. CUSHMAN, 1914, U.S. Nat. Mus., Bull. 71, pt. 4, p. 11, pl. 2, figs. 4-6; pl. 5, pl. 10, fig. 4.

Globigerinoides sacculiferus (Brady), NATLAND, 1950, Geol. Soc. America, Mem. 43, pt. 4, p. 37, pl. 10, fig. 5a, b, c.

Only two of this species were found in the material examined and they are of the smaller type with more restricted chambers and apertures.

Family CAUCASINIDAE

Subfamily FURSENKOININAE

Genus **Fursenkoina** Loeblich and Tappan

Fursenkoina species.

Only one specimen of this genus was found and it is not complete.

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