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THE FAMILY CYMATIIDAE IN THE WESTERN ATLANTIC

BY
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Most species in the family Cymatiidae are referred to as triton shells. They are wide-ranging in all tropical seas, a limited few reaching temperate waters. The family contains more than 100 species, though only a few of these occur in the Western Atlantic. Most of our Western Atlantic species are identical with species occurring in the Eastern Atlantic and Indo-Pacific provinces. No other family so far studied in this series of monographs has had so many species which are so widely distributed. Probably all have a fairly long veliger or free-swimming stage. This has, of course, aided these animals in their dispersal: but it is not the whole answer as many other mollusks with equally long pelagic life have failed to become as widely distributed.

The fossil record indicates that the family was established in the early Tertiary, so that there has been a time factor of considerable importance. The family probably had its origin in the Indo-Pacific, and during the existence of the Tethys Sea several species were able to migrate into the Atlantic Ocean. It would also appear that many specific elements in this family became stabilized fairly early and have since maintained themselves

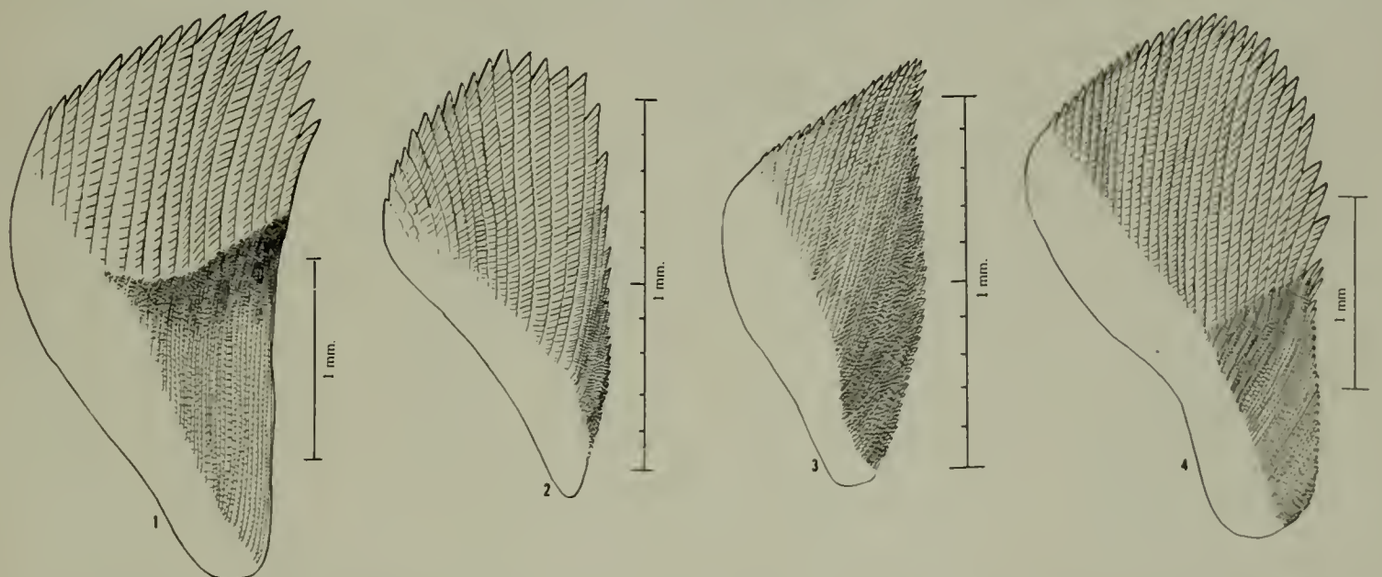

Plate 110. Jaws. Fig. 1. *Cymatium femorale* Linné. Oranjestad, Aruba, Dutch West Indies. Fig. 2. *Cymatium gemmatum* Reeve. Off Palm Beach, Florida. Fig. 3. *Cymatium rubeculum occidentale* Clench and Turner. Carboneras, Río Camarioca, Matanzas, Cuba. Fig. 4. *Cymatium parthenopeum* von Salis. Rio de Janeiro, Brasil.

with but little change in the morphology of the shell. This is not without precedent in other families, such as the Tonnidae, with *Tonna galea* Linné occurring as it does in the Eastern and Western Atlantic and in the Indo-Pacific. Examples of this sort are, however, rare and the present family is quite an exception.

The embryonic shell of all species contained in this family is very different from the adult shell. The embryonic shell is smooth or only feebly sculptured; it is amber or brownish in color and the whorls are only slightly convex. The change from this embryonic state into the young adult is exceedingly abrupt. Strongly marked sculpture appears in the form of ridges which are both spiral and axial, and knobs develop where these ridges cross. The larval or veliger stage may be long, lasting perhaps up to four weeks, so that dispersal by oceanic currents may play a very important part in their distribution. The veliger larvae of *Cymatium pileare* Linné and *C. chlorostomum* Lamarck (=*C. nicobaricum* Röding) have been figured by M. Lebour (1945, pp. 476–477). The four velar lobes are amazingly long and narrow, being about four times the length of the shell.

The feeding habits of most species are completely unknown: probably all are predatory, feeding mainly on other mollusks. The senior author found *Cymatium femorale* Linné feeding on *Laevicardium laevigatum* Linné at Savannah Sound, Eleuthera Island, Bahama Islands.

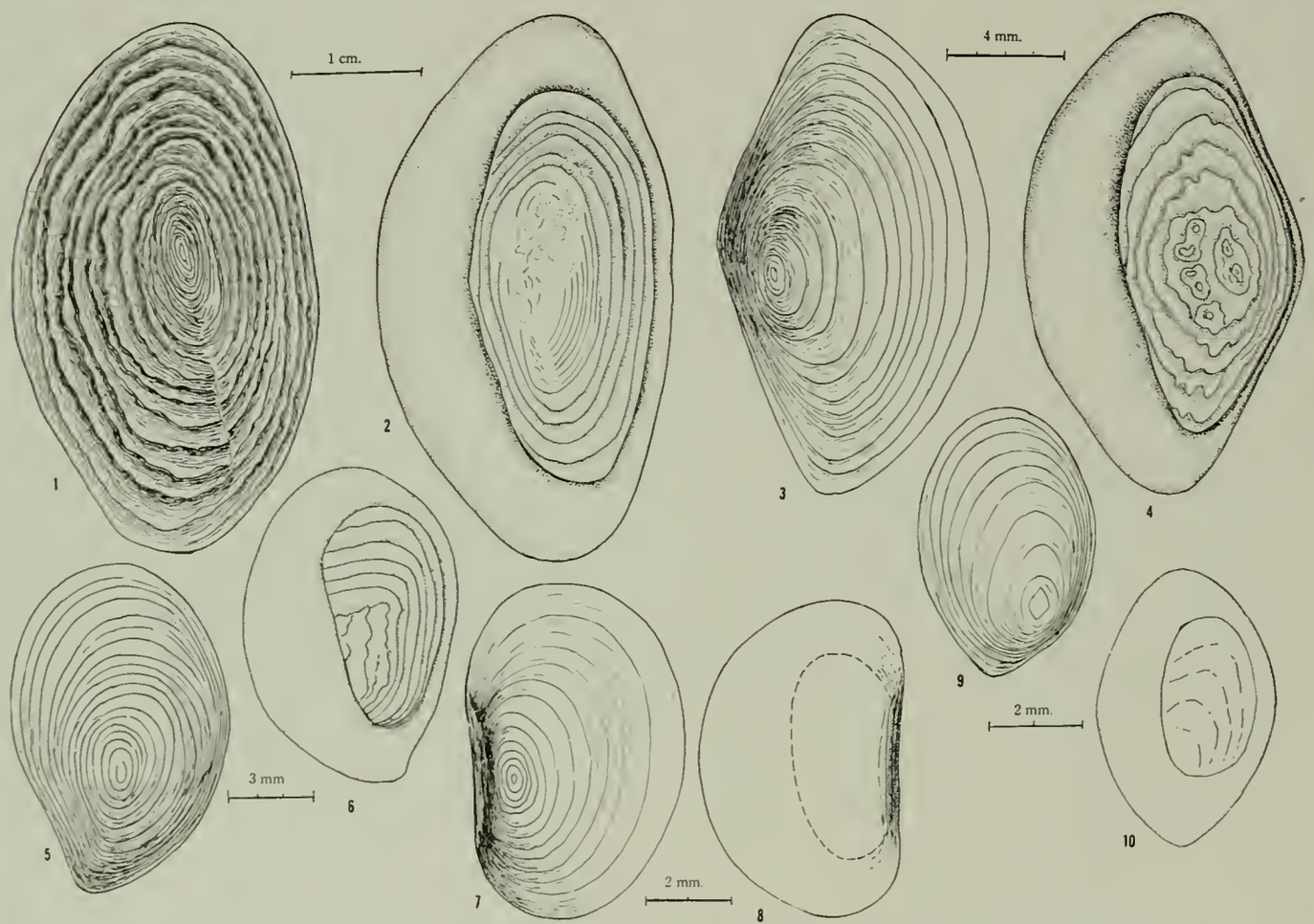

Plate 111. Opercula. Figs. 1–2. *Charonia variegata* Lamarck. Molasses Reef, Key Largo, Florida. Figs. 3–4. *Cymatium caribbaeum* Clench and Turner. Bear Cut, Miami, Florida. Figs. 5–6. *Cymatium nicobaricum* Röding. Molasses Reef, Key Largo, Florida. Figs. 7–8. *Cymatium poulsenii* Mörch. (Young specimen). Off Tampico, Mexico. Figs. 9–10. *Cymatium labiosum* Wood. From an ocean buoy off Cape Romain, South Carolina.

The jaws consist of two subtriangular and very thin chitinous plates which have numerous longitudinal rows of scales. On the basis of the differences shown in the few jaws that we have been able to examine, these may prove to have as much taxonomic value as the opercula. The jaws are lateral and appear to be structures which aid in opening the proboscis during feeding. They do not seem to be strong enough to be used as rasping or grasping organs. The radula, however, is fairly large and strong.

There is a surprising uniformity in the radulae of the various species in the genus *Cymatium*. It would appear that, regardless of what modifications have taken place in the morphology of the shell, the embryonic whorls and the opercula, the radula has remained relatively unchanged. The radula in the genus *Charonia*, however, is quite distinct from that of *Cymatium* (see Plate 113).

The opercula of the several species considered in *Cymatium* show some important differences. In the species *caribbaeum*, *nicobaricum*, *poulsenii* and *labiosum*, the nucleus is eccentric (Plate 111) while in the remaining species in this genus the nucleus is terminal. The nucleus of the operculum of *Charonia variegata* is almost central.

The position of the nucleus of the operculum appears to us to be an important character in the classification of the several subgenera. This character emphasizes the relationships between species which are sometimes difficult to see when dealing only with the several characters of the shell.

From a review of the literature concerning this family, there appears to be no real agreement among the various authors concerning the limits of the genus *Cymatium* and

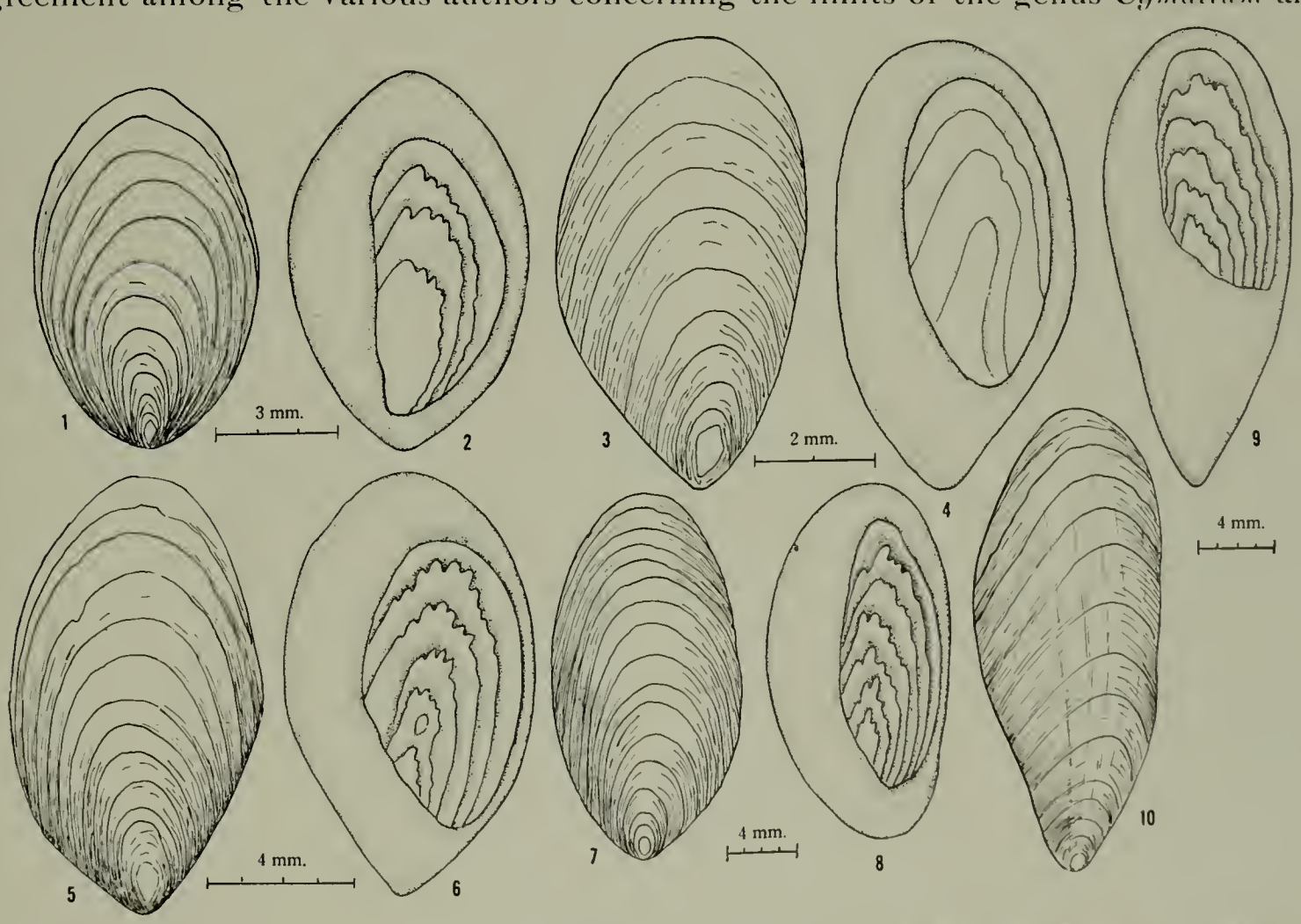

Plate 112. Opercula. Figs. 1–2. *Cymatium pileare* Linné. Varadero Beach, Matanzas Province, Cuba. Figs. 3–4. *Cymatium krebsii* Mörch. Sombrero Key Light, Lower Keys, Florida, in 40 fathoms. Figs. 5–6. *Cymatium muricinum* Röding. Fish Point, Guantánamo, Cuba. Figs. 7–8. *Cymatium parthenopeum* von Salis. Rio de Janeiro, Brasil. Figs. 9–10. *Cymatium femorale* Linné. Bear Cut, Miami, Florida.

its various subgenera. We may be too conservative in considering the various species groups as only subgenera. However, we still lack so much important data regarding these animals, such as their life history, ecology and soft anatomy, that a conservative stand is perhaps best at this time. It must be understood, however, that the various subgenera are not at all of equal value. Relationships between the groups are at different levels. They should be considered convenient categories in our system of classification, subject to change as more data become available.

Plate 113. Radulae. Fig. 1. *Charonia variegata* Lamarck. Jérémie, Haiti. Fig. 2. *Cymatium poulsenii* Mörch. Tampico, Mexico. Fig. 3. *Cymatium caribbaeum* Clench and Turner. Bear Cut, Miami, Florida. Fig. 4. *Cymatium nicobaricum* Röding. Long Reef, off Elliott Key, Florida. Fig. 5. *Cymatium rubeculum occidentale* Clench and Turner. Carboneras, Río Camarioca, Matanzas, Cuba. Fig. 6. *Cymatium gemmatum* Reeve. Off Palm Beach, Florida. Fig. 7. *Cymatium pileare* Linné. Mauritius. Fig. 8. *Cymatium muricinum* Röding. Amboyna Island, Molucca Islands. Fig. 9. *Cymatium parthenopeum* von Salis. Koka Shima, Japan. Fig. 10. *Cymatium parthenopeum* von Salis. Rio de Janeiro, Brasil. Fig. 11. *Cymatium femorale* Linné. Oranjestad, Aruba, Dutch West Indies.

All drawings were made with the aid of a camera lucida at a magnification of 100x and the plate is reduced to about 50x.

Acknowledgements

The loan of material in *Cymatium* has perhaps been more important to us than in any other group we have considered in Johnsonia. Most species in this group are quite rare and it was only by borrowing material widely that we could obtain an understanding of many of the species. Most of the borrowed material has been recorded under "Specimens examined" and many of the specimens were used in illustrating this paper. A

number of the people listed below also contributed specimens to our collection. We are most grateful to all for their help. Thanks are extended to R. T. Abbott, Academy of Natural Seiences, Philadelphia; C. G. Aguayo, Museo Poey, Universidad de la Habana; E. P. Chace, San Diego Museum of Natural History; R. M. DeWitt, Florida State Museum (referred to in the text as FSM); L. G. Hertlein, California Academy of Sciences; M. Keen, Stanford University; H. de Souza Lopes, Inst. Oswaldo Cruz, Rio de Janeiro, Brasil; H. A. Rehder, United States National Museum; G. L. Voss, Marine Laboratory, University of Miami; G. Warmke, Institute of Marine Biology, University of Puerto Rieo. The following private eollectors have also been most helpful in loaning material and we wish to thank K. Anderson; M. R. Branham; C. J. Finlay; E. Grigg; K. Johnstone; T. MeGinty; R. Merrill; W. Old, Jr.; A. Phares; R. Robertson; J. S. Schwengel; G. Ustieke and R. Walker.

Genus **Charonia** *Gistel*

Tritonium Röding 1798, Museum Boltenianum, p. 125 (type species, *T. tritonis* Linné [=*Murex tritonis* Linné], by tautonymy); non *Tritonium* O. F. Müller 1776.

Triton Denys de Montfort 1810, Conchyliologie Systématique **2**, p. 587 (type species, *Triton tritonis* Linné [=*Murex tritonis* Linné], original designation), non *Triton* Linné 1758 [Crustacea]; non *Triton* Laurenti 1768 [Reptilia]; non *Triton* Fleming 1828 [=*Tritonalia* Fleming 1828].

Tritonium 'Montfort' Bowdich 1822, Elements of Conchology, pt. 1, p. 36 [emendation of *Triton* Denys de Montfort 1810].

Tritonia Bowdich 1822, Elements of Conchology, pt. 1, caption of plate 10, fig. 4 [error for *Tritonium* 'Montfort' Bowdich 1822]; non *Tritonia* Cuvier 1798.

Charonia Gistel 1848, Naturgeschichte des Thierreichs für höhere Schulen, p. 170, no. 24 [new name for *Tritonium* 'Cuvier' Röding 1798, non Müller 1776].

Nyctilochus Gistel 1848, Naturgeschichte des Thierreichs für höhere Schulen, p. xi [new name for *Triton* 'Broderip' Montfort 1810; non Laurenti 1768 (Reptilia)].

Charonis 'Gistel' Mörch 1877, Malakozoologische Blätter **24**, p. 26 [error for *Charonia* Gistel 1848].

Buccinatorium Mörch 1877, Malakozoologische Blätter **24**, p. 26 (type species, *Triton nobile* Conrad [=*T. variegatum* Lamarck] here designated).

Tritonellium 'Valenciennes' Mörch 1877, Malakozoologische Blätter **24**, p. 25; non *Tritonellium* Valenciennes 1858.

Septa 'Perry' Dall 1904, Smithsonian Misc. Coll'n. **47**, p. 134; non *Septa* Perry 1810 in Arcana.

Eutritonium Cossmann 1904, Essais Paléoconchologie Comparée **6**, p. 123. [According to J. Thiele 1929. We have not seen this publication.]

Eutriton Dautzenberg 1907, Journal de Conchyliologie **55**, p. 146 [error for *Eutritonium* Cossmann 1904].

Type species, *Tritonium tritonis* Linné [=*Murex tritonis* Linné] by tautonymy.

Shells medium to very large in size, some specimens reaching about 430 mm. (17 inches) in length, attenuate, imperforate or only minutely rimate and solid in structure. Color of dark browns or reddish-browns, usually in marbled patterns. Sculpture generally consisting of spiral ridges and finer threads, the ridges with or without definite nodules. Varices present, but apparently produeed irregularly. Aperture large and usually flaring, with sculpture on both inner and outer lips. Siphonal canal distinct and short.

Charonia variegata *Lamarck*

Plate 111, figs. 1–2; Plate 113, fig. 1; Plate 114, figs. 1–2

Tritonium marmoratum Link 1807, Beschreibung der Naturalien-Sammlung der Universität zu Rostock, p. 122 [in part, Chemnitz' reference only; see *Remarks* below].

Triton variegatum Lamarck 1816, Tableau Encyclopédique et Méthodique, Liste, p. 5, Atlas **3**, pl. 421, fig. 2a–b (no locality given); Lamarck 1822, Animaux sans Vertèbres **7**, p. 178 [in part]; De Blainville 1825, Manuel de Malacologie, p. 399, pl. 18, figs. 3–3a; Kiener 1842, Iconographie des Coquilles Vivantes *Triton*, p. 28, pl. 2.

Tritonia atlantica 'Montfort' Bowdich 1822, Elements of Conchology, part 1, plate 10, fig. 4 (no locality given other than that indicated by the name).

Triton variegatus var. β Reeve 1844, Conchologia Iconica **2**, **Triton**, pl. 1, fig. 3a (West Indies).

Triton nobilis Conrad 1848, Proceedings Academy Natural Sciences Philadelphia **4**, p. 121 (West Indies); Conrad 1849, Journal Academy Natural Sciences Philadelphia (2) **1**, p. 212.

Triton commutatus 'Dunker' Kobelt 1876 [in] Martini and Chemnitz, Systematisches Conchylien-Cabinet (2) **3**, pt. 2, p. 224 [nomen nudum].

Tritonium seguenzae Aradas and Benoit 1871, Atti dell' Accademia Gioenia di Scienze Naturali di Catania (3) **5**, p. 90 (Sicily); W. Kobelt 1889, Iconographie Europäischen Meeresconchylien **2**, p. 19, pl. 35, fig. 1; pl. 36, fig. 1; pl. 37, fig. 1.

Description. Shell large, reaching 331 mm. (about $13\frac{1}{4}$ inches) in length, attenuate, rather heavy in structure, imperforate or with a narrow rimation. Color of the early whorls salmon-pink changing to a mottled coloration brought about by the alternate chevron-shaped bars of brown and white which follow the spiral cords. Whorls remaining in the adult 11 to 12, convex, the last proportionately larger and generally producing a pronounced sloping shoulder. Spire extended and very acutely pointed, forming an angle of 33° to 43°. Aperture subcircular to ovate. Outer lip expanded and margined with short plicae that are usually grouped in pairs and are opposite the furrows of the outside sculpture. Between the paired plicae and at the extreme margin of the lip there is usually a small dull point. The plicae are white and the space between and extending to the lip edge is a dark chocolate-brown. The intervals between the paired plicae are a light brownish-ivory in color. Parietal wall with numerous plicae which extend from the margin of the parietal shield well within the whorl. Actually these plicae have had a continuous growth from the very early stages but are absorbed as the animal builds the shell forward. These plicae are irregular as to width and spacing. They are white and the area between them is a dark chocolate-brown. Columella fairly wide and slightly arched. Umbilicus, when present, consisting only of a very narrow rimation beneath the parietal shield. Siphonal canal short and fairly broad. Suture irregular and not indented. Sculpture consisting of numerous flattened spiral ridges, separated by fairly broad furrows, the shoulder ridge being the largest. At the bottom of the furrows there may be from one to three spiral threads. Usually the ridges are narrow and small near the suture and again at the base of the body whorl. At the suture there is a band that is sculptured with short axial threads. Nuclear whorls five, smooth and pink in color but generally covered with a fairly heavy brownish periostracum. First four post-nuclear whorls with a spiral sculpture of nodulose ridges with spiral threads between. These whorls are usually salmon-pink in color. Beyond the fourth post-nuclear whorl the normal adult sculpture begins. The first varix appears at the end of the first post-nuclear whorl and is repeated about every three-fourths of a whorl thereafter. Operculum corneous, elliptical in outline, outer surface with a central nucleus and concentric growth lines. Inner surface with a large muscle scar, sculptured with numerous, fine, raised and irregularly concentric threads which at irregular intervals form little double-looped rings. Area beyond the muscle scar smooth and highly polished.

Plate 114. Fig. 1. *Charonia variegata* Lamarck. Bimini Islands, Bahama Islands (about 3/5x). Fig. 2. *Charonia variegata* Lamarck. Cuesco Beach, Guantánamo, Cuba (embryonic shell, 5.6x). Fig. 3. *Charonia tritonis* Linné. Ryukyu Islands, Japan (about 2/3x).

length	width	
331 mm.	168 mm.	St. Thomas, Virgin Islands
280	145.5	Lectotype of *C. nobilis* Conrad
255	113	Santa Bárbara de Samaná, Santo Domingo, Hispaniola
238	121	Alice Town, North Bimini, Bimini Islands, Bahama Islands
235	120	Sandy Cay, 4 mi. NW of Hope Town, Great Abaco, Bahama Islands

Types. The lectotype of *T. nobilis* Conrad is in the Academy of Natural Sciences Philadelphia, no. 42537 from the West Indies. According to Kiener the type of *T. variegata* Lamarck is in the Paris Museum. We here restrict the type locality to St. Thomas, Virgin Islands.

Remarks. This is one of the largest of our Western Atlantic gastropods. Though not rare, it does not seem to be common at any one locality.

It is very close in relationship to *Charonia tritonis* Linné (Plate 114, fig. 3), a wide-ranging species of the Indo-Pacific region but it differs from that species by never attaining the large size of *tritonis*. In addition, *C. variegata* differs by having a fairly well developed shoulder but a narrower and less flaring lip in the adult. The plicae on the outer lip of *tritonis* are proportionately much flatter and in many cases they are absent or are indicated only by the color markings. The plicae on the outer lip of *variegata* are always very well developed and are generally grouped in pairs. The plicae on the parietal wall of *tritonis* are much broader than those of *variegata*, so they limit definitely the amount of brown coloration on the columella.

There has been a great deal of confusion regarding the names to be employed for the Atlantic and Indo-Pacific species in this complex. Most of the early descriptions were composites, and many references by Linné, Gmelin and others were given to either one or the other indiscriminately. In Linné's original description of *tritonis* his citations were to Bonnani, Rumphius and Gualtieri. The first two refer to the Indo-Pacific species, *tritonis*, and the last is to the Atlantic species. We here select the figure in Bonnani 1684, Recreatio, fig. 188, to be the type figure of *tritonis* Linné. In 1807, Link (*loc. cit.*) introduced *Tritonium marmoratum* as a substitute name for *Murex tritonis* Linné. Link's first reference was to Gmelin 1791, Systema Naturae, ed. 13 and his second was to Chemnitz 1780, Conchylien-Cabinet. We here restrict Link's name to Gmelin's reference to Bonnani, Recreatio, fig. 188, so that both names (*tritonis* Linné and *marmoratum* Link) are now based upon the same figure.

So far as we have been able to determine, the earliest valid name for the Western Atlantic species is *Triton variegatum* Lamarck. This species has usually been dated from Lamarck's description in the Animaux sans Vertèbres 1822. However, Lamarck originally named this species in the Tableau Encyclopédique et Méthodique in 1816, referring to the figure in the Atlas. This figure is very definitely of the Atlantic species. Later, in 1822, as stated above, Lamarck described this species and gave several references which included both the Indo-Pacific and the Atlantic forms. Because of this later description, Lamarck's *variegata* has been considered a synonym of *C. tritonis* Linné, as his earlier use of the name in 1816 had been completely overlooked.

This species is generally found about rocky reefs below low water. Specimens taken from fish traps that had been placed in 60 to 120 fathoms are very much lighter in structure and somewhat smoother. Mr. C. J. Finlay reports that these specimens were not alive but were inhabited by hermit crabs.

Range. Eastern Atlantic: Mediterranean Sea, Cape Verde Islands, the Canary Islands and St. Helena. Western Atlantic: Bermuda (A. J. Peile), the Bahama Islands, the Lower Florida Keys, the West Indies and from central Mexico south to Santos, Estado São Paulo, Brasil.

Specimens examined. Western Atlantic. Florida: Molasses Reef, Key Largo (MCZ; R. Work); Key West (ANSP); Tortugas (MCZ). Bermuda: Castle Harbour (H. B. Moore—dredged and dead). Bahama Islands: Elbow Cay; Sandy Cay, 4 miles NW of Hope Town, both Great Abaco (both R. Robertson); Alice Town, North Bimini Island, Bimini Islands (MCZ); Pigeon Cays, Andros (J. Schwengel); Bullocks Harbour, Great Harbour Cay, Berry Islands; Dicks Point, Nassau, New Providence; The Current, Eleuthera Island (all G. Kline); Spanish Wells, northern Eleuthera (J. Schwengel); Governors Harbour, Eleuthera; Little San Salvador Island; Arthurs Town, Cat Island (all MCZ); Channel Cay, Great Exuma Island (G. Kline); Clarence Town, Long Island; Abraham's Bay, Mariguana Island; Matthew Town, Great Inagua (all MCZ). Cuba: Cabanas Bay, Pinar del Río (USNM); Matanzas Bay, Matanzas in 90–120 fathoms (C. J. Finlay); Cayo Francés, Caibarién, Las Villas (P. Bermudez); Cayo Largo, Banco de los Jardines, Las Villas (ANSP); Cayo Maja Figuro, off Punta Alegre, Camagüey (R. Humes); off Gibara, Oriente in 60–80 fathoms (C. J. Finlay); Cuesco Beach, Guantánamo Naval Base, Oriente (MCZ). Hispaniola: Monte Cristi; Blanco, 30 km. NW of Puerto Plata; Puerto Plata; Puerto Sosúa; Santa Bárbara de Samaná, all Santo Domingo (all MCZ); Saltrou, Dept. de l'Ouest; Roche à Bateau, Dept. du Sud; Ile de la Gonave, all Haiti (all USNM); Jérémie, Dept. du Sud, Haiti (MCZ). Jamaica: St. Anns Bay; near Buff Bay, Portland; Bull Bay, St. Andrews (all USNM). Puerto Rico: Areecibo (G. Warmke); Mona Island (A. Phares); Rincón Light, Rincón (G. Warmke; MCZ); reef 6 miles off Mayagüez (K. Yates); Mayagüez (G. Warmke); Punta Cuehara, about 5 mi. SW of Ponee (G. Warmke). Virgin Islands: St. Thomas (ANSP; USNM); The Baths, Virgin Gorda (M. Dewey). Lesser Antilles: St. Kitts (MCZ); Barbados (MCZ; USNM); St. Vincent (USNM); Grenada (K. Anderson); Bueeo Reef, Tobago (MCZ; ANSP); Cyril Bay, Trinidad (H. G. Kugler). Caribbean Islands: Swan Island (MCZ); Grand Cayman, Cayman Islands (ANSP). Mexico: Lobos Island, near Tampico; Tampico, both Tamaulipas (both T. Pulley); Veracruz, Veraeruz (M. E. Bourgeois; ANSP); Isla Mujeres, Yucatan (C. G. Aguayo). Panama: Colón (MCZ; USNM). Colombia: near Cartagena (USNM). Venezuela: Tucacos Bay, Estado Faleón (H. G. Kugler). Brasil: Santos, Estado São Paulo (ANSP).

Eastern Atlantic. Mediterranean Islands: Off Old Limassol, Cyprus (J. K. Howard). Lebanon: Beirut (USNM).

Genus **Cymatium** *Röding*

Cymatium Röding 1798, Museum Boltenianum, p. 129.

Lotorium Denys de Montfort 1810, Conchyliologie Systématique **2**, p. 583 (type species, *Lotorium lotor* Montfort [= *Murex femorale* Linné] original designation); non *Lotorium* Pusch 1837).

Currus Lesson 1842, L'Echo du Monde Savant (2) **6**, Col. 65 [reference from Dall 1904, p. 139. We have not seen this publication].

Luterium Herrmannsen 1846, Indicis Generum Malacozoorum **1**, p. 632. [Emendation of *Lotorium* Denys de Montfort.]

Type species, *Murex femorale* Linné, subsequent designation, Dall 1904.

Shells ranging in size from about 25 mm. (1 inch) to 212 mm. (about 8 inches) in length. Generally brown in color with bands of darker brown or red-brown. Many species show remnants of banding on the varices. Nearly all known species have one to six varices. They are generally sculptured with spiral cords which may or may not be beaded and, in many cases, the cords are knobbed. Siphonal canal generally fairly short and turned upward. Inside of outer lip usually with fine to coarse denticles. Parietal area generally having numerous lamellae. Periostracum generally heavy and produced in axial fringed blades. Operculum subcircular, sculptured with concentric growth lines and with an eccentric or terminal nucleus. Embryonic whorls fairly large, generally persistent and usually smooth or sculptured with microscopic axial striae.

All members of this genus occur only in the tropics or in the warmer portions of the temperate zone. They generally are found from the low water line out to depths of a little over 100 fathoms.

The genus *Cymatium* is composed of a number of subgenera many of which have been raised by various authors to generic rank. However, considering this genus from a world point of view, many of the characters used for separating the groups overlap. Consequently, it is impossible to assign clear cut definitions and it is often difficult to place species in the proper subgenus.

Subgenus **Linatella** *Gray*

Linatella Gray 1857, Guide to the Systematic Distribution of Mollusca in the British Museum, p. 39.
Zinatella Cossmann 1903, Essais de Paléoconchologie Comparée **5**, p. 86 [error for *Linatella* Gray].

Type species, *L. cingulata* Lamarck [= *C. cynocephalum* Lamarck] monotypic.

Shell medium to small in size and generally uniformly light yellowish brown in color and, in some, spirally banded with dark brown, particularly on the spiral cords. Sculpture consisting of numerous low and occasionally knobbed spiral cords. Only a few specimens produce more than one lip varix. Siphonal canal short and turned upward. Aperture subcircular. Outer lip with fine to fairly coarse denticles. Parietal area with or without lamellae. Periostracum rather thin, deciduous and produced in numerous low axial blades which are minutely fringed. Operculum subcircular, with an eccentric nucleus and sculptured with concentric growth lines.

Cymatium (Linatella) poulsenii *Mörch*

Plate 111, figs. 7–8; Plate 113, fig. 2; Plate 115, figs. 1–3

Triton (*Linatella*) *poulsenii* Mörch 1877, Malakozoologische Blätter **24**, p. 33 (Curaçao and Porto Cabello [Venezuela]).

Fusus cutaceus Lamarck 1816, Tableau Encyclopédique et Méthodique **3**, pl. 427, fig. 4a–b; Liste, p. 6; non *Triton cutaceus* Lamarck[1] 1816, ibid. pl. 414, fig. 2 a–b, Liste, p. 4 which is *Cymatium cutaceum* Linné.

Cymatium cingulatum peninsulum M. Smith 1937, East Coast Marine Shells, p. 113 (Lake Worth, Florida).

Description. Shell moderate in size, reaching 75 mm. (about 3 inches) in length, rather thin in structure, imperforate or nearly so, and spirally sculptured. Color light straw-

[1] This species has often been credited to Lamarck; but in 1822, Animaux sans Vertèbres **7**, p. 188, Lamarck definitely gives credit to Linné and refers to the same figures in Seba. This is a Mediterranean species.

yellow to a medium brown and occasionally banded with darker brown. Specimens occur rarely with axial stripes of darker brown. Post-embryonic whorls four, convex, with the body whorl slightly shouldered. Spire moderately extended and produced at an angle of about 75°. Aperture subelliptical in outline, the outer lip crenulated and slightly expanded. Inner lip with a light glaze on the body whorl and a much heavier glaze over the columella. Siphonal canal variable, moderately long and curved upward. Columella arched inward, its base continuing as the parietal margin of the siphonal canal. Suture slightly indented. Sculpture consisting of 18 to 20 major flattened spiral cords which are somewhat variable in height and width. In some specimens finer spiral cords may be present between the major cords. The shoulder cord of occasional specimens may be slightly beaded. Axial sculpture consisting of fine growth lines, with occasional specimens having a thin blade-like varix. Periostracum thin, usually deciduous and consisting of numerous fine axial blades from which extend short hair-like processes. Operculum thin, corneous, subcircular in outline, with concentric growth lines and an eccentric nucleus. Embryonic whorls 3 to $3\frac{1}{2}$, smooth, yellowish horn in color, narrow, extended, and set off from the later whorls.

length	width	
75 mm.	43 mm.	Lake Worth, Florida
65	45.5	off Port Isabel, Texas
58	33.5	off Laguna Madre, Tamaulipas, Mexico

Types. The holotype of *T. poulsenii* Mörch is probably in the Universitetets Zoologiske Museum, Copenhagen, Denmark. The location of the holotype of *F. cutaceus* Lamarck is unknown to us. The holotype of *Cymatium cingulatum peninsulum* M.Smith is in the Florida State Museum, Gainesville, Florida.

Plate 115. *Cymatium poulsenii* Mörch. Fig. 1. South end of Lake Worth, Palm Beach Co., Florida (slightly enlarged). Fig. 2. Off Laguna Madre, Tamaulipas, Mexico (1.21x). Fig. 3. Off Laguna Madre, Tamaulipas, Mexico (17x).

Remarks. This species is among the rarest of our Western Atlantic cymatiids. It has a fairly wide range throughout the Gulf of Mexico and the Caribbean Sea and, so far as now known, it lives well below low water line. Our few depth records range from 12 to 209 fathoms. The specimens from off the Barbados in 209 fathoms were apparently dead when collected and they may be advectitious at this depth.

This species is closely related to *Cymatium cynocephalum* Lamarck[1] from the Eastern Pacific. It differs by being much smaller and in having the spire far less extended.

Range. From Lake Worth, Florida south through the West Indies, and from west Florida to Texas, Mexico and south to Venezuela.

Specimens examined. Florida: Palm Beach in 14 fathoms (J. Schwengel); Lake Worth (FSM; T. McGinty); Boynton Beach; off Delray Beach (both T. McGinty); Bear Cut, Crandon Park, Biscayne Bay (R. Merrill); Bahia Honda Key; off Key West in 11 fathoms (both H. and K. Johnstone); off Tortugas, from shrimp boat in 18–20 fathoms (R. Merrill; T. McGinty); Naples (ANSP). Texas: 30 miles N of Port Isabel (H. Hildebrand); off Port Isabel (W. C. Frisby; H. and K. Johnstone; T. McGinty). Mexico: off Laguna Madre, Tamaulipas in 12 to 14 fathoms (C. L. Branch); Tampico, Tamaulipas (T. Pulley); about 70 miles NNE of Tampico, Tamaulipas (W. C. Frisby); 15 miles N of Tecolutla, Veracruz (T. Pulley). Cuba: Puerto Esperanza, Pinar del Río (C. G. Aguayo). Virgin Islands: St. Thomas (ANSP). Lesser Antilles: off Barbados, *Blake* station 274 (N. Lat. 13°00′50″; W. Long. 59°36′) in 209 fathoms (MCZ). Venezuela: Cubagua Island off Cumaná (MCZ).

Subgenus **Cabestana** *Röding*

Cabestana Röding 1798, Museum Boltenianum, p. 130.

Aquillus Denys de Montfort 1810, Conchyliologie Systématique **2**, p. 579 (type species, *Aquillus cutaceus* [=*Murex cutaceus* Linné] original designation).

Dolarium Schlueter 1838, Systematisches Verzeichniss meiner Conchyliensammlung, Halle, p. 20 (type species, *Murex caduceus* [error for *cutaceus* Linné], monotypic).

Aquilus Mörch 1852, Catalogus Conchyliorum Comes de Yoldi, p. 108 (error for *Aquillus* Montfort).

Neptunella Gray 1853 [1854] Proceedings Zoological Society London, p. 38 (type species, *Murex cutaceus* Linné, monotypic); non *Neptunella* Meek 1864; non Verrill 1873.

Tritonicus Dall 1904, Smithsonian Miscellaneous Collections **47**, p. 134 (type species, *Triton loroisi* Petit de la Saussaye [=*C. labiosum* Wood] original designation).

Turritriton Dall 1904, Smithsonian Miscellaneous Collections **47**, p. 133 (type species, *Triton gibbosus* Broderip, original designation).

Particymatium Iredale 1936, Records Australian Museum **19**, p. 307 (type species, *Triton strangei* Adams and Angas, monotypic).

Cabestanimorpha Iredale 1936, Records Australian Museum **19**, p. 307 (type species, *Triton exaratum* Reeve, monotypic).

Cymatilesta Iredale 1936, Records Australian Museum **19**, p. 307 (type species, *Triton spengleri* Lamarck, monotypic).

Parlicymatium 'Iredale' Wenz 1941, Handbuch der Paläozoologie **6**, pt. 1, p. 1063 [error for *Particymatium* Iredale].

Type species. *Murex cutaceus* Linné, subsequent designation, Dall 1904.

[1] This is an earlier name for *Cymatium cingulatum* Lamarck. See remarks under *C. caribbaeum* Clench and Turner, new name, regarding the use of the name *cynocephalum* Lamarck.

Shells relatively small to medium in size and generally brownish in color. Sculpture consisting of a few varices and rather strongly developed, knobbed, axial costae. Many species in this subgenus have very well developed spiral cords. Whorls with a broad shoulder. Siphonal canal short. Shells usually rimately umbilicate. Periostracum thin. Operculum unguiculate, with a marginal nucleus.

There are two species in this subgenus in the Western Atlantic.

Cymatium (Cabestana) labiosum *Wood*

Plate 111, figs. 9–10; Plate 116, fig. 1

Murex labiosus Wood 1828, Index Testaceologicus, Supplement, p. 15, pl. 5, fig. 18 (locality unknown); non *Murex labiosa* J. E. Gray 1828; non G. D. Nardo 1847.

Tritonium rutilum Menke 1843, Molluscorum Novae Hollandiae, p. 25 (litore occidentali [shore of western Australia]).

Triton loroisi Petit de la Saussaye 1852, Journal de Conchyliologie **3**, p. 53, pl. 2, fig. 8 (Guadeloupe [Lesser Antilles]).

Triton strangei Adams and Angas, July 1864, Proceedings Zoological Society London, p. 35 (Moreton Bay [Queensland] Australia); Smith 1878 [1879] Proceedings Zoological Society London, p. 816, pl. 50, fig. 16.

Triton (Gutturnium) orientalis G. and H. Nevill 1874, Journal Asiatic Society Bengal **43**, p. 29. Refers to figure in Reeve, Conchologia Iconica **2, Triton,** pl. 11, fig. 38 (Andamans, dredged).

Description. Shell rather small, reaching 29.5 mm. (about $1\frac{1}{8}$ inches) in length, solid, minutely perforate, shouldered and strongly sculptured. Color generally mahogany-brown to yellowish and occasionally with a white band at the middle of the whorl. Interior of aperture white. Post-embryonic whorls 5 and strongly convex. Spire moderately extended and produced at an angle of about 60°. Aperture subcircular, with the outer lip greatly thickened when a varix is produced. Parietal lip narrow and thickly glazed. Outer lip with 6 flattened and rather obscure denticles. Inner lip with very weak lamellae—usually one near the anal canal and two or three near the entrance of the siphonal

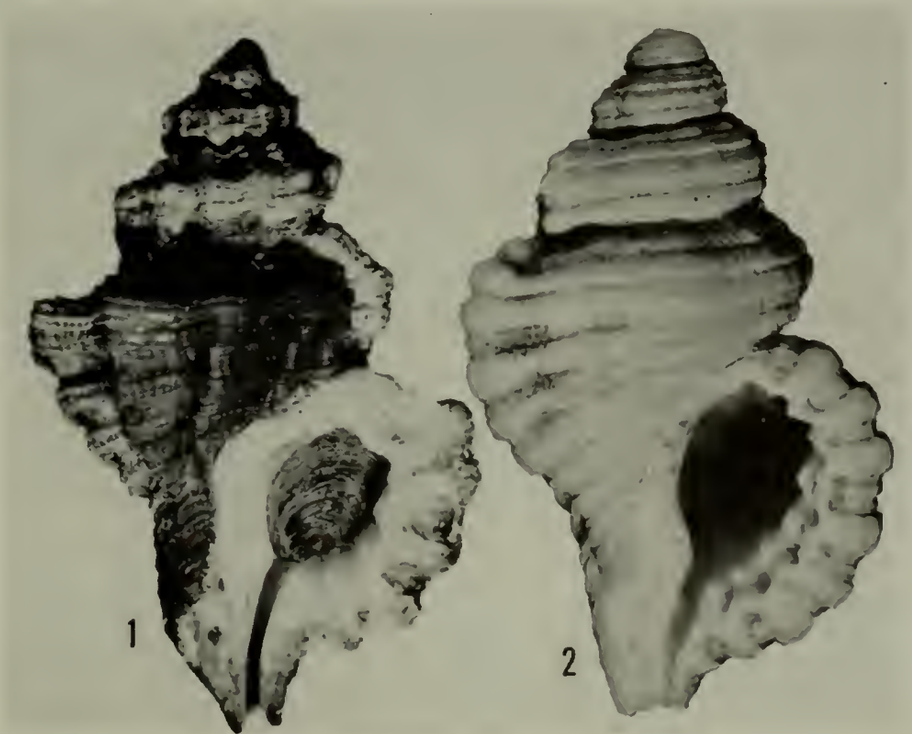

Plate 116. Fig. 1. *Cymatium labiosum* Wood. Carboneras, Rio Camarioca, Matanzas, Cuba (2.8x). Fig. 2. *Cymatium felipponei* von Ihering. Praia de Guarariba, Vitoria, Estado Espirito Santo, Brasil (1.85x).

canal. Columella slightly arched inwardly with its base continuing into the parietal margin of the short siphonal canal. Suture slightly indented. Sculpture consisting of 4 to 6 strong, nodulose, spiral cords. In addition, these cords are sculptured with 3 or 4 beaded threads. Beaded threads are also found in the interspaces between the major cords. From each knob on the shoulder cord there is a ridge extending to the suture. This ridge continues axially to the base of the shell. Periostracum straw-yellow in color and consisting of very low thin axial blades. Operculum unguiculate, with a marginal nucleus and sculptured with concentric growth lines. Embryonic whorls $3\frac{1}{2}$, moderately convex, amber in color and with very fine axial striae.

length	width	
29.5 mm.	18.5 mm.	North Inlet, Lake Worth, Florida
27	18	Carboneras, near Río Camarioca, Matanzas, Cuba
26.5	16.5	Zanzibar Island
24	15	St. Thomas, Virgin Islands
22.5	15	Funafuti, Ellice Islands

Types. The location of the type of *C. labiosum* Wood is unknown. It was originally in the cabinet of a Mrs. John Mawe and according to Sherborn it was purchased by "Tennant of the Strand." As the locality was unknown we here designate Guadeloupe, Lesser Antilles as the type locality. The type of *C. strangei* Adams and Angas was in the Angas Collection and is now probably in the British Museum. An idiotype from Angas is in the Museum of Comparative Zoology. The type locality is Moreton Bay, Queensland, Australia. The type of *C. loroisi* Petit de la Saussaye is in the collection of the Journal de Conchyliologie; the type locality is Guadeloupe, Lesser Antilles.

Remarks. This is a very distinctive species, not closely related to any other in the Western Atlantic. It is nearest in relationship to *C. felipponei* von Ihering from which it differs in being much smaller and having a more pronounced axial sculpture and a pronounced angle to the whorl shoulder. In the Indo-Pacific there appear to be two or three fairly closely related species. *Cymatium waterhousii* Adams and Angas from South Australia has a proportionately much larger aperture and *C. klenei* Sowerby from South Africa is much more strongly shouldered and sculptured, as well as being a larger and more elongate species.

This appears to be a rather rare species and many of the specimens in collections are dead beach shells. Nothing is known concerning depth range or habitat of this species.

Range. Western Atlantic: From off Cape Romain, South Carolina: Florida; the Bahamas and south through the Lesser Antilles.

Indo-Pacific: The Hawaiian Islands, west to the Philippine Islands, south to New South Wales, Australia and west to East Africa.

Specimens examined. Western Atlantic. South Carolina: From ocean buoy off Cape Romain (R. Merrill). Florida: off Palm Beach in 30 fathoms (T. McGinty): Lake Worth, Palm Beach County (FSM; J. Schwengel): Boca Raton (T. McGinty): Bear Cut, Key Biscayne (R. Work): Pelican Shoals, Key West (T. McGinty): Tortugas (FSM). Bahama Islands: Eight Mile Rock, Grand Bahama Island (MCZ): Drunken

Cays and Cooper Jacks Cays, Great Abaco; 4 miles W of Nassau, New Providence (all R. Robertson); North Cay, New Providence; off Nassau in 4–6 fathoms; North Bimini Island, Bimini Islands; Gun Cay, Bimini Islands; Pigeon Cay, Andros (all T. McGinty). CUBA: Vedado, Habana; Camarioca, Matanzas (both Museo Poey); Carboneras near Río Camarioca, Matanzas (C. J. Finlay); Varadero, Matanzas (C. J. Finlay; Museo Poey); Cayo Santa Maria, off Punta Alegre, Camagüey (R. Humes); Guantánamo Bay (MCZ); near Cienfuegos, Las Villas (Museo Poey). PUERTO RICO: Aguadilla (A. Phares); Rincón Light House, Rincón (G. Warmke). VIRGIN ISLANDS: 1 mile N of Frederiksted, St. Croix (G. Ustieke); St. Thomas, Virgin Islands (MCZ). LESSER ANTILLES: Tortola (MCZ); St. Kitts (R. W. Jackson).

INDO-PACIFIC. ELLICE ISLANDS: Funafuti (MCZ). PHILIPPINE ISLANDS: Zamboanga, Mindanao (MCZ). AUSTRALIA: Port Jackson, New South Wales (MCZ). INDONESIA: Manipa Island, Moluccа Islands (MCZ).

INDIAN OCEAN ISLANDS: Ceylon (MCZ); Zanzibar Island (MCZ).

Cymatium (Cabestana) felipponei *von Ihering*

Plate 116, fig. 2

Lotorium felipponei von Ihering 1907, Anales Museo Nacional de Buenos Aires (3) **7**, p. 443, pl. 18, fig. 122a–b (Maldonado, Uruguay).

Description. Shell medium in size, reaching 52 mm. (about 2 inches) in length, moderately heavy in structure, imperforate or with a small umbilical chink, and with pronounced sculpture. Color a light reddish brown. Post-embryonic whorls 5, convex and shouldered. Spire moderately extended and produced at an angle of about 45°. Aperture subelliptical, the outer lip margined with rather strong teeth, the inner lip smooth, forming a thickened shield over the parietal area. Columella arched inward; siphonal canal short and curved upward slightly. Axial sculpture consisting of 2 to 4 strong varices; in addition there are numerous and rather fine incised lines which cut across the spiral cords. Spiral sculpture consisting of numerous cords which are somewhat irregular in width, the shoulder cord usually being the largest. Periostracum thin, straw-yellow in color. Operculum and embryonic whorls unknown.

length	width	
52 mm.	31 mm.	Mar del Plata, Argentina (from Carcelles 1944, p. 246)
45	30	Punta del Este, Maldonado, Uruguay
42.5	27	Praia de Guarariba, Vitoria, Estado Espirito Santo, Brasil

Types. According to von Ihering 1907, p. 1, the types of this species are in the Museo Nacional de Buenos Aires. The type locality is Maldonado, Uruguay.

Remarks. This species appears to be distantly related to *Cymatium cutaceum* Linné of the Mediterranean, from which it differs in being less highly sculptured and having only a slight indication of an umbilicus. See also *Remarks* under *C. labiosum* Wood.

This is a very rare species to judge by the few specimens that are known to exist. We are indebted to Eliseo Duarte of Montevideo, Uruguay for two lots of this species, the one from Vitoria, Brasil extending the known range of this species about 1400 miles to the north.

Range. From Vitoria [Victoria], Brasil south to Puerto Quequen, Argentina.

Specimens examined. Brasil: Playa de Guarariba, Vitoria, Est. Espirito Santo (E. Duarte). Uruguay: Cabo Santa Maria (A. Carcelles); Punta del Este, Maldonado (E. Duarte).

Subgenus **Ranularia** *Schumacher*

Ranularia Schumacher 1817, Essai d'un Nouveau Système, p. 253.

Ranula Schumacher 1817, Essai d'un Nouveau Système, p. 77.

Tritonocauda Dall 1904, Smithsonian Miscellaneous Collections **47**, p. 133 (type species, *Murex caudatus* Gmelin, original designation). [New name for *Ranularia* 'Schumacher' Fischer, non *Ranularia* Schumacher.]

Type species, *Tritonium clavator* Chemnitz [=*Ranularia longirostra* Schumacher] subsequent designation, Herrmannsen, 1847.

Herrmannsen in his Indicis Generum Malacozoorum **2**, p. 388, gave the type species as *Tritonium clavator* Chemnitz. However, Schumacher used *longirostra*, with *clavator* Chemnitz given as a synonym.

Schumacher made a curious error when he instituted the name *Ranula* (p. 77) in his generic system, and later (p. 253), he used *Ranularia* referring by number back to *Ranula*. However, his second use carries not only the description but here he cites two species. The brief generic diagnosis under *Ranula* would be unidentifiable standing alone.

The new name *Tritonocauda* introduced by Dall for *Ranularia* Schumacher as used by Fischer (1884, Manuel de Conchyliologie, p. 655) was unnecessary and partly in error, for Dall gave as the type, *Murex caudatus* Gmelin, a name not mentioned by Fischer.

Shell medium in size and generally yellowish to brownish in color. Sculpture consisting of a few to several rounded varices, with most species having strongly developed, knobbed, axial costae. Spiral sculpture consisting of fairly strong cords which may be knobbed or beaded. Between these cords there are usually numerous, fine, spiral threads. Whorls convex. Siphonal canal moderately extended. Aperture subcircular with a moderately thickened parietal wall. Periostracum produced in numerous axial blades which are fringed with hair-like processes. Operculum subovate, with a submarginal nucleus located about midway near the parietal border.

Cymatium (Ranularia) caribbaeum, new name

Plate 111, figs. 3–4; Plate 113, fig. 3; Plate 117, figs. 1–2

Triton cynocephalum 'Lamarck' Kiener 1842, Iconographie des Coquilles Vivantes, **Triton**, p. 3, pl. 12, fig. 1 (Bahia, Brasil); non *Triton cynocephalum* Lamarck 1816 and 1822.

Cymatium cyanocephalum 'Lamarck' Johnson 1934, Proceedings Boston Society Natural History **40**, p. 114 [error for *cynocephalum* Lamarck].

Description. Shell medium in size, reaching about 84 mm. (about $3\frac{1}{4}$ inches) in length, solid, imperforate and strongly sculptured. Color a light tan to a rich cinnamon brown; the varices with alternating bands of tan and white. Occasionally specimens are found in which the white band of the varices extends as a spiral band from varix to varix. Whorls $5\frac{1}{2}$ to 6, convex and shouldered. Spire short and broad and produced at an angle of about 65°. Aperture subcircular; outer lip thickened and having seven rather coarse denticles. Inner lip consisting of a thickened shield on which there is a series of small

plicae set well within the aperture and not extending to the edge of the shield. The area between the plicae is a dark red-brown. The edge of the lip is usually a light tan or salmon color. Siphonal canal extended and slightly curved upward and to the left. Columella thickened and continued into the inner margin of the siphonal canal. Suture slightly indented. Sculpture consisting of about 7 nodulose, spiral cords, with numerous fine spiral threads between the cords. Axial sculpture consisting of two or three coarsely knobbed varices, the knobs being formed where the spiral cords cross over the varix. Between the varices, the spiral cords support from 8 to 18 small knobs. The knobs on the cords are in axial alignment, but are not noticeably connected. Those on the shoulder cord are usually the largest. Operculum subovate, sculptured with numerous concentric ridges and with the nucleus submarginal, about midway on the parietal side. Periostracum usually deciduous, yellowish to brown in color, thin in texture and consisting of fringed axial blades. Embryonic shell of 3 to 4 whorls which are amber in color, smooth, moderately extended and mainly chitinous. The first post-embryonic whorl is calcareous, spirally ribbed and slightly envelops a part of the embryonic shell.

length	width	
84 mm.	45 mm.	off Key West, Florida
67.5	41	Dry Tortugas, Florida
63	32	Puerto Plata, Santo Domingo
60	33.5	Barbados, Lesser Antilles

Types. The holotype of *Triton cynocephalum* Kiener is probably in the Paris Museum. The type locality is Bahia, Brasil.

Plate 117. *Cymatium caribbaeum* Clench and Turner. Fig. 1. Cárdenas Keys, Matanzas, Cuba (1.2x). Fig. 2. Bear Cut, Miami, Florida (1.16x).

Remarks. It seems incredible that an error should have persisted so long in the naming of this species. So far as we can trace it, this error was initiated by L. C. Kiener in his Iconographie des Coquilles Vivantes. He figured under the name of *cynocephalum* Lamarck a shell which is totally different from that originally figured by Lamarck in the Tableau Encyclopédique et Méthodique. Lamarck's original figure of *cynocephalum* (1816) is of the species generally known today as *Cymatium cingulatum* of the Panamic Province. Under the section *Notes* at the end of this report we give the synonymy of this Eastern Pacific species and figure a specimen from Bahía Magdalena, Baja California, as well as a copy of Lamarck's original figure for comparison.

Cymatium caribbaeum is close in its relationships to *C. sarcostomum* Reeve, from which it differs by having many small uniform knobs on the spiral cords. In *C. sarcostomum* there are only a few large, irregular knobs. From *C. pyrum rehderi* Verrill it differs likewise in the type of knobs; in addition, the plicae on the parietal wall do not extend to the outer margin of the narrow parietal shield of *caribbaeum*, while in *rehderi* they do reach to the outer edge.

Cymatium caribbaeum Clench and Turner is confined entirely to the warmer portions of the Western Atlantic.

Range. Bermuda, southern Florida, the West Indies and Central Mexico south to Bahia, Brasil.

Specimens examined. Florida: Lake Worth (FSM); Bear Cut, Key Biscayne, Miami (R. Work; G. Voss; R. Merrill); West Summerland Key; Missouri Key (both D. and N. Schmidt); Pelican Shoals, off Boca Chica Key (MCZ); Key West (MCZ; H. and K. Johnstone); Tortugas (MCZ; FSM; R. Merrill). Bermuda: Castle Harbour (dredged dead, H. Moore). Bahama Islands: Elbow Cay, Great Abaco (G. and M. Kline; R. Robertson); Alice Town, Bimini Islands (MCZ); Dicks Point, Nassau, New Providence (G. and M. Kline); Simms, Long Island; Matthew Town, Great Inagua (both MCZ). Cuba: Habana, Habana (Museo Poey); Cárdenas, Matanzas (J. Finlay); Cayo Francés, Caibarién, Las Villas (P. J. Bermudez); Cayo Santa Maria, Camagüey (R. Humes); Gibara, Oriente (Museo Poey); Caleton de Don Bruno, Cienfuegos, Las Villas (MCZ); Guantánamo Bay, Oriente (MCZ; Museo Poey). Jamaica: White House (J. K. Howard). Hispaniola: Puerto Plata and Santa Bárbara de Samaná, Santo Domingo (both MCZ). Puerto Rico: Catano; Rincón; Punta Algarrobo; Punta Guanajibo; Playa de Naguabo (all G. Warmke). Virgin Islands: Virgin Gorda (M. W. Dewey); St. John (MCZ); St. Croix (R. Walker; FSM; G. Usticke). Lesser Antilles: Barbados (MCZ); Chaguaramas, Trinidad (H. G. Kugler); Mexico: Tampico, Tamaulipas; Veracruz, Veracruz (both T. Pulley). Panama: 2 miles off Colón in 10 fathoms (W. C. Clarke). Brasil: Itaparica, São Salvador, Bahia (H. S. Lopes).

Cymatium (Ranularia) sarcostomum *Reeve*

Plate 118, figs. 1–5

Triton sarcostoma Reeve, April 1844, Conchologia Iconica **2, Triton,** pl. 7, fig. 21a–b (Island of Ticao, Philippines); Reeve, Dec. 1844, Proceedings Zoological Society London **12,** p. 114.

Triton moritinctus Reeve, June 1844, Conchologia Iconica **2, Triton,** pl. 13, fig. 49 (Philippine Islands); Reeve, Dec. 1844, Proceedings Zoological Society London **12,** p. 115.

Triton ridleyi Smith 1890, Journal Linnean Society London **20,** p. 489, pl. 30, fig. 1 (Fernando Noronha Island, Brasil).

Description. Shell medium in size, reaching 60 mm. (about $2\frac{3}{8}$ inches) in length, solid, imperforate and strongly sculptured. Color light straw-yellow to reddish brown, occasionally banded with white, particularly on the varices. Whorls 5 to 6, convex and shouldered. Spire short and broad and produced at an angle of about 65°. Aperture subcircular. Outer lip thickened and having 7 rather coarse denticles. Inner lip consisting of a thickened shield on which there is a series of small plicae set well within the aperture and not extending to the edge of the shield. The area between the plicae is usually a dark red-brown, the edge of the lip white to a light tan. Siphonal canal extended and slightly curved upward. Columella thickened and continued into the inner margin of the siphonal canal. Suture slightly indented. Spiral sculpture consisting of 6 to 7 heavy cords with numerous fine spiral threads between the cords. Axial sculpture consisting of 2 or 3 coarsely knobbed varices, the knobs being formed where the spiral cords cross the varices. In addition, there are 4 to 5 axially arranged and somewhat irregular knobbed

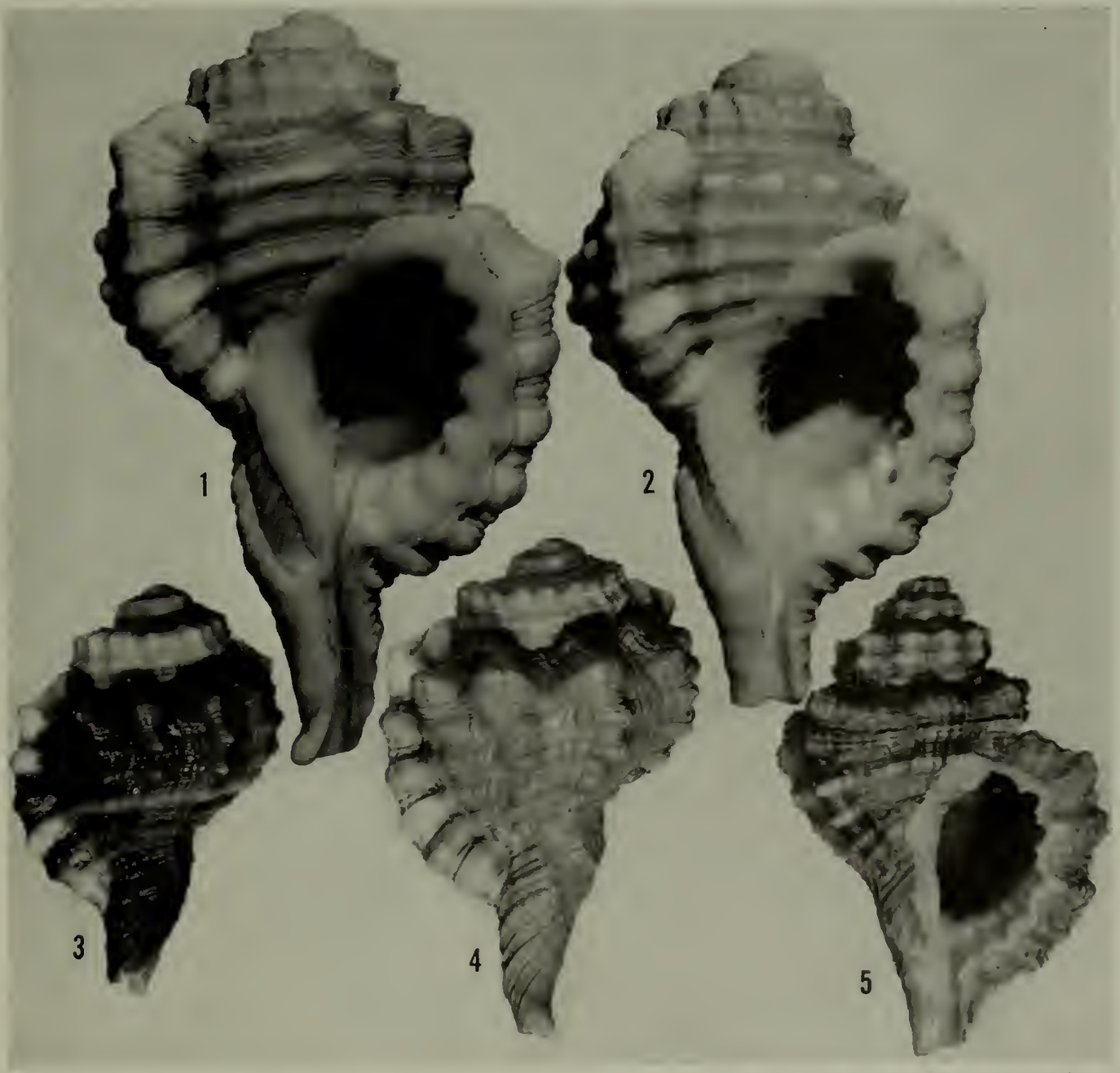

Plate 118. *Cymatium sarcostomum* Reeve. Fig. 1. Pelican Shoals, Florida (2x). Fig. 2. Mauritius (2x). Fig. 3. One mile north of Frederiksted, St. Croix, Virgin Islands (1.6x). Fig. 4. Mauritius (1.6x). Fig. 5. St. Croix, Virgin Islands (2.27x).

ridges between the varices. Operculum unknown. Periostracum generally deciduous, light brown in color, thin and consisting of low, axial blades. Embryonic whorls unknown.

length	width	
60 mm.	33.5 mm.	Bermuda
56	37	Calapan, Mindoro, Philippine Islands

Types. The type specimens of *C. sarcostomum* Reeve, *C. moritinctus* Reeve, and *C. ridleyi* Smith are probably in the British Museum. The type locality for *sarcostomum* is the Island of Ticao, Philippine Islands.

Remarks. This is a rare species in both the Western Atlantic and the Indo-Pacific regions. In the Western Atlantic this species appears to be very closely related to *C. caribbaeum*. The most significant differences separating these species are the fewer and more prominent axial ridges of *sarcostomum*. In this species the axial ridges cross several of the spiral cords while in *C. caribbaeum* the only evidence of the axial ridges is the alignment of the small knobs on the spiral cords.

In the Western Atlantic *C. sarcostomum* appears to occur in deeper water than it does in the Indo-Pacific.

Range. Western Atlantic: From southern Florida and Bermuda through the West Indies and south to Brasil. This last record is based upon *C. ridleyi* Smith as given in the synonymy above.

Indo-Pacific: From the Philippine Islands south through Indonesia and west to Portuguese East Africa. Locard (1897) records this species (as *moritinctum*) from the Cape Verde Islands, West Africa in the Eastern Atlantic.

Specimens examined. Western Atlantic. Florida: off Palm Beach in 75 fathoms; off Lake Worth in 70 fathoms; S. E. of Government Cut, Miami in 30 fathoms (all T. McGinty): Pelican Shoals, off Key West (MCZ). Bermuda: (R. Merrill) [dredged dead]. Virgin Islands: 1 mile N of Frederiksted, St. Croix (G. Usticke; R. Walker). Lesser Antilles: off Sombrero Island in 45 fathoms (*Blake*, MCZ); Carenage, Trinidad (H. G. Kugler).

Indo-Pacific. Philippine Islands: Subic Bay, Zambales, Luzon; Zamboanga, Mindoro (both MCZ). Molucca Islands: Morotai Island (MCZ). Indian Ocean Islands: Mauritius (MCZ); Portuguese East Africa: Bazaruto Island, Bazaruto Bay (J. K. Howard).

Cymatium (Ranularia) pyrum rehderi *Verrill*

Plate 119, figs. 2–3

Cymatium rehderi Verrill 1950, Nautilus **63**, p. 126, pl. 9, fig. 1a–b (25–40 fathoms off Dominica, British West Indies [Lesser Antilles]).

Description. Shell medium in size, reaching 92 mm. (about 3½ inches) in length, solid, rimately umbilicate and strongly sculptured. Color a light reddish brown, the varices having alternating bands of brown and white. Six convex post-embryonic whorls. Spire moderately extended and produced at an angle of 60°. Aperture subovate. Outer lip

thickened and having seven rather coarse denticles. Inner lip consisting of a thickened parietal area on which there are numerous, fine plicae which reach to the outer edge of the thickened area. The spaces between the plicae are reddish brown. Siphonal canal moderately broad and having a narrow aperture which is curved upward and slightly to the left. Columella thickened and continued into the siphonal canal. Suture slightly indented. Sculpture consisting of five or six varices, with five rather large, knobbed, axial ridges between the varices and with numerous, fine axial threads. Spiral sculpture consisting of about seven large cords interspaced with numerous threads. The crossing of the axial and spiral threads creates a beaded appearance. Operculum, periostracum and embryonic shell unknown.

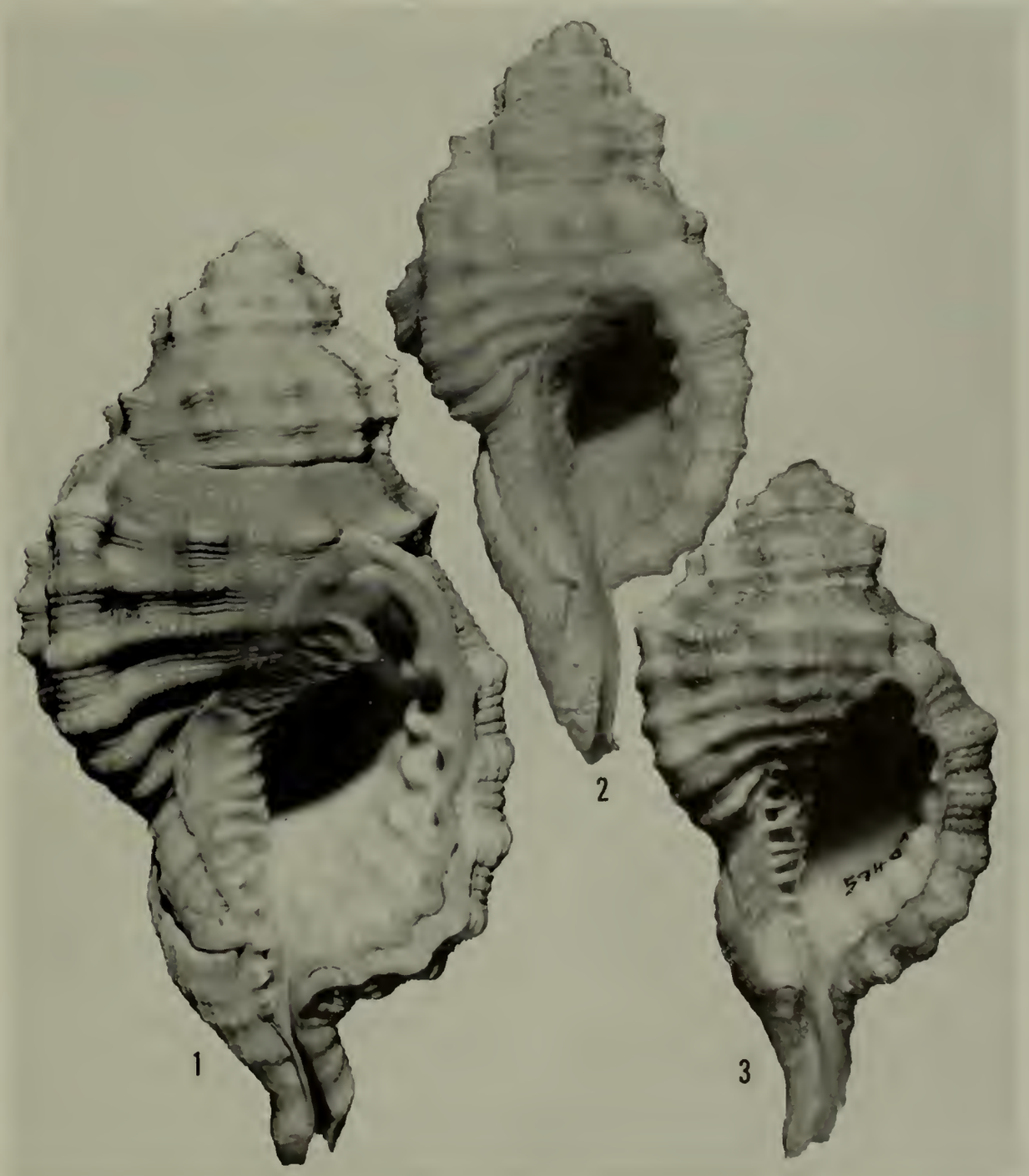

Plate 119. Fig. 1. *Cymatium pyrum* Linné. Okinawa, Ryukyu Islands, Japan (1.18x). Fig. 2. *Cymatium pyrum rehderi* Verrill. Banes, Oriente, Cuba (slightly enlarged). Fig. 3. *Cymatium pyrum rehderi* Verrill. Dominica, Lesser Antilles. Holotype, USNM no. 594095 (1.6x).

length	width	
59 mm.	30 mm.	Holotype of *C. p. rehderi*
92	46	Banes, Oriente, Cuba
65	33	Matanzas Bay, Cuba

Types. The holotype of *Cymatium rehderi* Verrill is in the United States National Museum, no. 594095, from off Dominica, Lesser Antilles in 25–40 fathoms. The measurements of the holotype given by Verrill in the original description were based on the photograph which was enlarged and not the specimen itself. His original measurements gave a length of 75 mm. and a width of 41 mm.

Remarks. Cymatium pyrum rehderi Verrill is very closely related to *C. pyrum* Linné of the Indo-Pacific region. Actually the only significant differences between this subspecies and the typical form are the smaller size of known specimens of *C. p. rehderi*, the lighter color of its shell and the darker reddish brown of the parietal area. In *C. pyrum* the parietal area is colored the same as the outer surface of the shell. We figure a specimen of *C. pyrum* (Plate 119, fig. 1) for comparison.

In the Western Atlantic *C. p. rehderi* is most easily confused with *C. sarcostomum* Reeve from which it differs by having a more extended spire and having the plicae on the parietal area extend to the outer edge of the thickened parietal lip. In addition, it usually has a longer siphonal canal.

Range. This species appears to be restricted to the West Indies, occurring mainly in fairly deep water.

Specimens examined. Cuba: Matanzas Bay and Varadero, Matanzas (both C. J. Finlay); Habana, Habana; off Matanzas, Matanzas, *Yara*, station 3 (N. Lat. 23°8′; W. Long. 81°28′) in 200 fathoms (both Museo Poey); Banes, Oriente (C. J. Finlay); Guantánamo, Oriente (USNM). Hispaniola: Puerto Plata, Santo Domingo (MCZ). Lesser Antilles: Dominica (USNM).

Subgenus **Cymatriton,** new subgenus

Shells rather small in size and generally uniformly colored a light ashen gray. Axial sculpture consisting of several varices and large, knobbed, axial ridges. Spiral sculpture consisting of large, rounded, cords interspaced with fine thread-like cords. Operculum broadly oval, having a subcentral nucleus and sculptured with concentric growth lines. Embryonic whorls convex, broad and minutely, axially striate.

Type species, *Cymatium nicobaricum* Röding.

Cymatium (Cymatriton) nicobaricum *Röding*

Plate 111, figs. 5–6; Plate 113, fig. 4; Plate 120, figs. 1–3

Tritonium nicobaricum Röding 1798, Museum Boltenianum, p. 126 [refers to Chemnitz 1780, in Martini, Conchylien-Cabinet (1) 4, pl. 130, figs. 1246–1247].

Triton chlorostomum Lamarck 1822, Histoire Naturelle des Animaux sans Vertèbres **7**, p. 185 (l'Océan des Antilles); Kiener 1842, Iconographie des Coquilles Vivantes **7, Triton,** p. 19, pl. 12, fig. 2.

Triton pulchellus C. B. Adams 1850, Contributions to Conchology, no. 4, p. 60 (Jamaica).

Triton chlorostomum pumilio Mörch 1877, Malakozoologische Blätter **24**, p. 29 (no locality given).

Description. Shell medium to small in size, reaching 85 mm. (about $3\frac{3}{8}$ inches) in length, solid, imperforate and strongly sculptured. Color a light ashen gray to rarely a reddish brown. In addition, on most specimens examined, there are flecks of reddish brown, usually appearing on the coarse spiral threads. Interior of aperture a bright orange, the lamellae and palatal denticles white. Occasional specimens have the aperture entirely white. Post-embryonic whorls 7 and strongly convex. Spire extended and produced at an angle of about 45°. Aperture subcircular, with the outer lip greatly thickened when a varix is produced. Parietal lip rather narrow, heavily glazed and with numerous, somewhat irregular, low lamellae. Inner margin of the outer lip with 7 strong denticles which extend well back into the aperture and which may be single or divided. Columella arched inward, with its base continuing into the parietal margin of the siphonal canal. Siphonal canal narrow, moderately long and generally curved upward. Suture slightly indented. Sculpture consisting of 6 strong spiral cords, which are nodulose and are interspaced with fine thread-like cords. Axial sculpture consisting of 5 to 8 rounded varices. There are 3 to 5 larger knobs between each pair of varices. These knobs are variable in size, both as to length and height. Many of them may extend over three of the heavy spiral cords. Periostracum reddish brown, very thin, produced in fringed axial blades and usually deciduous. Operculum broadly oval, with a subcentral nucleus and sculptured with concentric growth lines. Embryonic whorls 6, strongly convex, broad, amber in color and with fine axial striae.

length	width	
85 mm.	49 mm.	Marquesas Islands, Polynesia
78	43	Oshima, Osumi, Ryukyu Islands, Japan
71	43	Bermuda
57.5	29	Punta de los Colorados, Cienfuegos, Cuba
57	34	Long Reef, off Elliott Key, Florida

Types. The location of the type specimen of *T. nicobaricum* Röding is unknown. The type figure is in the Conchylien-Cabinet (1) 4, pl. 130, figs. 1246–1247. The holotype of *T. chlorostomum* Lamarck is probably in the Paris Museum. The holotype of *T. pulchellus* C. B. Adams is in the Museum of Comparative Zoology, no. 186135. We here restrict the type locality of *C. nicobaricum* to Jamaica.

Remarks. Like others in this family, this is a variable and widely dispersed species, occurring in both the Western Atlantic and the Indo-Pacific regions. We have been unable to separate the Indo-Pacific specimens from those of the Western Atlantic. The greatest variability is expressed in the number and size of the knobs. Some specimens have but a few large and rather irregular knobs while others have numerous, small and quite regular ones.

This species is not closely related to any other in the Western Atlantic. It superficially resembles both *C. pyrum rehderi* and *C. pileare*. However, the extended spire and small and nearly circular aperture of *nicobaricum* readily differentiates it from *rehderi*. From *C. pileare* it differs in having a nearly circular rather than oval aperture, a more twisted siphonal canal and a much coarser, knobbed sculpture.

The embryonic whorls in this species are quite different from those of most other species in the genus *Cymatium* in the Western Atlantic. They are proportionately much wider, stouter and far more conical in shape than other embryonic shells in this genus.

Range. Western Atlantic: From Palm Beach County, Florida, south to Tortugas; Bermuda and the West Indies, and from Mexico south at least to Honduras. It has been reported from Bahia, Brasil by Lange de Morretes (1949, p. 92).

Indo-Pacific: Hawaiian and Marquesas Islands, west to southern Japan, south to New Caledonia and west, through the East Indies and the Indian Ocean Islands to Mauritius. It has been reported from New South Wales, Australia according to D. F. McMichael (in litt.). There are several published records of this species from Madeira and the Canary Islands in the Eastern Atlantic.

Specimens examined. Western Atlantic. Florida: Jupiter Inlet; Riviera Beach, Palm Beach County (both FSM); Lake Worth, Boynton (FSM; T. McGinty; G. Kline; J. Schwengel); Boca Raton Inlet (J. A. Flowers); Bear Cut, Biscayne Key (H. and K. Johnstone); Long Reef, off Elliott Key (G. Voss); Molasses Reef, off Key Largo (R.

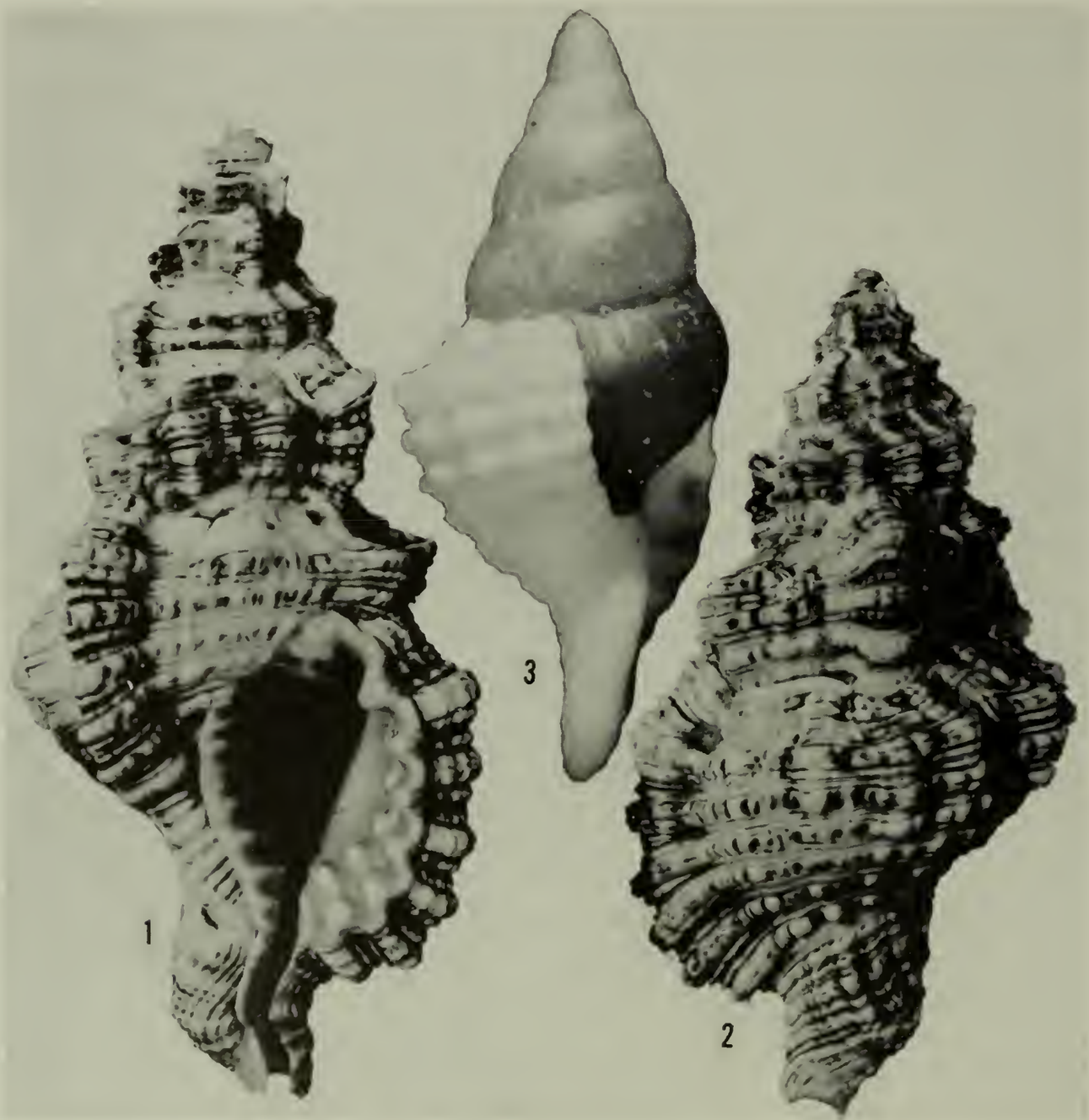

Plate 120. *Cymatium nicobaricum* Röding. Figs. 1–2. Nuevitas, Camagüey, Cuba (2x). Fig. 3. Barbados, Lesser Antilles (embryonic whorls, 13.7x).

Work); Sombrero Key (MCZ); Looe Reef, off Big Pine Key (MCZ); Sand Key, Key West (FSM); Pelican Shoals, Key West (R. Work); Garden Key, Dry Tortugas (FSM). Bermuda: (ANSP; MCZ). Bahama Islands: West End Point, Grand Bahama Island (MCZ); Hope Town, Great Abaco (R. Robertson); Sweetings Village, Great Abaco; Alice Town, North Bimini, Bimini Islands (both MCZ); North Cat Cay and Gun Cay, Bimini Islands; Morgans Bluff, Andros; Clifton Bluff, New Providence (all T. McGinty); Dicks Point, New Providence (MCZ); Harbour Island, Eleuthera (G. Kline); Little San Salvador Island; Northeast Point, 4 miles E of Arthurs Town, Cat Island; Clarence Town, Long Island; Abrahams Bay, Mariguana Island; Matthew Town, Great Inagua (all MCZ). Cuba: Habana, Habana (ANSP); Matanzas Bay, Matanzas (C. J. Finlay); Varadero, Cárdenas (C. G. Aguayo); Playa Comancho, Cárdenas (C. J. Finlay); Cayo Santa María, off Punta Alegre, Camagücy (R. Humes); Nuevitas, Camagüey (C. J. Finlay); Castillo de Jagua, Cienfuegos; Punta de los Colorados, Cienfuegos (both MCZ); Rente, Santiago de Cuba (C. G. Aguayo); Fish Point, Guantánamo Bay (MCZ). Hispaniola: Miragoâne, Haiti (W. J. Eyerdam); Montecristi; Puerto Plata; Puerto Sosúa; Santa Bárbara de Samaná, all Santo Domingo (all MCZ). Jamaica: Port Antonio (MCZ); Whitehouse (J. K. Howard). Puerto Rico: Mona Island (A. Phares); San Juan; San Geronimo; Camuy; Rincón; Bahía de Añasco; Punta Algarrobo; Mayagüez; Punta Cuchara; near Maunabo (all G. Warmke); Ponce (MCZ). Virgin Islands: The Baths, Virgin Gorda; Guana Island, Tortola (both M. W. Dewey); St. John (MCZ); St. Thomas (MCZ; ANSP); 1 mile N of Frederiksted, St. Croix (G. Usticke). Lesser Antilles: Barbados; Speyside, Tobago; Carenage, Trinidad (all MCZ). Caribbean Islands: Georgetown, Grand Cayman, Cayman Islands (C. G. Aguayo); Roatan Island, Bay Islands (ANSP). Mexico: Tuxpan, Veracruz; Veracruz, Veracruz (both T. Pulley); Cabo Catoche, Yucatan (MCZ). Honduras: Balfate (FSM).

Indo-Pacific. Hawaiian Islands: Hilo, Hawaii (MCZ; J. Schwengel); Kihui, Maui (W. Old); Waikiki, Oahu; off Koko Head, Oahu (both MCZ); Fort Kamehameha, Oahu (J. Schwengel); Midway Island (MCZ). Line Islands: Palmyra Island (MCZ). Marquesas Islands: (MCZ). Society Islands: Punaauia, Tahiti; Vaitape, Bora Bora (both R. Robertson). Phoenix Islands: Canton Island (MCZ). Samoan Islands: Nuuuli, Tutuila (MCZ). Ellice Islands: Funafuti (MCZ). Fiji Islands: Bega Island (J. Schwengel); Tokoh, 3 miles SW of Levuka, Ovalau (MCZ). Gilbert Islands: Apiang (MCZ). Marshall Islands: Ebon Island (MCZ); Rujoru Island and Iqurin Island, Eniwetok Atoll; Bikini Island, Bikini Atoll; Naen Island; Rongelap Atoll (all USNM). Marianas Islands: Agaña Bay, Guam; Tinian Island; Tumon Bay, Guam (all MCZ); Saipan (W. Old). Caroline Islands: N of Garokottan Island; Garakayo Island; Ngargersiul Island; East Babelthuap Island, all Palau Islands (all ANSP). New Caledonia: Isle of Pines (MCZ). New Guinea: Gusika, 13 miles N of Finschhafen, Australian New Guinea; Jamna Island, Dutch New Guinea (both MCZ). Abroeki, Aoeri Island, Geelvink Bay, Dutch New Guinea (ANSP). Australia: Lizard Island, north Queensland (E. Grigg). Gloucester Island, Whitsunday Group, Queensland (W. Old). Japan: Tokyo Bay (MCZ). Ryukyu Islands: Oshima, Osumi (MCZ). Philippine Islands: Guiuan, Samar Island; Lubang Island; Calapan, Mindoro; Siasi Island, Tapul Group, Sulu Islands (all MCZ). Molucca Islands: Bouro Island; Amboyna; Tengah Island, Bouro Island; Dagasoeli Island, North Loloda Island;

Morotai Island (all MCZ). Indian Ocean Islands: Mauritius (MCZ; J. Schwengel).

Subgenus **Septa** *Perry*

Septa Perry 1810, Arcana, pl. 2, fig. 2; Perry 1811, Conchology, London, pl. 14, fig. 2 (type species, *Septa scarlatina* Perry [=*Murex rubeculus* Linné], monotypic).

Lampusia Schumacher 1817, Essai Nouveau Système, p. 350 (type species, *Murex pilearis* Linné, subsequent designation, Herrmannsen 1847).

Simpulum Mörch 1852, Catalogus Conchyliorum Comes de Yoldi, p. 108 (type species, *Murex rubeculum* Linné, here selected); non *Simpulum* Fabricius 1823.

Simplum Stoliczka 1867, Paleontologia Indica (5) **2**, p. 131 (error for *Simpulum* Mörch).

Type species, *Septa scarlatina* Perry [=*Murex rubeculus* Linné], monotypic.

Shells medium to small in size, exceptional shells of *C. pileare* Linné reaching 138 mm. (about 5½ inches) in length; attenuate, imperforate and generally solid in structure. Color white buff or gray usually with spiral bands of brown or red-brown. Sculpture very variable among the several species, but generally with well-developed varices and strong spiral cords or ribs. Many species have fairly large knobs between the varices and these can be in axial arrangement. Aperture generally with well-developed denticles on the outer lip and many, usually fine plicae on the parietal wall. Siphonal canal short and usually curved upward.

Cymatium (Septa) rubeculum occidentale, new subspecies

Plate 110, fig. 3; Plate 113, fig. 5; Plate 121, figs. 1–3

Triton rubeculum occidentale 'Mörch' Tryon 1881, Manual of Conchology (1) **3**, p. 12 [nomen nudum].

Description. Shell rather small, reaching 32 mm. (about 1¼ inches) in length, rather solid, imperforate and strongly sculptured. Color light brownish yellow with 1 to 2 spiral bands of white. Post-embryonic whorls 5. Spire moderately extended and produced at an angle of about 55°. Aperture subelliptical, the outer lip greatly thickened when a varix is produced. Outer lip with 8 denticles. Inner lip with 14 or 15 rather coarse lamellae. Siphonal canal rather narrow, short and curved upward. Columella nearly straight. Suture slightly indented. Sculpture consisting of 7 or 8 beaded cords of nearly equal strength. Axial sculpture consisting of 3 to 5 ribbed varices. Between the varices there are 3 to 5 weak axial ridges. In addition, there are close-set axial threads which, crossing the spiral cords, produce the beaded effect and give the shell a reticulated appearance. Periostracum light straw-yellow in color and consisting of numerous close-set, low, axial, fringed blades. Operculum unknown. Embryonic shell very small for the size of the adult and consisting of 3 whorls which are light brown in color.

length	width	
32 mm.	17.5 mm.	Holotype, St. Thomas, Virgin Islands
25	16	Paratype, Carboneras, Matanzas, Cuba

Types. The holotype is in the Academy of Natural Sciences Philadelphia, no. 36874, from St. Thomas, Virgin Islands, R. Swift, collector. Paratypes from Carboneras, 1½ miles west of Río Camarioca, Matanzas, Cuba, collected by C. J. Finlay are in the collections of C. J. Finlay, T. McGinty and the Museum of Comparative Zoology, no. 202269.

Remarks. We are describing *C. rubeculum occidentale* as a new subspecies though this has long been known under the name *occidentale* Mörch. However, Mörch never described this subspecies. He used the term "occidentale" four times under the genus *Triton* in his paper on the "Synopsis molluscorum marinorum Indiarum occidentalium" (1877, Malakozoologische Blätter **24,** pp. 14–32). His use of the word "occidentale" was to indicate that he was considering only the specimens from the West Indies and not the Orient. Tryon made the original error in the Manual of Conchology (loc. cit.) when he stated that "Mörch made a variety, *occidentale*, but it has no distinctive characters." So far as we can determine no subsequent author referring to this form has ever described or figured it.

The subspecies *occidentale* differs from the typical form by being smaller, having a finer sculpture and being more somberly colored. Typical *rubeculum* of the Indo-Pacific region is usually an intense brick-red or orange-brown, while in *occidentale* the color is usually a dull brownish red to a light brown. In the West Indies this subspecies could be easily confused with small specimens of *C. pileare*, but they may be separated by the obtuse point of the spire and beaded sculpture of *occidentale*.

It would appear that the embryonic shell breaks off very easily in this subspecies. We have seen a few specimens which were collected alive but even these lack the embryonic whorls. Only a single specimen with the embryonic shell still attached has been seen.

Range. From southern Florida and probably all of the West Indies west to Central America.

Plate 121. *Cymatium rubeculum occidentale* Clench and Turner. Fig. 1. St. Thomas, Virgin Islands (Holotype, 2.8x). Fig. 2. Pigeon Cays, Andros Island, Bahama Islands (3x). Fig. 3. Off Lantana, Florida in 10 fathoms (embryonic whorls, 10x).

Specimens examined. Florida: Palm Beach in 25 and 40 fathoms (both T. McGinty); Ocean Ridge and off Lantana in 10 fathoms, Palm Beach County (both FSM). Bahama Islands: Pigeon Cays, Andros (T. McGinty). Cuba: Carboneras, 1½ miles W of Río Camarioca, Matanzas (C. J. Finlay; T. McGinty; MCZ). Virgin Islands: St. Thomas (ANSP). Mexico: Cabo Catoche, Yucatan (MCZ); Isla Mujeres, Yucatan (Museo Poey).

Cymatium (Septa) pileare *Linné*

Plate 112, figs. 1–2; Plate 113, fig. 7; Plate 122, figs. 1–3; Plate 123

Murex pileare Linné 1758, Systema Naturae, ed. 10, p. 749 [refers to Gualtierius 1742, pl. 49, fig. G] (M. Mediterraneo).

Triton pileare Linné, Lamarck 1816, Tableau Encyclopédique et Méthodique **3**, pl. 415, fig. 4a–b; Liste, p. 4; Lamarck 1822, Histoire Naturelle des Animaux sans Vertèbres **7**, p. 182 (l'Océan des Antilles).

Triton aquatilis Reeve 1844, Conchologia Iconica **2**, **Triton**, pl. 7, fig. 24 (Ticao, Philippine Islands).

Triton martinianum d'Orbigny 1847 [in] Sagra, Histoire de l'Ile de Cuba, Mollusques **2**, p. 162 [new name for *Triton pileare* Lamarck 1822, non *Murex* [*Triton*] *pileare* Linné 1758].

Litiopa effusa C. B. Adams 1850, Contributions to Conchology, no. 5, p. 71 (Jamaica); Turner 1956, Occasional Papers On Mollusks **2**, p. 136, pl. 21, fig. 3 [is the veliger stage].

Triton intermedius Pease 1869, American Journal of Conchology **5**, p. 74 (Oahu, Hawaiian Islands).

Triton martinianum latior Mörch 1877, Malakozoologische Blätter **24**, p. 29 [nomen nudum].

Triton veliei Calkins 1878, Records and Proceedings Davenport Academy of Natural Sciences **2**, p. 235, pl. 8, figs. 1–2 (southern Florida).

Dissentoma prima Pilsbry 1945, Nautilus **59**, p. 59, text fig. 1 (off Singers Island near North Inlet, Lake Worth, Palm Beach, Florida); Pilsbry 1949, Nautilus **62**, p. 142.

Description. Shell moderately large, reaching 138 mm. (about 5½ inches) in length, solid, imperforate and strongly sculptured. Color, in specimens denuded of their periostracum, a grayish brown to golden brown, generally banded with alternating light and dark bands, particularly on the varices. Within the aperture the color on the outer lip is reddish-brown with 12 to 14 whitish plicae which are often paired. Parietal wall a dark chocolate in color, with numerous fine, irregular, white lamellae. Post-embryonic whorls seven and strongly convex. Spire moderately extended and produced at an angle of 45°. Aperture elliptical with the outer lip greatly thickened when a varix is produced. Parietal lip glazed and with numerous irregular lamellae. Siphonal canal short and generally curved upward. Columella arched inwardly with its base continuing into the parietal margin of the siphonal canal. Suture slightly indented. Sculpture consisting of numerous spiral and generally nodulose cords of unequal strength. Axial sculpture consisting of 3 to 5 strongly knobbed varices. Periostracum generally a light golden brown in color, roughened with numerous periostracal 'hairs' and axial blades. Operculum unguiculate with a marginal nucleus and sculptured with numerous concentric growth ridges. Embryonic whorls four, slightly convex, amber in color and with very fine, axial striae.

length	width	
138 mm.	65 mm.	Philippine Islands
115	56	Rebecca Shoals, 45 miles W of Key West, Florida
111	52.5	Banes, Cuba
100	47	Mauritius
96	47.5	Castle Harbour, Bermuda
94	44	Boca Raton, Florida
84.5	42.5	Biscayne Bay, Florida

Types. The only reference given by Linné for *pileare* was to Gualtierius, pl. 49, fig. G and this is the type figure. The locality "M. Mediterraneo" given by Linné is in error. This species does not occur in the Mediterranean. The lectotype of *Litiopa effusa* C.B. Adams is in the Museum of Comparative Zoology, no. 186589 from Jamaica. The lectotype of *T. intermedius* Pease is also in the Museum of Comparative Zoology, no. 191331, from Oahu, Hawaiian Islands. The holotype of *Dissentoma prima* Pilsbry is in the Academy of Natural Sciences Philadelphia, no. 181369. The location of the holotype of *T. veliei* Calkins is unknown to us, but idiotypes from Key West, Florida are in the Museum of Comparative Zoology, no. 150085.

Plate 122. *Cymatium pileare* Linné. Fig. 1. Apiang Island, Gilbert Islands (2x). Fig. 2. Oahu, Hawaiian Islands (lectotype of *Triton intermedius* Pease [=*C. pileare* Linné] MCZ 191331, about 2x). Fig. 3. Venetian Causeway, Biscayne Bay, Florida (1.35x).

As Linné's type locality, as stated above, was in error we take that given by Lamarck as 'l'Océan des Antilles' and restrict it to Jamaica, the locality given by Lister who was Lamarck's first reference.

Remarks. This is an exceedingly far-ranging species occurring as it does in the tropical portion of the Western Atlantic and throughout most of the Indo-Pacific. There have been several attempts to separate specimens of the Atlantic from those of the Indo-Pacific, beginning with d'Orbigny who created a new name for Lamarck's use of *pileare* Linné. However, we have been unable to separate specimens from these two very distant areas on any shell characters.

Individual specimens from one locality may show a great deal of variation, but there does not appear to be any geographic significance to these variations.

Range. Western Atlantic: From Jupiter Inlet, Florida south to Tortugas; off Port Aransas, Texas in deep water (32 fathoms); Bermuda and the West Indies from the Bahamas, and from Veracruz, Mexico south to Bahia, Brasil.

Indo-Pacific: The Hawaiian Islands, west to the Ryukyu Islands, Japan and south through the East Indies and the Indian Ocean to East Africa.

Specimens examined. Western Atlantic. Florida: Jupiter Inlet (FSM); Boynton Inlet, Lake Worth (D. Moore; FSM; T. McGinty); 5 miles S of Delray Beach (FSM); Boca Raton Inlet (E. V. Flowers; FSM; T. McGinty); Pompano (MCZ); Biscayne Bay (R. Humes); off Key Largo (R. Merrill); off Sombrero Light in 35 fathoms (T.

Plate 123. *Cymatium pileare* Linné. Arthurs Town, Cat Island, Bahama Islands (embryonic whorls, 36x).

McGinty); Bahia Honda Key (D. and N. Schmidt); Pelican Shoal, off Boca Chica Key; Key West; Sand Key, off Key West (all MCZ); off Rebecca Shoals, about 45 miles W of Key West in 19 fathoms (H. and K. Johnstone); Dry Tortugas (MCZ). Texas: SE of Port Aransas in 32 fathoms (C. L. Branch). Bermuda: Castle Harbour (dredged fossil, H. B. Moore). Bahama Islands: Eight Mile Rock, Grand Bahama (MCZ); Cooper Jacks Cays, Great Abaco (R. Robertson); Alice Town, North Bimini (MCZ); Gun Cay, Bimini (T. McGinty); Middle Bight, Andros; Dicks Point, Nassau, New Providence (both G. Kline); Savannah Sound, Eleuthera; Orange Creek, near Arthurs Town, Cat Island; Clarence Town, Long Island; Watling Island; Fortune Island; Cay Sal, Cay Sal Bank (all MCZ). Cuba: Puerto Esperanza, Pinar del Río; Habana, Habana; Camarioca, Matanzas; Matanzas, Matanzas (all Museo Poey); Varadero, Matanzas (J. Finlay); Caibarién, Las Villas (MCZ); Cayo Maja Figuro, Punta Alegre, Camagüey (R. Humes); Banes, Oriente (J. Finlay); Levisa Bay, Mayari, Oriente (A. Quiñones); Maisí, Oriente (Museo Poey); Cuesco Beach, Guantánamo Naval Base (MCZ); Níspero, Santiago, Oriente (Museo Poey); Caleton de Don Bruno, Cienfuegos (MCZ). Jamaica: Port Antonio (MCZ; ANSP); Whitehouse (J. K. Howard). Hispaniola: Jérémie and Miragoâne, Haiti; Montecristi, Puerto Plata, and Puerto Sosúa, Santo Domingo (all MCZ). Puerto Rico: Mona Island (MCZ); San Juan (D. Thomas; R. Work); Arecibo (G. Warmke); Bahía de Aguadilla (A. Phares); Rincón; Bahía de Añasco; Mayagüez; Punta Guanajibo; Guanica (all G. Warmke; MCZ); Ponce (MCZ); near Maunabo (G. Warmke). Virgin Islands: Frederiksted, St. Croix (G. Usticke; MCZ); St. John; St. Thomas (both MCZ); Guana Island, Tortola; The Baths, Virgin Gorda (both M. W. Dewey). Lesser Antilles: St. Kitts; Guadeloupe (both ANSP); St. Lucia; Barbados (both MCZ); Buccoo Reef, Tobago (MCZ; K. Anderson); Chaguaramas, Trinidad (H. G. Kugler); Grenada (K. Anderson). Caribbean Islands: Southwest Point, Grand Cayman, Cayman Islands (ANSP). Mexico: Tuxpan, Veracruz; Cabo Catoche, Yucatan; Isla Mujeres, Yucatan (all MCZ). Honduras: Puerto Cortez (MCZ); Belfate (FSM). Panama: 2 miles off Colón; Brujas Point, Canal Zone (both W. G. Clark). Dutch Guiana: Corentyne River (dead, H. G. Kugler); Brasil: Itaparica, Ilha de Itaparica, Bahia (H. S. Lopes).

Indo-Pacific. Hawaiian Islands: Fort Kamehameha, Oahu (J. Schwengel); Pearl Harbor, Oahu (V. D. Spicer). Line Islands: Kingman Reef, 33 miles NW of Palmyra Island (J. Schwengel). Society Islands: Arue, Tahiti; Vaitape, Bora Bora (both R. Robertson). Gilbert Islands: Apiang (MCZ). Caroline Islands: Garakayo Island, Palau Islands; Babelthuap, Palau Islands (both ANSP). Marianas Islands: Saipan (W. Old). Fiji Islands: Bega Island (J. Schwengel). Japan: Ryukyu Islands (MCZ). Philippine Islands: Subic Bay, Zambales, Luzon; Calapan, Mindoro; Tagbac, Lubang; Araceli, Dumaran Island, Palawan; Davao, Mindanao; Zamboanga, Mindanao (all MCZ). New Guinea: Island 5 miles NW of Rani Island, Schouten Islands; Abroeki, Aoeri Island, Geelvink Bay; Samberbaba, Japen Island, all Dutch New Guinea (all ANSP); Jamna Island, Dutch New Guinea (MCZ); Madang Island, Finschafen, Australian New Guinea (E. Grigg). Australia: Augustus Island, northern Western Australia (MCZ); Low Wooded Isle and Portland Roads, both northern Queensland (both E. Grigg). Indonesia: Toelehoe, Amboina (MCZ); Woda Island, Halmahera, Molucca Islands; Moratai Islands; St. Nicholas Bay, Bali Island, Greater Sunda Islands (all MCZ). Indian Ocean Islands: 12 miles N of Trincomalee, Ceylon (W. Old);

Mauritius: Zanzibar (both MCZ): Nosy Bé, Madagascar (A. Humes). Pakistan: Makran Coast (MCZ). Aden: (MCZ). Kenya: Mombassa (MCZ): Kilifi (E. Grigg). Portuguese East Africa: Bazaruto Island, Bazaruto Bay (J. K. Howard).

Cymatium (Septa) krebsii *Mörch*

Plate 112, figs. 3–4: Plate 124, figs. 1–4

Triton krebsii Mörch 1877, Malakozoologische Blätter **24**, p. 30 (St. Thomas and St. Croix [Virgin Islands]); Kobelt 1878, Conchylien Cabinet (2) **3**, pt. 2, p. 265, pl. 70, figs. 3–4.

Cymatium (*Lampusia*) *krebsii* Mörch. Rehder and Abbott 1951, Revista de la Sociedad Malacológica **8**, pl. 8, fig. 6.

Lampusia? pharcida Dall 1889, Bulletin Museum Comparative Zoology **18**, p. 227, pl. 36, fig. 2 (*Blake*, station 293, N.Lat. 13°14′23″; W.Long. 59°39′10″, off Barbados in 81 fathoms).

Description. Shell medium in size, reaching 73 mm. (about 3 inches) in length, solid, imperforate and strongly sculptured. Color entirely white or white with spiral bands of yellowish brown in the grooves between the cords. Interior of the aperture white. Postembryonic whorls 7 and strongly convex. Spire extended and produced at an angle of about 37°. Aperture nearly vertical and narrowly elliptical. Outer lip greatly thickened when a varix is produced. Parietal lip rather narrow and heavily glazed. On the outer lip there are 6 or 7 strong denticles which extend well into the aperture. On the inner lip, at the upper end there is a strong lamella which forms the margin of the anal canal. On the columella and well within the aperture there are two large and somewhat irregular lamellae. In addition, between the anal lamella and the base of the siphonal canal there are numerous and very fine thread-like lamellae. Columella slightly arched inwardly, with its base continuing into the parietal margin of the siphonal canal. Siphonal canal narrow, rather short and curved upward. Suture slightly indented. Sculpture consisting of from 5 to 7 strong, nodulose varices. Between the varices there are 5 or 6 somewhat irregular and strongly nodulose, axial ridges. These are crossed by 6 or 7 heavy spiral cords. Between these cords there are three subequal but rather fine thread-like cords. Periostracum thin, deciduous, roughened and golden-brown in color. Operculum unguiculate with a marginal nucleus and numerous concentric growth lines. Embryonic whorls 3½ to 4, smooth, straw-yellow in color, narrow, extended and with microscopic axial striae.

length	width	
73 mm.	37 mm.	off New Ground Shoals, Dry Tortugas, Florida
58.5	29	Punta Guanajibo, Puerto Rico

Types. The holotype of *C. krebsii* Mörch is probably in the Universitetets Zoologiske Museum, Köbenhavn, Denmark. There are two paratypes from the Swift Collection in the Academy of Natural Sciences Philadelphia, no. 42605. The holotype of *C. pharcidum* Dall is in the United States National Museum, no. 94887. The type locality is here restricted to St. Thomas, Virgin Islands, the locality from which Swift's material came.

Remarks. Cymatium krebsii Mörch is a very rare species to judge by the few specimens in museum collections. It differs from *C. nicobaricum* in the shape of the aperture and the lack of color in the aperture, though in general sculptural characters it appears to be quite close to that species. From *C. pileare* Linné it differs in general shape and in the

lack of color in the aperture. In addition, it is far more nodulose. From both *C. nicobaricum* and *C. pileare* it differs by having two rather large columellar lamellae. See also *Remarks* under *C. gemmatum* Reeve.

Cymatium krebsii is apparently related to *C. corrugatum* Lamarck of the Eastern Atlantic, both species agreeing in the approximate shape of the more or less vertical and narrow, elliptical aperture. In both species the aperture is white and both have the large columellar lamellae. *C. krebsii* differs from *corrugatum* in being somewhat smaller and in being far more nodulose.

Range. From Palm Beach County, Florida to Dry Tortugas and south through the West Indies.

Records. FLORIDA: off Delray Beach in 65 and 80 fathoms (FSM; T. McGinty); off Palm Beach in 25 to 75 fathoms (T. McGinty; J. Schwengel; ANSP); Nellies Point, Fish Haven, Palm Beach County (ANSP); North Inlet, Lake Worth (T. McGinty); SE of Miami in 30 fathoms (T. McGinty); Little Duck Key (J. Schwengel); off Sombrero Light, E of Marathon in 37 fathoms (T. McGinty); Bahia Honda Key; off Key

Plate 124. *Cymatium krebsii* Mörch. Fig. 1. Off Sombrero Key, Florida (about 1.4x). Fig. 2. St. Thomas, Virgin Islands (paratype, 1.32x). Fig. 3. Off Barbados, Lesser Antilles (Holotype of *C. pharcidum* Dall [= *C. krebsii* Mörch], 5x). Fig. 4. Lake Worth, Palm Beach Co., Florida (showing embryonic whorls, 8x).

West in 18 fathoms (both H. and K. Johnstone): off Sand Key Light, Key West in 70 fathoms (T. McGinty): off New Ground Shoals, Dry Tortugas (USNM): off Tortugas in 18–20 fathoms (T. McGinty): off Destin in 14 fathoms (ANSP; T. McGinty); off Panama City in 21 fathoms (T. McGinty). Puerto Rico: Punta Guanajibo (A. Phares). Virgin Islands: St. Thomas (ANSP). Lesser Antilles: off Scarborough, Tobago in 36 fathoms (MCZ). Venezuela: Cubagua Island (MCZ).

Cymatium (Septa) gemmatum *Reeve*

Plate 110, fig. 2: Plate 113, fig. 6: Plate 125, figs. 1–2

Triton gracilis of authors, not of Reeve 1844.

Triton gemmatus Reeve 1844, Conchologia Iconica **2, Triton,** pl. 15, fig. 60 a–b (Island of Ticao, Philippine Islands).

Triton mundum Gould 1849, Proceedings Boston Society Natural History **3,** p. 143 (Tutuila, Samoan Islands).

Description. Shell small, reaching 43 mm. (about $1\frac{3}{4}$ inches) in length, rather solid, imperforate and strongly sculptured. Color yellowish brown, with patches of reddish brown on the varices. Interior of the aperture white. Post-embryonic whorls six and convex. Spire extended and produced at an angle of about 50°. Aperture elliptical. Outer lip thickened, the inner edge with 12 denticles which are grouped in pairs. Upper portion of the parietal wall with a large tooth formed to create the anal canal. Central portion of the parietal wall with very weak lamellae. At the base of the aperture the parietal lamellae increase in size and then diminish along the siphonal canal. Siphonal canal long, narrow, almost closed and curved slightly upward. Suture slightly indented. Axial sculpture consisting of 2 or 3 varices. Between the varices there are 3 or 4 rather weak axial ridges; in addition, there are numerous very fine, axial threads. Spiral sculpture consisting of numerous moderately heavy cords which are interspaced with finer cords. Embryonic whorls 5, yellowish amber in color, rather narrow and glass-like. Operculum unguiculate with a marginal nucleus at the base and with concentric growth lines. Periostracum thin, straw-yellow in color, smooth over most of the shell but producing fringed blades on the varices and axial ribs.

length	width	
43.5 mm.	21 mm.	Oshima, Osumi, Japan
36	18	Bazaruto Bay, Portuguese East Africa
34	14	Cays off Cárdenas, Matanzas, Cuba
28.5	13.5	Puerto Plata, Santo Domingo

Types. The types of *C. gemmatum* Reeve are probably in the British Museum; the type locality is the Island of Ticao [off Masbate], Philippine Islands. The location of the holotype of *C. mundum* Gould is unknown. An idiotype is in the Museum of Comparative Zoology.

Remarks. This species has long been known under the name of *gracilis* Reeve, but it certainly does not fit the description and figure of that species. Reeve's figure gives no indication of the enlarged columellar plicae and the large parietal lamella which aids in forming the clearly defined anal canal. Both of these characters are exhibited in the figure of *gemmatum*.

This is a rare species: it has been taken from low water to depths of 117 fathoms.

In relationship it appears to be nearest to *C. krebsii* Mörch. It differs from that species by having a smaller aperture and by having the columellar plicae proportionately smaller. Adult specimens of *C. gemmatum* are very much smaller, being only about half the size of an adult *C. krebsii*. However, it is often difficult to differentiate the young of *krebsii* from adult *gemmatum*.

The range given below is only an indication of the range of this species. It probably occurs throughout all of the tropical portions of both the Indo-Pacific and the Western Atlantic.

Range. Western Atlantic: Southern Florida from Palm Beach County to the lower Florida Keys and the West Indies, south to Trinidad.

Indo-Pacific: The Hawaiian Islands, west to southern Japan, south to northern Australia and west to Portuguese East Africa.

Specimens examined. Western Atlantic. Florida: Boynton Beach (T. McGinty); off Boynton, Palm Beaeh County (from stomach of a moray in 10 fathoms); 2 miles S of Boynton in 10 fathoms (both FSM); off Lantana in 25 fathoms; off Palm Beach Inlet in 25 and 40 fathoms; Boca Raton (all T. MeGinty); off Hillsborough Light, Brevard County in 20 fathoms (FSM); off Miami in 27 fathoms (T. McGinty); off The Elbow, Key Largo in 66 fathoms; 5 miles off Carysfort Light, Key Largo in 96 and 117 fathoms (all MCZ). Bermuda: St. George (T. McGinty). Bahama Islands: Channel Cay, Great Abaeo (R. Robertson); Nassau and Clifton Bluff, New Providence; North Bimini and Gun Cay, Bimini Islands (all T. MeGinty). Cuba: Arenas de la Chorrera, Habana

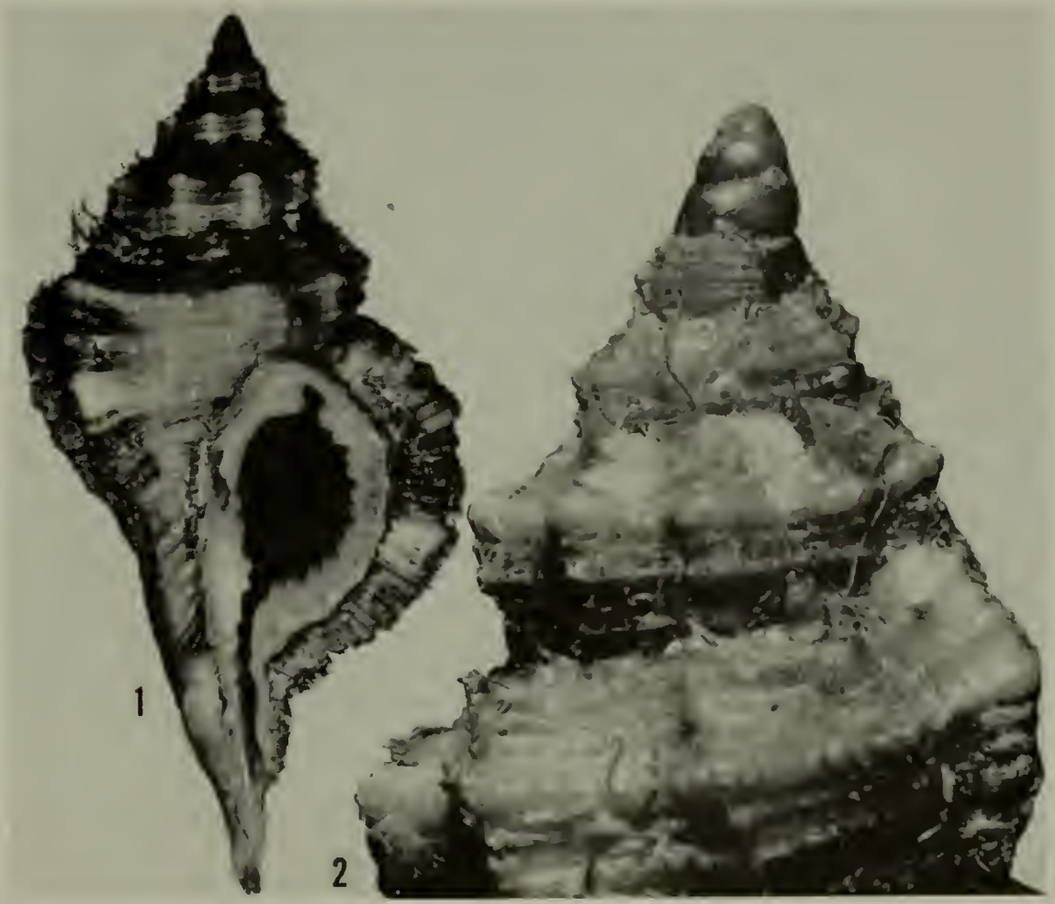

Plate 125. *Cymatium gemmatum* Reeve. Fig. 1. Cárdenas Keys, Matanzas, Cuba (2.9x). Fig. 2. North Bimini Island, Bimini Islands, Bahamas (8x).

(MCZ): Cays off Cárdenas, Matanzas: Varadero Beach, Matanzas (both C. J. Finlay). Hispaniola: Cap Haitïen, Haiti (T. McGinty): Caye Carenge, Boucassin, Haiti (R. Work): Puerto Plata, Santo Domingo (MCZ). Puerto Rico: Arecibo: Punta Algarrobo (both U.P.): Rincón (G. Warmke). Virgin Islands: St. Croix (FSM). Lesser Antilles: off Barbados. *Blake*, in 50 and 100 fathoms; 2 miles S of Fort George, Scarborough, Tobago in 36 fathoms (both MCZ).

Indo-Pacific. Hawaiian Islands: off Koko Head, Oahu (MCZ). Samoan Islands: Vaoto, Vailele Bay, Upolu Island (ANSP). Howland Island (MCZ). Gilbert Islands: Apiang (MCZ). Caroline Islands: Ponape (MCZ): Koror, Palau Islands (ANSP). Japan: Oshima Osumi (MCZ): Chishima, Okinawa, Ryukyu Islands (J. Schwengel). Philippine Islands: Lubang (MCZ). Australia: Debris Bay, Cape Grafton, near Cairns, Queensland (J. K. Howard): Murray Island, Great Barrier Reef, Queensland (MCZ). Indian Ocean Islands: Ceylon; Zanzibar (both MCZ). Portuguese East Africa: Bazaruto Island, Bazaruto Bay (J. K. Howard).

Subgenus **Gutturnium** *Mörch*

Gutturnium Mörch 1852, Catalogus Conchyliorum Comes de Yoldi, p. 109.

Type species, *Triton tuberosum* Lamarck [=*Distorsio muricina* Röding], subsequent designation, Dall 1904.

Shell medium in size and gray to brown in color. Sculpture consisting of a few varices, with one to four knobbed axial ridges. Spiral sculpture of numerous beaded cords, with finer cords between them. Whorls convex. Siphonal canal narrow, moderately extended

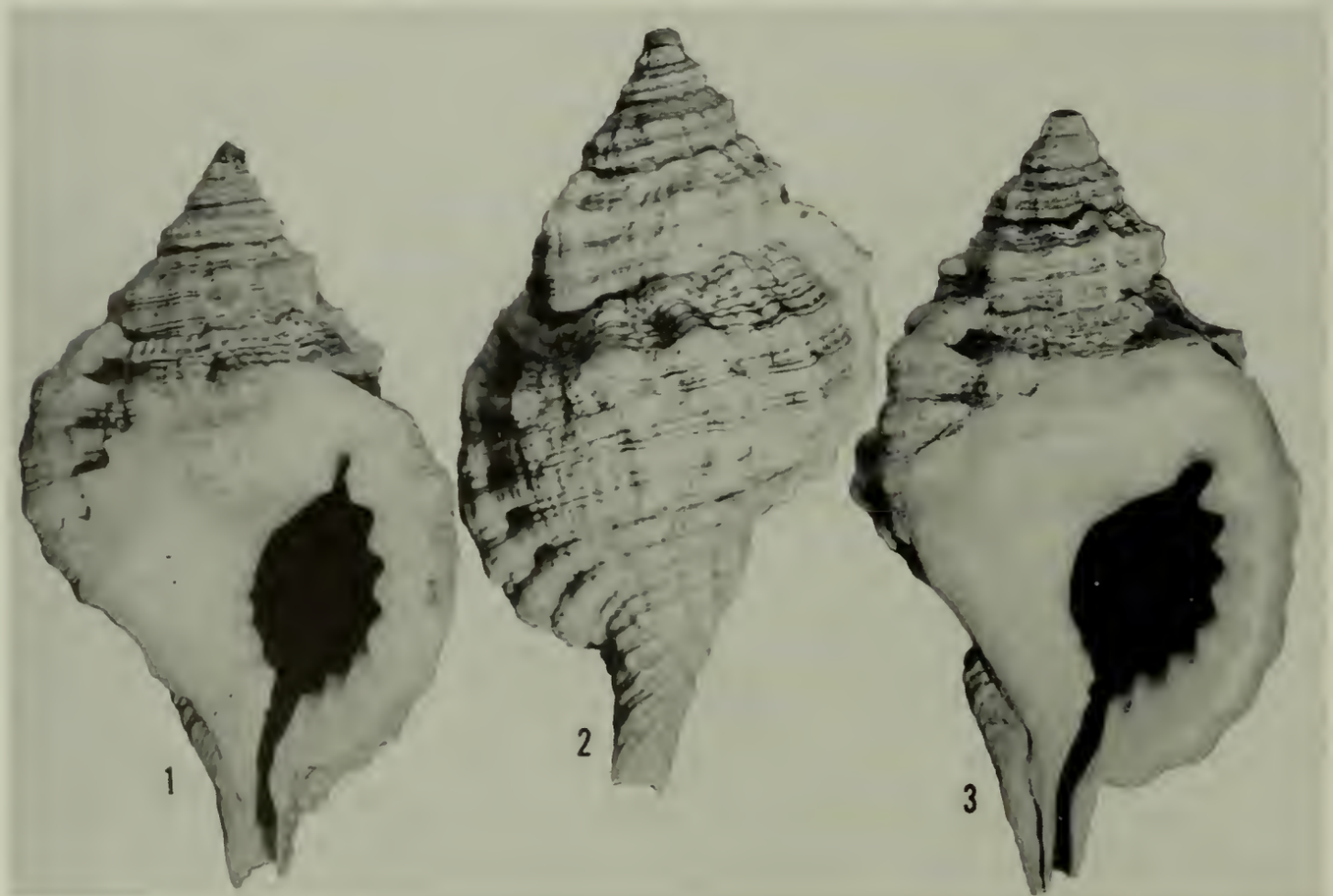

Plate 126. *Cymatium muriciuum* Röding. Figs. 1–2. Caleton de Don Bruno, Cienfuegos, Cuba (2.16x). Fig. 3. Savu Savu Bay, Vanua Levu Island, Fiji Islands (2.16x).

and directed upward. Aperture subcircular and having a broad parietal shield. Periostracum thin and deciduous. Operculum unguiculate with an apical nucleus and sculptured with concentric growth lines.

There is only one species in this subgenus in the Western Atlantic.

Cymatium (Gutturnium) muricinum *Röding*

Plate 112, figs. 5–6; Plate 113, fig. 8; Plate 126, figs. 1–3; Plate 127

Distorsio muricina Röding 1798, Museum Boltenianum, p. 133 [refers to Martini (1) 3, pl. 112, figs. 1050–1051].

Murex pyrum Gmelin 1791, Systema Naturae, ed. 13, p. 3535 [in part, reference to Martini (1) 3, pl. 112, figs. 1050–1051, only].

Triton tuberosum Lamarck 1822, Histoire Naturelle des Animaux sans Vertèbres 7, p. 185 (l'Océan des Grandes Indes). [Refers to Martini (1) 3, pl. 112, figs. 1050–1051.]

Triton pyriformis Conrad 1849, Journal Academy Natural Sciences Philadelphia (n.s.) 1, p. 211 [refers to Martini (1) 3, pl. 112, figs. 1050–1051].

Triton productum Gould 1852, United States Exploring Expedition 12, Mollusca, p. 240 (Fiji Islands).

Triton antillarum d'Orbigny 1842 [in] Sagra, Histoire de l'Ile de Cuba, Mollusques 2, p. 161, pl. 23, fig. 20 (Cuba).

Litiopa obesa C. B. Adams 1850, Contributions to Conchology, no. 5, p. 71 (Jamaica) [embryonic shell].

Description. Shell medium in size, reaching about 75 mm. (about 3 inches) in length, solid, imperforate and strongly sculptured. Color dull grayish brown, with occasional banded specimens having broad bands of dark reddish brown; often these bands are visible only in transmitted light. Lip and parietal shield white to light ivory and highly glazed. Interior of aperture a dark reddish brown. Post-embryonic whorls 5 to 7, and strongly convex. Spire elevated and produced at an angle of about 60°. Aperture subcircular with the outer lip greatly thickened when a varix is produced. Parietal lip glazed to form a rather broad shield. There are 4 or 5 inconspicuous plicae at the base of the columella. The outer lip has 7 strongly developed crenulations. Siphonal canal extended, though variable in length, and directed upward at an angle of about 55°. Columella slightly arched inwardly, its base continuing into the parietal margin of the siphonal canal. Suture irregular and somewhat indented. Sculpture consisting of numerous spiral and nodulose cords of unequal strength, and numerous fine, thread-like ridges. Axial sculpture consisting of 7 or 8 nodulose varices. In addition there are 2 to 3 knobbed ridges between the varices which give the shell a very rugose appearance. Periostracum produced in numerous rows of thin low blades, light brown in color and deciduous. Operculum unguiculate, its nucleus apical and the surface roughened by numerous fine concentric ridges.

length	width	
75 mm.	37.5 mm.	Mokuole Island, Kaneohe Bay, Oahu, Hawaiian Islands
71	33	Port Antonio, Jamaica
58	28	Mauritius
49	31	Caleton de Don Bruno, 4 mi. SW of Cienfuegos, Cuba
46	25.5	Savusavu, Vanua Levu, Fiji Islands

Types. The type figures are here selected to be Martini, Conchylien-Cabinet (1) 3, pl. 112, figs. 1050–1051, for *muricinum* Röding, *tuberosum* Lamarck and *pyriformis* Conrad, as indicated in the synonymy, were all based on these figures. The type of *antillarum* d'Orbigny is in the British Museum (Natural History). The holotype of *productum*

Gould is probably in the United States National Museum. The type locality as given by Martini is the Coromandel Coast, India. The holotype of *L. obesa* C. B. Adams is in the Museum of Comparative Zoology, no. 186594.

Remarks. So far as we can detect there is no appreciable difference between the Western Atlantic and the Indo-Pacific specimens of the species. It is quite variable in size at maturity and specimens also vary as to the number and development of the nodulose varices and ridges.

Range. Western Atlantic: Bermuda and from Jupiter Inlet, Florida and Veracruz, Mexico throughout the West Indies and south to Estado do Paraná, Brasil (Morretes, 1949).

Indo-Pacific: From the Hawaiian Islands south to the Marquesas, west to the Ryukyu Islands, the Philippines south to Australia and the East Indies and west in the Indian Ocean to Zanzibar.

Specimens examined. Western Atlantic. Florida: Jupiter Inlet (FSM); Lake Worth, Boynton (MCZ; FSM; ANSP; T. McGinty); Boca Raton (J. N. Flowers); off Fort Lauderdale (MCZ); Key Biscayne (J. K. Howard; R. Work); Grassy Key (ANSP); Boca Chica Key (D. and N. Schmidt); Pelican Shoals, Key West; Dry Tortugas (both FSM). Bermuda: Castle Harbour (MCZ). Bahama Islands: North Point,

Plate 127. *Cymatium muricinum* Röding. Miragoâne, Haiti (to show embryonic whorls, 30x).

Elbow Cay, Great Abaco (R. Robertson); Settlement Point, Grand Bahama; Adelaide, New Providence (both MCZ); Lyford Cay, New Providence (G. & M. Kline); South Bimini; Little San Salvador; Arthurs Town, Cat Island; Clarence Town, Long Island (all MCZ); Man Island, Eleuthera (G. and M. Kline). CUBA: Varadero, Matanzas (ANSP; J. Schwengel); Cárdenas, Matanzas (MCZ; J. Finlay); Cayo Francés, Caibarién, Las Villas (P. J. Bermúdez); Cayo Santa María, Camagüey (R. Humes); Banes, Oriente; Santiago, Oriente (both C. G. Aguayo); Blue Beach, Guantánamo Naval Base, Oriente; Caleton de Don Bruno, Cienfuegos (both MCZ). HISPANIOLA: Miragoâne, Haiti; Montecristi; Puerto Plata and Santa Bárbara de Samaná, all Santo Domingo (all MCZ). JAMAICA: Port Antonio (MCZ). PUERTO RICO: San Juan (D. Thomas); north of Veja Baja (MCZ); Arecibo; Aguada (both G. Warmke); Bahía de Añasco; Punta Guanajibo; Mayagüez; Ponce (all MCZ; UP; ANSP); Puerto Patillas (G. Warmke). VIRGIN ISLANDS: St. Thomas; St. John (both MCZ); Guana Island, Tortola (M. W. Dewey); St. Croix (FSM; ANSP). LESSER ANTILLES: Guadeloupe (ANSP); Barbados (MCZ). CARIBBEAN ISLANDS: Curaçao, Dutch West Indies. MEXICO: Veracruz, Veracruz (T. Pulley; MCZ). PANAMA: Colón (ANSP).

INDO-PACIFIC. HAWAIIAN ISLANDS: Mokuole Island, Kaneohe Bay, Oahu; Kawaihae, Hawaii; Hilo Bay, Hawaii (all MCZ). LINE ISLANDS: Palmyra Island (MCZ). BAKER ISLAND (MCZ). SOCIETY ISLANDS: Punaauia and Arue, Tahiti; Teavaro-Teaharoa, Moorea (all R. Robertson). MARSHALL ISLANDS: Ebon Island (MCZ). GILBERT ISLANDS: Apiang (MCZ). MARIANAS ISLANDS: Tumon Bay, Guam (MCZ); Apra Harbor, Guam (W. Old). CAROLINE ISLANDS: Ponape (MCZ); Peleliu Island and Koror Island, Palau Islands (both ANSP). FIJI ISLANDS: Valanga Bay, Vanua Levu; Suva, Viti Levu (both MCZ); Bega Island (J. Schwengel). NEW CALEDONIA (MCZ). NEW GUINEA: Sowek, Soepiori Island, Schouten Islands, Dutch New Guinea (ANSP). AUSTRALIA: Two Isles, Queensland (E. Grigg). JAPAN: Ookamijima, Taira, Miyako, Ryukyu Islands; Machinato, Okinawa, Ryukyu Islands (both MCZ). PHILIPPINE ISLANDS: Guiuan, Sámar; Calapan, Mindoro; Lubang; off Aborlan, Palawan (all MCZ). MOLUCCA ISLANDS: Tengah Island, off Bouro Island; Bouro Island; Amboina Island (all MCZ). INDIAN OCEAN ISLANDS: Hikkadua, Ceylon (ANSP); Mauritius; Zanzibar (both MCZ). KENYA: Kilifi (E. Grigg). PORTUGUESE EAST AFRICA: Bazaruto Island, Bazaruto Bay (J. K. Howard); Mozambique (J. Schwengel).

Subgenus **Monoplex** *Perry*

Monoplex Perry 1811, Conchology, pl. 3, fig. 3.

Type species, *Monoplex australasiae* Perry [= *Cymatium parthenopeum* von Salis], here selected.

Both Herrmannsen 1846 and Gray 1847 gave *M. olearium* as the type species of *Monoplex*, but this name was not included among the species described by Perry for this subgenus.

Shell medium to moderately large in size and generally yellowish to brownish in color. Sculpture consisting of large spiral cords and occasionally of varices. The shell is usually rimately umbilicate. Periostracum heavy, produced in fringed axial blades and usually deciduous. Operculum unguiculate, with an apical nucleus.

Cymatium (Monoplex) parthenopeum[1] *von Salis*

Plate 110, fig. 4; Plate 112, figs. 7–8; Plate 113, figs. 9–10; Plate 128, figs. 1–3

Triton olearius of authors not the *Murex olearium* Linné 1758 and 1767. We here select Linné's reference to Gualtieri 1742, pl. 50, fig. A to be the type figure of *M. olearium* Linné which is an earlier name for *Ranella gigunten* Lamarck.

Murex costatus Born 1778, Index Rerum Naturalium Musei Caesarei Vindobonensis **1**, p. 295 (locality unknown); Born 1780, Testacea Musei Caesarei Vindobonensis, p. 297 [refers to Seba 1758, Thesauri **3**, pl. 57, fig. 31], non *Murex costatus* Pennant 1777.

Murex parthenopeus von Salis 1793[2] Reisen in versch. Prov. Königreich Neapel **1**, p. 370, pl. 7, fig. 4; 1795, English translation by Aufrere, p. 462, pl. 7, fig. 4 (Bay of Naples).

Triton succinctum Lamarck 1816, Tableau Encyclopédique et Méthodique **3**, pl. 416, fig. 2; Liste, p. 5; Lamarck 1822, Histoire Naturelle des Animaux sans Vertèbres **7**, p. 181 (mers de la Nouvelle-Hollande).

Triton americanum d'Orbigny 1842 [in] Sagra, Histoire de l'Ile de Cuba, Mollusques **2**, p. 163, pl. 23, fig. 22 (Cuba).

Triton brasilianum Gould 1849, Proceedings Boston Society Natural History **3**, p. 142 (Rio de Janeiro, Brasil); Gould 1856, Appendix, p. 504 of the United States Exploring Expedition **12**, pl. 17, fig. 296.

Monoplex australasiae Perry 1811, Conchology, London, pl. 3, fig. 3 (New Holland and Lord Howe's Island).

Triton (Simpulum) acclivis Hutton 1873, Catalogue of the Marine Mollusca of New Zealand, Wellington, p. 13, fig. 8 (New Zealand).

Description. Shell large in size, reaching 145 mm. (about $5\frac{3}{4}$ inches) in length, rather heavy in structure, imperforate or with a small umbilical chink and with a pronounced spiral sculpture. Color brownish yellow, usually fairly uniform, but occasionally with spiral bands of slightly darker brown which become much darker on the varices. Embryonic whorls three, smooth, light straw-yellow in color, extended and slightly tilted from the remaining whorls. Post-embryonic whorls 7 to 8, convex and slightly shouldered. Spire moderately extended and produced at an angle of about 55°. Aperture subelliptical, the outer lip margined within by coarse teeth which are grouped in pairs, occasionally having smaller secondary teeth. These palatal teeth are opposite the grooves which are between the spiral cords. Parietal wall with numerous, irregular, white plicae, the area between the plicae being a dark reddish brown. There is a single large ridge on the upper portion of the parietal wall which margins the anal canal. Siphonal canal somewhat variable and curved upward and slightly to the left when viewed dorsally. Columella thickened and continuing as the parietal margin of the siphonal canal. Suture slightly indented. Sculpture consisting of 5 or 6 broad, low and often nodulose, spiral cords, with numerous finer cords on the base and on the siphonal canal. In addition, there are numerous fine spiral threads which appear in the interspaces as well as on the cords themselves. Axial sculpture consisting of numerous fine growth lines. Varices rather low and usually with only two, including the lip, showing in fully grown adult specimens. Periostracum rather thin, a dark golden brown in color and produced in numerous axial blades with a hair-like fringe, and usually deciduous. Operculum unguiculate with a terminal nucleus and sculptured with numerous concentric growth lines.

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[1] Parthenope was an old name for the town of Neapolis [Naples].

[2] We have seen only the English translation by Anthony Aufrere 1795, "Travels through various Provinces of the Kingdom of Naples in 1789," London, 527 pages, 9 plates.

length	width	
145 mm.	79 mm.	Bermuda
109	64	Nagasaki, Japan
96	56	Rio de Janeiro, Brasil
89	52.5	Moreton Bay, Queensland, Australia

Types. The type of *Murex costatus* Born is in the Zoological Museum, Vienna, Austria. The type of *Triton americanum* d'Orbigny is in the British Museum (Natural History). A paratype of *T. brasilianum* Gould is in the Museum of Comparative Zoology, no. 191179. We do not know the location of the type specimens of the other names listed in the synonymy. The type locality is Naples, Italy.

Remarks. The distribution of this species is quite remarkable, existing as it does in most tropical and warm temperate seas. On the basis of shell morphology we can detect no consistent differences in the specimens from any of the widely separated localities. This opinion was held by Watson (1886, p. 391) who reviewed most of the material con-

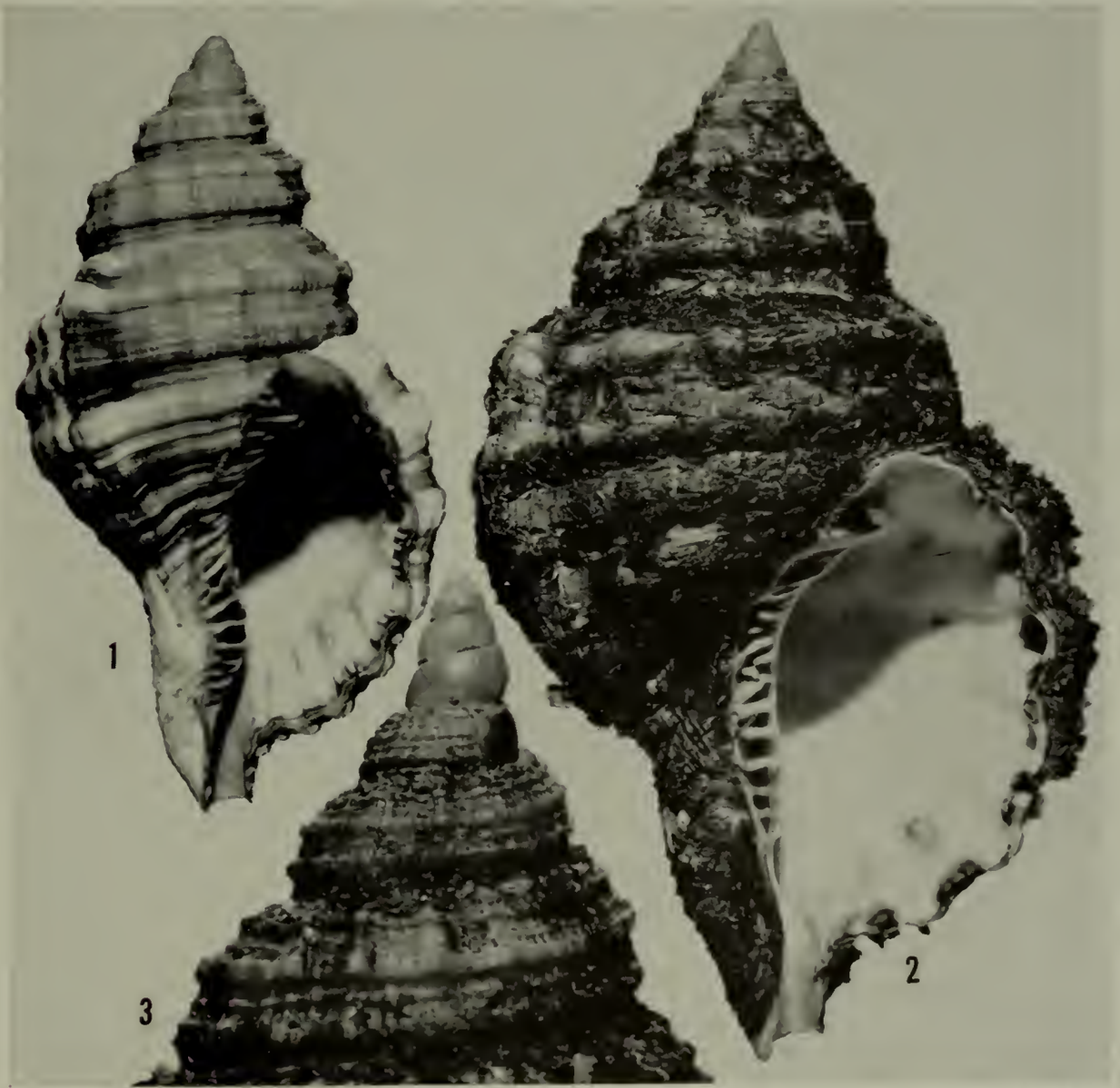

Plate 128. *Cymatium parthenopeum* von Salis. Fig. 1. Moreton Bay, Queensland, Australia (natural size). Fig. 2. Sanibel Island, Florida (natural size). Fig. 3. Rio de Janeiro, Brasil (to show embryonic whorls, 8x).

tained in several of the European museums. There may, of course, be consistent differences in the soft anatomy, but this study still remains to be done.

Our records are too few to determine whether or not there is a continuous population between the end localities in any one region. For example, Nicklès (1950, p. 86) states it occurs from Morocco and south to the Cape of Good Hope, but he neither lists any localities nor indicates upon how much material this statement was based. We possess material from Japan, Australia and New Zealand, but have no material from between these very widely separated localities. It is not known to occur in the Eastern Pacific.

The well-known name of *M. costatus* Born must give way to *C. parthenopeum* von Salis because of an earlier use of *Murex costatus* by Pennant in 1777 as indicated in the synonymy above. However, the name of von Salis has been used generally by Europeans for this species.

This species apparently is rarely found alive in the intertidal area, but it does occur from just below low water to depths of at least 35 fathoms.

De Gregorio (1884, Bullettino della Società Malacologica Italiana **10,** p. 96) described two living and one fossil varieties of *parthenopeum* from Sicily.

Range. Eastern Atlantic: Western Mediterranean, the Azores and south to the Union of South Africa.

Western Atlantic: Bermuda, Florida and Mexico, the West Indies and south to Brasil.

Indo-Pacific: Japan, eastern Australia, northern New Zealand and Portuguese East Africa.

Specimens examined. Florida: south end of Lake Worth; Jupiter Inlet, Palm Beach Co. (both FSM); Bear Cut, Key Biscayne (R. Work); Dry Tortugas (R. Merrill; FSM); Naples (MCZ); Sanibel Island (J. Schwengel); St. Andrews Bay, Panama City (R. Work). Texas: off Port Isabel in 25 fathoms (H. and K. Johnstone). Mexico: off Laguna Madre, Tamaulipas in 32 to 35 fathoms (H. Hildebrand); 15 miles N of Tecolutla, Veracruz (T. Pulley); Campeche (H. Hildebrand). Bermuda: (MCZ). Cuba: Matanzas Bay and Varadero Beach, Matanzas (both J. Finlay). Puerto Rico: Mona Island; Punta Algarrobo (both G. Warmke). Virgin Islands: St. Thomas (ANSP); Tortola (MCZ; ANSP). Lesser Antilles: Barbados; Trinidad (both MCZ). Brasil: Praia de Leste, Ilha Guaiba, Est. de Rio de Janeiro (de Oliveira); Rio de Janeiro (MCZ); Praia de Urca, Districto Federal; Manguinhos, Ilha de Itaparica, Est. de Bahia (both de Oliveira).

Eastern Atlantic. France: Marseilles (MCZ). Italy: Catania, Sicily (W. Old). Algeria: Gulf of Oran in 19 fathoms (MCZ). Azores: Fayal (MCZ). Senegal: Dakar (MCZ). South Africa: Jeffreys Bay (D. H. Kennelly); Port Alfred (J. Schwengel).

Indo-Pacific. New Zealand: Lauranga Harbour; Hen and Chicken Reef (both MCZ); Pana, Parengarenga Harbour (A. W. B. Powell). Australia: Moreton Bay, Queensland (MCZ; J. Schwengel); Narooma, New South Wales (MCZ); Sydney, New South Wales (J. Schwengel); Ulladulla, New South Wales (E. Grigg). Japan: Awaji; Kishiu; Misaki, Sagami; Yenosima; Tokyo Bay; Koka Shima (all MCZ); Nagasaki (ANSP). Portuguese East Africa: Bazaruto Island, Bazaruto Bay (J. K. Howard).

Subgenus **Cymatium** *Röding*

Cymatium Röding 1798, Museum Boltenianum, p. 129.

Type species, *Murex femorale* Linné, subsequent designation, Dall 1904.

Shell large, triangular in cross section, and generally a rich golden brown in color. Sculpture consisting of large knobs and spiral cords, in addition to having three or more well-developed varices. Both palatal denticles and parietal plicae usually well-developed. Generally with a depressed area at the beginning of the siphonal canal. Siphonal canal usually extended and curved upwardly. Periostracum thin and slightly roughened over most of the surface, but producing high, thin, axial blades which are fringed. Operculum small for the size of the aperture, unguiculate, with a terminal nucleus and sculptured with rather coarse concentric ridges.

Plate 129. *Cymatium femorale* Linné. Fig. 1. Great Abaco, Bahama Islands (slightly reduced). Fig. 2. Bear Cut, Miami, Florida (slightly enlarged). Fig. 3. French Beach, Varadero, Matanzas, Cuba (to show embryonic whorls, 12.4x).

Only one member of this subgenus is found in the Western Atlantic, with a single species in the Eastern Pacific: the remaining few species are from the Indo-Pacific area.

Cymatium (Cymatium) femorale *Linné*

Plate 110, fig. 1: Plate 112, figs. 9–10: Plate 113, fig. 11; Plate 129, figs. 1–3

Murex femorale Linné 1758, Systema Naturae, ed. 10, p. 749 (O. Asiatico); Hanley 1855, Ipsa Linnaei Conchylia, p. 287.

Lotorium lotor Montfort 1810, Conchyliologie Systématique 2, p. 583 (côtes d'Afrique).

Septa triangularis Perry 1811, Conchology, pl. 14, fig. 6 (Southern Ocean).

Triton lotorium Lamarck 1816, Tableau Encyclopédique et Méthodique, Liste, p. 5, Atlas 3, pl. 415, fig. 2.

Description. Shell large, reaching 220 mm. (about 8½ inches) in length, strong but not heavy, imperforate and sculptured. Color a golden brown to light reddish brown with alternating bands of brown and white on the varices. Whorls 8 or 9, convex, somewhat flattened dorso-ventrally and slightly shouldered. Spire somewhat extended. Aperture auricular in shape, the parietal wall consisting of a thin glaze: within there may be 1 to 4 or 5 small relatively inconspicuous plicae. Certain of these appear to be independently produced while others are nothing more than the glaze over the spiral cords. Outer lip rolled inwardly to form a varix. Columella irregular; it may be nearly straight or strongly arched inwardly and to the left. Siphonal canal somewhat extended and curved upwardly. Suture relatively indistinct. Sculpture consisting usually of five varices (lip included), visible in the adult. The varices are knobbed, the knobs being the high points where the spiral cords pass over them. There are 6 to 8 rather heavy, conspicuous spiral cords, the largest and heaviest at the shoulder. In addition, this shoulder cord may be irregularly nodulose and occasionally smaller nodules are present on the cords below the shoulder cord. Between the cords there are numerous spiral threads and these are crossed by somewhat finer axial threads. Operculum unguiculate and relatively small for the size of the aperture. It has a marginal nucleus and the growth ridges are concentrically developed. Periostracum thin, light but rough, somewhat foliated, yellowish brown in color and deciduous. Occasional specimens are found with several axial, fringed blades of periostracum which correspond with the axial ribs of the shell.

length	width	
212 mm.	115 mm.	Gulf of Mexico
176	74	Savannah Sound, Eleuthera Island, Bahama Islands
153	75	Cayo Francés, Caibarién, Las Villas, Cuba

Types. The holotype of *Murex femorale* Linné, according to Hanley (1855) is in the Linnean Collection of the Linnean Society, London. We here restrict the type locality to Jamaica, the locality given by Lister in his *Historiae Methodicae Conchyliorum* on plate 941 to which Linné referred.

Remarks. This is a species of rather wide distribution throughout the West Indian region. Specimens are not rare, yet they never appear to be common at any one locality. They are usually found a little beyond low water in areas with a sandy bottom where sea grass is abundant. Dall (1889, p. 132) has given Cedar Keys as the northern limit of this species on the west coast of Florida. This appears to be an error, however, as the species probably does not occur, at least alive, north of Key West on the west coast of Florida.

Range. Bermuda, southeastern Florida and the lower Florida Keys, throughout the West Indies, and from central Mexico south to Bahia, Brasil.

Specimens examined. FLORIDA: Melbourne, Brevard Co. (FSM); Bear Cut, Key Biscayne, Miami (R. Work; H. and K. Johnstone); Ragged Keys, Biscayne Bay (MCZ); Key West (ANSP; FSM); Tortugas (J. Miller). BERMUDA: Castle Harbour (dredged dead, H. B. Moore). BAHAMA ISLANDS: High Rock, Grand Bahama (MCZ); Elbow Cay, Great Abaco (G. Kline; R. Robertson); Nixon's Harbour, South Bimini, Bimini Islands: Hog Island, New Providence (both MCZ); Dick's Point, Nassau, New Providence (G. Kline); Spanish Wells, Eleuthera (MCZ; J. Schwengel); The Current, Eleuthera (G. and M. Kline); Sandy Point, Savannah Sound, Eleuthera; Little San Salvador; Orange Creek, Cat Island; Arthurs Town, Cat Island; Wemyss, Long Island; Matthew Town, Great Inagua (all MCZ). CUBA: near Habana (R. Humes); Cayo Francés, Caibarién, Las Villas (Museo Poey); Varadero, Cárdenas, Matanzas (ANSP; J. Finlay); Fishpoint, Guantánamo Bay (MCZ). HISPANIOLA: Cap Haïtien, Haiti (W. J. Eyerdam); Montecristi, Santo Domingo; Puerto Plata, Santo Domingo (both MCZ). JAMAICA: Whitehouse (J. K. Howard). PUERTO RICO: Cataño; Arecibo (both G. Warmke); Punta Borinquén (A. Phares); Rincón; Bahía de Añasco; Mayagüez; Ensenada; Puerto Patillas (all G. Warmke); Punta Guanajibo; Punta Algarrobo (both UPR). VIRGIN ISLANDS: Guana Island, Tortola (M. Dewey); St. Thomas (MCZ; ANSP); St. Johns (MCZ); St. Croix (FSM). LESSER ANTILLES: Barbados (MCZ; ANSP); English Harbour, Antigua (K. Anderson). CARIBBEAN ISLANDS: Oranjestad Harbour, Aruba (D. P. Barnes). MEXICO: Tampico, Tamaulipas; 15 miles N of Tecolutla, Veracruz (both T. Pulley). NICARAGUA: Bluefields (MCZ). PANAMA: Panama (Atlantic) (MCZ). BRASIL: Itapagipe, Salvador, Bahia (H. L. Lopes).

Cymatium (Cymatium) tigrinum *Broderip*

Plate 130, figs. 1–2

Triton tigrinus Broderip 1833, Proceedings Zoological Society London, p. 5 (in America Centrali (Guacomayo)).

Description. Shell large, reaching 185 mm. (about $7\frac{1}{2}$ inches) in length, strong and fairly heavy, imperforate and sculptured. Color a light reddish brown to yellow, overlaid by a rather dark reddish brown, roughened periostracum. Varices dark brownish red between the spiral cords. This color is also present inside the outer lip. Base of the columella may also be stained a dark mahogany-brown. Whorls 8 to $8\frac{1}{2}$, convex and flattened dorso-ventrally. Spire extended. Aperture subelliptical. Outer lip thickened when the heavy varix is present. Inner lip consisting of a somewhat heavy glaze on the parietal area. Outer lip rolled inwardly to form a varix. Columella straight to slightly curved. Siphonal canal somewhat extended and curved upwardly. Sculpture consisting usually of five varices (lip included) which are visible in the adult. These varices are doubled in all specimens which we have seen, except for the last varix. The varices are knobbed, the knobs being the high points where the spiral cords pass over the varices. There are 8 or 9 conspicuous spiral cords; the largest may possess 1 or 2 rather large nodules. In between the cords there are numerous and relatively indistinct spiral threads. Apical sculpture consisting mainly of very fine growth lines. Periostracum rather heavy, roughened, particularly at the varices and deciduous. Operculum unknown.

length	width	
185 mm.	101 mm.	Acapulco, Mexico
164	86	Corinto, Nicaragua
111	65	Panama

Types. The holotype of *T. tigrinus* Broderip is probably in the British Museum (Natural History). The type locality is Guacomayo, Central America. We have been unable to locate any coastal village by this name.

Remarks. This is a very distinct species and apparently not closely related to any other known species. We have added it here only as representing the Eastern Pacific analogue of the Western Atlantic *C. femorale*. The two species, however, are not closely related.

This appears to be a very rare species to judge by the few specimens that are to be found in our museums. The range we give below is probably not the limitations of this species. It may very well extend south at least to northern Ecuador.

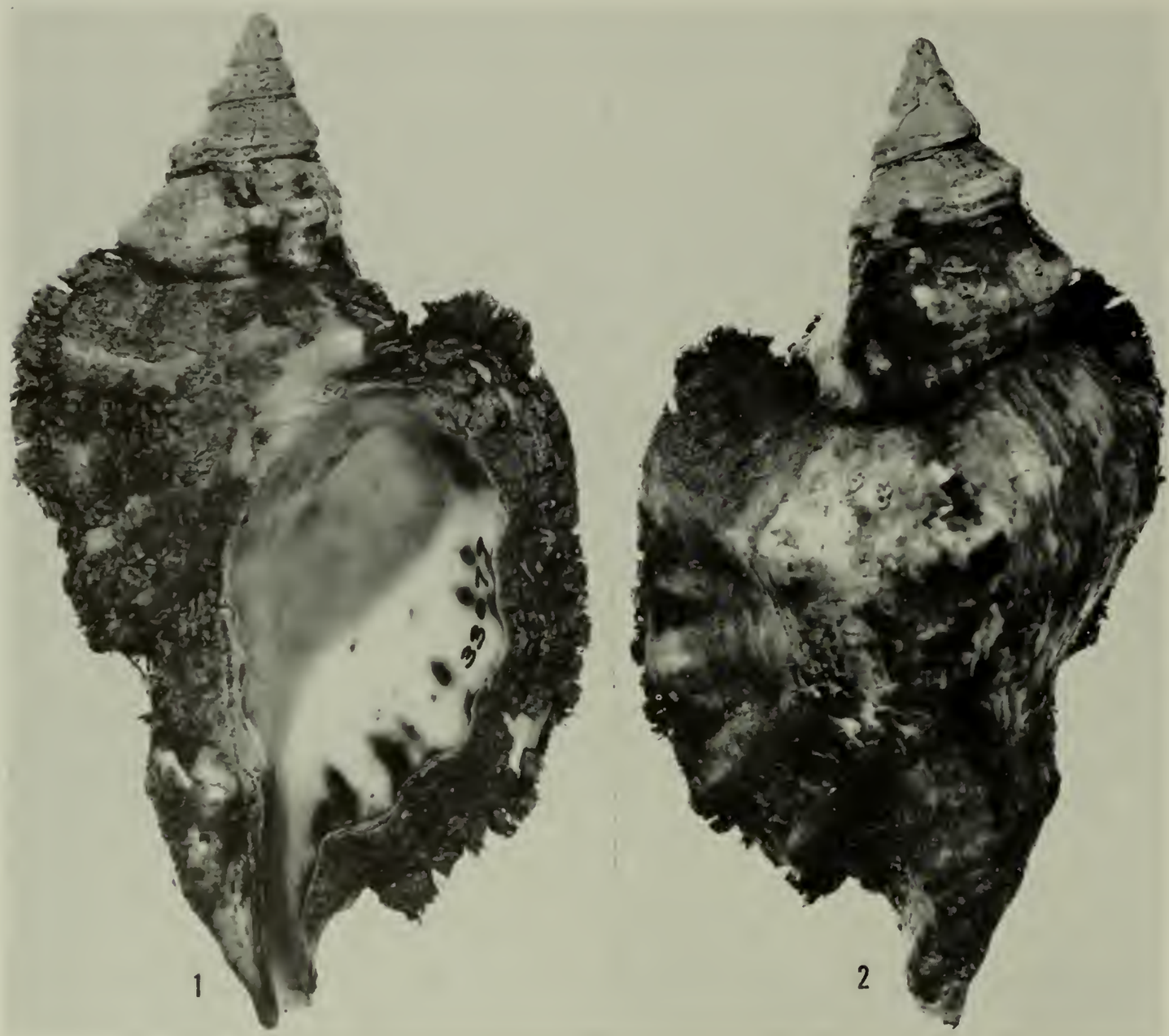

Plate 130. *Cymatium tigrinum* Broderip. Figs. 1–2. Costa Rica. (California Academy of Sciences, no. 33079, natural size.) Photograph through the kindness of Dr. L. G. Hertlein.

Range. From La Paz, Baja California (Pilsbry and Lowe 1932) south to Panama.

Specimens examined. MEXICO: Acapulco (MCZ: San Diego Soc. Nat. Hist.): Est. Oaxaca (Stanford Univ.). NICARAGUA: Corinto (San Diego Soc. Nat. Hist.). COSTA RICA: (California Acad. Science: USNM). PANAMA: (MCZ; ANSP: USNM). Venado Island (J. Schwengel: Mrs. J. D. Elliott): Balboa, Canal Zone (W. Old).

Genus **Distorsio** *Röding*

Distorsio Röding 1798, Museum Boltenianum, p. 133.

Distortrix Link 1807, Beschreibung der Naturalien-Sammlung der Universität zu Rostock, p. 122 (type species, *Distortrix anus* Linné [=*Murex anus* Linné], subsequent designation, Dall 1904).

Persona Denys de Montfort 1810, Conchyliologie Systématique **2**, p. 603 (type species, *Persona anus* Linné [=*Murex anus* Linné], monotypic).

Distorta Perry 1811, Conchology, pl. 10, fig. 2 (type species, *Distorta rotunda* Perry [=*Murex anus* Linné], subsequent designation, Puffer and Emerson 1953).

Distortio 'Bolten' Gray 1847, Proceedings Zoological Society London, p. 133 [correction for *Distorsio* Röding].

Distortix 'Link' Paetel 1875, Familien- und Gattungsnamen der Mollusken, Berlin, p. 71 [error for *Distortrix* Link].

Persoma 'Montfort' Paetel 1875, Familien- und Gattungsnamen der Mollusken, Berlin, p. 157 [error for *Persona* Montfort].

Distorsus 'Bolten' Paetel 1888, Catalog der Conchylien-Sammlung **1**, p. 103 [error for *Distorsio* Röding].

Distorsia 'Röding' Pilsbry 1922, Proceedings Academy Natural Sciences **73**, p. 359 [error for *Distorsio* Röding].

Type species, *Murex anus* Linné, subsequent designation, J. E. Gray 1847.

Winckworth in 1945 apparently overlooked Gray's type designation for this genus in 1847. Even though Gray corrected the spelling to *Distortio* there is no question that he was referring to *Distorsio* 'Bolten' Röding. Pilsbry (1922) has been credited with the type designation.

Shell ranging from 25 mm. (1 inch) to 75 mm. (about 3 inches) in length, imperforate, subglobose to elongate, and rather solid in structure. Color ranging from a grayish white to mottled brown. Whorls very irregular and distorted. Sculpture consisting of spiral cords and axial costae. Parietal shields thin but extended and portions of previous shields remain on earlier whorls producing the varices. Aperture auricular in appearance being complicated by numerous palatal denticles and parietal plicae. The denticles and plicae produced at earlier stages of growth are not absorbed as the shell grows but remain as internal structures in the shell as shown in Plate 131. Because of this apertural armature the shell is twisted and bulges to compensate for the space occupied by these internal denticulations.

Species in this genus are found in most tropical portions of the world and range from low water to depths of about 300 fathoms. According to Woodring (1928, p. 299) the earliest *Distorsio* s.s. appeared in the Byram marl, Upper Oligocene of Mississippi.

Some of our recent species are exceedingly close, if not identical with certain fossil forms. This is particularly true of *D. mcgintyi* Emerson and Puffer, and *D. decussatus similimus* Sowerby as figured by Woodring (1928, plate 18, fig. 9 and plate 19, fig. 1). The other specimens figured by Woodring (plate 18, figs. 7–8) appear to be *clathrata* Lamarck.

The opercula of all species so far examined are quite irregular, small for the size of the shell and often broken, undoubtedly a result of the great irregularity of the aperture. The nucleus of the operculum is submarginal. The general proportions and shape of the operculum and the muscle scars appear to be quite variable as shown on plate 132.

The radula is taenioglossate with a relatively small central tooth, a broad and denticulate lateral tooth and two subequal marginal teeth.

Subgenus **Distorsio** *Röding*

Distorsio Röding 1798, Museum Boltenianum, p. 133.

Type species, *M. anus* Linné, subsequent designation Gray 1847.

This subgenus contains but a single species and is characterized by the shell producing an exceedingly large parietal shield which extends well above the upper limits of the outer lip and covers the two preceding whorls. The early shields are not absorbed but remain as thin blade-like varices. Siphonal canal is nearly vertical and not visible from the apertural side.

Distorsio anus Linné, the only species now known to belong in the subgenus *Distorsio*, is wide-ranging throughout most of the tropical Indo-Pacific.

Subgenus **Rhysema**,[1] new subgenus

Shell ranging in size from 25 mm. (1 inch) to 90 mm. (about $3\frac{1}{2}$ inches). Color ranging from grayish white or light yellow to pinkish. Parietal shield broad but not extending above the upper limit of the outer lip. Sculpture consisting of spiral cords and axial costae, both being about equal in coarseness. Siphonal canal curved upwards but not vertical.

This subgenus differs from typical *Distorsio* by lacking the extended parietal shield and by not having the siphonal canal vertical.

Species in this subgenus occur in nearly all tropical and subtropical seas.

Type species, *Triton clathratus* Lamarck.

Distorsio (Rhysema) clathrata *Lamarck*
Plates 131; 132, figs. 2–8; 133

Triton clathratum Lamarck 1816, Tableau Encyclopédique et Méthodique, Liste, p. 4, Atlas **3**, pl. 413, fig. 4a–b; Lamarck 1822, Animaux sans Vertèbres **7**, p. 186 [reference to the Tableau only] (mers de l'Amérique Méridionale).

Distortrix reticulata 'Link' Dall 1889, Bulletin Museum Comparative Zoology **18**, p. 221 [in part]; non *D. reticulata* Link 1807 [= *D. reticulata* Röding 1798].

Description. Shell medium in size, reaching 77 mm. (about 3 inches) in length, rather solid, imperforate and strongly sculptured. Color white with a diffusion of yellowish or pinkish brown. Whorls 10, convex and irregular. Spire extended and produced at an angle of about 45°. Aperture auricular in shape, the outer lip being somewhat thickened and with 10 denticles, the third below the anal canal being the largest, while the smallest

[1] From the Greek, wrinkle; pucker.

one margins the siphonal canal. The largest denticle is opposite the deep parietal embayment. Inner lip consisting of numerous plicae. There are two large parietal plicae which margin the anal canal. On the lower portion of the columellar area there are 13 or 14 plicae. These are smallest near the siphonal canal, becoming larger posteriorly and project outward to form the anterior margin of the parietal embayment. In the parietal embayment the spiral cords are slightly thickened. A thin parietal shield is developed which is margined on the parietal side by glazing over the back of the thin varix and continuing as a ridge both above on the upper portion of the whorl and below to the mid area of the siphonal canal. Columella nearly straight but complicated by the numerous plicae. These plicae follow back to the early whorls. The denticles which were produced on early lips are not absorbed but remain within the shell as shown in Plate 131. Siphonal canal moderately short and narrow, deflected slightly toward the outer lip and turned slightly upward. Anal canal formed by the uppermost palatal denticle and the two parietal plicae. Suture slightly impressed, irregular and occasionally obscure. Spiral sculpture consisting of numerous cords interspaced with numerous and very fine spiral threads. Axial sculpture consisting of numerous ridges which cross the spiral cords to form a reticulated pattern. Where the spiral cords and axial ridges cross they produce small knobs. There are 7 to 9 varices. Operculum small for the size of the shell due to the distorted aperture. It is unguiculate in shape, has a submarginal nucleus and is sculptured with numerous concentric growth lines. Periostracum thin, yellowish brown in color, finely reticulate, and having numerous, fine hair-like processes over the entire surface and coarse hair-like processes on the knobs. The embryonic shell has 3 whorls which are smooth, glass-like in appearance and light amber in color.

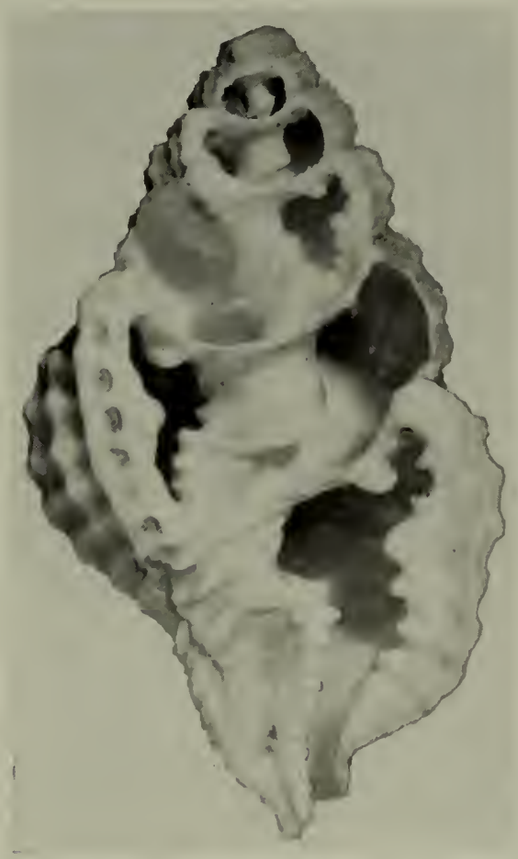

Plate 131. *Distorsio clathrata* Lamarck, Tuxpan, Veracruz, Mexico (1.5x). A sectioned shell to show retention of the early varices and apertural armature.

length	width	
77 mm.	43 mm.	off Key West, Florida
70	38	Bahía de Campeche, Mexico
67	34	West of Tortugas, Florida
62	34	Puerto Plata, Santo Domingo

Types. The present location of the holotype of *Distorsio clathrata* Lamarck is unknown to us. It is probably in the Paris Museum. The type locality as given by Lamarck

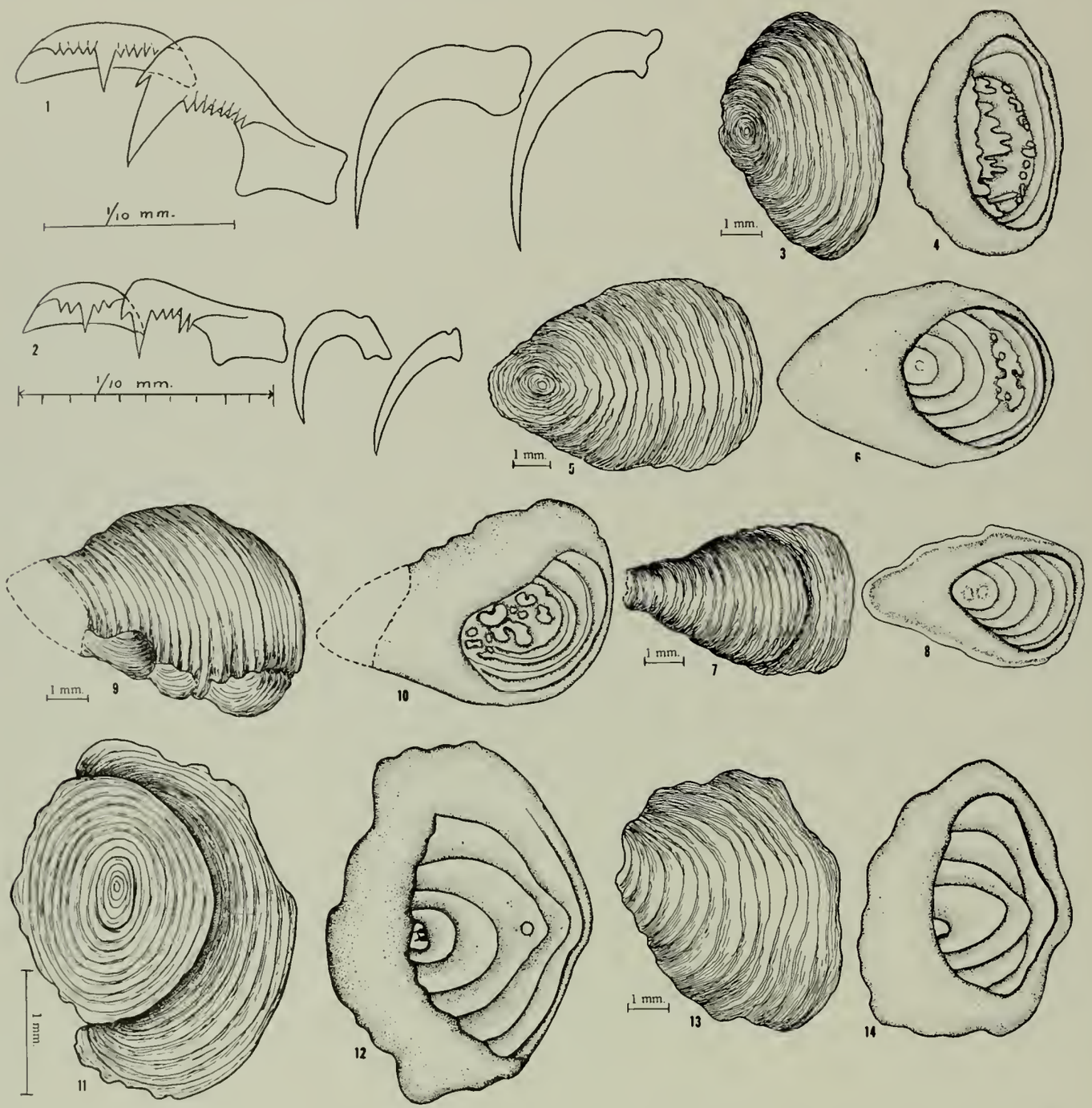

Plate 132. Radulae and opercula of *Distorsio.* Fig. 1. Radula of *Distorsio anus* Linné, Amboyna, Molucca Islands. Fig. 2. Radula of *Distorsio clathrata* Lamarck, Punta Algarrobo, Puerto Rico. Figs. 3–4. Operculum of *Distorsio clathrata* Lamarck from the same locality. Figs. 5–6. *Distorsio clathrata* Lamarck, 20 miles NE of North Pass, Mississippi Delta in 100 fathoms. Figs. 7–8. *Distorsio clathrata* Lamarck, SW of Destin, Florida in 18 to 20 fathoms. Figs. 9–10. *Distorsio mcgintyi* Emerson and Puffer, SSW of Sombrero Key, Key Vaca, Florida. Figs. 11–12. *Distorsio anus* Linné, Pwakuu Island, West Zanzibar in 11 to 18 fathoms, a young and broken operculum. Figs. 13–14. *Distorsio anus* Linné, Amboyna, Molucca Islands.

is "mers de l'Amérique Méridionale." We here restrict the type locality to the Bay of Campeche, Mexico, an area from which Lamarck had received much material.

Remarks. The two species in this genus found in the Western Atlantic are quite easily differentiated. The adult specimens of *D. clathrata* are nearly twice as large as those of *D. mcgintyi.* In addition, *D. clathrata* has two parietal plicae near the siphonal canal while there is only one in *mcgintyi.* There are 13 or 14 columellar plicae which extend well down the siphonal canal in *D. clathrata* but only 9 in *mcgintyi* and these stop abruptly about half way down the siphonal canal. In fully adult specimens of *D. mcgintyi* one of the spiral cords becomes thickened and forms a plica in the center of the parietal embayment. There is only a slight thickening of the spiral cords in this area in *D. clathrata.* The irregular coiling of the whorls is far more accentuated in *D. mcgintyi* than in *clathrata* and the siphonal canal is much shorter.

Dall in 1889 (loc. cit.) was the first to note that there were two different forms of *Distorsio* in the Western Atlantic. However, these were not named as new but considered varieties of his *reticulata,* a name now applied to an Indo-Pacific species. Olsson and McGinty first described the deeper water form as *Distorsio constricta floridana* but unfortunately the name *floridana* was preoccupied and so it was renamed *mcgintyi* by Emerson and Puffer.

Distorsio clathrata Lamarck is generally found from just below low water to depths of about 30 fathoms though we have examined two lots supposedly taken from depths of about 100 fathoms.

Range. From Cape Hatteras, North Carolina (Dall 1889, Bulletin United States National Museum, no. 37, p. 132) where it occurs occasionally and from Lake Worth, Florida, the northern Gulf of Mexico south to British Guiana. It is found throughout the West Indies.

Specimens examined. Florida: South Inlet, Lake Worth (MCZ; ANSP); Lake Worth, Boynton (T. McGinty); off Palm Beach in 20 fathoms (ANSP); off Sombrero Key, Key Vaca in 30 to 60 fathoms (MCZ; ANSP); off Key West in 17 fathoms (H. and K. Johnstone); W of Dry Tortugas in 10 to 12 fathoms (J. S. Schwengel); 30 miles NE of Dry Tortugas (ANSP); 18 miles SW of Destin in 18 to 20 fathoms (T. McGinty); off Fort Walton in 20 fathoms (MCZ). Alabama: 20 miles off Petit Bois Island in 10 fathoms; 45 miles off Bayou La Batre (both H. and K. Johnstone); Mississippi: 2 to 3 miles off Horn Island in 12 to 14 fathoms (H. and K. Johnstone). Louisiana: 20 miles NE of North Pass, Mississippi Delta in 100 fathoms; off Pass Saluda Light (both H. and K. Johnstone). Texas: off Aransas Pass (ANSP); Mustang Island (J. W. Hedgpeth); off Port Isabel (L. A. Weisenhaus); SE of Pass Cavallo and E of St. Joseph Island (both H. Hildebrand); Brownsville (ANSP). Bahama Islands: Bullocks Harbour, Great Harbour Cay, Berry Islands (G. and M. Kline). Cuba: Matanzas Bay, Matanzas (C. J. Finlay). Hispaniola: Puerto Plata, Santo Domingo (MCZ). Puerto Rico: Aguadilla (A. Phares); Bahía de Añasco (MCZ); Punta Algarrobo; Mayagüez (both G. L. Warmke). Virgin Islands: St. Thomas (ANSP). Mexico: Bahía de Campeche (MCZ; Museo Poey; H. and K. Johnstone); Veracruz, Veracruz (ANSP; M. E. Bourgeois); Tuxpan, Veracruz (M. E. Bourgeois); Tampico, Tamaulipas (T. Pulley);

Isla Mujeres, Yucatan (C. G. Aguayo): Punta Frontera, Tabasco (ANSP). Panama: 2 miles off Colón (W. J. Clarke). Colombia: Cartagena (MCZ). Venezuela: Guanta (ANSP). British Guiana: 4 miles E of Georgetown (H. G. Kugler).

Plate 133. *Distorsio clathrata* Lamarck. Figs. 1 and 3. West of Dry Tortugas, Florida in 10 to 20 fathoms (1.3x). Fig. 2. Boynton, Lake Worth, Florida (1.3x). Fig. 4. Off Fort Walton, Florida in 13 to 19 fathoms, showing embryonic whorls (18x).

Distorsio (Rhysema) mcgintyi *Emerson and Puffer*

Plates 132, figs. 9–10; 134

Distortrix reticulata var. *clathrata* 'Lamarck' Dall 1889, Bulletin Museum Comparative Zoology **18**, pp. 221–222 (Lesser Antilles); non *clathrata* Lamarck 1816.

Distorsio constricta floridana Olsson and McGinty 1951, Nautilus **65**, p. 27, pl. 1, figs. 5, 6, 9 (off Palm Beach, Florida, in 30–40 fathoms); non *D. floridana* Gardner 1947 (Miocene).

Distorsio mcgintyi Emerson and Puffer 1953, Proceedings Biological Society of Washington **66**, p. 101 [new name for *D. constricta floridana* Olsson and McGinty 1951; non Gardner 1947].

Description. Shell small to medium in size, reaching 46 mm. (about $1\frac{3}{4}$ inches) in length, solid, imperforate and strongly sculptured. Color white to pale yellowish brown. Whorls 9 to 10, convex and irregular. Spire moderately extended and produced at an angle of about 45°. Aperture auricular in shape, the outer lip somewhat thickened and with 8 or 9 denticles, the third below the anal canal being the largest, while the smallest one margins the anal canal. The largest denticle is opposite the deep parietal embayment. Inner lip consisting of numerous plicae. There is a single large plica margining the anal canal. On the lower portion of the columella area there are 9 plicae which are smallest near the siphonal canal, becoming larger posteriorly and projecting outward to form the anterior margin of the parietal embayment. In the center of the parietal embayment there is a single large plica which is developed upon one of the spiral ridges. A

thin parietal shield is developed which is free at its parietal margin and curved away from the shell. Columella nearly straight but complicated by the numerous plicae which continue back to the early whorls. Siphonal canal short, curved upwardly and toward the outer lip. Anal canal formed by the palatal denticle and the single parietal plica. Suture slightly impressed, irregular and occasionally obscure. Spiral sculpture consisting of numerous cords interspaced with numerous and very fine spiral threads. Axial sculpture consisting of numerous ridges which cross the spiral cords forming a reticulated pattern. In many specimens the axial ridges are more prominent. Where the spiral cords and axial ridges cross each other, small knobs are produced. There are 5 or 6 varices. Periostracum thin, yellowish brown in color, finely reticulate, having numerous very fine hair-like processes over the entire surface with a single large periostracal hair on each knob. Embryonic shell having 3 whorls which are smooth, glass-like in appearance and light amber in color. Operculum small for the size of the shell, unguiculate in shape, probably with a submarginal nucleus, and sculptured with concentric growth lines.

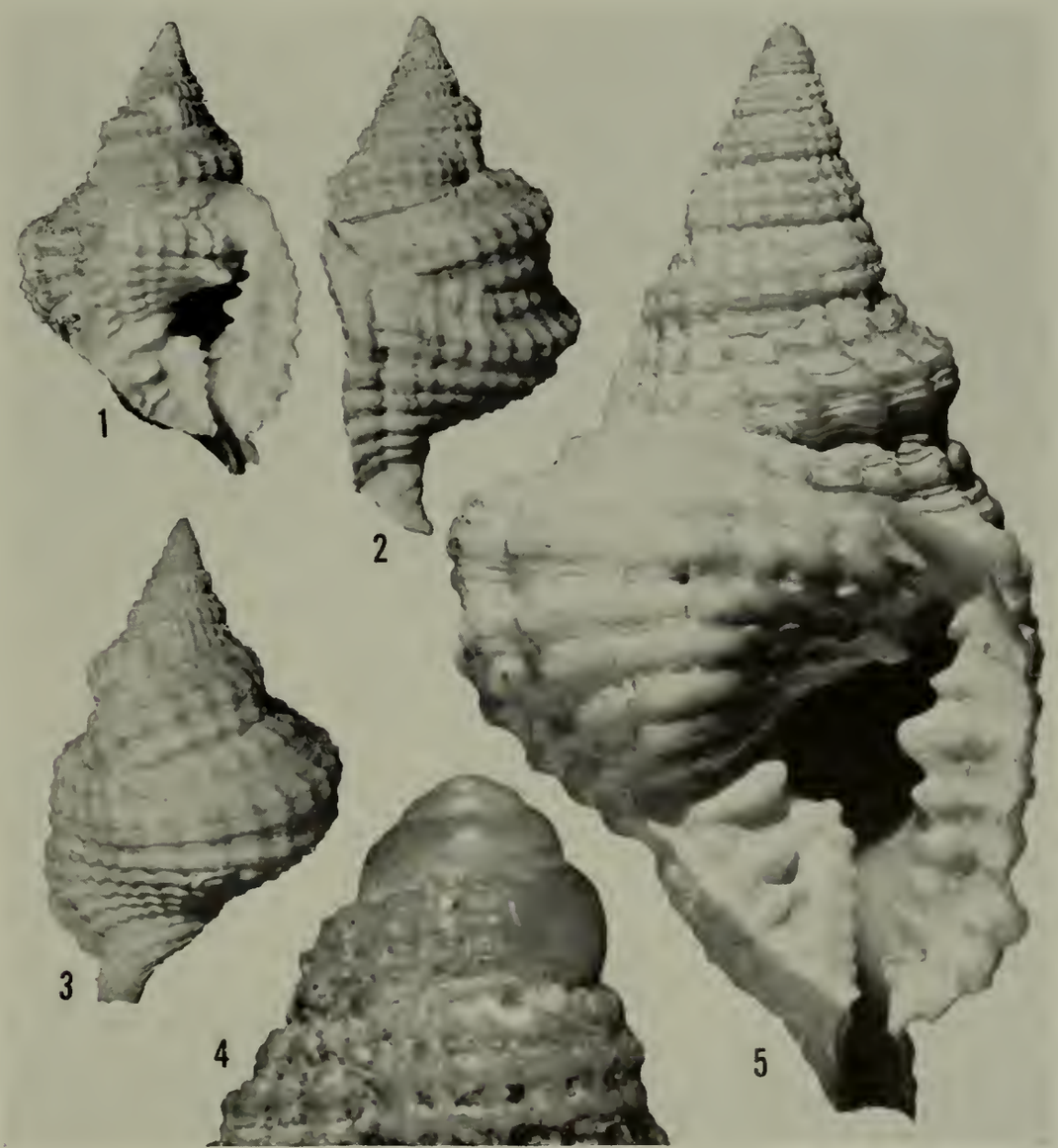

Plate 134. *Distorsio mcgintyi* Emerson and Puffer. Fig. 1. SW of Sombrero Light, Sombrero Key, Florida (1.3x). Fig. 2. Off Barbados, Lesser Antilles, *Hassler* voyage in 100 fathoms (1.3x). Fig. 3. Off Barbados, Lesser Antilles, *Blake* voyage in 82 fathoms (1.3x). Fig. 4. Off Barbados, Lesser Antilles, *Blake* voyage in 100 fathoms, showing embryonic whorls (16x). Fig. 5. Holotype of *Distorsio floridana* Olsson and McGinty (=*D. mcgintyi* Emerson and Puffer), off Palm Beach, Florida in 30 to 40 fathoms (4.4x).

length	width	
46 mm.	27 mm.	Off Barbados in 100 fathoms (*Hassler* Voyage)
43	26	Off Barbados in 82 fathoms (*Blake* Voyage)
32.5	20	Off Key Vaca, Florida in 70 fathoms
27.8	15.5	Holotype of *D. constricta floridana* Olsson and McGinty

Types. The holotype of *D. constricta floridana* Olsson and McGinty [=*D. mcgintyi* Emerson and Puffer] is in the Academy of Natural Sciences Philadelphia, no. 187684. The type locality is "Off Palm Beach, Florida in 30 to 40 fathoms."

Remarks. See *Remarks* under *D. clathrata* Lamarck. This is a deep water species, having been taken in depths of 30 to about 200 fathoms. It is most closely related to *D. constricta* Broderip of the Eastern Pacific from which it differs by having a pronounced plica in the parietal embayment and only a single parietal plica at the anal canal. In *constricta* the plica in the parietal embayment is small or wanting and there may be two or more plicae on the parietal wall at the anal canal. Both species are very irregularly coiled and otherwise quite similar.

Range. From off Palm Beach, Florida, the Florida Keys and south through the West Indies to the Island of Barbados.

Specimens examined. Florida: off Palm Beach in 30, 40, 58 and 70 fathoms (T. McGinty; MCZ; ANSP); 3½ miles NE of Pacific Reef off Elliott Key in 66 fathoms (MCZ); off Carysfort Light, Key Largo (MCZ); 5½ miles SE of The Elbow, Key Largo in 66 fathoms (MCZ); off Sombrero Light, Key Vaca in 40 fathoms (T. McGinty; MCZ; ANSP); off Key Vaca in 70 fathoms (T. McGinty); off Pensacola in 45 fathoms (ANSP). Cuba: Bahía de Matanzas, Matanzas in 120 fathoms (C. J. Finlay). Lesser Antilles: off Guadeloupe, *Blake* Station 164 in 150 fathoms; off Dominica, *Blake* Station 177, in 118 fathoms; off Barbados, *Blake* Station 273, in 103 fathoms: off Barbados, *Hassler* Stations in 82 and 100 fathoms; off Grenada, *Blake* Station 247 in 170 fathoms: off Grenada, *Blake* Station 262 in 92 fathoms (all MCZ).

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Notes

Under *Cymatium caribbaeum* Clench and Turner (p. 206) we discussed the confusion of names that existed for *cynocephalum* Lamarck and *cingulatum* Lamarck. The following is at least a partial list of the synonyms of *cynocephalum* in the Eastern Pacific. This species appears to be closely related to *C. poulsenii* Mörch of the Western Atlantic.

Cymatium cynocephalum *Lamarck*

Plate 135, figs. 1–2

Triton cynocephalum Lamarck 1816, Tableau Encyclopédique et Méthodique, Liste, p. 5; Atlas, **3**, pl. 422, fig. 3; Lamarck 1822, Histoire Naturelle des Animaux sans Vertèbres **7**, p. 184 (locality unknown); non *Triton cynocephalum* 'Lamarck' Kiener 1842, and of subsequent authors.

Cassidaria cingulata Lamarck 1822, Animaux sans Vertèbres **7**, p. 216 (no locality given).

Fusus wiegmanni Anton 1839, Verzeichniss der Conchylien, p. 77 (no locality given).

Triton undosum Kiener 1842, Iconographie des Coquilles Vivantes **7, Triton**, p. 44, pl. 6, fig. 2 (locality unknown) [substitute name for *Cassidaria cingulata* Lamarck 1822].

Triton chemnitzii 'Gray' Reeve 1844, Conchologia Iconica **2, Triton**, pl. 11, fig. 37 (Panama); non *Triton chemnitzi* Gray 1839.

Cassidaria setosa 'Hinds' Reeve 1844, Conchologia Iconica, **2, Triton**, pl. 11, fig. 37 [nomen nudum, in the synonymy of *Triton chemnitzii* Reeve].

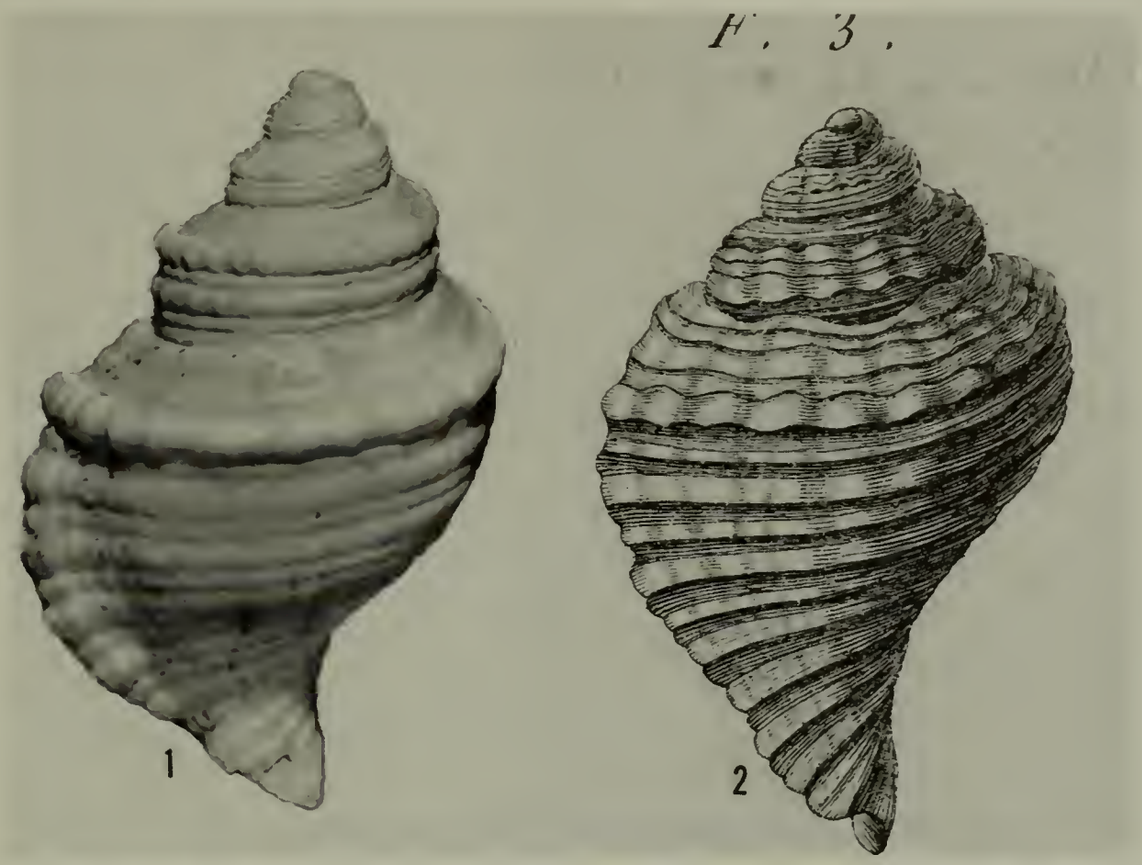

Plate 135. *Cymatium cynocephalum* Lamarck. Fig. 1. Bahía Magdalena, Baja California, Mexico (slightly enlarged). Fig. 2. From Lamarck's original figure, 1816, Tableau Encyclopédique et Méthodique, Atlas **3**, pl. 422, fig. 3, Liste, p. 5.

* * * *

A nomen nudum

Cymatium (*Ranularia*) *mohorteri* 'Verrill' Salisbury 1954, Zoological Record **89**, sec. 9, p. 70 [nomen nudum].

This species was described in mimeographed form only.

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The Genus Bailya *M. Smith*

In 1944 (Panamic Marine Shells, p. 22), Maxwell Smith instituted the genus *Bailya* as a new genus in the family Cymatiidae. He included in this genus *Triton parvus* C. B. Adams. Unfortunately he had overlooked a previous publication by Pilsbry and Vanatta (1904) in which *T. parvus* C. B. Adams, on the basis of its soft anatomy, was considered to be a species in *Tritonidea*, subgenus *Caducifer*, which is in the Family Buccinidae.

This in no way invalidates *Bailya*, as the type species is *Triton anomalus* Hinds, an Eastern Pacific species. Until the soft anatomy of this species is examined, the exact position of *Bailya* will remain unknown.

REFERENCES

Bayer, Ch. 1933, Catalogue of the Cymatiidae in 'sRijks Museum van Natuurlijke Historie. Zoologische Mededeelingen 'sRijks Museum van Natuurlijke Historie, Leiden, **16**, pp. 33–59.

Belletante, H. 1954, Catalogue des Cymatiidae du Muséum National d'Histoire Naturelle de Paris. Journal de Conchyliologie, **94**, pp. 70–84; 85–96.

Carcelles, A. 1944, Catálogo de los Moluscos Marinos de Puerto Quequén. Revista del Museo de La Plata (N.S.) Zoology, **3**, pp. 233–309.

Dall, W.H. 1889, A Preliminary Catalogue of the Shell-Bearing Marine Mollusks of the Southeastern Coast of the United States. Bull. United States National Museum, no. 37, pp. 1–221, 74 plates.

Dall, W.H. 1904, An Historical and Systematic Review of the Frog-Shells and Tritons. Smithsonian Miscellaneous Collections, **47**, pp. 114–144.

Emerson, W. K. and E. L. Puffer 1953, A Catalogue of the Molluscan Genus Distorsio. Proc. Biological Society of Washington, **66**, pp. 93–106.

Lange de Morretes, F. 1949, Ensaio de Catálogo dos Moluscos do Brasil. Arquivos do Museu Paranaense, **7**, pp. 1–216.

Lebour, M. V. 1945, The Eggs and Larvae of Some Prosobranchs from Bermuda. Proceedings Zoological Society London, **114**, pp. 462–489.

Locard, A. 1897, Expéditions Scientifiques du Travailleur et du Talisman, Paris, pp. 1–516, 22 plates.

Nicklès, M. 1950, Mollusques Testacés Marins de la Côte Occidentale d'Afrique. Manuels Ouest-Africains, Paris, **2**, pp. 1–269, 459 text figures.

Peile, A.J. 1926, The Mollusca of Bermuda. Proceedings Malacological Society London, **17**, pp. 71–98.

Pilsbry, H. A. and E. G. Vanatta 1904, On Certain Rhachiglossate Gastropoda Eliminated from the Aquillidae. Proc. Academy Natural Sciences Philadelphia, pp. 592–595.

Pilsbry, H.A. 1922, Revision of W. M. Gabb's Tertiary Mollusca of Santo Domingo. Proc. Academy of Natural Sciences Philadelphia, **73**, p. 357.

Pilsbry, H. A. and H. N. Lowe 1931. West Mexican and Central American Mollusks Collected by H. N. Lowe. Proceedings Academy Natural Sciences Philadelphia, **84**, pp. 33–144.

Puffer, E.L. 1953, Distorsio reticulata vs. Distorsio clathrata in the West Indies. Proc. of the Biological Society of Washington, **66**, pp. 109–124.

Smith, Maxwell 1944, Panamic Marine Shells. Winter Park, Florida, pp. 1–70, 53 plates.

Smith, Maxwell 1948, Triton, Helmet and Harp Shells. Winter Park, Florida, pp. 1–57, 16 plates.

Thiele, J. 1929, Handbuch der systematischen Weichtierkunde, **1**, pp. 281–283.

Tryon, G.W. 1880, Manual of Conchology (1) **3**, pp. 5–35, pls. 1–17.

von Ihering, H. 1907, Les Mollusques Fossiles du Tertiaire et du Crétacé Supérieur de l'Argentine. Anales del Museo Nacional de Buenos Aires (3) **7**, 611 pages, 18 plates.

Watson, R.B. 1886, Voyage of H.M.S. Challenger, **15**, pp. 389–396.

Wenz, W. 1941, Handbuch der Paläozoologie, **6**, pt. 1, pp. 1056–1071.

Winckworth, R. 1945, The types of the Boltenian Genera. Proc. Malacological Society London, **26**, pp. 136–148.

Woodring, Wendell P., 1928, Miocene Mollusks from Bowden, Jamaica, Part II. Carnegie Institution of Washington, Publication no. 385, pp. 297–301.