

**THALA CRASSA NEW SPECIES OF COSTELLARIIDAE
(GASTROPODA, MURICOIDEA) FROM THE
SOUTHERN COAST OF BRAZIL**

Luiz Ricardo Lopes de Simone

ABSTRACT

Thala crassa is described from deep water off São Paulo, Brazil. This new species has a typical Costellariidae digestive system (sensu Ponder, 1972), but the anterior oesophagus and proboscis are very long. The pallial oviduct has a long vestibule and the female genital aperture is a single pore projecting anteriorly. The penis has a rounded tip and the prostate is claviform. These characters of the genital system are the main differences from *Thala floridana* (sensu Maes and Ræihle, 1975).

The genus *Thala* H. and A. Adams, 1853 (type species *Mitra mirifica* Reeve, 1845) was not previously reported in Brazilian waters (Rios, 1985). In material dredged by the Oceanographic Institute of the University of São Paulo (IOUSP) several specimens of this genus were collected, at depths between 240 to 600 m. Detailed conchological examination shows that these specimens are a single, new species. The work of Maes and Ræihle (1975) has a full anatomical description of *Thala floridana* (Dall, 1883) from the Gulf of Mexico, a brief anatomical description is herein included for a better comparison between these species.

MATERIAL AND METHODS

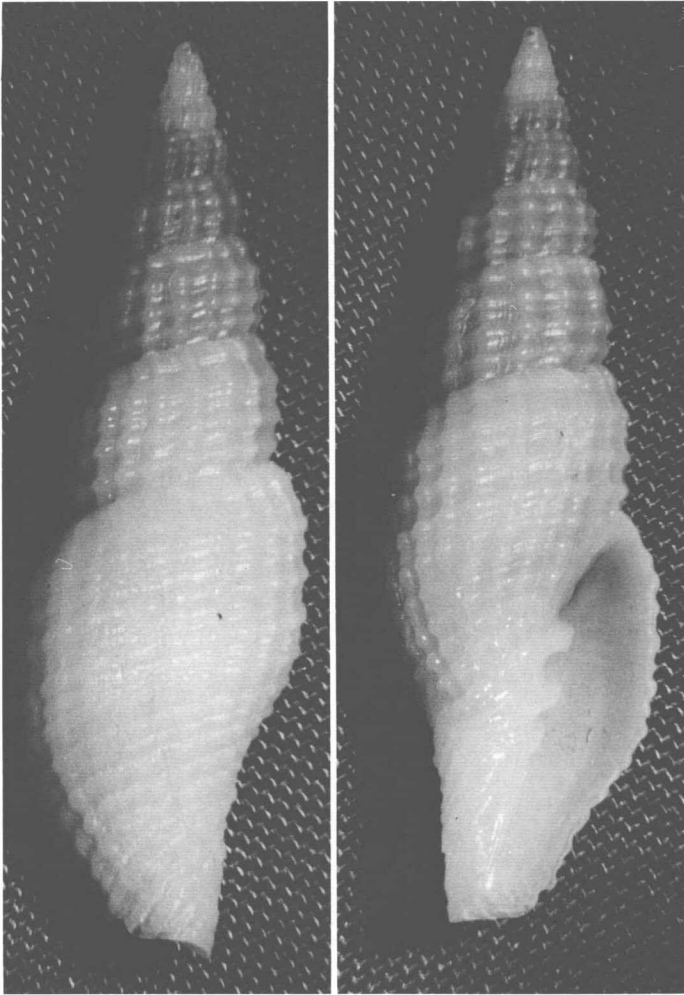
The specimens were dredged by R/V PROF. W. BESNARD offshore of Ubatuba, São Paulo coast, southeast Brazil, in the integrated project, Utilização racional dos ecossistemas costeiros da região tropical brasileira: Estado de São Paulo, by IOUSP. The specimens were fixed in 70% ethanol. Specimens prepared for anatomical studies have the shells decalcified in Railliet-Henry fluid. Some specimens were dissected directly, while others were dissected after dehydration in ethanol, stained with Carmine fluid, fixed and cleared in creosote. The radula was examined on a slide with Hoyer. All drawings were made using a camera lucida. About 150 shells and 3 radulae were examined; 20 specimens were dissected. Anatomical terminology is based on Ponder (1972) and conchological terminology on Cernohorsky (1970).

***Thala crassa* new species**
Figures 1 to 11

Holotype.—MZUSP 27919; Paratypes: MZUSP 27920, 1 specimen; MZUSP 27921, 1 specimen; MZUSP 27922, 1 specimen; MZUSP 27923, 1 specimen; MZUSP 27924: 25 specimens. Provenance of these: type locality; MZUSP 27925: 139 specimens, station 5368, 24°31'0"S 44°28'0"W 250 m deep, 8 Dec 1988. MZUSP 27926: 25 specimens, station 5367, 24°34'2"S 44°26'0"W, 350 m deep, 8 Dec 1988. MZUSP 27927: 5 specimens, station 5366, 24°22'3"S 44°18'0"W, 240 m deep, 7 Dec 1988. MZUSP 27928: 26 specimens, station 5361, 24°42'0"S 44°30'5"W, 320 m deep, 6 Dec 1988. MZUSP 27929: station 5362, 24°52'S 44°34'W, 600 m deep, Dec 1988. Fundação Universidade do Rio Grande, Museu Oceanográfico: MORG 30669 and MORG 30670 (2 specimens from type locality). Museu Nacional do Rio de Janeiro: MNRJ 6934 (2 specimens from type locality).

Type Locality.—Brazil, São Paulo, continental slope off Ubatuba, station 5365, 24°25'0"S 44°16'5"W, 320 m deep. 07 Dec 1988.

Diagnosis.—Shell clear, rather large for the genus, rather tall spira, strong spiral and axial threads, smooth outer lip, three folds in columella. Proboscis very long, rachidian tooth with nine cusps. Anterior oesophagus very long and convolute.



Figures 1 (left) and 2 (right). Dorsal and frontal view of the holotype shell of *Thala crassa*.

Female with long capsule gland vestibule, terminal genital pore. Male with a rounded penis tip, prostate gland claviform.

Description.—SHELL. Medium size (to 30 mm), cylindrically fusiform. Protoconch of two glassy nuclear whorls, rounded apex (Fig. 3). Teleoconch with up to 7.5 convex whorls. Sculptured with intersecting axial and spiral threads, both predominating or discrete predominance of axial threads; discrete nodule on intersection of threads producing beaded effect. (Number of axial and spiral threads of some specimens, see below.) Aperture narrow, about same length as spire, smooth within; labial lip thickened, smooth, angulate, constricted basally. Columella with three well developed oblique folds (fourth fold seen in few specimens, in inner basal region of canal, always insignificant), parietal wall glazed. Siphonal canal short, few recurved. Periostracum thin, translucent or rarely clear brown; ostracum white.

CEPHALO-PEDAL COMPLEX (Fig. 11). Well developed foot and head have ho-

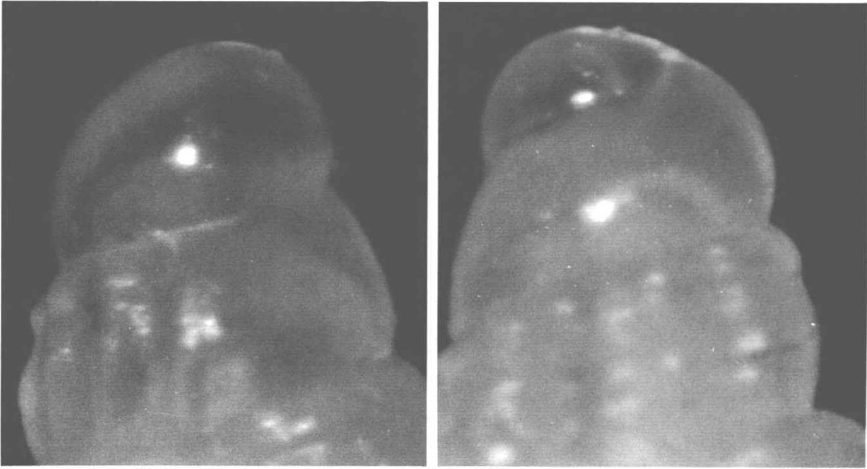


Figure 3. Two details of holotype protoconch in lateral view.

mogenous pale beige color. Short tentacles have same color, dark eye in basal-external region of each. Operculum absent. Columellar muscle with three brachs distally, fitting between columellar folds of the shell.

MANTLE COMPLEX (Fig. 5). Has usual features: large, pale brown bipectinate osphradium, with about 19 filaments below and about 34 above osphradial ganglion, lies on left alongside ctenidium, which has about 52 triangular filaments, bases slightly narrower than their height. Hypobranchial gland secretes dense pale blue secretion, accumulated mainly near right side. Mantle border and siphon with homogenous clear beige color. Pycnonephridian renal organ voluminous, axially striated in external view.

DIGESTIVE SYSTEM (Figs. 5–8). Pleurembolic proboscis long and broad (Fig. 6), has buccal mass projecting from its distal end. Muscular proboscis sheath attached in front to cephalic cavity by series of muscular fibers, but not as clear ring. Smooth inner and outer surface wall of proboscis without folds. When proboscis is dissected delicate, narrow oral tube leading from minute mouth can be seen (Fig. 7, ot), oral invagination thin walled. Moderately large odontophore protrudes into buccal cavity, rather slender odontophoral retrator muscle runs from posterior end of odontophore to floor of cephalic cavity, near columellar muscle. Rather broad radular sac same length as odontophore. Radula (Fig. 9) consists of two, curved, simple lateral teeth and broad rachidian tooth in each row. Rachidian slightly arched, with nine pointed cusps. There is no epiproboscis.

First portion of anterior oesophagus (Fig. 7) very long and convolute, narrow and with very thin wall, has four or five loops into buccal cavity of proboscis. Salivary glands are homogenous glandular mass around anterior and mid-oesophagus, to separate them in two salivary glands and two accessory salivary glands not possible, although four ducts discernible (each one of each gland), pair short (sd) enters in mid-oesophagus just in front of valve of Leiblein; another pair (ad) very long, lies anterior to oesophagus and finishes in oral tube, just like that described by Ponder (1972) for Costellariidae (Vexillidae). Valve of Leiblein relatively large bulb, its thick glandular walls consist of two different-staining regions, normal in this structure (Ponder, 1972: 314). Just behind valve mid-oesophagus suddenly narrows and passes through nerve ring and its walls become thin. Behind nerve ring mid-oesophagus suddenly expands, its walls becoming

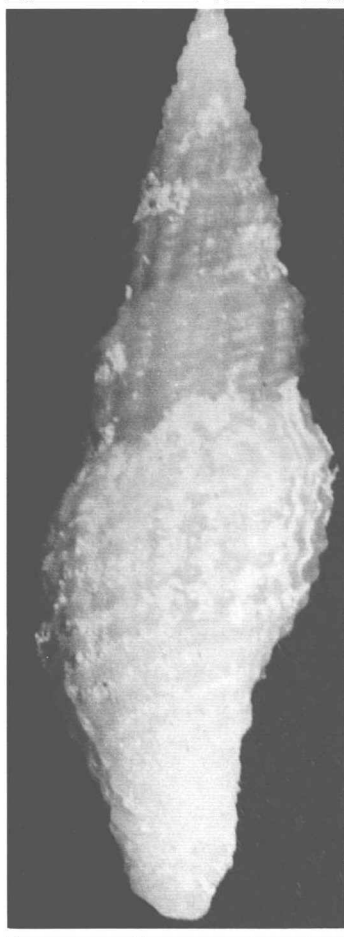


Figure 4. Shell of a paratype of *T. crassa* MZUSP 27929 collected from 600 m as sample of shell variation.

thick, large, flattened and glandular, always divided in two similar halves by median constriction. Short duct of gland of Leiblein opens on right ventral side of mid-oesophagus distal end. Gland of Leiblein lies on right side of posterior oesophagus, elongate, with some pleats, dark brown in color, distal region very narrow and long, lies posterior oesophagus distally. Posterior oesophagus narrow, thin-walled tube with no distinct crop region.

Rather small, U-shaped stomach (Fig. 8) has very delicate outer wall, oesophagus opens into stomach on left side and intestine emerges alongside on right, posteriorly there is short caecum (Fig. 8, co), some folds within its wall are seen; alongside posterior edge of stomach has single digestive gland duct. Intestine runs from stomach through renal organ and along right pallial wall (Fig. 5). In female, rectum is between pallial oviduct and pallial wall, anus stay just beside genital aperture.

GENITAL SYSTEM (Figs. 10, 11). Female: ovarian tubes remain separate from digestive gland, occupies about the fourth and fifth whorls of teleoconch. Oviduct short and straight, lies columella, no gonopericardial duct found. Posterior end of

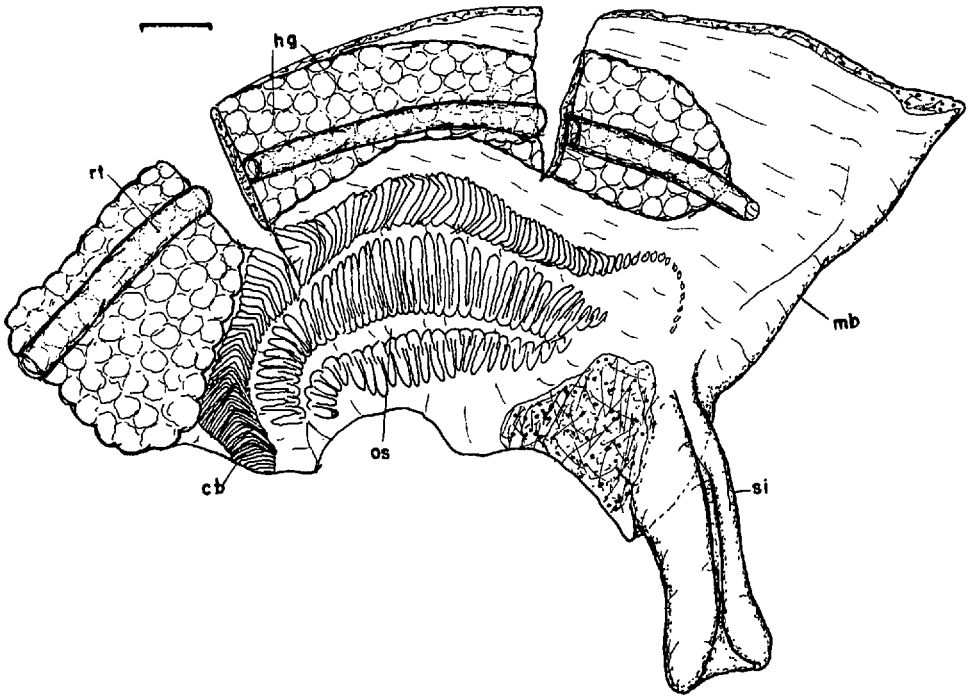
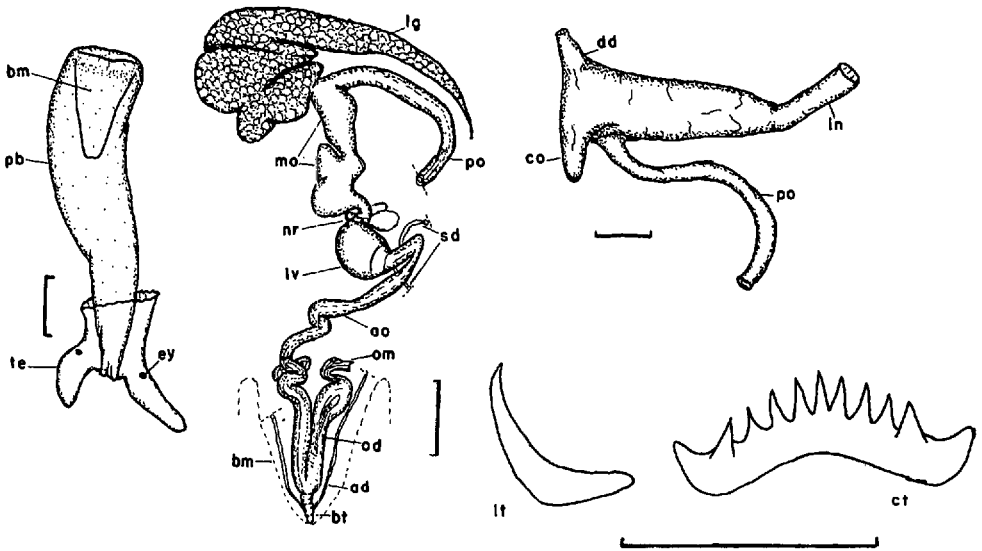


Figure 5. *Thala crassa*, pallial organs, internal view, genital organs removed, scale = 0.5 mm. Abbreviations: ad = duct of accessory salivary glands, ag = albumen gland, ao = anterior oesophagus, bc = bursa copulatrix, bm = buccal mass, bt = oral tube, cb = ctenidium, co = coecum of stomach, ct = central tooth (rachidian), dd = duct of digestive gland, ej = ejaculatory duct, ey = eye, ft = foot, ga = female genital aperture, hd = head, hg = hypobranchial gland, ig = ingesting gland, in = intestine, lg = Leiblein gland, lv = Leiblein valve, lt = lateral tooth, mb = mantle border, mo = midoesophagus, nr = nervous ring, od = odontophore, om = odontophore muscle, os = osphradium, ov = oviduct, pb = proboscis, po = posterior oesophagus, pt = prostate, rt = rectum, sd = ducts of salivary gland, si = siphon, sl = prostate aperture, sv = seminal vesicle, te = tentacle, vc = ventral channel and ve = vestibule.

albumen gland (Fig. 10) bulges into anterior wall of kidney, oviduct merges in left angle in posterior end of this. Ingesting gland duct opens into ventral channel between junction of albumen and capsule glands on their outer side. Capsule gland long and cylindrical, occupies most of pallial oviduct, with thick lateral lobes, its anterior end is rounded. Oviduct narrows in front of capsule gland, it lies on inner side of bursa copulatrix, corresponds to vestibule, investigated by Ponder (1972), but longer than those he illustrated. Bursa copulatrix is elliptical organ, circular in section, commences just behind anus, has rather thin walls. Vagina different from those described by Ponder (1972) as gonopore not elongate, this aperture is single pore (ga), with irregular and apparent muscular wall, in anterior end of pallial oviduct, regains anteriorly to mantle border.

Male: Vas deferens swollen into coiled seminal vesicle with discreet bulb before prostate (Fig. 11). No gonopericardial canal found. Prostate gland commences at posterior end of pallial cavity where it receives vas deferens, posterior portion broader than remainder of gland (claviform), and communicates with pallial cavity by way of slit (sl), rest of gland enclosed duct and narrows gradually in right margin of pallial cavity, into wide ejaculatory duct, convolute, on right side of penis basis (Fig. 11). Massive penis lies on right side of body at base of pallial



Figures 6–9. *Thala crassa*: 6 (left), detail of dissected head and proboscis, dorsal view, scale = 0.5 mm; 7 (left center), detail of dissected digestive system, anterior region, dorsal view, scale = 0.5 mm; 8 (upper right), detail of stomach in ventral view, scale = 0.5 mm; 9 (lower right), a row of radular teeth, scale = 0.05 mm. (See Fig. 5 for abbreviations).

cavity; oval in section and tapers to rounded point at which duct opens. Proximal portion of penis horizontal, always twisted internally and stays perpendicular to this proximal portion (Fig. 11).

Measurements: Between brackets, respectively: length, width, number of axial threads on body whorl, number of spiral threads on penultimate whorl and number of spiral threads on body whorl.

Holotype.—MZUSP 27919 (20.3 × 6.2 mm, 25, 5, 16)

Paratypes.—MZUSP 27920 (17.5 × 5.7 mm, 22, 5, 12); MZUSP 27921 (20.0 × 6.2 mm, 27, 5, 13); MZUSP 27922 (19.9 × 6.0 mm, 26, 6, 14); MZUSP 27923 (19.7 × 6.2 mm, 26, 5, 12).

Range.—Brazil, São Paulo, off Ubatuba continental slope.

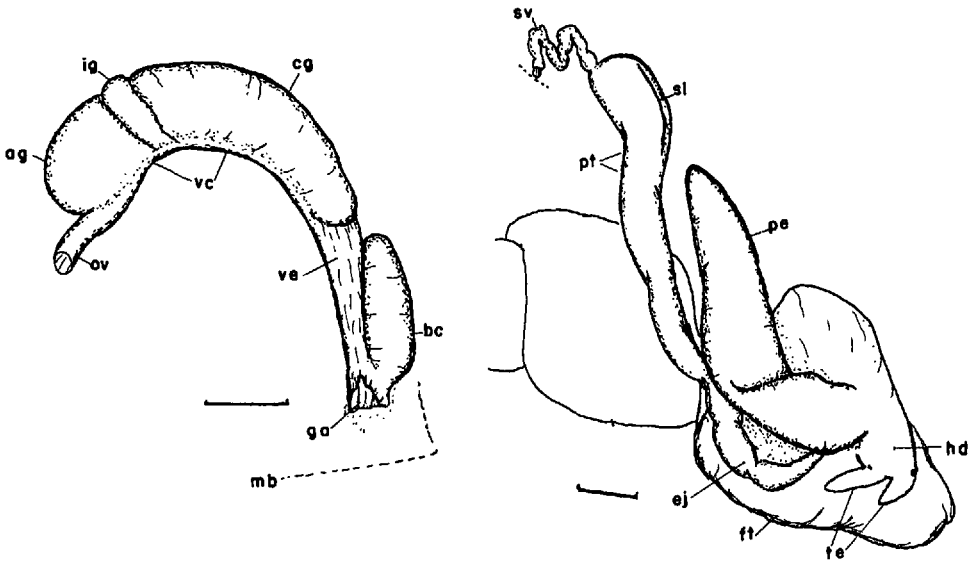
Etymology.—refers that this species has a strong sculpture on the shell (lt. *crassa*).

Habitat.—*Thala crassa* was collected between 240 to 600 m depths. The bottom is a muddy sediment, in some stations (as 5368, MZUSP 27925) the coral *Deltocyathus calcar* (Pourialés, 1874) was found in abundance.

The specimens MZUSP 27925, 27926 and 27928 are small; the dissection of some of them showed immature genital organs. All these small specimens have a coating of sponge around the shell; only the aperture is free. In the other stations the specimens are generally larger and without the sponge coating.

TAXONOMIC DISCUSSION

Recently, only three species of the genus *Thala* were reported from the western Atlantic ("*Thala*" *torticula* Dall, 1889, the fourth species is a Turridae, according to Maes and Ræihle, 1975: 46). *Thala crassa* differs from *T. foveata* (Sowerby, 1874) and *T. esperanza* Leal and Moore, 1993 in having larger size, a clear color, fewer spiral and axial threads, a deeper suture and more elongated outline.



Figures 10–11. *Thala crassa*: 10 (left) detail of extracted pallial oviduct, ventral view, to show the long vestibule and terminal pore, scale = 1 mm; 11 (right), dorsal view of cephalopodal complex and anterior male ducts, mantle removed, scale = 1 mm. (See Fig. 5 for abbreviations).

T. crassa differs from *T. floridana* (Dall, 1883) sensu Maes and Ræihle (1975) in having larger size of shell, strongest sculpture, a clear color (no dark brown), amplest aperture, outer lip smooth, and more elongated outline. On anatomy, *T. crassa* differs in having head-foot and siphon with an homogeneous pale beige color (without spots); mid-oesophagus with a median constriction; longest duct of gland of Leiblein; gland of Leiblein not fused with mid-oesophagus, with pleats, and with narrow and long distal region; stomach with only one duct to digestive gland; anal gland lacking; ctenidium with many more filaments (possibly related to the larger size); claviform prostate; wide and convolute ejaculatory duct; penis with rounded tip; and different form of pallial oviduct glands (larger albumen gland, long capsule gland, small bursa and well developed vestibule). Even with these differences, *T. crassa* is closely related morphologically with *T. floridana*, if compared with the other Costellariidae described by Ponder (1972).

T. crassa also differs from *Mitra* (*Costellaria*?) *styria* Dall, 1889 in having an homogeneous clear color (without spots), fewer whorls of protoconch (2.5 and not 3.5 whorls), shorter spira, deeper suture, fewer spiral threads per whorl and outer lip without callus.

The pallial oviduct of female *T. crassa* is similar to that of Mitridae sensu Ponder (1972), with a long vestibule and a subterminal female genital pore, this pore in *T. crassa* is very anteriorized. These characters are not in disagreement with table 3 of Ponder (1972: 336–7) on the features of families of mitriform gastropods.

ACKNOWLEDGMENTS

Special thanks to P. Verissimo for sorting and selecting the specimens of the new species and to J. H. Leal of RSMAS for comments and suggestions.

LITERATURE CITED

- Cernohorsky, W. O. 1970. Systematics of the Families Mitridae & Volutomitridae (Mollusca: Gastropoda). Bull. Auckland Inst. Mus. 8: 1-189.
- Dall, W. H. 1889. Report on the results of dredging, under the supervision of Alexander Agassiz, in the Gulf of Mexico (1877-78) and in the Caribbean Sea (1879-80), by the U.S. Coast Survey Steamer "Blake," Lieut-Commander C. D. Sigsbee, U.S.N., and Commander J. R. Bartlett, U.S.N. Commanding. XXIX—Report on the Mollusca, part II—Gastropoda and Scaphopoda. Bull. Mus. Comp. Zool. 18: 1-492. + pls 10-40.
- Leal, J. H. and D. R. Moore. 1993. *Thala esperanza*, a new Costellariidae (Mollusca: Gastropoda) from Northern Puerto Rico. *Nautilus* 107(2): 58-62.
- Maes, V. O. and D. Ræihle. 1975. Systematics and biology of *Thala floridana* (Gastropoda: Vexillidae). *Malacologia* 15: 43-67.
- Ponder, W. F. 1972. The morphology of some Mitriform Gastropods, with special reference to their alimentary and reproductive systems (Neogastropoda). *Malacologia* 11: 295-342.
- Rios, E. C. 1985. Sea shells of Brazil. Mus. Oceanogr. Rio Grande. Rio Grande: 1-328 + 102 pl.

DATE ACCEPTED: January 28, 1994.

ADDRESS: *Seção de Moluscos, Museu de Zoologia da Universidade de São Paulo, Caixa Postal 7172, CEP 01064-970, São Paulo, SP, Brazil.*