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THE GENERA XANCUS AND VASUM IN THE WESTERN ATLANTIC

BY
R. TUCKER ABBOTT

Although the chanks of the genus *Xancus* and the vase shells, of the genus *Vasum*, are often very common in many localities throughout the warm regions of the Western Atlantic, Indo-Pacific, and, to a lesser degree, the Eastern Pacific, they are represented by not many more than a dozen recent species in all. These genera extend back as far as Eocene times with no major morphological changes. Today's two genera are a curious mixture of common, moderately widespread species and uncommon, extremely localized species. For the most part, all inhabit shallow water and their main source of food appears to be bivalves and tube worms. The largest species is the West Indian chank, *Xancus angulatus* Solander, which is common in the Bahamas and is second in size in the Western Atlantic only to the horse conch, *Fasciolaria gigantea* Kiener. The second and smaller Atlantic species, *X. laevigatus* Anton, is less common and limited to a small area of Brasil's northeastern coast.

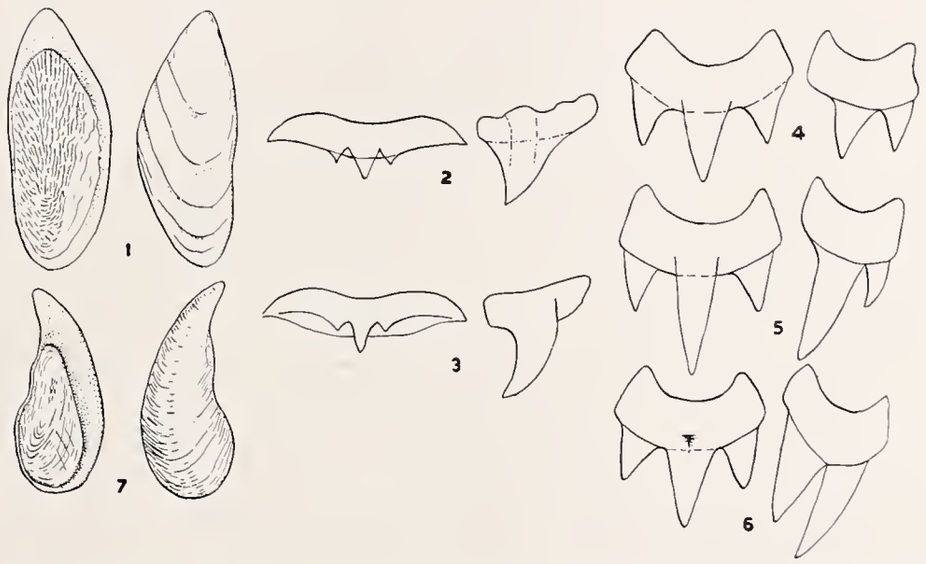

Plate 89. Fig. 1. Operculum of *Xancus angulatus* Solander from Eleuthera Island, Bahamas: *left*, inner side; *right*, outer side. x$\frac{1}{2}$. Fig. 2. Radula (central and right lateral) of *X. fusus* Sowerby, Andaman Islands, Indian Ocean (after Dall 1885). Fig. 3. Radula of *X. laevigatus* Anton, Bahia, Brasil (after Thiele 1929). Fig. 4. Radula of *Vasum muricatum* Born, Key Largo, Florida. Fig. 5. Radula of *V. turbinellum* Linné, Latobach Island, Rongerik Atoll, Marshall Islands. Fig. 6. Radula of *V. ceramicum* Linné, Philippines. Fig. 7. Operculum of *V. muricatum* Born, Key Largo, Florida: *left*, inner side; *right*, outer side. x$\frac{1}{2}$ (all radulae approx. x200).

Xancus is of considerable economical importance in the Indian Ocean where the sacred chank, *X. pyrum* Linné, is fished at an annual rate of over two million specimens. The most important market is in the province of Bengal, India, where the shells are sawed and carved into bangles for Hindu women of all castes. Larger specimens are used as trumpets in religious ceremonies. Hornell (1922, p. 130) says the meat is eaten by the families of the chank fishermen. The muscular part of the animal is boiled, cooled, and cut into thin slices for sun-drying. These molluscan "potato chips" keep indefinitely in this hard, dry condition. In cooking, the slices are fried in oil. The operculum is a valuable source of glue in the manufacture of incense sticks. Sinistral specimens of the sacred chank appear in about one out of every hundred thousand normally dextral shells. They are extremely valuable, and are held in high religious esteem by the Hindus and Buddhists. It is one of the emblems of Vishnu, the second god of the Hindu triad. A complete and extremely interesting account of the sacred chank fisheries, and of the innumerable superstitions connected with the shell, is given by J. Hornell (1914).

Nothing is known of the anatomy and little of the life history of the Western Atlantic species, *X. angulatus*. We have collected this species on the north coast of Cuba where it may be found in large, scattered colonies on the intertidal flats. *X. pyrum* in India is gregarious and beds of them are found on sandy bottom where tube worms serve as their main source of food. They are most abundant in waters of 8 to 10 fathoms in depth. The egg capsules are somewhat like those of *Busycon*. Hornell (1922) describes the ribbon as consisting of 25 or more discoidal capsules. Of the considerable number of fertilized eggs in each capsule, only half a dozen survive, the remainder being eaten by their stronger capsule-mates. The fully developed protoconch is very strong, cylindrical in shape, and consists of about 3 whorls. It persists, barring accidents, throughout the life of the snail. The breeding season, when the capsules are formed and are rooted at one end in the sand, occurs during the first three months of the year (see also Lamy 1928, p. 49).

Dall (1885) has described and figured the anatomy of *Xancus fusus* Sowerby from the Andaman Islands. He erroneously identified his specimen as *Turbinella pyrum* Lamarck (USNM specimen no. 41026).

The geographical distributions of the species of both genera in the Western Atlantic are unusual and a preliminary study of the Indo-Pacific species indicates a similarly unusual situation. *X. angulatus* is almost a dominant species in the Bahama area but becomes increasingly uncommon in its geographical extension southwestward through the Lower Florida Keys to Yucatan, Panama and Colombia. Although abundant in certain places along the north coast of Cuba, it has not been recorded eastward in the other Antillean islands. The only other Atlantic *Xancus* is found 3,000 miles to the south on a small portion of the Brasilian coast. In contrast, the commonest vase shell, *Vasum muricatum* Born, is apparently absent, or at least rare, in the Bahamas although it is common in southern Florida, nearby Cuba, and throughout the Caribbean area in general, except the Lesser Antilles. As in the case of *Xancus*, a somewhat similar species of *Vasum* is found far to the south in an extremely local Brasilian region. This is the rare *Vasum cassiforme* Kiener. As *V. muricatum* begins to become uncommon in Puerto Rico and absent southeastward in the Lesser Antilles, it is replaced by the quite different *V. capitellum* Linné. This latter species is uncommon throughout its odd range from Puerto Rico and the Virgin Islands south through the Lesser Antilles and then west-

ward along the north coast of South America to Colombia. A very distinct subspecies, *V. globulus nuttingi* Henderson, is known only from several small colonies in Antigua, Lesser Antilles.

Key to the Genera of *Xancidae*

Shell usually over 5 inches in length; most posterior (or upper) columellar plica is on the curvature of the body whorl; operculum very slightly curved; lateral radular tooth with one cusp. *Xancus*

Shell usually less than 4 inches in length; most posterior columellar plica below the curvature of the body whorl; operculum strongly curved at one end; lateral radular tooth with two cusps. *Vasum*

Genus **Xancus** *Röding*

Xancus Röding 1798, Museum Boltenianum (2), p. 134.

Turbinella Lamarck 1799, Mémoires Société Histoire Naturelle, Paris, ("Prodrome"), p. 73, no. 25 (monotypic genotype, *Voluta pyrum* Linné); *non* Bory St. Vincent 1827.

Turbinellus Lamarck 1801, Animaux sans Vertèbres, p. 83 (monotypic genotype, *Voluta pyrum* Linné); *non* Oken 1815.

Turbinellarius Duméril 1806, Zoologie Analytique, p. 166. [Regarded as a substitute name for *Turbinella* Lamarck. See Woodring's 1928 discussion of Duméril].

Buccinella Perry 1811, Conchology, London, text with plate 27 (genotype here designated as *B. caerulea* Perry = ? *X. pyrum* Linné. See Winckworth's 1945 discussion on the identity of this species).

Scolymus Deshayes 1843, Animaux sans Vertèbres, 2nd edition **9**, p. 375. [A replacement for *Turbinella* Schumacher 1816 = *Turbinella* Lamarck.]

Mazza 'Klein' H. and A. Adams 1853, Genera of Recent Mollusca **1**, p. 156 (genotype here selected as *M. pyrum* Linné).

Turbofusula Rovereto 1900, Atti Reale Universita, Genova **15**, p. 169 [not seen, *fide* Wenz 1946].

Genotype, *Voluta pyrum* Gmelin 1791 = *V. pyrum* Linné 1758 (subsequent designation, Dall 1906, Journal of Conchology **11**, p. 296).

The species in this genus are large, heavy and massive, and of fusiform shape. There are 3 to 4 prominent columellar plicae which are set almost at right angles to the axis of the shell. The top or most posterior plica is on the curvature of the body whorl. In general, the shells are smooth although in some species there are well-developed nodules or blunt spines at the shoulder of the whorls. Spiral sculpture is often present in the form of rough, raised threads which may be located at the top and base of each whorl. Axial ribs are often present in very young specimens. The nucleus consists of about 3 or 4 strong, smooth whorls which do not expand in size, thus piling up on each other to give the apex in undamaged specimens a cylindrical, raised or mammiform shape. The parietal shield is often well-developed in adults. Siphonal canal open and moderately long, but not twisted at its very end as in *Vasum*. In some species there is very often an abnormal, raised cord on the middle of the body whorl on the inside of the shell. The periostracum is thin to moderately thick and often flakes off from dried specimens. The operculum is horny, hard, unguiculate (claw-like with the nucleus at one end), about 1/3 the area of the aperture, twice as long as wide, very slightly curved, and with a muscle scar covering 9/10 of the area of the inner surface.

Animal with a small, rather broad foot. No separately developed head. Tentacles short, cylindrical, and not joined at their bases. Eye small, located near the end of the tentacle, beyond which there is a small, short, thin feeler or fleshy extension. Mouth large and circular. Proboscis long, white, muscular, cylindrical, and capable of being

completely withdrawn into the body. No jaws present. Radula rachiglossate, with two lateral teeth in each row bearing a single cusp, and with a long, narrow central tooth which bears 3 small, pointed cusps (see plate 89, figs. 2, 3).

Although the genus *Xancus* resembles *Vasum* in shell structure and in many animal characters, it should be noted that the radula of *Vasum* is much closer to that of *Melongena* than to that of *Xancus*. These two genera have been allied in the same family by most workers because of their strong columellar plicae, but the much more posterior position of those in *Xancus* may be of more phylogenetic significance than has been hitherto suspected. A careful anatomical review may in the future place this family between the Fasciolariidae and Melongenidae instead of in the Volutacea between the Mitridae and Harpidae as they are now placed by Thiele (1929), Wenz (1946) and others. In addition, the Xancidae may perhaps be separated by future workers into two subfamilies.

Volema Röding 1798, associated loosely with *Xancus* by Dall's 1906 listing of *V. pyrum* Gmelin as the first species, was defined and placed in the Melongenidae by Iredale's 1917 type designation for this genus of *V. paradisiaca* Röding (Proceedings of the Malacological Society of London **12**, p. 323).

Xancus angulatus *Solander*, Plate 90, figs. 1–3

Voluta angulata Solander 1786, Portland Catalogue, p. 76, no. 1711. [Refers to Martini 1780, Conchy.-Cab. (1) 4, fig. 1325.]

Murex scolymus Gmelin 1791, Systema Naturae, ed. 13, p. 3553, no. 101. [Refers to Martini 1780, Conchy.-Cab. (1) 4, fig. 1325.]

Turbinella scolymus Gmelin, Lamarck 1822, Animaux sans Vertèbres **7**, p. 103, no. 1.

Tubularia clavata Esper 1830, Pflanzen-Thiere **3**, p. 129, pl. 22 [egg case only].

Description. Adult shell varying from 180 to 360 mm. in length (7 to 14 inches). Solid, heavy, and fusiform in shape. Whorls 8 to 11, angulate at the shoulder and with prominent blunt tubercles at the top of the whorl. Color of shell cream-white, but often hidden by the thick, light-brown periostracum. Spire pointed, flat-sided, and of an angle of 50 to 60 degrees. Suture prominent, wavy, well-indented. Aperture large, elongate, with a porcelaneous finish and colored either a yellowish-white, pinkish-cream or a deep, brownish-orange. Parietal wall in adults developed into a thick, oval shield which has a glossy finish and is often more richly colored than the aperture. The shield continues anteriorly into the long, open siphonal canal. The length of the last whorl (aperture and siphonal canal) is generally 2/3 of the length of the entire shell. Outer lip strong, sharp, and often slightly crenulated at the edge on the lower third. Columella bears 3 strong, widely-spaced, rounded plicae or plaits which run back into the shell. They are situated opposite the widest part of the aperture and appear to be almost on a plane vertical to the axis of the shell. There is a thickened, spiral, indistinct, and sometimes absent, ridge on the center of the body whorl inside the aperture. This often accompanies a spiral, light color-streak on the outside of the shell. Umbilicus irregularly formed, deep, slit-like. Axial sculpture consists of 6 to 8 prominent, blunt tubercles on the top of each whorl. Spiral sculpture consists of numerous, small, raised threads which are coarsely beaded by the interruption of the fine axial threads. These spiral threads are usually absent on the center of the body whorl. Nucleus large, bulbous and rather smooth. Periostracum thick, persistent, light-brown in color. Operculum horny, hard, unguiculate,

dark-brown, $2\frac{1}{2}$ times long as wide, narrow at each end, and with a very large muscle scar (see plate 89, fig. 1). Animal unknown.

	length	width	
(large)	360	152 mm.	Bahamas
(average)	206	95	Cat Island, Bahamas

Types. The location of the type specimen once belonging to the Duchess of Portland and sold at auction is unknown to us. Should it prove to be lost, we select Martini 1780, Conchyl.-Cab. (1) 4, pl. 142, fig. 1325 as the type figure, and the type locality as Nassau,

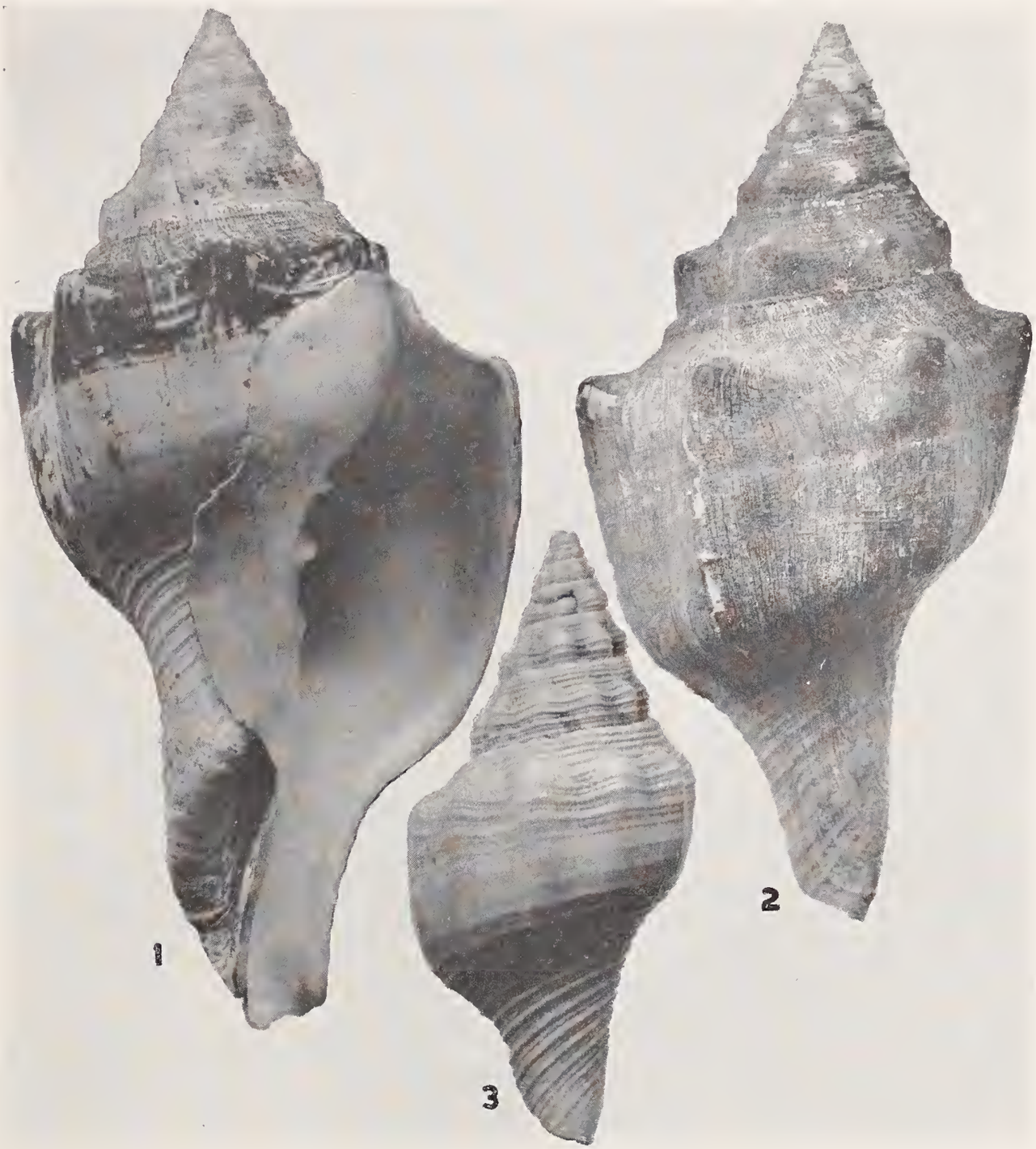

Plate 90. *Xancus angulatus* Solander

Fig. 1. Bahama Islands (reduced from 9 inches). Fig. 2. Yucatan, Mexico (reduced from $5\frac{3}{8}$ inches). Fig. 3. Alicetown, North Bimini Islands, Bahamas (reduced from $7\frac{3}{4}$ inches).

New Providence Island, Bahamas, since Solander (1786, p. 16) mentions "the Island of Providence" as its locality.

Common name. West Indian Chank.

Remarks. The West Indian Chank is common throughout the shallow waters of the Bahamas and the northern coast of Cuba and is found with less frequency along the Central American shores of the Gulf of Mexico. It is found in scattered colonies in relatively quiet waters from the intertidal zone down to a depth of a few fathoms. It is carnivorous and most likely feeds on bivalves and tube worms. In the collection of the Museum of Comparative Zoölogy there is an egg case collected by O. Bryant at Abaco Island, Bahamas, and labelled as coming from this species. It is very similar to that of *X. pyrum* Linné of the Indian Ocean. The horny, yellow-brown, translucent capsules are round discs $1\frac{1}{2}$ inches in diameter, each with a peripheral collar bearing three reinforced folds. The thin cord to which these capsules are closely attached is $\frac{3}{4}$ of an inch wide with a central, rope-like "umbilical" cord in the middle.

Variation in this species is common especially in the degree of development of the nodules on the shoulder of the whorls which may be low and rounded or pointed and triangular, and closely or distantly spaced. The umbilicus may be closed or open. The spiral threads on the whorls are prominent in some shells, especially two specimens from Yucatan, Mexico. It is not uncommon to find them with the spire leaning to one side. This is due to breakage of the siphonal canal in young examples.

A beautiful color photograph of a specimen cut to show the interior columellar plicae has been published in the National Geographic Magazine, Washington **96,** no. 1, p. 80, fig. 2, July 1949 by Rutherford Platt.

Woodring (1928, p. 251) has briefly reviewed the phylogenetic development of the fossil *Xancus* in the Western Atlantic area. There are two main stocks arising in the middle Oligocene Age, each of which is represented by a single living species. The *angulatus* stock includes such fossil species as *X. wilsoni* Conrad, *X. validus* Sowerby, *X. textilis* Guppy and *X. scolymoides* Dall. The distribution of the recent species has been reduced considerably to only the Bahama—Cuba—Western Caribbean area. The other major stock represented by *X. "praeovoideus"* Maury has probably given rise to the recent species, *X. laevigatus* Anton, which is now extremely local in its distribution on the coast of Brasil.

Range. Bahama Islands, Florida Keys, Cuba (north coast only?) and the coast of Central America from Yucatan to Colombia.

Records. Florida: Tortugas. Bahamas: Settlement Point, Grand Bahama: Marsh Harbour, Great Abaco: Alice Town, North Bimini; Turtle Rocks, South Bimini (J. Schwengel); Cat Cay, South Bimini: Sandy Point, Savannah Sound, Eleuthera: Dunmore, Harbour Island, Eleuthera: Arthurstown, Cat Island; Berry Cay, Cat Island; Bullock Harbour, Great Harbour Island, Berry Islands; Clarence Town, Long Island. Cuba: Cayo Francés, Caibarién; Habana. Haiti: Saltrou, Dept. de l'Ouest—fossil? (USNM). Mexico: Yucatan (USNM); Vera Cruz (M. E. Bourgeois, MCZ). British Honduras: Shoals near St. George Cay, Belize (USNM). Nicaragua: Bluefields. Panama: Colón (L. D. Sayers, USNM). Colombia: Puerto Colombia, Bolivar

(USNM); Cartagena, Bolivar—subfossil? (USNM). All records MCZ unless otherwise noted.

Xancus laevigatus *Anton*, Plate 91, figs. 1–2

Turbinella laevigata Anton 1839, Verzeichniss der Conchylien, Halle, p. 71, no. 2463 (no locality).

Turbinella ovoidea Kiener 1841, Icon. Coquilles Vivantes, Genre Turbinelle **6**, p. 7, no. 4, pl. 17, fig. 4 (les côtés de Bahia).

Xancus laevigatus Anton, Winckworth 1939, Proceedings Malacological Society London **23**, p. 347.

Description. Adult shell varying from 100 to 120 mm. in length (4 to 5 inches). Solid and heavy, somewhat turnip-shaped. Whorls 7 to 8, globose, smooth. Color of shell dull white, but often hidden by the moderately thick, brown periostracum. Spire pointed but not high, slightly to moderately concave, with the whorls becoming increasingly more rounded. Suture fairly even, deeply indented. Aperture relatively small, elongate, narrowing posteriorly into a narrow channel and produced anteriorly into a relatively short siphonal canal. Parietal wall, in adults, developed into a small, glazed shield which, at the spire end, possesses a low, rounded, thick callus. Length of last whorl (aperture and siphonal canal) equal to or slightly more than $\frac{2}{3}$ that of the entire shell. Outer lip heavy with a fairly sharp edge. Columella possesses on its center three well-developed plicae, the upper two being the largest. They protrude laterally and slightly downward from the columellar wall. Opposite these, and on the inside of the body whorl, there is a raised, spiral, irregular ridge in most specimens. Axial sculpture confined to the earlier whorls and consists of about 6 low, rounded, tubercles. Spiral sculpture consists of about 10 raised, even threads on the top third of each whorl and on the outside of the siphonal canal. Nuclear whorls unknown. Periostracum fairly thick, persistent, light to dark brown. Operculum corneous, heavy, unguiculate, dark brown, $2\frac{1}{2}$ times as long as wide, narrow at each end, and with a very large muscle scar. Animal unknown.

Plate 91. *Xancus laevigatus* Anton
Fig. 1. Maranhao, Brasil (reduced from $4\frac{3}{4}$ inches). Fig. 2. Recife, Pernambuco, Brasil (reduced from 4 inches).

	length	width	
(large)	176	88 mm.	Bahia, Brasil (ANSP)
(average)	122	64	Maranhao, Brasil (MCZ)
(small)	102	45	Recife, Brasil (USNM)

Types. The type is probably in Anton's collection, but we do not know if it has survived the last war. Bahia, Brasil is here selected as the type locality.

Common name. Brasilian Chank.

Remarks. So far as we know, this species is limited to the northeastern bulge of Brasil. It is apparently fairly common locally but it has been collected on less than a dozen occasions. *X. laevigatus* shows a closer resemblance to the Indian *X. pyrum* than it does to the only other Western Atlantic species, *X. angulatus*. It is possible that *Bucinella caerulea* Perry 1811 is this species, but, as Winckworth (1945) has said, the hideous illustration by Perry is equally applicable to *X. pyrum* Linné. Like so many of Perry's names, this one had best be relegated among the unknowns. *X. laevigatus* is heavier, smaller and more turnip-shaped than *X. angulatus*.

Range. The northeast coast of Brasil from the State of Maranhão to the State of Bahia.

Records. Brasil: Guimarães, 50 miles north of Maranhão; Maranhão, both Estado da Maranhão; Recife, Estado da Pernambuco (all USNM); Bahia; Manguinhos; Mar Grande, Ilha de Itaparica, Estado da Bahia (A. Oliveira, all MCZ).

Genus **Vasum** *Röding*

Vasum Röding 1798, Museum Boltenianum (2), p. 56.

Volutella Perry 1810, Arcana or the Museum of Natural History, sign. B1 [genotype here designated as *V. divergens* Perry 1810 = *V. rhinoceros* Gmelin]; 1811, Conchology, London, text with plate 26; *non* Swainson 1820 and 1835. Arcana data obtained from Mathews and Iredale 1912, The Victorian Naturalist **29**, pp. 9-13.

Cynodonta Schumacher 1817, Essai Nouveau Système Habitations Vers Testacés, p. 73 [monotypic genotype: *Voluta ceramica* Linné]. *Cynodona* on p. 241 is an error for *Cynodonta*.

Scolymus Swainson 1835, Elements of Modern Conchology, p. 21; 1840, Treatise Malacology, p. 304 [genotype here selected as *S. cornigerus* Chemnitz fig. 1725-6 = *Turbinella cornigera* Lamarck = *Voluta turbinellus* Linné]; *non* Deshayes 1843.

Cynodonta 'Schumacher' Fischer 1887, Manuel de Conchyliologie, p. 619 [an emendation for *Cynodona*].

Genotype, *Vasum turbinellus* Röding 1798 = *Murex turbinellus* Linné 1758 (subsequent designation by Winckworth 1945. See discussion below).

The shells of *Vasum* are from 1 to 5 inches in length, very heavy and solid, and sculptured with strong nodules or blunt spines. The columella bears 3 to 5 strong plicae which are located just above the region of the siphonal canal. The siphonal eanal is moderately to well-shortened and is slightly twisted up and to the left at its tip. The base of the shell usually bears 3 to 5 spiral rows of strong cords, nodules or blunt spines. When spines are present, they are hollowed out on their anterior faces. The animal is similar to that of *Xancus*. It is carnivorous and the radula is rachiglossate with about 150 transverse rows of teeth, each row possessing one central and two laterals. The central tooth is arched and bears on its anterior edge 3 prominent, pointed cusps. The lateral tooth bears 2 large, long, pointed and slightly curved cusps. The operculum is horny, hard,

dark-brown, unguiculate, rounded at one end, pointed at the other, and curved. The muscle scar occupies $\frac{1}{2}$ to $\frac{3}{4}$ of the inner surface. Periostracum either thick and matted or thin depending upon the species.

The subgenera employed in this genus are rather nebulous and it is possible that as other species are discovered, especially among the fossils, their recognition will be weakened. As a specific character, the number of eolumellar plicae is often useful, but in some species, such as *Vasum turbinellum* Linné from the Indo-Pacific and *V. muricatum coestus* Reeve from the Panamic province, there is a characteristic variation in number. The basic number throughout the group is 3, but a number of species, recent and fossil, have added two smaller plicae between these to give 5. Some fossil species have 4. There appear to be 3 types of periostraca, the thick, brown, matted form found in *V. muricatum* Born (Western Atlantic); the thin, yellowish, foliated type as in *V. capitellum* Linné (Western Atlantic); and the hard, varnish-like, blaek periostraeum found in *V. turbinellum* Linné and *V. ceramicum* Linné (both Indo-Paeific). The group recurrently evolves towards spinosity, *V. horridum* Heilprin of the Florida Pliocene age being an outstanding example. The living *V. capitellum* Linné represents a reeent development.

A genotype for *Vasum* Röding has been designated five times, but possibly only one of these stands as a elearly valid designation. In 1882, von Martens (Zoological Record, Mollusca, p. 43) designated *V. muricatum* Born. This speeies name is not included among Röding's originally listed six species in the genus *Vasum*. Even though *muricatum* Born and *urna* Röding (one of the six included species) are synonyms and based on the same figures in Martini 1777, Conehy.-Cab. **3,** figs. 949 and 950, von Martens' designation cannot be considered valid because *urna* is not mentioned by name. A similar case exists in Cossmann's 1901 genotype designation (Essais Paleo. Comp. **4,** p. 65) in which *Turbo cornigera* Lamarck is chosen. This species exists in Röding's list only as the synonym, *V. turbinellus* Röding. The first valid designation was inadvertently made by Winckworth in 1945 (Proeeedings of the Malacological Society of London **26,** p. 145) when he stated that Cossmann in 1901 designated as type "*V. turbinellus* Röding = *Voluta turbinellus* Linné 1767 = *Murex turbinellus* Linné 1758. *Turbinella cornigera* Lamarck 1822 is the same". Wenz (1946, p. 1300) elaims that *Murex ceramicus* Linné was designated as genotype by Hermannsen in 1852, but I can find no such referenee in the works of the latter author. Schumacher in 1817 made *V. ceramica* Linné the genotype of *Cynodona* whieh is a *subjective* synonym of *Vasum* and therefore eannot be transferred as genotype of *Vasum*. Dall (1885, p. 347) designated "types" for *Vasum* Link, but unfortunately gave two species, *Voluta ceramica* Linné and *V. cornigera* Lamarck. It might be argued by some, however, that, since *cornigera* does not appear among Röding's originally listed species, this species is eliminated from consideration, thus leaving *ceramica* Linné as the sole valid genotype. It should be noted that some genotype designations of "*Vasum*" Link 1807" are tantamount to designations for *Vasum* Röding, sinee Link aceepted and quoted Röding as the author. Subsequent authors, including Dall in 1885, believed Röding invalid and therefore erroneously credited Link with many of Röding's generic names. If none of the above designations seems acceptable beeause of its dubious and complex history, we hereby designate *V. turbinellus* Röding 1798 = *Murex turbinellus* Linné 1758 as the genotype of *Vasum* Röding 1798.

Subgenus **Vasum** *Röding*

(See synonymy under the genus *Vasum*.)

Subgenotype, *Murex turbinellus* Linné 1758.

Shells in this subgenus are heavy, with moderately produced spires, and with spiral rows of blunt or sharp spines. There are no pronounced, fine, axial lamellations. Columella with 3 to 5 plicae. Included here are two Western Atlantic species; one Eastern Pacific subspecies, *V. muricatum cocstus* Reeve; one South African species, *V. truncatum* Sowerby; and such Indo-Pacific species as *V. turbinellum* Linné, *V. ceramicum* Linné, *V. imperiale* Reeve and *V. rhinoceros* Gmelin.

Vasum (Vasum) muricatum *Born*, Plate 92, figs. 1–2

Voluta muricata Born 1778, Index Rerum Naturalium Musei Caesarea Vindobonensis, pt. 1, Testacea, p. 222. [Refers to Martini 1777, Conchyl.-Cab., (1) **3**, pl. 99, figs. 949–950.]

Vasum urna Röding 1798, Museum Boltenianum (2), p. 56, no. 711. [Refers to Martini 1777, **3**, pl. 99, figs. 949–950 (selected here as type figure) and Knorr 1773, (French edition) pt. 6, pl. 35, fig. 1.]

Turbinella capitellum Lamarck 1816 (in part), Encyclopédie Méthodique Vers, pl. 431 bis*, fig. 3 [not 4]. Liste, p. 7 [name and figure only].

Turbinella pugillaris Lamarck 1822, Animaux sans Vertèbres **7**, p. 104, no. 5. [Refers to Martini 1777, Conchyl.-Cab. (1), **3**, pl. 99, figs. 949–950; Knorr and Lister].

Vasum muricatum Born, Lyman 1949, Shell Notes **2**, nos. 7–9, illust. on front cover, Dec. [Nov. 21, 1949].

Description. Adult shell varying from 60 to 125 mm. in length (2½ to 5 inches). Solid and heavy. Whorls 8 to 9, slightly concave on their sides and shouldered at the top with prominent, blunt spines. Color of shell chalk-white, but usually hidden by a very thick, blackish-brown periostracum. Spire low with the first few whorls protruding to a rather

Plate 92. *Vasum muricatum* Born
Fig. 1. Dry Tortugas, Florida (reduced from 3½ inches).
Fig. 2. Key West, Florida (reduced from 3 inches).

sharp point, sometimes concave but usually flat-sided. Suture well-indented, wavy. Aperture moderately large, elongate, with a white porcelancous finish which is sometimes tinged with purple. Parietal wall, in adults, developed into a narrow, weak shield of white glaze. Siphonal canal short, thick-walled, upturned toward the left at its very end. The length of the last whorl (aperture and siphonal canal) is almost $\frac{3}{4}$ that of the entire shell. Outer lip strong, with 8 to 12 crenulations on the edge. Columella bears 5 well-developed plicae. The first and third plicae are twice as large as the second, fourth and fifth ones. Umbilicus is a shallow, slit-like indentation which is often obscured by the reflected edge of the columella. Axial sculpture consists of numerous, fine, raised threads. Spiral sculpture consists of 8 to 10 strong, raised, rounded cords on the middle of the body whorl, 1 or rarely 2 spiral rows of 9 to 10 blunt spines at the shoulder of the whorl, and 3 to 5 spiral rows of blunt spines at the base of the whorl. Large spines are hollowed out on their anterior faces. The umbilicus is bounded by a spiral, rugose, thick cord. Periostracum very thick, velvet-like in structure, axially foliated, dark-brown to blackish-brown in color and persistent. Operculum horny, thick, unguiculate, curved, narrow at one end, rounded at the other, with a muscle scar of about $\frac{1}{2}$ to $\frac{3}{4}$ the area of the inner side. The operculum fills most of the aperture.

The gross anatomy of the animal is typical of the genus. The radula is rachiglossate. The central tooth bears three anterior cusps, the center one being only $\frac{1}{3}$ longer than the two which flank it. The lateral bears two cusps of which the next one to the central tooth is very slightly larger than the outer one. We have not made notes on the living animal, nor seen egg cases.

	length	width	
(large)	100	80 mm.	Kingston, Jamaica
(small)	78	62	Key West, Florida

Types. Born (1778) cited no locality, but his sole figure reference is based on Martini's pl. 99, figs. 949–950 which was a specimen belonging to Spengler. The latter author stated that it "comes from St. Croix and Jamaica." We here restrict the type locality to Kingston, Jamaica.

Common name. Caribbean Vase.

Remarks. This is a handsome and well-known species which is not uncommon in certain localities in the Florida Lower Keys and abundant in certain areas in the Greater Antilles. It seems to prefer rather sheltered, shallow waters, but is sometimes found on relatively exposed reefs. Oddly enough, it has not been recorded from the Bahamas although it is well-established in southern Florida and the south coast of Cuba. Nor have we seen specimens from the Lesser Antilles.

There is considerable variation in the size and number of shoulder spines among individual specimens. The spire may be low in squat, wide specimens or rather high in elongate, narrower individuals. We have noted no specimens from the Western Atlantic which have not 5 plicae on the columella. This species is represented in the Panamic province by the subspecies *coestus* Reeve. Our series of Eastern Pacific specimens is small, but it appears that *coestus* may have 5 or 4 plicae on the columella at the same locality. Pacific specimens tend to have heavier spiral cords on the center of the body whorl. This species and its subspecies show many morphological similarities with *V.*

cassiforme Kiener (see next species) and *V. rhinoceros* Gmelin (Indo-Pacific, recent), and is especially close to *V. floridanum* McGinty 1940 (Nautilus **53,** no. 3, p. 82, pl. 10. fig. 1 Caloosahatchee Marl, Florida, Pliocene). The latter has 4 columellar plicae only.

Tryon's reference (Manual of Conchology (1) **4,** p. 71, 1882) of *Vasum crosseanum* Souverbie 1875 (Journal de Conchyliologie **23,** no. 4, p. 297 and **24,** pl. 13, fig. 1, no locality) to *V. muricatum* seems inadvisable.

Range. Southern Florida, through the Greater Antilles to the Virgin Islands and along the coast of the Caribbean Sea from Honduras to Venezuela. No Bahama records found.

Records. Florida: near Miami; Key Largo; Ragged Key; Key Vaca (all USNM); Sanibel Island; Newfound Harbor (both MCZ); Big Pine Key (ANSP); Bahia Honda Key; Sugarloaf Key; Key West; Sand Key Reef; Dry Tortugas (all MCZ); Content Key, Key West (J. Schmidt). Cuba: Punta de los Colorados, Cienfuegos Bay; Fish Point, Guantánamo Bay, Oriente (both MCZ). Haiti: La Gonave (MCZ); Les Cayes; Torbeck (both USNM). Jamaica: Gray's Inn, St. Mary; Hope Bay, Portland; Port Royal, Kingston; Port Henderson, St. Catherine (all USNM). Hispaniola: Monte Cristi; Santa Bárbara de Samaná; Puerto Plata (all MCZ). Puerto Rico: Muertos Island (USNM). Virgin Islands: St. Johns (MCZ); St. Thomas (USNM). Honduras: La Ceiba (USNM). Panama: Colón (MCZ). Colombia: Cartagena, Bolivar; Pasa Nueva, Bolivar (both USNM). Caribbean Islands: Swan Island (MCZ).

Vasum (Vasum) cassiforme *Kiener*, Plate 93, figs. 1–2

Turbinella cassiformis 'Valencienne' Kiener 1841, Iconographie Coquilles Vivantes **6,** Genre Turbinelle, p. 20, sp. 13, pl. 9, fig. 4 (. . . côtés de Bahia).

Turbinella cassidiformis Kiener, Deshayes 1845, Animaux sans Vertèbres, 2nd. edition **9,** p. 395 [an emendation].

Description. Adult shell about 65 mm. in length (2½ inches). Solid and heavy. Whorls about 8, shouldered at the top with a row of prominent, blunt tubercles and straight to

Plate 93. *Vasum cassiforme* Kiener
Fig. 1. Manguinhos, Ilha de Itaparica, Bahia, Brasil (reduced from 2¾ inches). Fig. 2. "Bahia, Brasil" reduced from 2½ inches).

slightly concave on their sides. The last whorl in adults flares at the aperture. Color a cream-white with heavy mottlings of reddish-brown. Spire moderately extended, flat-sided. Suture slightly indented and wavy. Aperture flaring and extended at the top, with a whitish interior and externally mottled with light purplish-brown. Parietal wall developed into a fairly wide, elongate shield which is glazed, purplish-brown in color and strongly concave or "dished out" in the area opposite the siphonal canal. Columella generally with 3 weak plicae. The lowest one is sometimes very weak. Siphonal canal short, slightly turned up at the very end. The length of the last whorl (aperture and siphonal canal) is greater than $\frac{3}{4}$ that of the entire shell. Outer lip strong, slightly rolled back and bears prominently raised, rounded, brown, crenulations. The anterior or lower end of the columella is stained a dark-brown. Umbilicus sealed over by the glazed parietal shield. Axial sculpture consists of numerous, fine, prominently raised threads which form fine foliations on the much larger, low spiral cords. Spiral sculpture on the body whorl consists of about a dozen round, foliated cords. At the top of the whorl at the shoulder there is a row of 8 or 9 large, blunt spines which are hollowed out on their anterior faces. At the base of the shell there are 3 to 5 spiral rows of prominent tubercles. Nuclear whorls appear to be smoothish and fairly large. Periostracum moderately thick, persistent, light- to dark-brown, and finely foliated on the spiral cords of the shell. Operculum and animal unknown.

	length	width	
(average)	68	50 mm.	Manguinhos, Ilha de Itaparica, Bahia, Brasil

Types. The type is presumably in the Muséum d'Histoire Naturelle in Paris. Bahia, Brasil is the type locality given by Kiener.

Common name. Helmet Vase.

Remarks. This species is apparently quite rare and limited in its distribution to the State of Bahia, Brasil. The outer lip flares considerably, especially at the top. The parietal wall and the lower portion of the columella are pressed in to form a dish-like depression, a feature which distinguishes it from *V. rhinoceros* Gmelin of the Indo-Pacific. The latter also differs in having 3 strong, white columellar plicae, while *cassiforme* has 3 weak, mauve-brown plicae of which the lower one is almost obsolete. The spiral cords on the body whorl of *cassiforme* are strongly fimbriated. We know of no fossil relatives of this species.

Range. Known only from the State of Bahia, Brasil. Reeve's (1847) record of "the West Indies" is open to question.

Records. Brasil: "Bahia" (USNM); Manguinhos, Ilha de Itaparica, Estado da Bahia (A. Oliveira, MCZ).

Subgenus **Altivasum** *Hedley*

Altivasum Hedley 1914, Biological Results of the Fishing Experiments carried on by the F.I.S. "Endeavour" 1909–1914 **2**, pt. 2, p. 68, pl. 9 (genotype, *Latirus aurantiacus* Verco 1895; *non* Montfort 1810).

Altivasum Hedley, Verco 1914, Transactions and Proceedings Royal Society South Australia **38**, p. 484.

Vasum (*Altivasum*) Hedley, Wenz 1946, Handbuch der Paläozoologie, Berlin **6**, Gastropoda part 6, p. 1300.

Shell moderately elongate, moderately heavy, with the spire quite elevated. Sculpture spinose with the spines often quite delicate. Axial sculpture delicate, consisting of fine, crowded, sharp, raised foliations or lamellae. Columella with 3 plicae. Umbilicus funnel-shaped, sometimes partially filled by the enrollment of the non-glazed portion of the wall of the siphonal canal. Siphonal canal moderately to greatly shortened. Periostracum very thin, brownish-yellow in color.

Subgenotype, monotypic, *Latirus aurantiacus* Verco 1895 (*non* Montfort 1810)= *Altivasum flindersi* Verco 1914.

This subgenus includes those *Vasum* species which have evolved in the direction of delicate spinosity, elevated spire, shortened siphonal canal, fine, crowded axial lamellae and lightness in shell. The most extreme of these is the subgenotype, *V.* (*A.*) *flindersi* Verco, from 75 to 140 fathoms in the Great Australian Bight. Our Western Atlantic representative is *V.* (*A.*) *capitellum* Linné which, however, does not have as high a spire nor as short a siphonal canal. This species has changed little from its Lower Miocene ancestor, *V.* (*A.*) *subcapitellum* Heilprin, from the Silex beds of Ballast Point, Tampa, Florida. *Vasum horridum* Heilprin of Shell Creek, Florida (Chipola formation, Lower Miocene) appears to be an unusual departure from *Vasum s.s.*, and may doubtfully be placed in the subgenus *Altivasum*. It is unique in its production of many, equal-sized spines on the spire and in having 4 columellar plicae. There is no recent derivative of this species known. *Vasum* (*Vasum*) *ceramicum* Linné of the Indo-Pacific bears a superficial relationship with this subgenus in its possession of an elevated spire, but is excluded by its 5 columellar plicae, stoutness of shell, absence of delicate, axial foliations or lamellae in the shell and complete absence of an umbilicus.

Vasum (Altivasum) capitellum *Linné*, Plate 94, figs. 1–2

Murex capitellum Linné 1758, Systema Naturae, 10th edition, p. 750, no. 465 [refers to Argenville 1742, Histoire Naturelle Lithologie et Conchyliologie, Paris, pl. 18, fig. k].

Voluta capitellum Linné, Gmelin 1791, Systema Naturae, 13th edition, p. 3462, no. 100 (Oceano indico et americano).

Turbinella capitellum Lamarck 1816, Encyclopédie Méthodique Vers, pl. 431 bis*, fig. 4 [not fig. 3]; Liste, p. 7 [name and figure only].

Turbinella mitis Lamarck 1822, Animaux sans Vertèbres **7**, p. 106, no. 10 (no locality).

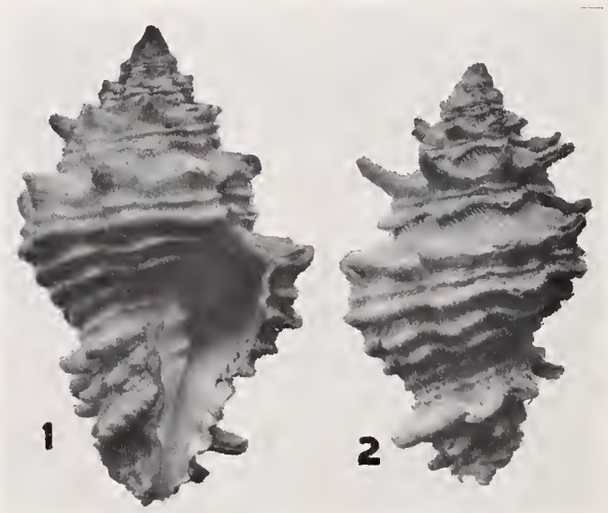

Plate 94. *Vasum capitellum* Linné
Figs. 1 and 2. Lesser Antilles (both natural size).

Description. Adult shell varying from 50 to 65 mm. in length (2 to 2½ inches). Solid, moderately heavy and spinose. Whorls 8 to 9, bearing prominent, sharp, though sometimes blunt, spines at the shoulder. Color of shell cream-white to yellowish-white, rarely with 2 or 3 chocolate-brown, spiral bands. Spire well-produced and pointed. Suture obscure and wavy and sometimes obscured by overlapping spines from the whorl above. Aperture relatively small, oval, continuous below with the siphonal canal, and colored a porcelaneous white. Parietal wall, in adults, developed opposite the columellar plicae into a thick, narrow, glazed shield. Siphonal canal moderately shortened, slightly turned up and to the left at its very end. The length of the last whorl (aperture and siphonal canal) is equal to or slightly greater than ½ the total length of the shell. Outer lip strong, with about 8 prominent, deep scallopings or crenulations. Columella bears 3 strong plicae of which the lowest is sometimes weak. Umbilicus small, funnel-shaped, partially filled by the reflected edge of the columella. Axial sculpture consists of numerous, crowded, raised lamellae which are very delicate in texture. Spiral sculpture consists of 1 or 2 rows of long and sharp or short and blunt spines at the shoulder of each whorl, and of 4 to 6 strong, wavy and rounded cords on the center of the whorl. At the base or lower third of the whorl there are 3 spiral rows of prominent spines. The lowest one is generally foliated and borders the umbilicus. All long spines, if present, are hollowed out on their anterior faces. Periostracum thin, persistent, axially foliated or lamellated and a light yellowish-brown in color. Operculum and animal unknown.

	length	width	
(large)	64	39 mm.	"Lesser Antilles"
(average)	50	32	Port Castries, St. Lucia, Lesser Antilles
(small)	38	25	St. Lucia, Lesser Antilles

Types. The figure given by Argenville 1742, pl. 18, fig. k (see reference above) is designated as the type figure. We restrict the type locality to St. Lucia, Lesser Antilles.

Common name. Spiny Vase.

Remarks. The spiny vase is an uncommon species which apparently lives in waters of moderate depth. The great variation in spinosity, which may in some cases be reduced to a simple nodulation, may be due to environmental conditions, although at present there are insufficient data to support this conjecture. Two young specimens from Villa, St. Vincent, Virgin Islands, have 3 spiral color bands of chocolate-brown.

Range. Puerto Rico, through the Lesser Antilles and thence westward along the northern coast of South America to Colombia.

Records. Puerto Rico: Mayagüez (MCZ). Virgin Islands: Villa, St. Vincent (USNM); St. Thomas (ANSP and MCZ). Lesser Antilles: Port Castries, St. Lucia; St. Lucia, 10 fathoms (both USNM); Carriacou Island, Grenadines; Fontenary Beach, Grenada; Barbados (all H. G. Kugler, MCZ). Caribbean Islands: Bonaire; Curaçao (both USNM). Colombia: Cartagena, Bolivar (USNM).

Subgenus **Globivasum,** *new subgenus*

Shell globular in shape, solid, with a very short siphonal canal. Sculpture nodulose, not spinose, with low, rounded, axial ribs. Spiral sculpture of weak, wavy, rounded

cords which are more pronounced on the middle of the body whorl. Columella with 3 prominent plicae, the lowest of which is weakest in development. Umbilicus funnel-shaped, shallow, sometimes partially filled by the reflected, porcelaneous portion of the columella. Periostracum thin, light-brown in color. Operculum typical of the genus. Animal unknown.

Subgenotype, *Turbinella nuttingi* Henderson 1919=*Vasum* (*Globivasum*) *globulum nuttingi*.

There appears to be no fossil representative described for this subgenus and the subgenotype, *V.* (*G.*) *globulum nuttingi* is the sole Western Atlantic member. This subgenus is an unusual development towards simplicity in sculpture and conservatism in shape. It shows an opposite trend from that displayed by members of the subgenus *Altivasum* which tend towards elongation, spinosity and delicateness in form. *V.* (*G.*) *globulum globulum* Lamarck is presumably limited to the West African coast.

Vasum (Globivasum) globulum globulum *Lamarck*

Turbinella globulus Lamarck 1816, Encyclopédie Méthodique Vers, pl. 431 bis*, fig. 2; Liste, p. 7 [name and figure only].

Voluta globosa Dillwyn 1817, Descriptive Catalogue Recent Shells, London **1**, p. 569 (no locality) [refers to Chemnitz 1795, Conchy.-Cab. (1) **11**, pl. 178, figs. 1715, 1716].

Turbinella globulus Lamarck, Kiener 1841, Iconographie Coquilles Vivantes **6**, Genre Turbinelle, p. 16, pl. 10, fig. 2 (Ocean Indien?).

Turbinella globulus Reeve 1847, Conchologia Iconica **4**, Turbinella, no. 11 (Africa).

Description. In all respects, so far as we know, like that of *V. nuttingi* Henderson, except that the columella and interior of the aperture are always bright, rosy-pink in color.

	length	width	
(large?)	35	25 mm.	Cape of Good Hope, Union of South Africa [?]. USNM 124677.

Types. The type upon which Lamarck based his description is presumably in the Muséum d'Histoire Naturelle in Paris. We refrain from suggesting a specific type locality because of insufficient material.

Common name. The Little Globe Vase.

Remarks. This rare species has not been recorded from the Western Atlantic and it presumably comes from the west coast of Africa. It differs from its West Indian subspecies, *V. globulum nuttingi*, only in having a bright, rosy-pink aperture instead of a brownish-orange to dark chocolate-brown one. *Buccinella tuberculata* Perry 1811 (Conchology, London, pl. 27, fig. 7, "Amboyna") may be this species, but the unsatisfactory figure and locality place this name among Perry's doubtfuls.

Range and Records. We can find only three locality records for this species. Reeve (1847) gave "Africa" and added that it is a peculiar and well-known species, though not one of very common occurrence." A young specimen in the Academy of Natural Sciences of Philadelphia is labelled "West Africa." An adult in the U. S. National

Museum from the Turton collection is labelled "Cape of Good Hope," but the accuracy of this is open to question.

Vasum (Globivasum) globulum nuttingi *Henderson*, Plate 95, figs. 1–2

Turbinella nuttingi Henderson 1919, [in] C. C. Nutting, University Iowa Studies, Natural History, 1st series, no. 28, p. 201, pl. 11, fig. 1 (Falmouth Harbour, Antigua).

Description. Adult shell varying from 25 to 43 mm. in length (1 to $1\frac{3}{4}$ inch). Solid, heavy and globular in shape. Whorls 8 to 9, rounded and bearing 8 to 10 low, rounded, axial ribs. Color of shell, white to cream-white with chocolate-brown mottlings seen in young specimens. Spire moderately produced, slightly rounded. Suture well-indented and wavy. Aperture ovate, continuous with siphonal canal opening, colored a pinkish-brown to light, brownish-orange outside and a dark brown inside. Parietal wall, in adults, developed into a narrow, glazed shield which extends anteriorly into the siphonal canal. Siphonal canal short, slightly turned up at its very end. The length of the last whorl (aperture and siphonal canal) is slightly less than $\frac{2}{3}$ that of the entire shell. Outer lip strong, with heavy crenulations, each of which bears 2 spiral, raised, glazed cords. These are thickened into teeth just inside the edge of the outer lip. Columella bears 3 well-developed plicae, the most anterior one being generally smaller than the two above it. They are almost vertical to the axis of the shell. Umbilicus funnel-shaped, shallow, sometimes closed over by the reflected edge of the columella. Axial sculpture consists of 8 to 10 low, rounded, evenly-spaced ribs. Over the entire shell are numerous, fine, axial lamellae which are often fimbriated. Spiral sculpture consists of fairly prominent rounded cords which, when crossing the axial ribs, give the shell a nodulose sculpture. Periostracum thin, yellowish-brown in color. Operculum corneous, heavy, light-brown, unguiculate, curved, pointed at one end, rounded at the other, with a muscle scar covering half the inner surface. Animal unknown.

	length	width	
(large)	43	34 mm.	Falmouth Harbour, Antigua (paratype)
(average)	37	26	Falmouth Harbour, Antigua (holotype)
(small)	25	19	English Harbour, Antigua (paratype)

Types. Holotype, USNM no. 600532. The type locality is Falmouth Harbour, Antigua Island, Lesser Antilles, station 402, 7 fathoms, Smithsonian–Univ. Iowa Expedi-

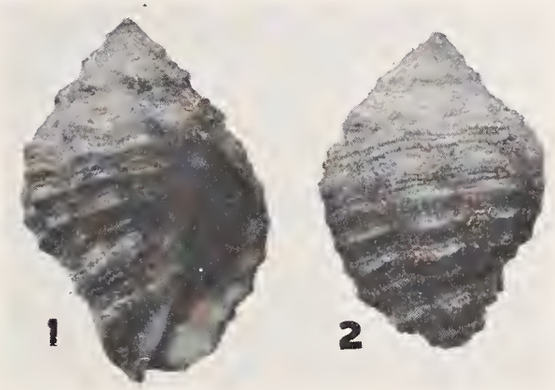

Plate 95. *Vasum globulum nuttingi* Henderson
Fig. 1. Falmouth Harbour, Antigua Island, Lesser Antilles (holotype). Fig. 2. English Harbour, Antigua Island, Lesser Antilles (paratype) (both natural size).

tion, June 21, 1918, J. B. Henderson, leg. Paratypes in USNM 459370 from the above locality. Paratypes in USNM 459365, 459366, 459368 and 459369, all from minor, shore localities in English Harbour, Antigua. J. B. Henderson, leg. June 1918.

Common name. Nutting's Vase.

Remarks. This subspecies is very similar to *V. globulum globulum* Lamarck, but differs in having a light yellowish-brown to mauve-brown columella and outer lip and an inner aperture of chocolate-brown. Henderson appears to be the only one who has collected this species, having found over thirty specimens in Antigua. He says (1919, p. 201) that they are very difficult to see against the rocky shore background. "One of the chief enemies of these rock-loving mollusks is a fish of the grouper family that at high tide swims about the reefs examining every inch of their surface for little mollusks." Henderson must have changed his mind about giving a new name to this species after the appearance of Nutting's 1919 report in which he gave a description, locality, and figure. His series of specimens in the U. S. National Museum were labelled "*globulus* Lamarck" and bore no indication of having been described. The figured specimen has been separated from the paratypes, and is now set aside as the holotype in USNM 600532.

Range and Records. Known only from the above localities in Antigua, Lesser Antilles.

Key to the Western Atlantic species of *Vasum*

1.	Columella with 5 plicae	*muricatum*
	Columella with 3 plicae	2
2.	Shell globose, without spines or tubercles	*globulum nuttingi*
	Shell elongate, with spines or tubercles	3
3.	Aperture white; lip not flaring	*capitellum*
	Aperture mauve-brown; lip flaring	*cassiforme*

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* * * *

Voyages of the "Eolis"

The motor yacht, "Eolis," was built in 1909 by Mr. John B. Henderson, Jr. for the purpose of dredging mollusks in Western Atlantic waters. The "Eolis" was 50 feet in length, 11 feet in width, and drew 5 feet of water. Her home port was Washington, D.C. Seven cruises were made from 1910 to 1915, five of which were in Florida and Bahama waters. During the summers of 1910 and 1912, Mr. Henderson took the "Eolis" to Bar Harbor and Frenchman's Bay, Maine, where a small amount of dredging was done. The most outstanding cruises were made along the coast of southern Florida, principally over the Pourtalès Plateau and Hawk Channel. During the five Florida cruises, over 31,400 lots of deep-sea mollusks were collected. These were later donated to the United States National Museum. A two week's trip was taken to the Bimini Islands during the third Florida cruise, but the dredging results were rather poor. Mr. George H. Clapp and Mr. Charles T. Simpson accompanied Mr. Henderson on most of these southern cruises. Interesting extracts of the log of the "Eolis" were published by Mr. Henderson in the *Nautilus* (1911, **25,** no. 6, pp. 71–72, no. 7, pp. 81–83).

No extensive report has been made on the "Eolis" collections and it will be many years before it is thoroughly worked, probably by numerous authors as the various families are monographed. In 1915, Henderson published an account of the "Rediscovery of Pourtales' Haliotis" (see *Johnsonia* **2,** no. 21, May 1946).

In 1918, Mr. Henderson carried out successful dredging operations in Antigua and Barbados, Lesser Antilles, during the Smithsonian-University of Iowa Expedition. Hauls from 6 to 120 fathoms were made from his 27-foot launch "Eolis, Jr." A fascinating account by Mr. Henderson appears in C. C. Nutting's "Barbados-Antigua Expedition" (Univ. Iowa Studies (1) **8,** no. 3, pp. 88–96 and 199–203). *Turbinella nuttingi* Henderson, a synonym of *Vasum globulum* Lamarck, is inadvertently described as new.

Since no obituary of Mr. John Brooks Henderson, Jr. has ever appeared in malacological literature, we are including a few remarks, pending a more complete account. Mr. Henderson was born in Louisiana, Pike County, Missouri, on February 18, 1870. He graduated from Harvard University in 1891 and received his law degree in 1893 from Columbian (now the George Washington) University. He was author of "American Diplomatic Questions" and "The Cruise of the Tomas Barrera."

Henderson collected mollusks in Jamaica, Haiti, Cuba, the Lesser Antilles, Hawaii, United States, Europe, Japan and China. He published 43 articles on mollusks, most of which appeared in the *Nautilus* and the *Proceedings of the U.S. National Museum*, the most outstanding being "A Monograph of the East American Scaphopod Mollusks."

He was a regent of the Smithsonian Institution from 1910 until his untimely death on January 4, 1923, at the age of 52.—R. T. Abbott.

The Voyage of the "Tomas Berrera"

One of the many important expeditions in Cuban waters was that of the schooner *Tomas Barrera*, an expedition organized by J. B. Henderson and Dr. Carlos de la Torre. The *Tomas Barrera* cruised along the Colorado Reefs on the northwest coast of Cuba from La Esperanza to Cabo de San Antonio for six weeks during May and June of 1914. The purpose of the trip was to make as complete a collection as possible of the flora and fauna of the region, especially to collect marine mollusks and to take advantage of the unusual opportunities for collecting land and fresh-water mollusks on the northern slopes of the Sierra de los Organos, a region more or less inaccessible from the south.

The party of naturalists included Paul Bartsch, George H. Clapp, John B. Henderson, J. Rodriguez, Charles T. Simpson, Carlos de la Torre and Manuel Lesmes, a fisheries expert for the Cuban government.

The *Tomas Berrera* was the prize member of a large Cuban fishing fleet. She was a "vivero," a ship possessing a large tank for keeping fish alive until delivered at the market. She was sixty-five feet long at the water line, had a twenty foot beam and carried a large set of sails but had no auxiliary engine. A twenty-five foot Gurnet dory equipped with a number of dredges of varying sizes and weights, and other special collecting apparatus had been brought from Miami. In addition to this, the expedition had at its disposal a small auxiliary sloop-rigged "vivero" the *Tarpon*, which served as a tug and was used for collecting trips into shallow waters.

Dredging began in the bay at La Esperanza and from then on collecting never ceased during daylight hours except when the *Tomas Barrera* was actually under way. Hauls were made in shallow depths along the entire length of the inner reef as the expedition was not equipped to make hauls in the deeper waters on the outside of the reef. Night collecting with the aid of a submarine light was most productive.

Collecting along the reef near Cayo Hutia was excellent and while half of the party were thus engaged the rest went inland to explore Pan de Azucar, a mountain noted for many fine land shells. From Cayo Hutia the schooner proceeded to Dimas, taking a route outside the reef, the inner waters being too shallow. From Dimas to Santa Rosia and thence to Los Arroyas the dredge was in constant use. Interesting hauls were made off Punta del Torete, but Cabo Colorado proved disappointing. Exploration of the Cayos de la Leña was interesting and varied. Dredging around Punta del Cajon and Cabo de San Antonio completed the main portion of the marine work of the expedition. The schooner put in at La Fé and from here a trip was made overland to Viñales and La Esperanza. Here the party joined the ship and the expedition proceeded eastward to explore the region about Mulata, Bahía Honda and Cabañas, while a land party made productive trips to Pan de Guajaibon and the hills about Cabañas.

Most of the material collected was deposited in the United States National Museum and records have appeared in many scattered reports, which include stations of the *Tomas Barrera* expedition. A popular account of this voyage appeared as "The Cruise of the Tomas Barrera" by John B. Henderson, 1916, 329 pages with 36 illustrations and maps, G. P. Putnam and Sons, New York.—Ruth D. Turner.