

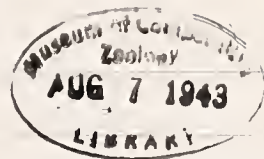
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FISSURELLIDAE



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## THE GENERA *FISSURELLA*, *LUCAPINA* AND *LUCAPINELLA* IN THE WESTERN ATLANTIC

BY

ISABEL PÉREZ FARFANTE

Guggenheim Fellow, Cuba 1942-43

The genera *Fissurella* and *Lucapinella* are widely distributed in tropical and temperate seas; *Lucapina* is mainly tropical. Most species in this family live attached to rocks both in exposed situations and under stones and coral where they are protected. Several species are to be found in the inter-tidal zone; many however live well below the low water line and a few species occupy fairly deep water. Deshayes (1832, *Ency. Meth. Vers.*, 2, p. 131) has pointed out that *Fissurella* move about at night, but usually return to their original position on the rocks. Wilcox (1905, *Science* (n.s.), 22, p. 90) has made the same observation on *F. barbadensis* in Bermuda. This is also well known in other allied families. Several species in this genus are rather difficult to find, even when they occur on the inter-tidal area, as they are frequently covered with marine algae and other marine organisms which render them relatively inconspicuous. Common names for individual species have not been generally applied, although the people are well acquainted with them. The various species, however, are usually known as key-hole limpets or volcano shells. In Cuba they are referred to as "sombbrero chino," the Chinese hat.

I am deeply indebted to many friends and colleagues for the loan of much valuable and critical material. Their names appear after the records. In addition to the use of private collections, I have been privileged to study certain of the larger museum collections. For the use of this material I am indebted to Dr. H. E. Vokes of the American Museum of Natural History (AMNH) and to Dr. S. C. Ball of the Peabody Museum, Yale University (Yale). I am deeply grateful to all members of the Department of Mollusks of the Museum of Comparative Zoölogy for their aid and kindness. I am particularly indebted to Mr. W. J. Clench under whose direction the present study was made, to Dr. J. Bequaert for his many helpful suggestions, and to Dr. M. Champion and Miss D. Slater for their constant help with the manuscript and aid in reading proof.

### ***Fissurella* Lamarek**

*Fissurella* Lamarek 1799, *Mémoires de la Société D'Histoire Naturelle de Paris*, 1, p. 78.

*Fissurellus* Denys de Montfort 1810, *Conch. Syst.*, 2, p. 102.

Genotype (monotypic), *Fissurella nimbosa* Linné 1758

Shell conical, elevated, depressed and even flattened, variable in size, with the apex subcentral. Orifice at the summit or anterior to it, variable in shape. Surface in a few species smooth, in others with shallow grooves, but generally with numerous radiating ribs which frequently possess small or large nodules or erect scales. Concentric growth

lines are always more or less visible. Margin simple, crenulated or notched. Muscle impression continuous but formed as two parts, the larger horse-shoe shaped with the extremities enlarged and connected by a smaller and narrower band or scar. The orifice is bounded inside by a callus which is not truncated or excavated. Shell wholly external, capable of containing the soft parts. Animal with one pair of sub-cylindrical tentacles with the eyes placed on slightly elevated tubercles at its outer side and near the base. These tubercles are on the tentacles. Foot large and oval. Central teeth of the radula narrow and feeble; lateral teeth strong; marginal teeth numerous. The animal and anatomy of the Western Atlantic *Fissurella* have been very little studied. Pilsbry (1890, *Man. of Conch.* (1), 12, p. 143) states that "in *F.* (*Cremides*) *barbadensis* the edge of the mantle is not at all fleshy, but is very narrow. It is not a simple edge, however, having short papillose scallops on the upper and lower edges as if pinked." P. Fischer (1857, *Journ. de Conchy.*, 6, p. 119) says about *Fissurella* (*Cremides*) *nodosa*: "foot very large, with thin margins; borders of the mantle short, but thick, forming two very narrow and deeply crenulated laminae. Lateral tentacles of the foot rudimentary. Anal opening as in *F. barbadensis*. Whitish; black spots on the head."

The genus *Fissurella* has been credited to Bruguière (1789, *Ency. Meth.*, Vers. 1, pt. 1, p. xlv) but, however, Bruguière mentioned no species whatsoever, but only gave the name *Fissurella* with a short diagnosis in his outline of classification. This diagnosis is not at all applicable to *Fissurella* alone, but would characterize many of the several genera in the family. Later Lamarck characterized this genus by the selection of a single species, *F. umbosa*. As a consequence the genus *Fissurella* will date from Lamarck and not from Bruguière.

The nine species recognized from the Western Atlantic are distributed in 3 subgenera.

### Subgenus **Fissurella**

Shell fairly large, reaching a length of from 45 to 60 mm., conical, elevated and heavy. Orifice large and located about in the middle. Outer surface sculptured with numerous radiating riblets. Margin of the shell entirely in one plane and finely crenulated. Internal callus of the orifice very broad and flat.<sup>1</sup>

### **Fissurella (Fissurella) nimbosa** Linné, Plate 1, fig. 1-2

*Patella nimbosa* Linné 1758, *Syst. Nat.* ed. 10, 1, p. 785 (M. Europae australis, Americae). [Based on figures of Lister, Gaultieri and d'Argenville].

*Fissurella nimbosa* Lamarck 1822, *An. s. Vert.*, 6, pt. 2, p. 10 (Mers de l'Europe australe, de l'Afrique occidentale, etc.).

*Fissurella balanoides* Reeve 1850, *Conchologia Iconica*, 6, *Fissurella*, pl. 10, fig. 66 (locality unknown).

*Description.* This is the largest and heaviest species of the genus in the Western Atlantic, reaching a length of 50 mm. It is elevated, conical and narrower anteriorly. Slopes straight or slightly convex. Base ovate. Summit slightly inclined towards the anterior

<sup>1</sup> Some authors have erroneously considered *F. picta* Gmelin as the genotype of *Fissurella*. However, Lamarck who first characterized the genus, named a single type, *Patella* [= *Fissurella*] *nimbosa* Linné. I propose the subgenus *Balboaina* for the species characterized by *F. picta* that occur along the Pacific coast of the Americas.

### **Balboaina**, new subgenus

Shell generally large, certain species reaching a length of 100 mm., heavy and broadly conical. Orifice a little in front of the middle. Outer surface smooth, with numerous radiating striae or ribs more or less nodulose. Margin of the shell entirely in one plane, simple not crenulated and with a dark and generally broad, interior border. Internal callus of the orifice usually broad.

Subgenotype, *Fissurella picta* Gmelin

extremity, pierced by a large, oblong orifice from one-seventh to one-ninth the length of the shell, its sides produced upward in little points on either side, as can be seen in the figure. Sculpture consisting of numerous irregularly spaced radiating shallow grooves, separating narrow, low ribs. These are crossed by fine and very close growth lines. Ground color buff to pinkish, with eleven or twelve rays of purplish-red to dark brown. Sometimes all the grooves are tinged with this dark coloration. Margin slightly crenulated. Inside pale green, darker around the central callus which in addition is oval, broad and also green. Muscle impression distinct and rather far from the edge.

	length	width	height	orifice length	
(large)	50	35	19	7 mm.	Trinidad
(average)	45	30	16	5	Toco, Trinidad

*Types.* Linné's original description refers to figures of Lister, Gaultieri, and d'Argenville, which represent more than one species. I here select the figure of Gaultieri (1742, Testarum Conchyliorum Index, pl. 9, fig. S) as the type figure of this species. This will restrict Linné's name *nimbosa* to the West Indian species. The figures in Lister (1770, Hist. Conch. Tab. Anat., Editio Altera, Huddersford, Oxoni, 4, s.1., c. 1, t. 1, 2 [= Book 4, pl. 527, fig. 1-2]) to which Linné also refers are not the West Indian species.<sup>1</sup> Later Lamarck (l.c.) made reference to Lister's pl. 528, fig. 4, not cited by Linné, which is the West Indian *nimbosa* and similar to the figure in Gaultieri also cited originally by Linné. As no specific locality was given by Gaultieri, I propose Toco, Trinidad, West Indies as the type locality (Neoholotype, M.C.Z. No. 124731.).

*Remarks.* This species is very different from the others found in our Atlantic waters and its characteristics on the whole are constant. *F. nimbosa* has not been obtained in Cuba or in the Bahamas where much marine collecting has been done. *F. balanoides* Reeve is only a young specimen of this species.

*Range.* Puerto Rico and south through the Lesser Antilles to the northern coast of South America. (Fernando Noronha, Ihering 1927, p. 101).

*Records.* PUERTO RICO: Humacao Beach (H. Vander Schalie): Escambrón Beach (AMNH). LESSER ANTILLES: Charlestown, Nevis (B. Baker): Antigua; Guadeloupe; Toco, Trinidad (all MCZ). COLOMBIA: Cartagena; Santa Marta (both MCZ). BRITISH GUIANA: (H. G. Kugler). BRASIL: Ilha de Itaparica and Reconcavo, Estado da Bahia (P. de Oliveira).

### Subgenus **Cremides**

*Cremides* H. and A. Adams 1854, Genera of Recent Mollusca, p. 446.

Subgenotype, *Fissurella barbadensis* Gmelin

Shells small or moderately large, generally not exceeding 40 mm., elevated or depressed, conical or lighter in structure than the two previous subgenera. Orifice generally a little in front of the middle. Outer surface sculptured with numerous radiating ribs usually nodulose or with small scales. Margin of the shell entirely in one plane and strongly crenulated. Internal callus of the orifice narrow or moderately broad.

### **Fissurella (Cremides) nodosa** Born, Plate 1, fig. 3-4

*Patella nodosa* Born 1780, Testacea Musei Caesarei Vindobonensis, p. 429 (Barbados). [Based on figures of Lister, Petiver and Martini].

<sup>1</sup> I have not seen the first edition of this work. The second edition, however, is supposed to be the same as the first.

*Patella jamaicensis* Gmelin 1789, Syst. Nat. ed. 13, 1, pt. 6, p. 3730 (Jamaica and Barbados). [Based also on the figures of Lister and Martini].

*Patella spinosa* Gmelin 1789, Syst. Nat. ed. 13, 1, pt. 6, p. 3731 (locality unknown). [Based on Schroeter's figure].

*Description.* Shell fairly heavy and strong, reaching a length of 30 to 35 mm., considerably elevated and dome-shaped. Base broadly oval. Summit slightly in front of the

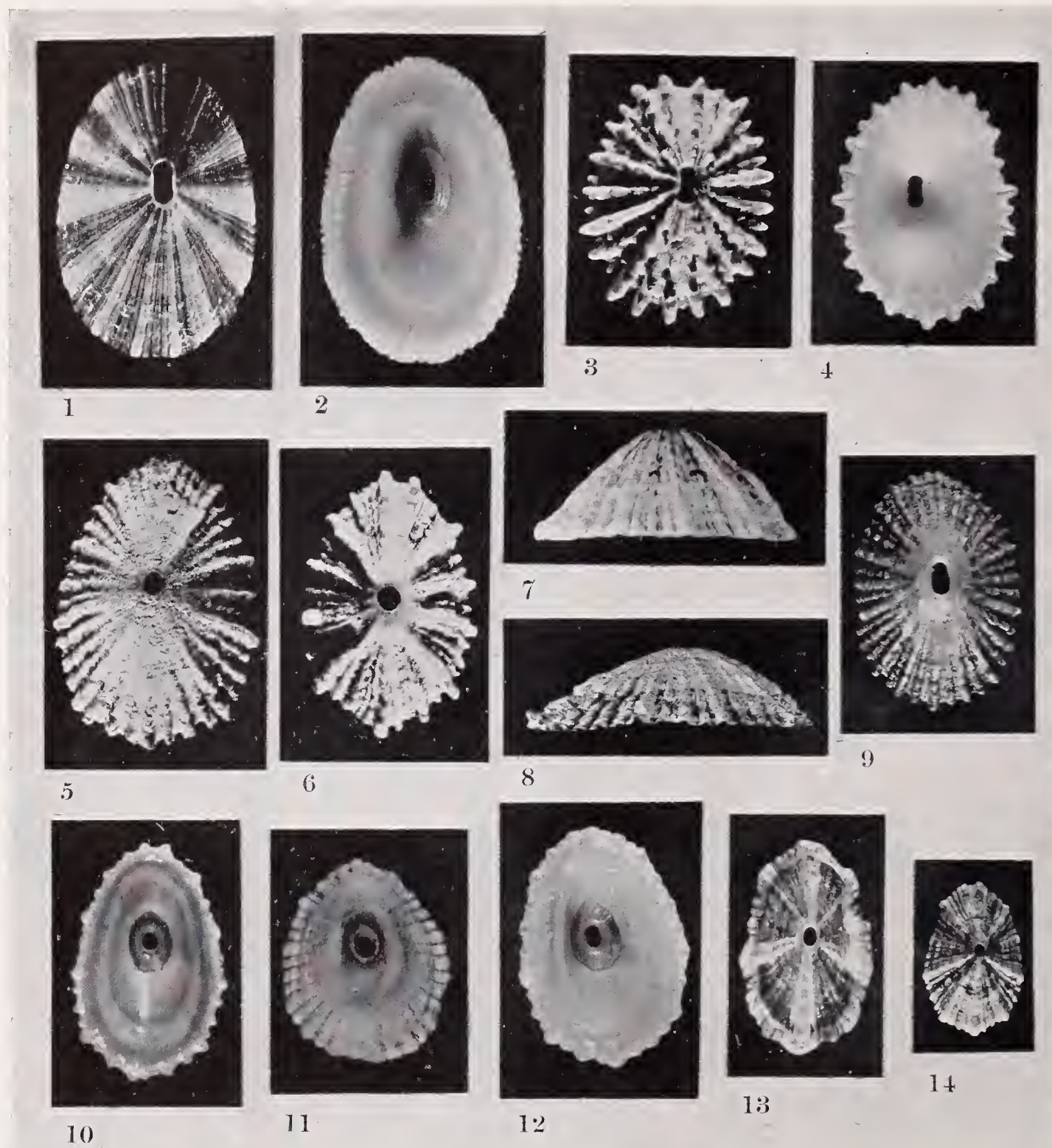


Plate 1. Fig. 1 and 2. *Fissurella nimbosa* Linné, Trinidad, Lesser Antilles. Fig. 3. *Fissurella nodosa* Born, Key Largo, Florida. Fig. 4. *Fissurella nodosa* Born, Navassa Island, West Indies. Fig. 5 and 8. *Fissurella barbadensis* Gmelin, St. George's, Bermuda. Fig. 6. *Fissurella barbadensis* Gmelin, Barbados, Fig. 7. *Fissurella barbadensis* Gmelin, Governor's Harbour, Eleuthera, Bahamas. Fig. 9. *Fissurella nodosa crusoë* P. Farfante (Holotype), Magueripe Bay, Trinidad. Fig. 10. *Fissurella barbadensis* Gmelin, Bermuda. Fig. 11 and 12. *Fissurella barbadensis* Gmelin [as *bermudensis* Pilsbry, Types] Bermuda (2 ×). Fig. 13 and 14. *Fissurella barbadensis* Gmelin, St. Thomas, Virgin Islands (fig. 13, 2 ×). All natural size except fig. 11, 12 and 13.

middle, which is partially occupied by the anteriorly placed orifice. The orifice is nearly twice as long as wide, contracted in the middle, the contracted areas being directed upward. Sculpture consists of from 20 to 22 strongly nodulated radiating ribs, between which are often riblets. The nodules are arranged concentrically and connected by fine laminae. The color varies from white to cream, a pale brown and even a faint pink. Margin strongly and sharply crenulated. The interior color a pure white with the outer ribs showing through in the form of fine radiating grooves. Internal callus of the orifice broad and white, outlined by a marked indenture. Muscle scar slightly impressed in most of the specimens, broad with its two anterior extremities very much enlarged and connected by a narrow scar, lying at some distance from the border.

	length	width	height	orifice length	
(large)	40	37	28	6 mm.	Jamaica
(average)	31	25	16	5	Habana, Cuba

*Types.* The type figure of *P. nodosa*, here selected, is that of Lister 1770, Hist. Conch. Tab. Anat. (Editio Altera, Huddersford, Oxoni), pl. 528, fig. 6 (see foot note p. 3). Barbados is the type locality as given by both Lister and Born. The actual specimens of Born are probably still in the Vienna Museum, under the same number 3369. (See reference Johnsonia No. 6 (*Conus*) p. 24, under types).

*Remarks.* *P. nodosa* varies but little, exhibiting always the same characteristic sculpture. This species, although distributed from the lower Florida Keys to Barbados, is exceedingly rare in both Florida and the Bahamas. However, it is quite abundant in Cuba and Navassa Island. It lives attached to the rocks, generally where there is surf and frequently covered by growths of calcareous algae. Characteristics of the animal are given by P. Fischer (1857, Journal de Conchy., 6, p. 119).

*Range.* Lower Florida Keys, West Indies, southern Mexico and south to Venezuela.

*Records.* FLORIDA: Key Largo (T. Van Hyning). BAHAMAS: Clarendon; Cape St. Maria; Millerton; Long Id. (all MCZ). CUBA: Vedado (M. L. Jaume); Playa del Chivo; Pesquero Ramajo, W. of Matanzas; Varadero; Caibarién (all P. J. Bermúdez); Guantánamo Naval Base; Castillo de Jagua, Cienfuegos (both MCZ). HISPANIOLA: Santa Bárbara de Samaná; Puerto Plata; El Canal, Cabo Macorís; Gonave Id. (all MCZ). NAVASSA ID.: (MCZ). JAMAICA: Runaway Bay, St. Ann (MCZ). PUERTO RICO: Arecibo (MCZ); San Juan (D. Thomas); Boca de Cangrejos; Humacao (both H. Vander Schalie). VIRGIN ISLANDS: St. Thomas (MCZ); Guana Id., Tortola (M. W. Dewey); St. Croix (AMNH). LESSER ANTILLES: Antigua; Guadeloupe; Barbados (all MCZ); Tobago (T. McGinty). CARIBBEAN IDS.: Utila Id.; Swan Id. (both MCZ). MEXICO: Isla Mujeres (AMNH). VENEZUELA: La Guaira (MCZ).

### ***Fissurella nodosa crusoe*, new subspecies, Plate 1, fig. 9**

*Description.* Shell similar in general outline to *nodosa* but differs by being lighter and having the primary ribs much less prominent so that all the ribs appear to be about equal. This new species is hardly nodulose and in this aspect differs quite sharply from the strongly nodulose typical form. In the orifice, the lateral projections tend to disappear and the resulting outline is oblong or almost rectangular, as shown in the figure. The color varies from white to brown.

	length	width	height	orifice length	
(large)	34	24	11	5 mm.	Magueripe Bay, Trinidad
(average)	32	21	13	5	Balata Bay, Trinidad

*Types.* Holotype, Mus. Comp. Zoöl. No. 62827, Magueripe Bay, Trinidad, E. Deichman collector, 1937. Paratypes from Toco Bay and Balata Bay, Trinidad.

*Range.* Known only from the north coast of Trinidad.

*Records.* TRINIDAD: Toco Bay (H. G. Kugler); Balata Bay and Magueripe Bay (both MCZ).

### **Fissurella (Cremides) barbadensis** Gmelin, Plate 1, fig. 5-8, 10-14

*Patella barbadensis* Gmelin 1789, Syst. Nat. ed. 13, 1, pt. 6, p. 3729 (Barbados). [Based on figures of Lister and Martini].

*Patella porphyrozonias* Gmelin 1789, Syst. Nat. ed. 13, 1, pt. 6, p. 3730 (America Septentrionali). [Based on figures of Martini].

*Fissurella edititia* Reeve 1849, Conch. Icon., 6, *Fissurella*, pl. 7, fig. 47 (locality unknown).

*Fissurella antillarum* d'Orbigny 1850-1853, [in] R. de la Sagra, Hist. Phy. Pol. Nat. Cuba, Moll., 2, p. 198, pl. 24, fig. 40-42 (Florida and Antilles, particularly Cuba).

*Fissurella barbadensis* var. *intensa* Pilsbry 1890, Man. of Conch. (1), 12, p. 165, pl. 60, fig. 86. (No locality).

*Fissurella barbadensis* var. *bermudeusis* Pilsbry 1890, Man. of Conch. (1), 12, p. 165, pl. 60, fig. 70-72 (St. Thomas: Bermuda).

*Description.* Shell fairly heavy, 20 to 40 mm. in length, conical and more or less elevated. Base oval or subovate. Front and posterior slopes straight or slightly convex. Apex subcentral and pierced by a small orifice almost circular in shape; its length one-eighth to one-tenth that of the shell. Sculpture consisting of numerous radiating, irregular ribs, eleven of which are generally stronger and extend from the orifice to the margin. Two of these eleven are placed very close to the sides of the anterior median line and the rest equally spaced on the shell. The ribs are either serrated or bear numerous little erect scales. These latter are usually developed on the large ribs. Color grayish white to pinkish buff, generally with purplish lines between the small ribs and, in most cases, blotched with dark reddish brown or purple in the area between the larger ribs. Margin strongly crenulated. Inside the color is alternately green and white and formed in concentric bands. Inner callus of the orifice green, generally bounded by a reddish brown line. The muscle impression is distinct and lies rather far from the edge.

	length	width	height	orifice length	
(large)	41	30	12	4 mm.	Bermuda
(average)	32	26	12	4	Cape St. Maria, Long Id., Bahamas

*Types.* Gmelin cites two references for this species and I here select that of Martini 1769, Conch.-Cab. (1), 1, pl. 11, fig. 93, to be the type figure, Barbados, Lesser Antilles, being the type locality.

*Remarks.* *F. barbadensis* is the most common West Indian species and it is exceedingly variable. As stated before it is generally rather elevated but may be fairly depressed. The ribs may have short scales. In some cases the smaller and the larger ribs become equalized so that the difference between them cannot easily be distinguished. The two varieties *intensa* Pilsbry (Pl. 1, fig. 13-14) and *bermudeusis* Pilsbry (Pl. 1, fig. 11-12) are only individual variations, which appear in any large series of specimens. The animals of this species live attached to the rocks, principally where the waves can reach them and they are generally covered with marine growths, so that it is rather difficult to recognize the specimens in their natural environment.

*Range.* St. Augustine, Florida, Bermuda, the West Indies and from Mexico south to British Guiana.

*Records.* FLORIDA: St. Augustine; Melbourne; Miami; Sand Key, Key West (all T. Van Hyning). BERMUDA: Shelly Bay; Gibbet Id.; Agar's Id. (all MCZ). BAHAMAS: Eight Mile Rock, Grand Bahama; Marsh Harbour, Great Abaco; Alicetown, Bimini Ids.; Mangrove Cay, Andros Id.; Nassau, New Providence; Savannah Sound, Eleuthera; Little San Salvador Id.; Arthurstown, Great Inagua (all MCZ). CUBA: Playa de Baracoa; Vedado (M. L. Jaume); Playa de Jibacoa (J. L. Mayor); Matanzas (H. Sarasúa); Varadero; Cayo la Farola, Sagua la Grande (P.J. Bermúdez); Cayo Francés; Guantánamo Naval Base; Punta de los Colorados, Cienfuegos (all MCZ). HISPANIOLA: Puerto Plata (H. Hurst); Santa Bárbara de Samaná; Puerto Sosúa; Monte Cristi (all MCZ); Gonave Id.; Miragoane (both W. J. Eyerdam). JAMAICA: Port Antonio; Dunn's River Falls, St. Ann's Bay (both MCZ). PUERTO RICO: San Juan (D. Thomas); Boca de Cangrejos (H. Vander Schalie); Mayagüez (MCZ). VIRGIN ISLANDS: St. Thomas; Guana Id., Tortola; Virgin Gorda (all M. W. Dewey); Fredericksted, St. Croix (AMNH). LESSER ANTILLES: Ft. James Beach, Antigua; Guadeloupe (both MCZ); Barbados; Carriacou Id.; Grenadines; N. Coast Trinidad (all H. G. Kugler). CARIBBEAN IDS.: Utilla Id.; Bay Ids. (both MCZ). MEXICO: Isla Mujeres, Yucatán (C.G. Aguayo). PANAMA: Colón (Yale). BRITISH GUIANA: Corentyne River (H. G. Kugler).

***Fissurella (Cremides) angusta* Gmelin, Plate 2, fig. 1-2, 6**

*Fissurella angusta* Gmelin 1789, Syst. Nat. ed. 13, 1, pt. 6, p. 3732 (no locality). [Based on Schroeter's description and figure].

*Fissurella schrammii* Fischer 1857, Journ. de Conchy., 6, p. 383, pl. 11, fig. 5-6 (Guadeloupe).

*Fissurella barbadensis* Gmelin var. *schrammii* Fischer, Pilsbry 1890, Man. of Conch. (1), 12, p. 165, pl. 60, fig. 77-79, (Guadeloupe; St. Thomas).

*Description.* Shell medium in size, reaching a length of 15 to 30 mm., moderately solid, depressed and sharply attenuated anteriorly. Base ovate. Summit a little in front of shell center. Orifice immediately before the summit, generally very small and oval or oblong, its length one-twelfth to one-thirteenth the length of the shell. Sculpture of nine, infrequently ten, irregular ribs, radiating from the orifice and projecting a little beyond the basal margin; a single rib is always situated on the median anterior line. Between the ribs there are riblets, varying from one to six in number. All the ribs possess small closely placed nodules. Generally the color is dark reddish brown in fresh specimens, but when the shell becomes worn, the stronger ribs are buff or even white, while the ground color fades to pinkish tan and in extreme cases to light pink. Crenulations strong, but widely and irregularly spaced. The internal callus of the orifice is rather broad and varies from light brown to dark reddish brown. The inside color is variable, frequently arranged in concentric rings: around the hole-callus is a white band beyond which is one of green, terminating in a buff margin. Sometimes it is pale green or buff all over. Muscle impression in adult specimens rather broad and distinct about 4 mm. from the edge.

	length	width	height	orifice length	
(large)	31	18	6	2 mm.	Pelican Shoals, Florida
(average)	24	15	5	2	Little San Salvador Id., Bahamas

*Types.* The figure of Schroeter (1784, Einleitung Conchylienkenntniss, 2, p. 516, pl. 6, fig. 14) is selected as the type figure. As the specimen upon which the figure was based is not known to exist, I propose the type specimen of *schrammii* to be the type of *angusta* as well. The type locality is Guadeloupe Id., Lesser Antilles, the original locality of *schrammii*.

*Remarks.* The description and figure of Schroeter upon which Gmelin based this species are excellent and exactly describe this West Indian form. *F. angusta* (as *schrammii*) was considered a variety of *F. barbadensis* Gmelin, but it is sufficiently distinct to be a good species. *F. angusta* is lighter in structure, quite depressed and typically narrower in front. The sculpture, though similar, consists of fewer and less pronounced primary ribs. It is reddish brown without overtones. The aperture is much smaller and narrower. The internal callus of the orifice also is a different shade of brown and never surrounded by a reddish line as in *F. barbadensis*. *F. angusta* prefers rocks in the lower inter-tidal zone and frequently it is covered with marine growth, principally calcareous algae.

*Range.* Lower Florida Keys, Bahamas and south to British Guiana.

*Records.* FLORIDA: Pelican Shoals (J.S. Schwengel); Garden Key, Dry Tortugas (T. Van Hyning). BAHAMAS: New Providence (P. D. Ford); Little San Salvador Id.; Simms, Long Island; Matthewtown, Great Inagua (all MCZ). CUBA: Playa de Jibacoa (J. L. Mayor); Matanzas (H. Sarasúa); Caibarién (P. J. Bermúdez); Guantánamo Naval Base; Punta de los Colorados, Cienfuegos; Vedado (all MCZ). HISPANIOLA: Puerto Sosúa; El Canal, Cabo Macorís; Monte Cristi (all MCZ). JAMAICA: Dunn's River Falls, St. Ann's Bay (MCZ). PUERTO RICO: Boca de Cangrejos (H. Vander Schalie). VIRGIN ISLANDS: Guana Id.; Marina Cay, Virgin Gorda (MCZ). LESSER ANTILLES: Antigua (MCZ); Tobago (T. McGinty); Balata Bay (MCZ) and Toco, Trinidad (H. G. Kugler). BRITISH GUIANA: Corentyne River (H. G. Kugler).

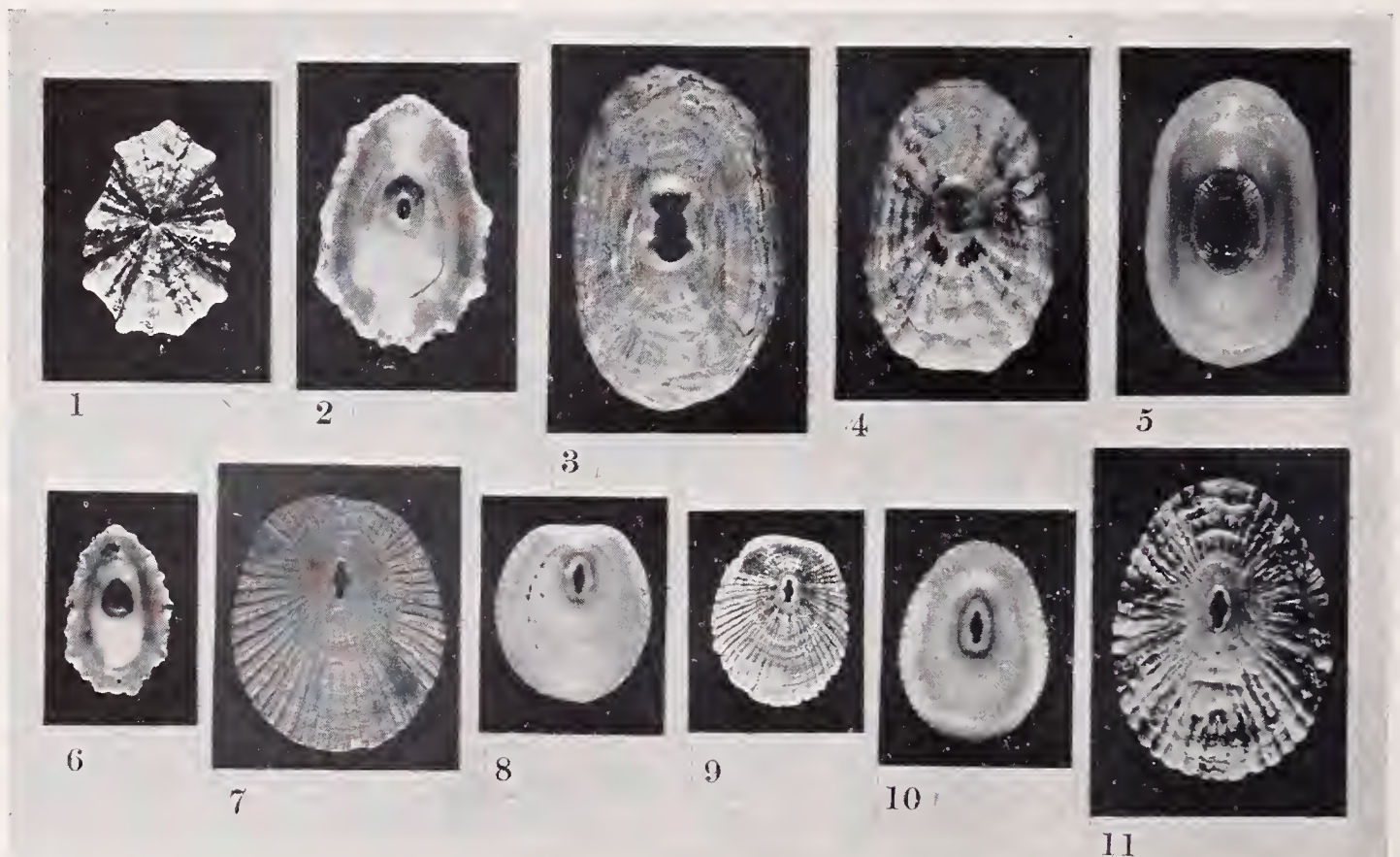


Plate 2. Fig. 1. *Fissurella angusta* Gmelin, Jamaica. Fig. 2. *Fissurella angusta* Gmelin, Punta de los Colorados, Cienfuegos, Cuba. Fig. 3. *Fissurella barbouri* P. Farfante (Holotype), Punta de los Colorados, Cienfuegos, Cuba (2×). Fig. 4. *Fissurella barbouri* P. Farfante, Matthewtown, Great Inagua, Bahamas (2×). Fig. 5. *Fissurella barbouri* P. Farfante, Nassau, New Providence, Bahamas (2×). Fig. 6. *Fissurella angusta* Gmelin, Punta de los Colorados, Cienfuegos, Cuba. Fig. 7. *Fissurella punctata* Fischer, West Indies. Fig. 8 and 9. *Fissurella punctata* Fischer, Governor's Harbour, Eleuthera, Bahamas. Fig. 10. *Fissurella fascicularis* Lamarek, Arecibo, Puerto Rico. Fig. 11. *Fissurella fascicularis* Lamarek, Orange Creek, Cat Id., Bahamas. All nat. size except fig. 3, 4 and 5.

**Fissurella (Cremides) barbouri**, new species, Plate 2, fig. 3-5

*Description.* Shell small, about 15 mm. in length, conical, rather solid, and depressed to elevated. Base long oval, the margin sometimes raised so that the shell rests upon the two ends alone. Anterior and posterior slopes slightly convex, the lateral slopes straight. Apex almost at the center. Orifice coincident with the apex and anteriorly directed. It is long and narrow; its shape as shown in the figure. Sculpture consisting of 15 to 20 rounded primary ribs which are separated by one or more interstitial riblets. Ground color white with red or purplish rays between the ribs; the rays may be solid in color or as fine radiating lines. Margin slightly crenulated. Interior highly polished, grayish green with overtones of buff. Internal callus of the orifice broad, buff or brown. In the latter case the aperture is also stained exteriorly with brown. Muscle impression wide with its anterior extremities enlarged, lying near the border.

	length	width	height	orifice length	
(large)	19	11	7	4 mm.	Punta de los Colorados, Cienfuegos, Cuba
(average)	15	8	7	3	Brown's Point, New Providence, Bahamas

*Types.* Holotype, Mus. Comp. Zoöl. No. 124729, Punta de los Colorados, Cienfuegos, Cuba. W.J. Clench collector, January, 1929. Paratypes from the same locality and from Brown's Point, New Providence, Bahamas.

*Remarks.* This species superficially resembles *F. angusta* Gmelin because of its coloring. However *F. barbouri* has more numerous primary ribs, its basal margin is long oval and not ovate, and it is more elevated. In *F. barbouri* the margin is only slightly crenulated while *F. angusta* possesses strong and deep crenulations. The orifices in these species are quite different (see illustrations). *F. barbouri* lives in cracks in the rocks of the lower inter-tidal zone. It varies but little and that principally in its sculpture which may be more or less pronounced. Its shape and raised margin may be due to its position on the rocks.

*Range.* Bahama Islands and south through the Greater and Lesser Antilles.

*Records.* BAHAMAS: Eight Mile Rock, Grand Bahama Id.; Matthewtown, Great Inagua (both MCZ); Brown's Point and Nassau, New Providence (P.D. Ford). CUBA: Vedado; Punta de los Colorados, Cienfuegos (both MCZ). HISPANIOLA: El Canal, Cabo Macoris (MCZ). JAMAICA: (T. McGinty). VIRGIN ISLANDS: Marina Cay, Tortola; Virgin Gorda (both M. W. Dewey). LESSER ANTILLES: Tobago (T. McGinty).

Named for Dr. Thomas Barbour, Director of the Museum of Comparative Zoölogy.

**Fissurella (Cremides) rosea** Gmelin, Plate 3, fig. 1-7

*Patella rosea* Gmelin 1789, Syst. Nat. ed. 13, 1, pt. 6, p. 3730 (locality unknown). [Based on figures of Lister, Martini and Schroeter].

*Fissurella radiata* Lamarek 1822, An. s. Vert., 6, pt. 2, p. 13 (l'Océan des Antilles).

*Fissurella barbadeusis* d'Orbigny 1850-1853? (in part; non Gmelin), [in] R. de la Sagra, Hist. Phys. Pol. Nat. Cuba, Moll., 2, p. 196 (Florida, Antilles, principally Cuba, St. Lucia and Martinique).

*Fissurella rosea* var. *sculpta* Pilsbry 1890, Man. of Conch. (1), 12, p. 166, pl. 60, fig. 80, 81.

*Lucapina itapema* Ihering 1927, Archiv für Molluskenkunde, 59, p. 102, pl. 6, fig. 5-8 (Itapema).

*Description.* Shell rather thin, reaching a length of 20 to 30 mm., conical, more or less depressed and attenuated anteriorly. Base ovate. Slopes straight or slightly convex. Apex a little anterior to the center of the shell. The orifice is oval or oblong and forms the apex. It is rather small and its length is one-sixth to one-ninth that of the shell. Sculpture consisting of numerous and very close radiating rounded ribs, unequal in size

and with or without minute scales. When present, these are closely set and somewhat overlapping. Color consists of a series of alternating rays, the first whitish to pale straw, the others from a deep pink to purple and 11 or 12 in number. Base bordered by shallow crenulations which are sometimes edged with the dark color. Interior smoothly polished, colored a pale green at the margin which shades above into white. This extends to the green callus which is bounded by a narrow pinkish line. The rather broad muscle impression is situated about 3 mm. from the margin in adult specimens.

	length	width	height	orifice length	
(large)	30	20	9	4 mm.	Varadero, Cuba
(average)	24	15	7	4	Boca de Cangrejos, Puerto Rico

*Types.* The type figure of *F. rosea*, here selected, is that of Martini (1769, Conchy.-Cab. (1) 1, pl. 12, fig. 105). Martini states that Sloane found it in Jamaica, which can be accepted as the type locality. Of the other references cited by Gmelin, Lister's figure

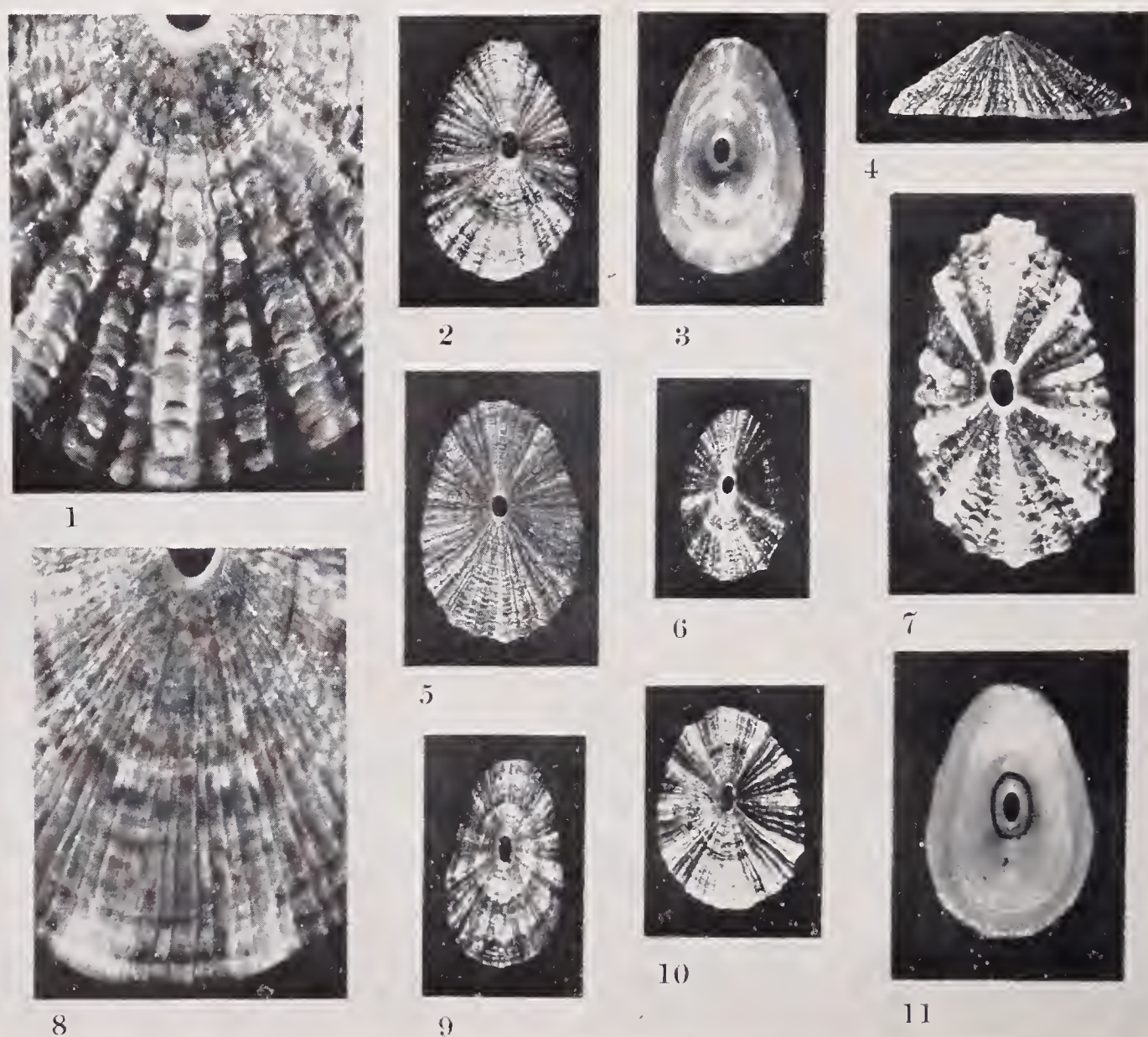


Plate 3. Fig. 1. *Fissurella rosea* Gmelin, Boca de Cangrejos, Puerto Rico (5×). Fig. 2, 3 and 4. *Fissurella rosea* Gmelin, Varadero, Cuba (nat. size). Fig. 5. *Fissurella rosea* Gmelin, Jamaica (nat. size). Fig. 6. *Fissurella rosea* Gmelin, Varadero, Cuba (nat. size). Fig. 7. *Fissurella rosea* Gmelin, El Canal, Cabo Macoris, Hispaniola (2×). Fig. 8 and 9. *Fissurella clenchi* P. Farfante, Praia das Conchas, Itanhaen, Sao Paulo, Brasil (fig. 8, 5×; fig. 9, 2×). Fig. 10. *Fissurella clenchi* P. Farfante (Holotype), Nova Almeida, Espirito Santo, Brasil (nat. size). Fig. 11. *Fissurella clenchi* P. Farfante, Praia das Conchas, Itanhaen, Sao Paulo, Brasil (2×).

refers to *rosea*, but only No. 316, Schroeter's description (1786, Neue Litt. Beitr. Conch. Foss., 3, p. 166) is possibly true *rosea*.

*Remarks.* This is one of our more colorful and delicate species. It is found dead on sand beaches in fair numbers and probably exists below the low water line on rocks. It is an exceedingly variable species both as to its sculpture and its color. *F. rosea sculpta* Pilsbry is only an extreme variation in sculpture in which the main ribs are a little more prominent. Occasionally specimens are found in which the entire outer surface of the shell is colored brown or dark reddish brown, though usually the solid color is broken by one or more of the radial ribs being lighter in coloration. From Lamarek's description of *F. radiata* it is obvious that what he had in his hand was *F. rosea*.

*Range.* Southeastern Florida, Bahamas, and south to Brasil.

*Records.* FLORIDA: St. Augustine; Garden Key, Dry Tortugas (both T. Van Hyning); Biscayne Bay; Key West (L. A. Burry). BAHAMAS: Millerton, Long Id. (MCZ). CUBA: Playa de Baracoa; Playa de Varadero (both MCZ); Caibarién (P. J. Bermúdez); Guantánamo Naval Base (MCZ). HISPANIOLA: Puerto Plata; Puerto Sosúa; El Canal, Cabo Macorís (all MCZ). JAMAICA: (MCZ). PUERTO RICO: Mayagüez (MCZ); Boca de Cangrejos (H. Vander Schalie); Arecibo (MCZ); Escambrón Beach (AMNH). VIRGIN ISLANDS: St. Thomas (MCZ); Little Camanoe Id., Tortola; Devils Bay, Virgin Gorda (all M. E. Dewey). LESSER ANTILLES: Guadeloupe; Barbados (both MCZ); Tobago (T. McGinty); Saline Bay, Trinidad (H. G. Kugler). MEXICO: Veracruz (M. E. Bourgeois). BRITISH GUIANA: Corentyne River (H. G. Kugler). BRASIL: Maranhão; Río de Janeiro (both MCZ); Santo Antonio, Ilha de Itaparica; Farol da Barra, Bahía, Victoria (all P. de Oliveira).

### **Fissurella (Cremides) clenchi**, new species, Plate 3, fig. 8-11

*Description.* Shell medium in size, usually not more than 25 mm. in length, rather solid, depressed, conical and narrower anteriorly. Basal outline ovate. Slopes straight or slightly convex. Summit a little in front of the middle, pierced by a long oblong orifice directed toward the anterior extremity. Orifice sides flare upward producing two very small teeth on each side; length of the orifice is about one-sixth that of the shell. Sculpture consisting of numerous low radiating ribs one of which, in the middle of the lighter rays, is generally larger. The shell is crossed by shallow growth lines which in some individuals are fairly strong. Color buff, sometimes tinged with rose, and with eleven or twelve rays of dark brown or black. Frequently these rays appear stippled; in this case the buff ground color is also stippled, but in a light rose. The orifice generally is stained outside with dark gray. Margin slightly crenulated. Inside, the shell is pale green and smoothly polished. The internal callus of the orifice is green, bounded by a black line. Muscle scar deeply impressed, lying rather far from the edge.

	length	width	height	orifice length	
(large)	25	19	7	4 mm.	Nova Almeida, Espirito Santo, Brasil
(average)	23	16	6	3.5	Praia das Conchas, Sao Paulo, Brasil

*Types.* Holotype, Mus. Comp. Zoöl. No. 124730, Nova Almeida, Espirito Santo, Brasil, Thayer Expedition, 1865-1866. Paratypes from the same locality and from Praia das Conchas, Estado de Sao Paulo, Brasil.

*Remarks.* This species is related to *F. rosea* but differs from it by its trilobate orifice, by its less pronounced sculpture, its dark brown or black rays which are generally stippled, and by the black-bounded orifice.

*Range.* Along the Northeast and East coast of South America.

*Records.* FRENCH GUIANA: Cayenne (MCZ). BRASIL: Ilha de Itaparica; Farol da Barra, Bahía; Pituba, Bahía (all P. de Oliveira); Nova Almeida, Espirito Santo; Victoria (both MCZ); Praia de Copacabana, Distrito Federal; Praia das Conchas, Itanhaen, São Paulo (both P. de Oliveira).

Named for William J. Clench, Curator of Mollusks of the Museum of Comparative Zoölogy.

### Subgenus *Clypidella* Swainson

*Clypidella* Swainson 1840, Treat. on Malacology, p. 356.

Subgenotype, (monotypic) *Fissurella pustula* Gmelin [= *Fissurella punctata* Fischer]

Shell medium in size, depressed, with its two extremities raised so that when placed on a plane it rests on its sides. Outline oval to ovate. Orifice situated well anterior to the center. It is long and narrow and widens in the middle so that a modified cross is formed. Sculpture consists of numerous rounded radiating ribs. Border crenulated. The internal callus of the orifice oval and white.

Fischer (1857, Journ. de Conch., 6, p. 115, pl. 7, fig. 5-7) gives a very detailed description of the external anatomy of *F. punctata* and its relationships.

### *Fissurella* (*Clypidella*) *punctata* Fischer, Plate 2, fig. 7-9

*Patella pustula* Gmelin 1789, Syst. Nat. ed. 13, 1, pt. 6, p. 3728 (in mari mediterraneo, atlantico, indico). [Based on figures of Lister, Petiver, da Costa, Chemnitz and Schroeter] (*non P. pustula* Linné 1758).

*Fissurella pustula* Gmelin, Lamarek 1822, An. s. Vert. 6, pt. 2, p. 14 (l'Océan indien).

*Clypidella pustula* Gmelin, Swainson 1840, Treat. on Malacology, p. 356.

*Fissurella punctata* Fischer 1857, Journ. de Conchy., 6, p. 115, pl. 7, fig. 5-7 (Guadeloupe).

*Fissurellidea pustula* Gmelin, Dall 1889, Bull. United States Nat. Mus., No. 37, p. 172 [*non P. pustula* Linné, as given by Dall].

*Fissurella* (*Clypidella*) *pustulata* Wenz 1938 [in] Schindewolf, Handbuch der Paläozoologie, 6, lfg. 1, p. 186, fig. 316 [err. typ. for *pustula* "Lamarck" Gmelin].

*Description.* Shell medium size, seldom exceeding 25 mm. in length, truncated anteriorly. The outline is broadly oval, with both ends of the shell raised, the anterior more so. When placed upon a plane it rests only upon the middle of each side. Lateral slopes slightly convex, the posterior and the short anterior straight or somewhat concave. Orifice decidedly anterior, a portion of it on the first third; it is long, narrow and with a mid-horizontal widening, so that a modified cross is formed, and it is usually banded by a narrow red line. Its length is about one-sixth that of the shell. Sculpture consists of about 55 radiating, rounded ribs widening toward the margin and separated by grooves wider and deeper at the border. The shell ribs are crossed by numerous fine growth lines which are sometimes thickened into scales. The color is pale straw, although white specimens are not rare. There is a series of red rays around the aperture which usually terminate close to it. Margin distinctly crenulated. Interior of shell pure white, including the inner callus of the orifice which is generally circumscribed by a red line. Muscle impression wide and lying about 3 mm. from the margin in full grown specimens. The enlarged anterior extremities are connected by a very narrow scar.

	length	width	height	orifice length	
(large)	27	23	6	4 mm.	West Indies
(average)	19	17	5	3	Antigua, Lesser Antilles

*Types.* The figure to which Gmelin refers in Chemnitz (1788, Conchy.-Cab. (1), 10, pl. 168, fig. 632-633) are chosen as the type figures. The type locality here selected is Governor's Harbour, Eleuthera Island, Bahamas. I figure the neoholotype, MCZ No. 124232.

*Remarks.* Linné's *Patella pustula* refers to an Eastern Atlantic species, probably *Diadora graeca*. Gmelin, using the same name, *Patella pustula*, gave a totally different set of references which all pertain apparently to our Western Atlantic species. As this is a homonym, the next available name is that of *punctata* Fischer, which curiously enough was a lapsus for *pustula*. Linné never described a *Patella puuctata*. The name, however, is available and will date from Fischer 1857.

This notable species is easily recognized by its peculiar form, its truncated anterior extremity and its anteriorly located and cross-shaped orifice. It probably lives on rocks fairly well below low water line. Very frequently *F. punctata* appears to have red spots which are in reality foraminifera which cement themselves to this *Fissurella*.

*Range.* Bahamas and Antilles. Cape Lookout, North Carolina (Dall 1889, p. 172).

*Records.* BAHAMAS: Governor's Harbour, Eleuthera. VIRGIN ISLANDS: St. John. LESSER ANTILLES: Antigua (all MCZ).

### **Fissurella (Clypidella) fascicularis** Lamarck, Plate 2, fig. 10-11

*Fissurella fascicularis* Lamarck 1822, An. s. Vert., 6, pt. 2, p. 14 (locality unknown).

*Clypidella fascicularis* Lamarck, Sowerby 1862, Thesaurus Conchyliorum, 3, p. 204, fig. 212-214 (West Indies).

*Fissurella (Clypidella) fascicularis* Lamarck, Arango 1880, Fauna Malacológica Cubana, Habana, p. 228.

*Description.* Shell 20 to 30 mm. in length, moderately solid, attenuated anteriorly and very depressed. Both extremities decidedly raised, principally the anterior, so that the shell rests upon its sides when standing upon a plane. Outline ovate. Slopes straight or slightly convex. Orifice situated on the anterior portion of the second third and shaped as is shown in the figure, its length being about one-sixth the length of the shell. Sculpture consists of 46 or 47 radiating ribs, much wider and more separated toward the margin. Many concentric growth lines cross the shell, frequently forming thickened marginal scales. Color superficially a faded magenta, but closer inspection shows that the grooves between the ribs are usually a paler shade of magenta or white. Frequently for a short distance around the orifice, there are darker colored rays which may sometimes extend to the margin. Border broadly crenulated. Interior of the shell white, tinged with pale green or pink. Inner callus of the orifice white, circumscribed by a narrow red line. Muscle impression deeply grooved, so that the central portion of the shell sometimes appears raised; its enlarged anterior extremities are connected by a narrow scar.

	length	width	height	orifice length	
(large)	32	24	7	5 mm.	Orange Creek, Cat Id., Bahamas
(average)	22	14	5	4	Caibarién, Cuba

*Types.* I select as type figures those of B. Delessert (1841, Recueil Coquilles Décrites par Lamarck, Paris, pl. 24, fig. 4a-d). As Lamarck gave no locality, I select Caibarién, Cuba, as the type locality.

*Range.* Southeastern Florida, the Bahamas and south through the Lesser Antilles. Probably also along the Central American coast.

*Records.* FLORIDA: Boynton Beach (T. McGinty). BAHAMAS: Great Abaco Id.; New

Providence (both P.D.Ford); Bimini Ids.; Governor's Harbour, Eleuthera; Little San Salvador Id.; Orange Creek, Cat Id.; Simms, Long Id.; Matthewtown, Great Inagua (all MCZ). CUBA: Vedado (M. L. Jaume); Varadero (H. Sarasúa); Caibarién (P. J. Bermúdez); Cayo Francés; Guantánamo Naval Base (both MCZ). HISPANIOLA: Puerto Sosúa (MCZ); Puerto Plata (T. McGinty); El Canal, Cabo Macorís; Jérémie (both MCZ). JAMAICA: (MCZ). PUERTO RICO: Boca de Cangrejos (H. Vander Schalie); Arecibo (MCZ); Escambrón Beach (AMNH). LESSER ANTILLES: Guadeloupe (MCZ); Barbados (AMNH). CARIBBEAN ISLANDS: Swan Id. (MCZ). MEXICO: Isla Mujeres (C. G. Aguayo).

### Lucapina Sowerby

*Lucapina* "Gray" Sowerby 1835, Conchological Illustrations, *Fissurella*, p. 4 of Catalogue of Species, fig. 29 (in the synonymy of *Fissurella cancellata* Sowerby).

Genotype, *Lucapina elegans* "Gray" Sowerby [= *Lucapina sowerbii* Sowerby]

The synonymy is given in full by Dall 1915, Proc. United States Nat. Mus., 48, p. 437.

Shell thin, small, of medium size, conical and rather depressed. Basal margin oblong or ovate, resting on a plane, not raised at the ends. Apex in front of the middle, the orifice large, oval and situated immediately before the apex. Outer surface of the shell decussated by numerous radiating ribs and concentric threads. Margin strongly and finely crenulated. Internal callus of the orifice roundly truncated posteriorly. Muscle impression of a uniform width. Body of the animal much thickened behind. The mantle is smooth and extends up and over the shell covering about one-third of it. It also extends below and shields the head, sides and back of the foot. Its border is simple and non-papillose. Tentacles long with large eyes situated on stout tubercles at their outer bases. Four species are known from the Western Atlantic.

### *Lucapina sowerbii* Sowerby, Plate 4, fig. 1-3

*Fissurella cancellata* "Solander" Sowerby [1825, Cat. Tankerville, p. 32; *nomen nudum*] 1835, (*non* Gray 1825) Conch. Illust., *Fissurella*, pt. 72, fig. 29, with name in explanation of plates (no locality); Reeve 1849, Conch. Icon., 6, *Fissurella*, pl. 7, fig. 51 [figure and description in part] (St. Vincent's and Honduras).

*Foraminella sowerbii* "Guilding" Sowerby 1835, Conch. Illust., *Fissurella*, p. 4 of Catalogue of Species [as a synonym of *Fissurella cancellata* Sowerby] (no locality).

*Lucapina elegans* "Gray" Sowerby 1835, Conch. Illust., *Fissurella*, p. 4 of Catalogue of Species [as a synonym of *Fissurella cancellata* Sowerby] (St. Vincents).

*Lucapina adspersa* Philippi 1845, Abbildungen Neuer Conchylien, 2, p. 34, pl. 1, fig. 3 (locality unknown).

*Fissurella lentiginosa* Reeve 1850, Conch. Icon., 6, *Fissurella*, pl. 13, fig. 97 (locality unknown).

*Lucapina* ? *fasciata* "Pfeiffer" Dall 1884, Proc. United States Nat. Mus. for 1883, 6, No. 22, p. 336 (Key West).

*Description.* Shell about 22 mm. in length, depressed conical and somewhat attenuated in front. Base oblong or oblong-ovate. Anterior slope straight or slightly concave toward the basal margin, a little more than half the length of the convex posterior slope. Orifice large, oblong, the rear wall frequently excavated obliquely, and placed mostly in the second third; its length about one-sixth the length of the shell. Sculpture consists of about 60 alternately larger and smaller ribs, radiating from the orifice. There are some shorter interstitial riblets posteriorly which start some distance from the orifice. All the ribs are separated by rather shallow grooves. The shell is encircled by from 9 to 13 concentric, close, raised threads which form small sublunated nodules where they intercept the radial ribs. Color varying from white to buff, usually with 7 to 9 irregularly placed broken or dotted rays of brown or flesh. Some specimens may be found with whole unbroken rays or dotted all over. Border very finely crenulated, the denticulations in pairs. Inside pol-

ished, color oyster white, the darker color pattern of the outside showing through. Riblets of the outer surface visible as white radiating lines from within. Internal callus of the orifice narrow, round, truncated behind, of the same color as the interior and sometimes bounded by an olive-green streak, which is ordinarily interrupted at the truncated end. Muscle scar close to the margin, lightly impressed and continuous.

	length	width	height	orifice length	
(large)	24	12	6	4 mm.	Varadero, Cuba
(average)	20	11	4	3	Biscayne Bay, Florida

*Types.* The type figure of this species is that of Sowerby (1835, Conchological Illustrations, *Fissurella*, pt. 72, fig. 29). The type specimen is probably in the British Museum. The type locality is St. Vincent Id., Lesser Antilles, as quoted by Sowerby under the synonym, *L. elegans*.

*Remarks.* This species was known for many years as *F. adspersa* due to Reeve's error. This author apparently had two species, *L. suffusa* and *L. soxerbi*, which he described as a single species under the name of *caucellata*. His figure refers to *L. soxerbi*, his description is a composite of the two. *L. soxerbi* is exceedingly variable in color, particularly in its color pattern. The dark color usually, as stated before, forms dotted or broken rays but specimens with continuous rays occur together with the above, as well as with those having short marginal rays or dotted all over. It lives on rocks. In a letter to us Dr. B. R. Bales states: "My experience with this species has been that it usually is found in pairs." Characteristics of the animal were given by Dall (1884, p. 336).

*Range.* Lower Florida and the West Indies south to Brasil.

*Records.* FLORIDA: Biscayne Bay (T. McGinty); Indian Key; Sugarloaf Key and Boca Chica Key, Pine Ids.; Pelican Shoal; Stock Id.; Key West (all B. R. Bales); Boca Grande (J.S. Schwengel); Marquesas Key (T. Van Hyning); Fort Jefferson, Dry Tortugas (B. R. Bales). BAHAMAS: Settlement Point, Grand Bahamas; Nassau, New Providence; Arhurstown, Cat Id.; Matthewtown, Great Inagua (all MCZ). CUBA: Blake, station 65, off Habana (127 fathoms, dead specimens); Varadero (both MCZ); Habana (C.G. Aguayo). HISPANIOLA: Monte Cristi (MCZ). JAMAICA: (MCZ). LESSER ANTILLES: Pigeon Point, Tobago Id. (MCZ). BRASIL: Santo Antonio, Ilha de Itaparica (P. de Oliveira).

### *Lucapina aegis* Reeve, Plate 4, fig. 4-6

*Fissurella aegis* Reeve 1850, Conch. Icon., 6, *Fissurella*, pl. 11, fig. 72 (locality unknown).

*Description.* Shell thin, reaching about 35 mm. in length, conical and depressed. Basal outline oblong. Anterior slope straight or slightly concave, posterior slope convex. Summit in front of the middle, the orifice situated before it. The orifice is narrow, oblong, contracted in the central portion, its sides produced upward in little points on either margin, its length being from one-sixth to one-seventh that of the shell. Sculpture consists of about 40 radiating ribs separated by wide and rather deep grooves which generally bear an intermediate riblet. Strong and elevated concentric laminae are formed which produce scales at their junction with the radiating ribs. Between the concentric laminae there are two or three fine threads. Color varying from light brown to olive-green with 8 darker broken rays. Margin finely crenulated. Inside, a polished grayish-white, the sculpture of the outside showing through in the form of radial and concentric white lines. Internal callus of the orifice narrow, with the same color as the interior and almost triangular in shape. Muscle impression distinct and of a uniform width.

	length	width	height	orifice length	
(large)	31	17	12	4.5 mm.	Habana, Cuba
(average)	22	13	5	3.5	Athol Id., Bahamas

*Types.* The type figure is that of Reeve given above. The type specimen is probably in the British Museum. As no locality was given by Reeve, Habana, Cuba, is here selected to be the type locality.

*Remarks.* This species is closely related to *L. sowerbii* Sowerby. It differs from the latter by possessing a denticulated orifice and having concentric laminae. In addition, the ribs are more pronounced, the shell is of a darker coloration and has a more sharply truncated inner callus. According to Mr. P. D. Ford, the mantle of this species is wine-colored.

*Range.* Florida, Bahamas and Greater Antilles.

*Records.* FLORIDA: off Lantana, 10 fathoms (T. Van Hyning). BAHAMAS: Athol Id., New Providence (P. D. Ford). CUBA: Habana (M. L. Jaume).

### **Lucapina philippiana** *Finlay*, Plate 4, fig. 10-12

*Fissurella elongata* Philippi 1845, *Abbildungen Neuer Conchylien*, 2, p. 33, *Fissurella*, pl. 1, fig. 2 (locality unknown). Non M'Coy 1844.

*Lucapina elongata* Philippi, Pilsbry 1891, *Man. of Conch.* 12, p. 199, pl. 62, fig. 1, 2; pl. 36, fig. 31 (St. Thomas, West Indies).

*Diodora philippiana* Finlay 1930, *Trans. Proc. New Zealand Institute*, 61, p. 39.

*Description.* Shell thin, small, about 15 mm. in length, conical, very depressed and exceedingly narrow. Base oblong with its sides subparallel. Front slope straight, about half the length of the convex posterior slope. Orifice anterior, located in the first third. It is large and oblong. The shell is finely sculptured with about 38 close, radiating and alternately larger and smaller ribs which start at the orifice. On the posterior slope there are a few shorter ribs which originate below the orifice. The ribs are beaded by raised concentric threads which number 8 or 9 on each side of the orifice. Color cream or white, irregularly and slightly speckled with rusty brown. Margin blunt with shallow crenulations obscurely arranged in pairs. Interior of shell polished white, showing the ribs in the form of white radiating lines. Internal callus of the orifice narrow, white and truncated behind. Muscle impression distinct, narrow and close to the margin.

	length	width	height	orifice length	
(large)	16	9	3	3 mm.	Arthurstown, Cat Id., Bahamas
(average)	14	7	3	3	El Canal, Cabo Macorís, Hispaniola

*Types.* The type figure of *L. elongata* Philippi is that given above. The type specimens are probably in the British Museum. As the original locality was unknown, I here select El Canal, Cabo Macorís, Hispaniola to be the type locality.

*Remarks.* This species has been listed as coming from Queensland by Hedley (1910 *Australasian Association for the Advancement of Science*, 12, p. 352). Philippi's description and excellent figure certainly apply to this West Indian species. The Queensland species may be exceedingly close in its characteristics but will probably prove to be different when material from the two regions can be compared. Finlay (l.c.) only renamed this species. If, however, the Australian species proves to be different, a new name will have to be supplied. *Lucapina philippiana* is closely related to *L. sowerbii*. It differs, however, in many of its basic characteristics, such as its smaller size, its narrower shape,

the position of the orifice, its color pattern and its sculpture. This latter consists of more closely set and less prominent ribs.

*Range.* Bahamas (rare) south to the Virgin Islands.

*Records.* FLORIDA: off Hollywood, 35-60 fathoms (L. A. Burry). BAHAMAS: Arthurs-town, Cat Id. (MCZ); Adelaide, New Providence (P. D. Ford). HISPANIOLA: El Canal, Cabo Macorís (MCZ). LESSER ANTILLES: St. Thomas (Pilsbry 1891, p. 199).

### *Lucapina suffusa* Reeve, Plate 4, fig. 7-9

*Fissurella hondurasensis* Reeve 1850 (*non* Reeve 1849), Conch. Icon., 6, *Fissurella*, pl. 10, fig. 70 (Honduras).

*Fissurella suffusa* Reeve 1850, Conch. Icon., 6, *Fissurella*, p. ii of Index (new name for *F. hondurasensis* Reeve, 1850).

*Fissurella cancellata* Reeve 1849 (*non* Sowerby, 1835), Conch. Icon., 6, *Fissurella* [part of description, not the figure].

*Fissurella cancellata* Sowerby 1862 (*non* Sowerby, 1835), Thes. Conchy., 3, p. 200, *Fissurellidae*, pl. 8, fig. 187, 189 (figures and description; part only of synonymy and localities; "California" certainly erroneous).

*Description.* Shell rather heavy and large, reaching a greater size than that of the other species of *Lucapina* in the Western Atlantic; conical, slightly elevated and narrower in front. Base ovate. Slopes variable but frequently the anterior straight and the posterior convex, the former being less than one-half the latter and sometimes one-third. Orifice large, from one-seventh to one-eighth the length of the shell; it is broad, oval or ovate and generally stained with bluish-black. The sculpture of the shell consists of numerous rounded ribs, alternately larger and smaller, the larger beginning at the orifice, while many

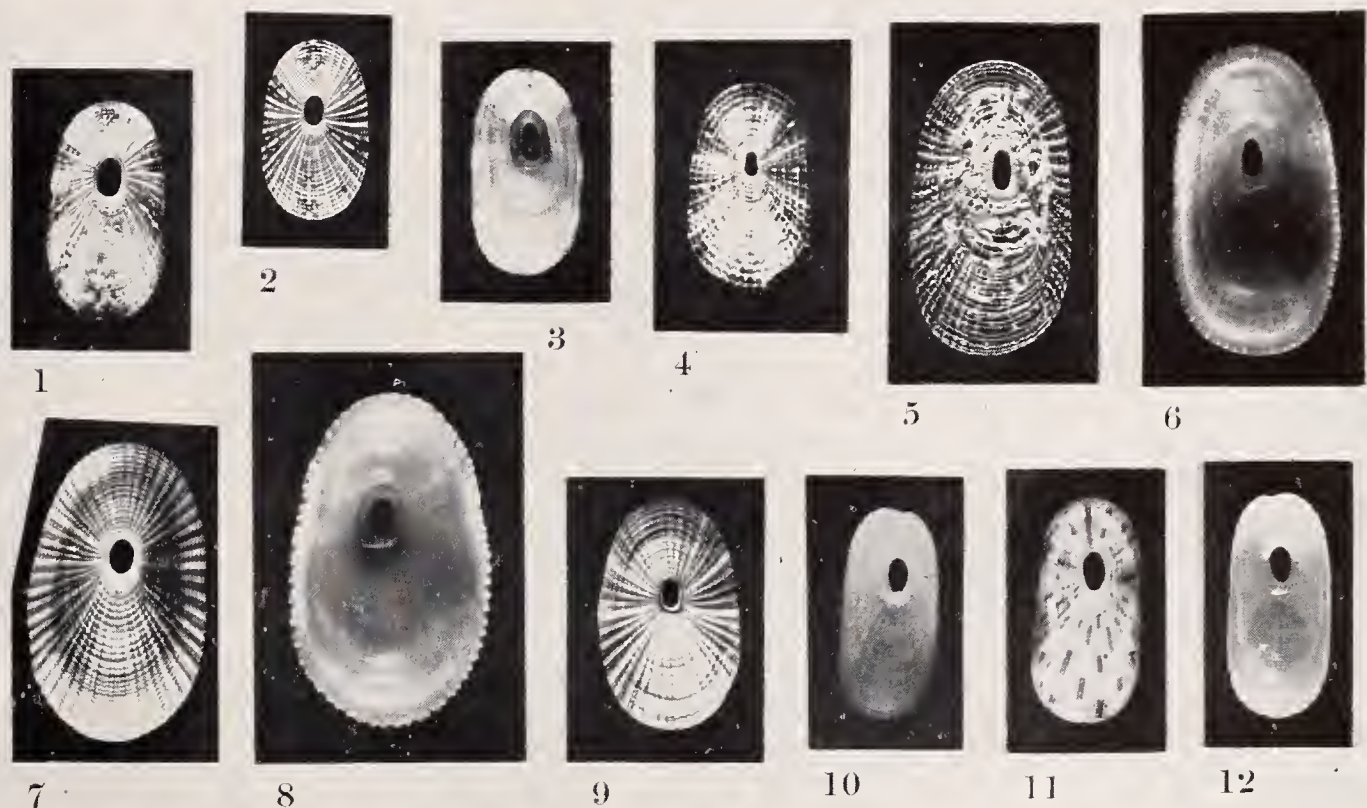


Plate 4. Fig. 1. *Lucapina sowerbii* Sowerby, Biscayne Bay, Florida. Fig. 2. *Lucapina sowerbii* Sowerby, Stock Id., Florida. Fig. 3. *Lucapina sowerbii* Sowerby, Key West, Florida. Fig. 4. *Lucapina aegis* Reeve, Athol Id., Bahamas. Fig. 5 and 6. *Lucapina aegis* Reeve (specimen partially covered with calcareous algae), Habana City, Cuba. Fig. 7 and 8. *Lucapina suffusa* Reeve, Biscayne Bay, Florida. Fig. 9. *Lucapina suffusa* Reeve, Bird Key, Dry Tortugas, Florida. Fig. 10. *Lucapina philippiana* Finlay, Arthurstown, Cat Id., Bahamas ( $2\times$ ). Fig. 11 and 12. *Lucapina philippiana* Finlay, El Canal, Cabo Macorís, Hispaniola ( $2\times$ ). All natural size except fig. 10, 11 and 12.

of the smaller start some distance below it. The ribs begin as very fine threads and increasingly broaden and separate toward the margin. Concentric raised threads cross the shell forming rounded nodules at the points of intersection with the radiating ribs. Besides these concentric threads there are innumerable growth lines. Color mauve, becoming a delicate pink when the specimens are worn. Occasionally broad rays of a darker tone may be noticed. Margin strongly crenulated with fine, paired and sharply pointed denticles. Inside of shell is gray fading to white in worn specimens. Rib sculpture of the outside is indicated on the interior as fine radiating white lines. Internal callus of the orifice thin, narrow and truncated, though not sharply so. Muscle impression distinct, uniform in width and lying very near the border. Periostracum present in this species. It is thin and covers the upper two-thirds of the shell.

	length	width	height	orifice length	
(large)	36	21	10	5 mm.	West Indies
(average)	30	18	8	4	Biscayne Bay, Miami, Florida

*Types.* The type figure is that of Reeve, Conch. Icon., 6, *Fissurella* pl. 10, fig. 70. The type specimen is probably in the British Museum. The type locality is Honduras.

*Remarks.* This species is most commonly found attached to rocks. Its bluish-black orifice readily distinguishes this species which, on the other hand, has also a very conspicuous orange body.

*Range.* Lower Florida, Bahama Islands and south along the Antilles and the eastern coast of Central America, probably as far as northern South America.

*Records.* FLORIDA: Fernandina; off Ocean Ridge, Palm Beach (4-10 fathoms); off Lantana, Palm Beach (10 fathoms); off Cape Florida (8 fathoms) (all T. Van Hyning); Biscayne Bay (T. McGinty); Key West (B. R. Bales); Fort Jefferson and Bird Key Reef, Dry Tortugas Keys (both T. Van Hyning). BAHAMAS: Octagon Point, New Providence (P. D. Ford); Governor's Harbour, Eleuthera Id.; Little San Salvador Id.; Arhurstown, Cat Id.; Clarencetown, Long Id.; Rum Key; Fortune Id.; Matthewtown, Great Inagua (all MCZ). CUBA: Habana, (M. L. Jaume); Varadero; Punta de los Colorados, Cienfuegos (both MCZ), HISPANIOLA: Miragoane; Santa Bárbara de Samaná (both MCZ). VIRGIN ISLANDS: St. John (M. Dewey).

#### Key to Western Atlantic *Lucapinella*

1. Orifice placed in the first third; shell with almost parallel sides *L. philippiana*  
Orifice placed posteriorly to the first third; shell usually with curved sides (almost parallel in *sowerbii*) 2
2. Shell concentrically sculptured with laminae which form scales where they intercept the radial ribs; orifice a little contracted in the middle *L. aegis*  
Shell concentrically sculptured with threads which form nodules where they intercept the radial ribs; orifice not contracted 3
3. Color mauve or pink; outside of orifice generally surrounded by a bluish black stain; usually of uniform color; rays, if present, scarcely set off from the ground color *L. suffusa*  
Color white, cream or buff; outside of orifice not stained; color pattern very apparent *L. sowerbii*

#### *Lucapinella Pilsbry*

*Lucapinella* Pilsbry 1890, Man. of Conch. (1), 12, p. 179.

Genotype, *Lucapinella callomarginata* Dall

Shell depressed conical, rather small, with the apex subcentral and completely occupied by the large orifice. The shell is sculptured with irregular radial ribs, crossed by laminae which form small scales. Margin thickened, so much so that in adult specimens the cren-

ulations are blunted. In general it rests on a plane but sometimes its posterior end is slightly raised. Internal callus of the orifice narrow, its posterior extremity roundly truncated. Muscle impression of a uniformly narrow width. Pilsbry (1891, Man. of Conch. (1), 12, p. 195) gives the following characteristics for the soft parts of this genus: "Animal with a fleshy foot, much too large to be contained in the shell; mantle-edge thickened, papillose on its lower edge and having narrow processes extending up over the shell-edge; tentacles short, obtuse; foot surrounded by a row of epipodial papillae; dorsal pore surrounded by papillar processes." There are two known species of this genus in the Western Atlantic.

### *Lucapinella limatula* Reeve, Plate 5, fig. 1-3

*Fissurella limatula* Reeve 1850, Conch. Icon., 6, *Fissurella*, pl. 15, fig. 115 (locality unknown).

*Fissurella aculeata* Reeve 1850, Conch. Icon., 6, *Fissurella*, pl. 15, fig. 111 (locality unknown).

*Fissurellidea limatula* Reeve, Dall 1889. Bull. Mus. Comp. Zoöl. 18, p. 409 (off Habana, in 80 fathoms. Coast of North Carolina, in 15-20 fathoms).

*Description.* Shell generally thin and small, not exceeding 20 mm. in length, depressed and attenuated anteriorly. Base ovate. Slopes straight or somewhat concave. Orifice almost at the shell center, triangular, with its sides projected upwards. Its length is from one-third to one-fifth that of the shell. Sculpture consists of alternately large and small ribs anteriorly, but posteriorly and laterally there are three riblets between each pair of primary ribs, the central one being the strongest. The shell is crossed by numerous concentric laminae which form small, erect, imbricated scales where they intercept the radial ribs and riblets. The growth lines are numerous and clearly distinct between the laminae. Color white, yellow, pink or brown, either solid or with 6 broad rays of deep pink, dark brown or black extending from the apex to the margin. These may be arranged in two ways: either with one anterior, one posterior and two on each side, or with three on each side. Margin thickened and crenulated, sometimes with the crenulations in pairs. Interior polished white, the outside color showing through the shell. Muscle scar rather deeply impressed, narrow, of a uniform width and lying very close to the margin. Internal callus of the orifice narrow, roundly truncated behind and outlined by a marked indenture.

	length	width	height	orifice length	
(large)	18	10	3	4 mm.	Sanibel Id., Florida
(average)	13	8	3	3.5	Boca Grande Key, Florida

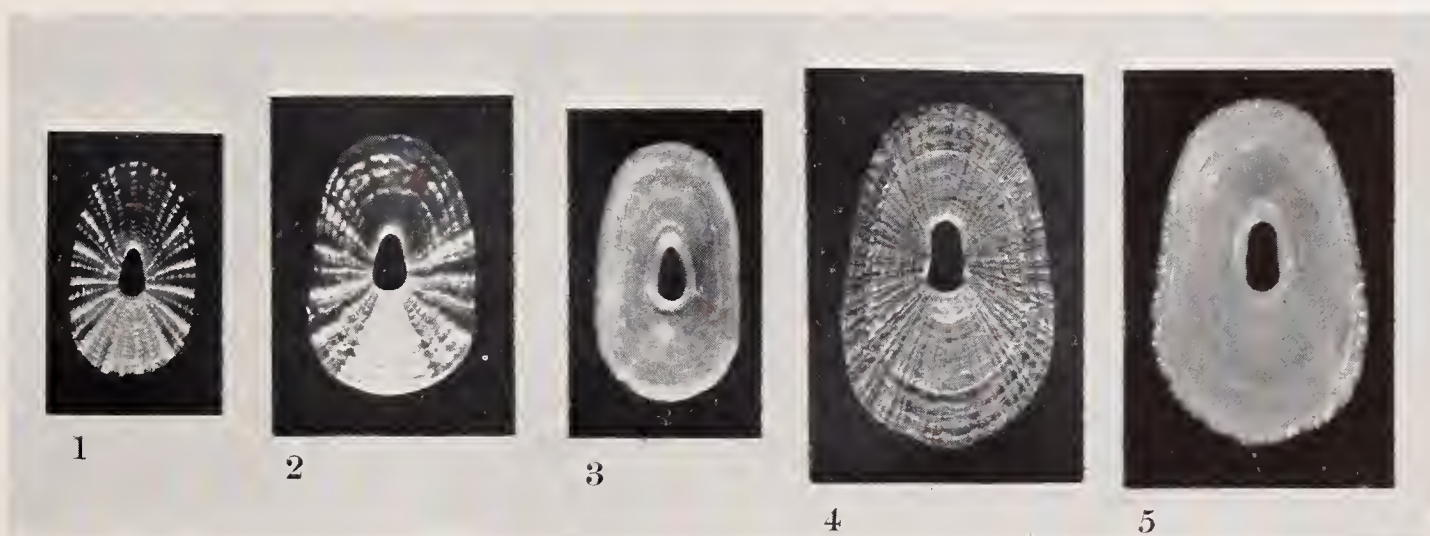


Plate 5. Fig. 1. *Lucapinella limatula* Reeve, Boynton Beach, Florida (2×). Fig. 2 and 3. *Lucapinella limatula* Reeve, Sanibel Id., Florida (2×). Fig. 4 and 5. *Lucapinella limatula hassleri* P. Farfante (Holotype) off Cabo Bermeja, Argentina (2×).

*Types.* The type figure is that of Reeve, Conch. Icon., 6, *Fissurella*, pl. 15, fig. 115. The types are probably in the British Museum. As Reeve gave no locality, Punta de los Colorados, Cienfuegos, Cuba, is here selected as the type locality.

*Remarks.* This species is very closely related to *L. callomarginata* Dall of the Pacific coast, but it is thinner, more brightly colored and its orifice is triangular instead of long oval. *L. limatula* lives completely under water at a depth varying from 6 to 80 fathoms. It is rather rare.

*Range.* North Carolina and south to the Virgin Islands, West Indies.

*Records.* FLORIDA: off Palm Beach, 50-67 fathoms; Boynton Beach; off Cape Florida, Biscayne Key, 50 fathoms; Destin, 18-20 fathoms (all T. McGinty); off Hollywood, 35-60 fathoms (L. A. Burry); Sanibel Id., 6-7 fathoms; Boca Grande Key (both J. S. Schwengel). CUBA: off Habana, *Blake*, 80 fathoms; Playa de Baracoa, Habana; Punta de los Colorados, Cienfuegos (all MCZ). HISPANIOLA: El Canal, Cabo Macoris (MCZ). VIRGIN ISLANDS: St. Thomas (MCZ).

### **Lucapinella limatula hassleri**, new subspecies, Plate 5, fig. 4-5

*Description.* Similar in its general characters to *L. limatula*, but differs in being thicker, more elevated, having less pronounced ribs which bear very small scales. The orifice is long-oval instead of triangular, its sides projected to form very pronounced teeth.

	length	width	height	orifice length	
(large)	17	11	5	4 mm.	Holotype
(average)	15	9	4	4	Paratype

*Types.* Holotype, Mus. Comp. Zoöl. No. 152227, off Cabo Bermeja, Argentina (S. Lat. 41°17'; W. Long. 63°), *Hassler*, 17 fathoms. Paratypes, from the same locality and from off Mouth of Río Negro, Argentina (S. Lat. 41°40'; W. Long. 63°13'), 30 fathoms.

*Range and Records.* Known only from the type series.

Named for the survey steamer, *Hassler*, which made a trip to California by way of Cape Horn. The scientific work was done under the direction of Louis Agassiz.

### **Lucapinella henseli** v. *Martens*

*Fissurella* (*Lucapinella*) *henseli* v. Martens 1900, Nachrichtenblatt Deutschen Malakozoologischen Gesellschaft, p. 187 (Desterro, Santa Catarina Province [Brasil]).

*Description.* Shell oblong, slightly elevated in the middle and distinctly narrower in front and in the middle. Margin subplane. Sculptured with radiating unequal ribs 5 to 7 in front and 5 larger posteriorly. Near the margin there are rather wide gray rays. Orifice oblong, large, slightly contracted in the middle. Internal callus of the orifice white. Margin crenulated by separated groups of fine denticles, with a white interior thickening. The interior color white. Length 23-26 mm.; width 15-16; height 4.5-6 mm.; orifice length 5-6 mm.; orifice width 2 mm.

*Remarks.* I am indebted to Dr. J. Bequaert for the following translation of von Martens remarks (German): "Greatest width a little behind the orifice; margin in one specimen at about the same level all around, but in the smaller specimens it is level only forward and behind, whereas it is somewhat raised at mid-length. Among the species in Reeve (Conch. Icon.) and Pilsbry (Man. of Conch.) it is most like *F. exquisita* and *F. limatula*, but both of these are not so much narrowed anteriorly and differ in sculpture." I have not seen this species and no specimens are available for study at this time. From the description it would appear very close to *L. limatula*. It has not been figured.