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Results of the Puritan-American Museum of Natural History Expedition to Western Mexico

6. Anascan Cheilostomata (Bryozoa) of the Gulf of California

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INTRODUCTION

Until the publication of Dr. Raymond C. Osburn's work on the Bryozoa of the Pacific coast of America (1950-1953) very little was known of the bryozoan fauna of the Gulf of California. Prior to this time only two accounts had appeared. In 1941, Steinbeck and Ricketts' "Sea of Cortez" listed seven species of Bryozoa in the phyletic catalogue, and in 1855 George Busk had described 13 species of bryozoans in the section on the "Class Bryozoa" in Philip P. Carpenter's "Catalogue of . . . Mazatlan Mollusca."

The reports on the littoral Bryozoa of the Gulf of California collected by the Puritan-American Museum Expedition will appear as three separate papers, first, Cheilostomata Anasca; second, Cheilostomata Ascophora; and third, Cyclostomata and Ctenostomata. The format adopted for each of the species treated is as follows: (1) the original citation and the eastern Pacific synonymy only; (2) a brief summary of the diagnostic features; (3) Gulf of California collection

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data; and (4) a brief summary of prior distribution within the Gulf of California and elsewhere. It is planned that the final paper will contain a comprehensive digest of the distribution of the littoral Bryozoa of the Gulf of California as revealed by the collection made by the "Puritan." For additional information on the expedition and for detailed data on the collecting stations, see the general account of the expedition by Emerson (1958).

The author is greatly indebted to the American Museum of Natural History for the opportunity to work up this very interesting collection. To Dr. William K. Emerson the author wishes to express his sincere gratitude for numerous courtesies that helped to make this project possible. The drawings of the new species are the work of Mrs. Dorothy Fisher Soule, whose efforts are gratefully acknowledged. This study was supported in part by a Grant-In-Aid from the Society of the Sigma Xi.

SYSTEMATIC ACCOUNTS

SUBORDER CHEILOSTOMATA BUSK, 1852

ANASCA LEVINSEN, 1909

DIVISION 1. INOVICELLATA JULLIEN, 1888

FAMILY AETIDAE SMITT, 1867

GENUS *AETEA* LAMOUROUX, 1812

Aetea anguina (Linné), 1758

Sertularia anguina LINNÉ, 1758, *Systema naturae*, ed. 10, vol. 1, p. 816.

Aetea anguina, ROBERTSON, 1905, *Univ. California Publ. Zool.*, vol. 2, no. 5, pp. 244-246, pl. 4, figs. 1-4.

Aetea anguina, C. H. AND E. O'DONOGHUE, 1926, *Contrib. Canadian Biol. Fish.*, new ser., vol. 3, pp. 39-40.

Aetea anguina, HASTINGS, 1930, *Proc. Zool. Soc. London*, 1929, pt. 4, p. 702.

Aetea anguina, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 11-12, pl. 1, fig. 3.

The problems that are encountered in the separation of *Aetea anguina*, which is typical of many of the so-called "simpler forms," from its closest relative, *Aetea recta*, are enhanced rather than resolved. For example, Osburn (1950-1953, no. 1) in his key to the species, separated these two on the basis of their annulation. Those individuals showing a punctate, non-annulated, basal portion and a finely annulated erect stalk, with a spoon-shaped terminal area, belong to the species *anguina*. Those with a finely annulated erect stalk, with a narrow terminal portion and a basal portion showing annulation, belong to the species *recta*.

Experience with the Gulf of California material indicates that less reliance should be placed on the criterion of the annulation of the basal region, and more on the morphology of the terminal portion. When basal annulation is used as a criterion, one portion of a colony can be "keyed out" as *A. anguina*, while an adjacent segment directly attached to the first could be called *A. recta*. Marcus (1937) states that the terminal portion of *Aetea recta* has a narrower, elongated appearance owing to a length to width ratio of 3/1 to 4/1, while *Aetea anguina*, with a 1.7/1 to 2/1 ratio, has a stubby short appearance.

Aetea anguina is characterized as follows: Adherent portion of the colony punctate, with some evidence of cross striae. Erect zooecia finely annulated, with a terminal "head" region frequently bent downward. This terminal region is flared, spoon-shaped in appearance, with a flattened membranous area on one side that contains the aperture. Colonies found adherent to mollusk shells.

OCCURRENCE: Station 123, Aqua Verde Bay, 1-3 fathoms. Station 140, Marquer Bay, Carmen Island, intertidal. Station 160, south end of Tiburón Island, 20-22 fathoms.

DISTRIBUTION: This is a widely distributed shallow-water species, especially well known from cool temperature to tropical waters. No prior report of occurrence in the Gulf of California is known.

Aetea recta Hincks, 1862

AE[tea] recta HINCKS, 1862, Ann. Mag. Nat. Hist., ser. 3, vol. 9, p. 25, pl. 7, fig. 3.

Aetea recta, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, p. 12, pl. 1, fig. 2.

Very similar in appearance to *Aetea anguina*; however, the length to width ratio of the terminal portion of the erect stalk is 4/1, giving this region a narrower appearance than that found in *anguina*. The erect stalk is finely annulated and punctate. The basal portion is punctate and in some, but not all, instances marked by cross striae. Colonies ranging across shells of mollusks.

OCCURRENCE: Station 151, off San Marcos Island, 10-11 fathoms. Station 159, off Tiburón Island, 10 fathoms. Station 160, off Tiburón Island, 20-22 fathoms. Station 161, off Tiburón Island, 30-32 fathoms.

DISTRIBUTION: *Aetea recta* has been collected in temperate and tropical waters of both the Atlantic and the Pacific oceans. In the Gulf of California, Osburn (1950-1953, no. 1) recorded this species from Angel de la Guarda Island.

Aetea ligulata Busk, 1852

Aetea ligulata BUSK, 1852, Catalogue of marine Polyzoa in the British Museum, pt. 1, Cheilostomata, p. 30, pl. 42, fig. 2.

Aetea ligulata, HINCKS, 1882, Ann. Mag. Nat. Hist., ser. 5, vol. 10, p. 460.

Aetea ligulata, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, p. 13, pl. 1, fig. 4.

"The erect portion of the zoecium is straight and the 'head' is a little wider than the stalk. The stalk is coarsely wrinkled or corrugated, quite different in appearance from the fine annulations of *anguina* and *recta*. . . the basal portion is also sometimes wrinkled, and both basal and erect portions are also finely 'punctate' " (Osburn, 1950-1953, no. 1, p. 13).

OCCURRENCE: Station 88, Los Frailes Bay, Baja California, 7-9 fathoms. Station 89, Los Frailes Bay, Baja California, 20-40 fathoms. Station 96, off Bonanza Point, Espíritu Santo Island, 10-24 fathoms. Station 114, Amortajada Bay, San José Island, 22-25 fathoms. Station 115, off San José Island, 13.5-17.5 fathoms. Station 132, off Salinas Bay, Carmen Island, 14-30 fathoms. Station 144, off Coronados Island, 13-16.5 fathoms. Station 151, off San Marcos Island, 10-11 fathoms. Station 162, off Tiburón Island, 20-22 fathoms. Station 168, off Angel de la Guarda Island, 16-17 fathoms. Station 173, off Angel de la Guarda Island, 17-19 fathoms.

DISTRIBUTION: This is a well-distributed species, known from both temperate and tropical waters. In the Gulf of California it has been previously reported from San Francisquito Bay, Baja California (Osburn, 1950-1953, no. 1).

DIVISION 2. MALACOSTEGA LEVINSEN, 1909

FAMILY MEMBRANIPORIDAE BUSK, 1854

GENUS *MEMBRANIPORA* BLAINVILLE, 1830*Membranipora tuberculata* (Bosc), 1802

Flustra tuberculata BOSCH (in part), 1802, Histoire naturelle des vers, vol. 3, no. 1, p. 118.

Flustra tehuelcha D'ORBIGNY, 1847, Voyage dans l'Amerique meridionale, vol. 5, pt. 4, p. 17, pl. 8, figs. 10-14.

Membranipora tehuelcha, ROBERTSON, 1908, Univ. California Publ. Zool., vol. 4, no. 5, pp. 265-267, pl. 15, figs. 16-17, pl. 16, fig. 18.

Membranipora tuberculata, CANU AND BASSLER, 1923, Bull. U. S. Natl. Mus., no. 125, pp. 22-23, pl. 33, figs. 3-5.

Nichitina tuberculata, HASTINGS, 1930, Proc. Zool. Soc. London, for 1929, pt. 4, pp. 706-707, pl. 3, figs. 9-10.

Membranipora tuberculata, OSBURN, 1950, in Allan Hancock Foundation

publications of the University of Southern California, vol. 14, no. 1, pp. 23-24, pl. 2, figs. 4-6.

Membranipora tuberculata, SOULE AND DUFF, 1957, Proc. California Acad. Sci., vol. 29, no. 4, pp. 88-89.

Zoaria, ranging in color from glistening white to a dull tan, are found encrusting the stipes and blades of marine algae, floating wood, and infrequently, in shallow water, the shells of mollusks or rocks.

Zooecia rectangular, variable in dimensions. Mural rim thin. The opesia are large, covered by a thin frontal membrane. On each zooecium the smooth cryptocyst forms a very narrow peripheral ledge, reaching its greatest width at the proximal end. Little spines project from the cryptocyst into the opesial opening. These small processes vary in size from minute papillae to discrete spines with terminal bifurcations.

On the distal mural rim, in all but the youngest zooecia, are found a pair of tubercles of variable size and shape. On some of the older zooecia the tubercles coalesce upon the midline, and in the case of the zooecia protected from erosion, the tubercles may project over the opesial area.

OCCURRENCE: Station 78, Olas Altas Bay, Mazatlán, Sinaloa, Mexico, intertidal. Station 84, Los Frailes Bay, Baja California, intertidal. Station 85, Los Frailes Bay, Baja California, 3 fathoms, encrusted on a rock. Station 87, Pulmo Reef, Baja California, 2-5 fathoms, on a mollusk shell. Station 125, Monserrate Island, intertidal. Station 140, Marquer Bay, Carmen Island, intertidal. Station 143, Coronados Island, intertidal. Station 149, San Marcos Island, intertidal. Station 154, ocean side, San Carlos Bay, Sonora, Mexico, intertidal. Station 158, Tiburón Island, 1-3 fathoms. Station 164, San Esteban Island, intertidal.

DISTRIBUTION: This species has a world wide distribution in warm temperate and tropic seas. Busk recorded it from Mazatlán, and Hastings (1930) from Panama and the Galapagos Islands. Aside from the record of Busk (1855 and 1856) it has not been recorded elsewhere in the Gulf of California area.

Membranipora tenuis Desor, 1848

Membranipora tenuis DESOR, 1848, Proc. Boston Soc. Nat. Hist., vol. 3, p. 66.

Membranipora denticulata BUSK, 1855, in Carpenter, Catalogue of . . . Mazatlán Mollusca in the British Museum, pp. 1-2.

Membranipora denticulata BUSK, 1856, Quart. Jour. Micros. Sci., vol. 4, p. 176, pl. 7, figs. 1-2.

Hemiseptella grandicella CANU AND BASSLER, 1923, Bull. U. S. Natl. Mus., no. 125, p. 71, pl. 5, fig. 12.

Acanthodesia denticulata, HASTINGS, 1930, Proc. Zool. Soc. London, for 1929, pt. 4, p. 707.

Membranipora tenuis, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 26-27, pl. 2, figs. 9-10.

Membranipora tenuis, SOULE AND DUFF, 1957, Proc. California Acad. Sci., ser. 4, vol. 29, no. 4, pp. 89-90.

Zoaria encrusting mollusk shells, rocks, and marine algae. Zooecia rectangular, elongate, except in areas where imperfections of the substrate produce crowding with resultant irregularities in zooecial morphology. Mural rim thin, beaded, exhibiting a thin line midway between adjacent zooecia. Opesia large, covered by a thin frontal membrane, bounded by a papillate cryptocyst. In the proximal zone of the zooecia the width of the cryptocyst varies considerably, occupying as much as one-half of the opesia area. The cryptocyst bears small spines, distributed irregularly, and ranging in size from minute protuberances to those that are elongate and sharply pointed.

OCCURRENCE: Station 76, Olas Altas Bay, Mazatlán, Sinaloa, Mexico, intertidal. Station 81, Mazatlán Harbor, Sinaloa, Mexico, 3 fathoms. Station 136, lagoon, Puerto Escondido, Baja California, intertidal. Station 141, Marquer Bay, Carmen Island, 2 fathoms.

DISTRIBUTION: *Membranipora tenuis* has been reported in the cool and warm temperate waters and in tropical seas along the Atlantic and Pacific coasts of America. Busk (1855, 1856) recorded it from Mazatlán, Mexico, and Hastings (1930) recorded it from Panama and the Galapagos Islands. Osburn (1950-1953, no. 1) recorded it from San Felipe Bay, Baja California, Angel de la Guarda Island and Tiburón Island, all within the Gulf of California.

Membranipora savarti (Audouin), 1826

Flustra savartii AUDOUIN, 1826, in Savigny, Description de l'Egypte, histoire naturelle, vol. 1, pt. 4, p. 240, pl. 10, figs. 11a-b.

Acanthodesia savartii, CANU AND BASSLER, 1930, Proc. U. S. Natl. Mus., vol. 76, art. 13, no. 2810, pp. 4-5.

Membranipora savarti, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 27-28, pl. 2, fig. 7.

Membranipora savarti, SOULE AND DUFF, 1957, Proc. California Acad. Sci., ser. 4, vol. 29, no. 4, pp. 90-91.

Zoaria erect, bilaminar (escharan) flattened, a mode of growth that appears to be typical for the Pacific representatives of this species.

Zooecia rectangular, elongate. Opesia ovoid, bordered by a papillate cryptocyst. Laterally and distally, the cryptocyst is relatively narrow, widening noticeably in the proximal region of the zooecia. It exhibits processes of variable size and location, ranging from minute tubercles to discrete spinules projecting laterally into the field of the opesia. The zooecia in the collection from the Gulf of California conform to the zooecia from other eastern Pacific areas in being devoid of the "denticle" on the proximal portion of the cryptocyst, a character commonly seen in Atlantic material.

OCCURRENCE: Station 88, Los Frailes Bay, Baja California, 7-9 fathoms. Station 89, Los Frailes Bay, Baja California, 20-40 fathoms.

DISTRIBUTION: This species is widely distributed in warm temperate and tropical waters. Osburn (1950-1953, no. 1) had one record of this species from the Gulf of California, at Tiburón Island.

GENUS *CONOPEUM* GRAY, 1848

Conopeum commensale Kirkpatrick and Metzelaar, 1923

Conopeum commensale KIRKPATRICK AND METZELAAR, 1923, Proc. Zool. Soc. London, 1922, p. 985, pl. 1, figs. 1, 4-7, 9.

Conopeum commensale, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 30-31, pl. 2, figs. 12-15.

Conopeum commensale, SOULE AND DUFF, 1957, Proc. California Acad. Sci., ser. 4, vol. 29, no. 4, p. 91.

Zoaria encrusting mollusk shells. Zooecia variable in shape, ranging from rectangular to quadrangular. Frontal membrane thin, provided with delicate spinules arising from its surface. The spinules are distributed over much of the frontal membrane, but seem to be most prevalent in the peripheral zones. The abundance of spinules varies from one zoarium to another. Operculum clearly demarked by a well-chitinized border.

Opesia oval to rounded. Mural rim roughened by innumerable minute papillae. Zooecia bounded by a brown band along the midline of the zooecial walls. Cryptocyst narrow, provided with numerous spines extending laterally over the opesial area. The presence of rounded tubercles in the proximal corners of the zooecia is the exception rather than the rule in the Gulf of California specimens, as it is in all of the eastern Pacific material of this species so far examined. For diagnostic purposes, the presence of the spinules on the frontal membrane and the prominent brown band bordering the zooecia are reasonably constant, and thus more reliable.

OCCURRENCE: Station 96, Espíritu Santo Island, 10-24 fathoms. Sta-

tion 115, off Amortajada Bay, San José Island, 13.5–17.5 fathoms. Station 119, San Diego Island, 10–15 fathoms. Station 122, inlet between San Carlos Bay and Point San Telmo, Baja California, intertidal. Station 132, off Salinas Bay, Carmen Island, 14–30 fathoms. Station 133, off Salinas Bay, Carmen Island, 20 fathoms. Station 134, Salinas Bay, Carmen Island, 8 fathoms. Station 144, off Coronados Island, 40–45 fathoms. Station 150, off San Marcos Island, 5–7 fathoms. Station 151, off San Marcos Island, 10–11 fathoms. Station 159, off Tiburón Island, 10 fathoms. Station 160, off Tiburón Island, 20–22 fathoms. Station 161, off Tiburón Island, 30–32 fathoms. Station 162, off Tiburón Island, 40 fathoms. Station 167, off Angel de la Guarda Island, 15–17 fathoms. Station 168, off Angel de la Guarda Island, 16–17 fathoms. Station 172, Puerto Refugio, Angel de la Guarda Island, 16–18 fathoms. Station 173, Puerto Refugio, Angel de la Guarda Island, 17–19 fathoms. Station 177, Gonzaga Bay, Baja California, 10 fathoms.

DISTRIBUTION: This species has been previously reported from the Gulf of California at Guaymas, Sonora, Mexico, and Tepoca Bay, Sonora, Mexico, by Osburn (1950–1953, no 1). It is found in warm temperate and tropical waters of the Atlantic and the Pacific oceans.

GENUS *CUPULADRIA* CANU AND BASSLER, 1919

Cupuladria canariensis (Busk), 1859

Cupularia canariensis BUSK, 1859, Quart. Jour. Micros. Sci., vol. 7, pp. 66–67, pl. 23, figs. 6–9.

Cupuladria canariensis, HASTINGS, 1930, Proc. Zool. Soc. London, for 1929, pp. 714–715, pl. 8, figs. 38, 40.

Cupuladria canariensis, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 33–34, pl. 3, figs. 2–3.

Zoaria free, unilaminar, typically cupuliform, taking the shape of a shallow cone or cup, with the zooecial apertures opening on the convex surface. Zooecia rhomboidal to irregular diamond-shaped, with the distal rim rounded. Immediately adjacent to the distal wall of each zooecium is located a prominent lunate vibraculum chamber, from which arises an elongated tapering vibraculum. The opesial opening of each zooecium is ovoid and covered by a thin frontal membrane. Each zooecium is provided with a cryptocyst that is narrow, forming a uniform border around the opesium. This cryptocyst is covered by innumerable minute papillae. Occasionally a zooecium is replaced by a larger functional vibraculum, having a typical lunate vibraculum chamber at its distal end.

OCCURRENCE: Station 88, Los Frailes Bay, Baja California, 7–9 fath-

oms. Station 89, Los Frailes Bay, Baja California, 20–40 fathoms. Station 97, off Dispensa Point, Espíritu Santo Island, 24–26 fathoms. Station 114, Amortajada Bay, San José Island, 22–25 fathoms. Station 120, off San Diego Island, 25–40 fathoms. Station 131, off Salinas Bay, Carmen Island, 41–45 fathoms.

DISTRIBUTION: This species has been previously reported from the Gulf of California by Osburn (1950–1953, no. 1), but no specific locality was given. Elsewhere it has been reported from tropical waters of the Atlantic and Pacific oceans, the Gulf of Mexico, and the Mediterranean Sea.

FAMILY ELECTRINIDAE D'ORBIGNY, 1851

GENUS *ELECTRA* LAMOUREUX, 1816

Electra crustulenta (Pallas), 1766

Eschara crustulenta PALLAS, 1766, Elenchus zoophytorum, p. 39.

Membranipora lacroixii var. *paucispina*, C. H. AND E. O'DONOGHUE, 1923, Contrib. Canadian Biol., new ser., vol. 1, p. 167.

Membranipora lacroixii var. *multispina*, C. H. AND E. O'DONOGHUE, 1923, Contrib. Canadian Biol., new ser., vol. 1, p. 167.

Electra crustulenta, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 35–36, pl. 3, figs. 4–5.

Zoaria unilaminar, encrusting, unobtrusive. Elliptical zooecia small, with a thin frontal membrane covering an ovoid opesia limited by a distinct, thin, mural rim. The opercula of the Gulf of California specimens is not of the calcareous type that is found in material from northern waters. (*Electra crustulenta arctica* Borg exhibits a strongly calcified operculum.) Gymnocyst smooth, wide in the proximal region of the zooecia. Cryptocyst minutely scalloped, forming a narrow rim surrounding the opesia. Originating from the mural rim of the zooecia, four to six erect spines arch over the opesial area. One young zoarium has a well-preserved ancestrula, with a zooecium budding from the distal end and one zooecium budding from the proximal end. From each of these additional zooecia have developed.

OCCURRENCE: Station 89, Los Frailes Bay, Baja California, 20–40 fathoms. Station 144, off Coronados Island, 13–16.5 fathoms.

DISTRIBUTION: On the Pacific coast, records of this species have hitherto been confined to the cool temperate waters (Osburn, 1950–1953, no. 1; O'Donoghue and O'Donoghue, 1923). Elsewhere it has been reported from both cool and warm temperate waters. Some doubt exists as to the validity of certain of the earlier ac-

counts. No prior occurrence in the Gulf of California has been recorded.

Electra tenella (Hincks), 1880

Membranipora tenella HINCKS, 1880, Ann. Mag. Nat. Hist., ser. 5, vol. 6, p. 376, pl. 16, fig. 7.

Zoarium unilaminar, encrusting a mollusk shell. Zooecia distinct, variable in size, oblong, rounded at the distal end, tapered at the proximal end. Mural walls thin. Opesium ovoid, covered by a thin frontal membrane bounded by a narrow crenulated cryptocyst. Gymnocyst moderately developed proximally, bearing one or two thickened, spine-like tubercles. On most zooecia the proximal region displays two well-developed, erect, spine-like tubercles; a few may have but a single process. In the distal portion of the zooecia, there is an additional pair of tall spinous tubercles that may arise independently or, as in some instances, from the expanded bases of the spines of the proximal portion of the zooecium immediately distad.

OCCURRENCE: Station 81, harbor, Mazatlán, Sinaloa, Mexico, 3 fathoms. This is the first record of this species in the eastern Pacific.

DISTRIBUTION: Osburn (1947) reported *E. tenella* from the Caribbean region. Marcus (1937) recorded it from Santos, Brazil. It was originally described from Florida, and apparently is restricted to very warm temperate and tropical waters. No previous record in the Gulf of California is known.

FAMILY HINCKSINIDAE CANU AND BASSLER, 1927

GENUS *APLOUSINA* CANU AND BASSLER, 1927

Aplousina filum (Jullien), 1903

Membranipora filum JULLIEN, 1903, in Résultats des campagnes scientifiques . . . par Albert I^{er} . . . de Monaco, fasc. 23, pl. 41, pl. 5, fig. 4.

Biflustra Lacroixii, SMITT, 1873, Handl. K. Svenska Vetensk.-Akad., vol. 11, no. 4, p. 18, pl. 4, figs. 85-88.

Callopora filum, CANU AND BASSLER, 1923, Bull. U. S. Natl. Mus., no. 125, p. 42, pl. 45, fig. 5.

Aplousina filum, CANU AND BASSLER, 1930, Proc. U. S. Natl. Mus., vol. 76, art. 13, pp. 5-7, pl. 1, figs. 1-2.

Aplousina filum, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, p. 47, pl. 4, fig. 1.

Zoaria encrusting, unilaminar, devoid of spines. Zooecia distinct, elliptical, varied in size and shape within the same zoarium. Opesia large elongate ovoid, covered by a thin frontal membrane, and bordered by a narrow, finely crenulated cryptocyst. Zooecial walls narrow.

Gymnocyst reduced, frequently absent. Endozooecial ovicells raised, bulging, readily seen distally.

OCCURRENCE: Station 114, Amortajada Bay, San José Island, 22–25 fathoms. Station 131, off Salinas Bay, Carmen Island, 41–45 fathoms. Station 133, off Salinas Bay, Carmen Island, 20 fathoms. Station 159, off Tiburón Island, 10 fathoms. Station 160, off Tiburón Island, 20–22 fathoms. Station 161, off Tiburón Island, 30–32 fathoms. Station 162, off Tiburón Island, 40 fathoms.

DISTRIBUTION: Prior occurrence in the Gulf of California was noted by Osburn (1950–1953, no. 1) off Isla Partida and San Esteban Island. *Aplousina filum* has been reported from tropical waters of both the Atlantic and Pacific oceans.

GENUS *ANTROPORA* NORMAN, 1903

Antropora claustracrassa (Canu and Bassler), 1930

Membrendoecium claustracrassum CANU AND BASSLER, 1930, Proc. U. S. Natl. Mus., vol. 76, art. 13, pp. 7–8, pl. 1, figs. 3–7.

Antropora claustracrassa, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 53–54, pl. 4, fig. 6.

Zoaria unilaminar or multilaminar, encrusting mollusk shells, rock, and sea urchin spines. Zooecia distinct, elliptical. Mural rim thin. Opesia oval, limited by a prominent, coarsely papillate cryptocyst, widest in the proximal region. The opesia is covered by a thin frontal membrane. Avicularia interzooecial, single or paired, located proximally, with the triangular mandible pointed forward. Ovicells endozooecial.

OCCURRENCE: Station 87, Pulmo Reef, Baja California, 2–5 fathoms. Station 89, Los Frailes Bay, Baja California, 20–40 fathoms, station 123, Aqua Verde Bay, Baja California, 1–3.25 fathoms. Station 128, off Monserrate Island, 5–6 fathoms. Station 140, Marquer Bay, Carmen Island, intertidal. Station 173, Puerto Refugio, Angel de la Guarda Island, 17–19 fathoms.

DISTRIBUTION: Osburn (1950–1953, no. 1) reported *A. claustracrassa* from the following localities in the Gulf of California: Puerto Escondido, Aqua Verde Bay, and Ensenada de San Francisco, Sonora, Mexico. Canu and Bassler (1930) originally described the species from the Galapagos Islands. On the basis of our limited knowledge of the distribution of this species, it must be judged to be primarily an inhabitant of tropical waters.

Antropora tincta (Hastings), 1930

Crassimarginatella tincta HASTINGS, 1930, Proc. Zool. Soc. London, for 1929, pt. 4, pp. 708–709, pl. 5, figs. 16–19, pl. 17, fig. 120.

Membranipora lacroixi, Robertson, 1908, Univ. California Publ. Zool., vol. 4, no. 5, pp. 261–262, pl. 14, fig. 5.

Antropora tincta, Osburn, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, p. 54, pl. 4, fig. 7, pl. 29, figs. 7–8.

Antropora tincta, SOULE AND DUFF, 1957, Proc. California Acad. Sci., vol. 29, no. 4, pp. 91–92.

Abundantly represented (23 stations) in the present collection. Zoaria unilaminar or multilaminar, typically displaying a range of coloration from white to dark purple. Only the young zoaria and the most recently formed peripheral zooecia of the older zoaria are devoid of pigmentation. Zooecia oval, elongated, variable in size within the same zoarium. Zooecia exhibit one or two triangular areas proximally. Opesia are oval, bordered by a narrow, finely papillate cryptocyst. The frontal membrane is thin, transparent. Avicularia interzooecial, varied in both size and location. Incidence of avicularia uneven, numerous on some zoaria, rare on others.

OCCURRENCE: Station 86, west side of Los Frailes Bay, Baja California, 1.25 fathoms. Station 87, Pulmo Reef, Baja California, 2–5 fathoms. Station 88, Los Frailes Bay, Baja California, 7–9 fathoms. Station 89, Los Frailes Bay, Baja California, 20–40 fathoms. Station 108, off Isla Partida, 0.5–3.25 fathoms. Station 111, off San Francisco Island, 0.5–4 fathoms. Station 114, Amortajada Bay, San José Island, 22–25 fathoms. Station 115, off Amortajada Bay, San José Island, 13.5–17.5 fathoms. Station 119, off San Diego Island, 10–15 fathoms. Station 120, off San Diego Island, 25–40 fathoms. Station 123, Aqua Verde Bay, Baja California, 1–3.25 fathoms. Station 127, off Monserrate Island, 5 fathoms. Station 132, off Salinas Bay, Carmen Island, 14–30 fathoms. Station 134, Salinas Bay, Carmen Island, 8 fathoms. Station 136, lagoon, Puerto Escondido, Baja California, intertidal. Station 140, Marquer Bay, Carmen Island, intertidal. Station 144, off Coronados Island, 13–16.5 fathoms. Station 147, off Pulpito Point, Baja California, 0.5–2 fathoms. Station 150, off San Marcos Island, 5–7 fathoms. Station 151, off San Marcos Island, 10–11 fathoms. Station 159, off Tiburón Island, 10 fathoms. Station 161, off Tiburón Island, 20–22 fathoms. Station 172, Puerto Refugio, Angel de la Guarda Island, 16–18 fathoms.

DISTRIBUTION: Although originally described from the Panama Canal region (Hastings, 1930), this species has since been reported in the

eastern Pacific (Osburn, 1950–1953, no. 1) from Point Conception, California, southward to Peru. No prior record in the Gulf of California is known. It is an inhabitant of warm temperate and tropical waters.

GENUS *CAULORAMPHUS* NORMAN, 1903

Cauloramphus spiniferum (Johnston), 1838

Flustra spinifera JOHNSTON, 1838, Trans. Nat. Hist. Soc. Northumberland, Durham, Newcastle upon Tyne, vol. 2, p. 266, pl. 9, fig. 6.

Membranipora spinifera, ROBERTSON, 1900, Proc. Washington Acad. Sci., vol. 2, p. 324.

Membranipora spinifera, ROBERTSON, 1908, Univ. California Publ. Zool., vol. 4, no. 5, p. 265, pl. 15, fig. 15.

Cauloramphus porosus CANU AND BASSLER, 1923, Bull. U. S. Natl. Mus., no. 125, p. 48, pl. 33, fig. 17.

Membranipora spinifera, C. H. AND E. O'DONOGHUE, 1923, Contrib. Canadian Biol., new ser., vol. 1, p. 168.

Cauloramphus spinifer, C. H. AND E. O'DONOGHUE, 1925, Publ. Puget Sound Biol. Sta., vol. 5, p. 98.

Cauloramphus spinifer, C. H. AND E. O'DONOGHUE, 1926, Contrib. Canadian Biol. Fish., new ser., vol. 3, p. 85.

Cauloramphus spiniferum, HASTINGS, 1930, Proc. Zool. Soc. London, for 1929, pt. 4, p. 713.

Cauloramphus spiniferum, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 55–56, pl. 5, fig. 9.

Cauloramphus spiniferum, SOULE AND DUFF, 1957, Proc. California Acad. Sci., vol. 29, no. 4, pp. 92–93.

Zoaria unilaminar, dark gray to brown in color, encrusting on calcareous algae and the shells of mollusks. Zooecia elliptical, with large ovoid opesia that are covered by a thin frontal membrane and bounded by a narrow beaded cryptocyst. Mural rim thick, bearing an average of 12 stout brown spines arranged as follows: distal wall with four or five sturdy spines bordering the outer periphery of the operculum; laterally and proximally, seven to eight spines curving over the opesial area. Avicularia pedicellate, arising from deep on the outer lateral walls. Usually two avicularia on each mature zooecium. Ovicell endozooecial, may produce a slight distal bulge.

OCCURRENCE: Station 96, off Espíritu Santo Island, 10–24 fathoms. Station 115, off Amortajada Bay, San José Island, 13.5–17.5 fathoms. Station 119, off San Diego Island, 10–15 fathoms.

DISTRIBUTION: *Cauloramphus spiniferum* is essentially a cool temperate to warm temperate species, ranging from Alaska southward, with comparatively few records occurring in tropical waters. Osburn (1950–1953, no. 1) had specimens from Panama. Hastings (1930) re-

corded it from the Galapagos Islands. It has not been previously recorded from the Gulf of California.

Cauloramphus brunea Canu and Bassler, 1930

Cauloramphus brunea CANU AND BASSLER, 1930, Proc. U. S. Natl. Mus., vol. 76, art. 13, p. 10, pl. 1, figs. 9–10.

Cauloramphus brunea, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, no. 1, pp. 56–57, pl. 5, fig. 6.

Zoaria unilaminar, tan in color, unpretentious, encrusting calcareous algae. Zooecia diminutive, elliptic, distinctly separated. Opesia oval, elongate. Frontal membrane thin. Cryptocyst narrow, finely beaded. Mural rim thick, provided with numerous spines, conforming to the following pattern: there are four to six large pointed spines around the distal rim, and 12 to 14 smaller pointed spines arching over the opesial region from the lateral and proximal walls. Avicularia pedicellate, usually two in number, arising from the lateral zooecial wall in the distal portion of the zooecia. Ovicell endozooecial.

OCCURRENCE: Station 144, off Coronados Island, 13–16.5 fathoms.

DISTRIBUTION: Originally described from the Galapagos Islands, and later recorded from the same area by Osburn (1950–1953, no. 1). Osburn also extended the range in tropical waters from Clarion Island (off southern Mexico) to Colombia. It has not been recorded prior to this time from the Gulf of California.

FAMILY ALDERDINIDAE CANU AND BASSLER, 1927

GENUS *ALDERDINA* NORMAN, 1903

Alderquina smitti Osburn, 1950

Membranipora irregularis, SMITT, 1873, Handl. K. Svenska Vetensk.-Akad., vol. 11, no. 4, p. 8, pl. 2, fig. 63.

Alderquina irregularis, HASTINGS, 1930, Proc. Zool. Soc. London, for 1929, pt. 4, p. 708, pl. 3, figs. 11–12.

Alderquina smitti OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 59–60, pl. 6, fig. 2.

Abundant in the Gulf of California collection of the "Puritan." Recovered from 25 stations. Zoaria extensive, usually unilaminar, forming brown encrustations upon mollusk shells and rocks. Zooecia exhibit some variation in size and shape within a given zoarium, ranging from an elongate-elliptic to egg shape in outline, widest in the proximal portion. Mural rims distinct. Opesia large, oval to egg-shaped, covered by a thin frontal membrane. Operculum delineated by a dark brown chitinous rim. Cryptocyst prominent, corrugated, with a crenulated inner border. Gymnocyct reduced or lacking. Ovicells raised.

OCCURRENCE: Station 76, Olas Altas Bay, Mazatlán, Sinaloa, Mexico, intertidal. Station 87, Pulmo Reef, Baja California, 2–4 fathoms. Station 89, Los Frailes Bay, 20–40 fathoms. Station 91, Espíritu Santo Island, intertidal. Station 102, off Ballena Island, 1.25–2 fathoms. Station 108, off Isla Partida, 0.5–3.25 fathoms. Station 111, off San Francisco Island, 0.5–4 fathoms. Station 114, Amortajada Bay, San José Island, 22–25 fathoms. Station 115, off San José Island, 13.5–17.5 fathoms. Station 119, off San Diego Island, 10–15 fathoms. Station 122, inlet between San Carlos Bay and Point San Telmo, Baja California, intertidal. Station 123, Aqua Verde Bay, Baja California, 1–3.25 fathoms. Station 125, Monserrate Island, intertidal. Station 132, off Salinas Bay, Carmen Island, 14–30 fathoms. Station 133, off Salinas Bay, Carmen Island, 20 fathoms. Station 136, lagoon, Puerto Escondido, Baja California, intertidal. Station 140, Marquer Bay, Carmen Island, intertidal. Station 141, Marquer Bay, Carmen Island, 0.5–2 fathoms. Station 143, Coronados Island, intertidal. Station 144, off Coronados Island, 13–16.5 fathoms. Station 151, off San Marcos Island, 10–11 fathoms. Station 159, off Tiburón Island, 10 fathoms. Station 160, off Tiburón Island, 20–22 fathoms. Station 167, off Angel de la Guarda Island, 15–17 fathoms. Station 168, off Angel de la Guarda Island, 16–17 fathoms.

DISTRIBUTION: The only prior listing in the Gulf of California for this species was from Puerto Escondido, Baja California (Osburn, 1950–1953, no. 1). It has been found in tropical Atlantic waters, and in the warm temperate and tropical waters of the eastern Pacific.

GENUS *COPIDOZOOM* HARMER, 1926

Copidozoum tenuirostre (Hincks), 1880

Membranipora tenuirostris HINCKS, 1880, Ann. Mag. Nat. Hist., ser. 5, vol. 6, pp. 70–71, pl. 9, fig. 3.

Membranipora tenuirostris, HINCKS, 1882, Ann. Mag. Nat. Hist., ser. 5, vol. 10, p. 465.

Callopora tenuirostris, C. H. AND E. O'DONOGHUE, 1926, Contrib. Canadian Biol. Fish., new ser., vol. 3, no. 3, p. 79, pl. 3, fig. 24.

Callopora tenuirostris, CANU AND BASSLER, 1930, Proc. U. S. Natl. Mus., vol. 76, art. 13, pp. 8–9.

Copidozoum tenuirostre, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, p. 72, pl. 7, fig. 4.

Copidozoum tenuirostre, SOULE AND DUFF, 1957, Proc. California Acad. Sci., ser. 4, vol. 29, no. 4, pp. 94–95.

Zoaria encrusting mollusk shells. Zooecia discrete, elongate, ovoid. Mural walls distinct. Opesia elliptic, narrowing in the distal area,

covered by a thin frontal membrane. Cryptocyst broad, corrugated, and having a relatively smooth inner edge. Gymnocyst poorly developed, may be seen in the proximal areas of some zooecia. Interzooecial avicularia numerous, large, with an elongated thin mandible pointing distally from a triangular base. Ovicells large, globular, provided with minute pores, and frequently having a roughened beaded surface. The ovicells lack an operculum.

OCCURRENCE: Station 87, Pulmo Reef, Baja California, 2–4 fathoms. Station 88, Los Frailes Bay, Baja California, 7–9 fathoms. Station 89, Los Frailes Bay, Baja California, 20–40 fathoms. Station 96, off Espiritu Santo Island, 10–24 fathoms. Station 114, Amortajada Bay, San José Island, 22–25 fathoms. Station 115, off San José Island, 13.5–17.5 fathoms. Station 119, off San Diego Island, 10–15 fathoms. Station 120, off San Diego Island, 25–40 fathoms. Station 131, off Salinas Bay, Carmen Island, 41–45 fathoms. Station 132, off Salinas Bay, Carmen Island, 14–30 fathoms. Station 133, off Salinas Bay, Carmen Island, 20 fathoms. Station 144, off Coronados Island, 13–16.5 fathoms. Station 147, off Pulpito Point, Baja California, 0.5–2 fathoms. Station 160, off Tiburón Island, 20–22 fathoms. Station 161, off Tiburón Island, 30–32 fathoms. Station 162, off Tiburón Island, 40 fathoms. Station 168, off Angel de la Guarda Island, 16–17 fathoms.

DISTRIBUTION: This species is widely distributed in cool temperate, warm temperate, and tropical waters around the world. Although not previously recorded from the Gulf of California, there is one specimen in the Hancock collection from Carmen Island, in addition to the present collection.

Copidozoum protectum (Hincks), 1882

Membranipora protecta HINCKS, 1882, Ann. Mag. Nat. Hist., ser. 5, vol. 10, p. 256.

Membranipora protecta HINCKS, 1882, Ann. Mag. Nat. Hist., ser. 5, vol. 10, p. 468, fig. 3.

Membranipora protecta, C. H. AND E. O'DONOGHUE, 1923, Contrib. Canadian Biol., new ser., vol. 1, p. 167.

Amphiblestrum protectum, C. H. AND E. O'DONOGHUE, 1926, Contrib. Canadian Biol. Fish., new ser., vol. 3, p. 84, pl. 3, fig. 30.

Copidozoum protectum, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 73–74, pl. 7, fig. 5.

Zoaria encrusting sea-urchin spines and mollusk shells. Zooecia elliptic, with large ovoid opesia covered by a thin frontal membrane. Cryptocyst narrow, finely papillate. Gymnocyst restricted, found in the

proximal region of the zooecia. Mural rim thin, from which arise four erect, unbranched, distal spines, and on each side two prominent, bifurcated, lateral spines that arc over the opesia. Avicularia large, interzooecial, pointed distally, and provided with an elongated thin mandible arising from a triangular base. Ovicells not present on this material, but have been described by O'Donoghue and O'Donoghue (1926) and Osburn (1950–1953, no. 1).

OCCURRENCE: Station 161, off Tiburón Island, 30–32 fathoms. Station 164, San Esteban Island, intertidal.

DISTRIBUTION: This species has previously been reported from cool and warm temperate waters of the eastern Pacific. Osburn (1950–1953, no. 1) states that it occurs in the Gulf of California but cites no definite locality.

GENUS *RETEVIRGULA* BROWN, 1948

Retevirgula tubulata (Hastings), 1930

Pyrulella tubulata HASTINGS, 1930, Proc. Zool. Soc. London, for 1929, pt. 4, pp. 709–711, pl. 6, figs. 20–26.

Retevirgula tubulata, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, p. 86, pl. 8, fig. 1.

Unilaminar zoaria encrusting calcareous algae and the shells of mollusks. Zooecia elliptical, disjunct. Adjacent zooecia typically separated by two or three short tubular processes. Opesia large, ovoid, covered by a thin frontal membrane. Cryptocyst very narrow, finely granular. A proximal gymnocyst present on some zooecia, lacking on others. Arising from the thin mural walls are slender, pointed, hollow spines that vary in number from nine to 12. The distal pair directed forward, the following pair erect, the others arching over the opesial area. The small interzooecial avicularia are scattered, provided with a stubby, rounded mandible. Ovicells globular, fenestrated, the ovoid or circular aperture covered by a thin membranous sheet.

OCCURRENCE: Station 87, Pulmo Reef, Baja California, 2–4 fathoms. Station 90, off Cerralvo Island, 2–3.5 fathoms. Station 91, Espíritu Santo Island, intertidal. Station 96, off Espíritu Santo Island, 10–24 fathoms. Station 115, off Amortajada Bay, San José Island, 13.5–17.5 fathoms. Station 122, inlet between San Carlos Bay and Point San Telmo, Baja California, intertidal. Station 132, off Salinas Bay, Carmen Island, 14–30 fathoms. Station 145, off Coronados Island, 40–45 fathoms. Station 147, off Pulpito Point, Baja California, 0.5–2 fathoms.

DISTRIBUTION: This species is primarily an inhabitant of tropical waters. It was described by Hastings (1930) from the Galapagos Islands

and Colombia and cited by Osburn (1950–1953, no. 1) from Panama, Colombia, the islands off southern Mexico (Socorro, Isabel, and Clarion), and from a single locality in the Gulf of California, Angel de la Guarda Island.

Retevirgula lata Osburn, 1950

Retevirgula lata OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 86–87, pl. 7, fig. 7.

Zoaria unilaminar, encrusting. Zooecia elliptical, coalescent or separated by very short tubular processes. Opesia ovoid, bounded by a very narrow granular cryptocyst, and covered by a thin frontal membrane. A proximal gymnocyst may be found on some zooecia. Mural walls thick, distinct, giving rise to 12 to 14 sturdy erect spines. Avicularia interzooecial. They are small in size, possess a rounded mandible, and are very rare on the Gulf of California material. Ovicells globose, fenestrated, provided with a large, distally placed, circular opening that is covered by a very thin membrane.

OCCURRENCE: Station 115, off San José Island, 13.5–17.5 fathoms. Station 119, off San Diego Island, 10–15 fathoms. Station 128, off Monserrate Island, 5–6 fathoms. Station 132, off Salinas Bay, Carmen Island, 14–30 fathoms. Station 159, off Tiburón Island, 10 fathoms.

DISTRIBUTION: This species was originally described from the Galapagos Islands (Osburn, 1950–1953, no. 1). It is an inhabitant of warm temperate to tropical waters. No prior occurrence in the Gulf of California has been noted.

Retevirgula areolata (Canu and Bassler), 1923

Mystriopora (?) *areolata* CANU AND BASSLER, 1923, Bull. U. S. Natl. Mus., no. 125, p. 19, pl. 33, figs. 1–2.

Retevirgula areolata, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 87–88, pl. 7, fig. 6.

Zoaria unilaminar, encrusting. Zooecia elongated, ellipsoid, adjacent zooecia connected by three or four short tubular processes. Opesia ovoid, slender, covered by a thin frontal membrane. Cryptocyst narrow, smooth, or with only a trace of granulation. Mural rim stout, possessing 14 to 16 sturdy elongated spines. The six distal spines erect or pointing forward, the remainder slanting obliquely over the opesial area. Some zooecia with a proximal gymnocyst. Avicularia interzooecial, few in number, scattered irregularly. Mandible semicircular. Ovicells

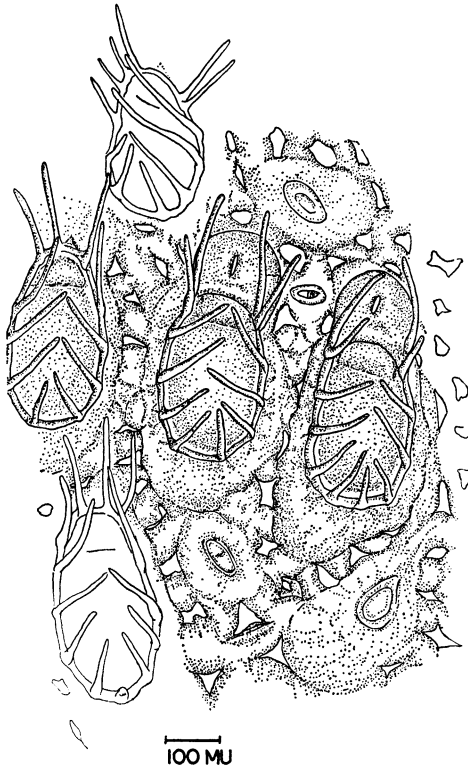


FIG. 1. *Retevirgula osburni*, new species.

prominent, globular, fenestrated, with a transverse elliptical aperture covered by a thin membrane.

OCCURRENCE: Station 132, off Salinas Bay, Carmen Island, 14–30 fathoms.

DISTRIBUTION: Although originally described from fossil material (Canu and Bassler 1923), this species has been subsequently reported in the warm temperate waters off California (Osburn, 1950–1953, no. 1). No previous occurrence in the Gulf of California has been noted.

***Retevirgula osburni*, new species**

Figure 1

DIAGNOSIS: Zoaria encrusting. Zooecia elliptical, distinct, separated by short tubular processes. Opesia oval. Mural rim bearing six elongated, erect, distal spines (or four when an ovicell is present), as well as six to eight shorter, erect, lateral, and proximal spines that slant over

the opesial area. Avicularia interzoecial, very small, scattered, possessing a rounded mandible. Ovicells globose, with a narrow, medial, distal, slot-like aperture covered by a thin membrane.

DESCRIPTION: Zoaria encrusting, unilaminar. Zooecia elliptical, ranging in length from 345 to 370 microns and from 145 to 155 microns in width. They are distinct, separated by short lateral processes that may number eight to 10 for each zooecium. Opesia ovoid, covered by a thin frontal membrane, and bordered by a very narrow, finely granular cryptocyst. Proximal gymnocyst present. Mural rims stout, bearing spines typically arranged in the following manner: Upon the distal rim are found six tall tapering spines that are erect or pointing forward. When an ovicell is present, only four distal spines appear. On the lateral walls and on the proximal wall are found six to eight short, thin, tapered spines that slant inward over the opesial region. Avicularia interzoecial, scattered, minute, with a semicircular mandible and a definite cross bar. Ovicell prominent, globular, possessing a distally located, narrow, slot-like aperture that is usually covered by a thin membrane.

Retevirgula osburni can be distinguished from *Retevirgula caribbea* (Osburn) by virtue of its larger size, the fewer number and arrangement of its lateral and proximal spines, and a greater number of tubular processes separating zooecia. It is distinct from *R. tubulata* (Hastings), *R. areolata* (Canu and Bassler), and *R. lata* Osburn, all of which have a rounded or an elliptical ovicell aperture, and from *R. sejuncta* MacGillivray, which has a triangular ovicell aperture.

This species is respectfully dedicated to the memory of the late Dr. Raymond C. Osburn.

HOLOTYPE: Allan Hancock Foundation number 136, Allan Hancock Foundation, University of Southern California, Los Angeles, California.

PARATYPE: In the American Museum of Natural History.

TYPE LOCALITY: Puritan-American Museum Expedition, station 145, off west side of Coronados Island, Gulf of California, latitude 26° 07' 15" N., longitude 111° 18' 15" W., bottom coarse sand, depth 40–45 fathoms; May 8, 1957.

FAMILY CHAPERIELLIDAE HARMER, 1957

GENUS CHAPERIELLA STRAND, 1928

Chaperiella patula (Hincks), 1881

Membranipora patula HINCKS, 1881, Ann. Mag. Nat. Hist., ser. 5, vol. 7, p. 150, pl. 9, fig. 4.

Membranipora patula, HINCKS, 1882, Ann. Mag. Nat. Hist., ser. 5, vol. 10, p. 465.

Membranipora patula, ROBERTSON, 1908, Univ. California Publ. Zool., vol. 4, no. 5, p. 263, pl. 15, fig. 10.

Membranipora patula, C. H. AND E. O'DONOGHUE, 1923, Contrib. Canadian Biol., new ser., vol. 1, p. 167.

Chaperia galeata, CANU AND BASSLER, 1923, Bull. U. S. Natl. Mus., no. 125, pp. 52-54, pl. 34, figs. 9-10.

Amphiblestrum patulum, C. H. AND E. O'DONOGHUE, 1925, Trans. Puget Sound Biol. Sta., vol. 5, p. 97.

Amphiblestrum patulum, C. H. AND E. O'DONOGHUE, 1926, Contrib. Canadian Biol. Fish., new ser., vol. 3, pp. 83-84.

Chapperia patula, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 89-90, pl. 10, figs. 1-2.

Chapperia patula, SOULE AND DUFF, 1957, Proc. California Acad. Sci., ser. 4, vol. 29, no. 4, pp. 96-97.

Living zoaria form reddish brown, unilaminar, occasionally bilaminar, encrustations upon the shells of mollusks. Zooecia 575-600 microns long, 445-460 microns wide, alternate, obtuse, ogival, the distal rim forming an arch. Opesia 280-300 microns long, 260-275 microns wide, circular to oval, covered by a frontal membrane, and surrounded by a prominent, coarsely granular cryptocyst that is widest on the proximal side and narrows distally. Below the distal lip of the opesia is a shelf-like, occlusar lamina, and laterally there are two projecting cardelles. Mural rim flaring, narrow, supporting four to six erect, unbranched, distal spines, Avicularia small, scattered, when present are located on the mid-distal wall. They are provided with a triangular mandible pointing forward. Ovicells prominent, hyperstomial, hood-shaped.

OCCURRENCE: Station 89, Los Frailes Bay, Baja California, 20-40 fathoms. Station 96, off Espíritu Santo Island, 10-24 fathoms. Station 139, off Puerto Escondido, Baja California, 40-46 fathoms. Station 144, off Coronados Island, 13-16.5 fathoms. Station 145, off Coronados Island, 40-45 fathoms. Station 162, off Tiburón Island, 40 fathoms. Station 163, off Tiburón Island, 50 fathoms.

DISTRIBUTION: Although no prior published report of the occurrence of this species in the Gulf of California has been noted, one specimen from San Pedro Nolasco Island was in the Hancock collections. It has been previously recorded from the cool and warm temperate waters of the eastern Pacific from the Queen Charlotte Islands to Thurloe Head on the Pacific coast of Baja California. The present collection marks a southern extension of the geographic range.

Chaperiella condylata (Canu and Bassler), 1930

Chaperia condylata CANU AND BASSLER, 1930, Proc. U. S. Natl. Mus., vol. 76, art. 13, pp. 44-45, pl. 9, figs. 1-3.

Chapperia condylata, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 90-91, pl. 10, fig. 3.

Zoaria reddish brown, encrusting calcareous algae and other bryozoans (i.e., *Cupuladria canariensis* and *Discoporella umbellata*). Zooecia small, 460-500 microns long, 400-440 microns wide, ogival, the distal wall forming an arch. Opesia 230-250 microns wide, 240-250 microns long, circular or ovoid, covered by a frontal membrane. Cryptocyst granulation gives the impression of a spoke-like, radial arrangement on the wide proximal area. Cryptocyst narrowed distally. Immediately below the distal rim of the cryptocyst is the occlusar lamina, bounded proximally by the cardelles (the condyles of Canu and Bassler). Mural rim with six erect, unbranched, distal spines. Avicularia variable in size and locality. Small triangular avicularia against the mid-distal walls can be found as in *C. patula*. Nearby, a pair of large, proximally located avicularia possessing elongated triangular mandibles may be present. Occasionally this proximal type will be found raised on a tall pedicel. Ovicells prominent, hyperstomial, hooded, frequently decorated with one or two avicularia.

OCCURRENCE: Station 108, off Isla Partida, 0.5-3.25 fathoms. Station 114, Amortajada Bay, San José Island, 22-25 fathoms. Station 131, off Salinas Bay, Carmen Island, 41-45 fathoms.

DISTRIBUTION: Although this species was originally described from the Galapagos Islands, its range was greatly extended by Osburn (1950-1953, no. 1). Known now from warm temperate to tropical waters (Santa Catalina Island, California to Colombia). Osburn (1950-1953, no. 1) recorded it from San Francisco Island, Gulf of California. In the Hancock collection is another specimen previously unreported from the Gulf of California, Angeles Bay, Baja California (station 539-36).

Chaperiella quadrispina, new species

Figure 2

DIAGNOSIS: Zoaria encrusting. Zooecia large, ogival, with a circular to ovoid opesia. Cryptocyst with a wide, granular, proximal area, narrowing distally. Mural rim flaring, the distal wall supporting four robust, erect, unbranched spines. Avicularia large, numerous, located immediately in the front and center of the distal wall, provided with

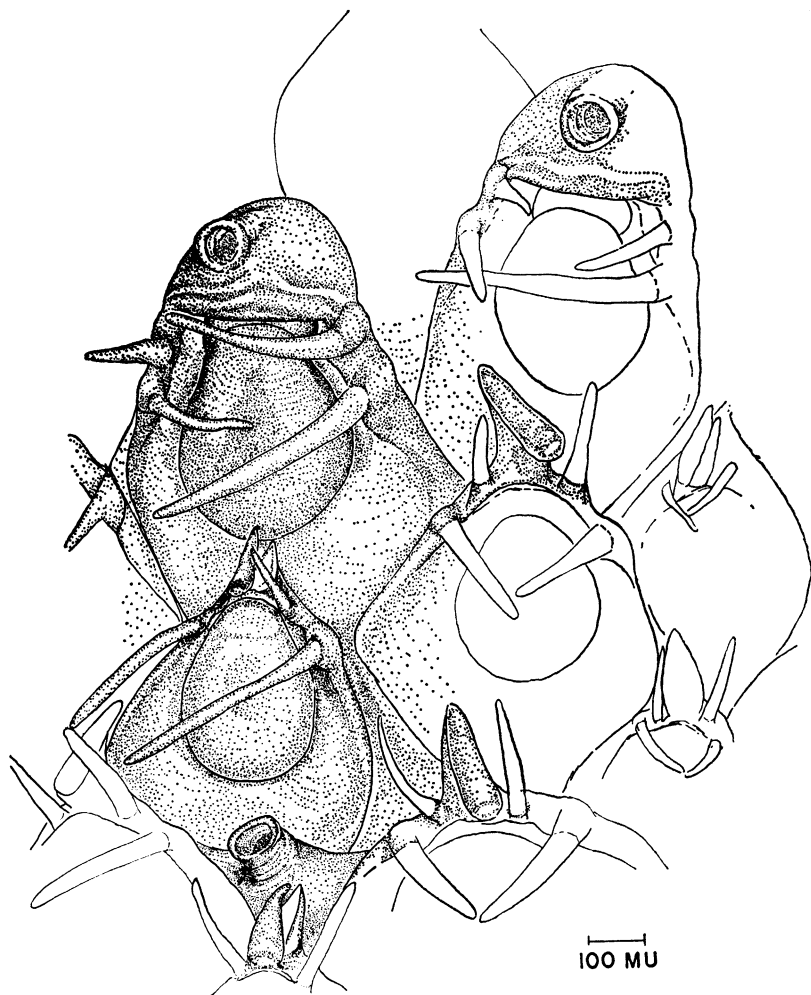


FIG. 2. *Chaperiella quadrispina*, new species.

an elongated, pointed, triangular mandible directed forward. Occasionally an avicularium is raised upon an expanded cylindrical stalk. Ovicells hyperstomial, hooded, frequently bearing an avicularium.

DESCRIPTION: Zoaria conspicuous, unilaminar expansions, maroon to reddish brown in color, encrusting the shells of mollusks. Zooecia ogival, the distal wall forming an arch, large, 650–700 microns in length and 555–575 microns in width. Opesia circular to oval in outline, 325–350 microns in length and 300–345 microns in width. Crypto-

cyst broad proximally, narrowing distally, distinctly granular. Beneath the distal rim of the cryptocyst can be found a crescent-shaped shelf, the occlusar lamina, bounded proximally by a pair of cardelles. Mural rim flaring, the distal wall giving rise to four sturdy, erect spines, the forward pair directed distally, the proximal two arching over the opesial area. Many large avicularia, with elongated, pointed, distally directed, triangular mandibles, are found immediately in front of and on the midline of the distal wall. Occasionally from this location, a large avicularium is raised on a thickset cylindrical stalk. Ovicells prominent, hyperstomial, frequently possessing a large avicularium.

Chaperiella quadrispina differs from *C. patula* (Hincks) in having larger zooecia, larger avicularia, avicularia upon ovicells, and a limit of four spines on each zoecium. It differs from *C. condylata* (Canu and Bassler) in having larger zooecia, no paired avicularia, fewer spines, and only a single avicularium on the ovicells. *Chaperiella californica* Osburn has smaller zooecia and ovicells devoid of avicularia.

HOLOTYPE: Allan Hancock Foundation number 137, Allan Hancock Foundation, University of Southern California, Los Angeles, California.

PARATYPE: In the American Museum of Natural History.

TYPE LOCALITY: Puritan-American Museum Expedition, station 132, off Salinas Bay, Carmen Island, Gulf of California, latitude 25° 57' 23" N., longitude 111° 05' 50" W., bottom sandy, depth 14–30 fathoms; May 4, 1957.

OCCURRENCE: Station 119, off San Diego Island, 10–15 fathoms. Station 133, off Salinas Bay, Carmen Island, 20 fathoms.

FAMILY ARACHNOPUSIIDAE JULLIEN, 1888

GENUS *ANEXECHONA* OSBURN, 1950

Anexechona ancorata Osburn, 1950

Anexechona ancorata OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 96–97, pl. 11, fig. 1.

Zoaria encrusting, brown to pale tan in color, unilaminar or multilaminar. Zooecia rectangular, elongate, with indistinct boundaries. Zooecia covered by a smooth, flattened, frontal shield (pericyst) that is perforated by numerous large, "funnel-shaped" pores. Aperture may show some minor variations in morphology owing to surface convolutions. Typically, the aperture is large, rounded both distally and proximally, with definite lateral indentations just above the proximal

border. Operculum usually dark brown in color. Avicularia distinctive, very large, interzooecial, irregularly distributed, possessing a robust, dark brown, spatulate, hooked mandible. Ovicells lacking.

OCCURRENCE: Station 87, Pulmo Reef, Baja California, 2–4 fathoms. Station 115, off San José Island, 13.5–17.5 fathoms. Station 119, off San Diego Island, 10–15 fathoms. Station 120, off San Diego Island, 25–40 fathoms. Station 132, off Salinas Bay, Carmen Island, 14–30 fathoms. Station 144, off Coronados Island, 13–16.5 fathoms. Station 167, off Angel de la Guarda Island, 15–17 fathoms. Station 172, Puerto Refugio, Angel de la Guarda Island, 16–18 fathoms. Station 173, Puerto Refugio, Angel de la Guarda Island, 17–19 fathoms.

DISTRIBUTION: This species was originally described by Osburn (1950–1953, no. 1) from the Gulf of California (type locality, Puerto Refugio, Angel de la Guarda Island, Hancock station 1049-40), with other Gulf localities at San Francisco Island and “Albatross” station 2824. Osburn also reported it in material from Clarion Island, from Port Parker, Costa Rica, and off Colombia. It is an inhabitant of tropical waters.

FAMILY HIANTOPORIDAE MACGILLIVRAY, 1895

GENUS *TREMOGASTERINA* CANU, 1911

Tremogasterina granulata magnipora, new subspecies

Figure 3

DIAGNOSIS: Zoaria forming erect cylindrical expansions, rarely encrusting. Zooecia medium in size, with a prominent aperture and operculum. The frontal pericyst exhibits a large bilobed pore, frequently provided with a central denticle. Avicularia regularly occurring between zooecia possess a triangular mandible directed forward.

DESCRIPTION: Zoaria form large, erect, cylindrical expansions, or infrequently may encrust mollusk shells. Zooecia rectangular, distinct in the younger portions of the colonies. Incineration reveals a row of pores separating zooecia. In older portions of the colonies the zooecial outlines are gradually obliterated by excess mineralization. Zooecial aperture is large, bell-shaped, measuring 195 microns in width and 250 microns in length. A pair of small cardelles are found near the proximal border. Operculum well chitinized, brown in color, measuring 160 microns in width and 185 microns in length. The zooecial frontal wall is a granular pericyst that is perforated by a large pore ranging in width from 57 microns to 81 microns. The frontal pore is usually divided or bilobed, the two portions partially separated by a central denticle. Avicularia prominent, large, regular in occurrence

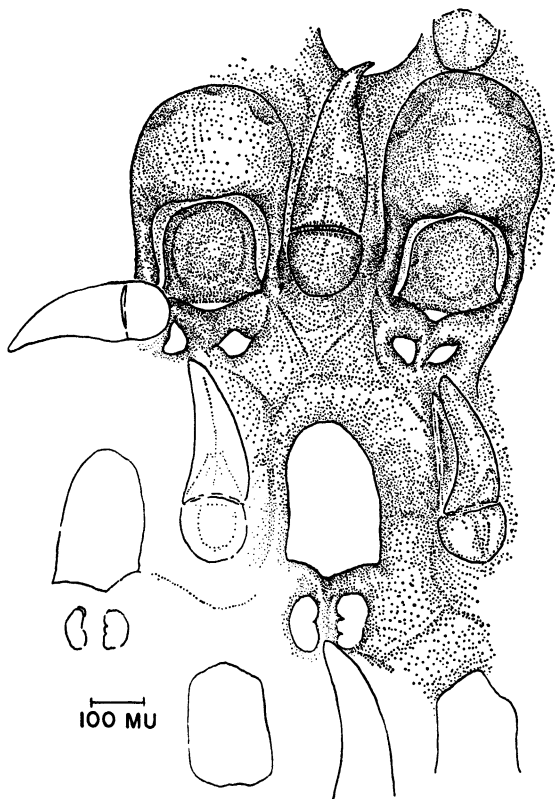


FIG. 3. *Tremogasterina granulata magnipora*, new subspecies.

between zooecia, flanking the zooecial aperture. The avicularian mandible is elongated, triangular, and directed distally. The mandible measures from 260 microns to 300 microns in length. Ovicells prominent, hyperstomial, granular. In older sections of the zoaria, the ovicells are somewhat obscured by secondary calcification.

Tremogasterina granulata magnipora differs from *Tremogasterina granulata* Canu and Bassler and *T. granulata subspatulata* Osburn in possessing a large frontal pore and in having smaller zooecia, smaller triangular avicularia, and a larger zooecial aperture and operculum.

Osburn's holotype and paratype material is from Hancock station 136-34, Clarion Island, off the southwest coast of Mexico. His specimen listed from Hancock station 539-36, Angeles Bay, Baja California, on the Gulf of California, and another specimen not recorded in his paper, from Hancock station 560-36, Isla Partida, Gulf of California,

differ from the type material and were found to be *T. granulata magnipora*, not *T. subspatulata*.

HOLOTYPE: Allan Hancock Foundation number 138, Allan Hancock Foundation, University of Southern California, Los Angeles, California.

PARATYPE: In the American Museum of Natural History.

TYPE LOCALITY: Puritan-American Museum Expedition, station 160, off Red Bluff, south side of Tiburón Island, latitude 28° 45' 30" N., longitude 112° 23' 115" W., 20–22 fathoms, coarse sand, May 18, 1957.

OCCURRENCE: Station 89, Los Frailes Bay, Baja California, 20–40 fathoms. Station 96, off Espíritu Santo Island, 10–24 fathoms. Station 119, off San Diego Island, 10–15 fathoms. Station 120, off San Diego Island, 25–40 fathoms. Station 128, off Monserrate Island, 5–6 fathoms. Station 132, off Salinas Bay, Carmen Island, 14–30 fathoms. Station 133, off Salinas Bay, Carmen Island, 20 fathoms. Station 139, off Puerto Escondido, Baja California, 40–46 fathoms. Station 144, off Coronados Island, 13–16.5 fathoms. Station 145, off Coronados Island, 40–45 fathoms. Station 160, off Tiburón Island, 20–22 fathoms. Station 161, off Tiburón Island, 30–32 fathoms. Station 167, off Angel de la Guarda Island, 15–17 fathoms. Station 168, off Angel de la Guarda Island, 16–17 fathoms. Station 173, Puerto Refugio, Angel de la Guarda Island, 17–19 fathoms.

DIVISION 3. COILOSTEGA LEVINSEN, 1909

FAMILY MICROPORIDAE HINCKS, 1880

GENUS *FLORIDINA* JULLIEN, 1881

Floridina antiqua (Smitt), 1873

Mollia antiqua SMITT, 1873, Handl. K. Svenska Vetensk.-Akad., vol. 11, no. 4, pp. 12–13, pl. 2, fig. 73.

Floridina antiqua, HASTINGS, 1930, Proc. Zool. Soc. London, for 1929, p. 715, pl. 9, figs. 41, 42.

Floridina antiqua, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, p. 102, pl. 11, fig. 4.

Zoaria unilaminar, encrusting the shells of mollusks. Zooecia exhibit minor variations in shape. The distal wall forms an arch, the lateral walls taper to a narrow, blunt, proximal wall. The granular cryptocyst is well developed, surrounding trilobed opesia, the distal lobe of which encompasses the aperture, and two inferior opesiules extending laterally and proximally. Interzooecial avicularia chambers (onychocellaria) are scattered irregularly over the zoaria in variable

numbers. Avicularian mandible elongated (240–255 microns in length), narrow, hooked. It is expanded in the basal region to form the “wings.” Ovicells endozooecial.

OCCURRENCE: Station 88, Los Frailes Bay, Baja California, 7–9 fathoms. Station 89, Los Frailes Bay, Baja California, 20–40 fathoms. Station 114, Amortajada Bay, San José Island, 22–25 fathoms. Station 115, off San José Island, 13.5–17.5 fathoms. Station 117, off San José Island, 35–41.5 fathoms. Station 119, off San Diego Island, 10–15 fathoms. Station 120, off San Diego Island, 25–40 fathoms. Station 131, off Salinas Bay, Carmen Island, 41–45 fathoms. Station 132, off Salinas Bay, Carmen Island, 14–30 fathoms. Station 133, off Salinas Bay, Carmen Island, 20 fathoms. Station 136, lagoon, Puerto Escondido, Baja California, intertidal. Station 139, off Puerto Escondido, Baja California, 40–46 fathoms. Station 144, off Coronados Island, 13–16.5 fathoms. Station 145, off Coronados Island, 40–45 fathoms. Station 151, off San Marcos Island, 10–11 fathoms. Station 159, off Tiburón Island, 10 fathoms. Station 160, off Tiburón Island, 20–22 fathoms. Station 161, off Tiburón Island, 30–32 fathoms. Station 162, off Tiburón Island, 40 fathoms. Station 163, off Tiburón Island, 50 fathoms. Station 167, off Angel de la Guarda Island, 15–17 fathoms.

DISTRIBUTION: Osburn (1950–1953, no. 1) cites one record from the Gulf of California, Angel de la Guarda Island. To that must be added a previously unreported record from a Hancock station in the Gulf, at Angeles Bay, Baja California, west of the southern tip of Angel de la Guarda Island. The Pacific geographic range of this abundant species is from Cedros Island, Mexico, to La Plata Island, Ecuador. In the Atlantic this species ranges from Florida to the northern coast of South America in warm temperate to tropical waters.

GENUS *VELUMELLA* CANU AND BASSLER, 1917

Velumella americana Canu and Bassler, 1928

Velumella americana CANU AND BASSLER, 1928, Proc. U. S. Natl. Mus., vol. 72, art. 14, pp. 54–56, fig. 7, pl. 6, figs. 9–10.

Vincularia abyssicola SMITT, 1873, Handl. K. Svenska Vetensk.-Akad. Handl., vol. 11, no. 4, pp. 6–7, pl. 1, fig. 60 (not fig. 61).

Velumella americana, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, p. 103, pl. 12, figs. 7–8.

Zoaria encrusting the shells of mollusks and upon other bryozoans. Zooecia rounded distally, ogival, distinct. Cryptocyst concave, granular, well developed proximally. Opesia large, bell-shaped. Interzooecial avicularian chambers (onychocellaria) large, elongated. Avicularian

mandibles elongated (570–600 microns in length), with thin membranous lateral wings. Ovicell endozoecial.

OCCURRENCE: Station 132, off Salinas Bay, Carmen Island, 14–30 fathoms. This is the first record of this species in the Gulf of California.

DISTRIBUTION: This species was originally described (Canu and Bassler, 1928) from the waters just north of Cuba. Since 1928 it has been reported from Florida, the Tortugas Islands, Puerto Rico, the Gulf of Mexico, Curaçao, Colombia, and the Gulf of Venezuela. In Pacific waters, Osburn (1950–1953, no. 1) recorded it in the Galapagos dredgings and from the Gulf of Panama. It is a tropical species.

GENUS *MICROPORA* GRAY, 1848

***Micropora coriacea inarmata*, new subspecies**

Figure 4

Reptescharellina disparilis GABB AND HORN, 1862, Jour. Acad. Nat. Sci. Philadelphia, new ser., vol. 5, pt. 2, p. 147, fig. 29.

?*Micropora coriacea*, var. HINCKS, 1880, Ann. Mag. Nat. Hist., ser. 5, vol. 6, pp. 378–379, pl. 16, fig. 6.

DIAGNOSIS: Zoaria encrusting. Zooecia distinct, hexagonal, rounded distally. Mural walls thin. Aperture prominent, rounded distally, and provided with a straight proximal border. On each side of the proximal border of the aperture is found a minute, knob-like tubercle. Cryptocyst finely perforate, covering the entire front, except for two small, distal opesiules flanking the aperture. No avicularia present. Ovicells raised, prominent, endozoecial.

DESCRIPTION: Little need be added to the above, as *Micropora coriacea* is well known on the Pacific coast of North America. After a careful examination of the zoaria from the Gulf of California collection disclosed the total absence of avicularia, an examination was made of zoaria from Socorro Island, Mexico, and the Galapagos Islands. Again avicularia were lacking. For comparison purposes a number of zoaria from Pacific waters to the north were examined (off Santa Cruz Island, California, off Santa Rosa Island, California, off Santa Cruz, California, Hein Bank, Puget Sound, Washington, and San Juan Island, Washington). On these, even the smallest zoarial fragments disclosed avicularia. This seems to be the first evidence of the existence of a geographical population within the species that differs consistently, in lacking avicularia, from the other populations of *Micropora coriacea* (Esper), 1791.

HOLOTYPE: Allan Hancock Foundation number 139, Allan Hancock

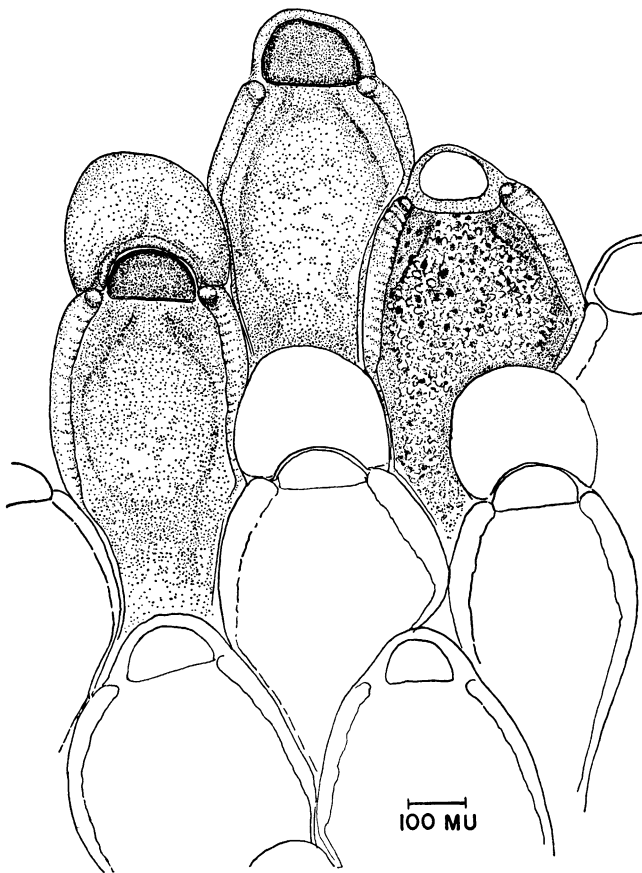


FIG. 4. *Micropora coriacea inarmata*, new subspecies.

Foundation, University of Southern California, Los Angeles, California.

PARATYPE: In the American Museum of Natural History.

TYPE LOCALITY: Puritan-American Museum Expedition, station 151, off south end of San Marcos Island, latitude $27^{\circ} 10' N.$, longitude $112^{\circ} 05' W.$, coarse sand; May 10, 1957; depth 10–11 fathoms.

OCCURRENCE: Station 85, Los Frailes Bay, Baja California, 3 fathoms. Station 87, Pulmo Reef, Baja California, 2–4 fathoms. Station 88, Los Frailes Bay, 7–9 fathoms. Station 89, Los Frailes Bay, 20–40 fathoms. Station 95, off Espíritu Santo Island, 5–9 fathoms. Station 96, off Espíritu Santo Island, 10–24 fathoms. Station 108, off Isla Partida, 0.5–3.25 fathoms. Station 111, off San Francisco Island, 0.5–4 fathoms.

Station 114, Amortajada Bay, San José Island, 22–25 fathoms. Station 115, off San José Island, 13.5–17.5 fathoms. Station 119, off San Diego Island, 10–15 fathoms. Station 120, off San Diego Island, 25–40 fathoms. Station 130, off Santa Catalina Island, 1–2.5 fathoms. Station 132, off Carmen Island, 14–30 fathoms. Station 134, Salinas Bay, Carmen Island, 5–8 fathoms. Station 140, Marquer Bay, Carmen Island, intertidal. Station 144, off Coronados Island, 13–16.5 fathoms. Station 145, off Coronados Island, 40–45 fathoms. Station 151, off San Marcos Island, 10–11 fathoms. Station 159, off Tiburón Island, 10 fathoms. Station 160, off Tiburón Island, 20–22 fathoms. Station 161, off Tiburón Island, 30–32 fathoms. Station 162, off Tiburón Island, 40 fathoms. Station 167, off Angel de la Guarda Island, 15–17 fathoms. Station 168, off Angel de la Guarda Island, 16–17 fathoms. Station 173, Puerto Refugio, Angel de la Guarda Island, 17–19 fathoms.

ADDITIONAL DISTRIBUTION: Hancock Foundation station 129–34, Socorro Island, Mexico, 14–18 fathoms. Hancock Foundation station 310–35, Bindloe Island, Galapagos, 15 fathoms. Hancock Foundation station 132–34, Socorro Island, Mexico. Hancock Foundation station 170–34, Chatham Island, Galapagos.

FAMILY STEGANOPORELLIDAE SMITT, 1873

GENUS *LABIOPORELLA* HARMER, 1926

Labioporella sinuosa Osburn, 1940

Labioporella sinuosa OSBURN, 1940, in Scientific survey of Porto Rico and the Virgin Islands, vol. 16, pt. 3, p. 377, pl. 5, figs. 40–41.

Labioporella sinuosa, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 109–110, pl. 11, fig. 12.

Labioporella sinuosa, SOULE AND DUFF, 1957, Proc. California Acad. Sci., ser. 4, vol. 29, no. 4, p. 98.

Zoaria encrusting, unilaminar. Zooecia rectangular in outline, regular in arrangement. Mural wall thin, with a finely beaded rim. Frontal membrane thin. No gymnocyst. Cryptocyst thick, perforated, occupying much of the frontal surface, and giving rise to a median, concave process extending distally. Operculum narrow, outlined by a brown colored border. Ovicells and avicularia lacking.

OCCURRENCE: Station 87, Pulmo Reef, Baja California, 2–4 fathoms. Station 88, Los Frailes Bay, Baja California, 7–9 fathoms. Station 114, Amortajada Bay, San José Island, 22–25 fathoms. Station 115, off San José Island, 13.5–17.5 fathoms. Station 119, off San Diego Island, 10–15 fathoms. Station 120, off San Diego Island, 25–40 fathoms. Station 133,

off Carmen Island, 20 fathoms. Station 144, off Coronados Island, 13–16.5 fathoms. Station 145, off Coronados Island, 40–45 fathoms.

DISTRIBUTION: Originally described from Tortugas Islands, Gulf of Mexico (Osburn, 1940), this species was cited by Osburn (1950–1953, no. 1) in the Hancock collections from the Gulf of California at Puerto Escondido, Baja California, Agua Verde Bay, Baja California, Espíritu Santo Island, and San Francisco Island. It ranges in tropical waters from the Gulf of California southward to Ecuador.

FAMILY THALAMOPORELLIDAE LEVINSEN, 1909

GENUS *THALAMOPORELLA* HINCKS, 1887

Thalamoporella gothica (Busk), 1855

Membranipora gothica BUSK, 1855, in Carpenter, Catalogue of . . . Mazatlán Mollusca . . . in the British Museum, p. 2.

Membranipora gothica BUSK, 1856, Quart. Jour. Micros. Sci., vol. 4, pp. 176–177, pl. 7, figs. 5–7.

Thalamoporella Rozieri, var. *D. (gothica)*, LEVINSEN, 1909, Morphological and systematic studies on the cheilostomatous Bryozoa, p. 184.

Thalamoporella gothica, HARMER, 1926, Siboga-Expeditie, vol. 28b, pp. 302–303.

Thalamoporella gothica, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 110–111, pl. 12, fig. 1.

Zoaria encrusting mollusk shells and the fronds of algae. Zooecia distinct, large, elongated, distally ogival. Opesia relatively small, with a curved, finely beaded proximal wall, and provided with a shallow oral shelf below the edge of the distal wall. Opesiules prominent, asymmetrical. Operculum thin, not heavily chitinated. Cryptocyst beaded and perforated in the proximal two-thirds of the zooecia. Avicularia elongate, narrow, with triangular mandibles frequently decurved distally. Ovicells prominent, globular, closed proximally by an operculum. Within the zoecial cavity two types of spicules, the compass and the caliper, are to be found.

OCCURRENCE: Station 84, Los Frailes Bay, Baja California, intertidal. Station 87, Pulmo Reef, Baja California, 2–4 fathoms. Station 90, off Cerralvo Island, 2–3.5 fathoms. Station 93, San Lorenzo Reef, San Lorenzo Channel, 2 fathoms. Station 111, off San Francisco Island, 0.5–4 fathoms. Station 127, off Monserrate Island, 5 fathoms.

DISTRIBUTION: Originally described from Mazatlán, Sinaloa, Mexico, this species has been reported by Osburn (1950–1953, no. 1) from two localities in the Gulf of California, Angel de la Guarda Island (545–36) and Bahia San Francisquito near Guaymas, Sonora, Mexico. It is an inhabitant of tropical waters.

Thalamoporella californica (Levinson), 1909

Thalamoporella Rozieri var. *E. (californica)* LEVINSON, 1909, Morphological and systematic studies on the cheilostomatous Bryozoa, pp. 184–185, pl. 6b, figs. 2a–2d.

Steganoporella Rozieri form *gothica*, HINCKS, 1880, Ann. Mag. Nat. Hist., ser. 5, vol. 6, p. 380.

Thalamoporella rozieri, ROBERTSON, 1908, Univ. California Publ. Zool., vol. 4, no. 5, pp. 277–279, pl. 17, figs. 27–29, pl. 18, fig. 30.

Thalamoporella californica, HASTINGS, 1930, Proc. Zool. Soc. London, for 1929, pp. 716–717.

Thalamoporella californica, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 111–112, pl. 12, fig. 2.

Thalamoporella californica, SOULE AND DUFF, 1957, Proc. California Acad. Sci., ser. 4, vol. 29, no. 4, pp. 98–99.

Zoaria encrusting algae, or erect, arising in club-like extensions from the substrate. Zooecia distinct, elongate, distally ogival. Opesia with a finely beaded, curved, proximal border and a distal shelf below the mural rim. Opesiules laterally placed, unequal in size. Some zooecia exhibit tubercles flanking the aperture. Operculum thin, poorly chitinated. Frontal membrane thin. Cryptocyst covering most of the frontal area, perforate. Avicularia large, elongate, with bluntly pointed, triangular mandibles directed distally. Ovicells prominent, globular, bilobed, with a large ovoid aperture closed by an operculum. Within the zoecial cavity the spicules, while variable in size, are of but one type, the calipers.

OCCURRENCE: Station 96, off Espíritu Santo Island, 10–24 fathoms. Station 103, off Isla Partida, 12–13 fathoms. Station 109, San Francisco Island, intertidal. Station 112, Amortajada Bay, San José Island, 0.5–2.25 fathoms. Station 115, off San José Island, 13.5–17.5 fathoms. Station 122, inlet between San Carlos Bay and Point San Telmo, Baja California, intertidal. Station 125, Monserrate Island, intertidal. Station 140, Marquer Bay, Carmen Island, intertidal. Station 141, Marquer Bay, Carmen Island, 0.5–2 fathoms. Station 143, Coronados Island, intertidal. Station 146, Ildefonso Island, intertidal. Station 147, off Pulpito Point, Baja California, 0.5–2 fathoms. Station 149, San Marcos Island, intertidal. Station 154, San Carlos Bay, Sonora, Mexico, intertidal. Station 158, off Tiburón Island, 1–3 fathoms. Station 164, San Esteban Island, intertidal. Station 167, off Angel de la Guarda Island, 15–17 fathoms. Station 168, off Angel de la Guarda Island, 16–17 fathoms.

DISTRIBUTION: This species ranges in shallow waters from the channel islands off southern California southward to the Galapagos Islands

and Colombia. The one previous record of this species in the Gulf of California comes from Steinbeck and Ricketts (1941), who found it at Angeles Bay, Baja California.

FAMILY LUNULARIIDAE LEVINSEN, 1909

GENUS *DISCOPORELLA* D'ORBIGNY, 1852

Discoporella umbellata (Defrance), 1823

Lunulites umbellata DEFRANCE, 1823, in Cuvier, Dictionnaire des sciences naturelles, vol. 27, p. 361, pl. 47, figs. 1, 1a, 1b.

Discoporella denticulata, GABB AND HORN, 1862, Jour. Acad. Nat. Sci. Philadelphia, new ser., vol. 5, pt. 2, pp. 142–143, pl. 20, fig. 25.

Cupularia canariensis, ROBERTSON, 1908, Univ. California Publ. Zool., vol. 4, no. 5, pp. 314–315, pl. 24, figs. 90–91.

Cupularia umbellata, CANU AND BASSLER, 1923, Bull. U. S. Natl. Mus., no. 125, pp. 80–82, pl. 2, figs. 15–19.

Cupularia robertsoniae CANU AND BASSLER, 1923, Bull. U. S. Natl. Mus., no. 125, p. 82, pl. 34, figs. 5–7.

Cupularia umbellata, CANU AND BASSLER, 1930, Proc. U. S. Natl. Mus., vol. 76, art. 13, pp. 11–12.

Discoporella umbellata, HASTINGS, 1930, Proc. Zool. Soc. London, for 1929, pp. 718–719, pl. 11, fig. 54.

Discoporella umbellata, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 113–114, pl. 11, figs. 7–10.

Discoporella umbellata, SOULE AND DUFF, 1957, Proc. California Acad. Sci., ser. 4, vol. 29, no. 4, pp. 99, 100.

Zoaria free, disc-, cup-, or bowl-shaped. Zooecia rhomboidal, narrow, or widened into an irregular diamond shape. Mural walls thin. The descending portion of the cryptocyst roughened, granular, forming a series of granular processes that fuse on the midline. As a result of this fusion a variable number of opesiules (four or five) are found along each lateral wall. Operculum moderately chitinized, bounded by a dark brown rim. Immediately above the distal portion of each zooecium is found a semilunar chamber from which a vibraculoid avicularium arises. The whip-like avicularian mandibles are very long, measuring between 850 and 960 microns in length.

OCCURRENCE: Station 88, Los Frailes Bay, Baja California, 7–9 fathoms. Station 89, Los Frailes Bay, Baja California, 20–40 fathoms. Station 97, off Espíritu Santo Island, 24–26 fathoms. Station 104, off Isla Partida, 13 fathoms. Station 114, Amortajada Bay, San José Island, 22–25 fathoms. Station 115, off San José Island, 13.5–17.5 fathoms. Station 120, off San Diego Island, 25–40 fathoms. Station 131, off Carmen Island, 41–45 fathoms. Station 132, off Carmen Island, 14–30 fathoms. Station 134, Salinas Bay, Carmen Island, 5–8 fathoms. Station

138, off Puerto Escondido, Baja California, 18–20 fathoms. Station 139, off Puerto Escondido, Baja California, 40–46 fathoms. Station 144, off Coronados Island, 13–16.5 fathoms. Station 145, off Coronados Island, 40–45 fathoms. Station 151, off San Marcos Island, 10–11 fathoms. Station 161, off Tiburón Island, 30–32 fathoms. Station 162, off Tiburón Island, 40 fathoms. Station 173, Puerto Refugio, Angel de la Guarda Island, 17–19 fathoms.

DISTRIBUTION: This species ranges from Point Conception, California, to Point Santa Elena, Ecuador (Osburn, 1950–1953, no. 1). In the Hancock Foundation collections from the Gulf of California are individuals of this species taken at Concepcion Bay, Baja California, Angeles Bay, Baja California, and off Puerto Refugio, Angel de la Guarda Island. Osburn (1950–1953, no. 1) listed the Gulf of California in the distribution of this species but gave no specific localities. It is found in warm temperate to tropical waters.

DIVISION 4. PSEUDOSTEGA LEVINSEN, 1909

No representatives of this group occur in the present collection.

DIVISION 5. CELLULARINA SMITT, 1867

FAMILY SCRUPOCELLARIIDAE LEVINSEN, 1909

GENUS *SCRUPOCELLARIA* VAN BENEDEN, 1845

Scrupocellaria bertholleti (Audouin), 1826

Acamarchis Bertholleti AUDOUIN, 1826, in Savigny, Description de l'Egypte, histoire naturelle, vol. 1, p. 241, pl. 11, fig. 3.

Scrupocellaria bertholletii, HASTINGS, 1930, Proc. Zool. Soc. London, for 1929, p. 703, pl. 1, figs. 1–5.

Scrupocellaria bertholletti, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, p. 133, pl. 15, figs. 7–8, pl. 21, fig. 8.

Zoaria erect, biserial, branching. Zooecia elongate, narrow. Opesia ovoid, occupying about two-thirds of the ventral area, covered by a thin frontal membrane. The outer distal rim of the opesia gives rise to three or four erect spines, while the inner possesses one or two. Curving over the opesial area can be found a well-developed scutum, usually with three main branches, and numerous sharply pointed tynes. Giant frontal avicularia with a large, proximally directed, hooked mandible, and small frontal avicularia are present. Lateral avicularia are small. Dorsal vibraculum chambers small, triangular, with short setose processes. Ovicells hyperstomial, globose, pierced by numerous large pores.

OCCURRENCE: Station 87, Pulmo Reef, Baja California, 2–4 fathoms. Station 88, Los Frailes Bay, Baja California, 7–9 fathoms. Station 90,

off Cerralvo Island, 2–3.5 fathoms. Station 93, San Lorenzo Reef, San Lorenzo Channel, 2 fathoms. Station 96, off Espíritu Santo Island, 10–24 fathoms. Station 97, off Espíritu Santo Island, 24–26 fathoms. Station 98, San Gabriel Bay, Espíritu Santo Island, 1–1.5 fathoms. Station 102, off Ballena Island, 1.25–2 fathoms. Station 108, off Isla Partida, 0.5–3.25 fathoms. Station 115, off San José Island, 13.5–17.5 fathoms. Station 122, inlet between San Carlos Bay and Point San Telmo, Baja California, intertidal. Station 123, Aqua Verde Bay, Baja California, 1–3.25 fathoms. Station 127, off Monserrate Island, 5 fathoms. Station 134, Salinas Bay, Carmen Island, 5–8 fathoms. Station 141, Marquer Bay, Carmen Island, 0.5–2 fathoms. Station 144, off Coronados Island, 13–16.5 fathoms. Station 159, off Tiburón Island, 10 fathoms. Station 167, off Angel de la Guarda Island, 15–17 fathoms. Station 168, off Angel de la Guarda Island, 16–17 fathoms.

DISTRIBUTION: This species ranges from southern California southward to the Galapagos. Osburn (1950–1953, no. 1) reported the species in the Gulf of California “as far north as Angel de la Guarda Island.” It is found in warm temperate to tropical waters.

Scrupocellaria bertholleti tenuirostris Osburn, 1950

Scrupocellaria bertholleti var. *tenuirostris* OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 134–135, pl. 18, fig. 8, pl. 21, fig. 6.

Zoaria erect, biserial, branching. The characters that separate this variety from *S. bertholleti* (Audouin) are primarily in the morphology of the giant frontal avicularia. This giant avicularia possesses a lengthy narrow mandible and a long narrow rostrum.

OCCURRENCE: Station 158, off Tiburón Island, 1–3 fathoms.

DISTRIBUTION: Originally described from Newport Harbor at Corona del Mar, California, this variety ranges southward to Costa Rica. Osburn (1950–1953, no. 1) lists specimens of it in the Hancock collections from two localities off Angel de la Guarda Island and one locality off Tiburón Island, Gulf of California. It occurs in warm temperate and tropical waters.

Scrupocellaria mexicana Osburn, 1950

Scrupocellaria mexicana OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 139–140, pl. 18, figs. 1–2, pl. 21, fig. 3.

Zoaria erect, biserial, branching. Zooecia stubby, thickened. Opesia elliptic, occupies approximately two-thirds of the frontal area. Frontal

membrane thin. From the outer distal rim of the opesia arise three, occasionally four, erect spines, and from the inner rim, usually two. Scutum flat, ovoid, forming a shield-like canopy over the opesial area. Frontal avicularia small, with a laterally or proximally directed triangular mandible. Lateral avicularia small, inconspicuous. Dorsal vibraculum chamber small, triangular, with a diagonal groove. Setae elongate, thin. Ovicells hyperstomial, globose, perforate.

OCCURRENCE: Station 89, Los Frailes Bay, Baja California, 20–40 fathoms. Station 119, off San Diego Island, 10–15 fathoms. Station 132, off Carmen Island, 14–30 fathoms. Station 133, off Carmen Island, 20 fathoms. Station 144, off Coronados Island, 13–16.5 fathoms. Station 161, off Tiburón Island, 30–32 fathoms. Station 162, off Tiburón Island, 40 fathoms. Station 163, off Tiburón Island, 50 fathoms.

DISTRIBUTION: Originally described from Acapulco, Mexico, this species ranges northward as far as the Santa Barbara basin, off southern California. In the Gulf of California it has previously been reported from Angel de la Guarda Island (Osburn, 1950–1953, no. 1). It occurs in warm temperate and tropical waters.

Scrupocellaria scruposa (Linné), 1758

Sertularia scruposa LINNÉ, 1758, *Systema naturae*, ed. 10, vol. 1, p. 815.

Scrupocellaria scruposa, HASTINGS, 1930, *Proc. Zool. Soc. London*, for 1929, p. 703.

Scrupocellaria scruposa, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 145–146, pl. 19, fig. 1, pl. 21, fig. 2.

Zoaria erect, biserial, branching. Zooecia elongate. Opesia oval, occupying one-half to two-thirds of the frontal area. Arising from the outer distal rim of the opesia are three slender unbranched spines, and the inner opesial rim usually exhibits two spines. No scutum. No frontal avicularia. Lateral avicularia are large, with a hooked rostrum and a proximally directed triangular mandible. Dorsal vibraculum chambers elongate, with a diagonal groove. Ovicells globular, low, imperforate.

OCCURRENCE: Station 84, Los Frailes Bay, Baja California, intertidal.

DISTRIBUTION: Reported by Hastings (1930) from the Galapagos Islands, and by Osburn (1950–1953, no. 1) from five stations ranging from an unknown locality in the Gulf of California to Ecuador. Steinbeck and Ricketts (1941) found the species in the Gulf of California at San Marcial Point, Baja California. It is primarily known as an inhabitant of tropical waters.

Scrupocellaria varians Hincks, 1882

Scrupocellaria varians HINCKS, 1882, Ann. Mag. Nat. Hist., ser. 5, vol. 10, pp. 461-462, pl. 19, figs. 1-1c.

Scrupocellaria varians, ROBERTSON, 1905, Univ. California Publ. Zool., vol. 2, no. 5, pp. 260-261, pl. 8, figs. 38-39, pl. 16, fig. 95.

Scrupocellaria varians, C. H. AND E. O'DONOGHUE, 1923, Contrib. Canadian Biol., new ser., vol. 1, p. 160.

Scrupocellaria varians, C. H. AND E. O'DONOGHUE, 1925, Publ. Puget Sound Biol. Sta., vol. 5, p. 98.

Scrupocellaria varians, C. H. AND E. O'DONOGHUE, 1926, Contrib. Canadian Biol. Fish., new ser., vol. 3, p. 87.

Scrupocellaria varians, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 149-150, pl. 19, fig. 5, pl. 20, fig. 6.

Scrupocellaria varians, SOULE AND DUFF, 1957, Proc. California Acad. Sci., ser. 4, vol. 29, no. 4, pp. 103-104.

Zoaria erect, biserial, branching. Zooecia narrow, elongate. Opesia ovoid, elongate, occupying one-half of the frontal area. On the outer distal rim of the opesium are found two or three unbranched slender spines, and on the inner distal rim only one spine is present. Scutum curving over the opesial area, usually having two main branches, each terminating in a pair of sharply pointed tynes. Frontal avicularia small, with a lateroproximally directed triangular mandible. Two types of lateral avicularia: numerous typical small avicularia with a proximally directed triangular mandible, and giant lateral avicularia sparsely scattered over the zoaria. The giant avicularia possess an elongated curved mandible, directed distally. Dorsal vibraculum small, with a transverse groove and comparatively short, slender setae. Ovicells globose, imperforate.

OCCURRENCE: Station 162, off Tiburón Island, 40 fathoms.

DISTRIBUTION: The present species is primarily an inhabitant of cool temperate to warm temperate waters. It is well represented in collections from British Columbia southward to San Diego, California. Osburn (1950-1953, no. 1) reported one locality in the Gulf of California, off Isla Partida at a depth of 45 fathoms.

FAMILY EPISTOMIIDAE GREGORY, 1903

GENUS *SYNNOTUM* PIEPER, 1881*Synnnotum aegyptiacum* (Audouin), 1826

Loricaria aegyptiaca AUDOUIN, 1826, in Savigny, Description de l'Egypte, histoire naturelle, vol. 1, p. 243, pl. 13, fig. 4.

Synnnotum aviculare, ROBERTSON, 1905, Univ. California Publ. Zool., vol. 2, no. 5, p. 286, pl. 14, figs. 84-85.

Synnotum aegyptiacum, HASTINGS, 1930, Proc. Zool. Soc. London, for 1929, p. 702.

Synnotum aegyptiacum, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, p. 151, pl. 13, fig. 5.

Zoaria delicate, branching, biserial, with zooecia arranged back-to-back. Zooecia small, the frontal area occupied by an elongated, egg-shaped opesia, narrowed at the proximal end. Two types of avicularia present: a minute sessile avicularia found in one or both distal corners of the zooecia, and scattered, stout, stalked, lateral avicularia arising from the distal portion of the zooecia. Coarse radicle fibers frequently attaining considerable length also arise from the distal portion of the zooecia. Gonozooecia.

OCCURRENCE: Station 151, off San Marcos Island, 10–11 fathoms.

DISTRIBUTION: The species has been reported from warm temperate and tropical waters, in the eastern Pacific southward from the channel islands off southern California. In the Gulf of California it has been previously reported from Isla Partida, and off Rocky Point, Sonora, Mexico (Osburn, 1950–1953, no. 1).

FAMILY BICELLARIELLIDAE LEVINSEN, 1909

GENUS *BUGULA* OKEN, 1815

Bugula neritina (Linné), 1758

Sertularia neritina LINNÉ, 1758, Systema naturae, ed. 10, vol. 1, p. 815.

Bugula neritina, ROBERTSON, 1905, Univ. California Publ. Zool., vol. 2, no. 5, p. 266, pl. 9, fig. 47, pl. 16, fig. 97.

Bugula neritina, HASTINGS, 1930, Proc. Zool. Soc. London, for 1929, p. 704.

Bugula neritina, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 154, 155, pl. 23, fig. 3, pl. 24, fig. 3.

Zoaria erect, branching, biserial, frequently forming luxurious red-purple tufts. Zooecia large, alternate, with a distinct process at the distal corners. Opesia occupies most of the frontal area. No avicularia. Ovicells large, globular, attached by a short stalk to the inner distal wall of the zooecia.

OCCURRENCE: Station 105, off Isla Partida, 3–5 fathoms. Station 120, off San Diego Island, 25–40 fathoms. Station 140, Marquer Bay, Carmen Island, intertidal. Station 141, Marquer Bay, Carmen Island, 0.5–2 fathoms. Station 146, Ildefonso Island, intertidal. Station 150, off San Marcos Island, 5–7 fathoms. Station 153, San Carlos Bay, Sonora, Mexico, intertidal. Station 158, off Tiburón Island, 1–3 fathoms. Station 159, off Tiburón Island, 10 fathoms.

DISTRIBUTION: This is a world-wide species in the warm temperate and tropical waters. Osburn (1950–1953, no. 1) recorded it in the Gulf of California “as far north as Angel de la Guarda Island.” In the Hancock collection is a specimen from Miramar Beach, Guaymas, Sonora, Mexico, collected by Mrs. G. E. MacGinitie. Steinbeck and Ricketts (1941) reported it from Angeles Bay, Baja California, and San Marcial reef.

Bugula minima (Waters), 1909

Bugula neritina var. *minima* WATERS, 1909, Jour. Linnean Soc. London, Zool., vol. 31, pp. 136–137, pl. 11, figs. 4–7.

Bugula neritina var. *minima*, HASTINGS, 1930, Proc. Zool. Soc. London, for 1929, pp. 704–705, pl. 2, fig. 6.

Bugula minima, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, p. 155, pl. 22, fig. 8, pl. 23, fig. 5.

Zoaria small, biserial, branching. Zooecia small, the opesia occupying most of the frontal area. The distal corners of the zooecia exhibit pointed or knob-like processes. Avicularia present, arising near the proximal end of the zooecia. Ovicells prominent, globose.

OCCURRENCE: Station 163, off Tiburón Island, 50 fathoms.

DISTRIBUTION: This species has a world-wide occurrence in warm temperate and tropical waters. In the eastern Pacific, Osburn (1950–1953, no. 1) reported it from Costa Rica and Panama, while Hastings (1930) cited it from the Galapagos Islands and Gorgona Island, Colombia. No previous report of it in the Gulf of California has been noted.

Bugula longirostrata Robertson, 1905

Bugula longirostrata ROBERTSON, 1905, Univ. California Publ. Zool., vol. 2, no. 5, p. 274, pl. 11, figs. 59–60.

Bugula longirostrata, C. H. AND E. O'DONOGHUE, 1923, Contrib. Canadian Biol., new ser., vol. 1, p. 163.

Bugula longirostrata, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, p. 156, pl. 22, fig. 7, pl. 24, fig. 1.

Zoaria erect, branching, biserial. Zooecia elongate, narrow, opesia occupying most of the frontal region. Avicularia prominent, large, elongate, slender, their length usually well over half of the length of the zooecia. They arise from the outer lateral wall on the proximal portion of the zooecia. Ovicells small, cap-like, shallow.

OCCURRENCE: Station 96, off Espíritu Santo Island, 10–24 fathoms. Station 114, Amortajada Bay, San José Island, 22–25 fathoms. Station

115, off San José Island, 13.5–17.5 fathoms. Station 132, off Carmen Island, 14–30 fathoms. Station 133, off Carmen Island, 20 fathoms. Station 138, off Puerto Escondido, Baja California, 18–20 fathoms. Station 144, off Coronados Island, 13–16.5 fathoms. Station 161, off Tiburón Island, 30–32 fathoms.

DISTRIBUTION: This species was originally described from La Jolla, California (Robertson, 1905); the known range extends from British Columbia to the Galapagos Islands. One previous record from the Gulf of California is from off San Francisco Island at a depth of 60 fathoms (Osburn, 1950–1953, no. 1). The species occurs in cool temperate to tropical waters.

Bugula californica Robertson, 1905

Bugula californica ROBERTSON, 1905, Univ. California Publ. Zool., vol. 2, no. 5, pp. 267–268, pl. 10, fig. 49, pl. 16, fig. 100.

Bugula californica, C. H. AND E. O'DONOGHUE, 1923, Contrib. Canadian Biol., new ser., vol. 1, p. 162.

Bugula californica, C. H. AND E. O'DONOGHUE, 1926, Contrib. Canadian Biol. Fish., new ser., vol. 3, p. 91.

Bugula californica, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 156–157, pl. 23, fig. 1, pl. 24, fig. 2.

Zoaria erect, biserial, branching. Zooecia elongate, narrow, opesia occupying nearly all of the frontal area. The zooecia exhibit three, occasionally four, hollow distal spines. Avicularia in two sizes: the largest, ranging in length from 210 microns to 230 microns, are the more abundant and are found on the outer zoecial wall towards the distal end; the smaller, less abundant, avicularia are found on the inner wall and range in length from 130 microns to 150 microns. Ovicells large, globular.

OCCURRENCE: Station 81, harbor, Mazatlán, Sinaloa, Mexico, 3 fathoms.

DISTRIBUTION: The species ranges from British Columbia to the Galapagos Islands. Osburn (1950–1953, no. 1) recorded one location in the northern portion of the Gulf of California, off Consag Rock. The species is known from cool temperate to tropical waters.

Bugula avicularia (Linné), 1758

Sertularia avicularia Linné, 1758, Systema naturae, ed. 10, vol. 1, p. 809.

Bugula avicularia, C. H. AND E. O'DONOGHUE, 1923, Contrib. Canadian Biol., new ser., vol. 1, p. 162.

Bugula avicularia, HASTINGS, 1930, Proc. Zool. Soc. London, for 1929, pp. 703–704.

Zoaria erect, biserial, branching. Zooecia elongate, narrow, the opesia occupying most of the frontal area. Each corner of the distal wall is drawn into a hollow, short, spinous process. Avicularia large, sturdy, ranging in length from 255 microns to 300 microns. They arise from the outer lateral wall about midway between the distal and proximal ends. Ovicells large, globular, abundant in the material from this area.

OCCURRENCE: Station 111, off San Francisco Island, 0.5–4 fathoms.

DISTRIBUTION: Only two prior records in the eastern Pacific are known: Balboa, Panama (Hastings, 1930), and British Columbia (O'Donoghue and O'Donoghue, 1923). No prior record in the Gulf of California has been noted.

GENUS *SESSIBUGULA* OSBURN, 1950

Sessibugula translucens Osburn, 1950

Sessibugula translucens OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, p. 164, pl. 26, figs. 1–3.

Zoaria form thin encrustations upon rock, mollusk shells, and other bryozoans. Zooecia rectangular, elongate. Opesia ovoid, confined to the distal half of the zooecia. Gymnocyst thin, occupying the proximal portion of the zooecia. Cryptocyst reduced to a barely discernible margin. From the distal corner of the opesia two thin erect hollow spines arise. Laterally, on each side, may be found one or two additional spines. Proximally, arising from the gymnocyst, one to four spines may be present. Avicularia large, pedunculate, “buguloid,” with hooked beak and mandible, arising singly or in pairs from the gymnocyst. Ovicells hyperstomial, large, operculated.

OCCURRENCE: Station 87, Pulmo Reef, Baja California, 2–4 fathoms. Station 90, off Cerralvo Island, 2–3.5 fathoms. Station 93, San Lorenzo Reef, 2 fathoms. Station 132, off Carmen Island, 14–30 fathoms. Station 144, off Coronados Island, 13–16.5 fathoms. Station 160, off Tiburón Island, 20–22 fathoms. Station 167, off Angel de la Guarda Island, 15–17 fathoms. Station 168, off Angel de la Guarda Island, 16–17 fathoms. Station 172, Puerto Refugio, Angel de la Guarda Island, 16–18 fathoms. Station 173, Puerto Refugio, Angel de la Guarda Island, 17–19 fathoms.

DISTRIBUTION: Originally described by Osburn (1950–1953, no. 1) from Isla Partida, Gulf of California, this species was also recorded

from Costa Rica and the Galapagos Islands. It occurs in warm temperate to tropical waters.

GENUS *BEANIA* JOHNSTON, 1840

Beania mirabilis Johnston, 1840

Beania mirabilis JOHNSTON, 1840, Ann. Mag. Nat. Hist., vol. 5, pp. 272-274, figs. 1-2.

Beania mirabilis, ROBERTSON, 1905, Univ. California Publ. Zool., vol. 2, no. 5, pp. 276-277, fig. 1, pl. 12, figs. 63-64.

Beania mirabilis, C. H. AND E. O'DONOGHUE, 1926, Contrib. Canadian Biol. Fish., vol. 3, pp. 45-46.

Beania mirabilis, HASTINGS, 1930, Proc. Zool. Soc. London, for 1929, p. 705.

Beania mirabilis, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 170-171, pl. 26, fig. 8.

Zoaria uniserial, delicate. Zooecia small, "boat-shaped," elongate. Proximally tubular, they expand widely to form the zoid. Opesia elliptical, long, occupying most of the frontal area. Operculum thin. Flanking the aperture are two short distal spines, directed forward. Laterally there are six to eight delicate spines on each side that curve over the opesial area in a wide arc. The tubular processes that connect zooecia arise from the middorsal area of the zoid immediately to the rear. No avicularia. No ovicells.

OCCURRENCE: Station 88, Los Frailes Bay, Baja California, 7-9 fathoms.

DISTRIBUTION: This species is world wide in temperate and tropical waters. This is the first record of it in the Gulf of California.

Beania cupulariensis Osburn, 1914

Beania cupulariensis OSBURN, 1914, Papers Tortugas Lab., Carnegie Inst. Washington, vol. 5, pp. 190-191, figs. 6-7.

Zoaria uniserial. Zooecia with a short, proximal, tubular portion originating in the distal region of the dorsal side of the zoid immediately behind it. Opesia large, ovoid, occupying most of the frontal area. On each of the lateral walls are found four or five short delicate spines that curve over the opesial area. The avicularia are located distally; usually a pair flank the aperture, occasionally only one is present. Ovicells wanting.

OCCURRENCE: Station 88, Los Frailes Bay, Baja California, 7-9 fathoms.

DISTRIBUTION: Originally described by Osburn (1914) from the Tortugas Islands, Florida, and subsequently found by Harmer (1926) in

the Sulu Archipelago, western Pacific. The presence of the species in the Gulf of California is the first report of its occurrence in the eastern Pacific area. Its known range is restricted to tropical waters.

Beania magellanica (Busk), 1852

Diachoris magellanica BUSK, 1852, Catalogue of marine Polyzoa in the British Museum, pt. 1, p. 54, pl. 67, figs. 1-3.

Beania magellanica, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 171-172, pl. 25, fig. 9.

Zoaria retiform, producing mesh-like coverings upon the substrate. Zooecia separate, joined by short, lateral, connecting tubes. Each of the elongate, "boat-shaped" zooecia is connected by a short tubular process arising from the dorsal surface of the zooid immediately to the rear. Avicularia large, pedunculate, "buguloid," with a hooked beak and mandible. No evidence of ovicells.

OCCURRENCE: Station 144, off Coronados Island, 13-16.5 fathoms.

DISTRIBUTION: This species is known only from warm temperate waters. The only previous eastern Pacific report of it was from off Peru (Osburn, 1950-1953, no. 1). The present record is the first of its presence in the Gulf of California.

DIVISION 6. CRIBRIMORPHA HARMER, 1926

FAMILY CRIBRILINIDAE HINCKS, 1880

GENUS MEMBRANIPORELLA SMITT, 1873

Membraniporella aragoi pacifica Osburn, 1950

Membraniporella aragoi var. *pacifica* OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 174-175, pl. 27, figs. 3-4.

Zoaria encrusting the shells of mollusks and upon other bryozoans. Zooecia ovoid, with a narrow, reduced, proximal gymnocyst. Opesia oval, covered by an arching, irregularly reticulated, frontal shield formed by the union of the branched tips of four, five, or six spines originating from the mural rim. On each side of the aperture is a short flattened spine, terminating in two, sometimes three, tyne-like processes. Where ovicells are lacking, a short stout spine occurs on the distal rim. No avicularia. Ovicells raised, hemispheroid, mucronate.

OCCURRENCE: Station 87, Pulmo Reef, Baja California, 2-4 fathoms. Station 132, off Carmen Island, 14-30 fathoms. Station 144, off Coronados Island, 13-16.5 fathoms. Station 145, off Coronados Island, 40-45 fathoms.

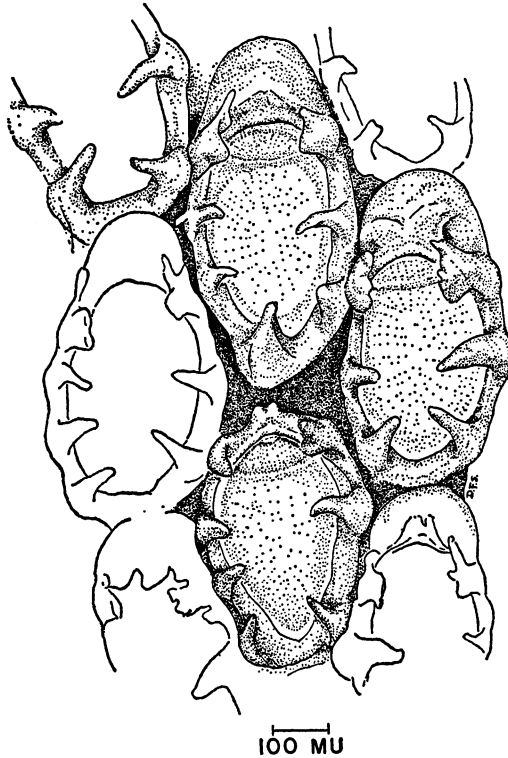


FIG. 5. *Membraniporella baueri*, new species.

DISTRIBUTION: Osburn (1950-1953, no. 1) recorded this species from Socorro Island and Clarion Island west of Mexico, the Galapagos Islands, and its northernmost locality in the Pacific, San Benito Island off Baja California. In the Gulf of California he cites a specimen from Angel de la Guarda Island. One other specimen has since turned up in the Hancock collections from the Gulf of California, at Carmen Island, station 1754-49. The species is known from warm temperate to tropical waters.

***Membraniporella baueri*, new species**

Figure 5

DIAGNOSIS: Zoaria encrusting. Zooecia ovoid, distinct. Opesia oval, occupying most of the frontal area. Zooecia with two or three pairs of lateral, stout, spine-like costules that typically do not meet or fuse on the midline, thus forming an incomplete frontal shield. Distally, flank-

ing the aperture are two short stocky costules, each terminating in two, three, or four minute, finger-like spines. Where an ovicell is lacking, the mid-distal wall is provided with a short, double-pronged costule. Ovicells hemispherical, frequently unbonate. Avicularia lacking.

DESCRIPTION: Zoaria encrusting. Zooecia ovoid, distinct, measuring 425–470 microns in length and 265–320 microns in width. Opesia oval, occupying most of the frontal area, and covered by a thin frontal membrane. From the lateral mural rims and the proximal gymnocyst a total of four to six stout, spine-like, non-branching costules form an arch over the frontal area. Typically, the costules fail to meet at the midline, thus forming an incomplete frontal shield (pericyst). Distally, two stout costules are found, one on each side of the aperture. Each of these is divided at its free end to form two, three, or four short, finger-like spines. In the absence of an ovicell, the mid-distal rim frequently supports a reduced, double-pronged spine. Ovicells prominent, hemispherical, measuring 230–240 microns in width and 160–185 microns in length. The ovicells have a V-shaped frontal area terminating in a blunt umbo. No avicularia present.

The small size of the zooecia, the reduced number of costules, and the absence of a pericyst distinguish this species from *Membraniporella aragoi* (Audouin), *M. aragoi pacific* Osburn, and *M. pulchra* Canu and Bassler. In having short, unbranched costules, it differs from *M. petasus* Canu and Bassler, which typically has bifid or trifid costules.

This species is dedicated to Mr. Harry J. Bauer, of Los Angeles, California, co-sponsor of the Puritan-American Museum Expedition.

HOLOTYPE: Allan Hancock Foundation number 140, Allan Hancock Foundation, University of Southern California, Los Angeles, California.

PARATYPE: In the American Museum of Natural History.

TYPE LOCALITY: Puritan-American Museum Expedition, station 151, off south end of San Marcos Island, latitude 27°10' N., longitude 112° 05' W., bottom coarse sand, depth 10–11 fathoms; May 10, 1957.

GENUS *REGINELLA* JULLIEN, 1886

Reginella mucronata (Canu and Bassler), 1923

Metracolposia mucronata CANU AND BASSLER, 1923, Bull. U. S. Natl. Mus., no. 125, p. 92, pl. 35, fig. 4.

Reginella mucronata, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 180–181, pl. 28, fig. 4, pl. 29, fig. 3.

Reginella mucronata, SOULE AND DUFF, 1957, Proc. California Acad. Sci., ser. 4, vol. 29, no. 4, p. 104.

Zoaria encrusting the shells of mollusks. Zooecia large, elliptical, protuberant. Frontal shield formed by five or six pairs of costules (ribs) that meet and fuse on the midline. Adjacent costules are separated by a radial row of pores, five, six, or more in number. Each costule exhibits two rounded, funnel-shaped pores. The proximal border of the aperture, formed by the first pair of costules, may be bi-mucronate. No avicularia. Ovicells large, spheroid, perforate, frequently carinate.

OCCURRENCE: Station 120, off San Diego Island, 25–40 fathoms. Station 131, off Carmen Island, 41–45 fathoms.

DISTRIBUTION: Range rather limited, extending from warm temperate waters of the channel islands off southern California southward to Point San Eugenio, Baja California, in the Pacific. One previous report (Osburn, 1950–1953, no. 1) from the Gulf of California, at San Esteban Island. The material from the present collection marks a southern extension of the range.

GENUS *COLLETOSIA* JULLIEN, 1886

Colletosia radiata (Moll), 1803

Eschara radiata MOLL, 1803, *Eschara ex zoophytorum seu phytozoorum*, p. 63, pl. 4, figs. 17a–i.

Cribrilina radiata form *innominata*, HINCKS, 1883, *Ann. Mag. Nat. Hist.*, ser. 5, vol. 11, pp. 442–443.

Cribrilina setosa WATERS, 1899, *Jour. Roy. Micros. Soc.*, pp. 8–9.

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Puellina setosa, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, p. 186, pl. 29, fig. 4.

Colletosia radiata, OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 187–188, pl. 29, figs. 2–2a.

Colletosia radiata, SOULE AND DUFF, 1957, *Proc. California Acad.*, ser. 4, vol. 29, no. 4, pp. 105–106.

Zoaria encrusting mollusk shells and rocks. Zooecia oval, distinct, with a prominent convex pericyst composed of five to eight pairs of radiating costae fused on the midline, and separated by radiating rows of small pores. Aperture semicircular, with a straight proximal border. Five oral spines are present. Flanking the aperture are a pair of small avicularia with slender setose mandibles. These avicularia may be obscured on older zooecia by increased calcification. Scattered irregularly over the zoaria are large vicarious avicularia possessing an elongated triangular mandible. Ovicells hyperstomial hemispherical, prominent, provided with a keel-like umbo.

In going over the specimens of *Puellina setosa* identified by Osburn in the Hancock collection, I find that on this material he overlooked the presence of the vicarious avicularia. In comparing colonies of *C. radiata* and *P. setosa*, I find the two to be identical, so that I must refer to *P. setosa* as a junior synonym.

OCCURRENCE: Station 87, Pulmo Reef, Baja California, 2–4 fathoms. Station 89, Los Frailes Bay, Baja California, 20–40 fathoms. Station 108, off Isla Partida, 0.5–3.25 fathoms. Station 115, off San José Island, 13.5–17.5 fathoms. Station 119, off San Diego Island, 10–15 fathoms. Station 120, off San Diego Island, 25–40 fathoms. Station 122, inlet between San Carlos Bay and Point San Telmo, Baja California, intertidal. Station 123, Aqua Verde Bay, Baja California, 1–3.25 fathoms. Station 131, off Carmen Island, 41–45 fathoms. Station 132, off Carmen Island, 14–30 fathoms. Station 133, off Carmen Island, 20 fathoms. Station 141, Marquer Bay, Carmen Island, 0.5–2 fathoms. Station 144, off Coronados Island, 13–16.5 fathoms. Station 145, off Coronados Island, 40–45 fathoms. Station 147, off Pulpito Point, Baja California, 0.5–2 fathoms. Station 159, off Tiburón Island, 10 fathoms. Station 160, off Tiburón Island, 20–22 fathoms. Station 161, off Tiburón Island, 30–32 fathoms. Station 162, off Tiburón Island, 40 fathoms. Station 168, off Angel de Guarda Island, 16–17 fathoms.

DISTRIBUTION: The species abundantly occurs in a world-wide range in cool temperate to tropical waters.

Colletosia radiata flabellifera (Kirkpatrick), 1888

Cribilina radiata var. *flabellifera* KIRKPATRICK, 1888, Ann. Mag. Nat. Hist., ser. 6, vol. 1, p. 75, pl. 10, fig. 4.

Zoaria and zooecia like those of *Colletosia radiata* (Moll), with the exception that the vicarious avicularia instead of possessing an elongated triangular mandible have the mandible rapidly broadened at its free distal end, spear-shaped, hastate.

OCCURRENCE: Station 123, Aqua Verde Bay, Baja California, 1–3.25 fathoms.

DISTRIBUTION: This subspecies was originally described by Kirkpatrick from Mauritius. Harmer (1926) reported it in the Siboga material, having been collected off New Guinea. Canu and Bassler (1929) reported it from the China Sea and the Philippines. Osburn (1950–1953, no. 1) noted the existence of the subspecies, but so far as I can determine, it has not previously appeared in eastern Pacific collections. It apparently occurs only in tropical waters.

Colletosia bellula Osburn, 1950

Colletosia bellula OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 188–189, pl. 29, fig. 1.

Zoaria encrusting a mollusk shell. Zooecia ovoid, distinct, provided with a convex pericyst made up of five, six, or, rarely, seven pairs of costules separated by narrow radiating rows of small pores. Aperture elongate, keyhole-shaped, with a pair of cardelles separating a large, expanded, distal portion from the smaller, rounded, proximal area. On the distal rim may be found two to four short distal spines, or their scars. Flanking the aperture is a pair of small avicularia, raised on thick stalks, and with the mandible pointed distally. No vicarious avicularia seen in the Gulf material.

Ovicells small, hemispherical, roughened with costules.

OCCURRENCE: Station 132, off Carmen Island, 14–30 fathoms.

DISTRIBUTION: Much of Osburn's material, including the type, comes from the Gulf of California (Angel de la Guarda Island and Raza Island). Except for one specimen from the Galapagos Island, the known Recent distribution is at this time limited to the Gulf of California.

GENUS *FIGULARIA* JULLIEN, 1886

Figularia hilli Osburn, 1950

Figularia hilli OSBURN, 1950, in Allan Hancock Foundation publications of the University of Southern California, vol. 14, no. 1, pp. 190–191, pl. 28, fig. 8.

Zoaria encrusting. Zooecia large, distinct, with a raised convex pericyst and a well-developed proximal gymnocyst. The pericyst is composed of three or four costules, each with an elongated narrow pore. Aperture large, circular, with a small pair of cardelles proximally. Operculum well chitinated. No oral spines.

Avicularia wanting. Hood-like ovicells small, low, inconspicuous.

Ancestrula large, with an extensive frontal membrane, and 12 to 14 short, delicate, mural spines.

OCCURRENCE: Station 120, off San Diego Island, 25–40 fathoms.

DISTRIBUTION: Until the appearance of this species in the present collection from the Gulf of California, it had been known from the warm temperate waters of southern California shore and islands, from Santa Catalina Island northward to Monterey Bay, California (Osburn, 1950–1953, no. 1). No previous record in the Gulf of California has been noted.

SUMMARY

Fifty-six species of Bryozoa Anasca have been identified in the present collection from the Gulf of California. Three are believed to be new species, and two are new subspecies. Twenty-one species are added to the faunal list of the area.

Of the 51 previously described species identified in this collection, many of which are well known and widely distributed, it is interesting to note that 65 per cent have a geographical distribution that includes both temperate and tropical waters throughout the world; 8 per cent were found only in cool and warm temperate waters; 8 per cent were found to be restricted to warm temperate waters; and 19 per cent are known to be confined to the tropical waters.

Within the Gulf of California, none of the species with a world-wide distribution restricted to the tropics was found north of Pulpito Point, Baja California, with the majority ranging from Coronados Island southward to Mazatlán. The bathymetric range of the Bryozoa in the collection is from intertidal to a maximum depth of 50 fathoms, well within the confines of the littoral zone. Fifty-three species were represented in both the eulittoral and sublittoral subdivisions of the zone. Three were found solely within the sublittoral at a depth of from 40 to 50 fathoms. Sixteen species were recovered from depths that did not exceed 26 fathoms, restricting them to the eulittoral zone.

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