

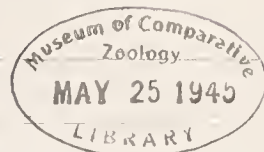
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MURICIDAE



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THE GENUS MUREX IN THE WESTERN ATLANTIC

BY

W. J. CLENCH AND I. PÉREZ FARFANTE¹

This genus includes some of the most beautiful of our marine shells. Though moderately colored, their beauty is mainly invested in the structure of the spines, which in some species have become exceedingly elaborate in their modification.

There are about 400 known species of *Murex*, commonly called Rock Shells, which are found in portions of temperate and in all tropical seas. All are probably carnivorous, feeding mainly on other gastropods and bivalves. In the Western Atlantic certain species are known to occur in depths up to 435 fathoms. Both *Murex brandaris* Linné and *M. trunculus* Linné of the Mediterranean Sea produce a dye called Tyrian Purple which was held in high esteem by the Romans. It is not, however, produced by all species of *Murex*, but appears to be limited to only a very few. On the other hand, it is also produced by certain species of *Thais*.

The number of genera, subgenera and sections proposed for the many species is exceedingly large and more than ordinarily confusing. Unfortunately, differential characteristics are not at all parallel. One character will place a species in a subgenus while another of its characters will fit it into another group, its final disposition depending upon the character regarded as the more important.

One of the most unfortunate classifications was that proposed by Jousseume in *Le Naturaliste* under the title "Division Méthodique de la Famille des Purpuridés." Some 47 genera were listed, mostly named by Jousseume, type selections were made, but no descriptions were given for the different genera. This type of publication imposes a tremendous amount of work upon all subsequent students and limits the studies of many others if they do not have access to a large collection or library.

In this present study, some well known names have had to fall by the way, but this was completely unavoidable if a rigid policy of adhering to the rules was to be followed. When any reasonable doubt existed, the better known name was always retained.

The characters that are generally considered for subgeneric differentiation are the number of varices, production and type of spines, shape, size and sculpture of the nuclear whorls, the length and width of the siphonal canal and the type of operculum. All of these several characters appear to be quite independent of each other and all possible combinations seem to exist in the vast species complex contained in this genus. Extremes in the various species are, of course, easily recognized as to their proper subgenus, but there are many intermediate species that are difficult to assign properly and in many cases their placement is entirely arbitrary. From the standpoint of shell morphology, we be-

¹Guggenheim Fellow, Cuba, 1942-44.

lieve that the number of varices is the most important single character: the development of spines, shape of siphonal canal and opercula differences are secondary. In this we appear to be in agreement with most other students of this genus.

A varix is not only an indication of the "rest period" in shell development, during which the edge of the shell is thickened by depositing shell material, but is probably a device to render additional strength to the shell structure. Secondary structures in the form of spines and folds add protection against predators. Few specimens of *Murex* are found with the shell developed mid-way between two varices. This may indicate that the animal secretes itself in the sand or among the rocks during this period of growth and remains quite inactive. Again, their rarity may be caused by a very short time period in this growth stage and a comparatively long period during the time the varix is developed and strengthened.

The spines are first developed as pointed outgrowths from the varix and, as growth proceeds, enfold their sides until they meet in front. All stages of spines exist for different species, from those that are completely closed to those that are broadly open. In addition, the spines may branch one or more times. In some species there may exist a shell webbing between the spines, which consists of a simple undulating plate as in *M. beavii* Crosse or a somewhat thickened and deeply fluted plate as in *M. hidalgoi* Crosse.

As new whorls are formed, the animal absorbs the spines and varices that are in front of the aperture. In the same way, the apertural side of the siphonal canal is absorbed during a growth period and again rebuilt at the time the varix is produced. However, when the canal is recurved, an entirely new canal is built, sealing off the old canal and leaving only the distal end as a scale-like spine. Species of *Murex* that possess more than three varices have a succession of canals that remain in a short spiral, the center of which is the false umbilicus.

The siphonal canal is a structure to encompass and protect the extended siphon. The length and breadth of this structure is an aid in characterizing the subgenera and species.

The nuclear whorls are of importance in determination as considerable variation is found in these structures among the several species. The first whorl may be larger than the second, or smaller, carinated or rounded, all depending upon the species in question. The carination may show some individual variation, depending much upon how high up on the whorls the succeeding whorls may be produced.

The operculum may be unguiculate or concentric, depending upon the species. One is only a modification of the other. The unguiculate or claw-shaped operculum possesses a subapical nucleus; the concentric operculum possesses a subcentral nucleus. The differences appear to be due to a change in the shape of the aperture and the breadth of the opening that extends along the ventral face of the siphonal canal.

Genus *Murex* Linné

Murex Linné 1758, Syst. Nat. ed. 10, 1, p. 746.

Genotype, *Murex tribulus* Linné (subsequent designation, Denys de Montfort, 1810).

Shells varying in size from a few millimeters to 250 mm. (10 inches) in length, generally solid and strong with most of the species being spinose. Spire moderately extended. Aperture subcircular to oval, ending below in a siphonal canal which may be greatly extended. Spines generally produced on a varix, the spines being either closed or open, single or branched, depending upon the species. Operculum unguiculate (claw-like) with an apical or subapical nucleus or concentric with a subcentral nucleus.

Subgenus *Murex* Linné

Murex Linné 1758, Syst. Nat. ed. 10, 1, p. 746.

Aranea Perry 1810, Arcana or The Museum of Natural History, pl. 47 (Genotype, *Aranea gracilis* Perry, monotypic. [This species was later described by Lamarck as *Murex tenuispina*]).¹

Tubicauda Jousseume 1880, Le Naturaliste, 1, no. 42, p. 335 (Genotype, *M. brevispina* Lamarck).

Acupurpura 'Bayle' Jousseume 1880, Le Naturaliste, 1, no. 42, p. 335 (Genotype, *M. tenuispina* Lamarck).

Subgenotype, *Murex tribulus* Linné (subsequent designation, Denys de Montfort 1810).

Shell possessing three varices (including the lip) on each whorl, each new varix formed more or less evenly and in the same or nearly the same plane with the varix on the whorl above. Spines usually present and developed on the varices. Rarely, as in *M. beaulti*, there is a webbing consisting of a thin axial plate of shell material that connects the spines along the varix. Siphonal canal narrow, generally long and may be straight or curved moderately upward.

Operculum corneous, generally unguiculate, the nucleus sub-apical, or concentric with the nucleus sub-central: the outer surface rather strongly sculptured with irregular concentric growth lines.

***Murex (Murex) cabritii* Bernardi, Plate 1, fig. 1-2**

Murex cabritii Bernardi 1858, Journ. de Conchy., 7, p. 301, pl. 10, fig. 3 (locality unknown).

Murex cabritii Bernardi, Dall 1889 (in part), Bull. Mus. Comp. Zool., 13, p. 196.

Murex cabritii 'Bernardi' M. Smith 1939, An Illust. Cat. of the Recent Species of the Rock Shells, Lantana, Florida, p. 2, pl. 1, fig. 3.

Description. Shell medium in size, from 40 to 78 mm. (about 1½ to 3 inches) in length.

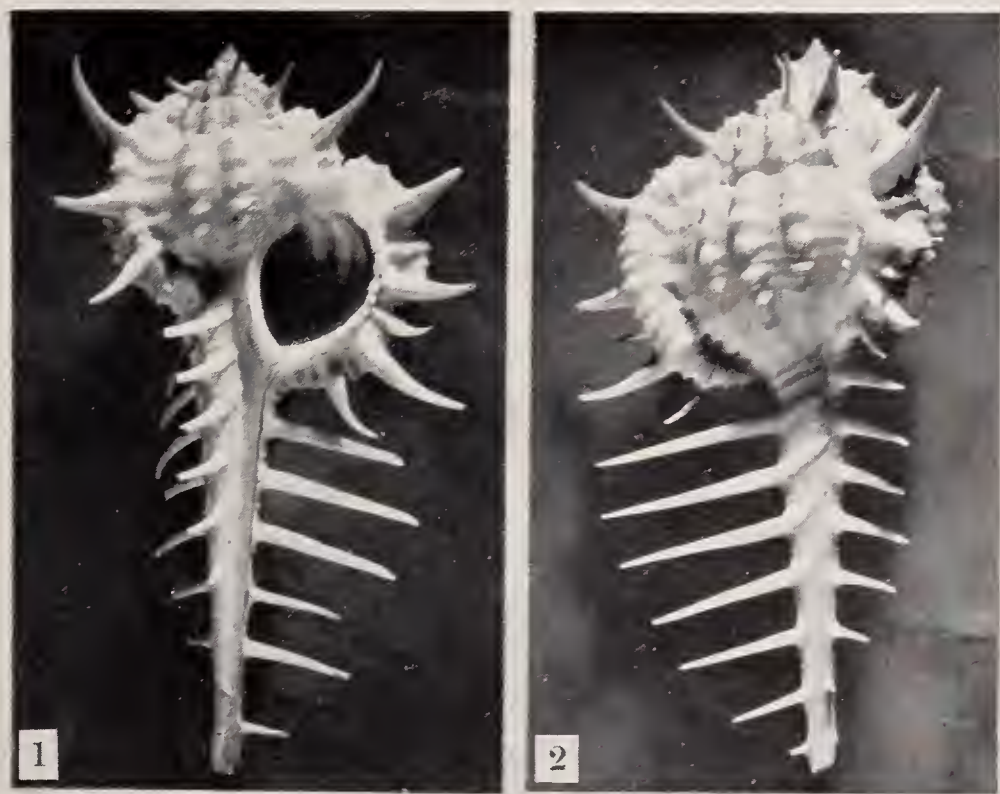


Plate 1. *Murex cabritii* Bernardi

Fig. 1. Tarpon Springs, Florida. Fig. 2. Cedar Keys, Florida.
(both natural size)

¹ We have not seen Perry's Arcana but obtained our data from a report on this publication by Mathews and Iredale (1912, The Victorian Naturalist, 29, pp. 9-13).

solid and strongly spinose. Whorls seven, strongly convex. Color white to variegated pink with the varices and intervarical ridges white or pale yellowish pink. There are no color bands. Spire moderately extended. Suture irregular, indented, interrupted by the varices that buttress the whorl above. Aperture oval and porcellaneous white. Parietal lip adhering above, free and slightly recurved below. A single strong tooth is developed at the upper end of the parietal area and slightly below the margin. The palatal or outer lip is erect along its entire length and strongly crenulated with the crenulations usually grouped in pairs. Siphonal canal long, generally as long as the whorls above. This canal is very straight, so much so that it leaves behind no trace of the older canals as growth advances. This is done by absorbing the spines on the left margin of the canal. As growth proceeds, the forward-growing margin is simply added on. The apertural opening of the siphonal canal consists of a long narrow slit. Axial sculpture consists of three very prominent rounded and strongly spinose varices which are pinched in on the backward edge. Each varix produces at the growing margin a series of three rather large spines with a small spine in between each two of the large spines and at both ends of the varices. The spines found on the siphonal canal following the varical series renders this a very spinose species. Between the varices there are generally four, sometimes three, axial ridges. A series of long and closely set spines follow down the siphonal canal as a continuation of the varices. These spines are remarkably regular and they diminish more or less regularly in height toward the distal end of the canal. In addition, they are curved forward. Intervarical ridges are three or four in number and are strongly rugose. These rugosities are produced by spiral cords as they pass over the ridges. There are fine spiral threads in between these stronger cords. On the back of the canal there are small spiral ridges connecting the spines in each axial series. Nuclear whorls one and one half, very small, rounded, polished and of a light brown coloration. They are followed by about three whorls, finely sculptured with numerous, equal axial ribs and four revolving threads. Perry (1940, Bull. 95, Paleontological Research Institution, Ithaca, N. Y., p. 140) reports the periostracum to be thin and smooth. Operculum unguiculate, suboval and rather strongly sculptured with concentric ridges.

	length	width (without counting the spines)	
(large)	77	34 mm.	Cedar Keys, Florida
(average)	62	29	Tarpon Springs, Florida

Types. The whereabouts of the type specimen of this species is unknown to us. The type figure is that given above in the original citation. The type locality was unknown to Bernardi, though Hidalgo noted that this species occurred in the Lesser Antilles (Tryon 1880, Man. of Conch. (1) 2, p. 134). We limit the type locality to Barbados, based on a specimen collected by the *Blake* in 76 fathoms.

Common name. Cabriti's Rock Shell.

Remarks. This species is quite different from all others in *Murex* s.s. in the Western Atlantic. The most outstanding character is that of the three long rows of spines that are produced on the siphonal canal. Young specimens, however, can be confused with *M. recurvirostris rubidus*, particularly if the spines have become broken, but their attachment points are readily detected with a low power lens. It is known to occur in depths up to 76 fathoms. Dall's records (1889, p. 196) included those of *M. tryoni* as he considered both these species to be the same.

Range. Florida and south through the West Indies to Barbados.

Records. FLORIDA: Pompano (L. C. Smith); 5 miles S. E. of Sombrero Key, Lower Florida Keys in 33–66 fathoms (L. A. Burry); Marco Pass; Captiva Id. (both MCZ); Tarpon Springs (T. Van Hyning); Cedar Keys (J. S. Schwengel); off Fort Walton in 18 to 20 fathoms (L. A. Burry). LESSER ANTILLES: off Barbados, *Blake*, station 272, in 76 fathoms (MCZ).

***Murex (Murex) tryoni* Hidalgo, Plate 2**

Murex (Tribulus) tryoni Hidalgo 1880, [in] *Man. of Conch.* (1) 2, p. 134 (Lesser Antilles).

Description. Shell thin, small, from 25 to 43 mm. (about 1 to 1.75 inches) in length. Whorls six to seven. Color white to gray, without dots or other color markings. Spire acute and moderately extended. Suture deeply indented, interrupted by the varices that buttress the whorls above. Aperture small, oval and a glossy white. Parietal lip thin, sharp and extended, lightly attached on its upper margin to the body whorl; no denticulations present on the specimens examined. Palatal lip thin, erect and rather finely crenulated. Siphonal canal long and varying in length from about two thirds to equal the length of the whorls above. It is straight to slightly recurved backwards. The previous siphonal canals remain as scale-like processes about midway on the new canal. Apertural opening of the latter consisting of a long narrow slit. Axial sculpture consists of three prominent and acute varices. These varices support alternating long and short spines which are closed in front and generally somewhat curved, the spines being all evolved in a single plane and not built forward as in most other species in this group. They are flat on their forward side and rather sharply keeled on their backward side. At the proximal end of the siphonal canal there are two or three spines at the base of each varix. The intervarical ridges are low, four or five in number and rather finely nodulose, the nodules occurring more or less regularly on the spiral threads that connect the spines of



Plate 2. *Murex tryoni* Hidalgo
Off Grenada Island, Lesser Antilles (2×).

one varix to those on another. The nuclear whorls large, number one and three-quarters, the first rounded, the second generally developing a carina. One and one-half post nuclear whorls sculptured with twelve equal axial ribs crossed by rather strong spiral threads. Remaining whorls as described above. Periostracum and operculum unknown.

	length	width (without counting the spines)
(large)	43	17 mm. off Grenada, Lesser Antilles
(average)	35	15 off Montserrat, Lesser Antilles

Types. Holotype, Academy of Natural Sciences of Philadelphia, from Hidalgo. As Hidalgo did not restrict the type locality, we here select the island of Grenada, Lesser Antilles, a station from which the *Blake* obtained several specimens of this species.

Remarks. *Murex tryoni* is closely related to *M. cabritii*, a species with which it has been confused and synonymized by several authors. In general *M. tryoni* is much smaller, thinner and possesses a more extended spire than that of *M. cabritii*. In addition, both the spiral cords and axial ridges are much finer in *M. tryoni*; the varices are nearly acute and not rounded and the spines on their forward side are flat, while they are more or less angular in *M. cabritii*. The nuclear whorls are much larger in *M. tryoni*, the second whorl being carinated. The most significant difference, however, is the lack of the strong comb-like spines on the siphonal canal. The possession of these spines differentiates *M. cabritii* from all other known species in the Western Atlantic. *M. tryoni* does have two or three spur-like spines on each of the three rows in line with the varices below the base of the aperture.

Range. Florida, probably the Greater Antilles and south to Grenada, Lesser Antilles.

Records. FLORIDA: off Destin in 18 fathoms; off Elbow Reef, Key Largo in 66 fathoms (both L. A. Burry); off Sombrero Key, *Blake*, in 54 fathoms; off Sand Key in 25 fathoms (both MCZ). VIRGIN ISLANDS: off St. Croix, *Blake*, station 132, in 115 fathoms. LESSER ANTILLES: off Montserrat, *Blake*, station 155, in 88 fathoms; off Barbados, *Blake*, station 273, in 103 fathoms; off Grenada, *Blake*, station 253, in 92 fathoms (all MCZ).

Murex (Murex) recurvirostris rubidus *F. C. Baker*, Plate 3, fig. 1-7

Murex recurvirostris of authors, not of Broderip 1833.

Murex messorius of authors, not of Sowerby 1841.

Murex messorius var. *rubidum* 'Dall' *F. C. Baker* 1897, Trans. Acad. Sci. St. Louis, 7, no. 16, p. 377, (Cedar Keys, Florida).

Murex marcoensis Sowerby 1900, Journ. of Malacology, 7, p. 162, text fig. (Marco Pass, Florida).

Murex narcoensis Sowerby 1900, Journ. of Malacology, 7, p. 162 [typ. error in caption of text figure].

Murex anniae M. Smith 1940, Nautilus, 54, p. 45, pl. 2, fig. 1 (Ortona Locks, Florida; Pliocene. [Data given in letter]).

Murex recurvirostris delicatus M. Smith 1940, Nautilus, 54, p. 45 (Lake Worth, Florida).

Murex recurvirostris citrinus M. Smith 1940, Nautilus, 54, p. 45 (off Key Largo, Florida).

Description. Shell medium in size, from 30 to 50 mm. (about 1 to 2 inches) in length, rather solid and with a short body whorl and extended siphonal canal. Whorls seven or eight, strongly convex. Color variable; it may be cream, pink, pale orange, salmon, or even red. Occasionally, on the shoulder of the last two whorls, there may be developed a band of color, generally of a much darker shade than the ground color. A few specimens possess an irregular band either narrow or broad, of the same color at the base of the whorl. When broad, this band extends part way down the canal. Spire acute and

extending but little above the body whorl. Suture deeply indented and interrupted by the varices. Aperture rather small, oval, polished and colored a milk or oyster white, the color bands of the outside showing through when present. The lower half of the parietal lip is erect with the edge slightly recurved; the remaining upper half adheres to the body whorl. On the inner wall of this lip there is a series of small flattened denticulations and at the upper part there is produced a low ridge which extends backward into the whorl.

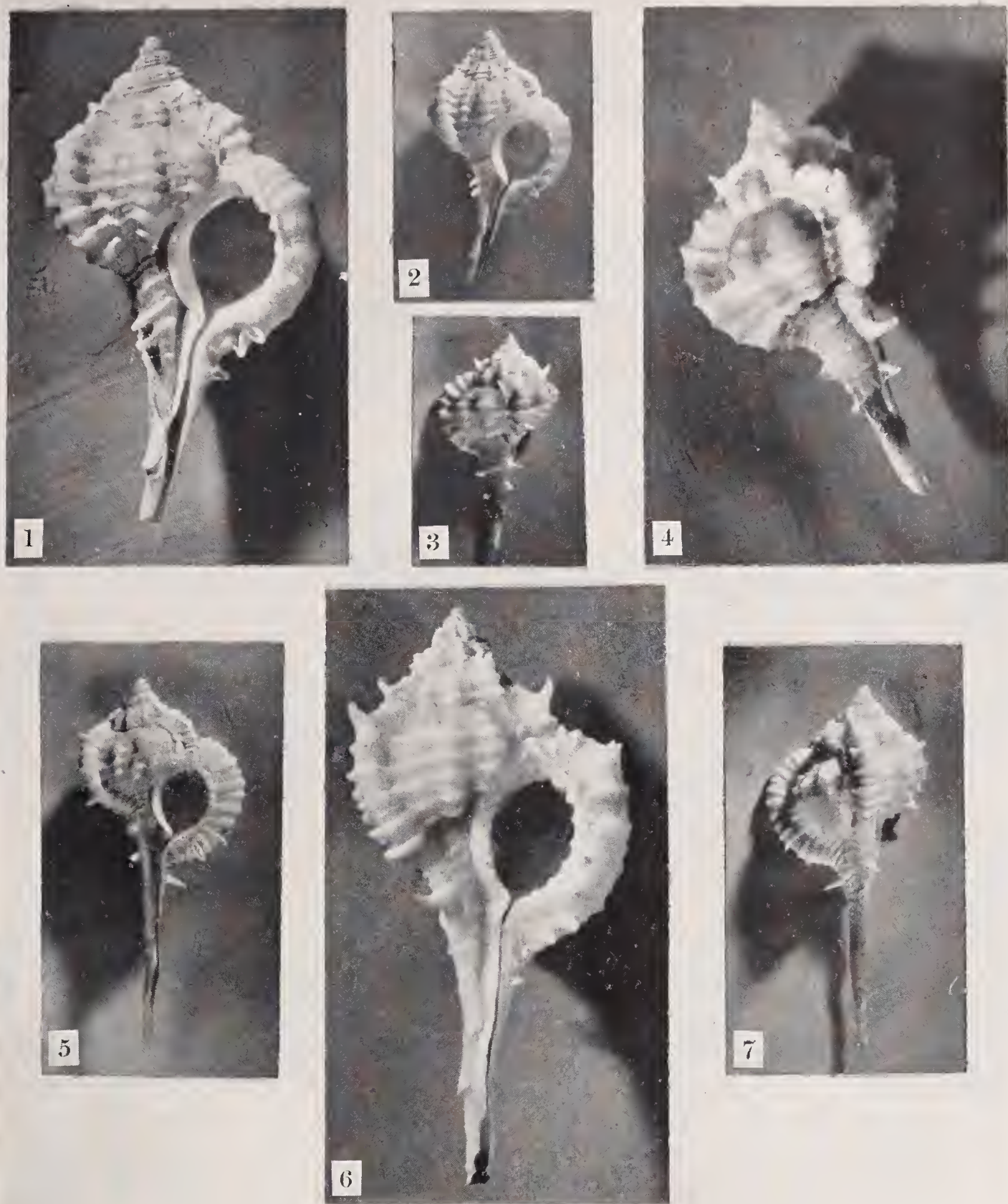


Plate 3. *Murex recurvirostris rubidus* F. C. Baker

Fig. 1-2. Holotype, Cedar Keys, Florida (fig. 1, $2\times$; fig. 2, natural size). Fig. 3-4. Off Boynton, Florida (fig. 3, natural size; fig. 4, $2\times$). Fig. 5 and 7. Off Fort Walton, Florida (natural size). Fig. 6. Off Key Largo, Florida (Holotype of *Murex recurvirostris citrinus* M. Smith, $3\times$).

The palatal or outer lip is erect along its entire length, the thin forward edge finely crenulated, the crenulations being the forward extensions of the denticulations that margin the inner surface of the lip below the edge. Siphonal canal varying in length from a little less than the length of the whorls above to about equal their length. The siphonal canal gradually tapers slightly towards the distal end. Old siphonal canals are merged smoothly with the newest formed, only the distal ends projecting slightly above. The apertural opening of the canal consists of a very narrow slit. At the base of the canal there may be one or two slightly recurved spines aligned with each varix which are longer than those found on the body whorl. Axial sculpture consists of three rounded varices and three intervarical ridges, two strong and one faint, which are crossed by from six to eight spiral and rather sharply keeled ridges and alternating raised threads. On the forward face of the varices short and open spines are sometimes formed by extensions of the ridges. Nuclear whorls one and one half, polished, rounded and colored cream to brownish. They are followed by three whorls axially sculptured with fine costae crossed by very fine spiral threads. On these whorls the varices can not be distinguished from the other axial ribs. Periostracum very thin, finely rugose and limited to small patches. Operculum unguiculate, the surface crossed by numerous and irregular growth lines.

	length	width	
(large)	55	24 mm.	off Fort Walton, Florida
(average)	42	21	Biscayne Bay, Florida

Types. As no types were selected or indicated by F. C. Baker, we here select a specimen from Cedar Keys, Florida, the type locality, to be the holotype (Mus. of Comp. Zoöl., no. 147272). Through the kindness of Maxwell Smith we have seen the types of both *M. recurvirostris delicatus* and *M. recurvirostris citrinus*. These in addition to *M. recurvirostris anniae* are contained in his collection.

Common name. Red Rock Shell.

Remarks. This species has long been known under the names of *M. recurvirostris* Broderip and *M. messorius* Sowerby; the disposition of the two names has been considered in the synonymy above. *M. recurvirostris rubidus* is the first available name for the Western Atlantic subspecies. The name *rubidus* in the original description by Baker was applied only to the deep pink or reddish specimens. However, in a study of a large series of shells we have been unable satisfactorily to separate the many existing transitional forms. Later writers have included under *rubidus* the specimens possessing a short canal, a form which was named *marcoensis* by Sowerby. The color, the length of the canal and even the extended whorls which this form exhibits, intergrade smoothly with darker and more lightly colored shells, those having a shortened series of whorls as well as those possessing a more lengthened canal. The several forms are not even limited geographically as they appear throughout the range as known to us, even in the same region and dredged haul. As a consequence it seems best to use the name *rubidus* Baker as a subspecies of *recurvirostris* to include this complex in the Western Atlantic. This species has been known under the several names given in the synonymy above.

The names *anniae* Smith, *delicatus* Smith and *citrinus* Smith are all synonyms of *rubidus*. In our opinion *M. recurvirostris anniae* appears to be a typical *rubidus* with the canal broken. *M. recurvirostris delicatus* was only a substituted name to distinguish *M. recurvirostris* of the Western Atlantic; the name *rubidus*, however, is earlier. *M. recurvirostris citrinus* is one of the several color forms that exist in this subspecies. Typical

M. recurvirostris Broderip is here restricted to include the chocolate brown form that occurs on the west coast of Central America and possibly along the eastern side of Central and South America. We possess a single and badly worn specimen from Santa Marta, Colombia which is exceedingly dark in color and may be true *recurvirostris*. Its worn condition prevents exact determination. *M. recurvirostris rubidus*, however, is consistent in being much lighter in coloration, even though the colors are very variable.

The record of *M. recurvirostris nigrescens* Sby. by M. Smith from Colón, Panama comes from the Calvert Collection and is open to question as to locality (Nautilus, 54, p. 45, 1940). *Murex nigrescens* Sby. is an absolute synonym of *M. recurvirostris*. We possess cotypes of both *recurvirostris* and *nigrescens* from H. Cuming.

So far as our records indicate, *M. recurvirostris rubidus* is limited to Florida and the Bahamas and does not extend into the remaining islands of the West Indies.

Range. East and West Florida and the Bahamas.

Records. FLORIDA: Lake Worth (B. R. Bales); off Lantana in 85 fms. (J. S. Schwengel); off Boynton in 10 fathoms; off Delray in 80 fathoms (both T. van Hyning); Miami Beach (A. H. Patterson); Looe Key, Lower Florida Keys in 25 to 39 fathoms; off Key Largo (both L. A. Burry); Bonefish Key (B. R. Bales); off Pelican Shoals in 25 to 30 fathoms (J. S. Schwengel); Stock Island (B. R. Bales); off Marco Island in 6 to 7 fathoms; Naples (both MCZ); Bonita Springs (B. R. Bales); Sanibel Island (R. Humes); Pass-a-Grille (MCZ); Tarpon Springs (J. S. Schwengel); off Cedar Keys (MCZ); off Fort Walton (L. A. Burry). BAHAMAS: Governor's Harbour, Eleuthera; Arhurstown, Cat Id. (both MCZ).

***Murex (Murex) woodringi*, new species, Plate 4, fig. 1-3**

Description. Shell medium in size, from 50 to 72 mm. (2 to 2 $\frac{3}{4}$ inches) in length, rather solid and moderately spinose. Whorls eight or nine, strongly convex. Ground color cream to dark gray with a wide band of a darker shade at the shoulder of the whorls; sometimes there is another immediately below the middle and a third one at the base of the whorls.

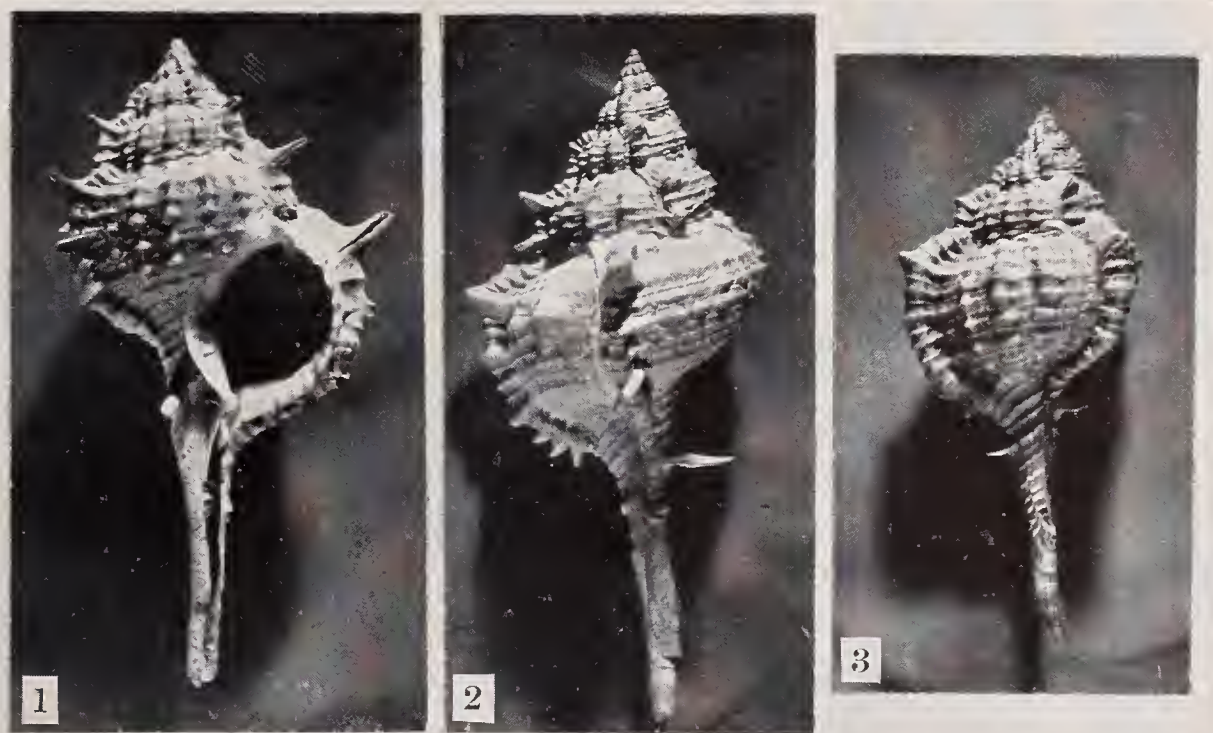


Plate 4. *Murex woodringi* Clench and Pérez Farfante
Fig. 1 and 3. Jamaica. Fig. 2. West Indies (both natural size).

These are best viewed from within the aperture. Spire acute and extended. Suture irregular and deeply indented. Aperture oval to subcircular, polished and colored from oyster white to dark gray and occasionally stained with brown. Parietal lip reflected, adhering to the body whorl above and free below the midpoint. Below the margin and on the inner wall of this lip there are from three to nine flattened denticles and a single rounded denticle at the upper extremity. Outer lip erect and possessing a series of very strong and long denticles with their forward ends producing a prominent crenulated edge on the lip. Siphonal canal narrow and extended, its length being a little less than the total height of the whorls. It is straight except for the distal end which is moderately turned upwards. Axial sculpture consists of three varices which are moderately spinose. At the shoulder of the whorls on each varix there is generally a large open spine and at the base of the varix at the beginning of the siphonal canal there is a rather large recurved, spur-like spine. Remaining spines on the varices are open in front and scale-like. Intervarical ridges are two in number on the early whorls and increase to four or five on the later whorls, though they may be reduced on the last whorl to only two. Spiral sculpture consists of alternating large and fine ridges, the larger culminating in a spine on each varix. Nuclear whorls one and one-half to two, rounded, glass-like and pale brown in color. The next two whorls possess very prominent axial ridges and somewhat finer spiral threads. Operculum subcircular, unguiculate and possessing very fine concentric lines.

	length	width (without counting the spines)	
(large)	72	30 mm.	Holotype
(average)	55	24	Jamaica

Types. Holotype, Museum of Comparative Zoölogy, no. 156087, from Jamaica, C. B. Adams collector. Paratypes from the same locality and from Cartagena, Colombia.

Remarks. This species is very close in its relationship to both *M. antillarum* and *M. recurvirostris rubidus*. From *M. antillarum* it differs by being less spinose, having a much longer and straighter siphonal canal and much coarser post-nuclear whorl-ridges. In addition the nuclear whorls are a little larger. From *M. recurvirostris rubidus* it differs in possessing a more extended spire and longer siphonal canal in the adult and in having more intervacular ridges. Young specimens, however, of this new species have a much shorter spire, but as the shell grows larger, the proportional length of the spire increases materially.

Woodring has published as *Murex recurvirostris* Brod. two figures from the Miocene of Bowden, Jamaica, which may possibly be this species of ours (Carnegie Institution of Washington, Publication no. 385, p. 288, pl. 17, fig. 7 to 8). Only the figures and the description refer to this new species, not his synonymy, which is for *M. recurvirostris*.

Named for Wendell P. Woodring as a tribute to his excellent studies on the Tertiary fauna.

Range. Jamaica and northern South America.

Records. See Types.

Murex (Murex) chrysostoma Sowerby, Plate 5, fig. 1-2

Murex chrysostoma 'Gray' Sowerby 1834, Conch. Illust., **Murex**, pt. 58, fig. 1, with name in the cat. of species, p. 1, no. 8 (locality not given).

Murex bellus Reeve 1845, Conch. Icon., **3**, **Murex**, pl. 21, fig. 84 (locality unknown).

Description. Shell medium in size, from 55 to 70 mm. (about 2 to 3 inches) in length and solid. Whorls convex, seven to eight. Ground color buff with occasional specimens having bands and the spiral threads brownish. The siphonal canal may be stained irregularly with brownish patches. Spire moderately extended. Suture indented and irregular. Aperture large, oval, highly polished and of a cream color. The lower half of the parietal lip erect and extended forward, remaining upper half adherent to the body whorl. There are three spots of yellow, two about midway on the lip and the other at its superior margin. In addition, there are a series of parallel denticulations a little below the margin and a well-developed tooth at the upper end. Outer lip strongly denticulated within, the ends of the denticulations forming a crenulated edge. Siphonal canal moderately long and tapering, broader on the columellar side. Earlier siphonal canals are obscure and in most cases completely adherent to the new canal. Axial sculpture consisting of three pronounced varices on each whorl which are rounded and nodulose instead of spinous. After the varix is produced, it is carried forward for a short distance and with the denticulations, there is formed a crenulated edge. The animal then proceeds to grow forward from below, leaving behind this crenulated margin as a sculpture character on the outer surface of the whorls. In between the varices there may be one to three axial and nodulose ridges which possess a strong knob at the whorl shoulder. At the base of the siphonal canal there may be one to three spur-like spines. Spiral sculpture consists of numerous raised threads which are developed into narrow and keeled ridges on both the varices and the axial ridges. Periostracum probably absent. Operculum unguiculate, possessing rather fine concentric ridges.

	length	width	
(large)	70	40 mm.	Tobago Id., Lesser Antilles
(average)	62	36	Tobago Id., Lesser Antilles

Types. The type figure is that in the Conchological Illustrations, pl. 58, fig. 1. As no

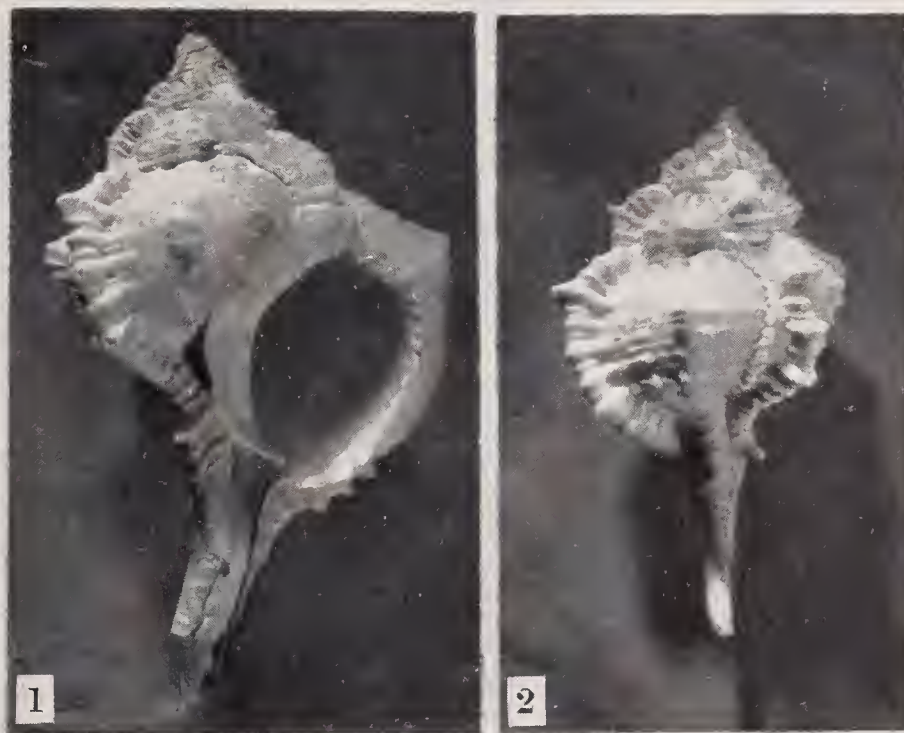


Plate 5. *Murex chrysostoma* Gray

Fig. 1. Tobago Island, Lesser Antilles. Fig. 2. West Indies
(both natural size).

locality was given, we here select Tobago Island, Lesser Antilles, to be the type locality.

Common name. Golden-Mouth Rock Shell.

Remarks. We have but little data on this species. Our records below show a very limited distribution, but we believe that it exists probably as far south as Brasil. *M. chrysostoma* appears to be closely related to *M. recurvirostris rubidus*. *M. chrysostoma* reaches a much larger size, is proportionately wider, and possesses the yellow patches of color on the parietal lip. In addition, it has the varices of each whorl built just behind the varices of the whorl above, while in *M. recurvirostris rubidus* the corresponding varices generally form a continuous ridge from apex to base or are built ahead of the varix of the whorl above. The intervarical ridges in *M. chrysostoma* may be reduced to one in the last whorls, while in *M. recurvirostris rubidus* there are generally two or more.

Range. Tobago and south probably to Brasil.

Records. LESSER ANTILLES: Tobago Id. (MCZ); Chaguaramas, Carenage Bay, and Harts Cut, Trinidad (all H. G. Kugler). VENEZUELA: Cumaná (MCZ).

Murex (Murex) antillarum Hinds, Plate 6

Murex motucilla var. Sowerby 1841, Conch. Illust., **Murex**, pt. 189, fig. 69, with name in explanation of plates (Indian Ocean).

Murex antillarum Hinds 1844, Proc. Zool. Soc. London, **11**, p. 126 (Tortola, Virgin Islands). Refers to Sowerby's Conch. Illust., 1841, pt. 189, fig. 69.

Murex uodatus Reeve 1845, Conch. Icon., **3**, **Murex**, pl. 15, fig. 107. Refers to Sowerby's Conch. Illust. 1841, pt. 189, fig. 69.

Murex urticulatus Reeve 1845, Conch. Icon., **3**, **Murex**, note under species 88. Based on Sowerby's Conch. Illust. 1841, pt. 169, fig. 69.

Murex gundlachi Dunker 1883, Malak. Blätt. (n.s.) **6**, p. 35, pl. 1, figs. 1-3 (Matanzas, Cuba).

Description. Shell medium in size, from 50 to 100 mm. (2 to 4 inches) in length, rather solid and very spinose. Whorls eight or nine, moderately convex. Color from cream to rusty or purplish brown with three rather indistinct bands of a darker shade on each whorl. Spire extended. Suture irregular and deeply indented. Aperture oblique and oval, porcellaneous white, sometimes with a purple tint. Parietal lip reflected and adherent to the body whorl. The upper portion completely attached, the lower part somewhat erect and standing free. Below the margin of the parietal lip there are two sets of small denticles; there are three or four denticles on the inner wall near the siphonal canal and generally two denticles at the upper portion near the union with the outer lip. One, in this latter group, is situated close to the margin, the other fairly well within the aperture. The palatal, or outer lip, is rather thin, erect and crenulated. The crenulation opposite the shoulder spine is drawn out to form a small tooth-like process. Siphonal canal short to medium in length in young specimens. Adults have the siphonal canal greatly extended, moderately recurved upwards and tapering to a rather narrow extremity. Two previous stages of the siphonal canal remain as scale-like spines and are to be seen on the aperture side of the shell at the lower left of the aperture.

There are three prominent equidistant varices on each whorl. These are more or less aligned with the varices on the whorls above. Each varix supports a series of rather long and pointed spines, the largest being produced at the shoulder of the whorl. Remaining spines more or less irregular as to size. There are two fairly strong spines immediately below each varix on the siphonal canal. All the spines are open on their forward or apertural side, though many may have the opening reduced to a mere slit. In between the

varices there are two to four axial ridges, two and three on the early whorls and generally four in the last whorl. In between the last two varices formed, these axial ridges may be reduced to one large and generally one or two smaller ridges. Spiral sculpture consists of numerous cords. Six or seven of these are larger and terminate at the spines on the varices; the remaining cords are much smaller and terminate on each varix in between the base of the spines. In addition, there exist very fine axial growth lines which appear as fine threads in between the cords. Nuclear whorls one and one half, smooth, rounded and brownish in color; the three following whorls sculptured with numerous equal axial ridges and revolving raised threads. Remaining whorls as described above.

	length	width (without counting the spines)	
(large)	95	38 mm.	off Cienfuegos Bay, Cuba
(average)	67	28	Bull Bay, Jamaica

Types. The type specimen is probably in the British Museum as it was described from the Cuning collection which is now in their possession. The type locality is Tortola, Virgin Islands.

Common name. Antillean Rock Shell.

Remarks. *M. antillarum* is closely allied to *M. beaultii* and appears to be somewhat near to *M. aguayoi*. See remarks under both of these species for the differences that exist between them.

This well known species is fairly abundant throughout the West Indies in moderate to fairly deep water. Specimens obtained from deep water appear to be more spinose. Those sent by Alcalde Ledón are the finest that we have seen. They were obtained from a submerged cable at 200 meters (about 100 fathoms) in depth (Plate 6).

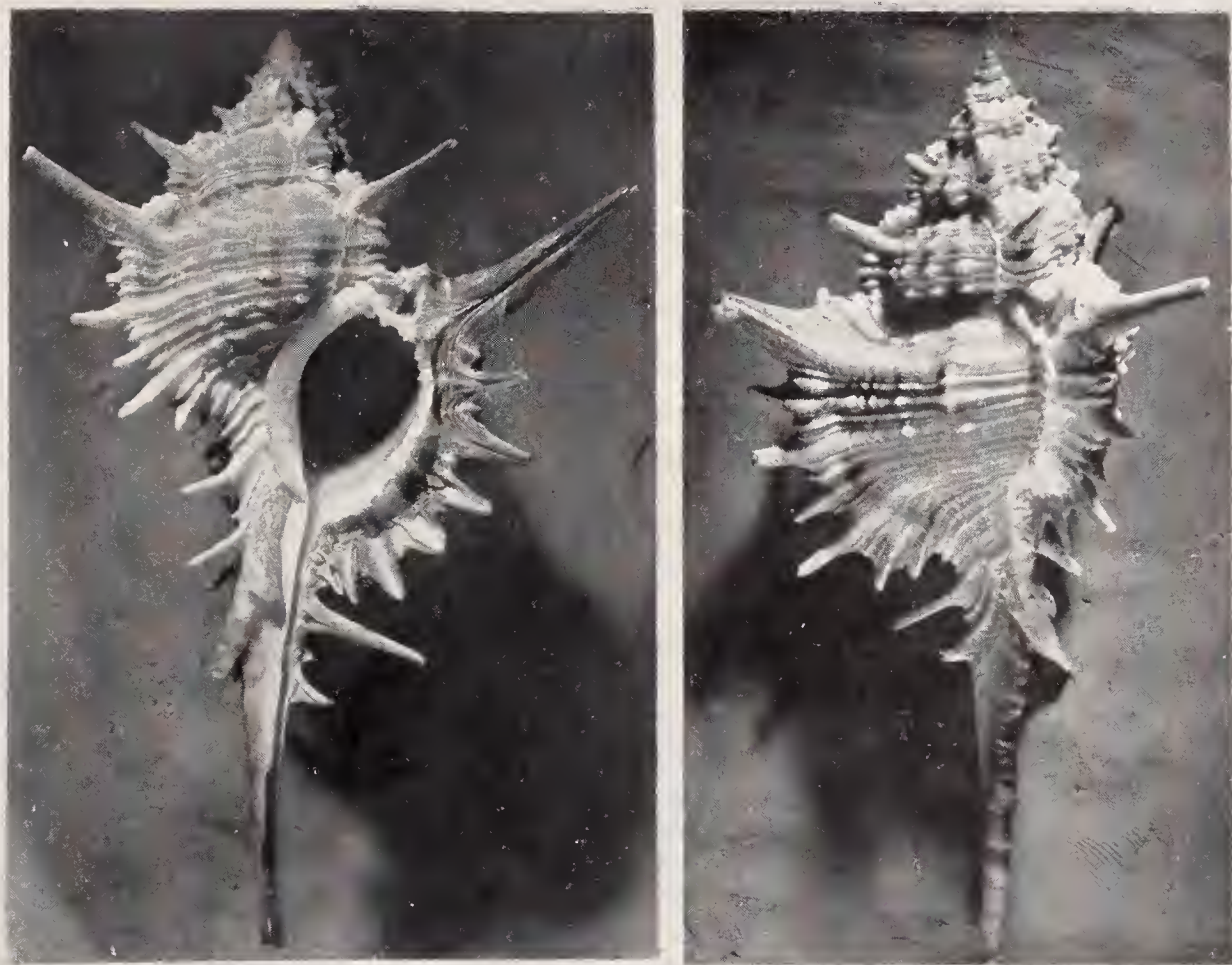


Plate 6. *Murex antillarum* Hinds
Cienfuegos Bay, Cuba (natural size).

Both *M. antillarum* and *M. nodatus* are based on the same figure in Sowerby's Conchological Illustrations.

Range. Southern Florida and south through the Lesser Antilles.

Records. FLORIDA: Tortugas (MCZ). CUBA: off Matanzas, *Atlantis*, station 3482 (N. Lat. 23°09'; W. Long. 81°27'30'') in 190 fathoms (MCZ); Casilda, Trinidad (C.G. Aguayo); off Cienfuegos Bay in 100 fathoms (Alcalde Ledón); off Bahía de Cochinos, *Atlantis*, station 2963 (N. Lat. 22°07'; W. Long. 81°08') in 155 to 190 fathoms (MCZ). HISPANIOLA: Puerto Plata; Monte Christi; Jérémie (all MCZ). JAMAICA: Port Royal, *Blake*, in 100 fathoms; Port Antonio (both MCZ); Bull Bay (P. D. Ford). VIRGIN ISLANDS: Flannegan Passage, off St. John, *Blake*, station 142, in 27 fathoms (MCZ). LESSER ANTILLES: Barbados (A. H. Patterson); off Grenada, *Blake*, station 247 in 170 fathoms (MCZ).

Murex (Murex) beauii *Fischer and Bernardi*, Plate 7, fig. 1-2

Murex beauii Fischer and Bernardi 1857, Journ. de Conchy., 5, p. 295, pl. 3, fig. 1 (Marie Galante [Lesser Antilles]); Dall 1889, Bull. Mus. Comp. Zoöl. 18, p. 195.

Description. Shell medium in size, from 70 to 120 mm. (about 3 to 5 inches) in length, thin, rather delicately constructed. Whorls eight and strongly convex. Color cream to pale brownish without developing bands of color. There are faint indications of spiral lines of rusty brown that are on the spiral cords. Spire extended. Suture irregular and deeply indented. Aperture subcircular to oval, glazed porcellaneous white. Parietal lip slightly reflected, adherent almost its whole length to the body whorl and possessing a few fine submarginal denticulations. Outer lip thin, erect and slightly reflected, its margin being finely irregular rather than crenulated. Siphonal canal somewhat long and

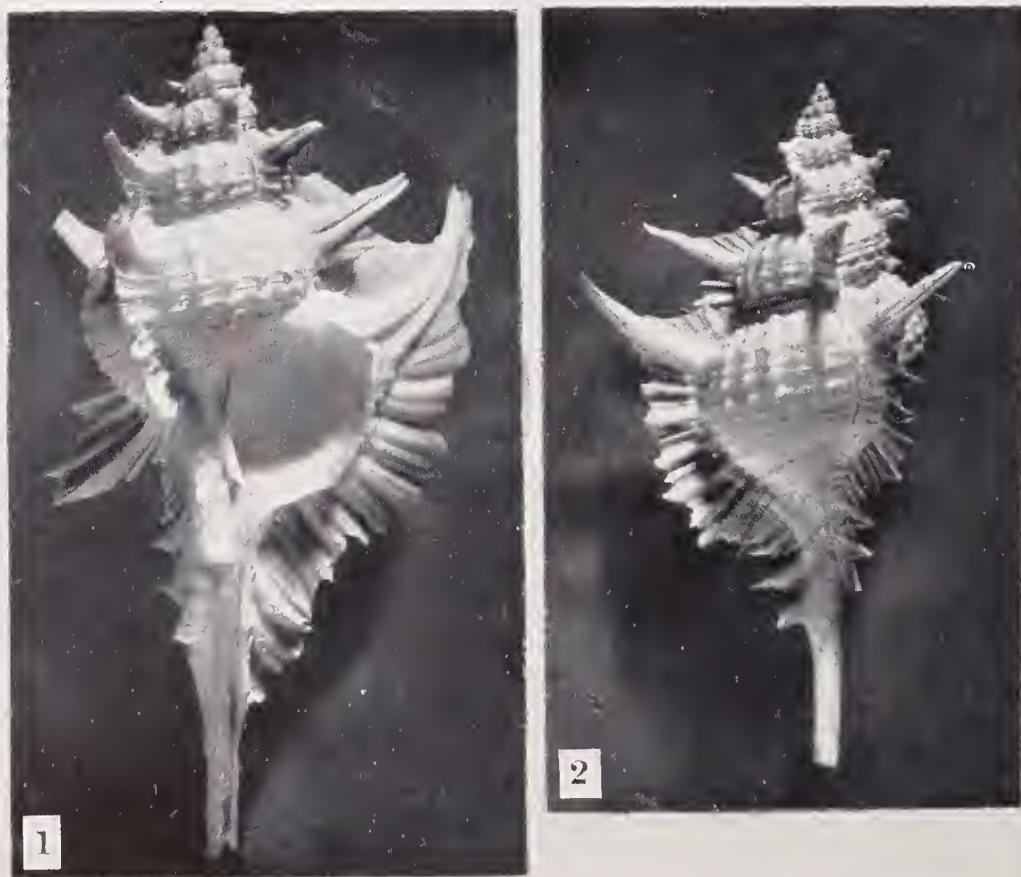


Plate 7. *Murex beauii* Crosse

Fig. 1. Off Guadeloupe Island, Lesser Antilles. Fig. 2. Off St. Vincent Island, Lesser Antilles (both natural size).

moderately recurved, two previous canals remaining as scale-like spines near the base of the aperture. Varices three on each whorl, moderately spinose. The spines developed at the shoulder of the whorls are long and generally open on their forward side. Remaining spines may be differentiated, but generally they have opened up and become connected with each other, forming a web-like structure that extends from above the shoulder spines to the base of the varix at the siphonal canal. The two or three spines generally found below the aperture exist in this species as high points in the webbing. Early webbing is generally broken away leaving only the shoulder spine behind. Axial sculpture consists of five or six nodulose ridges crossed by fine spiral cords. Axial growth lines very fine and slightly irregular. Nuclear whorls one and one-half, small, rounded and glass-like. Two following whorls sculptured with equal and very strong axial ridges and fine spiral threads. Periostracum absent. Operculum unguiculate with rather strongly developed concentric ridges.

	length	width	
(large)	120	51 mm.	(including spines) Holotype
(average)	88	30	(not including spines) off Guadeloupe, Lesser Antilles

Types. Holotype in the collection of the Journal de Conchyliologie from the Island of Marie Galante in the Lesser Antilles, from Commander Beau.

Remarks. This species is readily differentiated from all others of this group in the Western Atlantic. The possession of the webbing along the varices is unique. In relationship it appears near *M. autillarum* with which it agrees in nearly all of its other characters. Even in *M. autillarum* there is an indication of the webbing in the widely open spines which are connected at their bases. The spire is a little more elevated and the suture more deeply indented in *M. beauii* than in *M. autillarum*. In addition, there is a tendency to develop color bands in *M. autillarum*, which are absent in the few specimens of *M. beauii* we have seen, while the latter species possesses fine spiral threads of color. This species has been recorded in depths ranging from 95 to 245 fathoms.

Range. From Gulf of Mexico and south through the Lesser Antilles.

Records. FLORIDA: off the Lower Florida Keys in 100 to 120 fathoms (MCZ); about 65 miles south of Cape San Blas, *Albatross*, station 2402 in 111 fathoms (USNM). CUBA: off Santiago de Cuba, *Albatross*, station 2134 in 254 fathoms (USNM). LESSER ANTILLES: off Guadeloupe, *Blake*, station 171 in 183 fathoms; off St. Vincent, *Blake*, station 231 in 95 fathoms (both MCZ).

Murex (Murex) aguayoi, *new species*, Plate 8, fig. 1-3

Description. Shell medium in size, from 35 to 60 mm. ($1\frac{1}{2}$ to $2\frac{1}{2}$ inches) in length, rather thin and strongly spinose. Whorls from seven to nine, rather strongly convex with occasional specimens moderately carinated. Color uniformly milky white or light gray. Spire extended. Suture irregular and rather deeply impressed. Aperture obliquely ovate and porcellaneous white. Parietal lip slightly reflected, rigidly attached above, erect and free below. Generally it is smooth within though occasionally two or three very weak denticles may be formed near the lower part. Palatal lip thin, erect, somewhat irregular and not crenulated; opposite the large shoulder spine it is slightly drawn out to form a tooth-like process. The siphonal canal is extended, narrow throughout its length and rather abruptly turned upward at its base, forming a pronounced angle at the base of the

aperture. In addition, occasional specimens have the canal turned slightly to the right in an apertural view. Two previous stages of the siphonal canal remain as scale-like spines at the lower left of the aperture. Axial sculpture formed by three prominent equidistant varices. The varices of each whorl are aligned with those of the previous whorl, each varix supporting a series of recurved spines, the largest being developed at the shoulder of the whorl. The remaining spines are quite irregular and on a few specimens, they are alternately large and very small. The spines are closed on the aperture side, though occasionally there is a narrow slit remaining. In between the varices there are two to four nodulose axial ridges, the nodules being in both axial and spiral arrangement. Growth lines consist of very fine axial threads. Spiral sculpture consists of numerous fine cords. It is on these cords that the nodules are generally developed forming the axial ridges. Nuclear whorls two, bulbous, without a carina, smooth, with the first whorl larger. This whorl develops in a vertical plane, then turns at the beginning of the second whorl to a horizontal plane. The following whorl has spiral and axial ridges, the varices beginning at the end of this whorl.



Plate 8. *Murex aguayoi* Clench and Pérez Farfante

Fig. 1. Holotype, off Punta Alegre, Camagüey, Cuba. Fig. 2. Off Punta Alegre, Camagüey, Cuba (both natural size). Fig. 3. Off Caibarién, Cuba (2×).

	length	width (without the spines)	
(large)	65	24 mm.	Holotype
(average)	60	21	Off Punta Alegre, Camagüey, Cuba

Types. Holotype, Museum of Comparative Zoölogy, no. 147286, *Atlantis*, station no. 3415 (N. Lat. $22^{\circ}51'30''$; W. Long. $78^{\circ}55'30''$) off Punta Alegre, Camagüey Prov., Cuba, in 210 fathoms, Feb. 3, 1938. The following paratypes are all from the *Atlantis* dredgings: station 2951 (N. Lat. $26^{\circ}14'$; W. Long. $78^{\circ}43'$) off South West Point, Grand Bahama Island, Bahamas, in 285 fathoms; station 3422 (N. Lat. $22^{\circ}48'$; W. Long. $79^{\circ}09'$) off Caibarién, Cuba, in 235 fathoms; station 3414 (N. Lat. $22^{\circ}50'30''$; W. Long. $78^{\circ}52'$) off Punta Alegre, Camagüey Prov., Cuba in 230 fathoms; station 3320 (N. Lat. $22^{\circ}13'$; W. Long. $81^{\circ}11'$) Bahía de Cochinos, Santa Clara Prov., Cuba, in 185 fathoms.

Remarks. *M. aguayoi* appears to be nearest in its relationship to *M. antillarum* but it differs by possessing a narrower and a more recurved siphonal canal, a more extended spire and having the spines on the varices far more strongly recurved. Both the parietal and palatal lips in *M. aguayoi* are much smoother, the parietal denticles being relatively insignificant and the crenulations on the outer lip almost obsolete. The most significant difference is that of the nuclear whorls: *M. aguayoi* possesses a bulbous and twisted first whorl which is larger than the second whorl; in *M. antillarum*, the first nuclear whorl is smaller than the second and is not at all bulbous or twisted in a horizontal plane.

Our specimens of *M. aguayoi* were obtained in depths ranging from 185 to 285 fathoms.

Named for Carlos G. Aguayo, Professor of Zoology at the University of Habana, who has contributed much to our knowledge of Cuban malacology.

Range. In deep water, the Bahamas and south to Cuba.

Records. See Types.

Murex (Murex) cailleti Petit, Plate 9, fig. 3-6

Murex motacilla Lamarek 1822, An. s. Vert., **7**, p. 160 [description only, not the reference to Chemnitz] (l'Océan des grandes Indes [Indian Ocean]); *non M. motacilla* Gmelin 1790.

Murex elegans 'Beck' Sowerby 1841, Proc. Zool. Soc. London, **8**, p. 140 (locality unknown); Sowerby 1841, Conch. Illust., **Murex**, fig. 84 (locality unknown); *non M. elegans* Donovan 1804; *non M. elegans* Wood 1828.

Murex trilineatus Reeve 1845, Conch. Icon., **3**, **Murex**, pl. 25, fig. 103 (Gulf of Mexico); *non M. trilineatus* J. Sowerby 1813.

Murex cailleti Petit de la Saussaye 1856, Journ. de Conchy., **5**, p. 87, pl. 2, fig. 1-2 (Guadeloupe, Lesser Antilles).

Murex motacilla var. *cailleti* 'Petit' Tryon 1880, Man. of Conch. (1), **2**, p. 82, pl. 12, fig. 131; pl. 13, fig. 132 (Guadeloupe, Lesser Antilles).

Description. Shell medium in size, from 35 to 60 mm. (about 1 to $1\frac{1}{2}$ inches) in length and rather solid. Whorls eight or nine, convex but generally slightly angulated at the shoulder. Ground color from white to dark cream with numerous, spiral and equidistant chestnut brown lines. Many examples show in addition two indistinct brownish bands on the last whorl. The spiral lines may be reduced to a very few and these few are usually superimposed over the broader brownish bands. Spire moderately extended. Suture irregular and rather deeply indented. Aperture oblique and oval, porcellaneous white with the parietal lip reflected and, adherent above and erect below. Beneath the margin of this lip there is generally a series of three or four denticles on the inner wall near the siphonal

canal and one at the upper portion. In addition, there may be another denticle below the first which is placed well within the aperture. The palatal or outer lip is rather thick, erect and strongly crenulated. Siphonal canal moderately long, never as long as the whorls above, narrow, recurved upward and slightly inclined toward the right. Two previous stages of the siphonal canal exist on the apertural face as two scale-like spines at the proximal end of the siphonal canal. Sculpture consists of three thick varices on each whorl which are aligned with the varices of the whorl above. Occasional specimens are without spines but frequently the varices give rise to a short and pointed spine on the shoulder of the whorls. In addition the varices may possess several small and open spines on the forward side. At the base of the siphonal canal and at the lower end of each varix there is generally a strongly developed spur-like spine. In between the varices there are generally two, sometimes three, axial ridges which in addition are somewhat nodulose. Spiral sculpture consists of numerous and irregularly spaced cords which are frequently indicated by the brownish lines mentioned above under coloration. Nuclear whorls one and one-half, smooth, rounded, and brownish in coloration; the next two following whorls are sculptured with numerous close-set axial ridges which are crossed by spiral

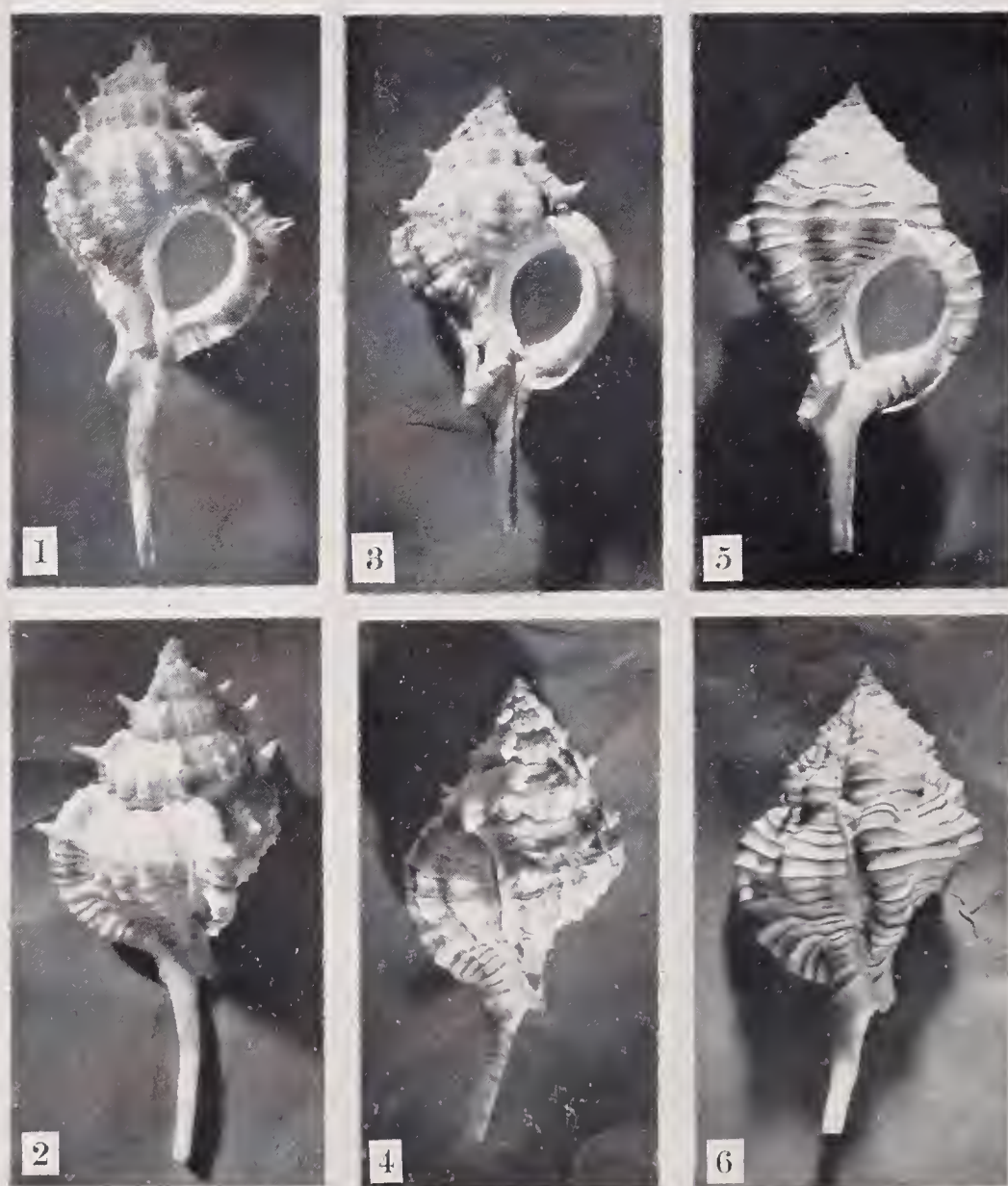


Plate 9. Fig. 1-2. *Murex cailleti kugleri* Clench and Pérez Farfante, Banes, Oriente, Cuba. Fig. 3-4. *Murex cailleti* Petit, Barbados, Lesser Antilles. Fig. 5-6. *Murex cailleti* Petit, Hispaniola (all natural size).

raised cords. The remaining whorls are as described above. Operculum unguiculate, ovate in shape with the surface having rather strongly developed concentric lines.

	length	width	
(large)	55	25 mm.	Barbados, Lesser Antilles
(average)	50	21	Barbados, Lesser Antilles

Types. The type specimen is probably in the collection of the Journal de Conchyliologie and was collected by Caillet. The type locality is Guadeloupe, Lesser Antilles.

Remarks. As far as we can now determine, the names in the above synonymy all refer to this species. The name *M. cailleti* is used here as it is the first available name among the several synonyms. This species shows considerable variation. Perhaps one of the most outstanding characteristics is that brown spiral lines are always present, either complete or only on the varices. These lines may be numerous and more or less regularly disposed over the surface of the shell as in Sowerby's *elegans*, or reduced to three that are rather widely spaced as in Reeve's *trilineatus*.

Range. Southern Florida, Bahamas, and south through the Lesser Antilles.

Records. FLORIDA: off Sombrero Key, *Blake*, in 54 fathoms (MCZ). BAHAMAS: off South West Point, Grand Bahama Id., *Atlantis*, station 2951 in 155 fathoms (MCZ). CUBA: Matanzas (C. G. Aguayo): off Matanzas, *Atlantis*, station 3465, in 175 fathoms and station 2480, in 200 fathoms (MCZ). HISPANIOLA: (J. S. Schwengel). LESSER ANTILLES: off Montserrat, *Blake*, station 155, in 88 fathoms (MCZ); off Barbados, *Blake*, station 290, in 73 fathoms (MCZ); Barbados (Mrs. Kellett).

Murex (Murex) cailleti var. **kugleri**, *new name*, Plate 9, fig. 1-2

Murex similis Sowerby 1841, Proc. Zool. Soc. London, 8, p. 140 (locality unknown); Sowerby 1841, Conch. Illust., **Murex**, fig. 70; *non M. similis* Schroeter 1805.

Description. This variety is very similar to the typical species but differs in having the spire slightly more extended and particularly in possessing more numerous and finer intervarical ridges. In addition, it is somewhat more spinous and has the siphonal canal longer. The differences exhibited by the figures on plate 9 are more apparent than is generally found by studying a large series of specimens, as certain examples appear to be intermediate in many of their characters.

As the name *similis* Sowerby is a homonym, a new name had to be selected. Many authors have considered this variety to be a synonym of *M. cailleti*, but in our opinion there are sufficient differences to warrant its retention as a variety.

	length	width	
(large)	60	25 mm.	Banes, Oriente, Cuba
(average)	46	19	Banes, Oriente, Cuba

Types. The type specimen is that of *M. similis* Sowerby as figured in his Conchological Illustrations (figure 70). This was originally contained in the Saul collection which is now in the British Museum. Since the locality was unknown to Sowerby, we here select that of Banes, Oriente Province, Cuba, to be the type locality.

Named for H. G. Kugler who has provided us with much critical material.

Range. Florida, Cuba and the Virgin Islands.

Records. FLORIDA: off Sand Key in 25 fathoms. CUBA: *Atlantis*, station 3419 (N. Lat. 22°46'30"; W. Long. 79°00'), off Punta Alegre, Camagüey, in 180 fathoms; Banes, Oriente. VIRGIN ISLANDS: *Blake*, station 132, off St. Croix in 115 fathoms (all MCZ).

Murex (Murex) ciboney, *new species*, Plate 10, fig. 1-3

Description. Shell medium in size, from 40 to 60 mm. ($1\frac{1}{2}$ to $2\frac{1}{2}$ inches) in length, solid and strongly sculptured. Whorls nine, uniformly convex. Color oyster white with an occasional specimen showing very faint and rather widely spaced brownish lines. Spire extended. Suture irregular and deeply indented. Aperture subcircular to oval, both lips flaring, porcellaneous white, the parietal lip reflected over the body whorl. The upper half of this lip adheres completely to the body whorl; the lower half is suberect from the mid area to the base of the siphonal canal; on the inner wall there is a series of four denticles at the base and a single denticle at the extreme upper margin. Palatal lip erect, strongly crenulated and built forward from the last varix and similar in appearance to the visor of a cap. Denticles formed well within the aperture, their forward ends giving rise to the crenulations on the lip. Siphonal canal medium in length, strongly recurved dorsally and with a very narrow slit which is placed close to the right margin. Terminations of the previous siphonal canals exist as two prominent scale-like spines near the base of the present siphonal canal. Axial sculpture consists of three equidistant and rounded varices which bear a series of short open spines. These spines are rather irregular in size, number from five to seven, are sharply pointed and built on the forward face of each varix. One or two spines are to be found at the base of the siphonal canal. Intervarical axial ridges, numbering two to five on the different whorls, are more or less smooth, though an occasional specimen will have these ridges strongly nodulose. Spiral sculpture consists of numerous close-set cords with fine threads between them. Nuclear whorls one and one half, rounded, smooth and grayish white. Next two whorls sculptured with strong axial ridges and three spiral raised threads. Remaining whorls with the varices more prominent than the intervarical ridges. No periostracum. Operculum oval with strong concentric ridges and possessing an apical nucleus.

	length	width	
(large)	59	25 mm.	off Punta Alegre, Camagüey, Cuba
(average)	52	23	Bahía de Cochinos, Cuba

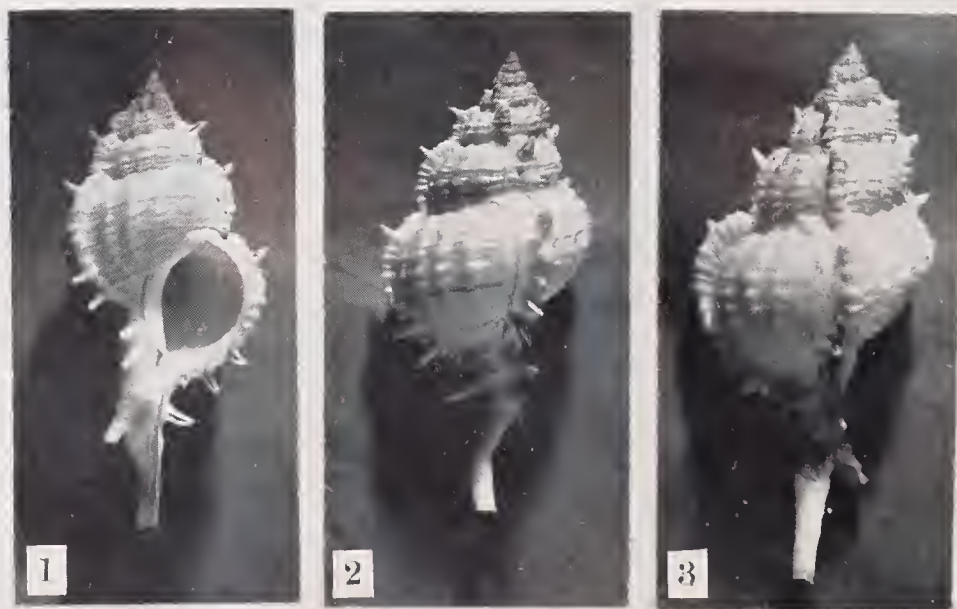


Plate 10. *Murex ciboney* Clench and Pérez Farfante
 Fig. 1-2. Off Matanzas, Cuba. Fig. 3. Off Punta Alegre, Camagüey,
 Cuba (both natural size).

Types. Holotype, Museum of Comparative Zoölogy, no. 147315, *Atlantis*, station no. 3482 (N. Lat. $23^{\circ}09'$; W. Long. $81^{\circ}27'30''$) off Matanzas, Cuba, in 190 fathoms. Paratypes from the *Atlantis* dredgings off Cuba as follows: station no. 3418 (N. Lat. $22^{\circ}49'$; W. Long. $79^{\circ}00'$) off Punta Alegre, Camagüey, in 195 fathoms; station no. 3375 (N. Lat. $22^{\circ}12'$; W. Long. $81^{\circ}11'$) off Puerto Tánamo, Oriente; station no. 3335, Bahía de Cochinos, Santa Clara, in 200 fathoms.

Remarks. This species is nearest in its relationship to *M. cailleti*, but differs in having a more extended spire, having stronger axial ridges on the earlier whorls, with more numerous spines and proportionately smaller varices. In general the spiral cords and threads are finer and more regularly disposed. Previous terminations of the siphonal canal in *M. ciboney* are far more prominent owing to their greater outward curvature.

This rather rare species is known from off Cuba, the Virgin Islands and the northern Lesser Antilles. The range and depth so far known is from 180 to 248 fathoms.

The name *ciboney* is taken from a group of Indians of the same name that once lived in Cuba.

Range. Cuba and east to the Virgin Islands and northern Lesser Antilles, in deep water.

Records. See under types. CUBA: Cayo Mégano Grande, Camagüey Prov. (P.J. Bermúdez). VIRGIN ISLANDS: off St. Croix, *Blake*, station 134, in 248 fathoms (MCZ). LESSER ANTILLES: off St. Kitts, *Blake*, station 149, in 60–150 fathoms (MCZ).

Murex (Murex) motacilla Gmelin, Plate 11

Murex motacilla Gmelin 1790, Syst. Nat. 13 ed., 1, pt. 6, p. 3530 (Indian Ocean). [Refers to Chemnitz, Conchy. Cat. (1), 10, pl. 163, fig. 1563]; Kiener 1843, Coquilles Vivantes, 7, p. 18, pl. 12, fig. 1; Reeve 1845, Conch. Icon., 3, **Murex**, pl. 22, fig. 88 (Senegal).

Murex motacilla Lamarek 1822, An. s. Vert., 7, p. 160 (reference to Chemnitz only, not the description which is for *M. cailleti*).

Murex motacilla var. *b* Lamarek 1822, An. s. Vert., 7, p. 160.

Description. Shell medium in size, from 50 to 60 mm. (about 2 to $2\frac{1}{2}$ inches) in length, rather solid and moderately spinose. Whorls eight or nine, strongly convex. Color cream to brownish orange, which is rather irregularly disposed and is generally more intensely

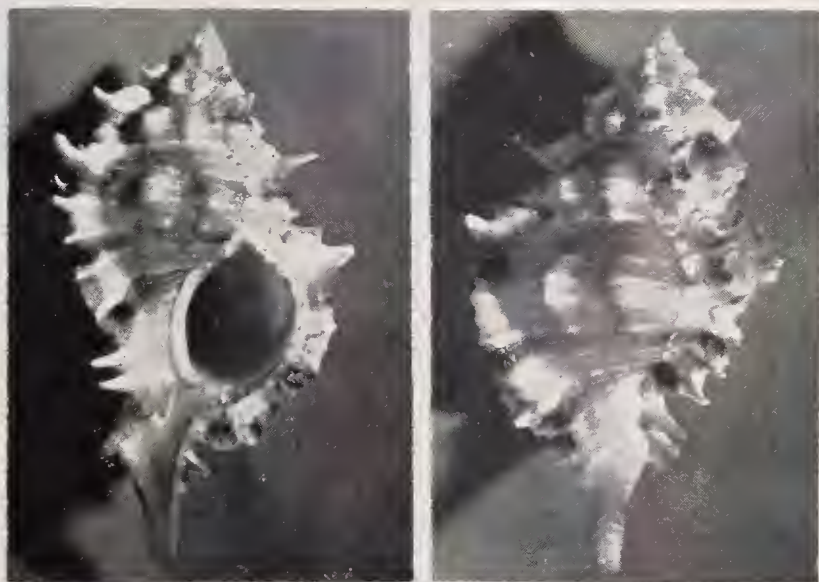


Plate 11. *Murex motacilla* Gmelin
St. Lawrence, Barbados, Lesser Antilles (natural size).

developed in between the varices along the upper part of the whorls. In live material these take on a faint purplish cast. In addition there are three rusty brown bands on each whorl which are more or less faint in between the varices but exceedingly dark as they pass over each varix. Spire acute and moderately extended. Suture irregular and somewhat indented. Aperture oval and porcellaneous white inside. Parietal lip reflected and adherent almost its entire length to the body whorl; near its lower end there are three or four denticles below the margin and one or two fairly large denticles at the upper end. Palatal lip erect, moderately thin and rather strongly crenulated. These crenulations are due to the forward extension of the denticles, which in this species appear to be quite long and arranged in pairs. Siphonal canal moderately extended and recurved upwardly and to the right. The canal is broad at its union with the aperture and constricts suddenly to form the narrow distal end. The two previous canals exist as well developed scale-like spines near the base of the aperture. Axial sculpture consisting of three varices which support a series of sharp but low spines which may, in places, be joined and ruffled. At the point of the whorl shoulder on the varix there is generally developed a spine somewhat larger than the remainder. In addition there may be two sharp and open spines at the base of each varix. Intervarical ridges two or three, rather prominent and strongly nodulose. Minute sculpture consisting of small and very low axial scales. There are numerous spiral alternating threads and cords; the latter give rise to the nodules, which are in axial arrangement, as well as the spines where they pass over the varices. Nuclear whorls two, rounded, glass-like and amber in coloration. Following two whorls are strongly sculptured with both spiral and axial ridges which are about equal in development. Remaining whorls as described above. No periostracum observed. Operculum unguiculate with rather strongly developed concentric ridges.

length	width	
58	28 mm.	St. Lawrence, Barbados
50	25	St. Lawrence, Barbados

Types. The type figure is that of Chemnitz 1788, Conchy.-Cab. (1), 10, pl. 163, fig. 1563. This is the only reference given by Gmelin. Both the Indian Ocean and Senegal, as stated by Reeve above, are apparently in error as to the original locality from which this species came. Our only specific records are from the West Indies. We here select Barbados, Lesser Antilles, to be the type locality.

Common name. Frog Shell (Barbados).

Remarks. The specimen that we have figured is almost an exact duplicate of the original wood-cut by Chemnitz, the only difference being that our specimen is a little smaller. In relationship *M. motacilla* appears to be nearest to *M. cailleti*. It differs from this latter species in being much more spinose, possessing the mottled brown coloration as well as the three dark bands, and in lacking the spiral chestnut threads which are possessed by *M. cailleti*. The proximal end of the siphonal canal is broader and the size of the shell is generally larger than that of *M. cailleti*. The two specimens from Barbados were collected on the beach and from a fish trap; the specimen from St. Vincent was dredged by the *Blake* in 95 fathoms.

Range. Lesser Antilles.

Records. LESSER ANTILLES: off St. Vincent, *Blake*, station 231, in 95 fathoms (MCZ); St. Lawrence and Oistin Bay, Barbados (Mrs. Kellett).

Murex (Murex) pulcher A. Adams, Plate 12, fig. 1-4

Murex trigonulus Reeve 1845, Conch. Icon., 3, **Murex**, pl. 22, fig. 87 [not species 97 as listed] (Red Sea); *non* Lamarek 1816.

Murex pulcher A. Adams 1853, Proc. Zool. Soc. London, 19, p. 270 (St. Croix, [Virgin Islands] in 60 fathoms); Sowerby 1879, Thes. Conchy., 4, **Murex**, p. 10, pl. 12, fig. 119.

Description. Shell rather small, from 34 to 60 mm. (about 1½ to 2½ inches) in length, rather solid and very moderately spinose. Whorls eight, slightly convex. Ground color cream to yellow and variegated with reddish brown. There are three darker bands of color which are generally irregular, one at the shoulder of the whorl, the second near the base of the whorl and the third at the narrowing point on the siphonal canal. The remaining distal portion of the canal is white in color. Spire moderately extended and acute. Suture irregular and somewhat indented. Aperture oval, porcellaneous white with the outside color showing through. Parietal lip reflected, adherent to the body whorl with almost no free margin. There is a series of denticles along the inner wall for its entire length. Outer lip thin, erect, finely crenulated and with a series of low and thin denticles extending well within the aperture; the crenulations are the forward extensions of these denticles. Siphonal canal long, rather broad at its proximal end and having the greater portion of its distal end narrow, recurved upwardly and outwardly. The two previous siphonal canals exist as scale-like spines near the base of the aperture. Sculpture consisting of three rounded varices which support, on the forward side, a ruffle-like series of spines which are usually rather low. At the base of the siphonal canal along the line of the varices there are generally two or three of these spines that are quite extended and widely opened. A few specimens have an open spine located at the shoulder. Elsewhere on each varix there are rather strong ridges which are part of the spiral sculpture. There are two to four nodulose intervarical ridges. Spiral sculpture consists of alternating fine threads and rather strong cords; these cords develop the nodules which are also in axial arrangement. Nuclear whorls one and one half, smooth, rounded, and of a dull reddish color. Next two whorls strongly spirally ridged and crossed by rather low axial ridges. Remaining whorls as described above. No periostracum. Operculum unknown.

	length	width	
(large)	51	20 mm.	Barbados
(average)	45	19	St. Lawrence, Barbados



Plate 12. *Murex pulcher* A. Adams

Fig. 1-2. Barbados, Lesser Antilles. Fig. 3-4. St. Lawrence, Barbados, Lesser Antilles (both natural size).

Types. The type specimens are in the British Museum, originally contained in the Cuming collection. The type locality is St. Croix, Virgin Islands.

Remarks. This species is best characterized by its overall mottled coloration except at the distal end of the siphonal canal which is white. In addition, it has fewer spines than any other species in the subgenus represented in the Western Atlantic. The lower part of the body whorl in this species is not as sharply constricted as in other closely allied forms. The base of the siphonal canal is broad, which makes it appear much shorter when seen from the dorsal side. The extension of the canal places it in *Murex* s.s. Without this extension, the broadening of the lower part of the body whorl and the expansion of the proximal end of the canal would make it a member of the subgenus *Naquetia* Jousseaume. Though this shell was originally reported from fairly deep water (60 fathoms), it has been found on the beach in Barbados. It appears to be quite a rare shell. The references to Red Sea by Reeve and Sowerby for this species are probably in error.

Range. Virgin Islands and Lesser Antilles.

Records. VIRGIN ISLANDS: St. Croix in 60 fathoms (A. Adams 1853). LESSER ANTILLES: St. Lawrence, Barbados (MCZ).

Subgenus *Siratus* Jousseaume

Siratus Jousseaume 1880, Le Naturaliste, 1, no. 42, p. 335 (subgenotype, *Pupura sirat* Adanson [= *Murex sirat* d'Orbigny, = *M. senegalensis* Gmelin]).

Genotype, *Pupura sirat* Adanson = *M. senegalensis* Gmelin (monotypic).

Shell possessing three varices on each whorl. Spines on the varices are few with the shoulder spines generally quite large. The siphonal canal is comparatively short and rather broad and is slightly recurved upward.

This subgenus differs but slightly from *Murex* s.s., the main difference being in the shortened and broader siphonal canal. The opercula are the same and the remaining characters, such as spines, spiral and axial sculpture are very similar.

Murex (*Siratus*) *senegalensis* Gmelin, Plate 13, fig. 1-2

Murex senegalensis Gmelin 1790, Syst. Nat. ed. 13, 1, pt. 6, p. 3537 (Senegal).

Murex costatus Gmelin 1790, Syst. Nat. ed. 13, 1, pt. 6, p. 3549 (Senegal); *non M. costatus* Pennant 1777; Born 1778; Meuschen 1787; Gmelin 1790, p. 3543; [Gmelin refers to the same plate and figure in Adanson as he did for *M. senegalensis*].

Murex brasiliensis Sowerby 1834, Conchological Illust. *Murex*, (Catalogue, p. 2, sp. 24) fig. 55 (Senegal).

Murex sirat d'Orbigny 1841, Voyage L'Amérique Méridionale, p. 453 (Senegal and Rio de Janeiro, Brasil). [Refers to Adanson 1757, pl. 8, fig. 19].

Description. Shell medium in size, 50 to 71 mm. (2 to 3 inches) in length, strong and with only a few spines. Whorls eight, convex, though somewhat angulate at the shoulder. Ground color cream or buff. Three pale and somewhat interrupted rusty or reddish brown bands occur in spiral arrangement. This coloration is not present on all specimens and, when it occurs, it is faint and difficult to follow. Spire moderately extended. Suture irregular and rather deeply impressed. Aperture relatively large, oval, polished and colored white to brownish. Parietal lip slightly reflected over the body whorl, generally smooth but sometimes with a series of fine denticles below the margin and along its entire length. Palatal lip erect and crenulated, with a series of strong denticles within, generally arranged in pairs, the terminal ends of the denticles producing the crenulations. On the margin of the lip opposite the large shoulder spine the lip is drawn out to form a small spout-like notch. Siphonal canal rather short and fairly broad with the opening along the

ventral side moderately wide and slightly curved. The two previous siphonal canals existing as large scale-like spines. Axial sculpture consists of three prominent rounded and equidistant varices on each whorl. Each varix is formed by the production of a half rounded arch, at which time one very large shoulder spine and one or two shorter, open spines are developed at the siphonal canal. Then growth starts anew from within; the growth of the varix continues down to the contour of the body whorl, infolding the large shoulder spine and closing it to a narrow slit in front. The animal fills in the hollow varix, then growth continues ahead to form another third of the body whorl and another new varix. There are two or three strong intervarical ridges. Spiral sculpture consists of numerous irregular, raised cords between which there are one or more fine threads. Both cords and threads are finely granulose. The cords connecting the shoulder spines and those at the siphonal canal are larger. Nuclear whorls, one to two, rounded, smooth, and of a brownish color. The three following whorls sculptured with numerous and equal axial ridges and fine spiral threads. Operculum unguiculate with the surface roughened by a few, low, growth lines.

	length	width	
(large)	71	38 mm.	Victoria, Espirito Santo, Brasil
(average)	62	34	Rat Id., Río de Janeiro, Brasil

Types. The type figure is that of Adanson (1757, Hist. Nat. Sénégal, pl. 8, fig. 19). This reference is the only one given by Gmelin. The type locality is Senegal, French West Africa.

Common name. Senegal Rock Shell.

Remarks. This is quite a distinctive species: the possession of three varices on each whorl, the large and backwardly curved shoulder spines and the broad and shortened siphonal canal differentiate it from all other species in the Western Atlantic.

We can add but little to the knowledge of this species. It probably occurs on rocks in shallow water to judge by a fair series of live material collected by the *Hassler* in 1872 on Rat Island, Río de Janeiro Harbor.



Plate 13. *Murex senegalensis* Gmelin
Fig. 1-2. Victoria, Espirito Santo, Brasil (both natural size).

Range. Senegal and probably elsewhere along the northwestern coast of Africa and the coast of Brasil.

Records. BRASIL: Victoria, Espirito Santo; Rat Island, R o de Janeiro, *Hassler* voyage, 1872 (both MCZ); Praia de Copacabana and Ilha de Paquet , Bah a de Guanabara, both Federal District; Ilha Grande, Enseada do Abrah o, Estado R o de Janeiro; Ilha de S o Sebasti o, Estado S o Paulo (all P. de Oliveira).

Subgenus *Phyllonotus* Swainson

Phyllonotus Swainson 1833, Zoological Illustrations [2], 3, p. 100; J. E. Gray 1847, Proc. Zool. Soc. London, 15, p. 133.

Subgenotype, *Murex imperialis* (= *M. pomum* Gmelin) (subsequent designation, J. E. Gray, 1847).

This subgenus is characterized by possessing three varices; low and generally broad and somewhat fluted spines and a short, broad siphonal canal which is generally sharply recurved upward at its distal end. The operculum is unguiculate.

Murex (*Phyllonotus*) *pomum* Gmelin, Plate 14, fig. 1-3

Murex pomum Gmelin 1790, Syst. Nat. ed. 13, 1, pt. 6, p. 3527 (West Coast of Africa).

Murex asperrimus Lamarek 1822, Anim. s. Vert., 7, p. 164 (Atlantic Ocean); Deshayes 1845 [in] Lamarek. Anim. s. Vert., 9, p. 576 [both refer to Lister's figure that we have selected as the type figure]; d'Orbigny 1841, Voy. l' Amerique Merid., 5, pt. 3, Mollusca, p. 452 (Brasil and Cuba).

Murex imperialis Swainson 1831, Zoological Illustrations (2), 2, p. 67, and plate (locality unknown); *non* *M. imperialis* Fischer 1807; *non* *M. imperialis* Swainson 1833.

Murex oculatus Reeve 1845, Conch. Icon., 3, *Murex*, pl. 9, fig. 36 (locality unknown).

Murex mexicanus Petit 1852, Journ. de Conchy., 3, p. 51, pl. 2, fig. 9 (Gulf of Mexico).

Murex pomiformis 'Martini' M rch 1852, Cat. Conchy. Comes de Yoldi, p. 96 (Antilles).

Murex globosa Emmons 1858, Geol. North Carolina, p. 247, fig. 105a (fossil: Miocene).

Description. Shell 50 to 115 mm. (2 to 4.5 inches) in length, thick, strong and rugose. Whorls convex, from seven to nine. Color irregular, from brownish yellow to brown with many specimens showing one to three dark brown, solid or interrupted, spiral bands. These bands are often reduced to color spots on the varices and the lower band may be wide and color the entire base of the shell. Spire extended. Suture not clearly indicated. Aperture rather large, oval to subcircular. Interior of aperture below lip polished and colored ivory, buff, yellow, orange and even pink. Parietal lip reflected over and adherent to the body whorl, except for the distal edge which is erect. Color the same as on the inside and in addition, there is generally a dark brown spot at the upper part which sometimes extends along the parietal wall to the siphonal canal. On the parietal wall there is a series of irregular elongated denticles which extends the entire length. Outer lip strongly toothed, with three dark brown spots, the last one extending down along the siphonal canal. The siphonal canal short, broad and curved back from the aperture, flat on the columellar side and with the right portion deeply fluted along the open margin. Previous canals extending obliquely downward and forming the left margin beyond the flattened area. Axial sculpture consisting of three prominent, equidistant varices on each whorl. Each varix possesses a series of low and open spines after which is developed a fluted edge on the forward margin. In addition there are one to three irregular, intervarical ridges which may be almost as high as the varices. Along the suture there may be developed small, buttressing scales which are cemented to the whorl above. Spiral sculpture consists of a series of very strong cords, generally scaly, which give rise to

nodules on the intervarical ridges. Between these cords there are several threads which are also scaly. Periostracum absent or exceedingly limited. Nuclear whorls two, very small, rounded, smooth and colored white to amber. They are generally missing in adult shells. Next four whorls sculptured with strong axial ridges which are crossed by well-developed spiral cords. Remaining whorls as described above. Operculum unguiculate, heavy and having very strong growth lines.

	length	width	
(large)	115	68 mm.	St. Thomas, Virgin Islands
(average)	87	53	Puerto Plata, Hispaniola

Types. The type figure of *M. pomum* here selected is that of Lister (1688, *Historiae Conchyliorum*, pl. 944, fig. 39a). The figures in the other references that we have examined are exceedingly poor. As far as we know Gmelin's locality of West Africa is an error. We here limit the type locality to St. Thomas, Virgin Islands, where large specimens approximating in size the figure of Lister have been found.

Remarks. This species is quite variable and under favorable conditions may reach a fairly large size. The brown spots both on outer lip and parietal wall may be absent although this condition appears to be very rare. The spot on the parietal wall may become a broad band extending around the callus. On specimens found in protected habitats where wave action is reduced to a minimum, the sculpture is generally a little more delicate and, in fact, becomes more rugose than on those found in exposed situations. Specimens found on grass-covered flats may have the siphonal canal considerably lengthened and more recurved than those occurring in other habitats. This is a shallow water species. In Trinidad, specimens have a decidedly pinkish cast in the aperture; elsewhere the coloration is generally whitish to orange. Dall (1899, *Blake Report*, p. 199) has noted that young shells are quite hispid.

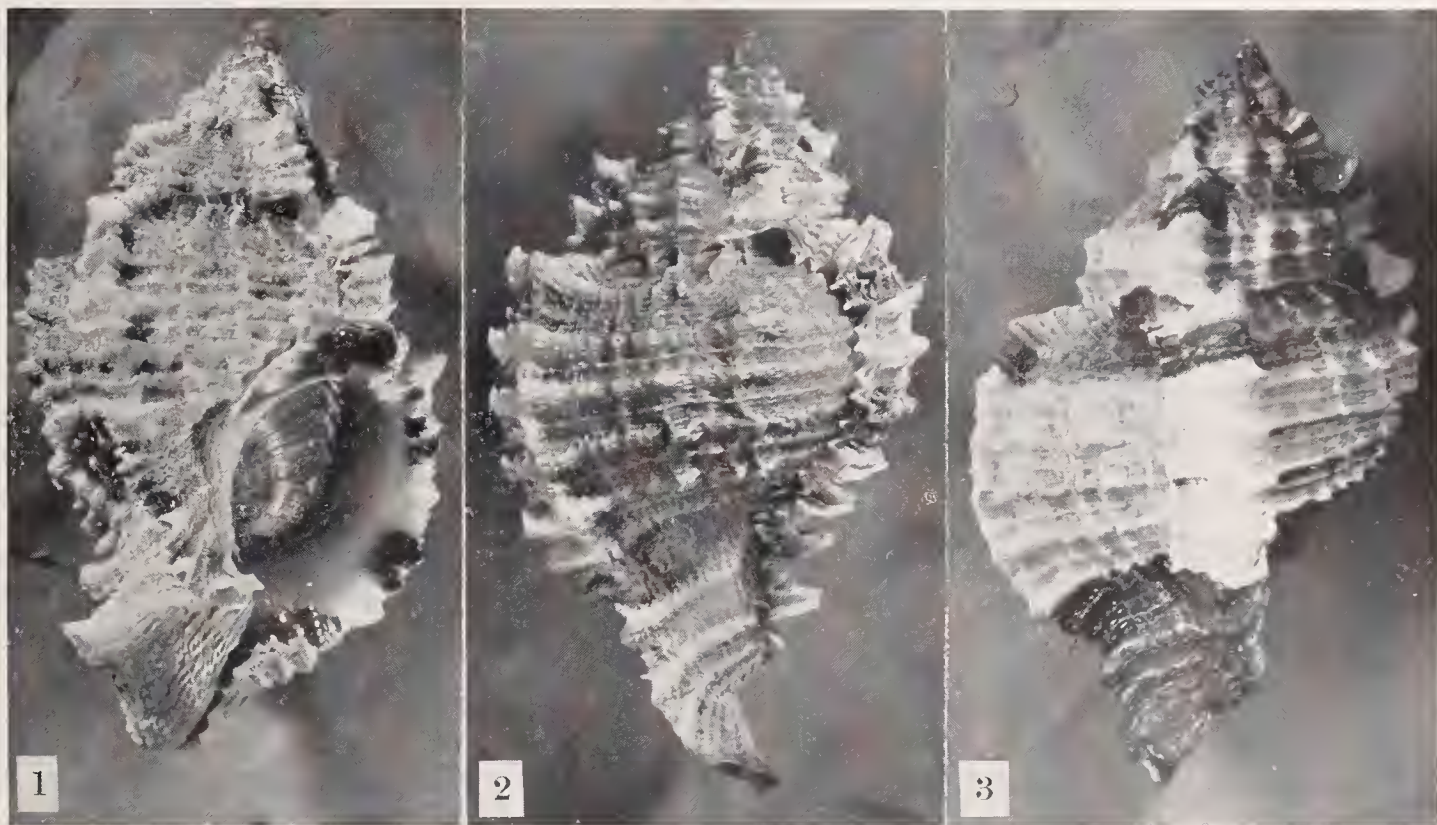


Plate 14. *Murex pomum* Gmelin
Fig. 1-3. Off Miami Beach, Florida (all natural size).

Range. Beaufort, North Carolina (Dall, 1889, p. 120), south through the West Indies, to Brasil (d'Orbigny 1841).

Records. SOUTH CAROLINA: Pawley Id.: Folly Beach (both Charleston Mus.). FLORIDA: Lake Worth (MCZ); Biscayne Bay (R. Humes); Pavilion Key (MCZ); Marco Id. (A. H. Patterson); Naples; Bonita Springs; Sanibel Id.: Captiva Id.: Boca Grande; Lemon Bay; Pass-a-Grille; Tampa Bay; St. Petersburg; Boca Chica Key; Key West; Sand Key (all MCZ); Bonefish Key (B. R. Bales): off the Elbow, Key Largo (L. A. Burry). BAHAMAS: Cherokee Sound, Great Abaco; Alicetown, Bimini Ids. (both MCZ); Whale Cay, Berry Ids.; Lowe Sound, Andros Id. (both A. H. Patterson); Nassau, New Providence (P. D. Ford); Harbour Id.; Savannah Sound, Eleuthera (both MCZ). CUBA: Canimar, Matanzas (H. Sarasúa); Cayo Francés, Caibarién (P. J. Bermúdez); Guantánamo Bay; Cayo Alcatraz, Cienfuegos (both MCZ); Punta del Este, Isla de Pinos (L. Howell). HISPANIOLA: Santa Bárbara de Samaná; Puerto Plata; San Lorenzo Bay, Samaná Bay; Jérémie; Gonave Id. (all MCZ). JAMAICA: (MCZ). PUERTO RICO: Mayagüez; Ponce (both MCZ). VIRGIN ISLANDS: St. Thomas; Flannegan Passage, St. John, *Blake*, Station 142 in 27 fathoms (young specimen); St. Croix (all MCZ). LESSER ANTILLES: Martinique (MCZ); Barbados (Mrs. Kellett); Magueripe Bay and Pointe à Pierre, Trinidad (H. G. Kugler). COLOMBIA: Cartagena (MCZ).

Subgenus **Chicoreus** *Denys de Montfort*

Chicoreus Denys de Montfort 1810, Conchyliologie Systématique, 2, p. 611 and plate.¹

Triplex Perry 1810 (June), Arcana or The Museum of Natural History, pl. 23 (Genotype, *Triplex foliatus* Perry).

Chicoreus Agassiz 1846, Nomen. Zool. Index Universalis, p. 85 (emendation for *Chicoreus* Denys de Montfort).

Torvauurex Iredale 1936, Rec. Australian Mus., 19, p. 323 (Genotype, *Murex denudatus* Perry).

Subgenotype, *Chicoreus ramosus* Denys de Montfort (= *Murex brevifrons* Lamarck) (monotypic); *non Murex ramosus* Linné.

Shells possess three strongly spinose varices on each whorl with the spines foliated and sometimes squamulose; siphonal canal generally rather short but broad and curved upward. Opercula unguiculate or concentric.

Species in this subgenus have evolved some of the most intricate spines. The large spines not only possess smaller spines or foliations on their margins, but there may be several open layers of shell material forming these spines. Occasional specimens may produce fine imbricated scales on the spines and spiral ridges or cords.

Murex (Chicoreus) brevifrons *Lamarck*, Plate 15, fig. 1-2; Plate 16, fig. 1-2

Murex ramosus Denys de Montfort 1810, Conchy. Syst., 2, p. 611 and plate; *non Murex ramosus* Linné 1758.

Murex brevifrons Lamarck 1822, An. s. Vert., 7, p. 161 (American Ocean).

Murex calcitrata Lamarck 1822, An. s. Vert., 7, p. 162 (locality not given).

Murex megaverus 'Sowerby' Reeve 1845, Conch. Icon., 3, **Murex**, pl. 6, fig. 24 (West Indies); *non M. megaverus* Sowerby 1841.

¹We have been unable to determine the exact date of Montfort's work other than the year as given above. Perry's name *Triplex*, appeared in June, 1810, and it is possible that this may eventually prove to be an earlier name.

Murex elongatus 'Lamarck' Reeve 1845, Conch. Icon., 3, **Murex**, pl. 6, fig. 26 (Gulf of Mexico); *non M. elongatus* Lamarck 1822.

Murex crassiviridosus Reeve 1845, Conch. Icon., 3, **Murex**, pl. 9, fig. 33 (locality unknown).

Murex pulcherrimus Reeve 1845, Conch. Icon., 3, **Murex**, pl. 33, fig. 171 (St. Thomas [Virgin Islands] West Indies).

Murex purpuratus Reeve 1846, Conch. Icon., 3, **Murex**, pl. 35, fig. 183, (locality unknown).

Murex microphyllus 'Lamarck' d'Orbigny 1853 ?, [in] R. de la Sagra, Hist. Phys. Pol. Nat. Cuba, Moll., 2, p. 159: *non M. microphyllus* Lamarck 1822.

Murex tonpiloti Bernardi 1860, Journ. de Conchy., 8, p. 211, pl. 4, fig. 5 (locality unknown).

Murex ulabastrum A. Adams 1863 [1864], Proc. Zool. Soc. London, p. 508 (Martinique); Sowerby 1879, Thes. Conchy., 4, **Murex**, p. 20, pl. 21, fig. 191; *non M. alabaster* Reeve 1845.

Murex ulamsii Kobelt 1877, Jahrbücher Deut. Malak. Gesell., 4, p. 154 [new name for *ulabastrum* A. Adams, *non alabaster* Reeve].

Murex approximatus Sowerby 1879, Thes. Conchy., 4, **Murex**, p. 13, pl. 7, fig. 62 (locality unknown).

Description. Shell large, from 90 to 150 mm. ($3\frac{1}{2}$ to 6 inches) in length, solid and frondosely spined. Whorls convex, eight or nine. Color very variable; it may be cream or from pinkish or rusty brown to a dark purplish brown. Generally there are dark brown bands, which are spirally arranged and are found mainly between the ridges. Spire extended. Suture irregular and impressed. Aperture suboval with the interior porcellaneous white. Parietal lip reflected over the body whorl, adherent, smooth and heavily glazed, sometimes showing irregular brown patches. At the upper portion of the parietal wall there is a low ridge which follows back into the aperture. Palatal lip strongly crenulated and possessing a series of paired and elongated denticles between each two of the large spines. Axial sculpture consisting of three rounded varices that are strongly armed, generally with five thickened and rather long spines, the uppermost spine being the largest, the next, large to small, and the lower three being smaller and more or less equal in



Plate 15. *Murex brevifrons* Lamarck

Fig. 1-2. Bargo Cove, Guantánamo Bay, Cuba (both natural size).

size. They are opened toward the aperture and have their edges foliated. The spines are fully developed before the animal attempts to fill in the varix canal: when this is done, a new set of smaller spines are formed from the base of those first developed. The animal then makes a third start, forming a part of the new body whorl beneath this second set of spines. In addition to the varices there are one or two intervarical knob-like ridges. Spiral sculpture consists of rounded and flattened ribs, generally of a lighter color than the areas between them. In addition, there are numerous spiral threads which cover the ribs, the interspaces and the backs of the spines. Siphonal canal broad and slightly curved backward at its distal end: the palatal side provided with three spines, the lowest one being very small: the columellar side is flattened, previous siphonal canals remaining as lengthened scale-like spines. Nuclear whorls two and one half, rounded, smooth and from light to purplish brown in coloration. First whorl somewhat twisted: remaining one and one half whorls regular and of equal size. Postnuclear whorl sculptured with numerous, strong, axial ridges crossed by equally strong spiral cords. Remaining whorls as described above. Periostracum absent. Operculum unguiculate, and with numerous concentric growth lines. It is colored a dull, dark brown.

	length	width (without counting the spines)	
(large)	155	70 mm.	St. Thomas, Virgin Islands
(average)	120	53	Guanta, Venezuela

Types. We select Martini's figure (1777, Conchy.-Cab. (1) 3, pl. 103, fig. 983) referred to by Lamarck, to be the type figure. The figure 982 in the same work is the type of *M. calcitrata* which unquestionably is the same as *M. brevifrons*. As Lamarck gave only



Plate 16. *Murex brevifrons* Lamarck
Fig. 1-2, Kingston Harbour, Jamaica (both natural size).

the "American Ocean," we here limit the type locality to St. Thomas, Virgin Islands.

Remarks. This species, although rare in Florida, is quite common throughout the West Indies. Adult specimens are readily differentiated from *M. florifer* to which it appears to be rather closely related. See *Remarks* under *M. florifer* and *M. imbricatus*.

M. megacernus Reeve is unquestionably a synonym of *M. brevifrons*. It possesses but three varices as the illustration clearly shows and not four as stated by Reeve and though his specimen possesses more spines than generally occur, we have seen occasional specimens exhibiting more than the usual number.

Murex alabastrum A. Adams is a very young shell of *M. brevifrons* with very poorly developed spines; we have a specimen exactly like that figured in Sowerby's *Thesaurus*.

Range. Southern Florida, West Indies and south to British Guiana.

Records. FLORIDA: West Crawfish Key; Pelican Shoals; Tortugas (all MCZ). CUBA: Gibara (C. G. Aguayo); Guantánamo Bay; Santiago de Cuba (both MCZ). HISPANIOLA: San Lorenzo Bay; Puerto Plata (both MCZ). JAMAICA: Port Henderson; Kingston Harbor (both P. D. Ford). PUERTO RICO: Ponce; Mayagüez (both MCZ). VIRGIN ISLANDS: St. Thomas; St. John (both MCZ). LESSER ANTILLES: Fort James, Antigua; Guadeloupe; Grenada (all MCZ); Barbados (F. S. Kellett); Ortoise River and Carenage, Trinidad (both H. G. Kugler). CARIBBEAN ISLANDS: Curaçao (MCZ). COLOMBIA: Cartagena (MCZ). VENEZUELA: Guanta (MCZ); Tucacas Bay, Falcón (H. G. Kugler). DUTCH GUIANA: Corentyne River (H. G. Kugler).

Murex (Chicoreus) argo, *new name*, Plate 17

Murex imbricatus Higgins and Marrat 1877, Proc. Literary and Philosophical Soc. Liverpool, no. 31, p. 413, pl. 1, fig. 2 (Carinage, Grenada, Lesser Antilles); *non Murex imbricatus* Brocchi 1814; *non* Risso, 1826; *non* Nardo 1847.

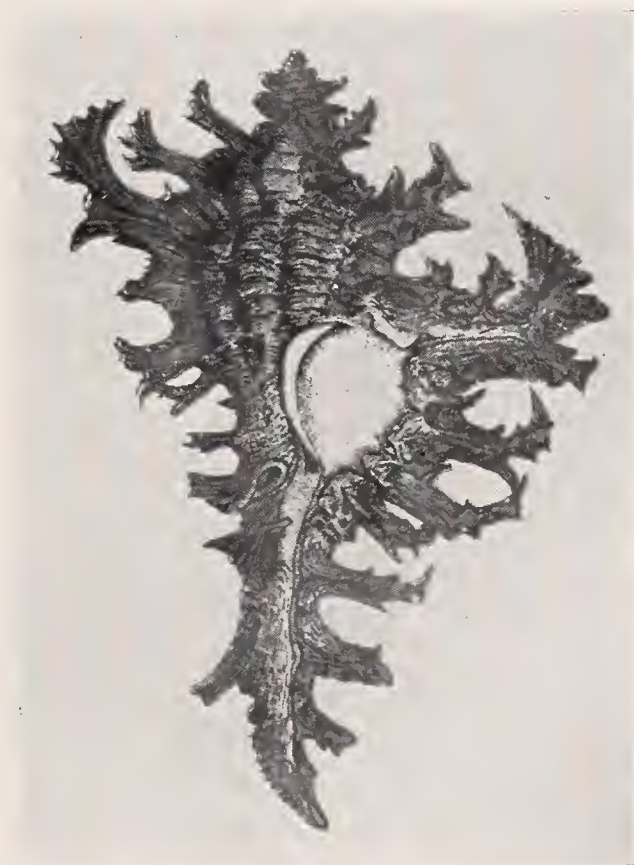


Plate 17. *Murex argo* Clench and Pérez Farfante Grenada (after Higgins and Marrat; natural size).

We are not familiar with this species and have seen no examples. The figure by Higgins and Marrat, here reproduced, plate 17, is well drawn and would indicate a species quite different from any other in the subgenus *Chicoreus* known to us from the Western Atlantic. *M. argo* differs from *M. brevifrons* by having a much smaller aperture, a longer and narrower siphonal canal and fewer spines on the varix. From *M. florifer*, it differs in the longer siphonal canal and in possessing fewer and more widely spaced spines. It differs from both in having more intervarical ridges.

length	width (without counting the spines)
82	34 mm. Holotype

Types. Holotype in the Liverpool Museum, the type locality being Carinage, Grenada Island, Lesser Antilles.

Range and Records. Known only from the Island of Grenada.

Murex (Chicoreus) florifer Reeve, Plate 18, fig. 1-5

Murex rufus Lamarck 1822, An. s. Vert., 7, p. 162 (locality unknown); *non M. rufus* Montagu 1803.

Murex florifer Reeve 1846, Conch. Icon., 3, **Murex**, pl. 36, fig. 188 (Honduras).

Murex salleanus A. Adams 1854, Proc. Zool. Soc. London, 21, p. 70 (Saint Domingo, West Indies, ex Cuming); Sowerby 1879, Thes. Conchy., 4, **Murex**, p. 19, pl. 388, fig. 73 (Gulf of Mexico).

Murex despectus A. Adams 1854, Proc. Zool. Soc. London, 21, p. 72 (West Indies, ex Cuming); *non M. despectus* Sowerby 1879.

Description. Shell medium in size, from 40 to 85 mm. ($1\frac{1}{2}$ to $3\frac{1}{2}$ inches) in length, solid, heavy and with three prominent varices which from above form a triangle in outline. Whorls convex, about seven in number. Ground color cream, buff or light brown, the spines and varices being of a rusty or chocolate brown. This dark coloration may exist, too, on the spiral ridges on the body whorl. Spire moderately extended. Suture distinct, slightly indented and irregular. Aperture small, oval and with the stronger spiral ridges of the outside showing through in the form of shallow grooves. Both inner and outer lips are margined within by a narrow band of buff; the remaining inner areas porcellaneous white. Parietal lip smooth, slightly reflected over the body whorl and possessing a non-crenulated edge. Palatal lip erect and both broadly and finely crenulated, the broad crenulations being the forward extensions of the grooves inside the aperture. On the upper margin of the outer lip there is produced a shallow sinus and in addition a small ridge is formed along its base which follows back inside the whorls. Siphonal canal broad and flattened; the parietal side occupies the greater part of its width while the palatal side is very narrow and bears four foliated spines, the lowest being the smallest. Previous canals extend obliquely downward and form the left margin beyond the flattened area. Axial sculpture consists of three prominent equidistant varices on each whorl. Each varix produces at the growing margin a series of six large spines on the body whorl and four along the siphonal canal; the uppermost spine is generally larger than all of the others. The forward side of the spines remains open in a narrow slit. The larger spines bear several smaller ones which give them their foliated appearance. There is a prominent knob-like ridge between each pair of varices. Spiral sculpture consists of a series of angular dark brown ridges which connect the corresponding spines. In addition there are numerous spiral threads which are formed on the ridges, between the ridges and on the back of the spines. On many specimens there is an additional sculpture of imbricated scales on the ends and back of the spines. Periostracum absent. Nuclear whorls one and one half, rounded, without carina, and of a reddish-brown coloration. The following three whorls

are sculptured with numerous equal longitudinal ribs and four spiral threads, both becoming stronger from the end of the nuclear whorls to the first varix. Operculum concentric, with a subcentral nucleus which is surrounded by a few coarse, concentric ridges.

	length	width (without counting the spines)	
(large)	84	32 mm.	Savannah Sound, Eleuthera, Bahamas
(average)	72	27	Nassau, New Providence, Bahamas

Types. The exact location of Lamarck's types is not known to us. However, Kiener credits the specimens used in his description both to Lamarck and to the Museum of Natural History in Paris. They may possibly be in this latter institution. As the locality was unknown to Lamarck, we here designate Honduras, where Reeve obtained *M. florifer*, to be the type locality. Reeve's types are in the British Museum.

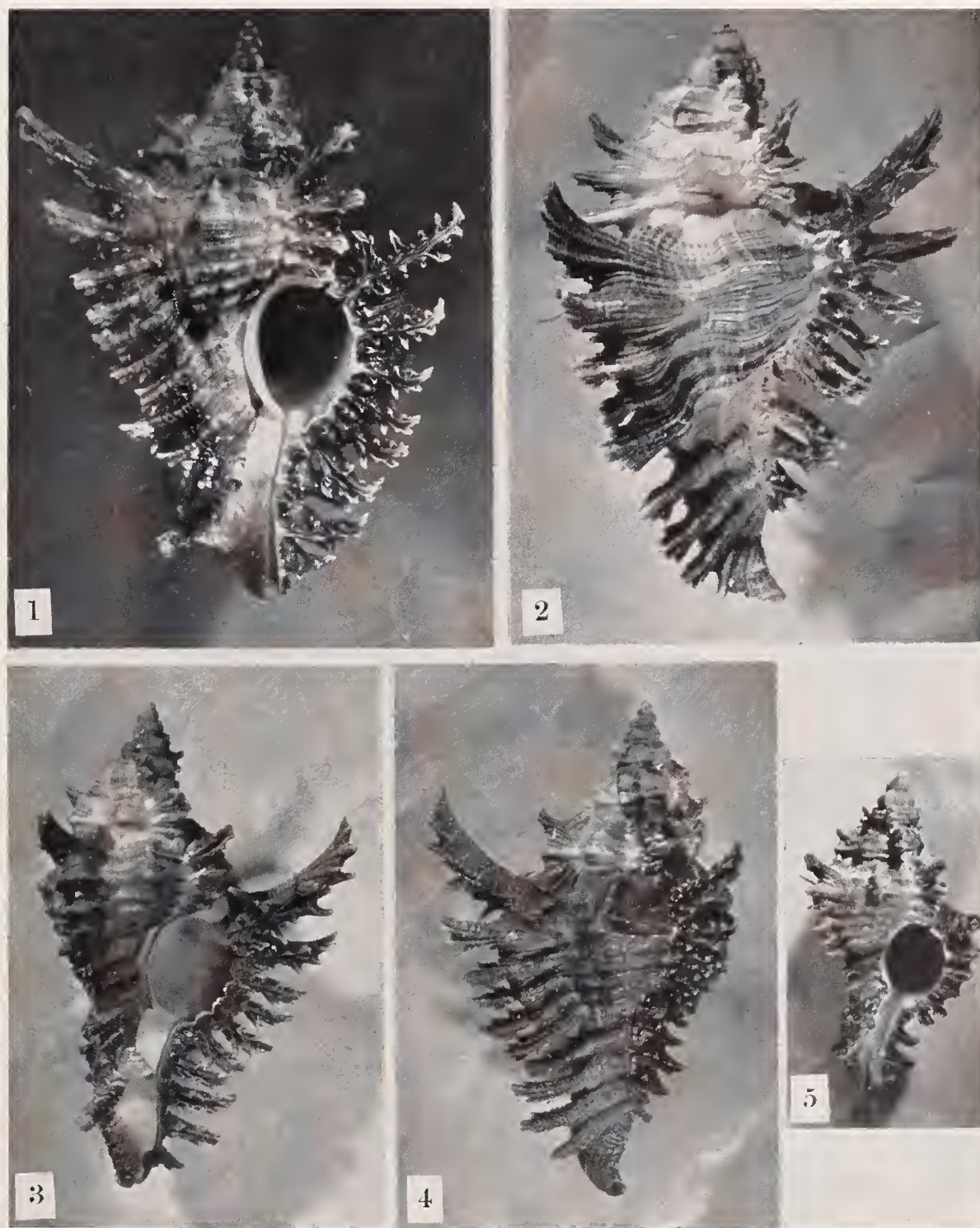


Plate 18. *Murex florifer* Reeve. Fig. 1-2. Fort Montague, Nassau, New Providence Island, Bahamas. Fig. 3-4. Guana Key, Bahamas. Fig. 5. (Beachworn specimen), Tice Island, Caxambas, Florida (all natural size).

Common name. The Burnt Rock Shell.

Remarks. This species is only superficially close to *M. brevifrons*. The latter reaches a larger size, possesses a proportionally larger aperture and has longer and more open spines. The spiral bands of dark brown are between the spiral ridges in *M. brevifrons* while in *M. florifer* these bands are on the ridges. *M. florifer* possesses one and one-half nuclear whorls while *M. brevifrons* has two and one-half; this makes the differentiation of young specimens very easy. The opercula are quite different in appearance in these two species: *M. brevifrons* possesses an unguiculate operculum, while in *M. florifer* the operculum is nearly round and concentric with a subcentral nucleus. This is a case in point, as mentioned before, where two species have certain of their characters in common and rather sharp differences in other of their characters. See also under *M. florifer arenarius*.

Reeve's figure of *M. florifer* has exceptionally long spines and has been considered different from the typical form; however, we possess specimens in which the spines are normal in size on one varix and particularly long on another. This character appears to be but an individual variation.

M. despectns A. Adams seems to be an absolute synonym of *M. florifer* Reeve. Adams' statement that the aperture was white and that the original locality was West Indies, would connect it with *M. florifer* and not with *M. adustus* Lamarek, the Indo-Pacific analogue of *M. florifer*. The aperture in *M. adustus* Lamarek is generally of a deep pink, particularly along the margin of the parietal wall. Subsequent writers have placed *despectns* as a synonym of *adustus*.

Murex florifer is a fairly abundant species, at least in the northern West Indies. It accepts a wide variety of habitats, living in sand, on rocks and even in mangrove swamps if the latter is not too brackish. It appears to be more abundant at low-water line.

Range. Southern Florida, the Bahamas, Greater Antilles and along the coast of Central America.

Records. FLORIDA: Palm Beach; Lake Worth (both MCZ); Biscayne Bay (A. H. Patterson); Tarpon Springs (T. Van Hyning); Cedar Keys (MCZ). BAHAMAS: Bimini Ids. (MCZ); Nassau, New Providence (A. H. Patterson); Savannah Sound, Eleuthera; Arthurstown, Cat Id.; Simms, Long Id. (all MCZ). CUBA: La Chorrera, Habana; Varadero (both R. de la Torre); Cayo Francés, Caibarién (C. G. Aguayo). HISPANIOLA: Puerto Plata; Monte Cristi (both MCZ).

***Murex florifer arenarius*, new subspecies, Plate 19, fig. 1-3**

Murex salleanus of authors, not of A. Adams.

Description. Shell medium in size, from 40 to 85 mm. ($1\frac{1}{2}$ to $3\frac{1}{2}$ inches) in length. In general the characters are similar to *M. florifer* but there are a few differences that distinguish this geographic subspecies. The uppermost spine on each varix is about the same size as the remaining varical spines and it recurves somewhat toward the spire. The color is generally a uniform cream or white with the early whorls pinkish. A secondary color of pale brown exists as lines on the spiral cords and as irregular patches. Intervarical sculpture consists of a prominent knob with one or more small axial ridges.

	length	width (without counting the spines)	
(large)	85	25 mm.	Sanibel Island, Florida
(average)	66	21	Cedar Keys, Florida

Types. Holotype, Museum of Comparative Zoölogy, no. 149854, Sanibel Island, Florida, collected by A. H. Patterson. Paratypes, from the same locality and from Cedar Keys, Marco Island and Naples, all on the west coast of Florida.

Common name. The Sand Rock Shell.

Remarks. *M. florifer arenarius* possesses constant differences from typical *M. florifer*. It is proportionally narrower; the varices with their associated spines are light in color; and the upper three or four whorls are generally pinkish. Between the varices there are, besides the pronounced knob found in *M. florifer*, one or more axial ridges. Generally, the uppermost spine that borders the outer lip of the aperture is so recurved that it comes in contact with the spines on the varix of the whorl above, which more or less hides the small sinus in the upper palatal wall.

This beautiful subspecies is limited to Florida so far as our present series would indicate.

Range. Florida along the southeast coast, the Keys and Gulf coast.

Records. FLORIDA: Palm Beach (MCZ); Marco Id. (A. H. Patterson); Naples; Bonita Springs; Sanibel Id. (all MCZ); off Captiva Id. (T. Van Hyning); Lemon Bay; Sarasota; Gulf Port (all MCZ); off Cedar Keys (J. S. Schwengel); 15-18 miles off Fort Walton in 13 to 19 fathoms; Key Largo (both L. A. Burry); Bonefish Key (B. R. Bales); Tortugas (MCZ).



Plate 19. *Murex florifer arenarius* Clench and Pérez Farfante
Fig. 1. Holotype. Fig. 2-3. Paratypes (all Sanibel Island, Florida; all natural size).

Subgenus *Pterynotus* Swainson

Pterynotus Swainson 1833, Zoological Illustrations (2) 3, p. 100.

Pteronotus Swainson 1833, Zoological Illustrations (2) 3, page and plate 122; *non Pteronotus* Rafinesque 1815; Gray 1838; Ranzani 1839; Swainson 1839.

Subgenotype, *Murex (Pteronotus) pinnatus* Swainson (monotypic).

Shells in this subgenus are usually about three inches or less in size, have three wing or blade-like varices which are generally laminated and have the spines very much reduced or absent. The siphonal canal is moderately long and usually quite narrow.

Swainson proposed and described the subgenus *Pterynotus* in the *Zoological Illustrations* without a type designation. Later, in the same volume, he changed the spelling to *Pteronotus* and figured *M. pinnatus* Swainson as its type. The name *Pterynotus*, however, will have to be used for this subgenus, not only because it has page precedence, but because the later name, *Pteronotus*, is a homonym.

Murex (Pterynotus) tristichus Dall, Plate 20, fig. 1-4

Murex (Pteronotus) tristichus Dall 1889, Bull. Mus. Comp. Zoöl., **18**, p. 202, pl. 15, fig. 2 (off Habana, Cuba).

Description. Shell about 15 mm. in length, very thin and delicate. Whorls six and one-half, strongly convex. Shell surface brightly polished and of a uniform cream color. Spire greatly extended and acute. Suture deeply impressed. Aperture very small, tear-shaped, with the parietal wall smooth, glossy, and adherent to the body whorl along its entire length. Siphonal canal moderately long, very narrow and turned upward and to the right. Previous siphonal canal exists as a long, scale-like spine. Axial sculpture consists of three well-developed, blade-like varices. Each varix is formed of a rather wide and thin lamina which has a denticulated edge. The denticles are due to the spiral ridges which extend upward on the backward side of each varix; on the forward side, these ridges appear as very shallow grooves. Each varix is widest at the shoulder area of the whorl. Spiral sculpture consists of four low ridges, inconspicuous in the intervarical areas, but fairly strong on the varices. Nuclear whorls one and one-half, large, rounded and glass-like in appearance. The first whorl is upturned in relation to the second. Post-nuclear whorls similar to the later whorls. Periostracum absent. Operculum unknown.

length	width	
15.5	10 mm.	Holotype

Types. Holotype, Museum of Comparative Zoölogy, no. 7308 from *Blake* station 51, off Havana, in 400 fathoms, and a single paratype from the same station.

Remarks. This species is exceedingly delicate and highly lustrous; the blade-like varices are composed of only one or two thin lamellae, which makes the shell very fragile. It is still a very rare species as only two records, both by Dall, have been reported. *M. tristichus* is closely related to *M. pygmaeus*, the following species.

Range and Records. See under Types.

Murex (Pterynotus) pygmaeus Bush, Plate 20, fig. 7-8

Murex (Pteronotus) pygmaeus Bush 1893, Bull. Mus. Comp. Zoöl., **23**, p. 213, pl. 1, fig. 3-4 (off Charleston, South Carolina).

Description. Shell small, about 16 mm. in length, thin and ornamented with three blade-like varices. Whorls six to seven, moderately convex. Color a uniform cream. Spire extended and acute. Suture regular and deeply impressed. Aperture oval with a lustrous interior. The parietal lip is smooth, brightly polished, reflected and adherent to the body whorl. The palatal lip possesses a slightly thickened and finely crenulated margin; at the shoulder of the whorl there is a small notch which is directed toward the shoulder expansion of the varix. Siphonal canal narrow, moderately long and slightly turned upward and to the right. The two previous siphonal canals remain as scale-like

projections on the parietal margin. Axial sculpture consists of three equidistant, well-developed, blade-like varices, each formed in front of the corresponding varix of the whorl above. The outer edge of the varices is rather finely crenulated, the crenulations being produced by the spiral ridges which cross the shell and extend upward on their backward sides and terminate at the margin. The front side of the varices is very lustrous and covered with numerous, low and wavy lamellae which are but the free edges of the successive layers and on this side, the spiral ridges, which are seven or eight in number, appear as shallow grooves. Nuclear whorls large, two in number, rounded and glass-like. The first one is decidedly upturned. Postnuclear whorls similar to the later whorls. Operculum unguiculate with an apical nucleus and colored a yellowish brown.

length width
16 9.5 mm. Holotype

Types. Holotype, Museum of Comparative Zoölogy no. 6918, (N. Lat. $32^{\circ}25'$; W. Long. $77^{\circ}42'30''$) from *Blake* station 319, off Charleston, South Carolina, in 262 fathoms.

Remarks. *M. pygmaeus* is closely related to *M. tristichus*, having the same general characters, differing only slightly in degree. *M. pygmaeus*, though possessing blade-like varices, has them composed of several lamellae; while on *M. tristichus*, the varices are composed of only one lamella or two at the most. In addition, there are more spiral ridges present in *M. pygmaeus* and its aperture is a little larger and more circular. However, more material may show this species to be a subspecies of *M. tristichus*.

Range and Records. See under Types.

Murex (Pterynotus) phaneus *Dall*

Murex (Pteronotus) phaneus Dall 1889, Bull. Mus. Comp. Zoöl., **18**, p. 201 (off St. Augustine, Florida); M. Smith 1939, Illustrated Catalog of the Recent Species of the Rock Shells, Lantana, Florida, p. 5, pl. 11, fig. 10.

Description. "Shell ashy white, elongated, thin, six-whorled. Nucleus translucent, smooth, polished, of about one and a half whorls; whorls slightly convex, appressed to the suture behind them, connected by three continuous fin-like varices which in descending the spire make about half a revolution around it; these varices on the upper whorls were extended backward into a little wing-like point with dentate edges; on the last whorl the lines of growth indicate that the thin margin was rounded, parallel with the whorl. Transverse sculpture of fine growth lines, and on the last two whorls at the periphery three short little narrow pinched-up riblets between the varices; spiral sculpture of fine rather faint striae and wider undulations, hardly visible except on the varices; of these there are nine or ten on the last varix. Aperture elongate-oval, internally white, thickened, smooth canal rather long, open, bent back."

length width
17 8 mm. Holotype

Types. The type specimen is in the United States National Museum. The type locality is *Albatross* station 2662, off St. Augustine, Florida, in 434 fathoms (N. Lat. $29^{\circ}24'30''$; W. Long. $79^{\circ}43'$).

Remarks. We have not seen this species. To judge by Dall's description, which is copied above, and the figure in Smith's catalogue, *M. phaneus* is quite different from all other species in *Pterynotus* so far as the Western Atlantic species are concerned. The

blade-like varices are rather short in proportion to the total length of the shell and the presence of three, small intervarical ridges differentiates this species from *M. tristichus* and *M. pygmaeus*, the two to which it appears to be most closely allied.

Range and Records. See under Types.

Murex (Pterynotus) abyssicola Crosse, Plate 20, fig. 9-10

Murex abyssicola Crosse 1865, Jour. de Conchy., **13**, p. 30, pl. 1, fig. 4-5 (Guadeloupe [Lesser Antilles]).

Description. Shell about 11 mm. in length, rather thin and somewhat translucent. Whorls six and convex. Color a brownish gray, with a band of light brown at the base of the body whorl. Spire somewhat extended. Suture impressed. Aperture small and nearly oval. Siphonal canal broad, short and slightly recurved upward. Axial sculpture consists of three well-developed, blade-like varices. There is a single intervarical knob-like ridge. Spiral sculpture consists of numerous, fine threads which are crossed by finer, axial threads. The fine axial and spiral sculpture is more accentuated on the varices and on the siphonal canal. Nuclear whorls one and one-half, smooth and whitish. Postnuclear whorls similar to the later whorls. Operculum unknown.

length width
11 6 mm. Holotype

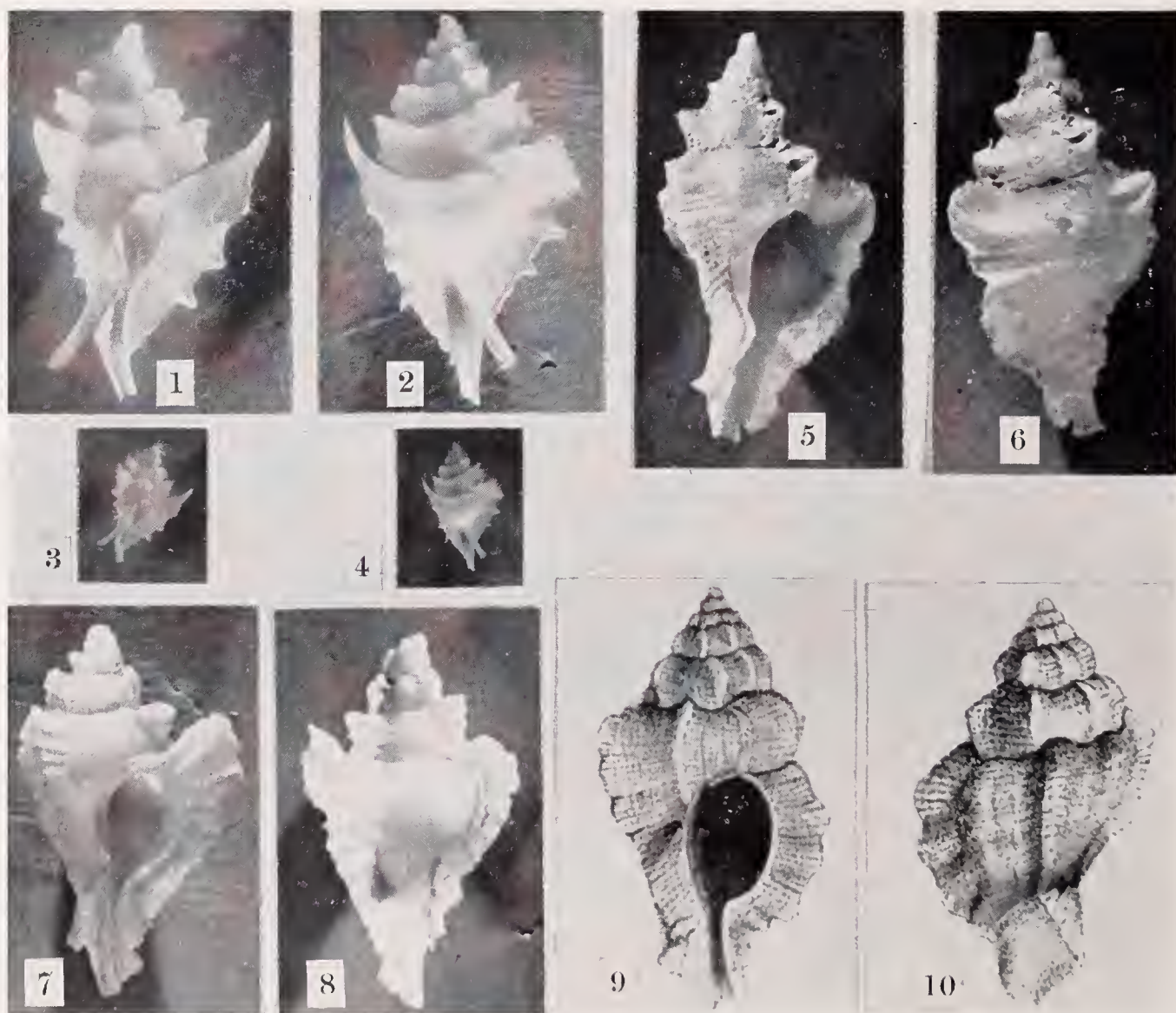


Plate 20. Fig. 1-4. *Murex tristichus* Dall, Holotype, off Havana, Cuba (fig. 1-2, 3 \times ; fig. 3-4, natural size). Fig. 5-6. *Murex ariomus* Clench and Pérez Farfaute, Holotype, off Hollywood, Florida (2 \times). Fig. 7-8. *Murex pygmaeus* Bush, Holotype, off Charleston, South Carolina (3 \times). Fig. 9-10. *Murex abyssicola* Crosse, Guadeloupe (after Crosse; 4 \times).

Types. According to Sherborn, the collection of H. Caillet is now in the École des Mines, Paris. Crosse had described the specimen of *M. abyssicola* from the collection of H. Caillet who had furnished him with many specimens from the Island of Guadeloupe, the type locality of this present species.

Remarks. We have not seen this species. Our description has been derived from the description of Crosse and his excellent figures. Our figures are copied from his plate in the *Journal de Conchyliologie*.

This species is included in *Pterynotus* with some uncertainty. Though having only three varices, their general structural formation is not clear in Crosse's figure or understandable in his description. All other characters would indicate a place in this subgenus.

Range and Records. Known only from Guadeloupe, Lesser Antilles, in 270 fathoms.

Murex (Pterynotus) ariomus, *new species*, Plate 20, fig. 5-6

Description. Shell about 25 mm. (1 inch) in length, rather solid and non-spinose. Whorls six and one-half and moderately globose. Color a dull white. Spire extended. Suture rather deeply impressed. Aperture oblique and oval, porcellaneous white within. Parietal lip adnate above, free and erect below. Palatal lip non-denticulated below. Siphonal canal broad and short, recurved upward at its distal end. Axial sculpture consists of three low and rather thin, laminated varices with a prominent angle rather than a spine at the shoulder area. The laminations are numerous, quite irregular and rather compact. There is a single knob-like ridge in between the varices. Spiral sculpture consists of numerous and rather fine ribs which turn up to sculpture the back side of the varices. The entire surface of the shell is covered with very small scale-like processes other than on the forward or the front side of the varices. At the suture these scales buttress the whorl above. Nuclear whorls one and one-half, small, rounded, smooth, the first whorl slightly twisted. Postnuclear whorls similar to later whorls. Operculum unguiculate and having an apical nucleus. No periostracum.

length	width	
24	12.5 mm.	Holotype

Types. Holotype, Museum of Comparative Zoölogy, no. 164734, from off Hollywood, Florida, in 50 to 60 fathoms. Collected by L. A. Burry.

Named for the strong shoulder angle that is developed on each varix.

Remarks. This species is not closely related to any other Western Atlantic *Pterynotus*. It does appear to approximate *M. angasi* Crosse from South Australia and Tasmania, in its general characters, particularly in its shape, though it is smaller and has a more reduced shoulder angle.

Range and Records. See under Types.

Subgenus **Pteropurpura** *Jousseaume*

Pteropurpura Jousseaume 1880, *Le Naturaliste*, 1, no. 42, p. 335.

Subgenotype, *Murex macropterus* Deshayes (original designation).

Shells generally under two and one-half inches in length and possessing three varices. The varices are webbed, blade-like and composed of numerous laminae. The siphonal canal is closed on the ventral side and not slit-like as in other subgenera. The canal becomes a tube which opens at the base of the aperture. Operculum unguiculate, with an apical nucleus.

Murex (Pteropurpura) bequaerti, *new species*, Plate 21, fig. 1-2

Murex (Pteropurpura) macropterus 'Deshayes' Dall 1889, Bull. Mus. Comp. Zool., 18, p. 201 (22 miles off Cape Hatteras, North Carolina); M. Smith 1939, Illustrated Catalog of the Recent Species of the Rock Shells, Lantana, Florida, p. 5, pl. 11, fig. 8 (Key West, Florida); *non M. macropterus* Deshayes 1841.

Description. Shell from 17 to 37 mm. (about three-fourths to one and one-half inches) in length, solid and provided with three strong, wing-like varices. Whorls about seven and rather strongly convex. Color a dull white with irregular areas of cream on the base of the varices and on the intervarical ridges. Spire extended. Suture rather deeply impressed. Aperture small, oval and entire, notched slightly above the opening to the siphonal canal. Both parietal and palatal lips are thin and erect. Siphonal canal short, broad and completely inclosed, with the distal end turned slightly toward the right. Previous siphonal canals exist as very short scales. Axial sculpture consists of three wing-like varices which are broad at the base and knife-like at the outer edge. The front surface of the varices consists of many very low laminae, which are built forward in overlapping layers. There is a single knot-like ridge between the varices. Spiral sculpture consists of numerous, large and small alternating threads. This sculpture passes over the intervarical ridges and up on the back surface of the varices. Postnuclear whorls similar to the later whorls. Periostracum absent.

length	width	
25	15.5 mm.	Holotype

Types. Holotype in the Florida State Museum, collected by F. B. Lyman in 80 fathoms off Delray, Palm Beach Co., Florida.

Remarks. This species has been considered to be *M. macropterus* Deshayes, but although they are somewhat similar, they are really distinct. The wing-like varices are much higher and thinner in *M. macropterus*, and in addition, are divided into four lobes while in *M. bequaerti* the outer margin is continuous. *M. bequaerti* is smaller, has at least one more whorl and is colored white and not brown as *M. macropterus* was described and figured by Deshayes.



Plate 21. Fig. 1-2. *Murex bequaerti* Clench and Pérez Farfante, Holotype, off Delray, Florida (2×).
 Fig. 3-5. *Murex atlaulis* Clench and Pérez Farfante, Holotype, off Bahía de Cochinos, Santa Clara Province, Cuba (fig. 3, 2½×; fig. 4-5, 2×).

Named for Joseph C. Bequaert.

Range. North Carolina and south to the Florida Keys.

Records. NORTH CAROLINA: 22 miles off Cape Hatteras, *Albatross*, station 2595, in 63 fathoms (Dall 1889). FLORIDA: off Delray, in 80 fathoms (T. Van Hyning); off Key West (M. Smith 1939).

Subgenus **Bathymurex**, *new subgenus*

Shell small, with six spinose varices. Each varix supports one proportionately long and open spine at the whorl shoulder. The single shoulder spine is formed very much the same way as it is produced in the subgenus *Siratns* (*Murex senegalensis* Gmelin). All other characters, however, would place *Bathymurex* among the groups possessing many varices and fairly close to *Poirieria*. The siphonal canal is relatively long and narrow. The operculum is unknown.

Subgenotype, *Murex* (*Bathymurex*) *atlantis*.

Murex (**Bathymurex**) **atlantis**, *new species*, Plate 21, fig. 3-5

Description. Shell small, about 23 mm. (about one inch) in length, rather thin and spinose. Whorls seven and strongly convex. Color a dull white. Spire well extended. Suture deeply impressed. Aperture subcircular, small and porcellaneous white within. Parietal lip smooth, adnate above and very slightly free below. Palatal lip smooth but possessing a series of small denticles below the margin on the lower half of the lip. Siphonal canal narrow, long, recurved upward and angled toward the right near the base. Previous siphonal canals remain as spur-like spines, the last one almost as long as the present canal, making it appear bifurcated. Axial sculpture consists of six low varices, each of which supports a rather long, slightly recurved, single, open spine at the shoulder of the whorl. Below this spine there are a few small knobs where the spiral ribs cross. Spiral sculpture consists of numerous fine and coarse ribs, the coarse ribs forming the little knobs as they pass over the varices. Nuclear whorls one and one-half, small, smooth and rounded, the first whorl moderately twisted. Post nuclear whorls similar to the later whorls but having the shoulder spine relatively smaller. Operculum unknown. No periostracum.

length	width (without counting spines)
23.5	10.5 mm. Holotype

Types. Holotype, Museum of Comparative Zoölogy, no. 164684, *Atlantis*, station 3333, Bahía de Cochinos, Santa Clara Province, Cuba (N. Lat. 22°13'; W. Long. 81°11') in 190 to 200 fathoms. Collected April 6, 1939.

Named for the ketch *Atlantis*.

Remarks. This little species is based upon a single specimen. It is very distinct and is not closely related to any other species in the Western Atlantic. Superficially, at least, *M. atlantis*, appears to be nearest to members of the subgenus *Poirieria*, namely *pazi*, *bnrryi* and *hystriinus*, but differs in its smaller size, proportionately shorter spines, and in having these spines limited to a single one on the shoulder area of each varix. The specimen was collected dead but in very good condition.

Range and Records. See under Types.

Subgenus **Muricanthus** Swainson

Centronotus Swainson 1833, Zool. Illust., (2) 3, p. 100 (genotype, *Murex eurystomus* Swainson); non *Centronotus* Schneider 1801; Lacépède 1802.

Muricanthus Swainson 1840, Treatise on Malacology, p. 296.

Muricantha 'Swainson' Suter 1913, Man. New Zealand Mollusca, Wellington, New Zealand, p. 400.

Subgenotype, *Murex radix* Linnè (subsequent designation, Herrmannsen 1847).

Shells large and possessing numerous spinose varices. The spines are rather broad, open and very heavy in structure and may be simple or rather finely foliated. The siphonal canal is short and generally broad and margined on the parietal side with the previous siphonal canals which form a nested spiral. The operculum is oval, concentric and with a submarginal nucleus.

Murex (Muricanthus) fulvescens Sowerby, Plate 22

Murex turbinatus Sowerby 1834, Conchological Illustrations, **Murex**, fig. 30, Catalogue, p. 7, sp. 94 (locality not given); non *M. turbinatus* Lamarck 1822; non *M. turbinatus* Brocchi 1814.

Murex fulvescens Sowerby 1834, Conchological Illustrations, **Murex**, fig. 30, Catalogue, p. 7, sp. 94 (locality unknown).

Murex spinicosta 'Valenciennes' Kiener 1843, Coquilles Vivantes, 7, p. 49, pl. 41, fig. 4 (South Carolina) [*spinicosta* on plate] [refers directly to Sowerby's figure 30 in the Conchological Illustrations].

Murex spinicostata 'Valenciennes' Reeve 1845, Conch. Icon., 3, **Murex**, pl. 4, fig. 18 (Gulf of Mexico); Tryon 1880, Man. of Conch. (1), 2, p. 107, pl. 23, fig. 207; pl. 28, fig. 251 (Beaufort, North Carolina).

Description. Shell large, reaching about 180 mm. (7 inches) in length, strong, heavy, and highly spinose. Whorls six to seven, early whorls slightly convex, later whorls strongly so. Color generally milky white to dirty gray on the exterior. Interior of aperture and of siphonal canal porcellaneous white. On the external surface there are numer-



Plate 22. *Murex fulvescens* Sowerby
Off Sand Key, Florida (natural size).

ous spiral threads of brown or brownish purple which on larger specimens may be weak or absent. The earlier whorls are cream and generally have more brownish threads showing, which impart a pronounced coloration to this part of the spire. Base of canal may be stained brownish. Spire rather short and nearly straight sided. Suture distinct and quite irregular. Aperture oval to subcircular. Parietal lip calloused and supporting a low ridge at the upper part. Palatal lip margined by a series of strong crenulations. Siphonal canal short and broad. Previous siphonal canals existing as a series of flutings which are in spiral arrangement and give rise to the false umbilicus. Axial sculpture consisting of six to ten highly spinous varices. The spines are erect, opened toward the outer lip and irregular in size and height, the largest being at the shoulder of the whorls. In addition, there are numerous and fine growth lines. Spiral sculpture consists of strong cords, usually brown in coloration, which connect the spines on one varix with the corresponding spines on the next varix. Between the cords there are numerous raised threads. Nuclear whorls one and one-half, rounded and smooth; two following whorls developing strong axial ridges crossed by numerous spiral cords. Remaining whorls as described above. Periostracum absent. Operculum unguiculate, thick, with numerous concentric growth lines which give rise to a very rough outer surface. Inner surface with a smooth and shiny ridge above the nucleus. Below the nucleus the surface is dull and possesses ridges or threads more or less concentric.

	length	width (without counting the spines)	
(large)	185	115 mm.	Fernandina Beach, Florida
(average)	135	80	off Breton Island, Louisiana

Types. Probably in the British Museum. The type locality is here restricted to off Charleston, South Carolina. Kiener was the first to give an American locality for this species, namely South Carolina.

Remarks. This very remarkable species is the largest in the Western Atlantic and one of the largest in the world in the family Muricidae. It apparently is quite rare and probably exists fairly well below low water line. We have a specimen which was collected on an oyster bed in Bastian Bay, Louisiana, which may indicate that it was feeding on oysters. *M. hoplites* Fischer from West Africa is very close to this species and may possibly be only a subspecies of our Western Atlantic form.

Range. North Carolina (Tryon 1880, p. 107) south to Florida and west to Texas.

Records. SOUTH CAROLINA: Isle of Palms: Sullivan's Id. and Dewees Inlet, Charleston (all Charleston Museum). FLORIDA: off Daytona (F.S. Webber); Fernandina (A.H. Patterson); Cape Canaveral: Cocoa Beach (both MCZ); off Sand Key in 25 fathoms (MCZ); Fort Jefferson, Dry Tortugas (T. Van Hyning); off Cedar Keys (J.S. Schwengel). LOUISIANA: off Breton Id.: Bastian Bay (both MCZ).

Subgenus **Poirieria** *Jousseaume*

Poirieria Jousseaume 1880, Le Naturaliste, 1, no. 42, p. 335 [Genotype, *Murex zelandicus* Q. and G.].

Paziella Jousseaume 1880, Le Naturaliste, 1, no. 42, p. 335 [Genotype, *Murex pazi* Crosse].

Subgenotype, *Murex zelandicus* Q. and G. (monotypic, Jousseaume 1880).

Shell medium in size to small and characterized by possessing five to nine varices on the later whorls with elongated spines; these spines may remain open or closed; both types of spine may exist in the same species and even on the same specimen. Nuclear whorls one and one-half, the first whorl formed obliquely. Siphonal canal short to mod-

erately long and moderately narrow. Pigment is produced, at least in *M. zelandicus* Q. and G. and may possibly occur in other species in this subgenus. Operculum unguiculate and possessing an apical nucleus.

Murex (Poirieria) pazi Crosse, Plate 23, fig. 1-3

Murex pazi Crosse 1869, Journ. de Conchy., **17**, p. 183 (Seas of the Antilles); Crosse 1870, Journ. de Conchy., **18**, p. 99, pl. 1, fig. 4.

Murex (Phyllonotus) pazi Crosse, Dall 1889, Bull. Mus. Comp. Zoöl., **18**, p. 199, pl. 15, fig. 1.

Description. Shell rather small, from 30 to 47 mm. (1 to 2 inches) in length, somewhat translucent and provided with numerous long spines. Whorls seven to eight and one-half, the first whorls being angular and the last two less so. Color milky to oyster white, the first whorls generally being of a dark gray. Spire extended. Suture deeply impressed, rather irregular and interrupted by the small spines at the varices of the whorls above. Aperture ovate to subcircular, porcellaneous white. Parietal lip reflected over the body whorl, smooth and thick. Palatal lip with a smooth margin but possessing within, a series of fine and regular denticles on adult specimens. Siphonal canal rather short and narrow and slightly curved back from the aperture. The palatal side has a long recurved spine; the columellar side is flattened and smooth, but supports the previous siphonal canals which remain in spiral arrangement. Axial sculpture consists of five or six low varices on each whorl, armed with a very long, open and backwardly recurved spine on the shoulder and two or three much smaller scale-like spines below. The shoulder spine, when first formed opens into the aperture, but when growth is resumed, the opening is closed and grown over. In addition, there are numerous and exceedingly fine growth lines. On the siphonal canal, there is a long recurved open spine following each varix.



Plate 23. *Murex pazi* Crosse

Fig. 1-3. Off Punta Alegre, Camagüey, Cuba (fig. 1, 2 \times ; fig. 2-3, natural size).

Spiral sculpture consists of fine ridges which connect the spines on one varix with the corresponding spines on the next varix. Periostracum absent. Operculum of a light yellowish brown, unguiculate, pointed below and possessing an apical nucleus. Growth lines numerous and fine. Nuclear whorls one and one-half, rounded, glass-like, the first whorl developing in a plane oblique to that of the second, that is to say, it is distinctly bent to one side. The postnuclear whorls are not sculptured differently from the later whorls, possessing only more varices.

	length	width (without counting the spines)	
(large)	47	22 mm.	off Punta Alegre, Camagüey, Cuba
(average)	39	17	off Punta Alegre, Camagüey, Cuba

Types. The type of this species is probably in the collection of the Journal de Conchyliologie. The original locality was given as Seas of the Antilles. Tryon (1880, p. 134) reports on the authority of Hidalgo that this species was dredged in the Lesser Antilles.

Remarks. This beautiful species appears to be quite unique in the Western Atlantic. In relationship, it is very close to *M. zelandicus* Q. and G. from New Zealand. *M. pazi* differs, however, in being smaller, heavier and possessing fewer spines on the varices, while possessing, in addition, a simple spur-like spine on the siphonal canal, corresponding to each varix. This last character is not found in *M. zelandicus*. In depth, this has been found in 200 to 338 fathoms. The *Atlantis* records for this species were most numerous in the dredgings north of Cuba.

Records. BAHAMAS: *Albatross*, station 2655 (N. Lat. 27°22'; W. Long. 78°07'30'') off Strangers Cay, Little Abaco Id. in 338 fathoms (USNM); *Atlantis*, station 2951 (N. Lat. 26°14'; W. Long. 78°43') off Southwest Point, Grand Bahama Id., in 285 fathoms. CUBA: *Blake*, station 20 (N. Lat. 23°02'; W. Long. 83°11') off Bahía Honda in 220 fathoms (MCZ); *Atlantis*, station 3480 (N. Lat. 23°10'; W. Long. 81°28') off Matanzas in 200 fathoms; *Atlantis*, station 3424 (N. Lat. 22°53'; W. Long. 79°08') off Caibarién in 250 fathoms; *Atlantis*, station 3411 (N. Lat. 22°47'; W. Long. 78°43') off Punta Alegre in 260 fathoms; *Atlantis*, station 3401 (N. Lat. 22°36'; W. Long. 78°19') off Cayo Coco, Camagüey in 235 fathoms; *Atlantis*, station 3388 (N. Lat. 22°32'; W. Long. 78°09') off Cayo Romano, Camagüey, in 255 fathoms (all *Atlantis* records in MCZ and Museo Poey).

Range. Deep water from the Bahamas south through the Lesser Antilles.

Murex (Poirieria) hystricinus Dall, Plate 24, fig. 4-7

Murex (Phyllonotus) hystricinus Dall 1889, Bull. Mus. Comp. Zoöl., **18**, p. 200, (*hystricina* on plate caption) pl. 15, fig. 4 (off Montserrat [Lesser Antilles]).

Murex (Phyllonotus) hystricinus Dall, Smith 1939, Illustrated Catalog of the Recent Species of the Rock Shells, Lantana, Florida, p. 9, pl. 9, fig. 7; pl. 12, fig. 5.

Description. Shell small, about 20 mm. (four-fifths of an inch) in length, highly ornamented with numerous spinous varices. Whorls nine, strongly angulated at the shoulder which gives rise to a turreted spire. Color a uniform white. Spire extended and acute. Suture deeply impressed. Aperture subcircular and porcellaneous white. Parietal lip smooth, reflected over the body whorl, adherent above and suberect below. Palatal lip very finely crenulated and with four emarginate, rounded, denticles. Siphonal canal short, narrow, oblique and recurved upwardly from near its base. Previous siphonal canals remaining as rather long, scale-like spines. Axial sculpture consisting of nine var-

ices on the body whorl of an adult specimen. Each varix possesses six recurved spines, the one at the shoulder of the whorls being the longest, remaining spines decreasing in size to the last one which is very small. The last four varices produced are laminated and all of them flare upward in their forward margin. There are no spines on the siphonal canal. Spiral sculpture consists of smooth rounded ribs which extend upward at each varix to produce the spines. Nuclear whorls one and one-half, rounded, smooth, glass-like and exceedingly small. Periostracum absent. Operculum "muricoid" according to Dall.

length width (without counting the spines)
20 10 mm. Holotype

Types. Holotype, Museum of Comparative Zoölogy, no. 7307, off Martinique, Lesser Antilles, *Blake*, station 206, in 170 fathoms.

Remarks. This remarkable species presents an interesting character in that there is a great reduction in the number of varices as the animal reaches maturity. The development of the large shoulder spine and the regularity of increase in size of all the spines produce an even turreted appearance of the spire.

This seems to be a very rare, deep-water species, occurring in depths from 148 to 254 fathoms.

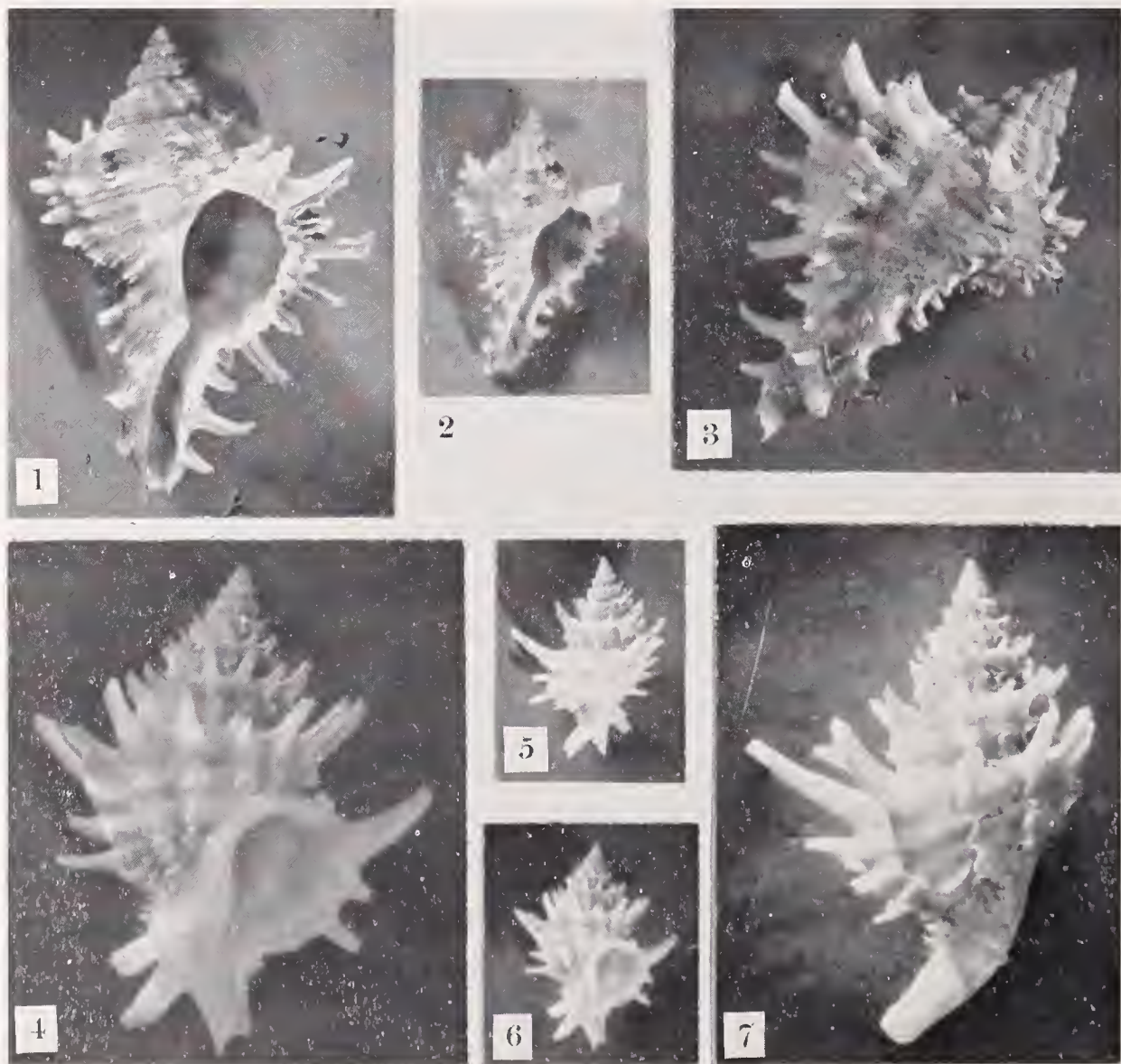


Plate 24. Fig. 1-3. *Murex burryi* Clench and Pérez Farfante, Holotype, off Fort Walton, Florida (fig. 1 and 3, 2×; fig. 2, natural size). Fig. 4-7, *Murex hystericinus* Dall, Holotype, off Martinique (fig. 1 and 4, 3×; fig. 2-3, natural size).

Range. Off Cuba and south through the Lesser Antilles.

Records. CUBA: off Santiago, *Albatross*, station 2134 (N. Lat. $19^{\circ}56'66''$: W. Long. $75^{\circ}47'30''$) in 254 fathoms (USNM). LESSER ANTILLES: off Montserrat, *Blake*, station 158, in 148 fathoms (USNM): off Martinique, *Blake*, station 206, in 170 fathoms (MCZ).

Murex (Poirieria) burryi, *new species*, Plate 24, fig. 1-3

Description. Shell small and having five varices with moderately long and foliated spines. Whorls convex, about eight. Color a more or less uniform brownish-cream with two or three dark brown spots on each varix. Spire moderately extended and acute. Suture irregular and slightly impressed. Aperture oval, about one-third the length of the shell. Parietal wall thinly glazed. Palatal lip finely crenulated, the crenulations due to the ends of the spiral ribs. Siphonal canal moderately long and rather narrow: previous siphonal canals remaining as scale-like spines along the parietal margin. Axial sculpture consisting of five prominent varices possessing five to seven minutely foliated open spines which are rather low and irregular in height. There are three more spines corresponding to each varix that are developed on the siphonal canal. Numerous fine axial lamellae give rise to scale-like processes particularly in between the spiral ribs. The latter are equal to the number of spines, each rib passing from the spine of one varix to the corresponding spine of the next varix. Nuclear whorls two and one-half, rounded, smooth and pale amber in color: the first whorl is exceptionally small. Post-nuclear whorls four, strongly axially ribbed and crossed by rather fine spiral threads. No periostracum. Operculum unguiculate, with a subapical nucleus.

length	width (without counting the spines)
26.5	14 mm. Holotype

Types. Holotype, Museum of Comparative Zoölogy, no. 164567, from off Fort Walton, Florida, in 13 to 19 fathoms. Only a single specimen of this new species is known: it was collected by Mr. L. A. Burry.

Remarks. *M. burryi* is a very distinct species. Its characters place it in the subgenus *Poirieria*, though it is not closely related to either *M. pazi* or *M. hystricinus*. It differs from both by lacking the well-developed shoulder spine, having its spines irregular but not showing much difference in size. The spines on *M. burryi* are minutely foliated, a character not possessed by the others. In addition, *M. burryi* has smaller nuclear whorls and the postnuclear whorls sculptured with axial ribs rather than with true varices.

Named for Mr. L. A. Burry of Pompano, Florida.

Range and Records. See types.

Subgenus **Murexsul** *Iredale*

Murexsul Iredale 1915, Trans. Proc. New Zealand Institute, 47, p. 471.

Subgenotype, *Murex octogonus* Quoy and Guimard (original designation, Iredale 1915).

Shells possessing six to nine varices which support rather small to medium-long, open, spines, the spines on the shoulder of the whorls and those occurring on the siphonal canal being the largest. The most important differential character is that of the laminated varices. These consist of several layers, the first and topmost layer producing the largest spines; each succeeding layer is built within and forward of the last layer or lamina produced. The completed varix appears as a series of nested and overlapping laminae.

Murex (Murexsul) carnicolor, *new species*, Plate 25, fig. 1-4

Murex pazi 'Crosse' Sowerby 1879, *Thes. Conchy.* **4**, **Murex**, p. 39, pl. 22, fig. 208 (West Indies); *non M. pazi* Crosse 1869.

Murex (Phyllonotus) interserratus 'Sowerby' Dall 1889, *Bull. Mus. Comp. Zoöl.*, **18**, p. 199 (off Barbados, *Blake*, station 273; off Monserratt, *Blake*, station 156); *non M. interserratus* Sowerby 1879.

Description. Shell small, about 20 mm. in length, highly spinose and rather thin. Whorls seven to eight, angulated at the shoulder, which gives rise to a turreted spire. The entire shell has a uniform flesh color. Spire extended. Suture irregular and not distinct, owing to small scale-like lamellae that overgrow it. Aperture ovate and colored similarly but paler than the outside. Parietal lip smooth, adhering above and slightly erect below. Palatal lip finely crenulated and with a few emarginate denticles. Siphonal canal rather short, narrow and slightly recurved upward at the distal end. Previous canals remain only as short overlapping scales. Axial sculpture consists of six to seven rounded varices. Each varix consists of a series of overlapping laminae, the first lamina giving rise to the first series of spines. Successive laminae are produced slightly forward of each other and following the general shape of the previous one formed. The spines are open, scale-like and rather short, except those developed at the shoulder of the whorls. These shoulder spines are rather low, sharply pointed and recurved upward. On the siphonal canal there is a large, spur-like spine corresponding to each varix. Additional axial sculpture consists of numerous low and irregular lamellae. Spiral sculpture consists of strong cords which connect the spines on one varix with the corresponding spines on the next. Nuclear whorls one and one-half, small, rounded, smooth and colored white. Postnuclear whorls sculptured the same as all of the later whorls but having more varices. Periostracum absent. Operculum unknown.

length	width (without counting the spines)
20	10 mm. off Barbados, Lesser Antilles

Types. Holotype, Museum of Comparative Zoölogy, no. 7305, from off Barbados, Lesser Antilles, collected by the *Blake*, station 273, in 103 fathoms.

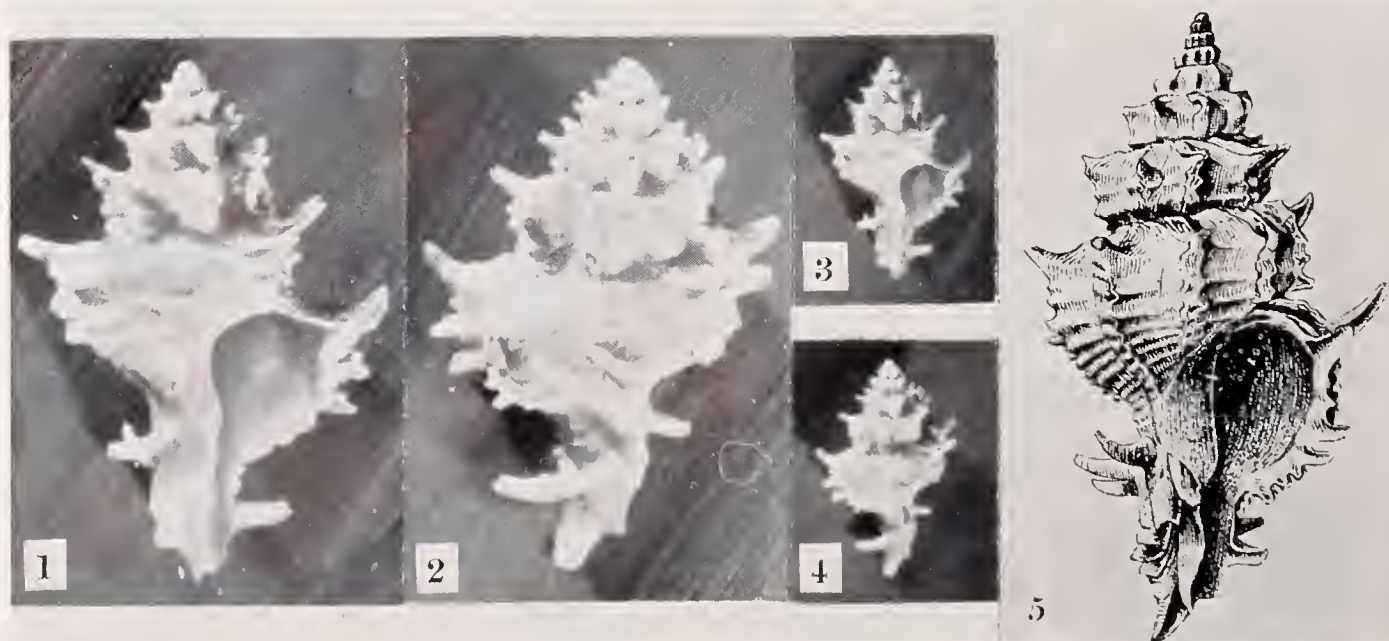


Plate 25, Fig. 1-4. *Murex carnicolor* Cleuch and Pérez Farfante, Holotype, off Barbados (fig. 1-2, 3×; fig. 3-4, natural size). Fig. 5. *Murex nuttingi* Dall, Holotype, off Sand Key, Florida (after Dall; about 2×).

Remarks. The specimen here described is the one that was listed by Dall in the *Blake* Report as *M. (Phyllonotus) interserratus* Sowerby, but it does not agree with Sowerby's original figure or description (1879, *Thesaurus Conchyliorum*, 4, **Murex**, p. 39, pl. 29, fig. 204). *M. carnicolor* is close in its general characters to that species, but differs rather sharply by the possession of long, spur-like spines on the siphonal canal which are absent in *M. interserratus*. In addition, all of the spines are more strongly developed in *M. carnicolor*, especially those at the shoulder of the whorls.

M. carnicolor is close to *M. nuttingi* Dall, both possessing laminated varices and well-developed spines on the siphonal canal. Our present species differs in being flesh-colored, not white, much smaller and having proportionately longer spines.

Range. Lesser Antilles.

Records. LESSER ANTILLES: off Montserrat, *Blake*, station 156 in 88 fathoms (USNM); off Barbados, *Blake*, station 273, in 103 fathoms (MCZ).

Murex (Murexsul) nuttingi Dall, Plate 25, fig. 5

Murex nuttingi Dall 1896, Bull. Lab. Nat. Hist. University of Iowa, 4, p. 13, pl. 1, fig. 1 (eight miles east of Sand Key, Florida).

Description. "Shell white with a pale straw-colored epidermis and eight whorls exclusive of the (lost) nucleus: suture deep, whorls rounded (the last) crossed by eight varices, each bearing a rather long grooved spine at the shoulder and anteriorly about six smaller and less conspicuous spinules, each of which corresponds to a more or less distinct revolving thread: at the shoulder and behind it there is no revolving sculpture or only faint traces of it: the apical three or four whorls show angular points, rather than spines, which are partly the result of wear: canal rather long, shorter than the spire, with a wreath midway of long recurved spines, each corresponding to a varix: the siphonal fasciole imbricated by the canal-ends of successive resting-stages: pillar white, moderately callous: canal open: outer lip modified by the sculpture, not lirate: operculum pale-brown, kite-shaped, the nucleus at the acute end which is nearly straight: height of shell 40, major diameter exclusive of spines 21 mm."

Types. The types are now in the United States National Museum, Washington, D.C. These were collected eight miles east of Sand Key, Florida (near Key West) in 15 fathoms by the Bahama Expedition of the State University of Iowa.

Remarks. We have not seen this species and have given above a full quotation of Dall's diagnosis and a copy of his figure. The numerous laminated varices, so well executed in Dall's figure, characterized this species as a member of the subgenus *Murexsul*. (See under *M. carnicolor*.)

Range and Records. See under Types.

Subgenus **Murexiella**, *new subgenus*

Shell possessing four to six varices with foliated spines. The spines are connected on each varix by a complex laminated webbing. This webbing is not formed of a single plate of material, but of several layers, the front margins separated and produced more or less horizontally to the vertical back. The forward side of this web appears as a series of layers between the foliated spines. Siphonal canal moderately broad and somewhat extended. Operculum unguiculate, with a subapical nucleus.

This subgenus would appear to be related to the subgenus *Chicoreus* by possessing well

developed foliated spines, relatively small apertures and the development in certain species of the fine scale-like spiral sculpture. *Murexiella* differs from *Chicoreus* in the possession of more than three varices and having the spines on each varix connected by a fluted webbing. *Murexiella* is probably more closely related to *Flavartia* through similarity in the structure of the varices. *Murexiella* differs, however, by having the spines greatly developed and foliated and having the webbing elaborated to an extreme degree.

Subgenotype, *Murex hidalgoi* Crosse.

Murex (Murexiella) hidalgoi Crosse, Plate 26, fig. 1-4

Murex hidalgoi Crosse 1869, Journ. de Conchy., **17**, p. 408 (Antilles); Crosse 1871, Journ. de Conchy., **19**, p. 68, pl. 1, fig. 4.

Murex (Chicoreus) hidalgoi Crosse, Dall 1889, Bull. Mus. Comp. Zoöl., **18**, p. 198, pl. 16, fig. 3.

Description. Shell 28 to 35 mm. (one to one and one-half inches) in length, highly sculptured and somewhat translucent. Whorls convex, six or seven. Color grayish white or cream. Spire somewhat extended. Suture irregular and deeply impressed. Aperture small, subovate and porcellaneous white. The lips are rather thin, erect and extend outward, the parietal lip being smooth while the palatal lip is minutely crenulated. Axial sculpture consists of generally five, sometimes four, varices on the body whorl which possess five, long, slightly flattened and hollow spines; the uppermost spine being the long-

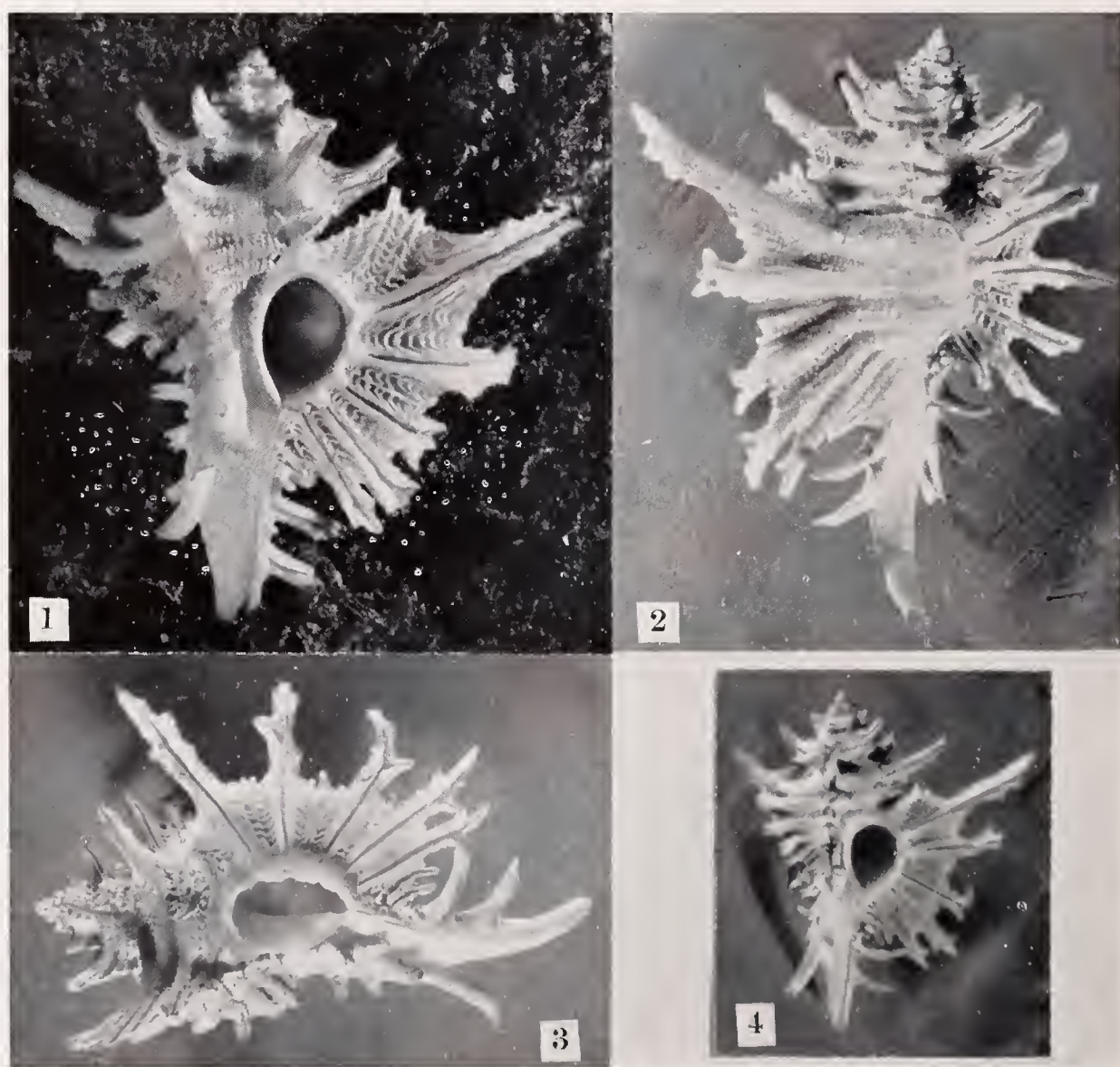


Plate 26. *Murex hidalgoi* Crosse

Fig. 1-4. Off Guadeloupe (fig. 1-3, 2×; fig. 4, natural size).

est, the spines below being smaller and equal to each other. All the spines along each varix are connected by a lamina which appears in front as cloth in loosely draped layers, while behind, this lamina has a series of small ridges which are clearly indicated in between the larger ridges that form the spines. On the siphonal canal, there are two rather long and narrow, pointed spines which are produced in line with each varix. Spiral sculpture consists of five strong, rounded ridges which extend upward at each varix to form the spines. At the base of each spine these ridges are built forward until they again form the new spines on the next varix. In addition, all of the ridges and sometimes the spaces in between are covered with numerous, minute scales. Siphonal canal moderately long, rather broad and slightly curved upward at its distal end. Previous siphonal canals form a depressed spiral around the false umbilicus. Periostracum nearly obsolete. Operculum unknown.

	length	width (without counting the spines)	
(large)	35	14 mm.	off Guadeloupe, Lesser Antilles
(small)	30	11	off Montserrat, Lesser Antilles

Types. The type of this species was in the collection of Patricio Paz of Madrid, according to H. Crosse. As Crosse gave only the Antilles, we here restrict the type locality to off Guadeloupe from which we have two records.

Remarks. *M. lidalgoi* is a very distinct species. It is related to *M. macgintyi*, though this relationship is not at all close. (See remarks under *M. macgintyi*). We can add but little to what is known regarding this species. It is a deep water form, having been dredged in depths ranging from 76 to 196 fathoms.

Range. Lesser Antilles in deep water.

Records. LESSER ANTILLES: off Montserrat, *Blake*, station 157 in 120 fathoms and station 158 in 148 fathoms; off Guadeloupe, *Blake*, station 159 in 196 fathoms and station 166 in 150 fathoms; off Barbados, *Blake*, station 272 in 76 fathoms (all MCZ).

Subgenus *Favartia* *Jousseaume*

Favartia Jousseaume 1880, Le Naturaliste, 1, no. 42, p. 335.

Subgenotype, *Murex breviculus* Sowerby (original designation, Jousseaume 1880).

Species composing this subgenus are small and possess five to seven low varices which support only small spines or no spines at all. The varices consist of a series of low and fluted laminae which are developed nearly in a vertical plane. At the varix the spiral ribs turn sharply upward and form the first layer of the varix. Below this layer there follow many others, all appearing as little truncated troughs. Each trough is connected on both sides by a depressed lamina to the corresponding troughs of the next two ribs, thus forming a webbing between them. The spiral sculpture is generally marked by rather strong ridges or ribs. Siphonal canal short and moderately broad. The operculum is unguiculate and has an apical nucleus.

Nothing is known so far as we have been able to determine regarding the kind of operculum possessed by *Murex breviculus* Sby., the type of *Favartia*. Until this is known, the position of this subgenus will have to remain in abeyance. It has been considered a subgenus of *Tritoualia*, but this latter genus has a purpuroid operculum, that is, one which is subtriangular in shape with the nucleus at the outer margin, and not the concentric or unguiculate operculum possessed by members of the genus *Murex*. Our Western Atlantic species, *M. macgintyi* and *M. cellulosus* are very similar in general structure

to *M. breviculus*, the subgenotype: both possess the fluted varices, the strong spiral ribs and general globose shape of *M. breviculus*. These two species have a muricoid operculum which would indicate that *Favartia* is a member of *Murex* and not of *Tritonalia*. It would also appear that *M. humilis* Broderip of the Panamic area should be placed in *Favartia*.

Murex (Favartia) macgintyi Smith, Plate 27, fig. 1-4

Murex macgintyi Smith 1938, Nautilus 51, p. 88, pl. 6, fig. 11 (Pliocene: Clewiston, Florida).

Tritonalia macgintyi Smith 1939, Illustrated Catalog of the Recent Species of the Rock Shells, Lantana, Florida, p. 16, no. 215, pl. 12, fig. 20.

Description. Shell small, from 20 to 30 mm. (a little under to a little over one inch) in length and possessing varices with low and upward curved spines. Whorls six, strongly convex. Ground color oyster white or pale straw with an interrupted band of dark mahogany-brown along the superior margin of the whorls. Occasionally there are brownish patches at the varices on the mid area as well. Spire somewhat extended. Suture depressed. Aperture small, porcellaneous white, subcircular to ovate in shape. Parietal lip smooth, erect, adnate only at its extreme upper margin. Palatal lip finely crenulated, the crenulations formed at the forward extensions of the spiral ridges. Axial sculpture consists of six or seven spinose varices. The spines are short, finely foliated, more or less uniform in height and recurved upward toward the spire, there being six spines on each varix and three or four along the siphonal canal. They are connected on each varix by a fluted webbing which is almost as high as the spines and consists of horizontal layers built at right angles to the back. A continuation of each layer forms smaller spines in front of the first series of primary spines. Spiral sculpture consists of numerous, narrow and rounded ridges on the whorls and three on the siphonal canal which extend upward at each varix to form the spines. The ridges and the areas in between them are generally covered with very fine scales. Siphonal canal short and fairly broad. Previous siphonal canals remaining as scale-like spines on the parietal margin of the new canal. Nuclear whorls one and one half, rounded, smooth and very small. Post-nuclear whorls similar to the later whorls. No periostracum. Operculum unguiculate with an apical nucleus, the surface of the operculum crossed by rather coarse and concentric growth lines.

	length	width	
(large)	29	17.5 mm.	New Providence, Bahamas
(average)	22.5	15	New Providence, Bahamas

Types. Holotype in the collection of Paul McGinty of Lantana, Florida. The type locality is the Pliocene beds along the canal banks at Clewiston, Florida.

Remarks. *M. macgintyi* Smith is very close to *M. humilis* Broderip from the Panamic region. This latter species is larger and possesses much more color than is known to occur in *M. macgintyi*. All other characters appear to be the same to judge by Reeve's excellent figure (Reeve 1845, Conch. Icon., 3, *Murex*, pl. 13, fig. 58a-b).

Recent specimens of this species agree exactly with Smith's description and figure which were based on a fossil specimen. The original type specimen was obtained from the spoil banks along the canal at Clewiston, Florida.

Range. Found fossil in the Pliocene of southern Florida and recent off the Lower Keys, Gulf coast of Florida and in the Bahamas.

Records. FLORIDA: off Port Everglade, Broward Co., in 50 fathoms (T. Van Hyning); off Carysfort Reef, Key Largo in 65 to 100 fathoms; off The Elbow, Key Largo, in 38

to 100 fathoms; off Molasses Reef, Key Largo, in 66 fathoms; off Fort Walton in 13 to 19 fathoms; (all L. A. Buffy). BAHAMAS: Alicetown, Bimini Islands (MCZ): Nassau, New Providence (P. D. Ford; R. Humes and A. H. Patterson).

Murex (Favartia) cellulosus Conrad, Plate 27, fig. 5-8

Murex cellulosus Conrad 1846, Proc. Acad. Nat. Sci. Philadelphia, 3, p. 25 (Tampa Bay [Florida]).

Ocenebra (Favartia) cellulosa Conrad, Dall 1889, Bull. Mus. Comp. Zoöl., 18, p. 210, pl. 16, fig. 1.

Description. Shell small, from 20 to 25 mm. (about one inch) in length and possessing five to seven low and fluted varices. Whorls seven to eight and moderately convex. Color generally a dull grayish white. Spire extended. Suture depressed and difficult to trace owing to the irregular sculpture. Aperture small, oval in shape and stained with brown within. Parietal lip smooth, erect, and adherent or adnate above, somewhat free below. Palatal lip finely denticulated and evenly crenulated, the crenulations produced by the terminations of the spiral ridges. Axial sculpture consists of five to seven, slightly oblique,

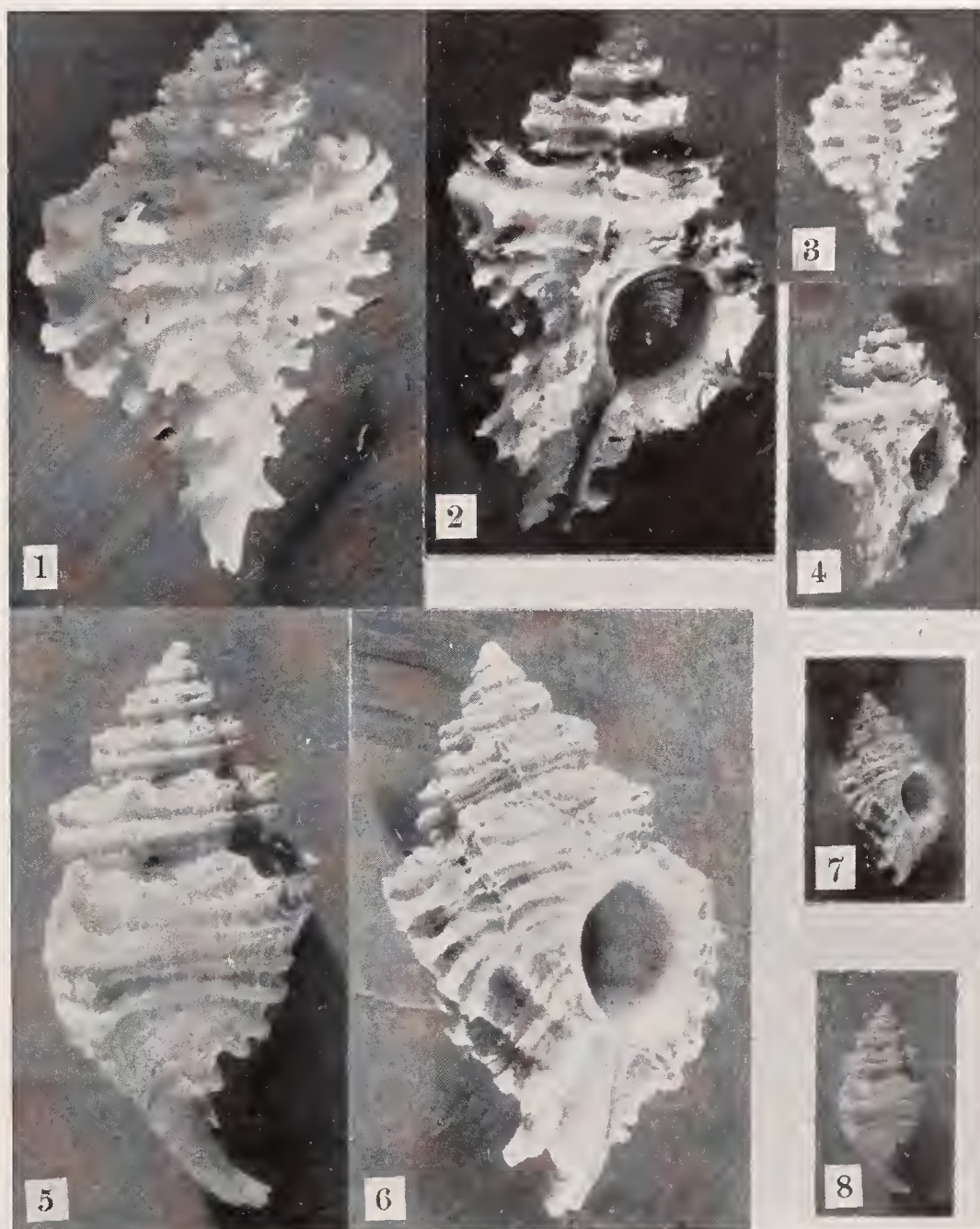


Plate 27. Fig. 1-4. *Murex macgintyi* Smith. Fig. 1 and 3. Montague Pier, Nassau, New Providence Island, Bahamas (fig. 1, 3×; fig. 3, about natural size); fig. 2 and 4, Lyford Key, New Providence Island, Bahamas (fig. 2, 2×; fig. 4, natural size). Fig. 5-8, *Murex cellulosus* Conrad, Gulfport, Florida (fig. 5-6, 3×; fig. 7-8, natural size).

low varices. The varices may be finely spinose and consist of a series of nearly vertically developed laminae. The ends of the spiral ribs are truncated and each rib is followed within and below by many more, thus producing a fluted appearance in frontal view. Each of these individual rib terminations is connected to the terminations of the ribs on both sides by a depressed lamina which creates the webbing between the ribs of the varices. Spiral sculpture consists of seven or more strong ridges or ribs which extend upward at each varix to form the low spines. Siphonal canal generally long and rather broad near the base. The extension of the canal is narrow and thin and is usually broken off. Previous siphonal canals remaining as scale-like spines along the parietal margin of the new canal. Nuclear whorls one and one-half, rounded, smooth and very small. Post-nuclear whorls similar to the later whorls. No periostracum. Operculum unguiculate, possessing an apical nucleus.

	length	width	
(large)	29	15 mm.	Gulfport, Florida
(average)	22.5	12.5	Bermuda
(small)	20	11	Gulfport, Florida

Types. The type specimens may be in the Academy of Natural Sciences, Philadelphia. Many, though not all, of Conrad's types are in the Academy; others have never been located. The type locality is Tampa Bay, Florida, and according to Conrad, this species occurs on oyster bars.

Remarks. This is a small and rather ornate little species which appears to be common only along the west coast of Florida. Perfect specimens have a rather long and upturned siphonal canal but this is quite frequently broken off near its base. It occurs on oyster bars and very probably drills the young oysters.

M. cellulosus differs from *M. macgintyi* by being of a much finer structure. The spines are far less developed, the spiral ribs not nearly as strong; it has a less convex shell and a more produced spire. In addition, *M. macgintyi* does not have the lengthened and upturned distal end to the siphonal canal.

Range. Bermuda, North Carolina (Dall 1889, p. 210), Gulf of Mexico and south through the Greater Antilles.

Records. BERMUDA: Agar's Island (MCZ). FLORIDA: off The Elbow, Key Largo in 75 to 100 fathoms (L. A. Burry); Carysfort Reef, Key Largo; Little Duck Key (both A. H. Patterson); Bonefish Key (B. R. Bales); Key West; off Shark River, in 2 fathoms (both J. S. Schwengel); Bonita Beach; Sanibel Island; Sarasota Bay; Gulfport; Indian Pass, Pinellas Co.; Cedar Keys (all MCZ); Boca Grande (H. Dodge); off Fort Walton in 13 to 19 fathoms (L. A. Burry).

***Murex cellulosus nuceus* Mörch, Plate 28, fig. 4-6**

Murex nucens Mörch 1850, Catalogus Conchyliorum C. P. Kierulf, Hafnia, p. 31, pl. 1, fig. 9 (Antilles).

Murex jamaicensis Sowerby 1879, Thesaurus Conchyliorum, 4, **Murex**, p. 39, pl. 23, fig. 223 (Jamaica); non *M. jamaicensis* Petiver, Mörch 1877, *nomen nudum*.

Description. Shell small, from 20 to 25 mm. in length and possessing five to six low, slightly oblique and fluted varices. Varices a little wider and heavier structurally than in *M. cellulosus*. In general, the shell is heavier and a little more globose than the typical species. All specimens so far examined have a somewhat shorter siphonal canal, but this character may equal in length that occurring in the typical species in live specimens.

	length	width	
(large)	23	14.5 mm.	St. Thomas, Virgin Islands
(average)	21	12	Holotype
(small)	15	10.5	off Fort Walton, Florida

Types. Mörch described *M. nuceus* from the collection of Dr. C. P. Kierulf which was offered for sale at public auction in 1850. The whereabouts of these types today is not known. We restrict the type locality to St. Thomas, Virgin Islands.

Remarks. Extreme forms of this subspecies appear to be quite distinct. However, innumerable specimens exist which merge smoothly in shape and general sculpture with typical *M. cellulosus*, at least in the region of the Lower Florida Keys. One form may well be a geographical subspecies of the other, the two merging their characters in Florida where both occur. Our records are still too limited, both in number and in distribution, even to be sure that we are dealing with geographical subspecies. More material may prove them to be close but distinct species.

The type of *M. jamaicensis* Sowerby is a slightly more elongate specimen than the type of *M. nuceus* as figured by Mörch. It could be considered a synonym of *M. cellulosus* equally as well.

Range. Gulf of Mexico and south through the Greater Antilles.

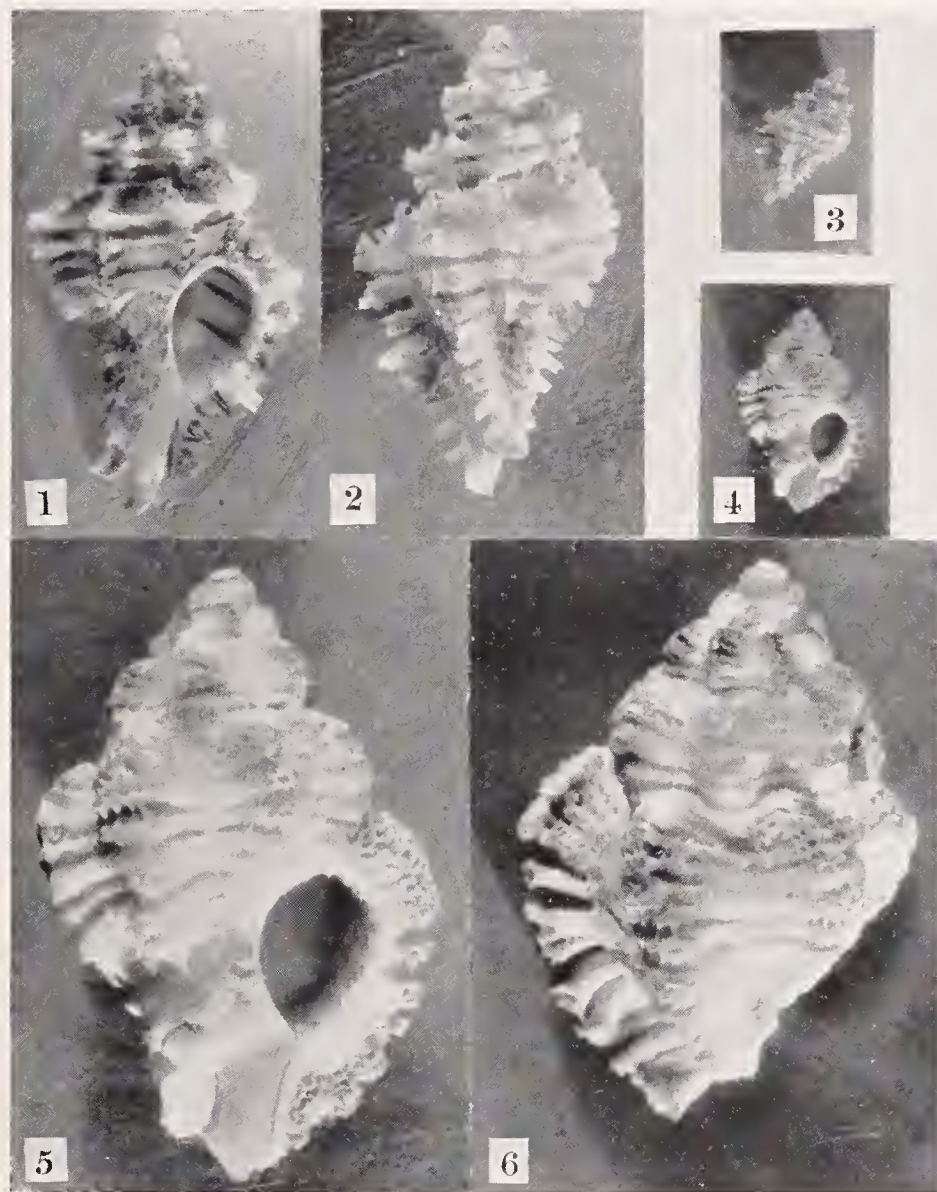


Plate 28. Fig. 1-3. *Murex cellulosus leviculus* Dall. Fig. 1, Sanibel Island, Florida (3×); fig. 2-3, off Destin, Florida (fig. 2, 3×; fig. 3, natural size). Fig. 4-6, *Murex cellulosus nuceus* Mörch, Topotype, St. Thomas, Virgin Islands (fig. 4, natural size; fig. 5-6, 3×).

Records. FLORIDA: off Fort Walton (L. A. Burry); Teatable Key (J. S. Schwengel). VIRGIN ISLANDS: St. Thomas (MCZ, ex T. Bland collection).

Murex cellulosus leviculus Dall, Plate 28, fig. 1-3

Ocenebra (Favortia) (cellulosa, var.?) levicula Dall 1889, Bull. Mus. Comp. Zoöl., 18, p. 211 (off Cape Lookout, North Carolina).

Tritonalia cellulosa levicula Dall, Smith 1939, Illustrated Catalog of the Recent Species of Rock Shells, Lantana, Florida, p. 16, pl. 13, fig. 8.

Description. Shell a little smaller than *M. cellulosus* and little higher proportionately. The varices are a little more acute and the shells colored a yellowish brown with a few scattered and irregular patches of dark brown.

	length	width	
(large)	18	11.2 mm.	off Sanibel Island, Florida
(average)	15.5	8.5	off Fort Walton, Florida

Types. Cotypes of this species are in the United States National Museum. The type locality is: *Albatross* station 2609 (N. Lat. 34°26'; W. Long. 76°12') from off Cape Lookout, North Carolina, in 25 to 40 fathoms.

Remarks. This subspecies is exceedingly close to *M. cellulosus* and may be only a form of the typical species. Specimens occur that intergrade completely. Actually, *leviculus* is the narrow form and *nucens* the globose form, *cellulosus* having characters just about in between these two extremes. Much more material is needed from a wide area before a better understanding can be had of all three forms.

Range. North Carolina and Gulf of Mexico.

Records. NORTH CAROLINA: off Cape Lookout, *Albatross*, station 2609, in 25 to 40 fathoms (USNM). FLORIDA: off Yamato, in 80 fathoms (T. Van Hyning); off Carysfort Light in 75 fathoms; and off Molasses Reef in 96 to 100 fathoms. Key Largo (both L. A. Burry); off Sanibel Island in 4 to 6 fathoms; off Dentin in 14 fathoms (both J. S. Schwengel); off Fort Walton in 13 to 19 fathoms (L. A. Burry).

Notes

Murex bilineatus 'Reeve' Beau 1858, Revue Coloniale [for] 1857, p. 9, *nomen nudum*; Krebs 1864, The West Indian Marine Shells, p. 18, Nykjobing, Denmark, *nomen nudum*.

This name was first introduced by Beau and credited to Reeve, probably in error for *M. trilineatus* Reeve. It was later used by Krebs on the basis of Beau's list as he cites the locality and name of Beau.

We have seen the specimen of *M. concinnus* Reeve mentioned by Dall in the Blake report (1889, Bull. Mus. Comp. Zoöl., 18, p. 197) as from the Antilles. It appears to be unquestionably *M. tenuispina* Lamarek of the Indo-Pacific region.

Murex (Jolon) gaza M. Smith 1940, Nautilus, 54, p. 44, pl. 2, fig. 3 (off Key West, Florida).

This species does not appear to belong to any of the various subgenera now included in *Murex*.

Murex microphyllus Lamarek 1816, Ency. Méth., 3, pl. 415, fig. 5 (locality unknown); Lamarek 1822, An. s. Vert., 7, pl. 163; *non* Kiener 1843.

This species is not known to occur in the Western Atlantic.

Murex pulchens Reeve 1845, Conch. Icon., 3, Murex, pl. 29, fig. 137 (Island of St. Domingo).

This species is wholly unknown to us. It appears to be a young shell, possibly beach-worn, and not recognizable as a young specimen of any known Western Atlantic species.

Murex spectrum Reeve 1846, Conch. Icon., 3, Murex, pl. 36, fig. 187 (locality unknown).

This species does not appear to us to be from the Western Atlantic. It is close to *M. brevifrons* in general appearance and has probably been misidentified for this species. It is possibly equal to or affiliated with *M. elongatus* Lamarek from the Indo-Pacific.

Growth of the Operculum in *Murex*¹

The operculum has its origin upon the embryo while still in the egg; it is above the foot and at the posterior end of the body. It is developed upon a restricted area which is distinguished by its denser texture, the operculigerous lobe.

The "nucleus" of the operculum is the first or one of the early layers of chitin to be produced. Succeeding chitinous layers grow from below and each layer *may* be produced at the time a varix is formed. As horizontal growth is unequal, the growth on the inner or parietal margin being much greater, the first or nuclear layers remain close to the outer or palatal margin. Thus the relative position of these earlier layers gives rise to the terms concentric and unguiculate, as they pertain to *Murex*. This unequal growth of each succeeding layer is best appreciated when it is considered that the increase in the size of the aperture of the shell is on the outer or palatal margin, while the inner or parietal region remains about the same. The under or attached side of the operculum also shows an unequal rate of growth. The palatal margin is greatly thickened by continuous deposition while the parietal margin is narrow and thin, owing to a continuous lateral growth in that direction. It appears then, that the initial point of growth, the "nucleus," remains fixed or nearly so; and as this point is on the lower and outer palatal margin, the growth in size of the animal carries this fixed point along and results in the new operculum growth being built along the parietal or inner margin. There is variation in the position of the nucleus, depending upon the species examined, but it would appear, that the more circular and regular the aperture, the more nearly the nucleus remains close to

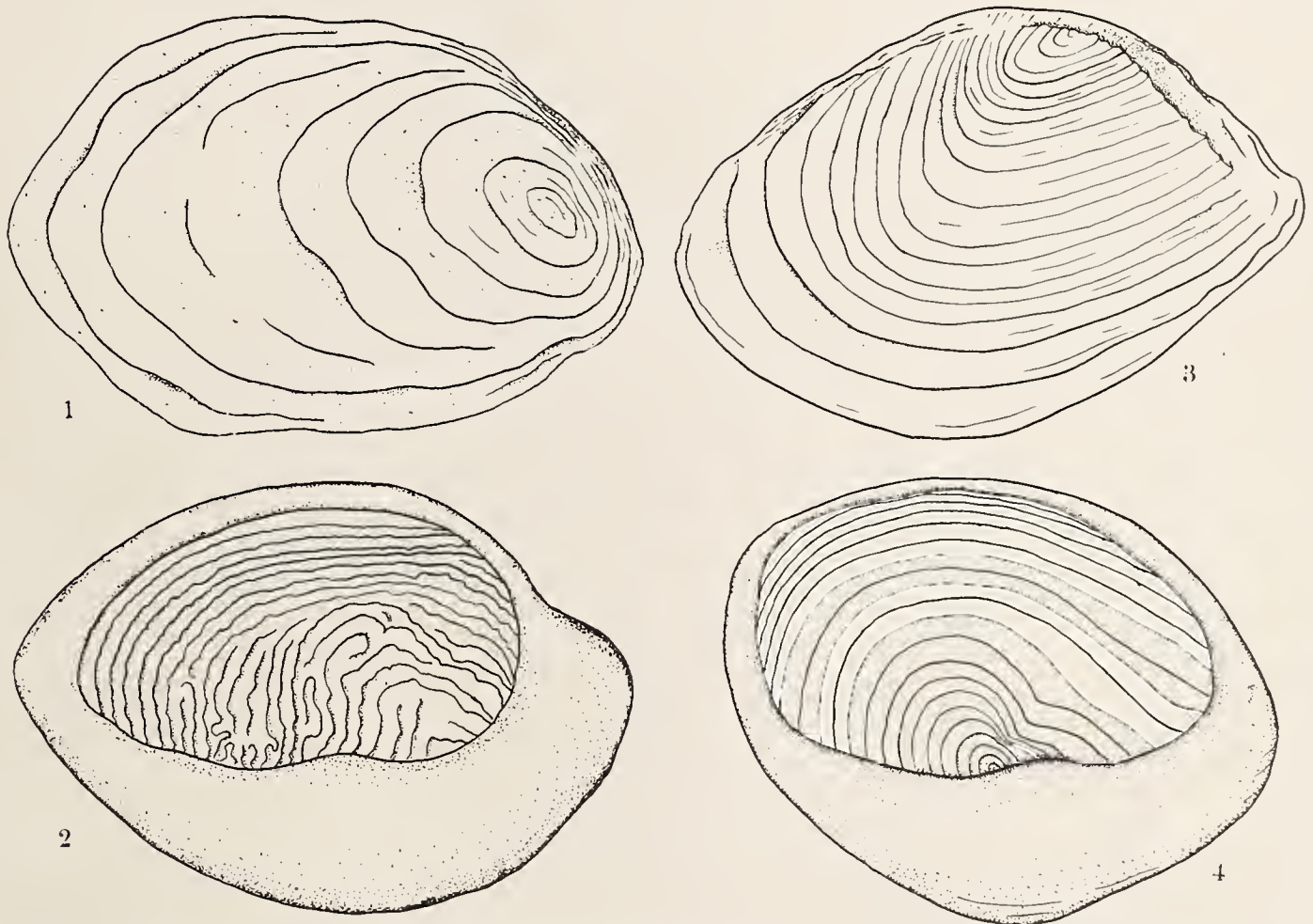


Plate 29. Opercula of *Murex* (fig. 1 and 3, outer surface; fig. 2 and 4, inner surface). Fig. 1-2. *Murex pommum* Gmelin (3 \times). Fig. 3-4. *Murex florifer arenarius* Clench and Pérez Farfante (3 \times).

¹ Pages 57 and 58 published November 23, 1945.

the center. This condition is observed in the subgenus *Haustellum* Bruguière, which does not occur in the Western Atlantic, in which the aperture is nearly circular and the operculum grows a little more equally around the entire margin. As a consequence, the nucleus is nearly central and not apical or submarginal.

The concentric growth lines that are generally observed on nearly all non-calcareous opercula are but the old margins that have been thrust vertically from the horizontal axis. This is brought about by pressure against the walls of the aperture during the time the animal has retracted and brought the operculum within the shell aperture and when, of course, these "growth lines" formed the margin of the basal plate or layer of the operculum.

* * * *

All shell photographs of *Murex* were made by Marion A. Bills. Copies of previously published figures (plate 20, fig. 9-10; plate 25, fig. 5) by F. P. Orchard.

* * * *

Review of the Genera completed for the Western Atlantic¹

The plan of the following review is to give additional data about the various genera that have been covered so far in Johnsonia. New information regarding records, extension of ranges, and species newly described will be added and, in addition, synonyms overlooked or not considered for our previously published species are also included. It is planned to have a number of this sort at the end of each volume so that we can keep up to date, at least on the genera and species so far published.

Earlier numbers did not include deep-water species, as we had set an arbitrary depth of 25 fathoms as a limit. Species only known to occur beyond this depth were not to be considered. However, such a policy was soon found to be unsound and too limited in scope. Interest in dredging is increasing, particularly in Florida and the West Indies, and to exclude such species would limit the value of Johnsonia in a very material way. Again, our knowledge of most species that occur a few fathoms beyond low water line is exceedingly fragmentary and more dredging and exploration will certainly show that many species possess a greater or lesser depth range than is now known.—W. J. CLENCH

¹The length of Johnsonia no. 18, has to be curtailed owing to the unavailability at the moment of heavy grade paper. As a consequence, a few species will be limited to a reference only and will be included, in detail, in the final number of Volume 2.