

THE TAXONOMY OF CARIBBEAN – ATLANTIC COSTELLARIIDAE (MOLLUSCA : GASTROPODA)

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Abstract. This account deals with 17 species of Costellariidae. Fourteen of these inhabit the east coast of America and the Caribbean, with some species ranging as far south as Brazil. One species lives in the N.E. Atlantic and 2 species are endemic to St. Helena. *Mitra rawsoni* Moerch and *M. brandii* Verrill, are considered *nomina dubia* and *M. pleurotomoides* E. A. Smith, *M. torticula* Dall, and *M. zilpha* Dall, are transferred from the Costellariidae to the Turridae.

This paper is a preliminary study of Caribbean-Atlantic Costellariidae, based on type-specimens of described species and collections of recent specimens in various United States Museums. Only species of the subgenera *Pusia* Swainson and *Costellaria* Swainson, have been included. The two species of *Thala* H. & A. Adams, i.e. *T. foveata* Sowerby, 1874, and *T. floridana* Dall, 1884, have been dealt with in detail by Maes & Raeihle (1975).

The three dimensions given throughout this paper represent in sequential order the length x width x height of aperture expressed in "mm". The British Museum (Natural History), London, has been abbreviated "BMNH" and the National Museum of Natural History, Smithsonian Institution, Washington, D.C., is abbreviated "USNM".

Family COSTELLARIIDAE Macdonald, 1860

Recent anatomical research (Ponder 1972) has shown that the Mitridae differ quite markedly in certain anatomical features from the Costellariidae and that a familial separation is warranted. The Costellariidae have paired accessory salivary glands which are absent in the Mitridae, and the Costellariidae have a pycnonephridian kidney and the Mitridae a meronephridian kidney. Apart from other differences, the spawns and radulae are also very different.

For details concerning chronological priority of Costellariidae Macdonald, 1860, over Vexillidae Thiele, 1929, see Cernohorsky (1976).

Genus *Vexillum* Roeding, 1798

Vexillum Roeding, 1798, Mus. Bolten. p. 138. Type species by SD (Woodring, 1928) *V. plicatum* Roeding, 1798 = *Voluta plicaria* Linnaeus, 1758. Recent, Indo-Pacific.

Subgenus *Pusia* Swainson, 1840

Pusia Swainson, 1840, Treat. Malac. p. 320. Type species by M. *P. microzonis* (Lamarck) = *Mitra microzonias* Lamarck, 1811. Recent, Indo-Pacific.

Vexillum (Pusia) dermestinum (Lamarck, 1811)

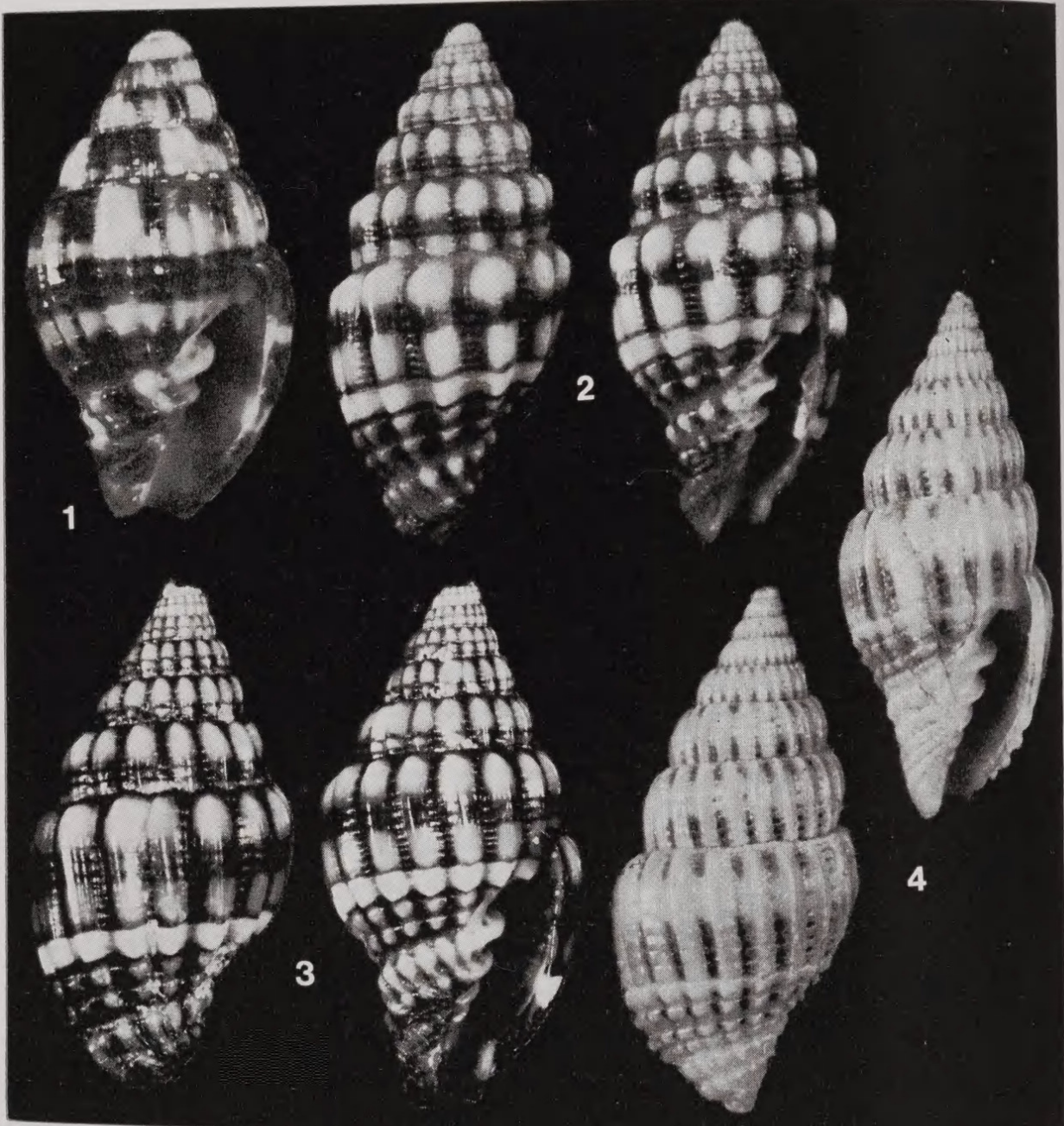
(Fig. 1)

1811. *Mitra dermestina* Lamarck, Ann. Mus. d'Hist. Nat. Paris 17: 221; 1969 Cernohorsky, Rev. Suisse Zool. 76 (4): 987, pl. 7, fig. 51 (figd. lectotype).
 1850. *Mitra albicostata* C. B. Adams, Contrib. Conch. 1: 57; 1950 Clench & Turner, Occ. Pap. Mo II. Harv. Univ. 1 (15): 252, pl. 36, fig. 11 (figd. holotype).
 1974. *Vexillum (Pusia) dermestinum* (Lamarck), Abbott, Americ. Seashells ed. 2: 240 fig. 2632.

TYPE LOCALITY: Indian Ocean = error (*dermestina*); Jamaica (*albicostata*).

DISTRIBUTION: From the Florida Keys to the east coast of Mexico to Tobago and the Bahama Is. Peile's (1926) record from Bermuda requires confirmation.

Type specimens: The lectotype of *M. dermestina* Lamarck, is in the Museum of Natural History, Geneva, No. 1102/82/1, dimensions 14.5 x 8.0 x 8.0 mm, and the



Figs. 1-4. 1. *Vexillum (Pusia) dermestinum* (Lamarck). Mujeres I, Quintana Roo, Yucatan; USNM 253884, 11.3 mm. 2, 3. *V. (P.) variatum* (Reeve). 2. Lectotype BMNH No. 1967906, 19.6 x 8.7 x 10.3 mm. 3. Specimen from Long reef, St. Croix, Virgin I; 12.7 mm. 4. *V. (P.) pulchellum* (Reeve). Lectotype BMNH No. 1967849, 19.4 mm.

holotype of *M. albicostata* C. B. Adams, is in the Museum of Comparative Zoology, Harvard University, No. 177083, dimensions 16.4 x 8.6 x 8.5 mm. Both type-specimens have been illustrated by Cernohorsky (1969) and Clench & Turner (1950).

Vexillum (Pusia) variatum (Reeve, 1845) (Figs. 2, 3)

1844. *Mitra speciosa* Reeve, Conch. Icon. 2: pl. 26, fig. 209 (*non M. speciosa* Reeve, 1844, pl. 19, fig. 148).

1845. *Mitra variata* Reeve, Conch. Icon. 2: Errata end of Index (*nom. subst. pro M. speciosa* Reeve, 1844, pl. 26, fig. 209).

1970. *Vexillum histrio* (Reeve), Rios (*pars*), Coast. Braz. Seashells p. 107, pl. 34, right hand fig. in bottom row (*non Mitra histrio* Reeve, 1844).

1974. *Vexillum (Pusia) variatum* Reeve, Abbott, Americ. Seashells ed. 2: 240, fig. 2633.

1975. *Pusia splendidula* Sarasua, Poeyana No. 140: 7, figs. 4, 5.

TYPE LOCALITY: None (*variatum*); Marianao, Habana, Cuba, 20-25 m (*splendidula*).

DISTRIBUTION: Cuba, Virgin Is and N.E. Brazil. Peile's (1926) record of "Bermuda" requires confirmation.

Type specimens: The type-series of *Mitra variata* Reeve, BMNH No. 1967906, consists of 3 specimens. The largest two, i.e. 19.6 mm and 17.3 mm being the species as illustrated by Reeve (1845) on pl. 26, fig. 209, while the smallest 16.4 mm specimen is a not fully mature individual of the tropical Indo-Pacific *Vexillum (Pusia) unifascialis* (Lamarck, 1811). The largest syntype, i.e. 19.6 x 8.7 x 10.3 mm, which appears to be the specimen illustrated by Reeve (*op.cit.*) is here designated as the lectotype of *Mitra variata* Reeve (Fig. 2); the lectotype has 8 + whorls, 14 axial ribs on the penultimate and 12 on the body whorl, c. 8 flattish cords on the penultimate whorl, 4 rows of basal nodules of which the two anterior ones are extensions of the posterior columellar folds, a lirate aperture, 5 columellar folds and a distinct parietal denticle. The axial ribs are whitish with a yellowish cast, the whorls have a posteriorly situated dark reddish-brown narrow band and the body whorl has an additional narrow white peripheral band which is bordered on either side by a reddish-brown line. The holotype of *Pusia splendidula* Sarasua, is in the Zoological Institute, Academy of Sciences, Cuba, No. 32, dimensions 19.0 x 8.0 x 7.0 mm.

The species can be usually readily separated from *V. (P.) histrio* on features of angulated whorls, stronger and more angulate axial ribs and more prominent nodulose cords especially those which are extensions of the columellar folds.

Garrett (1880) listed *V. (P.) variatum* (Reeve) from the Tuamotus and the Fiji Islands, and he placed his own *Mitra fratercula* Garrett, 1873, from the Pacific in synonymy. The original diagnosis of *M. fratercula* suggests a species closely similar to the highly variable Indo-Pacific *V. (C.) unifascialis* (Lamarck, 1811), and Garrett's remaining type-specimen in the Bernice P. Bishop Museum, Honolulu, shows that it is indeed conspecific with Lamarck's *V. (C.) unifascialis*.

Tryon (1882) reported *V. (C.) variatum* from Fiji and the Tuamotus, Hedley (1899) from Funafuti, Ellice Is, and most subsequent authors placed the species in the Pacific Ocean rather than the Caribbean. Peile (1926) was an exception since he listed "*Mitra dermestina* var. *variata* Rve." from Bermuda, but this record remains dubious. In 1968 during a study of the Mitracea in the world's leading Museums I came across only one specimen of an undoubted *V. (P.) variatum* in the National Museum of Natural History, Washington, which was originally in the Lea collection and bore the erroneous label "Java".

Rios (1970) illustrated a specimen of *V. (P.) variatum* collected at Maracajau reefs, Rio Grande de Norte, N.E. Brazil, under the name *Vexillum histrio* (Reeve). The first well-localized specimen examined by this writer was collected in 1974 by Mr. & Mrs. C. G. Bennett at Long Reef, St. Croix, Virgin Is (Fig. 3) and the same year Abbott (1974) correctly listed the species from the Caribbean. With such a locality confusion it is not at all surprising that the species has recently been re-described as *Pusia splendidula* Sarasua, 1975.

Vexillum (Pusia) pulchellum (Reeve, 1844)

(Fig. 4)

1844. *Mitra pulchella* Reeve, Conch. Icon. 2: pl. 19, fig. 142.

1970. *Vexillum pulchellum* (Reeve), Rios, Coast. Braz. Seashells p. 108, pl. 34, fig. on left in centre row.

TYPE LOCALITY: Island of Barbados, West Indies.

DISTRIBUTION: From the Florida Keys through the Caribbean to East Brazil.

Type specimens: Three syntypes of *Mitra pulchella* Reeve, are in the BMNH No. 1967849, and the largest syntype, i.e. 19.4 x 8.8 x 9.3 mm, which appears to be the specimen illustrated by Reeve (1844) is here designated as the lectotype of *M. pulchella* Reeve (Fig. 4). The lectotype has 8 whorls, a missing apex, 21 axial ribs in the penultimate and 19 on the body whorl, deep interstitial spiral grooves, a lirate aperture and 5 columellar folds. It is orange in colour, the spire whorls have 2 rows of axially elongated brown spots at the sutures between the ribs, the body whorl has 3 rows of similar spots and an additional narrow white peripheral band.

Apart from the type-specimens only about another half dozen lots have been seen in Museums. The species is closely allied to *V. (P.) variatum* (Reeve), but differs in features of more inflated, convex whorls, more numerous, slender and lower axial ribs and general colour ornamentation. Should, however, at some future date *V. (P.) pulchellum* be found to be conspecific with *V. (P.) variatum* then the former name would have chronological priority. The species has not been mentioned by Abbott (1974).

Vexillum (Pusia) histrio (Reeve, 1844)

(Figs. 5-7)

— *Mitra sulcata* auctt. (non *Voluta sulcata* Gmelin, 1791, p. 3455).

1844. *Mitra histrio* Reeve, Conch. Icon. 2: pl. 19, fig. 144.

1850. *Mitra monilifera* C. B. Adams, Contrib. Conch. No. 47: 57 (non *M. monilifera* C. B. Adams sensu Clench & Turner, 1950).

1852. *Pusia sulcata* var. *bifasciata* Moersch, Cat. Yoldi p. 84 (nom. nud.)

1950. *Mitra albocincta* Adams, Clench & Turner, Occ. Pap. Moll. Harv. Univ. 1 (15): pl. 36, fig. 10 (non C. B. Adams, 1845).

1959. ? *Mitra cruzana* Nowell-Usticke, Mar. shells St. Croix, p. 76, pl. 4, fig. 7

1959. ? *Mitra hayesae* Nowell-Usticke, Mar. shells St. Croix, p. 77, pl. 4, fig. 8 (spec. juv.)

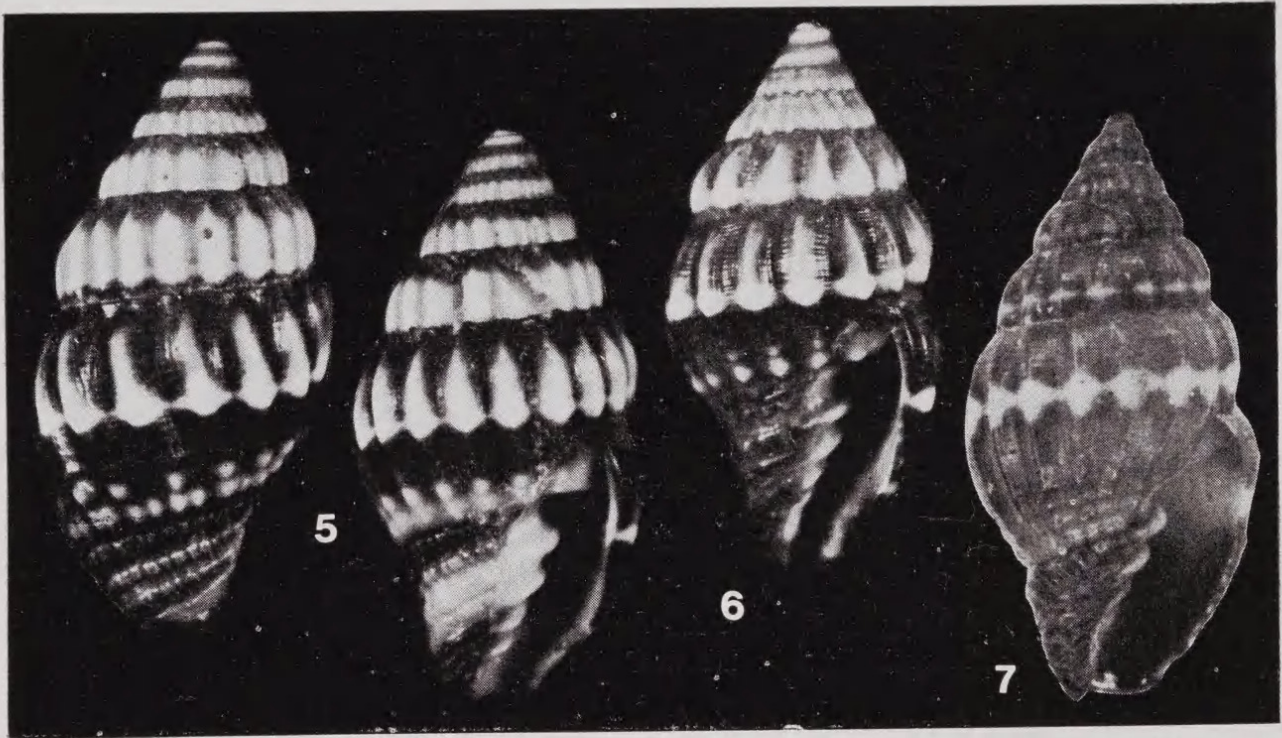
1974. *Vexillum (Pusia) albocinctum* (C. B. Adams). Abbott, Americ. Seashells ed. 2: 239, figs. 2623, 2623a (non *M. albocincta* C. B. Adams, 1845).

TYPE LOCALITY: None (*histrio*); Jamaica (*monilifera*); Ham Bay, St. Croix, Virgin Is (*cruzana* and *hayesae*).

DISTRIBUTION: From the Bahamas to N.W. Florida, East coast of Mexico and Panama, Curacao to Bahia, E. Brazil and throughout the Caribbean. From the intertidal zone to 275 m. Although not previously reported from N.W. Florida, there are specimens in the Academy of Natural Sciences, Philadelphia, from "off Destin, N.W. Florida, 14 fathoms (26 m)".

Type specimens: Three syntypes of *Mitra histrio* Reeve, are in the BMNH No. 1967778. The largest syntype (Fig. 5), dimensions 16.6 x 8.0 x 9.0 mm, corresponds

reasonably well with Reeve's description and figure and is here designated as the lectotype of *M. histrio*. The lectotype has 7 whorls, a worn apex, 17 axial ribs on the penultimate and 15 on the body whorl, fine spiral striae in the interspaces, a lirate aperture and 4 columellar folds. Base colour faint scarlet, banded and clouded with blackish-brown, and the body whorl with a white moniliform peripheral band which appears as white spots upon the band. The other two paralectotypes (Fig. 6) are other colour forms of the species. Reeve received the specimens of *M. histrio* from C. B. Adams, a fact which was acknowledged in the description (ex-Mus. Adamsonianum).



Figs. 5-7. *Vexillum (Pusia) histrio* (Reeve). 5. Lectotype BMNH No. 1967778, 16.6 mm. 6. Paralectotype BMNH No. 1967778, 15.6 mm. 7. Probable type of *Mitra monilifera* C. B. Adams, MCZ No. 177080, 18.0 mm (= *M. albocincta* of Clench & Turner, 1950).

Clench & Turner (1950) illustrated C. B. Adams' western Atlantic mollusc types, and a mix-up with some of the Mitracean types is suspected. The specimen illustrated as the holotype of "*Mitra monilifera* C. B. Adams", is a uniformly brown specimen which is conspecific with *M. nodulosa* (Gmelin, 1791). Adams (1850) described his *M. monilifera* as being brownish-black with a white spiral band which is dilated into spots on the ribs and with about 14 rather acute longitudinal ribs on each whorl and numerous, excessively minute and subequal raised spiral lines and 8-9 convex whorls. In addition, Adams (op. cit.) compared his species to *M. microzonias* Lamarck and *M. leucodesma* Reeve, both tropical Indo-Pacific species with blackish-brown shells and a white moniliform band. The specimen illustrated by Clench & Turner (op. cit.) as "*Mitra monilifera*" is tan in colour without a trace of a white band, the whorls are flat-sided and not convex, there are no acute longitudinal ribs and the species does not resemble either *M. microzonias* or *M. leucodesma* as Adams stated.

The individual illustrated by Clench & Turner (op. cit.) on plate 36, fig. 10 as "*M. albocincta* C. B. Adams" appears to be the type of *M. monilifera* C. B. Adams (Fig. 7) and not the real *M. albocincta* C. B. Adams. For further discussions see under *V. (P.) gemmatum* (Sowerby) below.

The original description of both *M. cruzana* Nowell-Usticke, 1959, and *M. hayesae* Nowell-Usticke, 1959, is inadequate and the illustrations are unrecognizable for specific identification. Nowell-Usticke (1969) placed his immature *M. hayesae* in synonymy with *M. cruzana*, and I agree with Abbott (1974) in considering *M. cruzana* conspecific with *V. (P.) histrio* (Reeve). The type specimens of *M. cruzana* and *M. hayesae* are presumably in Nowell-Usticke's private collection.

The species *V. (P.) histrio* (Reeve) has often appeared in literature as "*Mitra sulcata* Gmelin, 1791". Gmelin's *Voluta sulcata* appearing on page 3455 in Gmelin (1791) has been based on an illustration in Chemnitz (1780), who simply described his species as axially ribbed and brown in colour with a white central band. Chemnitz's locality indication of "Tranquebar" (India) would place *Voluta sulcata* Gmelin, 1791, in synonymy with the tropical Indo-Pacific *Vexillum (Pusia) microzonias* (Lamarck, 1811). The mitracean *V. sulcata* described by Gmelin (1791) on page 3455 is conveniently disposed of as a primary homonym of *V. sulcata* Gmelin, 1791, on page 3436, which is the acteonid species *Pupa solidula* (Linnaeus).

V. (P.) histrio is very variable in form, depending on its stage of development, and also colour which ranges from a uniform brown with a single moniliform white band to white or scarlet and variously banded with blackish-brown or stained with orange.

***Vexillum (Pusia) cubanum* Aguayo & Rehder, 1936**

(Figs. 8, 9)

1845. ? *Mitra articulata* Reeve, Conch. Icon. 2: pl. 36, fig 302.

1936. *Vexillum cubanum* Aguayo & Rehder, Mem. Soc. Cuba Hist. nat. 9 (4): 266, pl. 24, fig 4.

1943. *Pusiolina aresta* Rehder, Proc. U.S. Nat. Mus. 93: 201, pl. 20, fig. 1.

1958. *Pusia cubana* Aguayo & Rehder, Abbott, Mon. Acad. Nat. Sci. Philad. No. 11: 82.

1973. *Pusia histrio* (Reeve), Morris, Field Guide shells ed. 3: 225, pl. 62, fig. 6 (*non Mitra histrio* Reeve, 1844).

1974. *Vexillum (Pusia) arestum* Rehder, Abbott Americ. Seashells ed. 2: 239, fig. 2624.

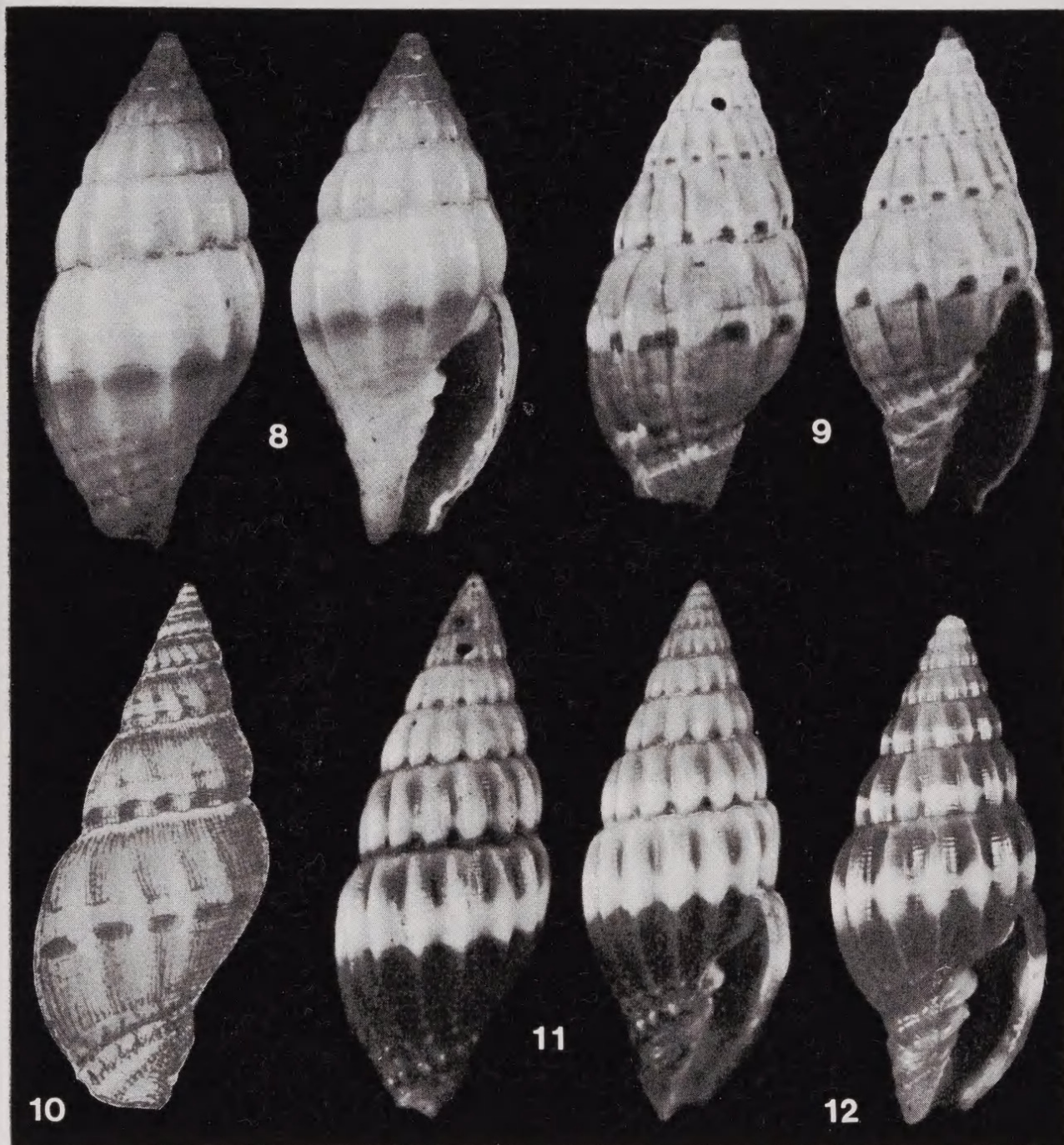
1974. *Vexillum (Pusia) cubanum* (Aguayo & Rehder), Abbott, Americ. Seashells ed. 2: 240.

TYPE LOCALITY: La Chorrera, Habana, Cuba (*cubanum*); Santa Rosa, N. coast Pinar del Rio, Cuba (*arestum*).

DISTRIBUTION: Bahamas; Cuba; Haiti; Antigua; Virgin Is; Grand Cayman Is; Barbados. From 11-146 m.

Type specimens: The holotype of *V. (P.) cubanum* is in the USNM No. 420978, dimensions 12.0 x 5.3 x 6.4 mm (Fig. 8). The holotype has 7 whorls and a missing apex, 12 axial ribs and 6 spiral striae on the penultimate and 11 ribs and 16 striae on the body whorl, a lirate aperture and 4 columellar folds. It is faded white in colour with a peripheral narrow brown band on the body whorl and the apex is faded brown, interior of aperture with a brown stain. A paratype in the Academy of Natural Sciences, Philadelphia, No. 247096 has spire whorls with faded brown spots between the axial ribs at the anterior of the sutures; on the body whorl the brown colouring is also confined to the interspaces.

The holotype of *V. (P.) arestum* is in the USNM No. 517056, dimensions 10.0 x 4.4 x 4.7 mm (Fig. 9). The holotype has 7 whorls and a broken protoconch, 12 axial ribs on the penultimate and 10 on the body whorl, spiral striae and 4 columellar folds. The colour is straw-yellow, spire whorls have a narrow white band at the anterior of the sutures and quadrate brown spots between the ribs, the body whorl has a white peripheral band and anterior quadrate brown spots, embryonic whorls and aperture are brownish.



Figs. 8-12. 8-10. *Vexillum (Pusia) cubanum* Aguayo & Rehder. 8. Holotype USNM No. 420978, 12.0 mm. 9. Holotype of *Pusiolina aresta* Rehder, USNM No. 517056, 10.0 mm. 10. Type-figure of *Mitra articulata* Reeve (from Reeve 1845, pl. 36, fig. 302). 11, 12. *V. (P.) epiphaneum* Rehder. 11. Holotype USNM No. 414278, 23.6 mm. 12. Specimen from Pompano beach, Florida, 21.0 mm.

V. (P.) cubanum and *V. (P.) arestum* are similar in size and almost identical in shape and numbers of axial ribs and differ only slightly in colour pattern, making allowance for the dead-collected types of *V. (P.) cubanum*. The two taxa are clearly conspecific and both resemble the form *articulata* Reeve. The type of the latter species is no longer extant having been sold at auction of the Norris collection. The type-figure of *V. (P.) articulatum* (Fig. 10) closely resembles the form *arestum* in colour pattern of dark brown spots and short dashes, but in shape it is closer to *V. (P.) epiphaneum* (Rehder). *V. (P.) cubanum* may eventually prove to be a small colour form of *V. (P.) histrio* (Reeve).

Vexillum (Pusia) epiphaneum (Rehder, 1943)

(Figs. 11, 12)

1943. *Pusia epiphanea* Rehder, Proc. U.S. Nat. Mus. 93 (3161): 201, pl. 20, fig. 14.1974. *Vexillum (Costellaria) epiphanea* Rehder, Abbott, Americ. Seashells ed. 2: 239, fig. 2620 (figd. holotype).

TYPE LOCALITY: Off Tortugas, Florida, 15 fathoms (27 m).

DISTRIBUTION: From the Gulf of Mexico to Florida and the Bahamas.

Type specimens: The holotype of *Pusia epiphanea* Rehder is in the USNM No. 414278, dimensions 23.6 x 8.9 x 11.0 mm. There are 14 axial ribs and 10 spiral threads on the penultimate and the same number on the body whorl in addition to the 5-6 rows of nodulose cords at the base, columella with 4 folds, aperture lirate. Brown in colour with a white subsutural band which tends to be rather broad on the spire whorls (Fig. 11).

V. (P.) epiphaneum is similar to *V. (P.) trophonium* (Dall) but differs in its squatter, more biconic shape, shorter whorls and prominent angulate ribs. *V. (P.) epiphaneum* is more closely related to *V. (P.) histrio* from which it differs only in its more elongate form.

Vexillum (Pusia) trophonium (Dall, 1889)

(Figs. 13, 14)

1889. *Mitra (Costellaria?) trophonia* Dall, Bull. Mus. Comp. Zool. Harv. Coll. 18: 161.1970. *Mitra (Cancilla) trophonia* Dall, Rios, Coast. Braz. Seashells pl. 34, fig. top row on left.1974. *Vexillum (Costellaria) trophonium* (Dall), Abbott, Americ. Seashells ed. 2: 240.

TYPE LOCALITY: St. 247, off Grenada, 170 fathoms (311 m), at 53.5°F (12°C). Dall (1889) cited 2 localities for his *Mitra trophonia*, i.e. St. Croix, Virgin Is, and off Grenada. The holotype, however, originated from the latter locality.

DISTRIBUTION: From Florida to the Virgin Is and East Brazil. From 27-311 m.

Type specimens: The holotype is in the USNM No. 508728, dimensions 19.3 x 6.9 x 8.8 mm (Fig. 13). The specimen is worn and faded has 15 axial ribs and 11 spiral striae on the penultimate and 13 ribs and 12 striae on the body whorl and 5 additional nodulose cords at the base, 4 columellar folds and a lirate aperture. The colour is a faded yellowish-brown with a white subsutural band on each whorl.

V. (P.) trophonium differs from *V. (P.) epiphaneum* in its more slender, elongate shape, longer spire whorls and more produced siphonal canal. The species appears to be very rare since I have examined only a few lots in Museums.

Vexillum (Pusia) puella (Reeve, 1845)

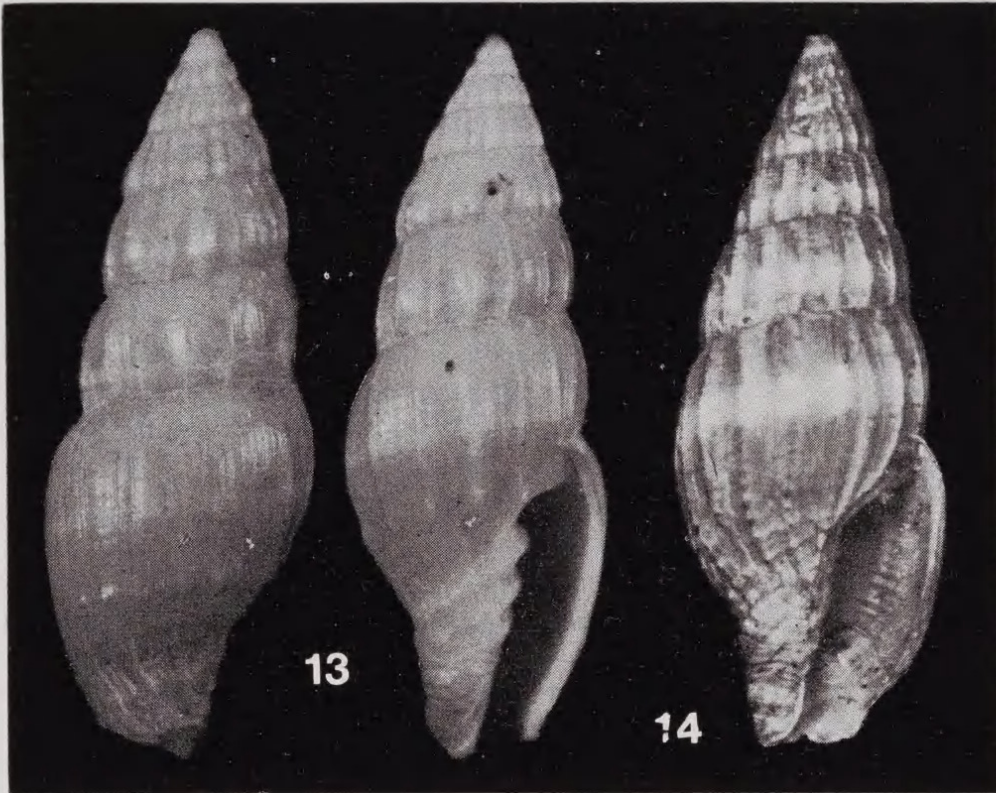
(Fig. 15)

1845. *Mitra puella* Reeve, Conch. Icon. 2: pl. 34, fig. 276.1874. *Mitra albomaculata* "A. Adams ? MS", Sowerby, Thes. Conchyl. 4: 16, pl. 21, fig. 449.1958. *Pusia puella* Reeve, Abbott, Mon. Acad. Nat. Sci. Philad. No. 11: 83.1974. *Vexillum (Pusia) puella* (Reeve), Abbott, Americ. Seashells ed. 2: 239, fig. 2625.1976. *Vexillum puella* Reeve, Bandel, Veliger 19 (2) L182, fig. 5 (spawn).

TYPE LOCALITY: Island of St. Thomas, West Indies (*puella*); none (*albomaculata*; "Jamaica" on tablet with type).

DISTRIBUTION: From North Carolina to Florida, East coast of Mexico through the Caribbean as far east as Barbados. Usually intertidal.

Type specimens: Three syntypes of *M. puella* Reeve are in the BMNH No. 1967849, dimensions of lectotype (here designated) 9.7 x 5.3 x 6.0 mm. The lectotype has 5 whorls, a worn apex, the body whorl has 14 striae which are followed by 5 rows of axially elongated nodules, columella with 4 strong folds and a parietal denticle, outer lip with 6 denticles. Dark brown in colour, nodules paler, spire whorls and sutures of body whorl with large, partly confluent white blotches.



Figs. 13, 14. *Vexillum (Pusia) trophonium* (Dall). 13. Holotype USNM No. 414278, 23.6 mm. 14. Specimen from Camamu, Bahia, E. Brazil, 49 m; 16.5 mm.

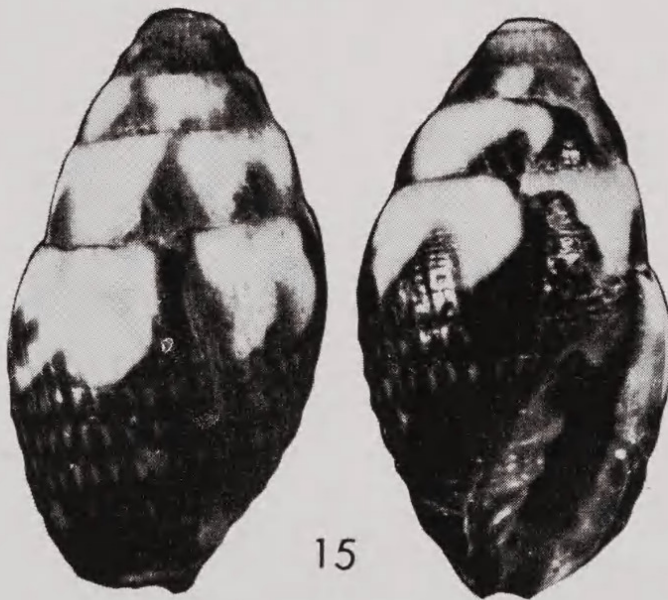


Fig. 15. *Vexillum (Pusia) puella* (Reeve). Lectotype BMNH No. 1967849, 9.7 mm.

The holotype of *M. albomaculata* Sowerby (marked on tablet "ex-Prof. C. B. Adams — Jamaica") is in the BMNH No. 1845.3.5.84., dimensions 7.7 x 4.2 x 4.5 mm. The holotype has 5 whorls, a worn apex, axial plicae and spiral striae, 4 columellar folds, a lirate aperture and 7 denticles on the outer lip. Base colour dark reddish-brown, axial riblets and elongated nodules paler and the white sutural blotches are smaller and less confluent.

This is an easily recognized species with an uncomplicated taxonomic history.

Vexillum (Pusia) exiguum (C. B. Adams, 1845)

(Figs. 16, 17)

1845. *Mitra exigua* C. B. Adams, Proc. Boston Soc. Nat. Hist. 2: 2; 1950 Clench & Turner, Occ. Pap. Moll. Harvard Univ. 1 (15): 278; 1956 Turner, Occ. Pap. Moll. Harvard Univ. 2 (20): 136, pl. 21, fig. 3 (figd. lectotype).
 1861. *Mitra hanleyi* Dohrn, Malakozool. Blaetter 8: 138; 1863 Dunker, Novit. Cinch. (2), p. 47, pl. 15, figs. 7, 8.
 1874. *Mitra roseocaudata* "Hanley", Sowerby, Thes. Conchyl. 4: 27, pl. 28, fig. 655.
 1958. *Pusia (Pusiolina) hanleyi* Dohrn, Abbott, Mon. Acad. Nat. Sci. Philad. No. 11. 83.
 1969. *Mitra hanleyi* form *antiguaensis* Nowell-Usticke, Suppl. list shells St. Croix p. 20, pl. 4, fig. 911 (invalid — art. 15 of ICZN).
 1971. *Mitra antiguaensis* Nowell-Usticke, Suppl. list shells St. Croix rev. ed. fig. 911.
 1974. *Vexillum (Pusia) hanleyi* (Dohrn), Abbott, Americ. Seashells ed. 2: 239, fig. 2621.

TYPE LOCALITY: Jamaica (*exigua*) none (*hanleyi* and *roseocaudata*); Antigua (*antiguaensis*).

DISTRIBUTION: From southern Florida to Cuba, Barbados and the Bahamas. From the intertidal zone to 128 m. Also reported by Peile (1926) from Bermuda.

Type specimens: The lectotype of *M. exigua* C. B. Adams, is in the Museum of Comparative Zoology, Harvard, No. MCZ 186593, dimensions 4.7 x 3.0 x 2.6 mm. The selected lectotype (selected Turner 1956) is very worn, has $4\frac{1}{2}$ whorls with part of the apex worn and missing, 15 axial ribs on the penultimate and 14 on the body whorl, 4 columellar folds and a partially worn outer lip. The colour is faded brown with a broad white subsutural band on each whorl (see Turner, op. cit.).



Figs. 16, 17. *Vexillum (Pusia) exiguum* (C. B. Adams). 16. Lectotype of *Mitra hanleyi* Dohrn, BMNH No. 1900.3.19.39., 5.3 mm. 17. Holotype of *M. roseocaudata* Sowerby, BMNH No. 1900.3.9.35., 4.0 mm.

Two syntypes of *M. hanleyi* Dohrn, are in the BMNH No. 1900.3.19.39-40, and the larger specimen, dimensions 5.3 x 2.2 x 2.5 mm is here designated as the lectotype (Fig. 16). The lectotype has 6 whorls and a worn apex, 16 axial ribs on the penultimate and the same number on the body whorl, numerous slender, crowded axial wrinkles (c. 2-3 per broad axial rib) in the subsutural area, 4 columellar folds and a lirate aperture. The base colour is greenish-brown, spire whorls with a broad

white band at the sutures and the body whorl with a white peripheral band which contains fine greenish-brown spiral lines, sutural wrinkles pale and interstices darker, aperture whitish and with 2 darker brown bands.

The holotype of *M. roseocaudata* Sowerby is in the BMNH No. 1900.3.9.35., dimensions 4.0 x 1.7 x 2.2 mm. The holotype has 6 whorls which tend to be biangulate, penultimate with 13 and body whorl with the same number of axial ribs, columella with 4 fold and some nodulose cords basally. The colouring is very similar to the lectotype of *M. hanleyi* (Fig. 16).

The holotype of *M. antiguaensis* Nowell-Usticke, given dimensions 4.5 x 2.25 mm, is most probably in the describer's private collection. The species has been described as having 6 whorls, 15 axial ribs and subsutural band with short riblets.

Clench & Turner (1950) when dealing with C. B. Adams' types of West Atlantic marine molluscs, remarked that the type of *M. exigua* has been lost. Turner (1956) however, reported the type of *M. exigua* as having been found and illustrated a very worn, faded specimen as the lectotype; under magnification a few subsutural axial wrinkles can still be seen. C. B. Adams (1845) described *M. exigua* with "numerous upper riblets and broader lower ribs" leaving no doubt that his species was conspecific with the subsuturally axially wrinkled *hanleyi* form. Adams' given dimensions of 0.13 x 0.06 poll. (= 3.3 x 1.52 mm), the mention of 6 whorls and description of a white colour with blackish-purple and dark staining, clearly shows that the much larger and considerably broader, 4½ whorled, worn and faded lectotype was most probably not the specimen Adams described.

Both Dohrn and Sowerby received their specimens from Hanley, and neither author realized that both were describing the same species. For further discussion and comparison see *V. (P.) gemmatum* (Sowerby) below.

Vexillum (Pusia) gemmatum (Sowerby, 1874) (Figs. 18-20)

- 1845. ? *Mitra albocincta* C. B. Adams, Proc. Boston Soc. Nat. Hist. 2: 2 (*non M. albocincta sensu* Clench & Turner, 1950).
- 1874. *Mitra gemmata* Sowerby, Thes. Conchyl. 4: 24, pl. 28, fig. 649.
- 1901. *Mitra hanleyi* var. *gemmata* Sowerby, Dall & Simpson, U.S. Fish. Comm. Bull. 1: 396.
- 1958. *Pusia (Pusiolina) gemmata* Sowerby, Abbott, Mon. Acad. Nat. Sci. Philad. No. 11: 82.
- 1969. ? *Mitra minutus* Nowell-Usticke, Suppl. list shells St. Croix, p. 20, pl. 4, fig. 912 (*non M. minuta* Roeding, 1798; *nec* Michelotti, 1847).
- 1970. *Vexillum (Pusia) exiguum* (C. B. Adams), Rios, Coast Braz. Seashells p. 107, pl. 34, fig. middle row on right.
- 1971. ? *Mitra minuta* Nowell-Usticke, Suppl. list shells St. Croix rev. ed., No. 911 (*non* Roeding, 1798; *nec* Michelotti, 1847).
- 1974. *Vexillum (Pusia) gemmatum* (Sowerby, Abbott, Americ. Seashells ed. 2: 239, fig. 2622.

TYPE LOCALITY: Jamaica (*albocincta*); none (*gemmata*); Conch Bay, Beef I, Virgin Is (*minuta*).

DISTRIBUTION: From southern Florida to the east coast of Mexico and Panama, the Bahamas and E. Brazil. From the intertidal zone to 81 m. Also reported by Peile (1926) from Bermuda.

Type specimens: Two probable syntypes of *M. albocincta* C. B. Adams, are in the BMNH No. 1845.3.5.85-86, dimensions 4.0 x 1.9 mm and 3.9 x 2.0 mm. These two specimens have been accessioned in 1845 ex-Prof. C. B. Adams from "Jamaica".

"*M. savignyi* Payraudeau, 1826" [= *Vexillum (Pusia) tricolor* (Gmelin, 1791)], a species which closely resembles *exiguum* and *gemmatum*. I have only tentatively adopted Sowerby's name of *gemmatum* for this species pending discovery of other genuine C. B. Adams material of *M. albocincta* in other Museums, which might shed some light on the real identity of *M. albocincta* C. B. Adams.

V. (P.) exiguum and *V. (P.) gemmatum* are closely similar in form, shape of whorls, adpressed sutures, concave subsutural area, often biangulate whorls, columellar folds and colouring which can range from tan to greenish-brown or blackish-brown with a white or cream band which may contain a brown spiral line. Both species have about 12-16 main axial ribs on either the penultimate or the body whorl. The only difference is the presence in *V. (P.) exiguum* of numerous, slender and crowded axial riblets which descend from the sutures onto the broader main axial ribs which are frequently developed into somewhat biangulate nodes in the white area; these subsutural riblets are so slender that 2-3 of these riblets fit within the width of one main axial rib. I have examined 54 lots of over 230 specimens from various Caribbean localities and found no difficulty in separating *exiguum* from *gemmatum* on the basis of presence or absence of subsutural axial riblets, until I encountered individuals in which the subsutural wrinkles were extremely faint or only 4-5 subsutural riblets were present on the whole shell-surface. It was also found that both species were sympatric in Florida, Cuba, Puerto Rico and the Bahamas and both species were taken in the same batch at Cardenas Bay, Cuba, in 2-5.5 m (ex-Barrera Exped., USNM). Both forms have a similar habitat and depth range, a similar size-range, i.e. 3.0-7.0 mm for *exiguum* and 4.0-9.0 mm for *gemmatum*, and the same number of axial ribs occur in both forms. Several authors (Dall & Simpson 1901, Peile 1926, Abbott 1958, 1974, etc.) have suggested that one is only a form of the other, an opinion this writer endorses after having seen intergrading individuals. Further population and animal studies are needed particularly in areas where both forms are sympatric, before both can be accepted as valid biospecies.

***Vexillum (Pusia) sykesi* (Melvill, 1925)** (Figs. 21, 22)

1925. *Mitra (Pusia) sykesi* Melvill, Proc., alac. Soc. Lond. 16 (5): 218, pl. 10, fig. 1.

1955. *Mitra moisei* McGinty, Proc. Acad. Nat. Sci. Philad. 107: 77, pl. 1, figs. 4, 4a; 1958 Abbott, Mon. Acad. Nat. Sci. Philad. No. 11: 83; 1959 Nowell-Usticke, Checklist shells St. Croix, p. 75.

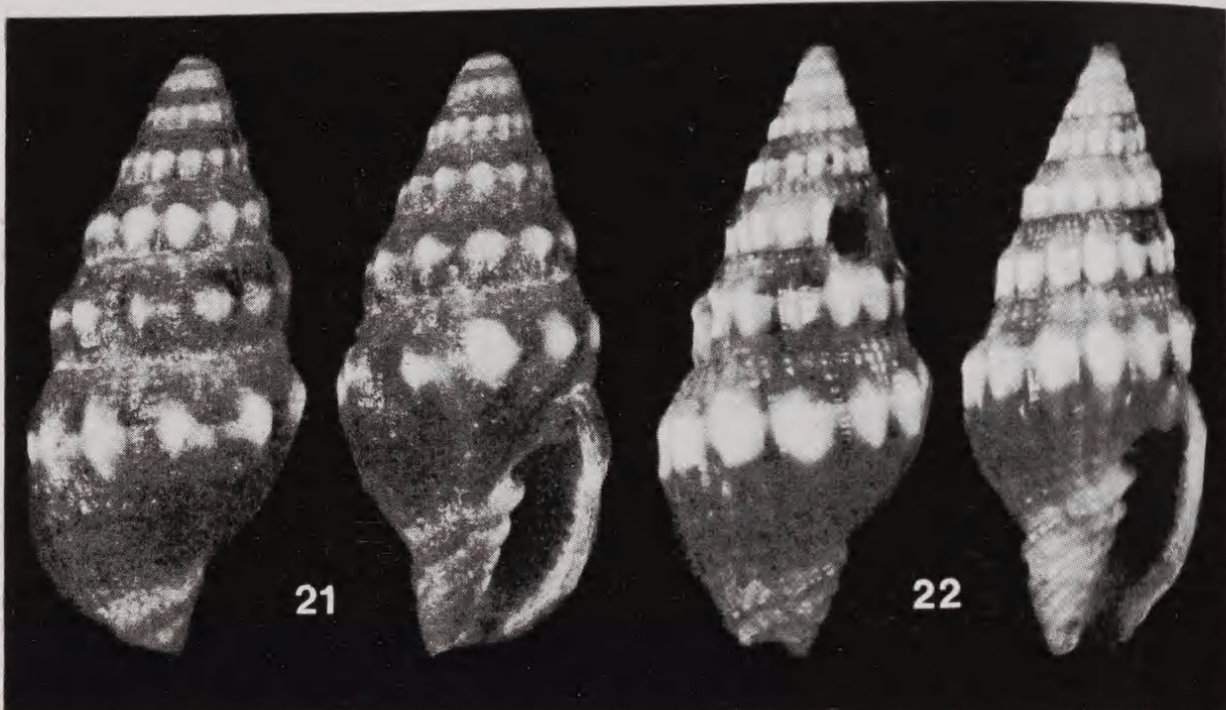
1974. *Vexillum (Pusia) moisei* McGinty, Abbott, Americ. Seashells ed. 2: 240, fig. 2630. TYPE LOCALITY: West Indies (*sykesi*); off Palm Beach, Florida, 25 fathoms (46 m) (*moisei*).

DISTRIBUTION: From southern Florida to the Virgin Is and Curacao, Antilles, from 2.5-73 m.

Type specimens: Four syntypes of *M. sykesi* Melvill, are in the BMNH No. 196584, ranging from 11.1 mm to 13.2 mm in size. The syntype measuring 12.0 x 5.3 x 5.8 mm, is here designated as the lectotype of *M. sykesi* (Fig. 21). The lectotype has somewhat biangulate whorls on the presutural ramp, adpressed sutures, a concave and obsoletely granose subsutural area, 10 axial ribs on the penultimate and the same number on the body whorl, the lower half of the body whorl has 4 spiral rows of small granules followed by half a dozen strong, oblique cords, 4 columellar folds and a lirate aperture. The colour is faded orange-brown with a white band across the nodes.

The holotype and four paratypes of *Mitra moisei* McGinty, are in the Academy of Natural Sciences, Philadelphia, No. ANSP 194061. The holotype measures 10.0 x 4.1 x 4.6 mm, has 7 whorls plus part of a protoconch, 12 axial ribs on the

penultimate and 11 on the body whorl, the lower half of the body whorl has 5 spiral rows of granules followed by 5 oblique cords, 4 columellar folds and a lirate aperture. The colour is reddish-brown with a white band across the nodules (Fig. 22). The remaining four paratypes range in size from 5.6 mm to 9.7 mm.



Figs. 21, 22. *Vexillum (Pusia) sykesi* (Melvill). 21. Lectotype BMNH No. 196584, 12.0 mm. 22. Holotype of *Mitra moisei* McGinty, ANSP No. 194061, 10.0 mm.

V. (P.) sykesi (Melvill) is very similar to *V. (P.) gemmatum* (Sowerby), and both have about the same number of axial ribs, i.e. 11-13 on the penultimate and 10-13 on the body whorl in specimens examined, but *V. (P.) sykesi* is coarser in sculpture particularly the granulose subsutural area and lower half of the body whorl. The very small paratypes of *moisei* are very close to *V. (P.) gemmatum*. Further study may show that *V. (P.) sykesi* is only a larger, more coarsely sculptured form of *V. (P.) gemmatum* as already suggested by Abbott (1974).

***Vexillum (Pusia) zebrina* (d'Orbigny in Webb & Berthelot, 1839) (Figs. 23-25)**

1839. *Mitra zebrina* d'Orbigny in Webb & Berthelot, Hist. nat. iles Canaries, Moll. 2: 86, pl. 6, figs. 29-31; 1874 Sowerby, Thes. Conchyl. 4: 23, pl. 22, fig. 481; 1890 Dautzenberg, Mem. Soc. Zool. France 3: 151, pl. 2, figs. 6, 6a; 1897 Watson, J. Linn. Soc. Zool. Lond. 26: 293.

1845. *Mitra semen* Reeve, Conch. Icon. 2: pl. 32, fig. 256; 1874 Sowerby, Thes. Conchyl. 4: 22, pl. 28, fig. 659.

1850. *Mitra capillata* Gould, Proc. Boston Soc. Nat. Hist. 3: 171; 1852 Gould, U.S. Expl. Exped. 12: 273, pl. 20, figs. 351a, b.

TYPE LOCALITY: Canary Is (*zebrina*); Puerto Galera, Island of Mindoro, Philippines = error (*semen*); Madeira (*capillata*).

DISTRIBUTION: From Morocco to the Azores and the Canary Is. Intertidal.

Type specimens: The holotype of *M. zebrina* d'Orbigny, is in the BMNH No. 1845. 9.28.103., dimensions 12.1 x 5.9 x 6.7 mm. The holotype has 5 smooth whorls, c. 7 basal cords, 3 columellar folds, a parietal callus-pad and a lirate aperture. The colour is greenish-brown, ornamented with thin, wavy white axial lines (Fig. 23).

The specimen marked as a holotype of *M. semen* Reeve, in the BMNH No. 1967878, dimensions 7.8 x 3.8 x 4.5 mm (fig. 24) is certainly not the specimen which was illustrated by Reeve (1845). The specimen extant in the BMNH is a colour-form of *zebrina* with fewer, wider-spaced wavy axial lines and a few white spots superimposed over the axial lines at the sutures of the penultimate and periphery of the body whorl, and the outer lip has been partially broken off. Reeve's (op. cit.) original illustration of *semen* is close to the typical colour form of *zebrina* and the outer lip is complete.



Figs. 23-25. *Vexillum* (*Pusia*) *zebrina* (d'Orbigny). 23. Holotype BMNH No. 1854.9.28.103., 12.1 mm. 24. Questionable holotype of *Mitra semen* Reeve, BMNH No. 1967878, 7.8 mm. 25. Holotype of *M. capillata* Gould, USNM No. 5746, 11.0 mm.

The holotype of *M. capillata* Gould, is in the USNM No. 5746, dimensions 11.0 x 5.0 x 6.2 mm (Fig. 25). The holotype has 6 smooth whorls, 5 basal cords, 3 columellar folds, a liriate aperture and a parietal callus-pad, and is closely similar in colour and ornamentation to the type of *zebrina*.

The species is very variable in colour, ranging from dark green to greenish or purplish-brown, and the ornamentation consists of either numerous close-set, wavy axial lines, sometimes occasional white spots upon the lines, or wide-spaced wavy axial lines with coalescing white blotches.

Vexillum* (*Pusia*) *sanctahelenae (E. A. Smith, 1890)

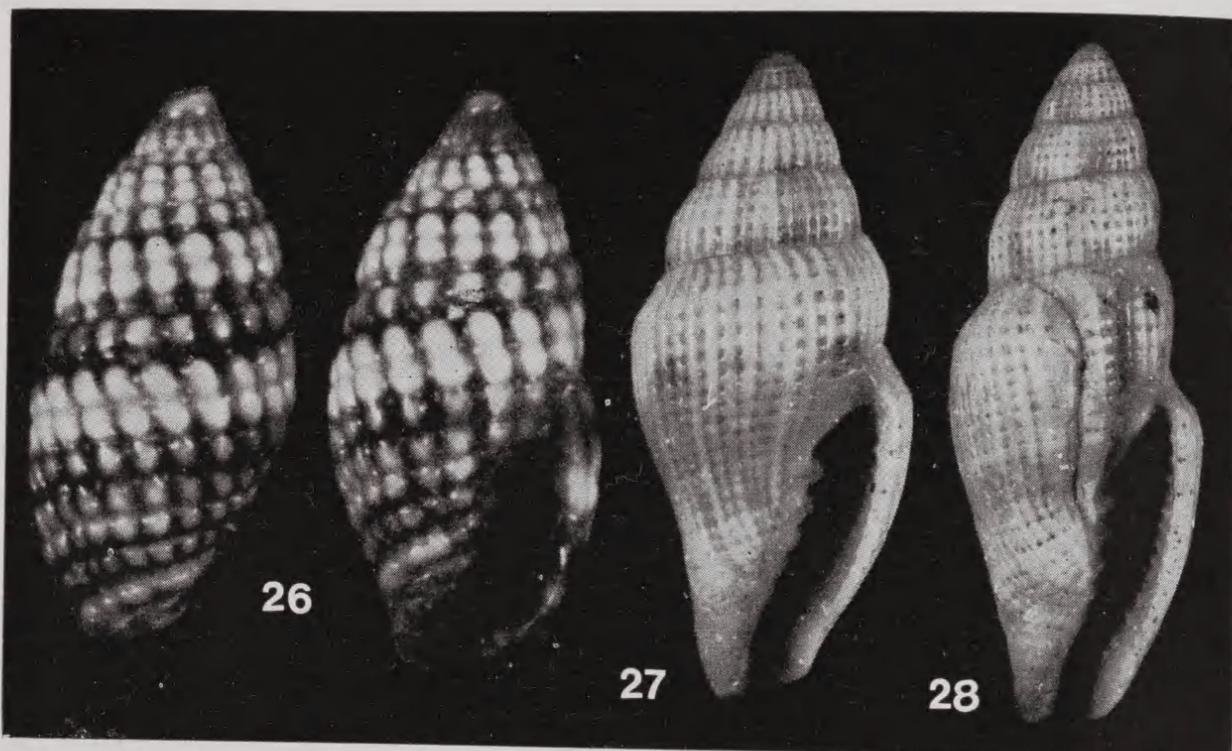
(Fig. 26)

1890. *Mitra* (*Pusia*) *sanctahelenae* E. A. Smith, Proc. Zool. Soc. Lond. p. 265, pl. 22, fig. 2.

TYPE LOCALITY: St. Helena, Atlantic Ocean.

DISTRIBUTION: Apparently endemic to St. Helena and probably subtidal.

Type specimen: A series of 18 syntypes is in the BMNH No. 1189.10.1.2398-415., ranging in size from 4.5 mm to 5.0 mm. A specimen which agrees closely with the original description and dimensions has been selected as the lectotype of *V. (P.) sanctaehelenae*, dimensions 5.0 x 2.5 x 2.2 mm (Fig. 26). The lectotype has 16 axial ribs on the penultimate and 19 on the body whorl, ribs are studded with small, round nodules, 3 spiral rows of nodules on the penultimate and 8 rows on the body whorl, base of shell with 3-4 nodulose cords, 3 columellar folds, aperture lirate, sutural nodules separated from subsequent row by a slightly broader trough. The nodules are whitish in colour, sutures on spire whorls with a dark greenish-brown band, body whorl with 3 greenish-brown bands, aperture greenish-brown and banded with white.



Figs. 26-28. 26. *Vexillum (Pusia) sanctaehelenae* (E. A. Smith). Lectotype BMNH No. 1889.10.1.2398., 5.0 mm. 27, 28. *V. (Costellaria) laterculatum* (Sowerby). 27. Holotype BMNH No. 1875.4.19.5., 14.0 mm. 28. Holotype of *Mitra oriflavens* Melvill, BMNH No. 196582, 16.8 mm.

Subgenus *Costellaria* Swainson, 1840

Costellaria Swainson, 1840, Treat. Malac. pp. 130, 320. Type specimens by M *Mitra rigida* Swainson, 1821 = *Mitra semifasciata* Lamarck, 1811. Recent, Indo-Pacific.

Vexillum (Costellaria) laterculatum laterculatum (Sowerby, 1874) (Figs. 27, 28)

1874. *Mitra laterculata* Sowerby, Thes. Conchyl. 4: 28, pl. 28, fig. 651.

1925. *Mitra oriflavens* Melvill, Proc. Malac. Soc. Lond. 16 (5): 216, pl. 10, fig. 3.

1955. *Mitra olssoni* McGinty, Proc. Acad. Nat. Sci. Philad. 107: 78, pl. 1, fig. 3.

1974. *Vexillum (Costellaria) laterculatum* (Sowerby), Abbott, Americ. Seashells ed. 2: 239, fig. 2626 (fig. on left holotype of *Mitra olssoni* McGinty).

TYPE LOCALITY: None (*laterculatum*); West Indies (*oriflavens*); off Palm Beach, Florida, 30 fathoms (55 m) (*olssoni*).

DISTRIBUTION: Known records are from Southern Florida, Cuba, Jamaica, Puerto Rico and the Virgin Is. Subtidal, to 92 m.

Type specimens: The holotype of *M. laterculata* Sowerby, is in the BMNH No. 1875.4.19.5., dimensions 14.0 x 6.1 x 8.2 mm. The holotype has 7 whorls and a worn apex, 36 axial ribs and 5 spiral cords on the penultimate and 35 ribs and 22 spiral cords on the body whorl, whorls weakly subangulate on the presutural ramp, columella with 5 folds, aperture lirate. Creamy-white in colour, spire whorls with orange-brown streaks, body whorl with a peripheral row of quadrate orange-brown spots, aperture orange (Fig. 27).

The holotype of *M. oriflavens* Melvill, is in the BMNH No. 196582, dimensions 16.8 x 6.4 x 9.0 mm. The holotype has 7 whorls and a worn apex, 36 axial ribs and 6 spiral cords on the penultimate and 42 ribs and 20 cords on the body whorl, whorls weakly subangulate on presutural ramp, columella with 5 folds, aperture lirate. White in colour, ornamented with orange streaks, body whorl with an additional orange central band, aperture orange (Fig. 28).

The holotype of *M. olssoni* McGinty, is in McGinty's private collection, dimensions 12.8 x 4.6 mm. According to McGinty (1955), the type has 7 mature whorls and 3½ glassy, light brown embryonic whorls, numerous axial ribs, 5 cords on the penultimate whorl and 5 columellar folds. The holotype has been well illustrated by McGinty (op. cit.) and also Abbott (1974).

This rather rare species is characterized by the numerous, slender axial ribs which are overridden by equally as slender, flattish spiral cords which either produce low nodules at the point of intersection or minute pits in the interspaces; the colouring is generally orange or fawn. *V. (C.) laterculatum voraginosum* Woodring, 1928, from the Miocene of Bowden, Jamaica, is so similar to recent specimens of *laterculatum* that it remains debatable whether *voraginosum* should even be retained as a subspecies purely on the basis of separation in time.

Vexillum (Costellaria) hendersoni (Dall, 1927) (Figs. 29, 30)

1927. *Mitra hendersoni* Dall, Proc. U.S. Nat. Mus. 70 (18): 49.

1943. *Pusia hendersoni* Rehder, Proc. U.S. Nat. Mus. 93: 200, pl. 20, fig. 12 (described as a new species).

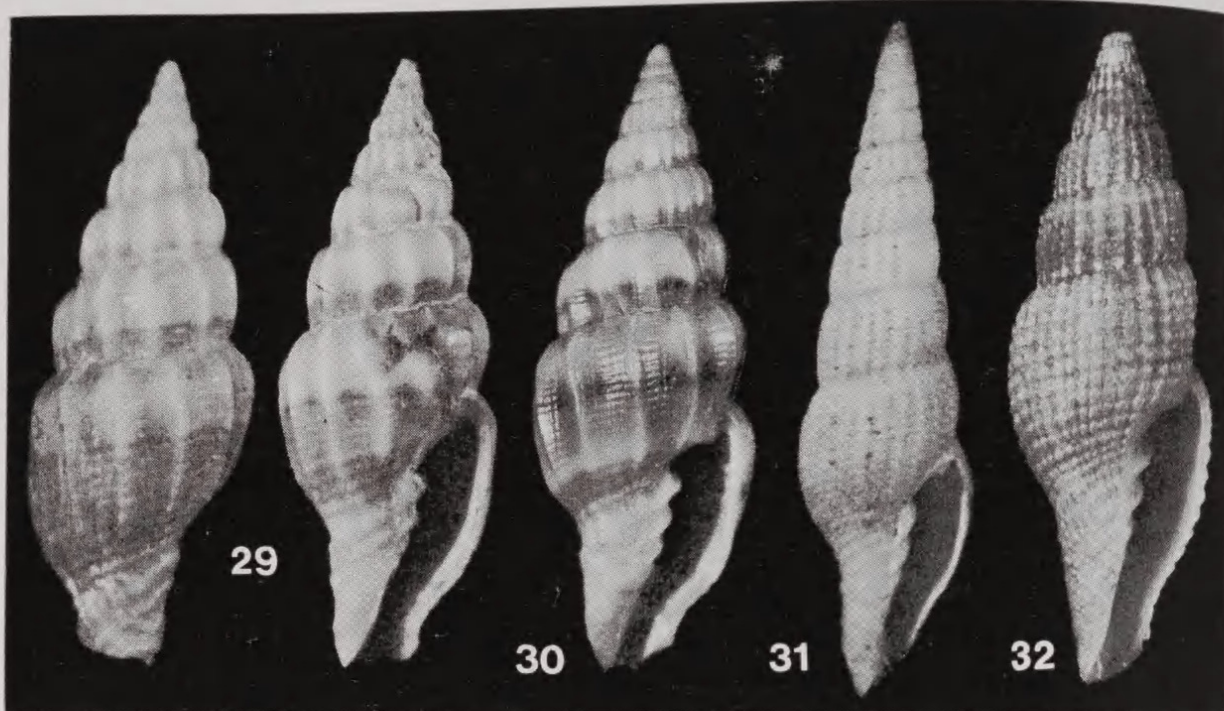
1970. *Vexillum (Costellaria) hendersoni* (Dall), Rios, Coast. Braz. Seashells, p. 107, pl. 33, figs. centre row on right; 1974 Abbott, Americ. Seashells ed. 2: 239, fig. 2618 (figd. type of *Pusia hendersoni* Rehder, 1943).

TYPE LOCALITY: Off Georgia, 440 fathoms (805 m) (*hendersoni* Dall); off Bear's Cut, Miami, Florida, 30 fathoms (55 m) (*hendersoni* Rehder).

DISTRIBUTION: From off Georgia to off southern Texas, through the Caribbean to East Brazil. From 11-805 mm, in sand and weed.

Type specimens: The holotype of *M. hendersoni* Dall, is in the USNM No. 333455, dimensions 17.0 x 6.2 x 8.0 mm (Fig. 29). The holotype has 9 whorls and a missing apex, 18 angulate axial ribs on the penultimate and 12 on the body whorl, overriding spiral cords and nodulose cords at the base, 4 columellar folds and a lirate aperture. Creamy-white in colour, spire whorls with a narrow brown sutural band, lower two-thirds of body whorl brown.

The holotype of *Pusia hendersoni* Rehder, is in the USNM No. 414359, dimensions 14.6 x 6.1 x 7.1 mm. The holotype is immature and therefore broader than adult *hendersoni*, has 7 whorls, 10 axial ribs and 6 spiral cords on the penultimate and 9 ribs and 15 cords on the body whorl and 4 columellar folds. The colour ornamentation is closely similar to the holotype of *hendersoni* Dall. The holotype of *hendersoni* Rehder, has been illustrated by Abbott (1974).



Figs 29-32. 29, 30. *Vexillum (Costellaria) hendersoni* (Dall). 29. Holotype USNM No. 333455, 17.0 mm. 30. Specimen from Venice, Gulf of Mexico, 19.8 mm. 31, 32. *V. (C.) styria* (Dall). 31. Holotype USNM No. 86948, 18.4 mm (adult). 32. Specimen from off Fowey light, Florida, 50 fathoms (92 m); 14.8 mm (immature).

Some individuals of *V. (C.) hendersoni* are closely spirally striate with up to 10 spiral threads on the penultimate and 25 threads on the body whorl having been counted on specimens from off Fowey light, Florida. The occurrence of *V. (P.) hendersoni* from the west side of the Gulf of Mexico has not been reported before, but a specimen from off Port Isabel, southern Texas, 50 fathoms (92 m), is in the Museum of Comparative Zoology, Harvard (ex-Weisenhaus coll.).

***Vexillum (Costellaria) styria* (Dall, 1889)**

(Figs. 31, 32)

1889. *Mitra (Costellaria?) styria* Dall, Bull. Mus. Comp. Zool. Harv. Coll. 18: 159, pl. 15, fig. 6 (June 1889); 1889 Dall, U.S. Nat. Mus. Bull. No. 37: 181, pl. 15, fig. 6 (December 1889).

1927. ? *Mitra styliola* Dall, Proc. U.S. Nat. Mus. 70 (18): 48.

1974. *Vexillum (Costellaria) styria* (Dall), Abbott, Americ. Seashells ed. 2: 239, fig. 2619 (copy of Dall's type-figure).

1974. *Costellaria styliola* (Dall), Kaicher, Card cat. world-wide shells, Pack No. 3/4: card 266, 3 figs. (figd. juvenile holotype).

TYPE LOCALITY: Blake station 185, off St. Domingo, Dominican Republic, 333 fathoms (609 m) (locality of the holotype of *styria*); off Georgia and Fernandina, Florida (*styliola*).

DISTRIBUTION: From Florida to the Mississippi River Delta and Yucatan, Mexico to Barbados. From 46-609 m.

Type specimens: The holotype and several paratypes of *M. styria* Dall (Dall 1889), are in the USNM No. 86948 dimensions of holotype 18.4 x 4.9 x 6.8 mm (Fig. 31). The holotype has 13 whorls inclusive of part of the protoconch 20 finely nodulose axial ribs and 8 overriding spiral cords on the penultimate and 24 ribs and 20 cords on the body whorl, 3 columellar folds and a lirate aperture. Faded white in colour with an indication of a yellow peripheral band on the body whorl.

The holotype of *M. styliola* Dall (Dall 1927) is in the USNM No. 108440 dimensions 11.0 x 5.5 x 6.0 mm. The type is a very juvenile specimen with an immature convex outer lip and a prominent constriction towards the base of the body whorl. The number of axial ribs and spiral threads is very similar to the holotype of *styria*. The holotype has been illustrated by Kaicher (1974).

Fresh specimens are usually light straw-yellow in colour under a thin, pale grey periostracum. The species varies in shape according to the stage of development. Larger adults are fusiform in shape and have short aperture in relation to the spire, whereas smaller, immature specimens are broader and the aperture is longer (Fig. 32).

V. (C.) callipictum Woodring, 1928, and *V. (C.) uncidum* Woodring, 1928, from the Bowden Miocene, Jamaica, and *V. (C.) mauryae* (Anderson, 1929) from Miocene deposits of North Colombia, are very similar to the Recent *V. (C.) styria*.

Vexillum (Costellaria) wandoense (Holmes, 1860) (Figs. 33, 34)

1858. *Pyramidella reticulata* (sic) Emmons, Rept. Nth. Carolina Geol. Surv. p. 268, textfig. 155 (corrected to *reticulata* in Index) [rejected homonym *fide* emended art. 59 (b) (i) of ICZN].
1860. *Volutomitra wandoensis* Holmes, Post-Plioc. Foss. Sth. Carolina p. 77, pl. 10, figs. 10, 10a.
1887. *Mitra rushii* Dall, Conch. Exchange 2 (1): 9.
1889. *Mitra (Costellaria) rushii* Dall, Bull. Mus. Comp. Zool. Harv. Coll. 18: 160.
1890. *Mitra wandoensis* Holmes, Dall, Wagner Free Inst. Sci. Philad. 3 (1): 92 (*Pyramidella reticulata* Emmons and *Mitra rushii* Dall, tentatively placed in synonymy); 1927 Dall, Proc. U.S. Nat. Mus. 70: 50; 1930 Mansfield, Florida Geol. Surv. Bull. No. 3: 60, pl. 5, fig. 7.
1937. *Vexillum (Uromitra) wandoense* (Holmes), Gardner, U.S. Geol. Surv. Prof. Pap. No. 142F: 412, pl. 48, fig. 26.
1974. *Vexillum (Costellaria) wandoense* (Holmes), Abbott, Americ. Seashells, ed. 2: 40, fig. 2627.

TYPE LOCALITY: Wando River, Post-Pliocene of Sth. Carolina (*wandoensis*); St. 2372, between Mississippi Delta and Cedar Keys, Gulf of Mexico, 27 fathoms (49 m) (*rushii*).

DISTRIBUTION: Upper Miocene to Recent. From Nth. Carolina to Cuba and the Gulf of Mexico. From 22-805 m.

Type specimens: The holotype of *Volutomitra wandoensis* Holmes, is in the American Museum of Natural History, New York.

The holotype of *Mitra rushii* Dall is in the USNM No. 86957 dimensions 5.2 x 2.0 x 2.4 mm (Fig. 33). The holotype has 5 mature whorls and 1½ mamillate embryonic whorls, 24 very slender axial ribs on the penultimate and 26 on the body whorl, fine spiral striae in interspaces, 3 columellar folds and a lirate aperture. Uniformly brown in colour. The type is holed above the outer lip at the suture of the last two whorls.

The species is moderately frequent in Upper Miocene deposits of Carolina and Florida, and several closely similar Miocene species may upon closer examination prove to be conspecific with the recent *V. (C.) wandoense*.

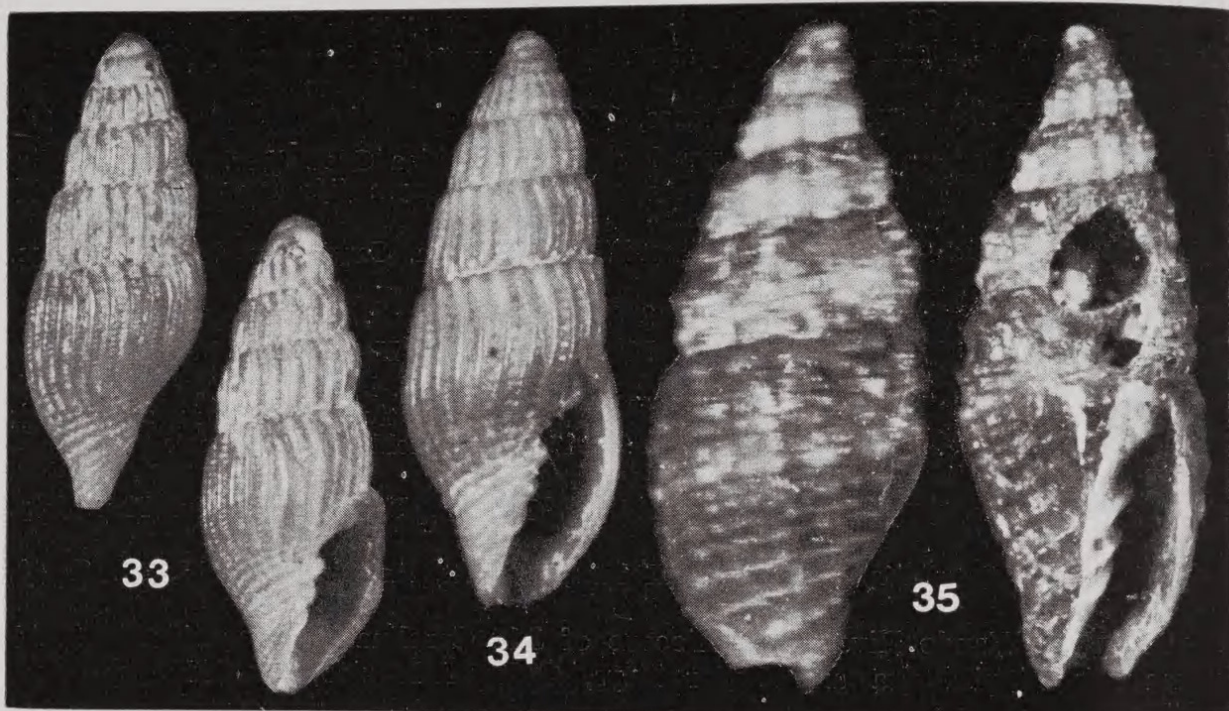
Vexillum (Costellaria) innotabilis (E. A. Smith, 1890) (Fig. 35)

1890. *Mitra (Turricula) innotabilis* E. A. Smith, Proc. Zool. Soc. Lond. p. 265, pl. 23, fig. 9.

TYPE LOCALITY: St. Helena, Atlantic Ocean.

Type specimen: The holotype is in the BMNH No. 1889.10.1.371., dimensions 7.0 x 2.8 x 3.4 mm (Fig. 35). The holotype is worn and the dorsal side has a large hole extending over the penultimate and a small part of the body whorl. Teleconch of $4\frac{1}{2}$ whorls, protoconch of $1\frac{1}{2}$ smooth embryonic whorls, penultimate whorl with 13 coarse axial ribs, body whorl with c. 12, penultimate whorl with 3 spiral cords which produce laterally elongated nodules upon the ribs, aperture lirate, columellar with 3 folds. Brown in colour, anterior part of spire whorls cream, third anterior row of nodules white.

This is a very rare species which is absent in Museum collections and apart from the holotype I have not seen any other specimens.



Figs. 33-35. 33, 34. *Vexillum (Costellaria) wandoense* (Holmes). 33. Holotype of *Mitra rushii* Dall, USNM No. 86957, 5.2 mm. 34. Specimen from off Fowey light, Florida, 55 fathoms (101 m); 6.4 mm. 35. *V. (C.) innotabilis* (E. A. Smith). Holotype BMNH No. 1889.10.1.371., 7.0 mm.

DUBIOUS AND EXCLUDED SPECIES OF COSTELLARIIDAE

Vexillum (? *Pusia*) *brandii* Verrill, 1950

1950. *Mitra brandii* Verrill, Min. Conch. Club Sth. Calif. No. 104: 3, right figure.

TYPE LOCALITY: off Dominica, British West Indies, 75-100 fathoms (137-183 m).

Type specimen: Lost. Formerly in coll. A. H. Verrill. Original dimensions 24.0 x 12.0 mm (width-index 50%). Described as having 5 whorls, 8-10 low, rounded axial ribs which end in low nodules at shoulder, columella with 4 folds. Dull brownish or greenish-orange in colour with a pale yellow columella.

The textfigure supplied by Verrill (1950) is a stylized drawing consisting only of a few strokes and lacking details of sculpture. The relative dimensions of the textfigure do not agree with the measurements given in the text and the shell is shown to be considerably narrower (width-index 43%) and the siphonal canal also appears truncated due to excessive wear. The taxon remains a *nomen dubium*.

Vexillum (Costellaria) rawsoni (Moerch, 1876)

1876. *Turricula (Costellaria) rawsoni* Moerch, J. Conchyl. 24: 373.

TYPE LOCALITY: Antilles, probably Barbados.

Type specimen: Lost. Formerly in coll. Sir R. W. Rawson. Original dimensions given as 16.0 x 5.5 mm. Described as having 18 reddish axial ribs and 13 spiral threads on the body whorl and 4 subnodulose threads on the penultimate whorl with a white, subcentral band, triplicate brown columella and 9 lirae within the aperture.

Moerch (1876) remarked that his new species is very similar to *Vexillum (Costellaria) virgo* Linnaeus, 1767 (formerly *cruentatum* Gmelin, 1791) and the description certainly confirms this. The taxon remains a *nomen dubium*.

Mitromorpha torticula (Dall, 1889)

1889. *Mitra (Thala ?) torticula* Dall, Bull. Mus. Comp. Zool. Harv. Coll. 18: 162, pl. 15, fig. 8; 1972 Cernohorsky, Rec. Auckl. Inst. Mus. 9: 227 (placed in *Mitromorpha* Carpenter, 1865).

TYPE LOCALITY: Off Morro, Havana, Cuba, 400 fathoms (732 m).

Type specimen: The holotype of *M. torticula* Dall, is in the USNM No. 508727, dimensions 12.2 x 4.0 x 5.5 m. The holotype has 12 axial ribs and 6 spiral cords on the penultimate and 11 ribs and 20 cords on the body whorl and only 2 typical mitromorphine folds on the columella.

This species, together with all other biplicate species like *Mitra haycocki* Dall & Bartsch, 1911, from Bermuda (= *Mitrolumna biplicata* Dall, 1889), *Mitra grammatula* Dall, 1927, from off Georgia, *M. zilpha* Dall 1927, from off Georgia and Florida, and *M. pleurotomoides* E. A. Smith, 1890, from St. Helena, belong to the mitromorphine group of the family Turridae.

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