

ON THE COLLECTION OF STROMBIDAE
(MOLLUSCA : GASTROPODA) FROM BAY OF BENGAL,
ARABIAN SEA AND WESTERN INDIAN OCEAN - 2. GENERA LAMBIS,
TEREBELLUM, TIBIA AND RIMELLA

N. V. SUBBA RAO

Zoological Survey of India, Calcutta

31766



Vlaams Instituut voor de Zee
Flanders Marine Institute

ABSTRACT

This paper is the concluding part on the Strombidae of Indian Seas and the first comprehensive report on the species of this region. Fourteen species belonging to four genera namely, *Lambis*, *Tibia*, *Terebellum* and *Rimella* are recorded from the Indian Ocean. Two species of *Rimella* are reported here for the first time from Indian Seas.

INTRODUCTION

THE FAMILY STROMBIDAE is represented by five genera namely, *Strombus*, *Lambis*, *Terebellum*, *Tibia* and *Rimella* in the Indian Seas. The collections in the Zoological Survey of India are well represented in having all the genera. The genus *Strombus* was dealt with in a previous paper (Subba Rao, 1971). The present paper deals with the remaining four genera namely, *Lambis*, *Tibia*, *Terebellum* and *Rimella*.

The author is grateful to Dr. S. Khera, Joint Director-in-Charge, Zoological Survey of India for the necessary facilities. Thanks are due to Dr. R. Tucker Abbott, du Pont chair of Malacology, Delaware Museum of Natural History, Delaware, U.S.A. for supplying the necessary reprints and for encouragement.

Abbreviations used: Coll. - Collector or collected by; ex (s) - example (s); Reg. No. - Register Number; Sta. - Station; Z.S.I. - Zoological Survey of India.

SYSTEMATIC ACCOUNT

Genus *Lambis* Röding, 1798

Lambis Röding, 1798. *Museum Boltenianum* pt. 2. p. 16 (Type by absolute tautonymy: *Lambis lambis* Gmelin = Linnaeus).

Lambis Abbott, 1961. *Indo-Pacific Mollusca*, 1 (3) :147.

Nine species of this genus are reported from the Indo-Pacific region. But the collections studied include only the following seven species from Indian Seas.

Lambis (Lambis) lambis (Linnaeus)

Lambis (Lambis) crocata crocata (Link)

Lambis (Millepes) scorpius indomaris Abbott

Lambis (Millepes) violacea (Swainson)

Lambis (Millepes) digitata (Perry)

Lambis (Harpago) chiragra chiragra (Linnaeus)

Lambis (Harpago) chiragra arthritica Röding

Lambis truncata (Humphrey) was recorded by Issel and Canevari (1878) and on their authority by Abbott (1961) from Andamans. However, its occurrence in Andamans is doubtful as the author could not see even a single specimen during his three survey trips to Andaman and Nicobar Islands, nor is there any specimen in the old collections.

KEY TO THE SPECIES OF *Lambis*

1. Outer lip with 8 or more labial digitations, generally short, first digitation bifurcated, spire proportionately high.....2
— Outer lip with 6 or less number of labial digitations, generally long, first digitation not bifurcated, spire generally low.....3
2. Outer lip with 8 or 9 labial digitations, aperture purplish mauve, yellowish-white within the throat.....*digitata* (Perry)
— Outer lip with 10 or 11 labial digitations, aperture whitish, with violet tint within the throat.....*violacea* (Swainson)
3. Aperture and columella smooth for most of the part.....4
— Aperture and columella with spiral lirae for most of the part.....5
4. Digitations generally stout, dorsum of the last whorl with a spiral row of 3 or 4 small nodules or rarely raised elongate nodule; aperture and columella with 4-7 weak lirae at the posterior end.....*lambis* (Linnaeus)
— Digitations generally slender and more pointed, dorsum of the last whorl with 3 spiral rows of knobs, the upper row having 2-4 widely separated, rather large, rounded knobs and the lower 2 rows having 4-6 smaller knobs; aperture solid, smooth, constricted within by a long axial ridge on the inside of the body whorl.....*crocata crocata* (Link)
5. First digitation with a lobe on the left side, digitations 4,5,6 considerably more stunted, siphonal canal either straight or curved to the right.....*scorpius indomaris* Abbott
— First digitation without a lobe, digitations 4, 5, 6 not stunted, siphonal canal turned to the left.....6
6. Deep set depression at the upper end of aperture, spiral lirae on the parietal wall running oblique to the spiral cords, on the dorsum the top spiral cord bears 6-7 large knobs, the last two being the largest and fused together.....*chiragra chiragra* (Linnaeus)
— Broadly rounded, arch-like, small depression at the upper end of the aperture, spiral lirae on the parietal wall running parallel to the spiral cords, on the dorsum the top spiral cord bears 7-9 evenly-sized rounded nodules*chiragra arthritica* Röding

Lambis (Lambis) lambis (Linnaeus, 1758) (Pl. I A, B)

Strombus lambis Linnaeus, 1758, *Syst. Nat.*, ed. 10 : 743. No. 425; 1767, ed. 12 : 1208, No. 493. Type locality : Amboina, Indonesia (Abbott, 1961).

Pterocera lambis Satyamurti, 1952, *Bull. Madras Govt. Mus. N. S. Nat. Hist. Sec.*, 1(2)/6, 103, pl. VII, fig. 6.

Lambis (Lambis) lambis Abbott, 1961, *Indo-Pacific Mollusca*, 1 (3) : 151, pl. 121, fig. 4.

Material : 10 exs., Andamans; 12 exs., Nicobar Islands; 2 exs., Sri Lanka.

Measurements (in mm) :

Length	Width	No. whorls
280	160	10+ (Large; Andamans)
175	130	10 (Average; Andamans)
85	45	10 (Small; Andamans)

Description : The shell bears six slender, labial digitations, which may be short and bent posteriorly, or long and bent upwards towards the dorsum. The columella and interior of aperture are smooth and polished. In young specimens the margin of the outer lip is very thin and the labial digitations are indicated by depressions on the expanded part and are not produced beyond the free margin.

Distribution : East Africa to Micronesia and Eastern Melanesia (Abbott, 1961).

Remarks : It is a common species on sand or coral rubble bottom of the coral reefs in Andaman and Nicobar Islands and in the Gulf of Mannar. It is always found in 60 to 75 cms depth of water and usually with algae growing on the shell. Some of the specimens collected near Chriatapu, South Andamans had shell lengths of (including digitations) 280 mm.

Lambis (Lambis) crocata crocata Link, 1807 (Pl. II A)

Pteroceras crocatus Link, 1807. *Beschr. Naturalien Sammlung. Universitat Rostock*, 2 : 109-110. (Refers to *Conch-Cab.*, 10, taf. 158, figs. 1508, 1509). (Type locality : Amboina, Indonesia (Abbott, 1961).

Lambis (Lambis) crocata crocata Abbott, 1961. *Indo-Pacific Mollusca*, 1 (3):157, pl. 121, fig. 8.

Material : 3 exs., Andamans; 1 ex., Maldives.

Measurements (in mm) :

Length	Width	No. whorls
128+	58.6	8+ (Average; Photographs)
106.4	46.5	7+ (Small; Andamans)

Distribution : "East Africa to Samoa and the Ryuku Islands to northern Australia" (Abbott, 1961).

Remarks : It is not a very common species. It can be readily recognized by its solid orange and smooth aperture, six slender labial digitations and a long, slender, curved siphonal digitation. Small specimen from Andamans has seven labial digitations. Andamans and Maldives form new locality records for this species.

Millepes Klein, Mörch, 1852, *Cat. Conchyl. yoldi* Hafniae, p. 60.

The shell is characterised by elongate aperture bearing well developed spiral lirae, a straight or rightly curved siphonal canal and by the presence of 6 to 10 labial digitations.

***Lambis (Millepes) scorpius indomaris* Abbott, 1961 (Pl. I.C, D)**

Lambis (Millepes) scorpius sub sp, *indomaris* Abbott, 1961. *Indo-Pacific Mollusca*, 1 (3) : 165. (Type locality : Nossi-be, northwest Madagascar).

Material : 7 exs., Andamans; 3 exs., Mauritius (Z.S.I. Reg. No. M 2480).

Measurements (in mm):

Length	Width	No. whorls
150	63	7+ (Large ; Andamans)
110	50	8 (Small ; Andamans)

Distribution : Limited to western and central Indian Ocean (Abbott, 1961).

Remarks : The lobe on the left side of the digitation is very much reduced. Digitations 4, 5, and 6 are considerably more stunted than in *scorpius scorpius*.

***Lambis (Millepes) violacea* (Swainson, 1821)**

Pterocera violacea Swainson, 1821, *Exotic Conchology*, Sign B4 12th page; 1834, *Ibid.* appendix, p. 33; 1841, *Ibid.*, ed, 2, p. 33. Type locality : Red Sea.

Pterocera multipes "Chemnitz", Sowerby, 1842, *Thes. Conch.*, 1 : 43, pl. 11, fig. 8.

Lambis (Millepes) violacea Abbott, 1961. *Indo-Pacific Mollusca*, 1(3) : 167, pl. 121, fig. 1. pl. 129, fig. 1.

Material : 1 ex; Z.S.I. Reg. No. M 1251, Mauritius; 1 ex., Brandons (Mauritius).

Measurements (in mm):

Length	Width	No. whorls
126	61	9 (photograph)

Description : The shell is yellowish-white and the aperture white with violet tint within the throat. The outer lip bears 10 labial digitations gradually decreasing in size towards the anterior end. Below the U-shaped stromboid notch 4 very small digitations are seen in one of the example. Outer wall of aperture with fine, strongly raised, spiral white lirae.

Distribution : Indian Ocean.

Remarks : It is a rare species and Abbott (1961) remarks that "there are no more than a hundred known specimens and most of these have come from Mauritius". However, Butot (1965) recorded it from Indonesia (Abbott 1961).

Lambis (Millepes) digitata (Perry, 1811) (Pl. II D)

Strombus digitatus Perry, 1811. *Conchology*, London; pl. 13, fig. 1. Type locality: "Eastern Ocean" Restricted to Upolu Island, Western Samoa (Abbott, 1961).

Lambis digitata Abbott, 1961. *Indo-Pacific Mollusca*, 1 (3):163, pl.121, fig. 3, pl. 129, fig. 2.

Material : 1 ex., Z.S.I. Reg. No. M 2483, Locality : not known.

Measurements (in mm) :

Length	Width	No. whorls
107.9	53.5	8+

Distribution : East Africa to Samoa.

Remarks : A single specimen in the collection is labelled as *Lambis elongata* (Swainson) which is a synonym of *L. digitata*. It agrees with the description given by Abbott (1961). Shell is with 8 labial digitations, the anterior two are longer and the first one is bifurcate. the lower 6 are gradually decreasing in size. Body whorl is with three rows of nodules, the top row with the 4th and 5th larger and the two rows below bearing 6 and 4 small nodules respectively.

Subgenus Harpago Mörch, 1852

Harpago Klein, Mörch, 1852. *Cat. Conchyl. Yoldi Hafniae*, p. 60.

The siphonal canal is curved towards the left. The labial digitations are stouter and never more than six.

Lambis (Harpago) chiragra chiragra (Linnaeus, 1758) (Pl. I E, F)

Strombus chiragra Linnaeus, 1758. *Syst. Nat.*, 10 : 742 no. 423 ; 1767, 12 : 1207, no. 491.

Lambis chiragra chiragra Abbott, 1961. *Indo-Pacific Mollusca*, 1 (3): 170, pl. 121, figs. 10-12

Material : 15 exs., Andamans; 1 ex., Great Nicobar; 1 ex., Singapore.

Measurements (in mm) :

Length	Width	No. whorls
270	170	6+ (Large female ; Andaman)
250	125	8+ (Large male ; Andamans)

Distribution : "Eastern Indian Ocean to eastern Polynesia (but not now living in Hawaii) (Abbott, 1961).

Remarks : There is a remarkable sexual dimorphism; the females have larger shells with whitish, smooth lower columella, while the males have smaller shells with purplish columella bearing strong, white and spiral lirae.

Lambis (Harpago) chiragra arthritica Röding, 1798 (Pl. II B)

Lambis arthritica Röding, 1798. *Museum Bolteianum*, pt. 2 : 67 no. 858. (Refers to *Conch. Cap.*, 3, fig. 857) (Type locality : Mauritius).

Lambis (Harpago) chiragra arthritica, Abbott, 1961. *Indo-Pacific Mollusca*, 1 (3) : 137, pl. 121, fig. 7.

Material : 2 exs., Mauritius; 1 ex., Seychelles; Z.S.I. Reg. No. M. 2480.

Measurements (in mm) :

Length	Width	No. whorls
133+	67	8+ (Mauritius, photograph)

Distribution : East Africa to Central Indian Ocean.

Remarks : It bears some resemblance to the male phase or form *rugosa* of *L. chiragra chiragra*, but differs from it in lacking a deep-set depression at the upper end of the aperture, in the presence of white spiral lirae on the parietal wall running parallel with the spiral cords, and in yellowish rose background to the aperture.

Genus *Tibia* Röding, 1798

Tibia Röding 1798. *Museum Boltenianum*, pt. 2, 123. (Type by subsequent designation, Dall, 1906. *Tibia insulae chorab* Röding=*Strombus fusus* Linnaeus).

Rostellaria Lamarck, 1799. *Mem. Soc. Nat. Hist. Paris*, 1:102 (Type by monotypy *Strombus fusus* Linnaeus).

Rostellum Montfort, 1810. *Conch. Syst. Class. Method. coq.* p. 109.

Rostellaria Schumacher, 1817. *Essai Dun Nouveau Systeme des Habitations des vess Testaces*, XXII planches. p. 67.

Gladius (Klein) H. & A. Adams, 1858. *Gen Recent Moll.*, 1 : 8.

Rostellaria Tryon, 1885-*Man. Conch.*, 7 : 102.

The genus *Tibia* is represented in the recent fauna by 5 species in all, in the Indo-Pacific region. Unlike the other genera which are mostly confined to the shallow waters this genus is found to occur mostly in deeper waters or buries deep in mud. Animal is similar to *Strombus* and it has all the habits of the Strombidae, "progressing by means of its powerful and elastic foot which it places under the shell in a bent position, whens uddenly by muscular effort, it straightens that organ, and rolls and leaps over and over" (Adams).

Shell fusiform with elevated spire, whorls numerous, smooth or slightly ribbed. Aperture produced into a narrow long, straight or slightly curved anterior canal and a shorter posterior canal ascending the spire. Columella smooth and broadly reflected, outerlip not much expanded, slightly thickened on the margin, and digitated. Operculum small, ovate, not serrate.

The genus is known by the following 5 species.

Tibia fusus (Linnaeus)

Tibia powisii (Petit)

Tibia unicornis (Dillwyn)

Tibia delicatula (Nevill)

Tibia martini Murrat (known from the Philippines only)

KEY TO THE INDIAN OCEAN SPECIES OF *TIBIA*

1. Shell generally large, with more than twelve whorls, the first few spiral whorls vertically ribbed, anterior canal long, posterior canal with ridge-like constriction on its columellar side, digitations prominent...2

- Shell generally small or moderately large, generally not more than twelve whorls, all the whorls either smooth or transversely ribbed, anterior canal comparatively short, posterior canal without constriction, digitations not very prominent.....3
- 2. Body whorl more swollen and quite distinct from spire, anterior canal slightly curved, digitations proportionately small, 3-7 on the lower half of the outer lip.....*fuscus* (Linnaeus)
- Body whorl not very much swollen as in the above species and gradually passing to the spire, anterior canal slender and almost straight, digitations, six, spread over the whole of outer lip, posterior, most digitation peculiar in shape, rest very distinct and finger-like.....
.....*unicornis* (Dillwyn)
- 3. Shell fusiform, smooth, body whorl enlarged, outer lip not very much thickened, digitations generally four, rarely five.....*delicatula* (Nevill)
- Shell elongately fusiform, spirally ribbed, outer lip very much thickened and broader, bearing five digitations, the posterior most digitation broader and bluntly pointed.....*powisii* (Petit)

Tibia fuscus (Linnaeus, 1758) (Pl. III B, E)

Murex fuscus Linnaeus, 1758. *Syst. Nat.*, ed. 10 : 752, no. 478.

Strombus fuscus Linnaeus, 1767, *Syst. Nat.*, ed. 12 : 1207, no. 489.

Tibia insulae-chorab Roding, 1798. *Museum Boltenianum*, pt. 2, p. 123, sp. np. 1581. (Refers to Martini & Chemnitz's *Syst. Conch. Cab.*, 4 : 331, Taf. 158, figs. 1495-1497). Mienis 1971, *Argamon*, 2 (3-4) : 87.

Tibia magna Schroter, 1788, *Conch. Cab.*, 10, p. 38.

Rostellum ternatatum Montfort, 1810. *Conchyl. Syst. classification Method. Coq.* Paris, p. 110.

Rostellaria dentata Perry, 1811. *Conchology*.

Rostellaria brevirostrata Schumacher, 1817, *Essai Nouv. Syst. testaces*, p. 223.

Rostellaria curvirostris Lamarck, 1822. *Hist. nat. anim. sans. vert.*, 6 ed 2 : 192. Reeve, 1851 *Conch. Icon.* 6.

Rostellaria, sp. no. 1, pl. 1, fig. 2. Tryon, 1885. *Man. Conch.*, 7 : 127, pl. 10. figs. 14-16, pl. 11, fig. 26. Melvill & Standen, 1898, *J. Conch.*, Leeds, (9) 2 : 46. Winckworth, 1945,

Proc. Malac. Soc. Lond., 26 (4 & 5) : 144. Ray, 1947, *Rec. Indian Mus.*, 16 : 98.

Rostellaria curta Sowerby, 1842, *Thes. Conch.*, 1 (1) : 22, pl. v, figs. 7, 11.

Rostellaria luteostoma Angas 1878. *Proc. Zool. Soc. Lond.*, p. 313, pl. xviii, figs. 8, 9.

Material : (i) 2 exs., off the Sindh Coast (muddy bottom); (ii) 34 exs., Sta. 179 : off mouth of Indus; (iii) 2 exs., Malabar Coast, (Coll. Investigator) (45 fms); (iv) 27 exs. Loc?; (v) 4 exs., Ashtamudi Lake, Quilon (A. S. Rajagopal, 29.1.69); (vi) 3 exs., off Bombay (trawled 10-15 fms,) (F. B. Steiner, 1964); (vii) 3 exs., off Okha, Gujarat (10 fms) (F. B. Steiner, 1964).

Measurements (in mm) :

Length	Width	No. whorls
140	41	14+ (Large; Malabar Coast)
110	40	13+ (Average; off Mouth of Indus)

Description : It is a well known species and found in great abundance. The shell is characterised by its long, slender and stout, light fulvous-brown shell; fusiformly turreted, spire acuminate. Anterior canal short, curved, whorls 16-20, rather flattened, whorls of the upper portion of the spire vertically ribbed, rest smooth with thick epidermis. The aperture wider and longer. Columella arched, provided with callus. Outerlip slightly expanded, without any dentations in younger specimens but the number varies from 3 to 7 in grown-up specimens, present in the lower part of the lip. Columella and interior of the aperture white.

Distribution : Red Sea, Persian Gulf, Gulf of Oman, Aden, Arabian Sea, India, Bombay, Okha, Quilon, Rameswaram (Madras Museum, Madras).

Ecology : It lives deep in mud like *Turritella* (Subrahmanyam *et al.*, 1952). On the Mekran Coast it is dredged at 7 fms in mud. Shells are found among the rocks mostly inhabited by the hermit-crab, *Clibanarius longitarsus* (de Haan).

Remarks : Tryon (1879-1888) considered two varieties, namely *curta* Sowerby, *luteostoma* Angas, under this species, Melvill and Standen (1901) have also followed the same, but Reeve (1851) and Subrahmanyam *et al.* (1952) treated *T. curta* Sowerby as a distinct species. The only difference between *T. curta* and *T. curvirostris* is in the structure of the anterior canal; in the former it is straight and in the later curved. Except for this the shells agree with each other so closely that it is very difficult to distinguish them. In view of the absence of any other major difference both are treated as same. Dodge (1956) also considered *curta* Sowerby as identical with *curvirostris* Lamarck.

The collection studied shows variation in the number of denticles on the outer lip. Normal examples are seen possessing seven denticles (Melvill and Standen, 1905).

Types : Types in the Linnaean Society, London. Dodge (1956) had clearly stated that the specimen marked for *fuscus* Linnaeus in the Linnaean Society of London is *curvirostris* Lamarck. The specimen labelled *Murex fuscus* in the Uppsala collection is also *curvirostris* Lamarck. It is evident that hitherto the name *fuscus* Linnaeus is erroneously applied to *unicornis* Dillwyn.

Linnaeus (1758) cited the locality as "America," which was definitely an error. We now restrict the type locality to "Red Sea".

***Tibia unicornis* Dillwyn, 1817 (Pl. III A)**

Strombus unicornis Dillwyn, 1817. *Descriptive Cat. Recent shells*, 2: 654 (Type locality: Not specified).

Rostellaria rectirostris Lamarck, 1822. *Hist. nat. anim. sans. vert.*, 7: 192.

Rostellaria rectirostrum Lamarck, Sowerby, 1842. *Thes. Conch.*, 1 (1): 22, pl. v, figs. 8, 10.

Rostellaria fuscus Deshayes, *Hist. nat. anim. sans. Vert.*, 8 (2); Reeve, 1851, *Conch. Icon.*, 6.

Rostellaria, sp. no. 5, pl. ii, fig. 5a, 5b and 7. *Rostellaria fuscus* Linnaeus, Tryon: 1885, *Man. Conch.*, 7: 127, pl. 10, fig. 17, pl. 11, fig. 21.

Material : Z. S. I. Reg. No. M 2672, 1 ex., Bombay; (ii) 1 ex., Nancowry Harbour, Nicobars, Coll. G. H. Tipper.

Measurements (in mm) :

	Length	Width
	160.00 mm	30.2 mm (Bombay)
	143.00 mm	30.2 mm (Nicobar)
Length of the canal	42.00 mm (tip of the canal broken; Bombay)	
	35.00 mm (tip of the canal broken; Nicobar)	

Description : Shell more slender than the preceding species, fusiform in shape, spire very much acuminate, the spire and canal longer, first eight whorls are convex bearing fine longitudinal ribs which are very closely set, the ribs are traversed by faint transverse striae thus giving an indication of beaded appearance; the rest of the whorls (7 in Bombay specimen and 6 in Nicobar specimen) smooth, upper part of each whorl concavely slanting, then rounded, the body whorl with transverse striae or ridge-like lines on its lower part.

Aperture rather small, columella arched, callus, posterior canal short and curved, with a ridge-like development on the columellar side, anterior canal slender, very long (broken in both the specimens), the outer lip between the digitations is dark purple brown, with 6 teeth-like projections, the last or the posterior-most one is peculiar in structure, it is very much thickened, lies along the outer border of the posterior canal, and does not project as much as the other teeth, the one below it is grooved at the base bearing a tooth-like swelling on its upper side, the columella is plicated on its upper part, fulvous orange.

Distribution : China Seas ; India : Nancowry, Bombay. Pakistan : Karachi (Reeve), Persian Gulf, Red sea.

Remarks : It is a rare species and Reeve (1851) mentions that it has always been esteemed a choice species by the collector. The living animal is not known and hence its ecology is also not known.

Burghardt (1970) described the shell morphology of this species.

Nomenclature : Dodge (1956) has discussed at length the nomenclatural problems connected with *Strombus fusus* Linnaeus.

Type locality : Dillwyn (1817) quoted two localities — "East Indies" (Chemnitz) and coasts of Sumatra (Humphreys). The latter is preferred as the original locality.

Tibia powisii (Petit, 1842) (Pl III F)

Rostellaria powisii Petit, 1842. *Mag. de Zool.*, pl. 53.

Rostellaria powisii Petit M. S. Sowerby 1842. *Thes. Conchyl.*, 1 (1) : 22, pl. v. figs. 5, 6. Kiener, 1843, *Cog. Viv.*, 3. *Rostellaria*, p. 6, pl. 2, fig. 2 Kuster, 1846 In: *Martini-Chemnitz. Syst. Conch. Cab.*, (2) 4. *Strombea*, p. 97. pl. 25, fig. 2, 3. Reeve, 1851, *Conch. Icon.*, 6. *Rostellaria* sp. No. 4, pl. 11. fig. 4a, 4b. Tryon, 1885, *Man. Conch.*, 7 : 127, pl. 11 fig. 22. E. A. Smith, 1904. *Ann. Mag. Nat. Hist.*, 7 (13) : 469 : (7) 18:71 (1906). Schepman, 1909. *Siboga Exped.*, 49 B, Prosobranchia, pt. II, p. 154, pl. XVI, fig. 2. (Teeth of radula).

Material : (i) 2 exs., Z.S.I. Reg. No. M 543/1, Sta. 226 : Gulf of Martaban (67 fms); (ii) 3 exs. Z.S.I. Reg. No. M 762-763, Sta. 237, off Andaman Islands

(90 fms); (iii) 2 exs. Z.S.I. Reg.No. M. 808, 809, Port Blair (100 fms); (iv) 2 exs. Z.S.I. Reg. No. M. 822, 823, off Port Blair (100 fms); (v) 7 exs. Z.S.I. Reg. No. M. 3270/1, Sta. 328 : Andaman Sea, (61 fms); (vi) 3 exs., Z. S. I. Reg. No. M. 3276/1. Sta. 328, Andaman Sea (61 fms)-Coll. All 'Investigator'.

Measurements (in mm):

Length	Width	No. whorls
59	16.7	12+ (Large; Andaman Sea)
50	15	12+ (Average; Andaman Sea)

Description: Shell elongately fusiform, solid, smaller in size than in the other species, spire acuminate. Number of whorls 12 to 13, whorls flatly rounded, the first four of five whorls smooth without any spiral ridges, the rest loosely, spirally ridged, the interstices or grooves densely cancellated with striae, the general colour straw-tinted brown, third liration on the body whorl is broader and more prominent, the seventh liration or ridge is same as the other ones, unlike in the specimens studied by Schepman (1909).

Columella with callous deposit, the posterior canal is very short and curved, the tip is dark brown, anterior canal rather short (broken in all the examples), slender; outer lip thickened, bears five tooth-like projections, the posterior one is broader and blunt at the tip, the distance between it and the next one on its anterior side is more than that is between the other projections, the four anterior projections are arranged equidistantly, projections prickly. The colouration cannot be made out as the collection is very old.

Schepman (1909) described a variety called *abyssicola* from Molucca Passage.

Distribution: China, East Savu Sea, north coast of Sumbawa. Its occurrence in Indian Ocean is of some interest.

Ecology: This is a deep water form occurring at a depth of 61 fms to 100 fms. The soft parts are not known. Tryon (1889) mentions it as a "rare shell".

***Tibia delicatula* (Nevill, 1881) (Pl. III C, D)**

Rostellaria delicatula Nevill, 1881. *J. asiat. Soc. Beng.*, 50 (2): 262. (Type-locality: off Cheduba, Arakan, Burma). Wood-Mason and Alcock, 1891. *Ann. Mag. nat. Hist.*, 7 (6): 16-17, fig. 3. Melvill and Standen, 1901, *Proc. Zool. Soc. Lond.*, 2: 381. Melvill and Standen, 1905. *J. Conch. Leeds.*, 11: 161-163. pl. 11.

Material: (i) 5 exs., Z. S. I. Reg. No. M 4416-4417/1, 4419-4421/1 Balasore Bay, Coll. Bengal Fisheries; (ii) 9 exs., Z. S. I., Reg. No. M 4480, Bay of Bengal, 65 fms, (iii) 9 exs., Z. S. I., Reg. No. M 618/1, Reef Island, Kynk Phyon, (iv) 4 exs. (2 broken) Z. S. I. Reg. No. M. 5160, M. 5163-5168; (v) 16 exs. Z.S.I. Reg. No. 6149/9, Sta. 76: Bay of Bengal; (vi) 2 exs. Z. S. I. Reg. No. 6150/9, Sta. 76: Bay of Bengal; (vii) 18 exs. Z.S.I. Reg. No. 6153/9, Sta. 32 : Bay of Bengal, (viii) 11 exs. Z.S.I. Reg.No. 8950/9, Sta. 166 : 133 fms, Coll: *Investigator*.

Measurements (in mm) : The specimens are of uniform size.

Length	Width	No. whorls
67.0	28.4	10+ (Bay of Bengal)

Description : The shell is comparatively thinner, more delicate and translucent than in other species, pale ochreous brown. Number of whorls 10-10, moderately convex, spire moderately acute; the first three or four whorls are without any sculpture, the following three or four with inconspicuous but regular spiral striations. As the shells are very old the number of striation could not be made out. In the shells at hand the last four whorls are indistinctly striated. The body whorl is with four narrow white bands, each one terminating on one of the four digitate processes on the outer lip. A single white band is present in the middle of the other whorls. Aperture oval, and not very large, anteriorly it is drawn out into a canal which is broken in almost all the specimens; posteriorly a small groove is present. Columellar callus thickened and smooth. Outer lip thickened and with four, equidistant, teeth-like, small digitate processes.

Distribution : It is common in deep water throughout the north Indian Ocean.

Ecology : It is a characteristic inhabitant of the infra-littoral region of the Bay of Bengal at and near the 100 fathom contour from Arakan to Krishna Delta. In the Red Sea and in Arabian Sea it is collected from depths ranging between 175 fms and 400 fms. It is generally found at an even temperature of about 62°F (Melvill and Standen, 1901). The eyes are very large. The animal is very agile and active and survived for days in a bucket of sea-water on ship board (Wood-Mason and Alcock, 1891).

Remarks : Woodmason and Alcock (1891) were of the opinion that "the type appears to have been described from an abnormally thin and varicose shell". The thickness of the shell varies inversely as the depth. A specimen, probably studied by Nevill, present in the Z. S. I. is examined and it seems to be not a young one; the digital processes are fully developed as in the other specimens. The shell is variable as regards the number of denticles on the outerlip. Melvill and Standen (1901) has recognised three forms.

- 1) lip with three processes (tridenticulata)
- 2) ,, four ,, (quaturoidenticulata)
- 3) ,, five ,, (quinquedenticulata)

Nevill described the common quaturoidenticulata form. The present collection shows a wonderful uniformity and all the specimens are with four digitate processes on the outer lip.

Genus *Terebellum* Röding, 1798

Terebellum Röding, 1798. *Museum Boltenianum*, Hamburg, pt. 2 : 135.

Terebellum Jung and Abbott, 1967. *Indo-pacific Mollusca*, 1 (7) : 449.

Jung and Abbott (1967) have dealt with the habits, anatomy and taxonomy of this genus. The genus is characterised by its elongate, narrow, strong shell, without a stromboid notch and axial sculpture.

The genus is represented by a single living species *Terebellum terebellum* (Linnaeus).

Terebellum terebellum (Linnaeus, 1758)

Conus terebellum Linnaeus, 1758. *Syst. Nat. ed. 10* : 718, no. 284.

Terebellum (Terebellum) terebellum Jung and Abbott, 1967, *Indo-pacific Mollusca*, 1 (7) : 449.

Material : India - Andamans; Sri Lanka; Burma - Mergui Archipelago (Coll. J. Anderson).

Description : The shell is smooth, cylindrical and without a stromboid notch. Aperture narrow, pointed above, regularly widening toward base. Outer lip slightly thickened. Inner lip with a callus which continues as a spiral band above the suture.

Distribution : East Africa to Samoa, Japan to Australia.

Remarks : It has a wide distribution in the Indo-Pacific region. Andamans and Mergui Archipelago are two new locality records for it. Fossil forms are known from Miocene deposits of Quilon, Kerala (Dey, 1962).

Genus *Rimella* L. Agassiz, 1840

Rimella Agassiz, 1841 in Sowerby, *Min. Conch.* (Germ. Ed.), p. 137. (Type species *Strombus cancellatus* Lamarck).

Fischer (1887) and Tryon (1885) considered *Rimella* as a subgenus of *Rostellaria* while Schepman (1909) treated *Rimella* as a genus because the operculum is serrate as in *Strombus* but not smooth margin as in *Rostellaria*.

It is known by the following species. *Rimella cancellata* Lamarck), *R. tyleri* H. & A. Adams, *R. crispata* Sowerby known from the Philippines only, *R. speciosa* H. & A. Adams, from an unknown locality.

KEY TO THE INDIAN OCEAN SPECIES

Vertical ribs very close, outer lip plicated *cancellata* (Lamarck)
Vertical ribs not very close, outer lip smooth with a single sharp tooth.....
..... *tyleri* H. & A.A. Adams

Rimella cancellata (Lamarck) (Pl. III G)

Strombus cancellatus Lamarck, *Hist. nat. Anim. Sans. Vert. Ed.* II, 9 : 710.

Rostellaria cancellata, Kiener, 1843. *Cog. iv.*, 3 : 9, pl. 3, fig 3. Reeve, 1851. *Conch. Icon*; 6, *Rostellaria*, sp. no. 10, pl. III, fig. 10, Tryon, 1879, *Man. Conch.*; 7 : 129, pl. 10 figs, 18, 20.

Rimella cancellata Schepman, 1909. *Siboga Exped.*, 49 B, Prosobranchia, pl. 2, Taenio glossa and Ptenoglossa, p. 155.

Material : 23 exs., Andamans ; Sri Lanka

Measurements (in mm) :

Length	Width	No. whorls
28	11.4	11 (Average ; Andamans)
20	7.5	10 (Small ; Andamans)

Description : Shell fusiform, somewhat thick, spire acuminate, whorls $10\frac{1}{2}$, somewhat rounded, first two whorls smooth, the rest bivaricose, vertically closely ribbed, interstices neatly cancellated with numerous transverse small ridges, columella callous, slightly recurved, and smooth; outer lip thickened, and ridge-like, corrugately plicate within and out side, posterior canal narrow

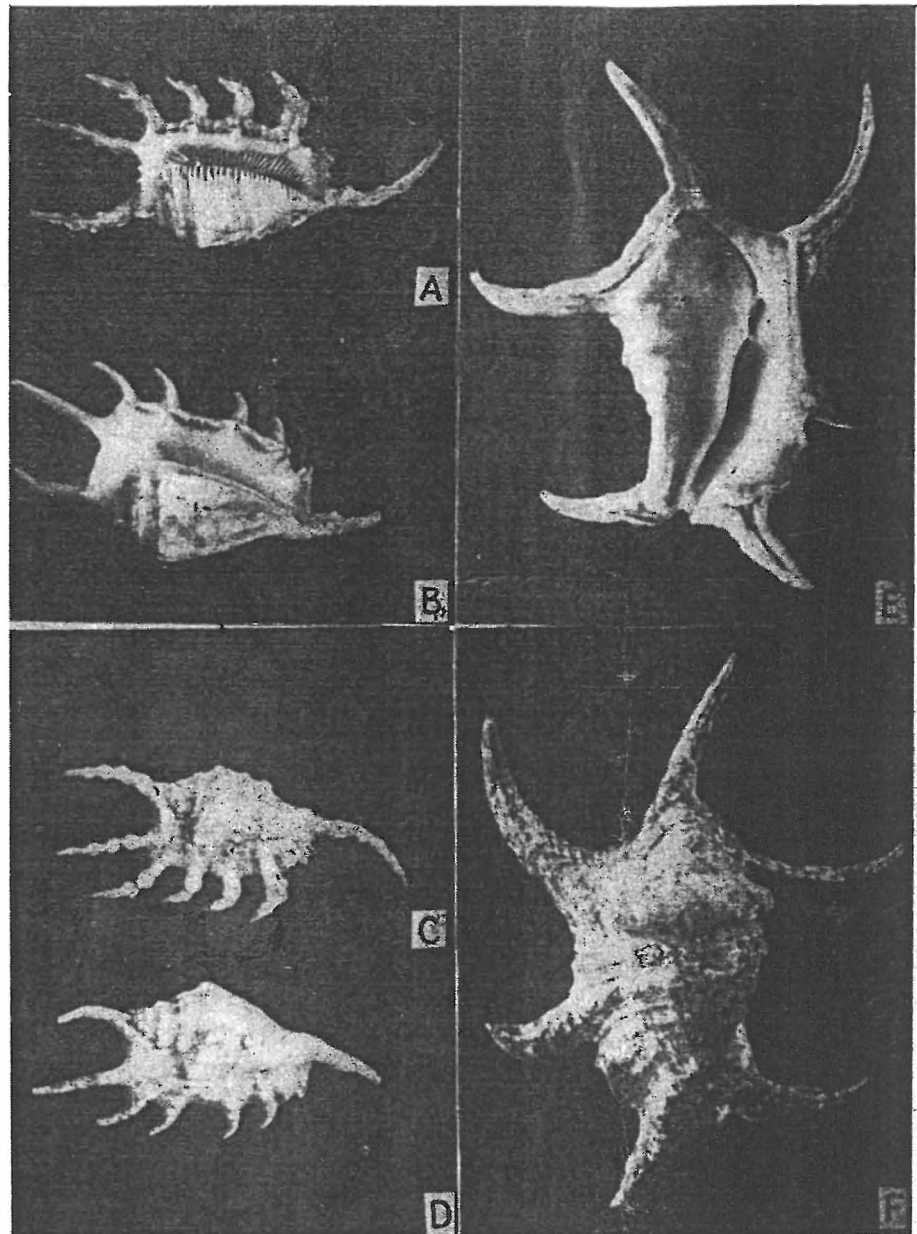


PLATE I A, B: *Lambis (Lambis) lambis* Linnaeus, Andamans; C, D. *Lambis (Millepes) scorpius indomaris* Abbott Andamans and E, F. *Lambis (Millepes) chiragra chiragra* (Linnaeus), Andamans.

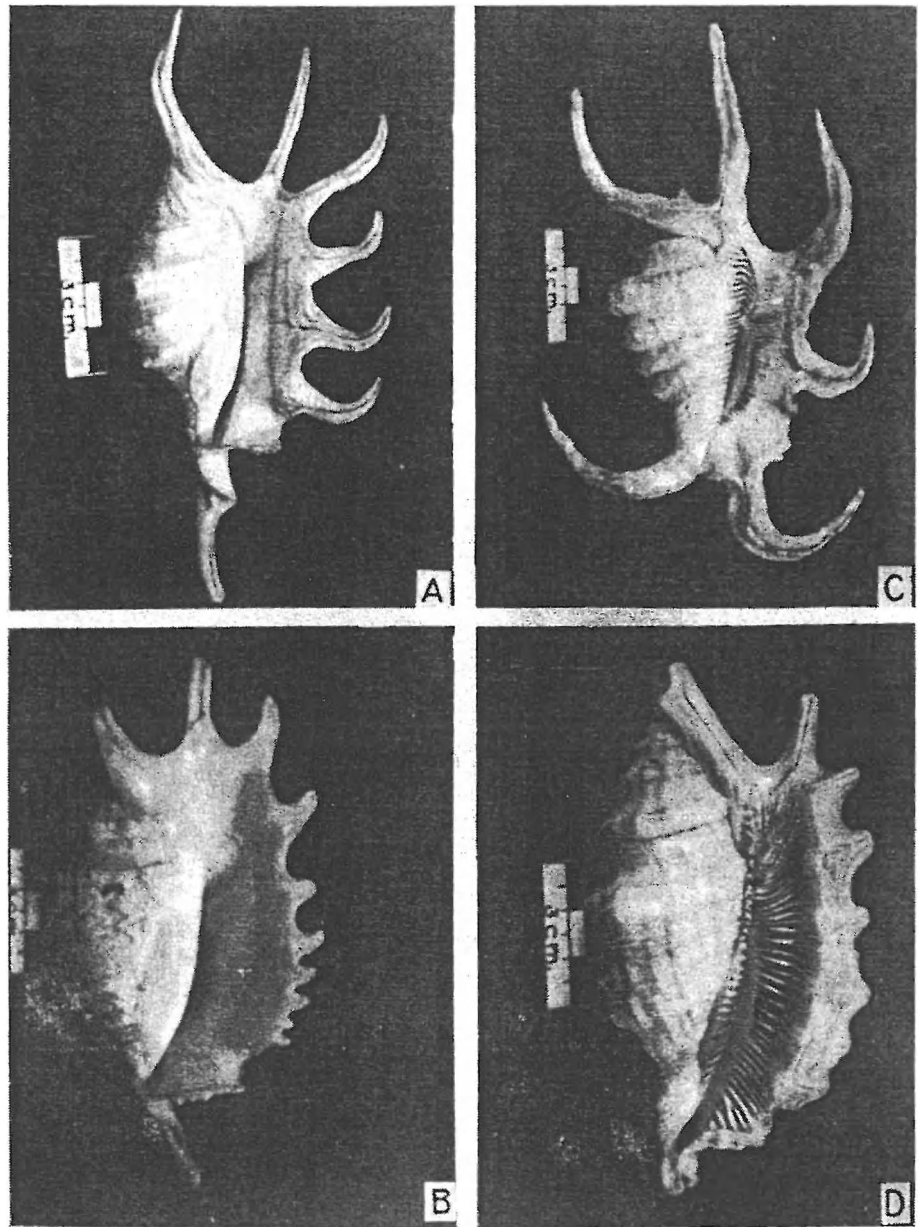


PLATE II A. *Lambis (Lambis) crocata* Link, Indian Seas; B. *Lambis (Harpago) chiragra arthritica* Roding, Mauritius; C. *Lambis (Millepes) violacea* (Swainson), Mauritius and D. *Lambis (Millepes) digitata* (Perry), unknown locality.

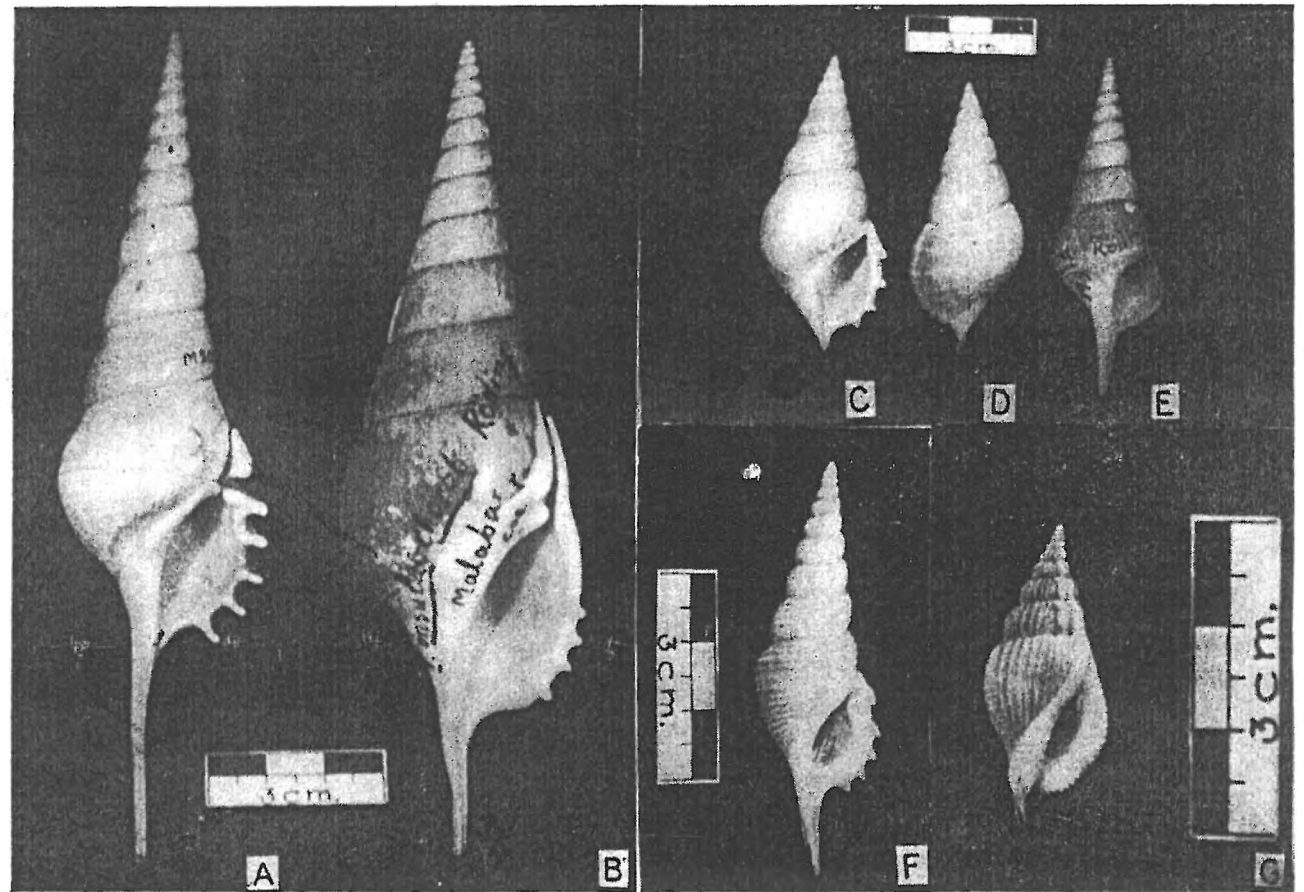


PLATE III A. *Tibia unicornis* (Dillwyn), Nancowry Harbour; B. *Tibia fusus* (Linnaeus), Malabar Coast; C. *Tibia delicatula* (Nevill) - ventral view, Bay of Bengal; D. *Tibia delicatula* (Nevill) - Dorsal view, Bay of Bengal; E. *Tibia fusus* (Linnaeus) - juvenile form, off mouth of Indus; F. *Tibia powisii* (Petit), Andaman Sea and G. *Rinella cancellata* Lamarck, Andamans.

and extends up to the 4th whorl. It is slightly recurved at the lip. Anterior canal short pale yellowish brown, with indistinct pale chest-nut bands.

Distribution : From Sri Lanka to Amboina; the Philippines.

Rimella tyleri H. & A. Adams, 1863 (Fig. 1)

Rimella tyleri H. & A. Adams, 1863. *Proc. Zool. Soc. Lond.* p. 428. Type-locality : China Seas. Tryon, 1879. *Man. Conch.*, 7 : 119. Schepman, 1909. *Siboga Exped.*, 49 : 156, pl. XV, fig. 5, pl. XVI, fig. 1.

Material : 2 exs.; Andamans.

Measurements (in mm) :

Length	Width	No. whorls
16.1	6.6	9

Description : Shell less fusiform than in *Rimella cancellata*, spire acuminate, whorls $8\frac{1}{2}$ rounded, nuclear whorls smooth, vertically less closely ribbed than in *cancellata*, interstices neatly cancellated with numerous transverse

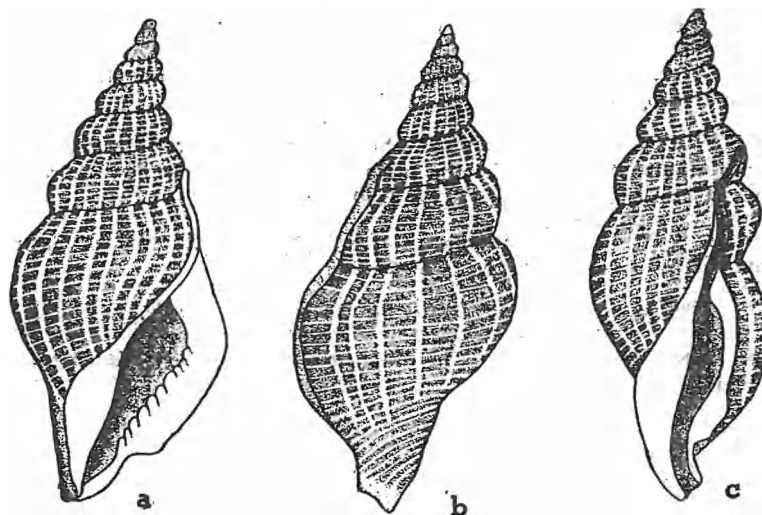


Fig. 1. *Rimella tyleri* : a. ventral view, b. dorsal view and c. lateral view.

small ridges, columella with callous deposit, smooth; outer lip thickened and smooth, with a conspicuous sharp tooth near the anterior end, posterior canal very narrow, and curved extending on to the second whorl. Anterior canal short and somewhat straight. Shell pale yellowish brown with four distinct transverse reddish brown bands on the body whorl.

Distribution : China Sea; Java, west coast of Flores, Makassar and surroundings. The present one is a first record from the Indian Ocean.

Remarks : Schepman (1909) had figured the shell and gave a detailed description of radula.

REFERENCES

- ABBOTT, R. T. 1961. The genus *Lambis* in the Indo-Pacific. *Indo-Pacific Mollusca*, 1(3): 147-174.
- *BURGHARDT, G. E. 1970. *Tibia* : an aristocratic shell. *Off sea and shore*, 1 : 165-167.
- DEY, A. K. 1962. The Miocene Mollusca from Quilon, Kerala (India). *Palaeont. Indica*, N. S. 36 : 1-129.
- DILLWYN, L. W. 1817. *A descriptive catalogue of recent shells*, 11 : 581-1092.
- DODGE, H. 1956. A historical review of the molluscs of Linnaeus, pt. 3. *Bull. Amer. Mus. Nat. Hist.*, 107 : 1-157.
- JUNG, P. AND R. T. ABBOTT 1967. The genus *Terebellum* (Gastropoda Strombidae). *Indo-Pacific Mollusca*, 1 (7) : 445-454.
- MELVILL, J. C. AND R. STANDEN 1901. The mollusca of the Persian Gulf, Gulf of Oman and Arabian Sea as evidenced mainly through the collections of Mr. F. W. Townsend 1893-1900; with descriptions of new species. *Proc. Zool. Soc. Lond.*, 2 : 327-460.
- _____ AND _____ 1905. *Rostellaria delicatula* Nevill - Notes upon its distribution and limits of variation. *J. Conch. London*, 11 (6) : 161-163.
- SCHEPMAN, M. M. 1909. The Prosobranchia of the Siboga Expedition pt. II. Taenioglossa and Ptenoglossa. *Siboga Exped.*, 49 b : 110-231.
- SUBBA RAO, N. V. 1971. On the collection of Strombidae (Mollusca : Gastropoda) from Bay of Bengal, Arabian Sea and Western Indian Ocean, with some new records, 1. Genus *Strombus*. *J. mar. biol. Ass. India*, 12 (1 & 2) : 109-124.
- SUBRAHMANYAM, T. V., K. R. KARANDIKAR AND N. N. MURTI 1952. Marine Gastropoda of Bombay. Part II. *J. Univ. Bombay, N. S.*, 21 B (3) : 26-73.
- TRYON, G. W. 1886. Monograph of the family *Strombidae*. *Man. Conch.*, 7 : 99-152.
- WOODMASON, J. AND A. ALCOCK 1891. On *Rostellaria delicatula*. *Ann. Mag. nat. Hist. Lond.*, (6) 7 : 16-17.

*Not seen in original.