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Water in the Northwestern Gulf of Mexico

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INTRODUCTION

This paper is based on long distance collaboration between the authors. Hedgpeth has in the main collected the material and made sketches of the anemones in life and provided notes about the exterior and natural history of the animals. Carlgren has determined the species and in the main prepared the anatomical descriptions and histological drawings.

The collection of anemones from Texas and Louisiana described in this paper consists of material collected from shore and shallow water in Texas by the junior author in the Rockport, Port Aransas and Port Isabel areas, together with material from other localities donated by various collectors. Whenever possible the living material was studied and the nematocysts examined. In all, fifteen identifiable species have been found in the region, thirteen actinarians, one zoanthid and one ceriantharian, as follows:

<i>Andwakia isabellae</i> n. sp.	<i>Calliactis tricolor</i> (Lesueur)
<i>Bunodosoma cavernata</i> (Bosc).	<i>Bartholomea annulata</i> (Lesueur)
<i>Anemonia sargassensis</i> Hargitt	<i>Aiptasia pallida</i> (Verrill)
<i>Anthopleura krebsi</i> (Duch. et Mich.)	<i>Aiptasiomorpha luciae</i> (Verrill)
<i>Bunodactis texaensis</i> n. sp.	<i>Aiptasiomorpha texaensis</i> n. sp.
<i>Bunodactis</i> sp.	<i>Botryon tuberculatus</i> n. g., n. sp.
<i>Minyas olivacea</i> (Lesueur)	<i>Palythoa texaensis</i> n. sp.
<i>Paranthus rapiformis</i> (Lesueur)	<i>Ceriantheomorpha brasiliensis</i> Carlgren

Although it is possible that more species occur in the shallow waters along the Texas coast, the actinian fauna is evidently poor in comparison with the rich fauna of the Antilles. Louisiana waters are probably even more impoverished, and it is to be noted that only four anemones and a cerianthid have been previously reported from that region (Cary, 1906).

The Corallimorpharia and benthic stichodactyline Actiniaria are completely lacking from the northwestern Gulf of Mexico, as well as representatives of the families Aliciidae and Boloceroididae. Only one species of Zoantharia, which are numerous on the coasts of the West Indies, is found in the waters of Texas. It must be emphasized that these remarks apply to the coastal waters proper; the occurrence of living coral patches on small topographic features near the 100 fathom line suggests that some of the typical West Indian forms may be found on these elevations, some of which rise to within 10 fathoms of the surface. Close inshore, there is but one living madreporarian coral, *Astrangia astreiformis* Milne Edwards and Haime, occurring in small clumps in the deeper parts of the bays near the passes along the Texas coast and in the shallow Gulf. Two alcyonarians, *Renilla mülleri* Kölliker and *Leptogorgia setacea* (Pallas) are common in relatively shallow water in the Gulf along the shore, and a third, *Virgularia mirabilis* (O. F. Müller), occurs occasionally.¹

The poverty of the actinian fauna in the northwestern Gulf of Mexico can be attributed to several factors. Hard or rocky substrates are lacking, except for the jetties at the passes and the stonework of the bay harbors, pilings, and shell reefs. These offer at best an insignificant opportunity for the development of a rich actinian

¹We are indebted to Dr. Elisabeth Deichmann for identification of these alcyonarians.

fauna. Furthermore, the temperature and salinity along the shore, especially near the passes where most of the collecting has been done, and in the bays, is quite variable (see Whitten, Rosene and Hedgpeth, 1950, and Collier and Hedgpeth, 1950); this range of environmental conditions limits the fauna to a few comparatively hardy species.

The actinian fauna of the northwestern Gulf of Mexico is predominantly temperate or possibly warm-temperate in its affinities, with a number of tropical strays. Of the thirteen actinians represented in this collection, two occur as far northward as Woods Hole, three northward to Cape Hatteras (one of these has not been found in tropical Florida waters), four are West Indian forms whose northernmost range is Texas or Louisiana, and four species are new, possibly endemic. The remaining species is the ubiquitous *Aiptasiomorpha luciae*, which on the basis of its known distribution can be expected to turn up almost anywhere except the tropics. The characteristic jetty form, found both on the jetties of passes and the harbor works of the bays, *Bunodosoma cavernata*, is a West Indian species ranging as far north as Beaufort, North Carolina. Two species, *Anemonia sargassensis* and *Bartholomea annulata*, are carried to the shore on sargassum, the former as far north as Woods Hole, but these are only accidental guests which do not live long enough to develop new populations. One species, *Minyas olivacea* is pelagic, bearing a float at its aboral end. Among the new and possibly endemic species the most noteworthy is the curious *Botryon tuberculatus*. A small, inconspicuous species, *Aiptasiomorpha texaensis*, is of interest since it appears to be a *bona fide* estuarine species, similar in that respect to *Diadumene schilleriana* of the Ganges Delta region. The occurrence of *Aiptasiomorpha luciae* at Port Aransas during the winter of 1947-48 adds still another locality to the itinerary of this wandering species, which is found at Woods Hole, Beaufort, along the Central California coast, in Japan, the Suez Canal and many other regions. It may not, however, be a naturalized member of the fauna, and its presence in 1948 may have been the sequel to the shipment of a barrel of oysters to Port Aransas from New Jersey for experimental purposes a few months before, or it may have travelled from Delaware to Port Aransas as a fouling organism on the oil tankers which regularly ply between the loading docks at Port Aransas and the refineries at Wilmington. Such circumstances may also account for some of the boreal hydroids on the Texas coast considered by Deevey (1950) as glacial relicts.

Many of the individual anemones are small, an indication, perhaps, of the influence of environmental extremes. According to Coe (1951), the nemerteans of the northern Gulf of Mexico are generally smaller than the northern representatives of the same species. In the case of the actinians, which are for the most part the northernmost representatives of warmer water species, the suggestion that they are smaller representatives of forms which are larger in colder waters cannot apply, and the question of size in relation to temperature is obviously more a matter of the optimum for the species concerned rather than of the temperature conditions *per se*. Picard and Le Roch (1949), have observed a reduction in general size of anemones in waters of reduced salinity along the shore of the northern Mediterranean as compared with those in the sea nearby, and speak of them as "dwarfed forms."

More information is necessary before such a generalization may be safely made about the actinians of the Texas and Louisiana coast; few species are found both in the bays and in the nearby Gulf, and there are too many factors acting upon the life

on the jetties along the channel for us to separate these variables without experimentation. One possible example of environmental differences is that presented by *Aiptasia pallida* which occurs offshore near Port Isabel and in South Bay. The South Bay forms appear to be somewhat larger, and are brown, whereas the representatives in the Gulf are very pale blue and generally smaller. In South Bay salinities may be somewhat higher than in the Gulf, but temperatures are also higher, and the food supply is probably greatly different.

KEY TO THE SPECIES

Unfortunately it is not possible to construct a key to anemones which can be used in the field; a few can be determined, in a limited area, on the basis of external characters, but determination of most species requires the examination of prepared sections and of the nematocysts. The latter are best examined in freshly macerated material. The various types of nematocysts to be expected in the species known from Texas and Louisiana are indicated in Figure 1. In the following key, diagnoses are provided for several species which are not completely characterized in the systematic part of this paper.²

- I. Tentacles in several cycles, the inner cycles larger; *b*-mastigophors and holotrichs lacking or rare; usually with well developed base and contractile column ACTINIARIA
- Tentacles arranged in two cycles on the margin, or if in several cycles, the outermost largest II.
- II. Small polyps without marked pedal disc; solitary or connected by a coenenchyme; column wall usually thick, slightly contractile; with *p* and *b*-mastigophors and holotrichs ZOANTHARIA
- Column wall comparatively thin, strongly contractile; column without pedal disc but with a terminal pore; *b*-mastigophors and hoplotelic *b*-mastigophores present, *p*-mastigophors absent; burrowing forms CERIANTHARIA

I ACTINIARIA

- 1. Species with distinct basal disc and basilar muscles 2
- With rounded basal end, without basilar muscles; column divisible into physa, scapus and scapulus; scapus with distinct tenaculi; sphincter mesogaeal; 2 siphonoglyphs and 2 pairs of directives; 24 pairs of mesenteries, 6 of which are perfect; retractors strong on the perfect mesenteries, restricted to circumscribed on others and lacking pennons; acontia on at least some of the mesenteries *Andwackia isabellae*
- 2. Species without acontia 3
- Acontia present 8
- 3. With marginal spherules, usually containing atrichs, rarely lacking; lower part of the column often with atrichs 4
- Without marginal spherules 6
- 4. Column with rows on non-adhesive vesicles or adhesive verrucae 5
- Column smooth, low; sphincter diffuse, not strong; tentacles variable in number, up to 40-50, often irregularly arranged; 2 or no siphonoglyphs; 2 directives or none; arrangement of the mesenteries often irregular as a result of asexual reproduction, or regular; retractors of the mesenteries diffuse *Anemonia sargassensis*

²For descriptions of the anatomy of sea anemones, see Hyman, L., *The Invertebrates*, Vol. I, Protozoa through Ctenophora (McGraw Hill, 1940), p. 566 ff., and Stephenson, T. A., *The British Sea Anemones* (Ray Society, 1928), Vol. I.

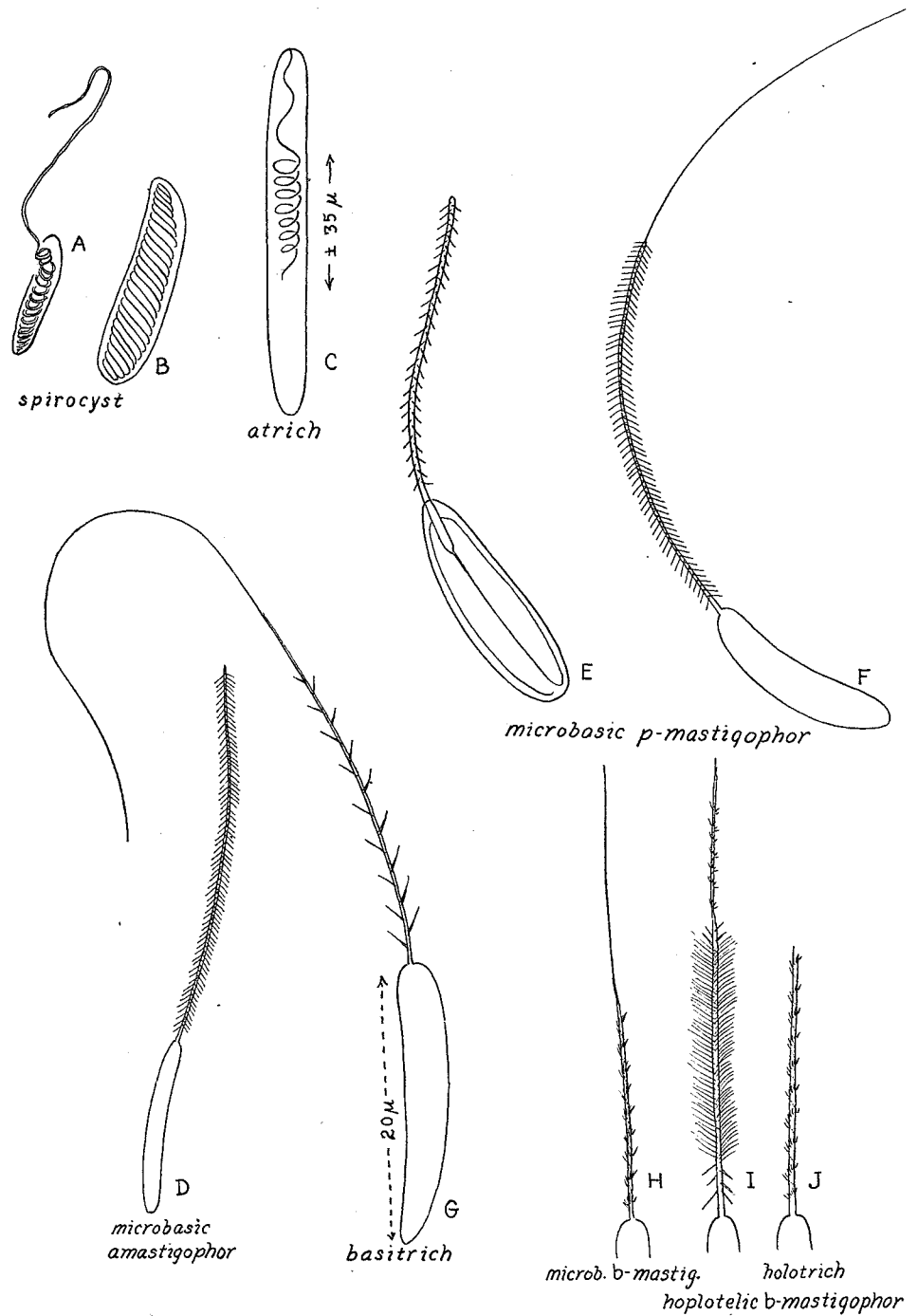


FIGURE 1

Types of nematocysts found in the species described in this paper: A, B, spirocysts, ruptured and unexploded, from *Paranthus rapiformis*. C, partly unexploded atrich, from *Ceriantheomorpha brasiliensis* (After Carlgren, 1940). D, microbasic amastigophor, from *Aiptasia pallida*. E, F, microbasic p-mastigophor, *Aiptasiomorpha luciae*, partially and completely exploded. G, basitrich, from *Bunodactis texaensis*. H, microbasic b-mastigophor; I, hoplotelic b-mastigophor. J, holotrich (H, I, J, diagrammatic).

5. Entire column provided with rows of (non-adhesive) vesicles; sphincter circumscribed, strong; tentacles rather short, up to 96; 2 distinct siphonoglyphs and 2 pairs of directives; most of the mesenteries perfect and fertile
Bunodosoma cavernata
 Column provided with rows of adhesive verrucae; sphincter circumscribed, weak; tentacles rather short, not numerous; arrangement of the mesenteries irregular, owing to longitudinal fission *Anthopleura krebsi*
6. Without adhesive verrucae on the column 7
 Column with rows of adhesive verrucae; sphincter circumscribed; tentacles cyclically arranged, up to 96 in number; 2 siphonoglyphs and 2 pairs of directives; 24 pairs of perfect mesenteries; all stronger mesenteries fertile
Bunodactis texaensis
7. Body melon shaped, with 20 longitudinal furrows; pedal disc invaginated, so that an opening is visible in the aboral end, the cavity of the aboral end containing a structure forming a hydrostatic apparatus; sphincter circumscribed, very weak; tentacles papilliform, arranged in radial series; one siphonoglyph and two pairs of directives; arrangement of the mesenteries different from the common scheme because of arrangement of the endocoels and reduction of the exocoels, giving the appearance of many directive pairs; retractors strong
Minyas olivacea
 Body elongate, smooth; sphincter mesogleal; tentacles rather short, more numerous than the mesenteries at the base; 2 siphonoglyphs, 2 pairs of directives; at least 12 cycles of mesenteries perfect in fertile specimens; retractors of the mesenteries strong *Paranthus rapiformis*
8. Acontia bearing two types of nematocysts 9
 Acontia bearing only basitrichs; column with an annulus of cinclides near the base; sphincter strong, mesogleal; tentacles up to 96 in number; 2 siphonoglyphs and 2 pairs directives; 6 pairs of perfect and fertile mesenteries; retractors weak, diffuse *Calliactis tricolor*
9. Acontia with microbasic *p*-mastigophors and basitrichs; cinclides present 10
 Acontia with microbasic amastigophors (?) and basitrichs; cinclides absent; at least 12 pairs of perfect mesenteries; column with longitudinal rows of mesogleal papillae more or less regularly arranged; all or almost all mesenteries fertile, the male organs (at least) forming botryoid clusters
Botryon tuberculatus
10. With mesogleal sphincter; column smooth, regular, not divisible into scapus and capitulum 11
 Without sphincter; column divisible—or apparently so—into scapus and capitulum 12
11. Sphincter rather well developed; tentacles long, not retractile, smooth, up to 96 in number; 6 pairs of perfect mesenteries; 2 siphonoglyphs and 2 pairs of directives; retractors of the perfect mesenteries diffuse or restricted; cinclides in middle part of the column; reproduction by laceration (constriction)
Aiptasia pallida
 Sphincter not strong; tentacles long, not retractile, considerably more than 96 in full grown individuals, bearing raised bands of nematocyst batteries; 6–8 pairs of perfect mesenteries *Bartholomea annulata*
12. Column divisible into scapus and capitulum, the former ending in a very distinct parapet; cinclides present from parapet to base; tentacles long, irregularly arranged; number of siphonoglyphs and directive mesenteries as well as perfect mesenteries variable owing to reproduction by longitudinal fission
Aiptasiomorpha luciae
 Column apparently divisible into scapus and capitulum; cinclides in a ring in the middle of the column; sphincter apparently absent; tentacles long, few, probably not retractile; 2 siphonoglyphs and 2 pairs of directives; 6 pairs of perfect and fertile mesenteries; reproduction probably by laceration
Aiptasiomorpha texaensis

II. ZOANTHARIA

Free polyps; column incrustated with grains of sand occupying the whole mesoglea; divisible into scapus and scapulus, the scapular ridges distinct; sphincter mesogleal; tentacles 28, arranged in two cycles; one siphonoglyph; 28 mesenteries *Palythoa texaensis*

III. CERIANTHARIA

Column cylindrical, its aboral end rounded, with a strong longitudinal muscle layer; tentacles in several cycles, partly at the margin, partly at the mouth; one siphonoglyph and one pair of directives; directive mesenteries rather short, also the third protomesenteries; second protomesenteries long, reaching almost to the aboral end, provided with craspedonemes on the orthocraspedon (ciliated streaks), in almost their whole length, and a small plectocraspedon (cnidoglandular streak) in their aboral end; older metamesenteries 1 and 3 (M and m) in each quartette somewhat longer than the directives, with craspedonemes forming a bunch in the lowest part close to the plectocraspedon; matamesenteries 2 and 4 (B and b) shorter than the directives, their orthocraspedon often with craspedonemes, but not forming the clusters at the plectocraspedon; all mesenteries, except the directives, fertile *Cerianthemorphe brasiliensis*

SYSTEMATIC DISCUSSION

ORDER ACTINIARIA

Family ANDWAKIIDAE

Andwakia isabellae n. sp.

Figure 2, A-E

Material examined: Off Port Aransas, Texas, May 18, 1933. K. H. Mosher, coll., 1 specimen (no other data) (Paratype, U.S.N.M. No. 49981). Off Port Isabel, in about ten fathoms, sandy bottom, with try net, March 30, 1947, J. Hedgpeth, coll., 1 specimen (Holotype, U. C. N. M. No. 49982).³

Description: The base is apparently rounded, but from the available material it is not possible to be certain that basilar muscles are absent, although they appear to be lacking. The column is divisible into scapus and scapulus, the former provided with numerous well developed tenaculi. The sphincter is mesogleal, reticular, occupying a part of the mesoglea, but owing to the inadequate material cannot be adequately figured. The tentacles are arranged in 4 cycles, thus 48 in numbers (observation by Hedgpeth). They are very small in comparison to the size of the animals and their longitudinal muscles ectodermal, palisade-like in arrangement. There are two well developed siphonoglyphs. The pairs of mesenteries are $6 + 6 + 12 = 24$; two pairs are directives and six pairs are perfect. The retractors of the perfect mesenteries are very strong, strongly restricted to circumscribed in cross section (Fig. 2, C and E), the longitudinal muscles of the other mesenteries form no pennons, but are rather well developed (Fig. 2, D). The parietal muscles of the perfect mesenteries resemble the muscles of the imperfect mesenteries. All mesenteries are provided with filaments and at least a part of them with acontia. Owing to the smallness of the other mesenteries, it is probable that only the perfect mesenteries bear generative organs. The

³"Material examined" indicates the material sent to Sweden to be examined by the senior author; in some cases, as indicated in the text, more material was collected.

wider (Figure 8B). The column is provided with papillae, showing a distinct tendency to be arranged in longitudinal rows, distinctly visible on a sketch of the living specimen (Figure 8, A-B). The papillae are thickening of the mesoglea, but their ectoderm is more compact than the other ectoderm of the column. There are, however, no foreign bodies attached to the papillae in the single specimen. The sphincter is well developed, mesogleal, reticular, occupying about half of the thickness of the mesoglea and separated from the endodermal muscles of the column by a thin mesogleal lamella (Figure 8, E). The tentacles are short, conical, the inner longer than the outer and between 70-80 in number. The actinopharynx is longitudinally furrowed and there are two distinct siphonoglyphs. The perfect pairs of mesenteries are twelve in the uppermost part of the actinopharynx, six in the lower part. All—or almost all—of the mesenteries are fertile. Of particular interest is the appearance of the male organs, which form *botryoidal clusters* (Figure 8, C), not previously observed in any actinarian, but somewhat suggestive of the arrangement of the reproductive organs in the Ptychodactaria. The retractors of the mesenteries are restricted (Figure 8D) and of about the same appearance as those in *Aiptasia*; the parietobasilar muscles are weak. The nematocysts of the column are partly basitrichs, 13.3-14 x 2.2-2.5 μ , partly (12.7) 14.8-17 x 3.5-4 μ , opaque *p*-mastigophors or amastigophors; those of the tentacles partly basitrichs (12.7) 14-15.5 x 2.2-2.5 μ , partly *p*-mastigophors or amastigophors, 15.5-19 x 3-3.5 μ ; those of the actinopharynx partly numerous basitrichs, 19.7-24 x 2.5-2.8 μ , partly microbasic *p*-mastigophors, 15-19.7 x 3.5-4.5 (5) μ ; those of the filaments partly numerous microbasic *p*-mastigophors, 10-12.7 x 4.2-5 μ , partly probably *p*-mastigophors, 18.3-21 x 3.5-4.2 μ ; those of the acontia partly basitrichs, 21-26.2 x 2.8 μ ; partly probably amastigophors, 26.8-32.4 x 4.2-5 μ (the shaft in the unexploded capsules is about 2/3-3/4 the length of the capsules).

Size, in the expanded, preserved state: Body, 1.2 cm. long, diameter of the base 0.45, at the margin 0.5. Length of the inner tentacles, 0.3 cm.

Color: Tentacles pale green cream, center of oral disc violet, the base of the tentacles of cycles 1-3 olive green, disc at the base of cycle 4 pale orange (Plate IV).

Order ZOANTHARIA

Family ZOANTHIDAE

Palythoa texaensis n. sp.

Figure 9, A-C.

Material examined: Port Isabel, Texas, 10-12 fathoms, on old shells. April 1, 1947. 3 specimens. J. W. Hedgpeth, coll. (Holotype, U. S. N. M. No. 49989.)

Description: Three small polyps, not connected by a coenenchyme. The column is very strongly incrustated with sand grains, occupying the whole mesoglea. There are 14 distinct scapular ridges. The ectoderm of the column is thin and discontinuous, its cuticle weak. The mesoglea is thick and provided with numerous cells and cell-islets, the latter situated near the endoderm, which is thinner than the ectoderm (Figure 9, C). The mesogleal sphincter forms a single row of large muscle meshes (Figure 9, B). The tentacles are small, 28 in number in the largest specimen. There is no distinctly marked siphonoglyph, but its cilia are apparently stronger than in other parts of the actinopharynx, the mesoglea of which contains rounded granulous cells. There are 28 mesenteries, regularly arranged. The perfect mesenteries are thin, the imperfect thick

and rounded, their mesoglea containing numerous granulous cells, usually strongly packed and probably lying in canals, but owing to the smallness of the mesenteries it was difficult to observe and it could not be determined that there was actually a canal system. The longitudinal and parietobasilar muscles form a straight lamella. The specimens are sterile. The nematocysts of the tentacles are microbasic *b*-mastigophors, 18.3–22.6 x 2.8–3.5 μ ; those of the actinopharynx *b*-mastigophors, 31–33.8 x ca. 4 μ ; those of the filaments partly microbasic *p*-mastigophors, 17–19.7 x 3.5–4.2 (5) μ , partly *b*-mastigophors, 28.2–38.4 x 4.2–5 μ ; partly holotrichs (only one nematocyst found), 25.4 x 10 μ . The sparseness of the holotrichs may possibly be characteristic of the species.

Length of the largest polyp, 1.2 cm., diameter at the margin, 0.5–0.4 cm.

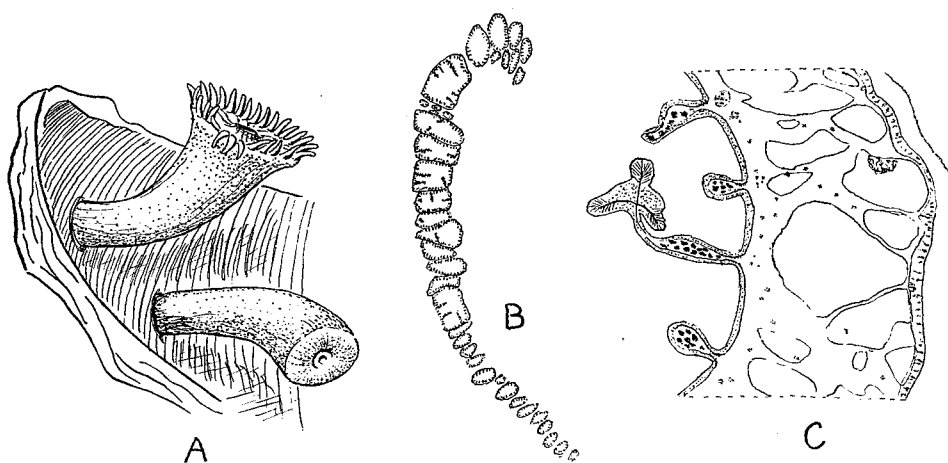


FIGURE 9

Palythoa texaensis n. sp.; A, sketch of living individuals on bit of old shell; B, sphincter, C, section of column wall showing structure of mesoglea.

Order CERIANTHARIA

Family CERIANTHIDAE

***Cerianthomorpe brasiliensis* Carlgren**

Plate IV.

Cerianthomorpe brasiliensis Carlgren, 1931, p. 2, figs. 1–5; Carlgren, 1940, p. 12.

Material examined: 20 miles S. of Port Aransas, Texas, off Corpus Christi Pass, 14 fathoms, Nov. 7, 1945, W. Close, coll.; 1 specimen, in try net; 10 miles north of Huts Bayou, Mexico, 14 fathoms, W. W. Anderson, coll. (upper part of specimen).

These two specimens have been identified with this species although their habitat is far from that of the type. One specimen is well preserved and entire, the other consists of only the upper part of the body with the actinopharynx. Unfortunately the nematocysts of the holotype were not measured, and it is possible that these specimens may

represent another species, but in both cases they are very closely related to the type. The long marginal tentacles are very numerous. The arrangement of the mesenteries and their filaments agrees with that found in the type (see Carlgren, 1931, fig. 2), except that the plectocraspedon (cnidoglandular tract of the filaments) of the proto-mesenteries 3 and the metamesenteries B and b are considerably stronger. In both specimens there is a directive labial tentacle present. Four mesenteries are attached to the siphonoglyph in the well preserved specimen, in the other there seem to be more than four, but it is difficult to determine the exact limit of the siphonoglyph. All mesenteries, except probably the youngest in the multiplication-compartment, are fertile. The arrangement and size of the nematocysts in the two samples agree rather well. The nematocysts of the incomplete specimen are given in parentheses. The nematocysts of the column are partly atrichs, very common, 37-69 x 9-21 μ (25.5-59 x 6-21 μ), partly fairly common holotrichs, 49-56.5 x 10-11.3 μ (44-60.5 x 8.5-12 μ partly hoplotelic *b*-mastigophors, 29.5-46.5 x 7-8.5 μ (31-42.3 x 5.5-10 μ), partly *b*-mastigophors (not hoplotelic), 21-31 x 3.5-4 μ (24-35 x 4 μ); those of the marginal tentacles partly hoplotelic *b*-mastigophors, 32.4-42.3 x 5-10 μ (32.4-42.3 (70) x 5-5.6 (10) μ), partly not-hoplotelic *b*-mastigophors, 22.6-26.8 x 3-4 μ (19.7-26.8 x 2.8-3.5 μ), partly a few atrichs (33.8-42.7 x 6.3-11.3 μ); those of the labial tentacles partly hoplotelic *b*-mastigophors, 36.7-53.6 x 4.5-10 μ (29.6-43.7 x 4.2-7.8 μ), partly not-hoplotelic *b*-mastigophors, 19.7-25.4 x 3 μ (19.7-26 x 3.5 μ); those of the actinopharynx partly hoplotelic *b*-mastigophors, 38-63.5 x 5-10 μ (38-52 x 5-10 μ), partly not-hoplotelic *b*-mastigophors 26.8-35.2 x 4 μ (22.5-38 x 3.5-4.2 μ), partly atrichs, 41-53.6 x 6.3-8.5 μ (31-38 x 5.6-7 μ); those of the plectocraspedon hoplotelic *b*-mastigophors, partly 18.3-31 (42.3) x 4.5-7 μ , partly 21 x 3.5 μ ; those of the orthocraspedon (ciliated tracts), hoplotelic *b*-mastigophors (rare), 46.5-63.5 x 8.5-12 μ . The smallest, not hoplotelic *b*-mastigophors have a short shaft, the hoplotelic, larger mastigophors (probably two sorts) have a long shaft or one of intermediate length.

The complete specimen is 21 cm. long, about 4 cm. in largest diameter, the marginal tentacles up to 6 cm. long.

Color: (Of the complete specimen) Preserved, the column and actinopharynx are olive brown, oral disc yellowish brown, the tentacles colorless. This specimen, when freshly dead, was a rich sepia brown on the column with brown striping on the outer parts of the tentacles; the inner tentacles were bright salmon (See Pl. IV).

Distribution: Previously known from St. Sebastian, Brazil.

Remarks: Cary (1906) and other workers at the old Gulf Biologic Station at Cameron, reported colonies of a *Cerianthus* on the Chandeleur Islands. Unfortunately the animal has not been collected recently, and it is not known whether the colonies are still extant, and the identity of the species cannot be ascertained at this time. The burrowing habit of these animals makes it difficult to collect them with ordinary gear, and it is possible that they may be more abundant than these collections indicate. The occurrence of colonies of cerianthids, which may form vertical burrows over an inch in diameter and perhaps two feet deep, lined with mucous sheaths, should have noticeable effects on layering of sediments. Under certain conditions, the tube might become filled with a sediment different from that in which the tube is formed following the death of the animal. This would result in a long, core-like cast.

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