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# **Records of the Zoological Survey of India**

**Contribution to the Knowledge  
of Indian Marine Molluscs—Pt. 3  
Family : Muricidae**

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**Zoological Survey of India**



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CONTENTS

Introduction	...	...	...	1
Diagnostic features and general account of the family	...	...	...	2
Reproduction and development	...	...	...	3
Characters of Taxonomic importance	...	...	...	4
List of Muricid species reported from Indian seas	...	...	...	5
Systematic Account	...	...	...	10
Key to the subfamilies	...	...	...	10
Subfamily Muricinae	...	...	...	11
Subfamily Muricopsinae	...	...	...	54
Subfamily Trophoninae	...	...	...	62
Subfamily Drupinae	...	...	...	66
Subfamily Rapaninae	...	...	...	78
Subfamily Thaidinae	...	...	...	81
Summary	...	...	...	120
Acknowledgements	...	...	...	120
References	...	...	...	121
Index	...	...	...	129

## INTRODUCTION

In an attempt to up-date the knowledge on marine molluscs of India we have taken up the study of various individual families. This is the third in the series of our contributions, and in the earlier two we have dealt with the families Mitridae (Subba Rao and Dey, 1984) and Donacidae (Subba Rao and Dey, 1986). The family Muricidae, a large and important family of gastropods, which includes predatory forms, is treated in the present communication.

Muricidae of India were reported in several earlier publications while dealing with the general molluscan fauna of Indian coasts (Annandale and Kemp, 1916 ; Cheriyan, 1968 ; Crichton, 1941 ; Gravely, 1927, 1942 ; Hornell, 1921, 1941 ; Melvill, 1893, 1898, 1928 ; Melvil, and Standen, 1898, 1899, 1901, 1903 ; Melvill and Sykes, 1897, 1898 ; Menon *et. al.*, 1961 ; Nevill, 1875 ; Preston, 1904, 1909, 1910, 1914, 1916 ; Ray, 1948, 1977 ; Satyamurti, 1952 ; Smith, 1878, 1894, 1899, 1903, 1904, 1906 ; Subrahmanyam *et. al.*, 1952 ; Subba Rao and Mookherjee, 1975 ; Atapattu, 1972 ; Surya Rao and Subba Rao, 1991). Each of these publications deal with only a few species and none have tried to give a picture of Muricidae family as a whole. Valuable contributions to a general understanding of the family Muricidae were made by Cernohorsky, (1971, 1974, 1976, 1978, 1980) ; Radwin and D'Attilio (1971, 1976) ; D'Attilio (1983a, b) ; Bertsch and D'Attilio (1980) Vokes and D'Attilio (1982) and Ponder and Vokes (1988). There is another recent publication (Fair, 1976), which the authors however could not examine.

There have been many ecological studies pertaining to individual species of Muricids (Connell, 1961, 1970 ; Paine, 1966 ; Lutkens, 1970 ; Menge, 1974). Feeding habits, abundance and habits of many common littoral and sublittoral muricid species of Indian Ocean were studied by Taylor (1976, 1980). Breeding habits of some common Indian species were observed by Annandale and Kemp (1916), Hornell (1921), Chari (1950) and Natarajan (1957). The absence of any comprehensive report dealing with identification, ecology, anatomy etc. of muricids of India prompted us to take up the present work.

Most of the species included in the present report are relatively common in the Indo-Pacific area and a few are fairly well-known taxonomically. The genus *Drupa* has been well revised by Emerson and Cernohorsky (1973). The Muricidae of the world by Radwin and D'Attilio (1976) has clarified several taxonomic problems in the subfamily Muricinae. There has been considerable confusion with regard to several species within the genus *Thais*

and others in the subfamily Thaidinae. Some authors are inclined to consider Thaididae as a separate family (Ray, 1949 ; Radwin and D'Attilio, 1976) while others treat it as a subfamily Thaidinae (Cernohorsky, 1972 ; Emerson and Cernohorsky, 1973) under the family Muricidae. The latter has been followed in the present work.

### DIAGNOSTIC FEATURES AND GENERAL ACCOUNT OF THE FAMILY

Radwin and D'Attilio (1976) gave an account of the anatomical characteristics of the family Muricidae. But the information was drawn mostly from the studies on the oyster drill, *Urosalpinx*.

According to these authors the following are some of the important characters of the family :

1. A well developed bipectinate chemo-sensory osphradium.
2. A moderately long extensible proboscis.
3. A long, stenoglossate radula with the formula of 1-1-1, a rachidian tooth and two lateral teeth.
4. A special accessory boring organ located on the mid anterior ventral surface of the foot.
5. A pair of salivary glands, with a pair of smaller accessory salivary glands lying dorsal to the pharyngeal bulb.
6. The oesophagus with a posterior valve of Leiblein, consisting of two flaps projecting backward into the lumen of the pharynx, their free surfaces fringed with long cilia.
7. A true anal gland, in the form of a caecal out-growth of the rectum in the anal region.
8. The mantle cavity contains a hypobranchial gland which produces mucoid or slimy substance that cements extraneous particles together as they leave mantle cavity. It forms into a sort of viscous conveyer belt which is kept in motion by beating cilia. The gland also emits a clear fluid that becomes the Tyrian purple dye of antiquity, a characteristic, unique to the Muricea.
9. A ventral pedal gland or capsular gland in the female which helps in preparing capsules of eggs.

Muricids are important and abundant members of intertidal rocky shore communities and reef ecosystem. Some of the muricids occupy a primary position while the majority have terminal carnivore position in the intertidal food chain. They mainly feed upon molluscs and barnacles by shell drilling and wedging techniques (Connell, 1970). However, there is very little information concerning sublittoral muricids and in particularly those belonging to the genus *Murex*. Sublittoral molluscs feed upon a variety of prey and carrion, like molluscs, polychaetes, crustaceans, small fish etc. (Taylor, 1980). The elaborate development of spines on the siphonal canal and aperture of some of the *Murex*

species form a cage-like structure which is supposed to be useful in prey trapping (Paul, 1981). The morphological features of the shell of intertidal muricids are believed to have some adaptive significance. Some of these features like the presence of operculum, structure of foot are concerned with resistance to desiccation and holding capacity in wave-exposed intertidal regions (Gibson, 1970 ; Miller, 1974). Strong sculpture on shell, elongate aperture with teeth and folds and a thick inflexible operculum are supposed to be anti-predaceous devices (Vermeij, 1974).

Muricidae has a world-wide distribution occurring in tropical and subtropical waters. Although all the species are purely marine, at least one species of Thaidinae has extended into estuaries. Majority of the species occur in littoral and sublittoral zones, a few extending to depths of 1900 m. Muricids are common in the littoral zone of the Andaman and Nicobar Islands.

Muricid gastropods show a strong latitudinal gradient in species diversity towards the equator (Taylor and Taylor, 1977). There is a high tropical diversity in the family ; 33 species are found in the intertidal zone around Aldabra Atoll (Taylor, 1976). In the present study we have recorded sixty species from the intertidal zone of the Andaman and Nicobar Islands.

## REPRODUCTION AND DEVELOPMENT

Sexes are separate. The penis is situated just behind the right tentacle. It is wide, blunt and dorsoventrally flattened and has a flagellum at the tip. The length of a female shell is greater than that of a male in *Urosalpinx* and *Eupleura* (Griffith and Castagna, 1962). Difference in radular structure of male and female was noticed in *Nassa sertum* and *Nassa francolina* (Maes, 1966). Specific differences have been noticed in the structure of penis and pallial vas deferens (Ponder and Vokes, 1988). The male reproductive system and the structure of albumen and capsular glands were studied in *Thais bufo* (= *Mancinella bufo*) (Rajalakshmi Bhanu et. al., 1982, 1983). In male the testes is situated in the visceral mass near the midgut region. The vas deferens is a straight tube leading from the gonad and opening into the prostate gland. It runs as a closed tube through the mantle floor parallel to the rectum. The gonoduct is connected to the penis by a narrow and centrally located penial tube.

Development is usually direct and a few species have pelagic veliger larvae. The egg masses and breeding habits of only a few species of muricids were studied. For a general review of egg masses of *Murex* s. str. and *Haustellum* one may refer to Ponder and Vokes (1988).

Egg masses of five species have been described from the Indian coasts. The species were *Thais carinifera* (= *Thais lacera*) (Annandale and Kemp, 1916), *Thais bufo* (= *Mancinella bufo*) (Chari, 1950 and Hornell, 1921), *Thais tissoti*, *Murex virgineus ponderosa* (= *Murex virgineus*) and *Murex trapa* (= *Murex carboniere*) (Natarajan, 1957).

The eggs are laid in the capsules which form a cluster and are attached to shells or sea weeds. The number of capsules in a cluster may vary from 25 to 80. Each capsule consists of eggs ranging from a few (19 to 32 in *Thais tissoti*) to many, 440 to 730 as in *Murex virgineus ponderosa*. In the species of *Murex* some of the eggs develop into embryos while a few serve the purpose of nurse eggs. In species where there are nurse eggs the number of eggs are more than those without nurse eggs. Thus in species of *Thais* the number of eggs per capsule are only a few ; 19 to 32 in *Thais tissoti* (Natarajan, 1957).

The capsules are yellow or pale brown, either vase-shaped or cylindrical. In *Murex* the narrow basal portion of the capsule stands on a basal plate which is confluent with other such plates forming a broad sheet at the bottom of capsules. At the tip of the distal end there is a circular or elliptical exit hole, covered by a thin transparent membrane. In *Thais tissoti* there is no exit hole, but the entire top forms the exit passage for the emerging larvae (Natarajan, 1957).

Embryos emerge out of the capsule as free swimming veligers, which have a short pelagic period. In *M. virgineus ponderosa* the breeding took place all the year round. Larvae may be plankto-trophic with long duration of planktonic life or lecithotrophic with only a short duration of pelagic life (Ponder and Vokes, 1988). Certain species of *Haustellum* and *Murex* have direct development. From the structure of the protoconch it is possible to infer whether the species has plankto-trophic lecithotrophic or direct development (Ponder and Vokes, 1988). The species with the last mentioned type of development have restricted geographical distribution.

#### CHARACTERS OF TAXONOMIC IMPORTANCE

The identifications were mainly based on shell characters. In recent years protoconch has been widely used in separating gastropod species (Ponder and Vokes, 1988). But we have used that character only in distinguishing a few species. We have depended mainly on teleoconch characters, such as the general shape, sculpture, aperture and denticulation on the inner and outer lips. Varices have been useful in separating species under the sub-family Muricinae. Siphonal canal is used in differentiating genera. The characters of operculum mainly the position of nucleus and its general sculpture were useful in distinguishing genera. We could not rely too much on radula as most of our collections include only shells. For the same reason we have not attempted to find out the anatomical details.



## LIST OF MURICID SPECIES REPORTED FROM INDIAN SEAS

(\* Indicates species included on the basis of literature record only).

The list includes all the species reported in this paper and also those reported by the previous workers. Every attempt has been made to check on the validity of literature records and also to ascertain its current scientific name. As we could not examine the collections of the species reported by previous authors, the actual identity of a few species could not be established. However, all the literature records are also included in the list citing the locality, followed by a number within the brackets which refers to the source as given under references.

Family : MURICIDAE

Subfamily : MURICINAE

Genus 1. *Attiliosa* Emerson, 1968

1. *Attiliosa nodulifera* (Sowerby, 1841)
- \*2. *A. orri* (Cernohorsky, 1976) Andamans (14).

Genus 2. *Chicoreus* Montfort, 1810

3. *Chicoreus axicornis* (Lamarck, 1822)
4. *C. banksii* (Sowerby, 1840)
5. *C. brunneus* (Link, 1807)
6. *C. cnissodus* (Euthyme, 1889)
7. *C. crocatus* (Reeve, 1845)
8. *C. denudatus* (Perry, 1811)
9. *C. kilburni* Houart and Pain, 1982
10. *C. microphyllus* (Lamarck, 1816)
11. *C. palmarosae* (Lamarck, 1822)
12. *C. ramosus* (Linnaeus, 1758)

Genus 3. *Haustellum* Schumacher, 1817

13. *Haustellum haustellum* (Linnaeus, 1758)
- \*14. *H. dolichourus* Ponder and Vokes, 1988 Andamans & Gujarat (20).

Genus 4. *Hexaplex* Perry, 1811

- \*15. *Hexaplex cichoreum* (Gmelin, 1791) Coromandel coast (1) ; Bombay (2).

Genus 5. *Homalocantha* Moerch, 1852

16. *Homalocantha scorpio* (Linnaeus, 1758)  
 17. *H. secunda* (Lamarck, 1822)

Genus 6. *Murex* Linnaeus 1758

- \*18. *Murex aduncospinosus* Sowerby, 1841      Andamans (20).  
 \*19. *Murex badius* Reeve, 1845      Krusadai (3). Identity needs confirmation. As per Radwin and D'Attilio (1976) it is a synonym of *Ocinebra aciculata* (Lamarck).  
 20. *M. brevispina brevispina* Lamarck, 1822  
 21. *M. carbonneri* (Jousseume, 1861)  
 22. *M. malabaricus* Smith, 1894  
 \*23. *M. mindanaoensis* Sowerby, 1840      Malabar coast (5). Identity needs confirmation.  
 24. *M. occa* Sowerby, 1840  
 25. *M. pecten* Lightfoot, 1786  
 \*26. *M. rectirostris* Sowerby, 1840 var.      Burma (6). Identity needs confirmation.  
 27. *M. scolopax* Dillwyn, 1817  
 28. *M. tenuirostrum tenuirostrum* Lamarck, 1822  
 29. *M. ternispina* Lamark, 1822  
 30. *M. trapa* Roeding, 1798  
 31. *M. tribulus* Linnaeus, 1758  
 32. *M. troscheli* Lischke, 1868  
 \*33. *M. (Ocinebra) submissus* Smith, 1906      Maldives (7). Identity needs confirmation.  
 \*34. *M. (Phyllonotus) rusticus* Reeve, 1845      Andamans (8 & 9). Uncertain identity as per Radwin and D' Attilio (1976).  
 \*35. *M. (Phyllonotus) turbinatus* Lamarck, 1822      Karachi (9). Identity needs confirmation. As per Radwin and D'Attilio (1976) it is a synonym of *Phyllonotus trunculus* Linnaeus, 1758.

Genus 7. *Muricanthus* Swainson, 1833

36. *Muricanthus kuesterianus* (Tapparone-Canefri, 1875)  
 37. *M. virgineus* (Roeding, 1798)

Genus 8. *Naquetia* Jousseaume, 1880

38. *Naquetia annandalei* (Preston, 1910)  
 39. *N. capucina* (Roeding, 1798)  
 40. *N. triqueter* (Born, 1778)

Genus 9. *Pterynotus* Swainson, 1833

- \*41. *Pterynotus albobrunneus* Bertsch and D'Attilio, 1980 Off Kiltan Island, Lakshadweep (10).  
 \*42. *P. barclayanus* (H. Adams, 1873) Andamans (11 & 12).  
 43. *P. pinnatus* (Swainson, 1822)

## Subfamily : MURICOPSINAE

Genus 10. *Favartia* Jousseaume, 1880

- \*44. *Favartia brevicula* (Sowerby, 1834) Andamans (13).  
 45. *F. cyclostoma* (Sowerby, 1841)  
 46. *F. salmonea* (Melvill and Standen, 1899)  
 47. *F. tetragona* (Broderip, 1833)

Genus 11. *Murexiella* Clench and Perez Farfante, 1945

- \*48. *Murexiella cirrosa* (Hinds, 1844) Andamans (8 & 13). Identity needs confirmation. As per Radwin and D'Attilio (1976) it does not occur in India.  
 49. *M. macgintyi* (M. Smith, 1938)

Genus 12. *Muricopsis* Bucquoy and Dautzenberg, 1882

50. *Muricopsis bombayanus* (Melvill, 1893)

Genus 13. *Vitularia* Swainson, 1840

51. *Vitularia miliaris* (Gmelin, 1791)

## Subfamily : TROPHONINAE

Genus 14. *Actinotrophon* Dall, 1902

52. *Actinotrophon planispina* (Smith, 1906)

Genus 15. *Boreotrophon* Fischer, 1884

53. *Boreotrophon indicus* (Smith, 1899)

54. *B. tenuirostratus* (Smith, 1899)

Subfamily : TYPHINAE

Genus 16. *Talityphis* Jousseaume, 1882

\*55. *Talityphis bengalensis* Radwin and Off Visakhapatnam (15).  
D'Attilio, 1976

Subfamily : DRUPINAE

Genus 17. *Drupa* Roeding, 1798

56. *Drupa (Drupa) morum morum* Roeding, 1798  
57. *D. (D.) ricinus ricinus* (Linnaeus, 1758)  
58. *D. (Drupina) lobata* (Blainville, 1832)  
59. *D. (Ricinella) clathrata miticula* (Lamarck, 1822)  
60. *D. (R.) rubusdaeus* Roeding, 1798

Genus 18. *Drupella* Thiele, 1925

61. *Drupella cornus* (Roeding, 1798)  
62. *D. concatenata* (Lamarck, 1822)

Genus 19. *Maculotriton* Dall, 1904

63. *Maculotriton seriale* Deshayes in Laborde and Linant, 1834

Subfamily : RAPANINAE

Genus 20. *Rapana* Schumacher, 1817

64. *Rapana rapiformis* (Born, 1778)

Subfamily : THAIDINAE

Genus 21. *Cronia* H. and A. Adams, 1853

- \*65. *Cronia amygdala* (Kiener, 1836) Madras (4).  
66. *C. (Ergalatax) contracta* (Reeve, 1845)  
67. *C. fiscella* (Gmelin, 1791)  
68. *C. konkanensis* (Melvill, 1893)  
69. *C. ochrostoma* (Blainville, 1832)  
70. *C. ozenneana* (Crosse, 1861)  
71. *C. subnodulosa* (Melvill, 1893)

- \*72. *C. ventricosulum* (Nevill, 1875) Sri Lanka (18). Identity needs confirmation.  
 73. *C. xuthedra* (Melvill, 1893) Bombay (2, 16, 17) ; Karachi (9).

Genus 22. *Mancinella* Link, 1807

74. *Mancinella alouina* (Roeding, 1798)  
 75. *M. bufo* (Lamarck, 1822)

Genus 23. *Morula* Schumacher, 1817

76. *Morulaanaxeres* (Kiener, 1836)  
 77. *M. biconica* (Blainville, 1832)  
 \*78. *M. chrysostoma* (Deshayes, 1844) Andamans (8) Identity needs confirmation.  
 79. *M. funiculata* (Reeve, 1846)  
 80. *M. granulata* (Duclos, 1832)  
 81. *M. marginatra* (Blainville, 1832)  
 \*82. *M. musiva* (Kiener 1836) Andamans (8) ; Burma (19).  
 83. *M. nodicostata* (Pease, 1968)  
 84. *M. uva* (Roeding, 1798)

Genus 24. *Nassa* Roeding, 1798

85. *Nassa sarta* (Brugiere, 1789)

Genus 25. *Purpura* Brugiere, 1789

86. *Purpura buccinea* (Deshayes, 1844)  
 87. *P. panama* (Roeding, 1798)  
 88. *P. persica* (Linnaeus, 1758)

Genus 26. *Thais* Roeding, 1798

89. *Thais armigera* (Link, 1807)  
 90. *T. blanfordi* (Melvill, 1893)  
 91. *T. echinata* (Blainville, 1832)  
 \*92. *T. echinulata* (Lamarck, 1822) Bombay (9 & 10). Identity needs confirmation.  
 93. *T. hippocastanum* (Linnaeus, 1758)  
 94. *T. intermedia* (Kiener, 1836)  
 95. *T. lacera* (Born, 1778)  
 96. *T. rugosa* (Born, 1778)  
 97. *T. tissoti* (Petit, 1836)  
 98. *T. tuberosa* (Roeding, 1798)

Genus 27. *Vexilla* Swainson. 184099. *Vexilla vexillum* (Gmelin, 1791)

(1) Ray, H. C. 1948 ; (2) Melvill, J. C. 1928 ; (3) Satyamurti, S. T. 1952 ; (4) Melvill and Standen, 1898 ; (5) Smith, E. A. 1904 ; (6) Smith, E. A. 1906a ; (7) Smith, E. A. 1906b ; (8) Melvill and Sykes, 1897 & 1898 ; (9) Melvill and Standen, 1901 ; (10) Bertsch and D'Attilio, 1980 ; (11) Smith, E. A. 1878 ; (12) Cernohorsky, W. O. 1978 ; (13) Smith, E. A. 1878 ; (14) Cernohorsky, W. O. 1976 ; (15) Radwin and D'Attilio, 1976 ; (16) Subrahmanyam et. al. 1952 ; (17) Melvill, J. C. 1893 ; (18) Nevill, G. H. 1875 ; (19) Ray, H. C. 1977 ; (20) Ponder and Vokes, 1988.

## SYSTEMATIC ACCOUNT

Shell elongate, fusiform to club shape or biconic, ornamented with varices ; Smooth to scabrous or lamellose ; aperture rounded to ovate ; siphonal canal short to long, narrowly open or entirely closed as in the genera *Pteropurpura* and *Typhis*. Shell size ranges from 6 mm. to 300 mm. Operculate, operculum unguiculate, ovate or rounded. Radula long with a number of transverse rows of teeth, each row with three teeth—a central and lateral on either side ; mantle enclosed, border extends to anterior canal ; foot broad, simple ; branchial plumes two ; sexes separate ; carnivorous.

The family includes eight subfamilies viz. Muricinae, Muricopsinae, Ocenebrinae, Trophoninae, Typhinae, Drupinae, Thaidinae and Rapaninae. Cernohorsky and Emerson (1973) did not recognise a separate subfamily Muricopsinae but separated Aspellinae from Muricinae. Ocenebrinae is not known to occur in Indian waters.

Members of this family, distributed throughout world, extends from cooler parts to tropical and subtropical ; shallow to deeper waters. Prefers coral beds and rocky shores. Includes a total of 92 genera and 388 species excluding the subfamilies Thaidinae, Drupinae and Rapaninae (Radwin and D'Attilio, 1976). During the last ten years the total number of species in the family (excluding the above three subfamilies) have gone up to 400 (D'Attilio, personal communication). A total of about 800 species have been described in the family Muricidae (Ponder and Vokes, 1988).

## Key to the subfamilies

- |    |  |     |     |     |                  |
|----|--|-----|-----|-----|------------------|
| 1. | Shell pyriform ; basal part of body whorl with spiral groove ending with labial tooth on apertural margin, canal short | ... | ... | ... | <i>Rapaninae</i> |
|    | Shell not pyriform ; basal part of the body whorl without spiral groove ; canal short or long                          | ... | ... | ... | 2                |
| 2. | Shell ornamented with simple, foliated or spinose varices  | ... | ... | ... | 3                |
|    | Shell without varices  | ... | ... | ... | 4                |

3. Shell with or without spiral sculpture between body whorl and canal ; anal sulcus weakly developed ... .. *Muricopsinae*  
 Shell with continuous spiral sculpture extending from body whorl to canal ; anal sulcus more or less well developed ... .. *Muricinae*
4. Shell ornamented with lamellose spines ; aperture smooth, without denticles or lirations : canal long (usually deep water forms) ... .. *Trophoninae*  
 Shell ornamented with tubercles or spines ; aperture denticulate ; canal short (usually shallow water forms) ... .. 5
5. Spire elevated ; aperture large, some times wide, interior either lirate or ridged ; columella simple ; operculum with lateral nucleus ... .. *Thaidinae*  
 Spire low ; aperture small, narrow, interior denticulate ; columella usually plicate, operculum with marginal nucleus ... .. *Drupinae*

#### Subfamily : *Muricinae* Rafinesque, 1815

Shell small to very large in size, fusiform to globose ; outer lip dentate or lirate to smooth on its inner side ; siphonal canal moderate to very elongate, broad or tubular, narrowly open ; varices simple, foliated or spiny ; axial sculpture with one to few ridges or knobs ; operculum unguiculate and marginally thick with depression in the centre, nucleus terminal or subterminal. Radula distinctively simple, rachidian tooth shallow, more or less gently arched, central cusp longest, followed by two smaller lateral cusps and two small intermediate cusps, no denticles found on rachidian tooth as comparable to those of *Thaidinae* and *Ocenebrinae*.

About 180 species belonging to 28 genera are known. A total of 44 species belonging to 9 genera are reported from the Indian seas. Cosmopolitan, tropical and subtropical waters upto 300 metres depth (Radwin and D'Attilio, 1976).

#### Key to the Genera

1. Body whorl club or spindle shape ; canal long, tubular, with or without spines ... 2  
 Body whorl either fusoid or globose ; canal short, not tubular ... 3
2. Varices and canal devoid of long spines ; outer lip without labial tooth ... .. *Haustellum*  
 Varices and canal with long spines, outer lip usually with labial tooth ... *Murex*
3. Shell with three varices on each whorl, spines either lamellose or frondose ... 4  
 Shell with more than three varices on each whorl, spines either foliaceous or digitate ... .. 6
4. Body whorl slender, fusoid shape ; varices with weblike extensions composed of fronds ... .. 5  
 Body whorl broad, globose ; varices with foliaceous spines ... *Chicoreus*

5. Varical expansion on the canal extending beyond the body whorl; canal narrow and long ... .. *Pterynotus*  
 Varical expansion on the canal not extending beyond the body whorl; canal broad and short ... .. *Naquetia*
6. Shell length not exceeding 50 mm; aperture proportionately larger compared to the size of the body whorl, columella with three denticles anteriorly ... *Attiliosa*  
 (*A. nodulifera*)  
 Shell length more than 50 mm; aperture proportionately smaller compared to the size of the body whorl; columella without denticles ... 7
7. Body whorl large with four to eight varices bearing short, stout and pointed spines, aperture large, with labial tooth on outer lip; anal sulcus present; canal narrowly open ... .. *Muricanthus*  
 Body whorl small, with varices five to ten bearing digitate spines; aperture small, outer lip without labial tooth, anal sulcus absent; canal partly sealed ... .. *Homalocantha*

### Genus 1. *Attiliosa* Emerson, 1968

Type species : *Coralliophila incompta* Berry, 1960 by original designation.

1968. *Attiliosa* Emerson, *Veliger*, 10 (4) : 379.

1976. *Attiliosa* : Radwin and D'Attilio, *Murex Shells of the World* : 25.

1982. *Attiliosa* : Vokes and D'Attilio, *Veliger*, 25 (1) : 67.

Shell stout, biconic, spire acuminate; aperture large, outer lip lirate interiorly, columella with fold anteriorly; anterior canal long, base with siphonal fasciole.

The genus includes four species of which one species is represented in the Indian waters.

#### 1. *Attiliosa nodulifera* (Sowerby)

(pl. 1, fig. 1; text fig. 1)

1841. *Murex noduliferus* Sowerby, *Conchological Illustrations, Murex*. pl. 194, fig. 94; 1841. *Proc. zool. Soc. Lond.*, pt. 8 : 147. (Type locality : Masbate island, Philippines).

1880. *Murex (Phyllonotus) noduliferus* : Tryon, *Man. Conch.*, 2 : 111, pl. 30, figs. 282, 288.

1967. *Poiriera nodulifera* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 128, pl. 27, fig. 166.

1971. *Muricopsis noduliferus* : Vokes, *Bull. Am. Paleont.*, 61 (268) : 75.

1976. *Muricopsis noduliferus* : Cernohorsky, *Rec. Auckland Inst. Mus.*, 13 : 119, figs. 22-26.

1976. *Marchia nodulifera* : Radwin and D'Attilio, *Murex Shells of the World* : 59, pl. 27, fig. 3 (not Pease, 1860).

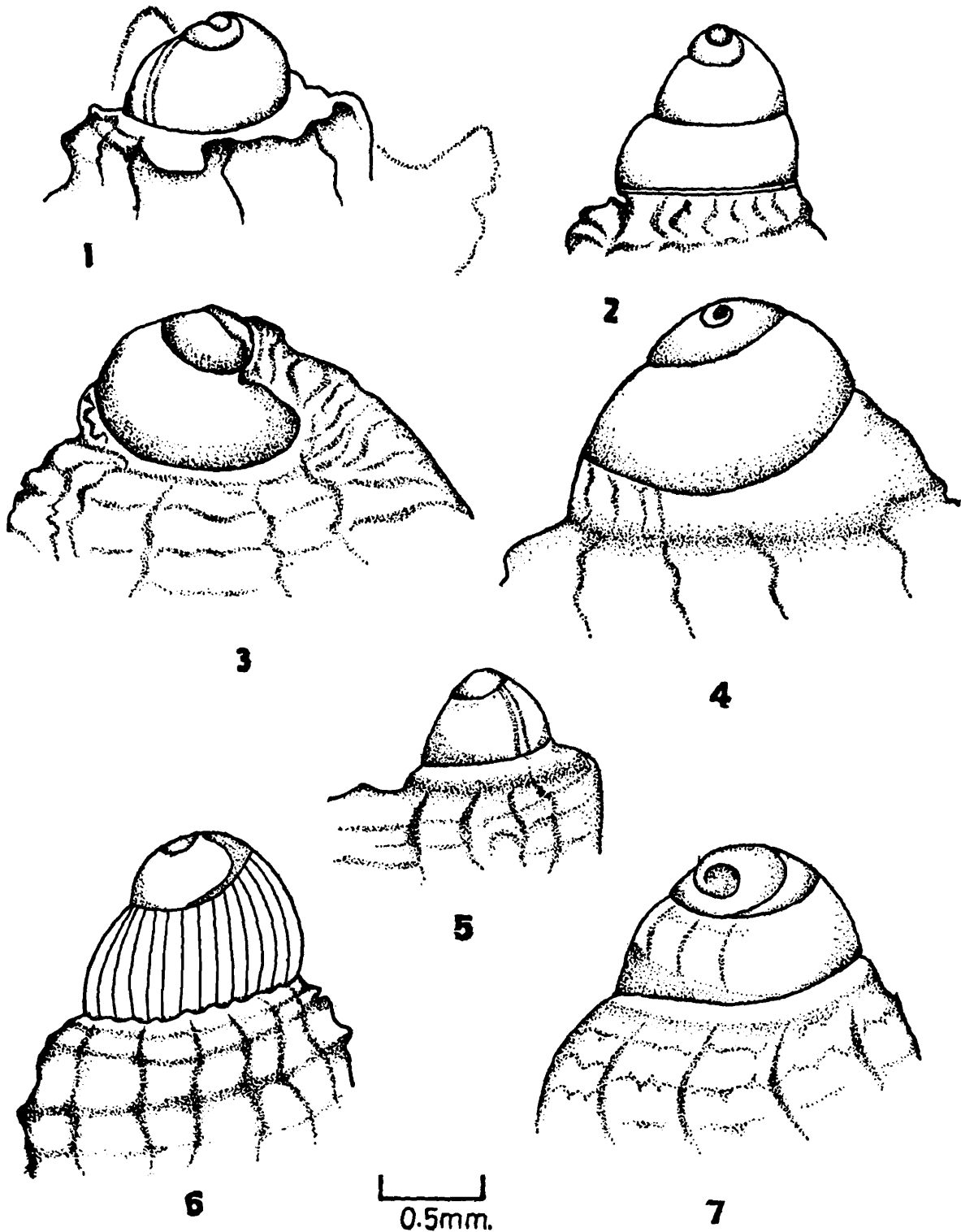
1982. *Attiliosa nodulifera* : Vokes and D'Attilio, *Veliger*, 25 (1) : 70, figs. 1-5, 11.

*Material examined* : 3 exs., Andamans (Regd. No. 3425).

*Description* : Protoconch consists of  $2\frac{1}{2}$  whorls, tip depressed, paucispiral, completed whorl high, sides evenly rounded, smooth, sculpture starts from the end of the last whorl,



suture deep. Shell moderate in size not exceeding 35 mm. fusiform, spire high, acute, consists of five whorls, shouldered, body whorl large, broadly fusoid, suture wavy, impressed, aperture ovately rounded, outerlip thick, margin erect, crenulate, interior



Text figs. Protoconch : 1- *Attiliosa nodulifera*—30X ; 2 : *Chicoreus axicornis*—30X ; 3 : *Chicoreus banksii*—30X ; 4 : *Chicoreus brunneus*—30X ; 5 : *Chicoreus cnissodus*—30X ; 6 : *Chicoreus denudatus*—30X ; 7 : *Chicoreus kilburni*—30X.

denticulate, consisting light denticles, inner lip smooth, posteriorly adherent, anteriorly detached, erect, with three prominent denticles anteriorly, canal short, narrowly open, curved upwards terminally; body consists of six frondose varices, sculpture consists of fine scabrous cords, interstices with varices developed into spinose fronds decrease in size anteriorly, shoulder spines prominent, branched, followed by two spines. spinelets in between, spiral whorls developed into single row of prominent short spines, recurved, open.

Colour light brown, concealed by coral growth, interior white.

*Remarks*: Shells mostly covered with coral growths concealing its sculpture. In one of the shells outerlip and columella not with out denticles. Cernohorsky (1976) gave a full description based on the syntypes as well as collection from Fiji, Tonga islands. Vokes and D'Attilio (1982) reviewed the genus *Attiliosa*.

*Distribution*: India: Andaman Islands. Elsewhere: Fiji & Tonga, Philippines to Solomon; moderately rare.

This is the first record from Andamans.

*Measurements*: (in mm).

	Length L	Diameter D	Length of the aper- ture LA	Length of the spire LS	Length of the canal LC
Smallest :	15.85	11.25	8.86	8.00	
Average :	17.50	12.80	10.00	9.10	
Largest :	19.30	14.45	12.20	9.40	

## Genus 2. *Chicoreus* Montfort, 1810

Type species: *Murex ramosus*. Linnaeus (ICZN Opinion, 911)

1810. *Chicoreus* Montfort, *Conchyl. Syst.*, 2: 611.

1976. *Chicoreus*: Radwin and D'Attilio, *Murex Shells of the World*: 32.

Shell with three foliaceous varices; spire generally high; body whorl moderate to large; outer lip with or without a prominent labial tooth; siphonal canal short or long; axial sculpture with one or more ridges between varices. Colour varies from white to dark brown or black.

Distributed in tropical and subtropical waters. Prefers coral beds and rocks. The genus includes 27 species (Radwin and D'Attilio, 1976) in all but only 10 species are represented in seas around India.

### Key to the species

1. Shell very large (more than 100 mm in length); spire low; outer lip with prominent labial tooth ... .. *C. ramosus*

	Shell small to large, spire high ; outer lip without labial tooth ...	2
2.	Columellar lip entirely adherent ... ..	3
	Columellar lip detached ... ..	8
3.	Varices with well developed foliaceous spines, palmately branched ; siphonal canal long ... .. <i>C. palmarosae</i>	
	Varices with less developed foliaceous spines, not palmately branched ; canal short ... ..	4
4.	Last varix only with foliaceous spines, shoulder spine branched and longer than the rest ... .. <i>C. crocatus</i>	
	All three varices with foliaceous spines, shoulder spine almost equal to rest of spines ... ..	5
5.	Axial sculpture with a single prominent knob like tubercle between varices ; anal sulcus narrow ... .. <i>C. brunneus</i>	
	Axial sculpture with two to three longitudinal tubercles ; anal sulcus broad. ... ..	6
6.	Spines on lower part of body whorl forming a wing-like structure ... <i>C. demudatus</i>	
	Spines on lower part of body whorl separate ... ..	7
7.	Shell rhomboidal, one of the tubercles in between varices large ; columella with denticles on its margin ... .. <i>C. kilburni</i>	
	Shell fusiform ; tubercles of equal size in between varices ; columella smooth ... .. <i>C. microphyllus</i>	
8.	Shell narrowly fusiform ; shoulder spine very long and distinct from others followed by two smaller spines ... .. <i>C. axicornis</i>	
	Shell broad ; shoulder spine short and stout followed by more than two smaller spines ... ..	9
9.	Aperture large, ovately rounded ; shoulder spine simple followed by one short and three spines of equal length ; canal with two spines ... .. <i>C. cnissodus</i>	
	Aperture small, ovate ; shoulder spine foliated, followed by four smaller spines of equal size ; canal with three spines ... .. <i>C. banksii</i>	

## 2. *Chicoreus axicornis* (Lamarck)

(pl. 1, figs. 2, 3 ; text fig. 2)

1822. *Murex axicornis* : Lamarck, *Hist. nat. Anim. Sans. Vert.*, 7 : 232 Type locality : ?

1904. *Murex axicornis* : Smith, *Ann. Mag. nat. Hist.*, (7) 13 : 462.

1906. *Murex axicornis* : Smith, *Ann. Mag. nat. Hist.*, (7) 18 : 168.

1967. *Euphyllon axicornis* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 124, pl. 26, fig. 154.

1976. *Chicoreus axicornis* : Radwin and D'Attilio, *Murex Shells of the World*, : 33, pl. 4, fig. 2.

**Material examined :** 7 exs., Andamans (100 to 170 m) ; 1 ex., Sri Lanka (62 m).

**Description :** Protoconch consists of 2½ whorls, smooth, sculpture starts from 3rd whorl,

sharp ridge demarcates the protoconch and teleconch at lower part of 2nd whorl; suture deep. Shell of moderate size, between 20-55 mm., spire high with 8 post nuclear whorls, body whorl small, suture deep; aperture ovate, anal sulcus inverted 'U' shape, outer lip erect, dentate, interior lirate, inner lip detached; siphonal canal long; body whorl with three varicès, spines foliaceous, axial sculpture with two prominent ridges between varices, shoulder spine largest followed by two smaller spines on lower part of body whorl, followed by very short spines bent backward, siphonal canal with two moderately long spines.

Colour light brown, interior of aperture white.

*Distribution* : India : Andamans. Elsewhere : Sri Lanka, Persian Gulf, Taiwan, Philippines.

<i>Measurements</i> :	L	D	LA	LS	LC
Smallest :	20.00	9.85	5.25	6.20	*6.00
Average :	30.43	18.65	7.05	13.55	*11.90
Largest :	52.15	38.73	10.55	16.70	21.50

(\* broken)

### 3. *Chicoreus banksii* (Sowerby)

(pl. 1, fig. 4; text fig. 3)

1841. *Murex banksii* Sowerby, *Proc. zool. Soc. Lond.*, : 140 (Type locality : Moluccas)

1841. *Murex banksii* Sowerby, *Conchological Illustrations* : 184, pl. 191, fig. 82.

1901. *Murex (Chicoreus) banksii* : Melvill. *Proc. zool. Soc. Lond.*, pt. 2 : 397.

1928. *Murex (Chicoreus) banksii* : Melvill. *Proc. malac. Soc. Lond.*, 18 (3) : 104:

1976. *Chicoreus banksii* : Radwin and D'Attilio, *Murex Shells of the world* : 33, pl. 4, fig. 12.

*Material examined* : 3 exs., Andamans.

*Description* : Protoconch consists of  $2\frac{1}{2}$  whorls, smooth, short, suture deep. Shell of moderate size, ranges 28-56 mm, fusiform; spire high consisting of seven post nuclear whorls, shouldered, suture deep, body whorl of moderate size, aperture ovate, anal sulcus inverted 'U' shape, outer lip erect, margin crenulate between suture and shoulder, and dentate below shoulder, columella slightly adherent posteriorly and detached anteriorly; siphonal canal long, narrowly open, distally curved upwards, body whorl with three foliaceous varices, axial sculpture consists of two prominent knobs on shoulder, spiral sculpture with major and minor cords, nodules, shoulder spine longest followed by one shorter and three of equal length and followed by another shorter spine, distally curved; canal with three larger spines.

Colour light brown, interior of aperture white.

*Distribution* : India : Bombay; Andamans. Elsewhere : Persian Gulf, Mozambique, Zanzibar, Sulu sea, Queensland, Eastern Australia.

<i>Measurements</i> :	L	D	LA	LS	LC
Smallest :	28.45	19.20	7.45	4.50	5.00

Average	:	41.35	26.85	10.00	13.67	14.60
Largest	:	56.45	41.62	11.95	20.00	20.75

#### 4. *Chicoreus brunneus* (Link)

(pl. 1, figs. 5, 6 ; text figs. 4, 9)

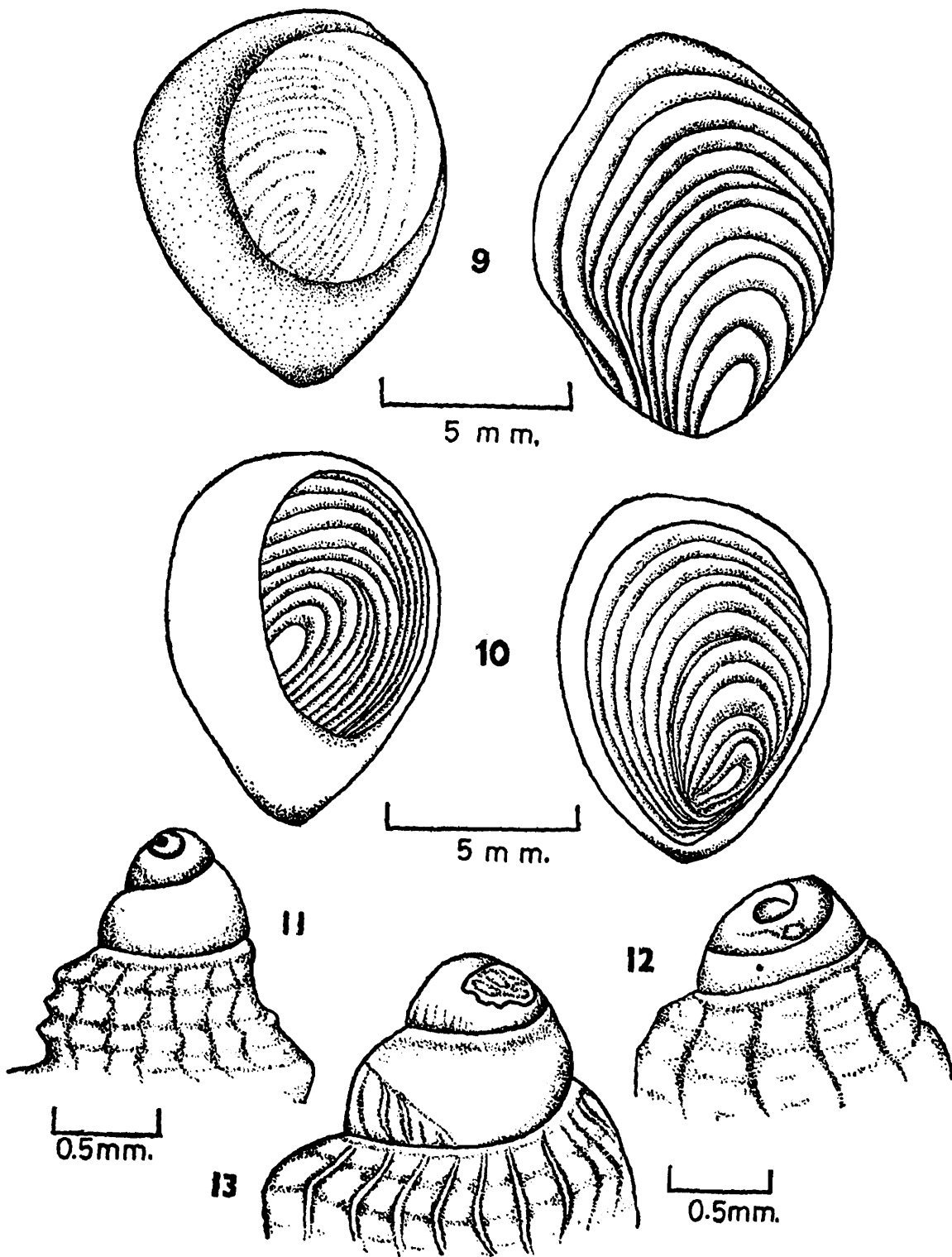
1807. *Purpura brunnea* Link, *Beschreibung der Naturalien Sammlung der Universitat Zu Rostock* : 121 (Type locality : ?).
1822. *Murex adustus* Lamarck, *Hist. nat. Anim. sans Vert.*, 7 : 162.
1893. *Murex (Chicoreus) adustus* : Melvill & Abercrombie. *Mem. Proc. Manchester Lit. Phil.Soc.* (4) 7 : 30.
1906. *Murex (Chicoreus) adustus* : Smith, in : *Gardiners' Fauna and Geography Maldive and Laccadive Archipelagoes*, pt. 2 : 605.
1942. *Murex adustus* : Gravely, *Bull. Madras Govt. Mus. new Ser.*, 5 (2) : 98.
1948. *Murex (Chicoreus) adustus* : Ray, *Rec. Indian Mus.*, 46 : 102.
1952. *Murex adustus* : Satyamurti, *Bull. Madras Govt. new Ser.*, 1 (2), pt. 6 : 156, pl. 15, fig. 2.
1952. *Murex adustus* : Subrahmanyam *et al.*, *J. Univ. Bombay*, 21 (3) : 44, fig. 1, 94.
1961. *Murex adustus* : Menon *et al.* *J. Bombay nat. Hist. Soc.*, 58 (2) : 486, pl. 7, fig. 57.
1967. *Chicoreus brunneus* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 120, pl. 25, fig. 148.
1976. *Chicoreus brunneus* : Radwin and D'Attilio, *Murex Shells of the World* : 35, pl. 4, fig. 4.

*Material examined* : Gujarat—2 exs., Okha ; 4 exs., Dwarka ; 1 ex., Sikha ; 4 exs., Pirotan Island ; 1 ex., Subhasnagar nr. Porbandar ; 1 ex., Jaleswar ; 9 exs., Veraval ; 2 exs., Navibandar ; 1 ex., Muldwarka nr. Kodinar ; 1 ex., Odedhad ; 9 exs., Diu ; Maharashtra—12 exs., Bombay ; Andamans—1 ex., Peel Island ; 4 exs., Neil Island ; 1 ex., West of Ross Island ; 7 exs., South point, Port Blair ; 1 ex., Corbyn's Cove ; 1 ex., Chatham jetty, Port Blair ; 2 exs., Chidiyatapu ; 5 exs., Aerial Bay, Diglipur ; 1 ex., Sri Lanka ; Maungmagan, Myammar ; 2 exs., Mergui Archipelago.

*Description* : Protoconch depressed, consists of  $2\frac{1}{2}$  whorls, smooth, black in colour but lighter than teleconch and body sculpture starts from last whorl with spiral and axial ribs. Shell rhomboid, spire elevated with seven post nuclear whorls, anal sulcus narrowly deep ; aperture small, ovate, outer lip erect, finely dentate, interior lirate, columella adherent posteriorly, detached anteriorly, smooth ; siphonal canal short, broad, narrowly open, distally curved ; body whorl large, varices profusely frilled ; axial sculpture with a single large knob occupying most of the space between varices, spiral sculpture with major and minor cords with fine tubercles, spines on varices branched foliate, shoulder spine long followed by seven short spines, first three dorsally curved, followed by four small, straight spines, canal with three spines.

Colour varies from dark chestnut brown to black ; aperture white, columella yellow or pink.

*Distribution* : India : Gujarat, Bombay, Pamban, Madras, Andaman and Nicobar Islands. Elsewhere : Persian Gulf, Red sea, Mauritius, Maldives, Sri Lanka, Bangladesh, Singapore. Throughout Indo-Pacific in Tropics (Radwin and D'Attilio, 1976).



Text figs. 9 : *Chicoreus brunneus*—Operculum 8X ; 10 : *Chicoreus ramosus*—Operculum 8X ; 11 : *Chicoreus palmarosae*—Protoconch 30X ; 12 : *Chicoreus microphyllus*—Protoconch 30X ; 13 : *Chicoreus ramosus*—Protoconch 30X.

<i>Measurements</i> :	L	D	LA	LS	LC
Smallest :	46.95	32.70	11.50	17.50	15.70
Average :	61.66	44.35	13.94	24.75	18.83
Largest :	80.00	52.13	18.80	31.85	23.65

### 5. *Chicoreus cnissodus* (Euthyme)

(pl. 1, figs. 7, 8 ; text fig. 5)

1889. *Murex cnissodus* Euthyme, *Bull. Soc. Malac. France*, 6 : 263. pl. 6, figs. 1-12 (Type locality : "La Nouvelle-Caledonie").

1976. *Chicoreus cnissodus* : Radwin and D'Attilio, *Murex Shells of the world* : 35, pl. 5, fig. 3.

*Material examined* : 1 ex., Bay of Bengal, 161 M. (Lat. 14° 11' 6'' N : Long. 80°24' E., 88 Kms. N by E of Madras from unknown coral bank, coll. 'Investigator' Marine survey) (Regd. M 21183/4).

*Description* : Protoconch consists of 2½ whorls, elevated, sides rounded, smooth but mildly tuberculate, axial ridge on last whorl, suture deep. Shell of moderate size, fusiform, spire high consisting of seven rounded post nuclear whorls, suture deep, body whorl large, with three varices ; aperture large, ovate ; anal sulcus inverted 'U' shape, outer lip erect, dentate, interior lirate, columella slightly attached posteriorly, anteriorly detached ; siphonal canal long, shorter than spire, distally curved towards right ; body whorl with three longitudinal ridges, third one not prominent ; spiral sculpture with lamellose threads, some threads slightly prominent and arranged at regular intervals ; shoulder spine long, grooved and recurved upwardly, followed by four medium sized spines enclosing spinelets in between ; canal bears two prominent spines curved backward.

Colour light brown, threads slightly dark, aperture white.

*Remarks* : This species closely agrees with *C. banksii* but differs in having broader shell, larger aperture, shoulder spine followed by four medium sized spines of equal length, longer than in *C. banksii*, curved upwards ; canal more curved towards right.

D'Attilio (personal communication) is of the opinion that *C. cnissodus* is always white in colour and do not resemble *C. banksii*. The specimen is light brown in colour and agrees with the figure and description given by Radwin & D'Attilio (1976).

*Distribution* : India : Bay of Bengal. Elsewhere : South eastern Japan to New Caledonia including Taiwan and Philippines (Radwin and D'Attilio, 1976). It is the first record from Indian waters and extends its distribution further westwards into the Indian Ocean.

<i>Measurements</i> :	L	D	LA	LS	LC
	54.65	32.10	12.96	20.65	17.45

6. *Chicoreus crocatus* (Reeve)

(pl. 2, fig. 1)

1845. *Murex crocatus* Reeve, *Proc. zool. Soc. Lond.*, (1845) : 108; *Conch. Icon.*, 3, *Murex*, sp. 168, pl. 33, fig. 168 (Type locality : Not given).  
 1880. *Murex crocatus* Tryon, *Man. Conch.*, 2 : 97, pl. 19, fig. 181, pl. 20, fig. 192.  
 1991. *Chicoreus crocatus* : Surya Rao and Subba Rao, *Fauna of Lakshadweep, State Fauna ser.*, 2 : 317.

*Material examined* : 1 ex., Minicoy, 1 ex., Sri Lanka.

*Description* : Protoconch consists of  $2\frac{1}{2}$  whorls, as the shells eroded not seen very clear. Shell small measuring 33 mm, triangularly fusoid, spire elevated, consisting of five post nuclear whorls, suture shallow; aperture small, ovate, anal sulcus not deep, inverted 'V' shape, outer lip dentate, interior with ten denticles leading to lirations; columella adherent, canal short, straight, broadly open; body whorl with three rounded, moderate varices, only the last one bear frondose spines; shoulder spine large, branched, followed by three short spines, canal with two spines, spines open; axial sculpture consists of two longitudinal ridges, more prominent towards shoulder; spiral sculpture consists of primary, secondary and tertiary threads, the former two thick and latter finely nodulose.

Colour light brown with reddish saffron tinge prominent on spiral sculpture and interior of frondose spines.

*Remarks* : After its original discovery by Reeve, there was no subsequent report of this species. The species is recorded for the first time from Bay of Bengal. *Chicoreus crocatus* (Reeve) presents difficulties on precise identification because of the specimen figured and described by Reeve is a poor worn specimen difficult to identify. There probably is a true *Chicoreus* that has been collected recently but this is often confused especially with unusually colourful specimens of *Chicoreus banksii*. The last shows some degree of shell variability from its distribution from East Africa to the Western Pacific (D'Attilio, *personal communication*).

*Distribution* : India : Lakshadweep. Elsewhere : Sri Lanka; St. Thomas, West Indies.

<i>Measurements</i> :	L	D	LA	LS	LC
	33.10	19.60	8.30	11.95	10.70

7. *Chicoreus denudatus* (Perry)

(pl. 2, figs. 2, 3; text fig. 6)

1811. *Triplex denudata* Perry, *Conchology or the Natural History of Snails*, pl. 7, fig. 2 (Type locality : ?).  
 1841. *Murex corrugatus* Sowerby, *Conchological Illustrations*, pl. 189, fig. 72.



1841. *Murex palmiferus* Sowerby, *Conchological Illustrations*, pl. 195, fig. 104.  
 1967. *Chicoreus extraneus* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 120, pl. 25, fig. 150.  
 1972. *Chicoreus denudatus* : Cernohorsky, *Marine Shells of the Pacific*, 2 : 122, pl. 34, fig. 4.  
 1976. *Chicoreus denudatus* : Radwin and D'Attilio, *Murex Shells of the World* : 36, pl. 4, fig. 5.

**Material examined** : 1 ex., Andamans ; 1 ex.. 'Investigator', stn. 152, West of Colombo.

**Description** : Protoconch consists of  $2\frac{1}{2}$  whorls, elevated, last whorl axially ribbed, ribs distant ; suture deep. Shell medium, spire very high consisting of six post nuclear whorls, suture impressed, shallow, aperture subcircular, anal sulcus deep inverted 'V' shape ; outer lip erect, denticulate, interior lirate, columella adherent, smooth ; siphonal canal medium, smaller than spire, narrowly open, curved upward towards right, body whorl with three varices of variable development, spines frondose or short and denuded ; axial sculpture with a prominent knob-like ridge between varices, spiral sculpture consists of major and minor threads, finely nodulose, varices on body whorl well developed, spines on lower part of body whorl combined to form a continuous structure ; spines on the spire much reduced ; siphonal canal with three short, open spines, increasing in length anteriorly.

**Remarks** : The shell from Sri Lanka has a partly damaged spire ; the sculpture is concealed by the encrustations of bryozoans and corals. However, specimens agree with identified collections from Port Jackson, New South Wales.

Initially there was some doubt regarding the existence of *C. denudatus* in the Indian Ocean. But D'Attilio (personal communication) confirmed the occurrence of *Chicoreus denudatus* in the Indian Ocean. He writes, "Recent exploration by the Australian government of the continental shelf of N. W. Australia has shown that many mollusk species known previously only from the Western Pacific occur in that part of the Indian Ocean.

The specimen is being returned to you by registered air mail. My only comment is that it falls well within the range of variation in the species. A couple of "subspecies" all from Queensland or N. S. Wales were described by Iredale but I have not examined typological material and can express no opinion."

**Distribution** : India : Andamans. Elsewhere : Sri Lanka, Port Jackson, New South Wales. It is moderately common and confined to east Australia (Cernohorsky, 1972), New South Wales to Queensland (Radwin and D'Attilio, 1976). It is the first record from Indian waters.

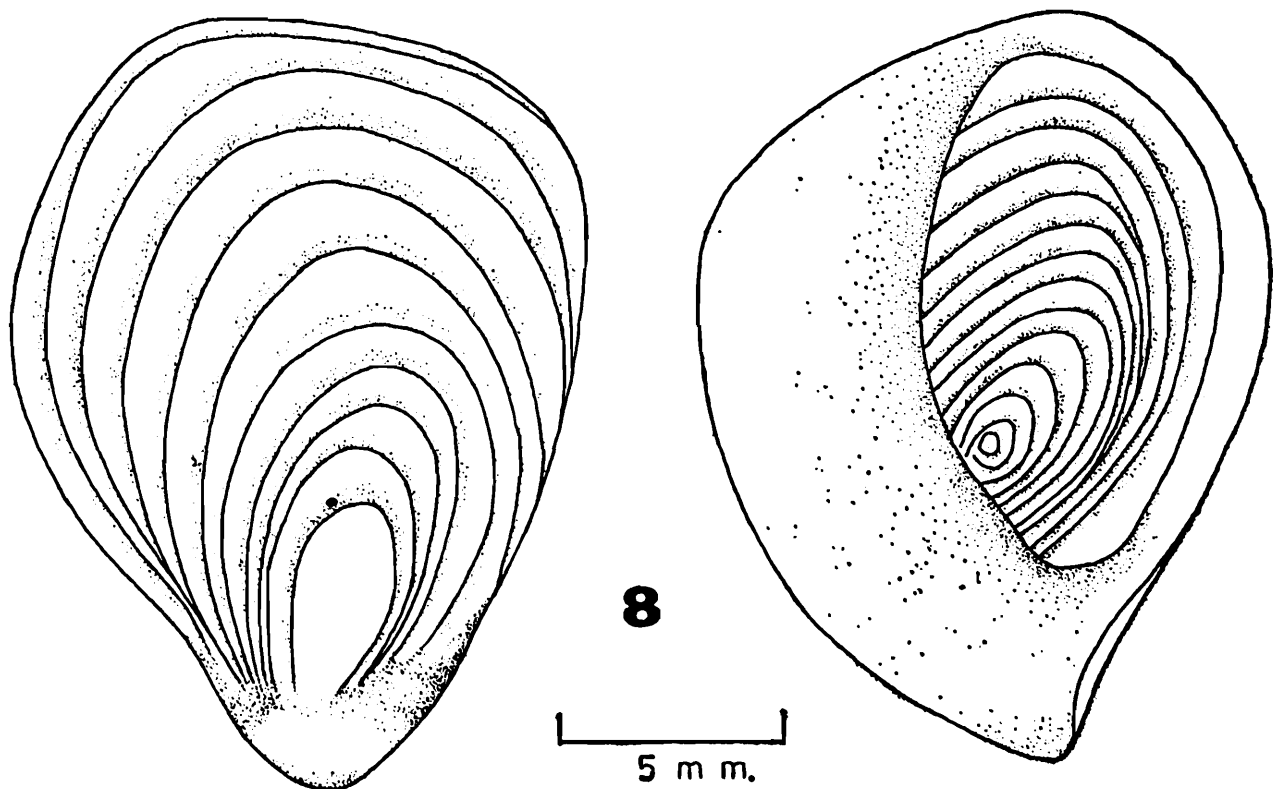
<b>Measurements</b> :	<b>L</b>	<b>D</b>	<b>LA</b>	<b>LS</b>	<b>LC</b>
Smallest :	24.25	14.50	6.40	7.75	7.50
Average :	45.90	27.75	11.20	15.35	12.75
Largest :	57.70	28.95	13.70	19.05	15.25

8. *Chicoreus kilburni* Houart and Pain

(pl. 2, figs. 4, 5 ; text figs. 7, 8)

1952. *Murex maurus* : Subrahmanyam, et. al., *J. Univ. Bombay*, 21 : 44 fig. 95.1982. *Chicoreus (Chicoreus) kilburni* Houart and Pain, *Information de la Soc. Belge de Malacologie*, 10 (1-4) : 51, pl. 3, figs. 1-4 (Type locality : Durban Bay, Natal).

**Material examined :** Gujrat—2 exs., Madwad ; 2 exs., Chorwad ; 1 ex., Subhasnagar, near Porbandar ; 1 ex., Navibandar ; 2 exs., Odedhad ; 2 exs., Jaleswar ; 4 exs., Veraval ; 1 ex., Somnath ; 2 exs., Kotda, Diu ; 3 exs., Jalander ; 2 exs., Goghla ; 1 ex., Vanakbara, Diu ; Andamans—6 exs., Corbyn's Cove ; 1 ex., Long Island, Andamans ; 1 ex., West Bay, Katchal, Nicobars ; 4 exs., Mergui Archipelago.

Text fig. 8 : *Chicoreus kilburni*—Operculum 8X.

**Description :** Protoconch consists of  $2\frac{1}{2}$  whorls, sculpture starts from the last whorl, terminal part depressed like a cavity. Shell of moderate size, ranges between 40—92 mm ; broadly rhomboidal, spire elevated with seven to eight post nuclear whorls, suture shallow, body whorl large, rhomboid ; aperture large, ovately rounded, anal sulcus inverted 'V' shaped, outer lip erect, denticulate, interior lirate, columella adherent but slightly detached anteriorly ; few ridges on posterior and tubercles on anterior margin ; siphonal canal medium, broad, narrowly open and recurved upwards towards right. Body whorl with three varices, axial sculpture with two or three ribs, one prominent, knob-like on its shoulder ; spiral sculpture with major and minor threads with fine nodules, varices developed to

frondose spines, prominent on body whorl and less on spire ; shoulder spine large, branched, followed by four equal size spines with spinelets in between ; canal bears three spines.

Colour light brown to chocolate brown with dark pink ribs, interior of aperture white with large pink patch on parietal region.

*Remarks* : Shells from Gujarat are light brown with dark patches, and columella light yellow, where as specimens from Andaman are light pink. Houart and Pain (1982) while describing the species mentioned its affinities with *C. maurus* and *C. torrefactus*. *C. kilburni* differs from the former in having more oval aperture, suture not appressed, denticles on the anterior part of the columella, two or three intervarical ridges instead of one. The geographical range is also different ; *C. kilburni* is restricted to South Africa while *C. maurus* occurs in Marquesas Islands and perhaps in New Caledonia also. *C. kilburni* differs from *C. torrefactus* in having much straighter spire, shorter spines and one axial node on the body whorl.

*Distribution* : India : Gujarat, Bombay, Andaman and Nicobar Islands. Elsewhere : Durban Bay, Cocos ; Mozambique. This species has been reported as *Murex maurus* from Bombay by Subrahmanyam *et. al.* (1952).

<i>Measurements</i> :	L	D	LA	LS	LC
Smallest :	49.08	25.60	13.78	25.40	15.00
Average :	68.08	41.12	19.50	33.61	18.59
Largest :	91.82	45.86	23.95	46.56	23.76

## 9. *Chicoreus microphyllus* (Lamarck)

(Pl. 2, fig. 6 ; text fig. 12)

1816. *Murex microphyllus* Lamarck, *Ency. methd.*, pt. 23, pl. 415.  
 1841. *Murex torrefactus* Sowerby, *Conchological Illustrations, Murex*, pl. 199.  
 1898. *Murex (Chicoreus) microphyllus* : Melvill and Standen, *J. Conch. Lond.*, 9 : 42.  
 1942. *Murex torrefactus* : Gravely, *Bull. Madras Govt. Mus. new Ser.* 5 (2) : 98, fig. 120.  
 1967. *Chicoreus torrefactus* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 122, pl. 25, fig. 153.  
 1967. *Chicoreus microphyllus* : Cernohorsky, *Marine Shells of the Pacific* 1 : 122, fig. 15.  
 1976. *Chicoreus microphyllus* : Radwin and D'Attilio, *Murex Shells of the World* : 39, pl. 4, fig. 7 ; pl. 5, fig. 7.

*Material examined* : 1 ex., Off Gopalpur, Orissa ; 6 exs., Andamans, 1 ex., Barren island ; 1 ex., St. Martin Island, Bangladesh.

*Description* : Shell fusoid, large ; spire high consisting of nine post nuclear whorls ; Protoconch consists of  $2\frac{1}{2}$  whorls, rounded, depressed, smooth ; body whorl large, elongate ; suture not deep ; anal sulcus narrow, deep ; aperture circularly ovate ; outer lip thick and dentate, finely lirate above shoulder ; interior lirate ; columella adherent except extreme anterior, slightly twisted, smooth, but faint plications on the posterior part ;

canal moderate, narrowly open, recurved terminally to right, body whorl with three foliaceous varices, spines short, broadly open, obtusely branched; shoulder spine large, followed by four short spines increasing in length; spinelets in between them; canal bears four spines; axial sculpture with one to two faint knob-like ridges, spiral sculpture with primary, secondary cords, finely tuberculated, fine threads in between, scabrous nature.

Colour light to dark brown with varices and spiral cords chestnut (in East Indies specimen); aperture white with light pink tinge.

**Remarks:** This species closely agrees with *C. maurus* of authors (non Broderip, 1833) except in the presence of fine lirations above the shoulder spine on its outer lip; body whorl is narrower and elongated, spines followed by shoulder spine on the body whorl are increasing gradually, whereas they decrease in the former species, axial sculpture with two to three intervarical ridges.

Houart and Pain (1982) designated 'Neotype' for *Chicoreus (Chicoreus) torrefactus* (Sowerby, 1841).

**Distribution:** India: Gopalpur, Madras, Andamans. Elsewhere: Seychelles to Tahiti (Cernohorsky, 1967); Throughout Indo-west Pacific (Radwin and D'Attilio, 1976).

<i>Measurements:</i>	L	D	LA	LS	LC
Smallest:	60.26	31.25	15.14	27.26	19.28
Average:	67.64	28.80	17.05	32.00	17.75
Largest:	91.10	42.75	28.05	49.85	23.65

#### 10. *Chicoreus palmarosae* (Lamarck)

(Pl, 2, figs. 7, 8; text fig. 11)

1811. *Triplex rosaria* Perry, *Conchology of Natural History of Snails* pl. 6, fig. 3.

1822. *Murex palmarosae* Lamarck, *Hist. nat. Anim. sans. Vert.*, 7: 161. (Type locality: Ceylon (= Sri Lanka).

1945. *Murex palmarosae*: Reeve, *Conch. Icon.*, 3: *Murex* sp. 30 pl. 8, fig. 30.

1908. *Murex (Chicoreus) palmarosae*: Rogers, *The Shell Book*: 31, pl. 2.

1976. *Chicoreus palmarosae*: Radwin and D'Attilio, *Murex Shells of the World*: 40, pl. 5, fig. 2.

**Material examined:** 3 exs.. Sri Lanka.

**Description:** Shell of moderate size, ranges between 78-97 mm; fusiform; protoconch consists of 2½ whorls, rounded smooth, suture deep, teleconch whorls angular; spire high, consisting of eight whorls, suture impressed; aperture ovate, outer lip erect, dentate, inner side lirate, columella adherent except for a short part anteriorly; bears numerous denticles throughout its length, anal sulcus shallow, broad, bounded by ridge; siphonal canal long, moderately broad, narrowly open, distally recurved to right. Body whorl with three foliaceous varices, much branched; axial sculpture two to three low ridges; spiral sculpture with numerous primary cords followed by fine threads, nodulose; body

whorl with four long foliaceous spines, ventrally open, distally bifurcate ; shoulder spine largest, followed by three smaller spines ; canal with three short spines, leaving a distinct gap between body spines.

Colour light brown with dark pinkish spiral threads ; margin of outer and inner lip slightly brown and aperture white interiorly. Interior of spines pinkish tint.

*Distribution* : Sri Lanka to Philippines, and South western Japan (Radwin and D'Attilio, 1976).

<i>Measurements</i> :	L	D	LA	LS	LC
Smallest :	27.80	20.80	7.57	11.05	11.70
Average :	78.13	56.30	16.97	25.70	27.10
Largest :	97.30	61.50	22.15	33.95	33.10

### 11. *Chicoreus ramosus* (Linnaeus)

(Pl. 2, figs. 9, 10 ; Pl. 3, figs. 1, 2 ; text figs. 10, 13)

1758. *Murex ramosus* Linnaeus, *Syst. Nat.*, ed. 10 : 747, Type locality : "Persica Jamaica."

1798. *Purpura incarnata* Roeding, *Museum Boltenianum* : 142.

1906. *Murex (Chicoreus) ramosus* : Smith, in : *Gardiners' Fauna and Geography of the Maldives and Laccadive Archipelagoes* pt. 2 : 608.

1942. *Murex incarnatus* : Gravely, *Bull. Madras Govt. Mus. new Ser.* 5 (2) : 98.

1967. *Chicoreus ramosus* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 122, pl. 25, fig. 152.

1976. *Chicoreus ramosus* : Radwin and D'Attilio, *Murex Shells of the World* : 40, pl. 4, fig. 8.

*Material examined* : 1 ex., Okha ; 1 ex., Sikha port ; 15 exs., Pondicherry ; 1 ex., Mallapatnam eastwards Pudupattinam of Pattukottai ; 2 exs., Tuticorin ; 1 ex., Visakha-patnam, 3 exs., India.

*Description* : Shell large to very large, fusiform, ranges from 45-254 mm ; protoconch consists of  $2\frac{1}{2}$  whorls, rounded, smooth, sculpture starts last whorl, spire low, consisting of six rounded whorls, suture impressed, body whorl large, globose ; aperture large, ovately rounded, anal sulcus shallow, broad, bounded by parietal ridge, outer lip erect, coarsely dentate with prominent labial tooth on lower half of body whorl, inner side lirate, columella partly adherent posteriorly formed into callus, detached and weakly erect anteriorly, smooth ; siphonal canal moderate, broad, narrowly open, distally curved upwards to right ; body whorl with three varices ornamented with foliaceous spines ; axial sculpture with prominent intervarical ridges followed by one to two low ridges ; spiral sculpture with prominent cords and fine threads, scabrous nature ; spines on varices moderate, distally recurved and foliated ; shoulder spine prominent, followed by five of equal length, ornamented with spinelets in between ; canal with three spines, decreasing in length anteriorly.

Colour white to light brown to dark with pinkish tinge on spiral cords, interior of aperture white with reddish pink margin.

**Remarks :** Largest shell from Tuticorin is encrusted with bryozoans, serpulids, barnacles, corals and *Vermetus* and bears a number of holes made either by boring sponges or molluscs. It is the largest species in the family and fancied as a curio. It is found associated with horned helmet shells (*Cassis cornuta*) at a depth of 18 m in the pearl banks off Tirunelvely coast (Hornell, 1921). Gohar & Soliman (1968) studied the egg masses, development and metamorphosis of the species.

**Distribution :** India : Gujarat, Tuticorin, Pondicherry, Visakhapatnam, Andaman & Nicobar Islands. Elsewhere : Throughout Indo-west Pacific (Radwin & D'Attilio, 1976).

<b>Measurements :</b>	<b>L</b>	<b>D</b>	<b>LA</b>	<b>LS</b>	<b>LC</b>
<b>Smallest :</b>	45.20	29.80	16.59	13.61	18.22
<b>Average :</b>	96.41	65.00	32.75	33.88	38.30
<b>Largest :</b>	254.00	245.00	105.00	82.80	94.40

### Genus *Haustellum* Schumacher, 1817

(Type species : *Murex haustellum* Linnaeus, 1758)

1817. *Haustellum* Schumacher, *Ess. vers. testaces*, 64 : 213.

1976. *Haustellum* : Radwin and D'Attilio, *Murex Shells of the World* : 49.

Shell club shaped, varices three, devoid of spines, rounded ; spire elevated, aperture large, subcircular, lips thickened ; siphonal canal narrow, elongated, straight, devoid of spines.

The genus is restricted to Indo Pacific, with two species. A single species is recorded from India and adjacent countries.

## 12. *Haustellum haustellum* (Linnaeus)

(Pl. 3, figs. 3, 4 ; text fig. 14)

1758. *Murex haustellum* Linnaeus, *Syst. Nat.*, ed. 10 : 746. Type locality : "O Africa."

1906. *Murex haustellum* : Smith, in : *Gardiners' Fauna and Geography of the Maldiva and Laccadive, Archipelagoes* pt. 2 : 608.

1942. *Murex haustellum* : Gravely, F. H., *Bull. Madras Govt. Mus. new Ser.*, 5 (2) : 98.

1952. *Murex haustellum* : Satyamurti, *Bull. Madras Govt. Mus. new Ser.* 1 (2) : pt. 6 : 154, pl. xiv, fig. 5.

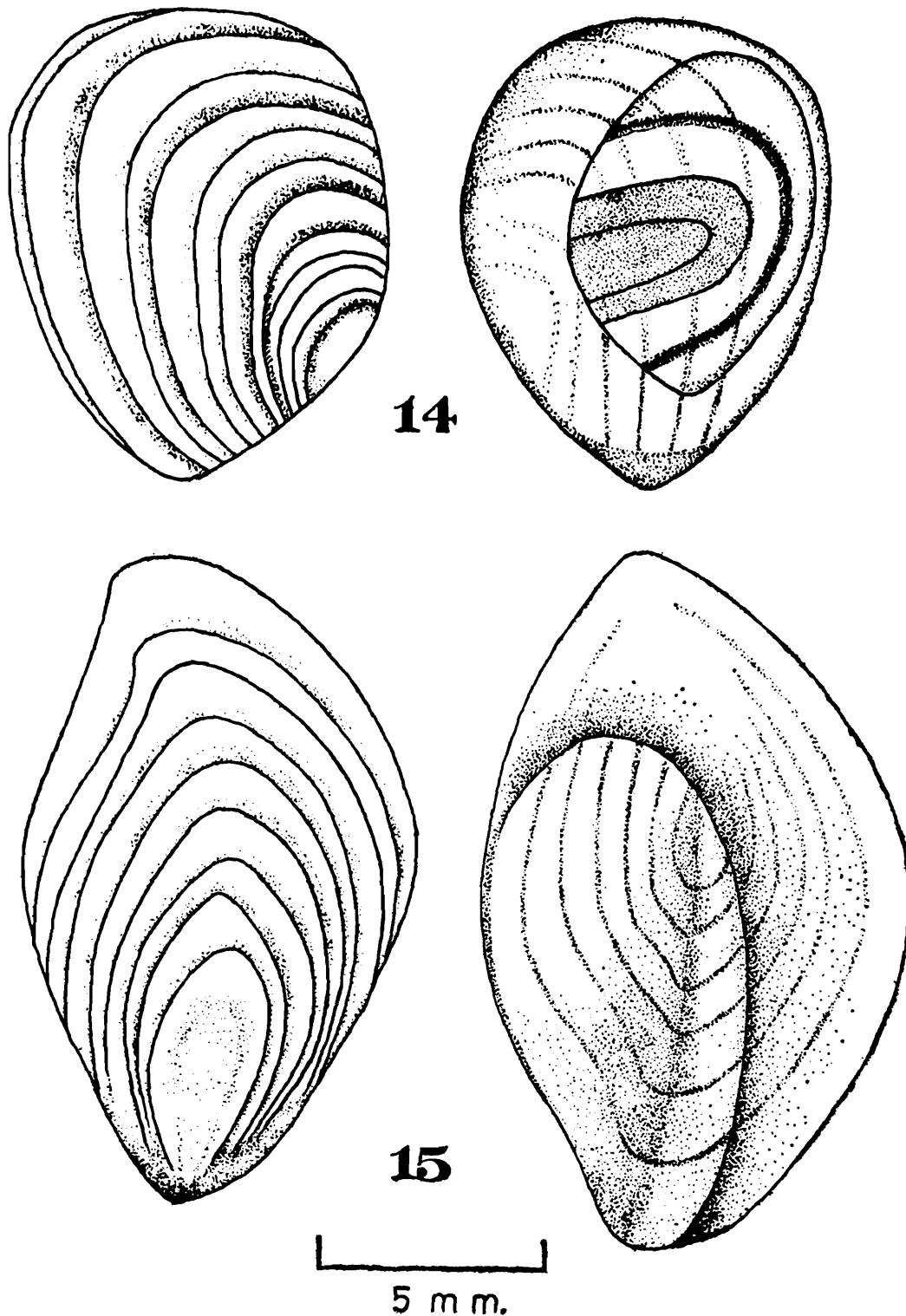
1967. *Haustellum haustellum* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 118, pl. 24, fig. 142 (for Synonyms).

1976. *Haustellum haustellum* : Radwin and D'Attilio, *Murex Shells of the World* : 49, pl. 11, fig. 10.

1988. *Haustellum haustellum haustellum* : Ponder and Vokes, *Rec. Aust. Mus. Suppl.* 8 : 86. figs. 1 EF, 46 A-D, 47, 68 D, 72 I, 78 D, 87 A-C.

*Material examined* : 3 exs., Tuticorin ; 2 exs., Andamans ; 1 ex., Neil Island ; 7 exs., Sri Lanka.

*Description* : Shell club shaped, Protoconch consists of  $2\frac{1}{2}$  whorls, sides rounded, smooth, suture deep, last whorl with a spiral ridge at its base and terminates in an axial



Text figs. Operculum 8X—14 : *Haustellum haustellum* ;  
15 : *Murex pecten*.

rib, sculpture of both axial and spiral ridges starts from the beginning of teleoconch, spire elevated consisting of six subangulated whorls, suture impressed, body whorl large, inflated, globose; anal sulcus, narrow 'U' shaped; aperture large, subcircular, outer lip thickened with a thinner projection over it, inner surface lirate 12 to 15 in number; inner lip adherent slightly towards posterior, but on the anterior part strongly detached, erect and raising above the plane of the canal, inner surface smooth, outer surface strongly and irregularly ridged; siphonal canal longer than the body whorl and spire together, straight, tapering anteriorly, narrowly open, without spines, opening into a hole in the aperture; body whorl with three rounded varices; axial sculpture three to four broad, low ridges, prominent on shoulder; spiral sculpture with five to eight primary cords followed by fine threads in between; intersection of primaries with varices formed into tubercles, strongest on the shoulder; canal bears eight primary cords with fine threads in between.

Colour of the shell white to light brown, with distinct, prominent chocolate brown on cords and tubercles, interior of aperture pale pink on its margin.

*Distribution*: India: Madras (Gravelly, 1942), Tuticorin, Pamban (Satyamurti, 1952), Andaman and Nicobar Islands (Ponder and Vokes, 1988). Elsewhere: Mozambique, Zanzibar, Madagascar, Democratic Yemen, Malaysia, Indonesia, Philippines, Japan, Australia (Ponder and Vokes, 1988).

<i>Measurements</i> :	L	D	LA	LS	LC
Smallest :	54.06	25.58	15.20	12.45	30.04
Average :	82.85	39.78	21.72	20.65	49.35
Largest :	90.50	39.13	22.35	20.55	53.30

#### Genus *Homalocantha* Moerch, 1852

Type species: *Murex scorpio* Linnaeus, 1758 by Monotypy.

1852. *Homalocantha* Moerch, *Catalogus conchyliorum quae reliquit*: 95.

1976. *Homalocantha* Radwin and D'Attilio, *Murex Shells of the World*: 52.

Body whorl of the shell with five to ten spinose varices, distally palmate or not; suture not impressed, excavated strongly with shoulder part of varices; aperture small; siphonal canal narrowly open or partly sealed; anal sulcus absent; columellar lip detached; operculum subcircular, nucleus on outer side slightly right, interior surface oval, irregularly depressed, concentrically ridged. Radula muricoid, rachidian type, central cusp longest, laterals long, intermediate small and fused with laterals.

The genus includes seven species with a tropical distribution. In India only two species are recorded.



## Key to the species

Shell with a deeply excavated region surrounding the suture, varix not connected to the preceding whorl by webbing ; projections on the outer lip very distinct, long and bluntly bifid ... .. *H. scorio*

Shell without any such excavation surrounding the suture ; varix connected to the preceding one by webbing ; projections on the outer lip not very long and distally palmate ... .. *H. secunda*

13. *Homalocantha scorio* (Linnaeus)

(Pl. 3, fig. 5)

1758. *Murex scorio* Linnaeus, *Syst. Nat.* ed. 10 : 74. Type locality : "O Asiatic."1967. *Homalocantha scorio* : Cernohorsky, *Marine Shells of the Pacific*. 1 : 128, pl. 27, fig. 164.1976. *Homalocantha scorio* : Radwin and D'Attilio, *Murex Shells of the World.* : 54, pl. 8, fig. 11-13. (for Synonyms).*Material examined* : 2 exs., Andamans.

*Description* : Shell moderate, ranges between 44 to 54 mm., fusiform ; spire elevated, consisting of four whorls, shouldered, suture deeply excavated ; aperture small, subcircular, outer lip erect, finely dentate, inner lip detached, erect, smooth, anal sulcus absent ; siphonal canal long, narrowly open, distally recurved, body whorl with five varices, spinose, spines short, except on last varix ; without any axial sculpture, spiral sculpture with alternate major and minor cords, giving rise to spines at the intersection of varices, last varix with four long spines, distally palmate and digitate, ventrally open, connected by webbing ; canal bears two long spines ; shoulder extensions of varices connect the preceding whorl.

Colour dark pinkish brown, interior light.

*Distribution* : India : Andamans. Elsewhere : Philippines, Indonesia and Red Sea (Radwin and D'Attilio, 1976). This species is recorded for the first time from Indian waters.

<i>Measurements</i> :	L	D	LA	LS	LC
Smallest :	44.75	32.68	8.70	15.98	19.20
Largest :	53.37	33.70	11.95	15.95	22.72

14. *Homalocantha secunda* (Lamarck)

(Pl. 3, fig. 6)

1822. *Murex secunda* Lamarck, *Hist. nat. Anim. sans. Vert.*, 7 : 169. Type locality : ?1971. *Homalocantha secunda* : Cernohorsky, *Veliger* 14 (2) : 190, fig. 9 (lectotype), fig. 10.

1976. *Homalocantha secunda* : Radwin and D'Attilio, *Murex Shells of the World* : 55, pl. 8, fig. 1-2.  
 1983. *Homalocantha secunda* : D'Attilio, *The Festivus*, 15 : 48, fig. 1, 3-6.

**Material examined** : 6 exs., Sri Lanka, Regd. No. 3338.

**Description** : Shell broadly fusiform, size ranges from 23 to 40 mm., spire less elevated than in the preceding species, consisting of five shouldered whorls, suture deep, obscured by succeeding whorl ; aperture small, oval shape, anal sulcus absent, outer lip erect anteriorly but less posteriorly, dentate, inner lip adherent, slightly detached anteriorly, smooth ; siphonal canal long, broad, narrowly open, body whorl with five to six varices, last whorl well developed near the aperture ; spiral sculpture with major and minor cords, shoulder extensions connect preceding whorl by web only, last varix with five digitate, distally, palmate spines ; canal bears three long spines, smaller spines develop in between and connected by a web.

Colour varies from light brown to chestnut brown, interior white, variable.

**Remarks** : D'Attilio (1983b) gave a further detailed description and figures of radula and operculum (figs. 5, 6) and expressed his doubt, about its inclusion in the subfamily Muricinae as it exhibits certain characters of the subfamily Ocenebrinae.

**Distribution** : India : Madras beach (Gravelly, 1942) ; Southern tip of India (D' Attilio, 1983b). Elsewhere : Sri Lanka, North western Australia to Indonesia and New Caledonia (Radwin & D'Attilio, 1976). It confirms the occurrence of this species in the Indian ocean and thus its western range of distribution.

<b>Measurements :</b>	<b>L</b>	<b>D</b>	<b>LA</b>	<b>LS</b>	<b>LC</b>
Smallest :	22.73	15.00	6.02	8.15	8.95
Average :	29.55	18.33	7.62	9.68	11.58
Largest :	39.42	28.54	9.68	10.86	18.15

**Genus** *Murex* Linnaeus, 1758.

**Type species** : *Murex pecten* Montfort, 1810

(non Lightfoot, 1786) (= *Murex tribulus* Linnaeus, 1758) by subsequent designation.

1758. *Murex* Linnaeus, *Syst. Nat.*, ed. 10 : 746.  
 1976. *Murex* : Radwin and D'Attilio, *Murex Shells of the World*, 60.  
 1988. *Murex* : Ponder and Vokes, *Rec. Aust. Mus. suppl.*, 8 : 14.

Shell spindle or club shaped ; three spinose varices ; spines variable ; siphonal canal narrow, long to very long, with or without spines ; aperture ovate to lenticular, with or without anal sulcus ; outer lip with or without labial tooth.

The genus includes largest number of species (30), distributed in tropical waters throughout the world (Radwin and D'Attilio, 1976) ; eleven species are reported in the present paper,

Key to species

1. Varices with single spine on shoulder of each whorl ; anal sulcus absent  
 ... .. *M. malabaricus*  
 Varices with more than one spine on each whorl, spines long ; anal sulcus present ... .. 2.
2. Siphonal canal with less than four spines below body whorl ; whorls angulate ; labial tooth long ... .. 3.  
 Siphonal canal with more than four spines either on entire or part of canal ; whorls rounded ; labial tooth short, some times inconspicuous ... .. 4.
3. Spire high ; axial sculpture with longitudinal ribs in between varices ; spines long ... .. *M. trapa*  
 Spire low ; axial sculpture with tubercles in between varices ; spines short, stumpy ... .. *M. brevispina brevispina*
4. Outer lip with slits open into base of spines, crenulations on margin deep ; axial sculpture weak ; spines short on body ... .. 5.  
 Outer lip with slits closed at base of spines, crenulations on margin shallow ; axial sculpture prominent ; spines long on body ... .. 6.
5. Spiral cords inconspicuous ; whorls with two inter varical axial ribs ... .. *M. occa*  
 Spiral cords prominent ; whorls without inter varical axial ribs ... .. *M. scolopax*
6. Siphonal canal with more than ten long narrow spines closely arranged like comb, secondary spines perpendicular to primary ones ... .. *M. pecten*  
 Siphonal canal with less than ten spines, spines distant, thick, secondary spines if present not perpendicular to primary ones ... .. 7.
7. Suture deep, canaliculate ; siphonal canal with more than seven spines, secondary spines present, not perpendicular to primary spines ; spiral sculpture more dominant ... .. *M. troscheli*  
 Suture shallow, not canaliculate ; siphonal canal with less than seven spines, secondary spines rarely develops, not perpendicular ; both axial and spiral sculpture present ... .. 8.
8. Siphonal canal very long, more than one and half times of body ; spines on canal very few not more than five, distant, second spine longest ; suture deep ... .. *M. tenuirostrum tenuirostrum*  
 Siphonal canal less than one and half times of body ; spines on canal more than five, decrease in size anteriorly ; suture shallow ... .. 9.
9. Spiral cords nodulose, cords with dark brown spots in between nodules ... .. *M. carbonieri*  
 Spiral cords simple, without brown spots ... .. 10.

10. Whorls with prominent spiral sculpture, axial sculpture obsolete ; canal with secondary spines in between primary ... .. *M. tribulus*  
 Whorls with both spiral and axial sculpture prominent ; axial ribs tuberculate, discontinuous ; canal without secondary spines in between primary... *M. ternispina*

### 15. *Murex brevispina brevispina* Lamarck

(pl. 3, figs. 7, 8, 9)

1822. *Murex brevispina* Lamarck, *Hist. nat. Anim. sans. Vert.*, 7 : 159. (Type locality : Unknown locality NHMG, No. 1099/5 from "Arabia" designated by Ponder and Vokes, 1988).  
 1875. *Murex brevispina* : Tapparone and Canefri, *Anneli del Museo Civico di Geneva*, 7 : 72.  
 1880. *Murex brevispina* : Tryon, *Man. Conch.*, 2 : 70 (part), pl. 11, fig. 21.  
 1976. *Murex brevispina* : Radwin and D'Attilio, *Murex Shells of the World* ; 62, pl. 11, fig. 2.  
 1978. *Murex (Murex) brevispina* : Vokes, *Ann. Nat. Mus.*, 22 (2) : 380.  
 1988. *Murex brevispina brevispina* : Ponder and Vokes, *Rec. Aust. Mus. Suppl.* 8 : 60, figs. 30, 32, 67A, 72F, 74C, 83A-C.

*Material examined* : 2 exs., Sri Lanka, 1 ex., Natal (Mixed coll. Regd. No. 3399) ; 1 ex., No data.

*Description* : Shell club shape, protoconch damaged, only part of last whorl seen, smooth, spire low, consists of 5-6 whorls including protoconch of one and half whorls ; body whorl large, whorls angulate with three rounded varices ; aperture large, ovate, outer lip margin thickened, crenulate, lower half with prominent labial teeth, inner lip detached, erect anteriorly, adherent posteriorly ; canal long, tubular, straight, broadly open ; sculpture consists of spiral cords and threads ; three cords on body whorl and single cord on other whorls develops into short and stumpy spines at the intersections with varices of which shoulder spine is slightly longer ; axial sculpture represented by two rounded prominent tubercles in two rows on body whorl and single row on rest of the whorls in between varices ; canal with one to two short spines developed just below the body.

Colour creamy white, aperture white inside.

*Remarks* : Ponder and Vokes (1988) reported this species from Nicobar Islands as present in the American Museum of Natural History and expressed its affinity to *Murex brevispina seniles* in having long spines. Melvill and Standen (1898) reported this species from Madras coast but we have not examined them. Zoological Survey of India have four specimens, three of them in a box with locality as 'Natal', on examining the shells two of them were found marked with 'C' indicating its locality as "Sri Lanka" (Ceylon) and the other as 'N' indicating its locality as 'Natal' with registered No. 3399. Other specimen is without any data. Specimen from Natal, was found encrusted by barnacles on its body.

*Distribution* : India : Nicobar Islands, Madras. Elsewhere : South Africa, Mozambique, Tanzania, Kenya, Somalia, Democratic Yemen, Mauritius.

<i>Measurements :</i>	L	D	LA	LS	LC
Smallest :	59.12	29.45	16.75	18.92	*20.15
Average :	68.61	32.50	19.50	20.25	*34.75
Largest :	68.25	36.90	18.78	21.05	*34.90

(\* broken canal)

### 16. *Murex carbonnieri* (Jousseaume)

(Pl. 4, figs. 1, 2, 3)

1881. *Acupurpura carbonnieri* Jousseaume, *Le Naturaliste*, 44 : 345 (Type locality : Aden, Red Sea).  
 1898. *Murex tribulus* : Melvill and Standen, *J. Conch. Lond.* 9 : 42.  
 1941. *Murex tribulus* : Crichton, *J. Bombay nat. Hist. Soc.*, 42 : 330. pl. 3. fig. 4.  
 1976. *Murex tribulus* : Radwin and D'Attilio, *Murex Shells of the World* : (in part, non Linnaeus).  
 1978. *Murex (Murex) carbonnieri* : Vokes, *Ann. Natal Mus.*, 23 (2) : 378, pl. 1, figs. 6, 7.  
 1988. *Murex carbonnieri* : Ponder and Vokes : *Rec. Aust. Mus. Suppl.* 8 : 22, figs. 7, 13, 70A, 75A-C, 80G-I.  
 1991. *Murex tribulus* : Surya Rao and Subba Rao, *Fauna of Lakshadweep, Mollusca : State Fauna ser.*, 2 : 318 (Part).

*Material examined* : 1 ex., Sika nr. Jamnagar ; 2 exs., Jaleswar nr. Veraval ; 1 ex., off Veraval ; 57 exs., Laccadive Sea, Marine Survey stn. 271 ; 12 exs., Malabar coast ; 1 ex. Ashtamudi Lake, Quilon ; 19 exs., Tranquebar ; 11 exs., Madras coast ; 2 exs., Uppada nr. Kakinda ; 2 exs., Kakinada ; 4 exs. Visakhapatnam ; 3 exs., Chatrapur, Ganjam ; 1 ex., Bhimilipatnam ; 2 exs., Chandrabhaga nr. Konarak ; 7 exs., Off Orissa coast ; 1 ex., Karachi ; 3 exs., Off Karachi ; 1 ex., Maldives ; 1 ex., S. W. of Torres Island.

*Description* : Shell club shaped, Protoconch similar to that of *M. tribulus*, whorls  $2\frac{1}{2}$ , sides rounded, smooth, suture deep, spire elevated, acute consisting of 7 to 9 whorls, whorls subangulate ; suture simple, crossed by growth lamellae ; aperture ovate, outer margin lip crenulate, lower part with small labial tooth, inner lip partly adherent on posterior, erect, detached on anterior part ; siphonal canal tubular, straight, terminally recurved, narrowly open ; body whorl large, preceding two whorls along with body whorl with three prominent varices, varices provided with long spines, shoulder spine longest, open, straight, curved terminally ; sculpture consists of spiral cords, of which three prominent, followed by secondary, in between with fine tertiary cords, both primary and secondary cords provided with spines on the varices, except for the shoulder spine, rest are short, straight ; siphonal canal with cords, provided with straight spines upto  $\frac{2}{3}$  of its length, gradually decrease in its length.

Colour of the shell creamy white to light brown, spiral cords with elongated brown spots between lighter nodes ; aperture smooth, white, marked with brown spots on notches. Operculum reddish brown with subterminal nucleus.

**Remarks :** This species closely resembles *Murex tribulus* and often confused with it, but readily distinguished by presence of reddish brown spots on its primary cords.

**Description :** India : Gujarat : Mandvi, Dwaraka, Sika, Veraval ; Maharashtra : Bassein, Bombay ; Karnataka : Honavar ; Kerala : Malabar coast ; Tamil Nadu : Tranquebar, Madras, Mandapam, Tuticorin ; Andhra Pradesh : Kakinada, Uppada, Visakhapatnam, Bhimilipatnam ; Orissa : Chatrapur, Puri, Konarak ; Andaman Islands. Elsewhere : Madagascar, Karachi, Maldives, Mauritius, Zanzibar, Tanzania, Persian Gulf, Pakistan, Bangladesh, Indonesia, Philippines, Indo-West Pacific.

<i>Measurements :</i>	L	D	LA	LS	LC
Smallest :	35.90	19.94	11.90	11.98	15.05
Average :	62.05	39.20	14.00	18.80	30.05
Largest :	99.25	62.10	20.70	26.40	56.80

### 17. *Murex malabaricus* Smith

(Pl. 4, figs. 4, 5, 6)

1894. *Murex malabaricus* Smith, *Ann. Mag. nat. Hist.*, (6) 14 : 162, pl. 3, fig. 3 (Type locality : Off Malabar coast).
- 1897-98. *Murex malabaricus* : Smith, *Illustr. Zoology I. M. S. 'Investigator'*, pt. 1, fig. 1a, b.
1901. *Murex malabaricus* : Melvill and Standen, *Proc. zool. Lond.* 397.
1928. *Murex malabaricus* : Melvill, *Proc. malac. Soc. Lond.*, 18 : 104.
1976. *Murex serratospinosus* : Radwin and D'Attilio, *The Murex Shells of the World* : 72 (part), pl. 10, fig. 2 (non Dunker).
1982. *Murex mindanoensis* : Abbott and Dance, *Compendium of Sea Shells* : 130, fig. (non Sowerby).
1988. *Haustellum malabaricus* : Ponder and Vokes, *Rec. Aust. Mus. suppl.*, 8 : 112, figs. 1D, 57, 58, 78G, 88A, B.

**Material examined :** 1 ex., Off Malabar coast, Stn. 146 "Investigator" (Type of *M. malabaricus*) ; 1 ex., Off Mangalore, 48 m., Arabian Sea, Stn. 242, 10 exs., Bay of Bengal, 119 m., 1 ex., Gulf of Martaban, Stn. 328, 112 m.

**Description :** Shell spindle shaped, moderately large ; Protoconch of  $2\frac{1}{2}$  whorls, smooth, sides rounded, suture deep, spire elevated, acute, consisting of eight whorls, suture deep, body whorl large, rounded ; aperture ovate, anal sulcus absent, outer lip erect, crenulate, interior slightly lirate, inner lip adherent slightly towards posterior end, detached and erect anteriorly. In young shells three to four elongated denticles present towards anterior margin, absent in the adult forms ; siphonal canal elongated, narrowly open, distally recurved upwards. Body whorl with three varices ; axial sculpture with three to six low ridges, nodulose ; spiral sculpture consists of primary cords twenty two in number interspersed with secondary cords, each secondary cord bounded by a tertiary cord ; on siphonal canal each primary cord flanked by two secondary cords. Primary cords give rise to short, open, recurved spines at the intersection with the varix ; shoulder spine

largest ; spines connected by web ; canal bears three to four short, straight open spines with alternate shorter spines. In young shells only two to three short spines present.

Colour of the shell light brown with dark transverse bands, one on shoulder, one at the middle and other at the lower part of body whorl, crest of spiral bands dark brown in colour. Aperture white with light pinkish colour inside.

*Remarks* : Younger shells have three prominent axial ridges. One of the young shells is found with a round hole on its spire made by a predator. In another shell (Stn. 242, Arabian Sea) a few epizoic shells are found attached to its body whorl, besides the tube of serpulid worms on its spire and body whorl. Shell from Gulf of Martaban (Regd. No. M 21200/4) had its spire bent towards right.

*Distribution* : India : Gujarat coast, West off Jaigarh in Maharashtra, Kerala coast & Mangalore, Bay of Bengal (Ponder and Vokes, 1988). Elsewhere : Gulf of Martaban ; United Arab Emirates ; Oman, North Arabian Sea, Pakistan.

<i>Measurements</i> :	L	D	LA	LS	LC
Smallest :	29.70	13.28	7.25	9.72	12.86
Average :	39.74	15.31	7.26	16.34	21.58
	108.44	42.74	23.00	38.35	52.85
					Type
Largest :	113.83	45.61	23.24	38.40	25.85

### 18. *Murex occa* Sowerby

(Pl. 4, figs. 7-9)

1834. *Murex occa* G. B. Sowerby, II *Conchological Illustrations*, *Murex*, pl. 64, fig. 45.  
 1841. *Murex occa* Sowerby, *Proc. zool. Soc. Lond.*, (1840) : 137. (Type locality : 'Insulas Nicobaricas' = Nicobar Island).  
 1845. *Murex occa* : Reeve, *Conch. Icon.*, 3, *Murex*, sp. 81, pl. 20, fig. 81.  
 1976. *Murex scolopax* : Radwin and D'Attilio, *Murex Shells of the World* : 71, pl. 10, fig. 7 (in part).  
 1982. *Murex occa* : Abbott and Dance, *Compendium of Sea Shells* : 130 fig.  
 1988. *Murex occa* : Ponder and Vokes, *Rec. Australian Mus. Suppl.* 8 : 51, figs. 25-27, 76D-F, 85F, Tab. 17.

*Material examined* : 1 ex., Andamans (Regd. No. 3398) ; 2 exs., Penang (Regd. No. 3398).

*Description* : Shell club shaped, protoconch of  $2\frac{1}{2}$  whorls, smooth, angulated, earliest whorl of dark colour, suture deep, spire elevated, acute, consists of four to five angular whorls, body whorl large, rounded, angulate at shoulder ; suture deep ; anal sulcus deep,

broad, aperture lenticulate, outerlip erect, margin coarsely dentate below shoulder, labial tooth prominent as in *M. trapa*, inner lip adherent, partly detached anteriorly, smooth; siphonal canal long, straight, open; sculpture consists of three prominent varices, ornamented with spines, axial sculpture represented by two or three ridges in between varices, spiral sculpture consists of three primary followed by secondary and tertiary, primary cords provided with spines, spines curved upwards, secondary cords with minute spines on varices; interstices of cords with axial ridges marked by tubercles on shoulder region; siphonal canal provided with five to six long spines decreasing in size anteriorly.

Colour creamy white, aperture white; operculum thin, brown in colour with longitudinal depression in middle.

**Remarks:** It is closely similar to *M. scolopax* and has been synonymised with it by earlier authors. However, it differs from *scolopax* in having angulate whorls, less prominent spiral cords, spines on varices shorter and stubby; labial tooth more prominent, shoulder much sloping than in *scolopax*. One of the shells found encrusted with bryozoan colonies.

**Distribution:** India: Andaman and Nicobar Islands. Elsewhere: Thailand, Malaysia, Singapore, Indonesia (Ponder and Vokes, 1988).

<i>Measurements:</i>	L	D	LA	LS	LC
Smallest:	71.70	32.60	22.54	18.13	32.05
Average:	80.80	32.50	23.35	17.70	41.60
Largest:	83.50	38.20	24.26	20.15	42.40

### 19. *Murex pecten* Lightfoot

(Pl. 4, figs. 10, 11; text fig. 15)

1786. *Murex tribulus* var. *pecten* Lightfoot, *Catalogue of the Portland Museum London*: 188. Type locality: "Amboina", lectotype designated by Ponder and Vokes, 1988 based on Rumphius fig 3).
1822. *Murex tenuispina* Lamarck, *Hist. nat. Anim. sans. Vert.*, 7: 158.
1967. *Murex triremis* Cernohorsky, *Marine Shells of the Pacific*, 1: 117, pl. 23, fig. 140.
1976. *Murex pecten*: Radwin and D'Attilio, *Murex Shells of the World*: 69, pl. 10, fig. 1.
1988. *Murex pecten pecten*: Ponder and Vokes, *Rec. Aust. Mus. suppl* 8: 69, figs. 1A, B, 36, 39, 68F, 71G, H; 77H, 86H.

**Material examined:** 2 exs., Sri Lanka; 1 ex., Off Cape Negrais, Myanmar (Marine Survey, Stn. 387).

**Description:** Shell club shaped, size ranges between 89 and 106 mm, protoconch of 2½ whorls, elevated, smooth, sides evenly curved, suture deep, last whorl with a spiral ridge



at its base, spire elevated, acute, consists of seven whorls, suture deep, canaliculate, body whorl large, globose ; aperture large, lenticulate, anal sulcus broad, shallow, outer lip erect, coarsely dentate, consists of five pairs of blunt teeth, interior lirate, inner lip adherent shortly on posterior side, calloused, anteriorly detached, strongly erect and its tip bent slightly left, smooth ; siphonal canal very long, narrowly open, straight and spinose, body whorl rounded with three spinose varices ; axial sculpture consists six to eight low ridges, nodulose ; spiral sculpture with primary, secondary and tertiary cords, gives rise to spines of various lengths at the intersection with varices ; shoulder spine longest, five major cords on the body and eleven to thirteen on the canal give rise to spines ; between shoulder spine and next large spine secondary and tertiary cords give rise to short spines ; between next two large spines one secondary and one tertiary spine and single tertiary spine on the lower part of body ; each primary cord on canal develops into long, ventrally closed, upwardly curved spine, decreasing in length anteriorly, and second set of spines short, ventrally bent, developed between primary ones.

Colour light brown to pale, interior of aperture deep brown ; notches on outer lip margin reflecting the cords.

*Remarks* : Specimens from Sri Lanka are light brown and has nine long spines on the canal, whereas the specimen from Cape Negrais has thirteen long spines.

*Distribution* : Andamans, Sri Lanka ; Myanmar : Indo-West Pacific (Ponder and Vokes, 1988).

<i>Measurements</i> :	L	D	LA	LS	LC
Smallest :	89.43	50.12	18.02	20.05	50.94
Average :	95.87	46.74	17.26	21.05	56.59
Largest :	105.36	48.65	22.36	24.58	58.05

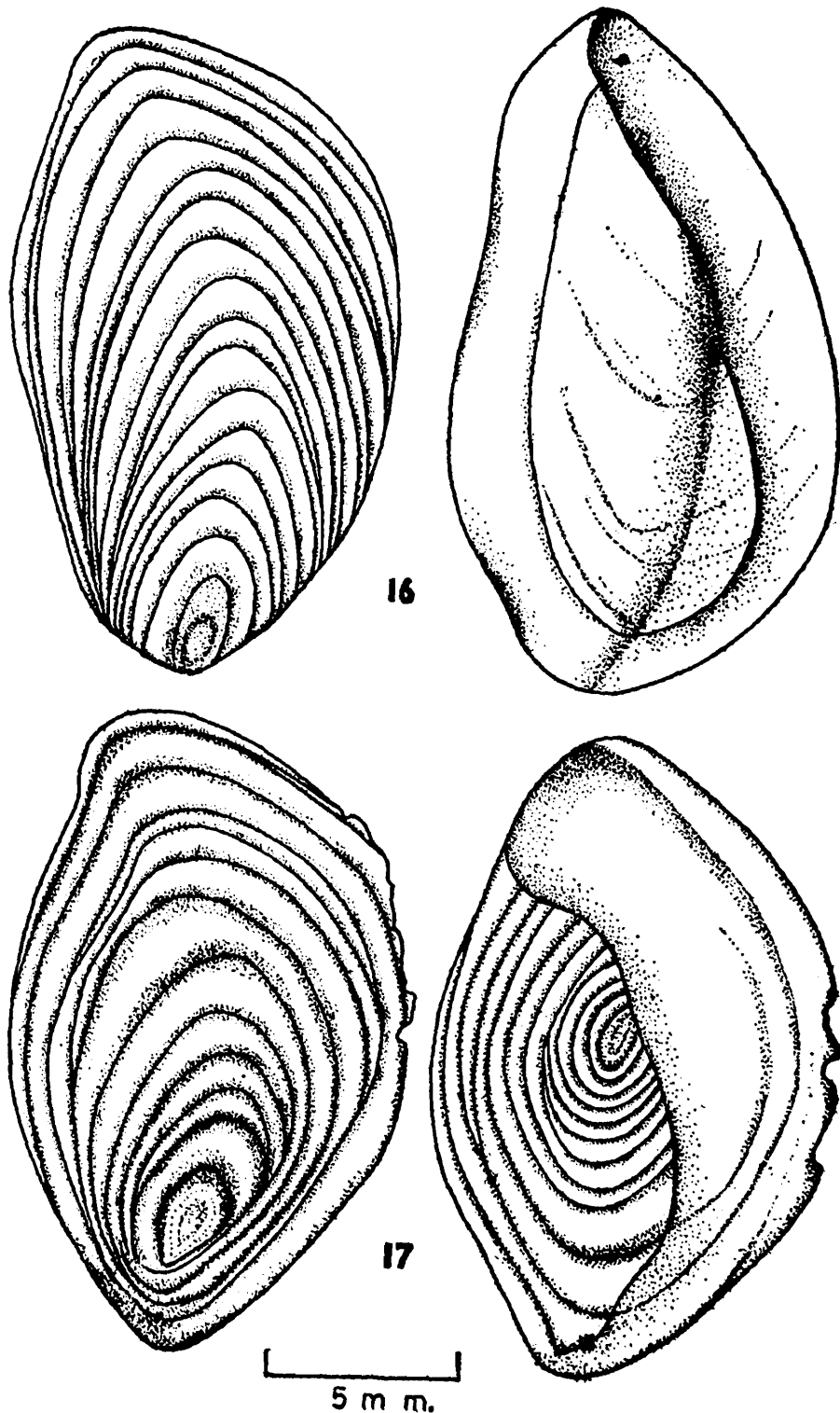
## 20. *Murex scolopax* Dillwyn

( Pl. 5, figs. 1, 2 ; text fig. 16)

1817. *Murex scolopax* Dillwyn, *Descriptive Catalogue of Recent Shells*, 2: 681. (Type locality: Red Sea, refers to Chemnitz, 1795, figs. 1819, 1820 and Martini, 1777, fig. 1052) Lectotype designated by Dean, 1936.)
1928. *Murex scolopax* : Melvill, *Proc. malac. Soc. Lond.*, 18 (3): 104.
1976. *Murex scolopax* : Radwin and D'Attilio, *Murex Shells of the World* : 71, pl. 10, fig. 6.
1988. *Murex scolopax* : Ponder and Vokes, *Rec. Aust. Mus. suppl.* 8: 49, figs. 24, 25, 72C, 76AB, 84A-C, 85E.

*Material examined* : 1 ex., Andamans, (Regd. No. 3398), 1 ex, Annesley Bay (Regd. No. 3397).

*Description* : Shell club shaped, protoconch of  $2\frac{1}{2}$  whorls, smooth, angulated in the middle, especially in the last whorl, ends with an axial rib from which sculpture of



Text figs : Operculum 8X—16 ; *Murex scolopax* ;  
17 : *Murex trapa*.

teleoconch starts, spire high acute, consists of five to six sub-angulate whorls ; body whorl large, rounded, suture deep canaliculate ; anal sulcus broadly deep, aperture lenticulate,

outer lip erect, coarsely dentate, no teeth above shoulder, five teeth below shoulder, fourth one broad forming a labial tooth, inner lip adherent posteriorly formed with callus and anteriorly detached, erect and smooth, with a fold above canal; siphonal canal long, straight, narrowly open and distally curved upwards; body whorl with three spinose varices; axial sculpture absent in the adult shells, faintly present in the young shells as ridges, but prominent on shoulder as tubercles (2 to 3 in number); spiral sculpture consists of strong cords and fine threads, cords four to five on the body whorl and six on the canal excluding threads in between; cords give rise to moderately long, curved spines, two to four threads present on shoulder in between cords; in larger shells small spinelets developed in between the long spines on canal.

Colour of the shell pale brown with dark brown streaks on cords, interior white.

*Ramarks*: Shell from Annesley Bay is largest in the lot with long curved spines on the body whorl, as well as on the canal closely resembling *M. pecten*, but differs in the absence of axial sculpture and in the nature of spines. In younger shells axial sculpture is slightly prominent as ridges. It also closely resembles *M. brevispina* but differs in the presence of number of spines on the canal, and elevated spire. In another shell, spire is dark brown in colour and is covered with bryozoans.

*Distribution*: India: Andamans. Elsewhere: Gulf of Oman (Melvill, 1928); North Indian Ocean from Red Sea to N. W. Australia and Philippines (Radwin and D'Attilio, 1976). Red Sea Democratic Yemen, Persian Gulf (Ponder and Vokes, 1988).

<i>Measurements</i> :	L	D	LA	LS	LC
Smallest :	84.90	38.91	20.65	20.45	41.16
Largest :	120.85	66.50	31.95	31.20	*59.78
	( * canal broken)				

## 21. *Murex tenuirostrum tenuirostrum* Lamarck

(Pl. 5, figs. 3, 4, 5)

1832. *Murex tenuirostrum tenuirostrum* Lamarck, *Hist. nat. Anim. sans Vert.*, 7: 159 (Type locality: Unknown) Lectotype designated by Ponder and Vokes, 1988).
1839. *Murex tenuirostrum*: Deshayes and Milne Edwards, *Hist. nat. Anim. sans. Vert.*, (3rd ed.), 3: 702.
1967. *Murex tribulus*: Cernohorsky, *Marine Shells of the Pacific* 1: 117 (in part) (non Linnaeus).
1976. *Murex ternispina*: Fair, *The Murex Book*: 80 (in part), pl. 1, fig. 7 (non Linnaeus).
1979. *Murex tribulus*: D'Attilio, *Hawaiian Shells News.*, 27 (5): 16 (non Linnaeus).
1982. *Murex tribulus*: Abbott and Dance, *Compendium of Sea Shells*: 130, fig. in text (non Linnaeus).
1988. *Murex tenuirostrum tenuirostrum*: Ponder and Vokes, *Rec. Aust. Mus. Suppl.*, 8: 24, figs. 1c, 8-11, 70C, 73C, 78C, 80B, C.
1991. *Murex tribulus*: Surya Rao and Subba Rao, *Fauna of Lakshadweep. State Fauna ser.*, 2; 311 (Part) (non Linnaeus).

**Material examined :** 1 ex., Lakshadweep Sea, stn. 272 (Marine Survey) ; 2 exs., Off Travancore stn. 467 (Marine Survey) ; 1 ex., Reef N. of Fuladu Island, stn. 655 (Marine Survey) ; 3 exs., Madras coast, shallow water (Marine Survey) ; 3 exs., Indian coast (Marine Survey) ; 4 exs., Neil Island, S. Andamans ; 1 ex., Gulf of Martaban, Andaman Sea (Marine Survey) ; 9 exs., Off C. Negrais, Burma, stn. 387 (Marine Survey) ; 1 ex., Hong Kong.

**Description :** Shell large upto 92 mm. in length, club shaped, protoconch of  $2\frac{1}{2}$  whorls, smooth, sides evenly curved, whorls elevated, suture shallow, curved axial rib on the last whorl demarcates from the teleoconch ; spire acute consists of 8 to 10 whorls including protoconch of two and half smooth whorls ; whorls rounded but due prominence of primary cord on shoulder appears angulate, suture shallow ; body whorl large, rounded, aperture oblong, outer lip margin erect, crenulate, lirate inside, lower half with a prominent labial tooth ; inner margin adherent posteriorly, erect, detached anteriorly, canal very long, straight, canaliculate, narrowly opens.

Sculpture of both spiral and axial, consists of cords and ribs ; each whorl with three rounded varices except of protoconch, these varices give rise to long spines at the intersections of spiral cords ; body whorl with three primary cords one on shoulder, one at middle, third at lower part and followed by secondary cords in between spiral threads ; canal consists of more than ten cords ; primary and secondary cords give rise to long spines of which shoulder one is the longest and this follows in each whorl, secondary cords also give shorter spines ; spines closed, curved, solid ; spines on canal very few and maximum of five on its upper part, second spine is longest only on the body whorl others gradually decrease in size ; axial sculpture consists of longitudinal ribs prominent on earlier whorls, but on body whorl tuberculate in appearance at intersections with spiral cords, body whorl and penultimate whorls with five to seven in number in between varices and their number reduced in earlier whorls.

Colour creamy white, aperture white ; operculum thin, horny reddish brown with excentric nucleus.

**Remarks :** This species has been recorded as *Murex tribulus* and *M. ternispina* by earlier workers and closely resembles *M. aduncospinosus*. It differs from it in having shallow suture. It also differs from *M. tribulus* and *M. ternispina* in having very long siphonal canal with very few short spines. Ponder and Vokes designated the Lectotype from an unknown locality present in the Geneva Museum and photographed. The specimen is without any spine on its siphonal canal. It can be readily distinguished by presence of six to seven nodulose axial ribs in between varices on body whorl and a longest second spine on canal. It is a deep water form as evidenced by the collections made from deep waters (1649 M). Specimen from Gulf of Martaban is found encrusted by growth of red coral ; another specimen from Off Travancore is with serpulid tube near its aperture.

**Distribution :** India : Arabian Sea-Off Kerala coast, Bay of Bengal-Off Madras coast, Tranquebar, Andamans. Elsewhere : Seychelles, Yemen, Oman, U.A. Emirates, Myanmar, Thailand, Malaysia, Indonesia, Philippines, Papua New Guinea, Australia, Solomons, New Caledonia, Marshall Islands.

<i>Measurements :</i>	L	D	LS	LA	LC
Smallest :	26.72	15.31	8.12	7.10	12.66
Average :	71.25	37.10	16.36	13.65	44.70
Largest :	90.70	42.00	19.35	15.05	58.30

## 22. *Murex ternispina* Lamarck

(Pl. 5, figs. 6, 7, 8)

1822. *Murex ternispina* Lamarck, *Hist. nat. Anim. sans. Vert.*, 7 : 158 (Type locality : Indian Ocean).  
 1845. *Murex nigrispinosus* Reeve, *Conch. Icon.*, 3 : *Murex*, sp. 79, pl. 20, fig. 79.  
 1846. *Murex nigrispinosus* Reeve, *Proc. zool. Soc. Lond.*, (1845) : 88.  
 1964. *Murex (Acupurpura) nigrispinosus* : Habe, *Shells of the Western Pacific in colour* : 49, pl. 25, fig. 2.  
 1976. *Murex tribulus* : Radwin and D'Attilio, *Murex Shells of the World* : 72 (in part), pl. 10, fig. 8 (non Linnaeus).  
 1988. *Murex ternispina* : Ponder and Vokes, *Rec. Aust. Mus. Suppl.*, 8 : 80, figs. 41-43, 77J, 86B, C, tab. 31.

**Material examined :** 1 ex., Bhadreswar, Kutch ; 1 ex., Orissa coast (Bengal Fisheries) ; 32 exs., Andamans ; 10 exs., Neil Island, South Andamans ; 11 exs., Off Sri Lanka (Marine Survey) ; 2 exs., West of Colombo (Marine Survey) ; 3 exs., Myanmar.

**Description :** Shell moderate to large, club shaped, protoconch of  $1\frac{1}{2}$  whorls, smooth, sides sloping, angulate at base, suture deep, spire low consists of 8 to 9 whorls including protoconch of two whorls rounded ; suture deep with crossed terminations of growth lamellae from the preceding whorl ; body whorl large, globose ; aperture ovate, outer lip margin crenulate, interior lirate, inner lip partly adherent towards posterior, erect anteriorly ; canal straight, long, canaliculate, narrowly opens, terminations of previous canals fuse with it. Sculpture consists of spiral cords and axial ribs, cords on body whorl differentiate into primary, secondary in between with threads, these cords give rise to long spines at the intersections of varices which are three in number on each whorl, of which shoulder spine is very long and prominent in each whorl, body whorl consists of three primary cords followed by secondary which gives to long spine of various sizes, spines solid, closed, terminally curved, decrease in size gradually ; canal with five prominent cords which give rise to long spines curved terminally, shoulder spine on body whorl is the longest and straight ; axial sculpture consists of longitudinal rounded ribs in between varices, ribs on body whorl appears discontinued as tubercles ; operculum thin, horny, reddish brown, with subcentral nucleus, and raised concentric lamellae.

Colour creamy white, aperture white, terminal parts of spines with dark purple colour which sometimes fades away.

*Remarks* : Most of the earlier workers referred this species under other species, especially under *Murex tribulus*. Ponder and Vokes (1988) validated this species by recovering its type from Lamarck's collections. This species can be distinguished by presence of discontinued axial ribs on its whorls and tips of spines with dark purple colour.

Most of the collections present are juvenile and old, and the colouration of the tips of the spines have been lost.

*Distribution* : India : Gujarat : Kutch, Andamans, Orissa. Elsewhere : Sri Lanka, Myanmar, Singapore, Indonesia, Hong Kong, Philippines, Japan, Papua New Guinea, Solomons, Australia.

<i>Measurements</i> :	L	D	LA	LS	LC
Smallest :	25.44	*14.30	5.70	6.84	14.24
Average :	86.42	52.60	21.18	21.61	49.54
Largest :	94.24	*51.90	22.58	22.29	53.54

(\* spine broken)

### 23. *Murex trapa* Roeding

(Pl. 5, figs. 9, 10, 11 ; text fig. 17)

1798. *Murex trapa* Roeding *Museum Boltenianum* : 145. (Type locality : Tranquebar, India, designated by Ponder and Vokes, 1988).
1822. *Murex rarispina* Lamarck, *Hist. nat. Anim. sans. Vert.*, 7 : 158.
1845. *Murex martinianus* Reeve, *Conch. Icon.*, 3 *Murex*. sp. 72, pl. 18, fig. 72.
1942. *Murex tribulus* var. *trapa* : Gravely, *Bull. Madras Govt. Mus. new Ser.* (2) : 98.
1952. *Murex trapa* : Satyamurti, *Bull. Madras, Govt. Mus. new Ser.*, 1 (2) : 153, pl. 14, fig. (for other synonyms).
1967. *Murex trapa* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 117, pl. 23, fig. 138.
1976. *Murex trapa* : Radwin and D'Attilio, *Murex Shells of the World* : 72, pl. 10, fig. 14.
1988. *Murex trapa* : Ponder and Vokes, *Rec. Aust. Mus. suppl.* 8 : 41, figs. 17-19, 67 G, H ; 71 B, C ; 73D ; 83G, H.

*Material examined* : 1 ex., Digha beach ; 23 exs., Sandheads, Bay of Bengal ; 2 exs., Chandipur ; 1 ex., Puri ; 1 ex., Kakinada ; 2 exs., Dammulapalem ; 2 exs., Uppada ; 7 exs., Manginapudi nr. Masulipatnam, 2 exs., North of Setubaba Chatram, nr. Pudukottai ; 15 exs., Tranquebar ; 11 exs., Andamans ; 24 exs., Akyab, Myanmar.

*Description* : Shell club shaped, of moderate size. protoconch of  $2\frac{1}{2}$  whorls, smooth, mildly depressed, base with prominent spiral ridge at its base which continues as shoulder ridge on teleoconch, suture deep, spire elevated, acute, consisting of seven post nuclear whorls,

whorls angular, body whorl large, rounded ; suture deep ; aperture large, lenticular, anal sulcus broad and deep, outer lip erect and crenulate throughout except between anal sulcus and shoulder spine, last few fused to form into a broad prominent labial tooth on the anterior part, inner lip adherent posteriorly, formed into callus, detached, weakly erect anteriorly ; siphonal canal elongated, straight, narrowly open ; body whorl bears three varices, rounded and spinose ; axial sculpture with four to five intervarically low costae ; spiral sculpture with primary, secondary and tertiary cords ; three primaries on body bounded by tertiaries, one on shoulder, one on middle and the other on lower part, three secondary cords each above shoulder margin and between first and second primaries ; two secondary cords between second and third primary cords and each followed by a tertiary one ; basal primary cord followed by one secondary and three tertiary cords ; the canal region with a secondary cord followed by three tertiary cords and this repeated thrice on canal, the primaries and two secondaries on lower part of body give rise to moderate to short spines, closed ventrally, curved upwards on body and straight on canal.

Colour light brown, aperture and interior margin white, deep brown in middle.

*Remarks* : This species closely agrees with *M. tribulus* but differs in having an elevated and acute spire, and subangulate whorls ; canal bearing a few spines on upper part, more prominent labial tooth. The species is reported from Gulf of Kutch by Menon *et. al.* (1961) but the figure given by them suggest it to be *M. tribulus*. So far there is no record of this species from the west coast of India. Taylor, J. D. (1980) studied the gut contents of this species and found that it feeds on polychaetes, crustaceans and fish scales.

*Distribution* : India : East coast from Sandheads to Tranquebar ; Krusadai Is., Tuticorin, Andamans. Elsewhere : Madagascar, Mauritius, Myanmar, Akyab : Thailand, Philippines, China, Malaysia, Indonesia to Japan and Fiji (Ponder and Vokes, 1988).

<i>Measurements</i> :	L	D	LA	LS	LC
Smallest :	28.60	14.16	8.09	9.32	13.45
Average :	58.45	27.90	13.35	14.90	30.86
Largest :	92.85	49.32	21.25	27.70	47.52

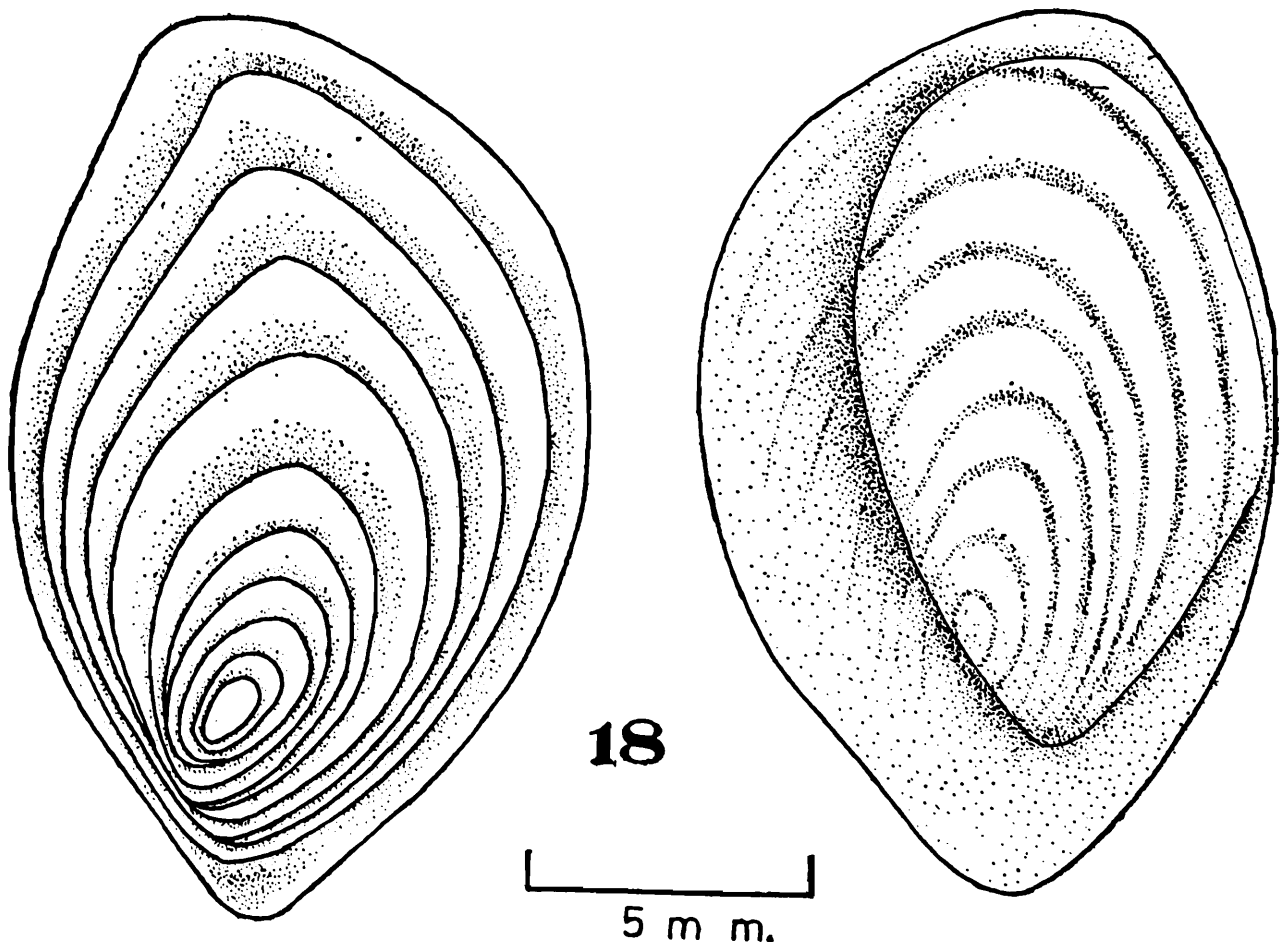
#### 24. *Murex tribulus* Linnaeus

(Pl. 6. figs. 1, 2, 3 ; text fig. 18)

1758. *Murex tribulus* Linnaeus, *Syst. Nat.*, ed. 10 : 746. (Type locality : O. Asiae).  
 1898. *Murex tribulus* : Melvill and Standen, *J. Conch, Lond.*, 9 : 42.  
 1904. *Murex ternispina* : Smith, *Ann. Mag. nat. Hist. Soc.* (7) 13 : 416.

1906. *Murex ternispina*: Smith, in: *Gardiner's Fauna and Geography of the Maldivian and Laccadive Archipelagoes*, pt. 2: 608.
1942. *Murex tribulus*: Gravely, *Bull. Madras Govt. Mus. new Ser.* 75 (2): 98, fig. 8c.
1952. *Murex tribulus*: Subrahmanyam *et. al.* *J. Univ. Bombay (N. S.)* 21: 43, fig. 93.
1967. *Murex tribulus*: Cernohorsky, *Marine Shells of the Pacific*, 1: 117, pl. 23, fig. 139.
1976. *Murex tribulus*: Radwin and D'Attilio, *Murex Shells of the World*: 72, pl. 10, fig. 8 & 9, text figs. 40-42 (for synonyms).
1977. *Murex tribulus*: Ray, *Contribution to the Knowledge of the Molluscan fauna of Maungmagan, Lower Burma*: 46.
1988. *Murex tribulus*: Ponder and Vokes, *Rec. Aust. Mus. suppl.* 8: 18, figs. 5, 6, 67D, E; 70B, 73A, B, 80A.

**Material examined**: 1 ex., Okha; 8 exs., Madhi nr. Dwaraka; 2 exs., Off Kerala coast (Investigator stn. 611); 11 exs., Off Malabar coast (Investigator stn. 273); 1 ex., Laccadive Sea; 1 ex., Backwater, Munambam, Kerala; 2 exs., Porto Novo; 16 exs., Kakinada; 4 exs., Puri, Madras etc. (Mixed Coll.); 1 ex., Paradip nr. Cuttack; 1 ex., Chandipore; 1 ex., East Chanel Light house, Bay of Bengal (Golden Crown); 2 exs., Andamans; 9 exs., No data; 6 exs., Persian Gulf (Investigator stn. 291 & 344); 1 ex., Maungmagan, Myanmar; 8 exs., Singapore.



Text fig. 18: *Murex tribulus*-Operculum 8X.



**Description :** Shell club shaped, protoconch of  $3\frac{1}{2}$  whorls, sides evenly curved, smooth, last whorl with prominent spiral ridge, suture shallow ; spire high, acute, consists of six to seven rounded whorls suture compressed, deep ; body whorl globose ; aperture large, sub circular ; anal sulcus broad, shallow ; outer lip erect with limited crenulations, few crenulations on lower part of body whorl united into a prominent labial tooth ; interior lirate, inner lip slightly adherent posteriorly, with callus, anteriorly detached and erect, canal elongate, tubular, narrowly open, straight, distally curved ; body whorl consists of three spinose varices ; axial sculpture consists of three to four prominent costae, strongly nodose ; spiral sculpture with primary, secondary and tertiary cords, body whorl bears three primary cords one on the upper, one in the middle and an other at the lower parts, each primary cord intercalated with two secondary cords and latter flanked by fine tertiary cords ; both primary and secondary cords give rise to spines ; spines of primary cords straight, long and ventrally closed, those of secondary short and closed ; body spines slightly curved upwards, spines on the canal slightly bent ventrally, decreasing in length anteriorly, generally seven in number.

Colour white to light brown ; interior of aperture white, tips of the spines some times dark purple.

**Remarks :** It has highly variable colour and sculpture. It closely agrees with the preceding species, but differs from it in having more spines on the entire length of the canal, less pointed and blunt labial teeth. Radwin & D'Attilio (1976) described the polymorphism in this species.

**Distribution :** Very common on east and west coasts of India ; Indo-west Pacific (Radwin and D'Attilio, 1976).

<i>Measurements :</i>	L	D	LA	LS	LC
Smallest :	17.94	8.64	9.60	6.05	8.30
Average :	81.15	43.84	17.40	20.59	44.59
Largest :	111.20	63.71	25.46	26.18	60.16

## 25. *Murex troscheli* Lischke

(Pl. 6, figs. 4,5)

1868. *Murex troscheli* Lischke, *Malak. Blatt.*, 15 : 219 (Type locality : Nagasaki).  
 1904. *Murex troscheli* : Smith, *Ann. Mag. nat. Hist.*, (6) 13 : 462.  
 1967. *Murex troscheli* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 117.  
 1976. *Murex troscheli* : Radwin and D'Attilio, *Murex Shells of the World*, : 74, pl. 7, fig. 18.  
 1988. *Murex troscheli troscheli* : Ponder and Vokes, *Rec. Aust. Mus. suppl.* 8 : 27, figs. 13, 14, 70D, 73H, 82A-C (for other synonyms).

**Material examined :** 1 ex., Andaman Sea, 164 m. (Marine Survey, Stn. 237, Lat. 13°17'N ; Long. 90°7'E.).

**Distribution :** Shell large, club shaped, spire high, with seven rounded whorls ; suture deep, canaliculate, body whorl globose, medium size ; aperture sublenticular to ovate, anal sulcus very shallow, broad, outer lip erect, crenulate, interior lirate, inner lip slightly attached posteriorly, detached weakly, erect anteriorly, smooth ; canal elongate straight, narrowly open, body whorl with three spinose varices ; axial sculpture five to six low costae, not prominent ; spiral sculpture with primary and secondary cords with fine threads, scabrous, spines given off at the intersection of the cords with varices ; spines long, solid, closed, curved upwardly ; body whorl with nine straight spines, on the canal gradually decreasing in length anteriorly ; secondary set of spinelets almost perpendicular to primary ones, shoulder spine longest.

Colour of the shell light brown with dark brown on the spiral cords, interior of aperture white.

**Remarks :** It closely agrees with *M. pecten*, but differs from it in having less number of spines on the canal and spines being thicker and coarse. Columellar lip weakly erect, callus does not extend beyond anal sulcus.

**Distribution :** India : Andamans. Elsewhere : Indonesia, Taiwan, Solomon Islands (Ponder and Vokes, 1988), Japan.

<b>Measurements :</b>	L	D	LA	LS	LC
	107.95	*52.14	23.50	30.60	18.16
		(* broken spines)			

### Genus *Muricanthus* Swainson, 1840

Type species : *Murex radix* Gmelin, 1791. ICZN opinion 888, 1969).

1840. *Muricanthus* Swainson, *Treatise on Malacology* : 419.

1976. *Muricanthus* : Radwin and D'Attilio, *Murex Shells of the World* : 75.

Shell generally with four to eleven varices ; with moderate to long foliaceous spines, body whorl large, globose, aperture large, outer lip serrate ; siphonal canal short to moderately long, narrowly open, outer lip without labial tooth.

It includes eight species (Radwin and D'Attilio, 1976) but two species are so far known from Indian waters,

## Key to the species

Shell with four varices ; shoulder spine prominent ; prominent knob in between varices ; canal with two spines ... ..	<i>M. virgineus</i>
Shell with more than four varices : shoulder spine not prominent ; no knob in between varices ; canal with single spine ... ..	<i>M. kuesterianus</i>

26. *Muricanthus kuesterianus* (Tapparone-Canefri)

(Pl. 6, figs. 6, 7)

1875. *Murex kuesterianus* Tapparone-Canefri, *Ann. Mus. Civ. Stor. Nat. Genova*, 7 : 635, pl. 19. (Type locality : East Africa).  
 1952. *Murex virgineus* : Subrahmanyam *et. al. J. Univ. Bombay*, 21 : 44, fig. 96.  
 1961. *Murex virgineus* : Menon *et. al.*, 1961. *J. Bombay nat. Hist. Soc.* 58 (2) : 486, pl. 7, fig. 56.  
 1976. *Muricanthus kuesterianus* : Radwin and D'Attilio, *Murex Shells of the World* : 76, pl. 12, fig. 7.

*Material examined* : Gujarat—19 exs., Port Okha ; 3 exs., Adatara ; 1 ex., Naya-bandar nr. Bedi port ; 2 exs. Sika ; 5 exs., Hanumandandi, Beyt Island.

*Description* : Shell broad ; spire low with five angular whorls ; suture obscure ; anal sulcus broad and deep, delimited by parietal ridge ; aperture large, ovate, outer lip erect, strongly dentate, inner side lirate, few of the denticles on lower part fused to form a prominent labial tooth, inner lip adherent, smooth, slightly detached and twisted anteriorly ; siphonal canal broad, short, narrowly open, distally curved ; body whorl large, globose, with seven to eight rounded varices ; spiral sculpture with major and minor cords, rounded, shoulder region with short, ventrally open spines, more prominent on spire forming into an angle, near the anterior region each varix develops into a prominent, short, ventrally open spine forming into a sort of cluster, preceded by very short spines ; canal with a large stout spine.

Colour dark brown, interior of aperture white with light purplish brown margin.

*Remarks* : It resembles *M. virgineus* very closely and is often mistaken for that. Hence the confusion by the earlier authors (Subrahmanyam *et. al.* 1952, Menon *et. al.* 1961) who identified them as *M. virgineus*. But the figure clearly indicates that it is *M. kuesterianus*. The eastern range of the species does not extend beyond west coast of India.

*Distribution* : India : Gujarat and Bombay. Elsewhere : Gulf of Oman and adjacent region (Radwin and D'Attilio, 1976).

<i>Measurements</i> :	L	D	LA	LS	LC
Smallest :	38.10	27.06	13.10	15.07	12.98

Average :	51.66	37.94	19.25	20.12	18.12
Largest :	61.95	44.60	22.95	21.40	21.74

### 27. *Muricanthus virgineus* (Roeding)

(Pl. 6, figs. 8, 9, 10)

1798. *Purpura virginea* Roeding, *Museum Boltenianum* : 141 (Type locality : Not given. Refers Chemnitz fig. 1030).  
 1822. *Murex anguliferus* Lamarck, *Hist. Anim. sans. Vert.*, 7 : 171.  
 1898. *Murex (Phyllonotus) anguliferus* : Melvill & Standen, *J. Conch. Lond*, 9 : 42.  
 1922. *Murex anguliferus* : Hornell, *Madras Fish. Bull.*, 14 (6) : 135.  
 1942. *Murex virgineus* var. *ponderosa* : Gravely, *Bull. Madras Govt. new Ser.* 5 (2) : 98, fig. 86.  
 1952. *Murex virgineus* var. *ponderosa* : Satyamurti, *Bull. Madras Govt. Mus. new. Ser.*, 1 (2) : 155, pl. 15, fig. 1a, 1b.  
 1976. *Stratus virgineus* : Radwin and D'Attilio, *Murex Shells of the World* : 108, pl. 17, fig. 15.

**Material examined** : 2 exs., Indian Seas, (M 19034/3) ; 2 exs., Porto Novo ; 1 ex., Tuticorin beach ; 1 ex., Oyster bed about 23 kms. from Tuticorin, 110 m. depth ; 5 exs., Hare Island nr. New Tuticorin port ; 3 exs., Shore nr. Inspection bungalow, Tuticorin ; 1 ex., nr. State Fisheries unit, Tuticorin ; 1 ex., Setubaba Chatram, 5 kms. west of Mallipattinam, South of Pattukottai ; 8 exs., Mallipattinam east wards to Pudupattinam ; 3 exs., Adirampattinam ; 1 ex., Cuddalore ; 1 ex., North of jetty, Solathandakuppam, nr. Pondicherry ; 1 ex., Madras ; 7 exs., Sri Lanka.

**Description** : Shell moderate to large, ranging from 35 to 117 mm., fusiform ; spire elevated, acute, consisting of six to seven subangulated whorls ; suture obscured by succeeding whorl ; body whorl large, globose ; aperture large, ovate ; anal sulcus shallow inverted 'U' shaped, delimited by parietal ridge on left ; outer lip thick, erect, coarsely dentate, prominent tooth towards lower part of body, interior weakly lirate ; inner lip adherent completely, except for anterior most part twisted slightly, smooth except for parietal ridge ; siphonal canal of moderate length, broad, narrowly open, distally curved upwards towards right. Body whorl with four rounded varices ; axial sculpture with a single prominent knob like ridge, scarcely extends anteriorly ; spiral sculpture of six to seven major cords alternating with minor cords and fine threads of scabrous nature ; intersection of major cords with varices develops few short, open spines, curved backward, a prominent one on shoulder margin, two on lower part of body whorl and two on the canal ; a deep groove on lower part of body indicating the position of labial tooth. Spine on lower part of body may develop into a wing like structure.

Colour light cream with either a pinkish or chocolate brown band on middle of body interior of aperture marble white with reddish pink margins, some times with light pink band indicating its position on outer part.

**Remarks :** Some of the shells have very heavy, thick and tumid body whorl, axial knobs more closed towards the developing varices, almost fusing with the latter, less developed spines on lower part and almost smooth on shoulder margin. Such shells are generally identified as a variety *ponderosa* Sowerby (Satyamurti, 1952 & Gravely, 1942). On examination of the shells from Tuticorin, we found that it is nothing but a slight variation from the typical form. The species recorded by Subrahmanyam *et. al.* (1952) and Menon *et. al.* (1961) as *Murex virgineus* from west coast of India do not belong to this species, and on examination of the figures given by them reveals that it agrees with *M. kuesterianus*. Some of the shells particularly collected from oyster bed from Tuticorin are encrusted with calcareous tubes of *Vermetus* sp. serpulids, oysters, bryozoans, corals and have holes made by other boring animals.

This species apparently resembles *Murex ramosus*, but differs from it in the presence of four varices on body whorl and less developed foliaceous spines on varices. It also closely agrees with *Muricanthus kuesterianus*, but differs from it in having less number of varices and in the presence of axial knob and prominent shoulder spines on varices. Radwin and D'Attilio (1976) doubtfully included the species in the genus *Siratus*. The genus *Siratus* is characterised by a body whorl with three prominent varices, more axial ribs between varices, siphonal canal moderate to very long, bent to right ; columellar lip with few denticles. But as the species in question do not have these characters we are more inclined to include it under the genus *Muricanthus* which has more than three varices on the body whorl.

**Distribution :** India : Rameswaram ; Pamban ; Kundugal point ; Tuticorin, Madras ; (Hornell, 1921, Satyamurti, 1952). Elsewhere : North western Indian ocean from east Africa to Bay of Bengal (Radwin and D'Attilio, 1976).

<i>Measurements :</i>	L	D	LA	LS	LC
Smallest :	35.96	25.00	11.85	13.90	14.22
Average :	*89.26	64.75	28.80	35.82	35.54
Largest :	*117.54	80.65	36.46	46.90	48.88

(\* Spire broken)

Genus *Naquetia* Jousseaume, 1880.

Type species : *Murex triqueter* Born, 1778

1880. *Naquetia* Jousseaume, *Le Naturaliste*, 1 (42) : 335.

1976. *Naquetia* : Radwin and D'Attilio, *Murex Shells of the World* : 79.

Shell fusiform, slender with three varices ; varical extensions more prominent anteriorly, composed of fused fronds on varix ; proportion of spire and body whorl differs from species to species. Radula with broad laterals.

It is restricted to Indo-west Pacific (Radwin and D'Attilio, 1976). Three species are reported from Indian waters.

#### Key to the species

1. Columella partly adherent ; siphonal canal long, narrow ; varical webbing overlapping the preceding whorl ... .. *N. annandalei*  
 Columella entirely adherent ; siphonal canal short, broad ; varical webbing absent ... .. 2.
2. Shell broad ; anal sulcus deep ; varices frondose ; no anterior extension on last varix ; axial sculpture without prominent knobs on shoulder ... .. *N. capucina*  
 Shell narrow ; anal sulcus shallow ; varices rounded ; anterior extension on last varix present ; axial sculpture with prominent knobs on shoulder... *N. triqueter*

#### 28. *Naquetia annandalei* (Preston)

(Pl. 7, figs. 1, 2, 3)

1910. *Pteronotus annandalei* Preston, *Rec. Indian Mus.*, 5 : 118, fig. 3. (Type locality : Off Gopalpur, 55-69 m.).
1968. *Pterynotus (Naquetia) annandalei* : Vokes, *J. Conch. Lond.*, 26 : 302, pl. 13, fig. 1-2. (for Synonyms).
1976. *Naquetia annandalei* : Radwin and D'Attilio, *Murex Shells of the World* : 80, pl. 15, fig. 9-10.
1987. *Naquetia annandalei* : D'Attilio and C. M. Hertz. *The Festivus.*, 19 (6) : 56, figs. 1-6, 11 (for other synonyms).

**Material examined** : 1 ex., Off Gopalpur, Orissa (Type Regd. No. 4708/1) ; 1 ex., Andaman Sea, Marine Survey, Stn. no. 223 or 224 (Lat. 14°54' 30'' N. Long. 96°13' E., 10 or 100 m. depth).

**Description** : Shell moderately large, slender, fusiform ; spire high, acute consisting of seven subangulate whorls ; suture impressed ; body whorl large, fusiform ; aperture lenticular ; anal sulcus shallow, inverted 'U' shaped ; outer lip thick, weakly erect, inner side lirate ; inner lip adherent posteriorly, detached anteriorly, smooth ; siphonal canal long, moderately broad, narrowly open, distally curved right, body whorl with three frondose varices, varical webbing overlaps the preceding whorl, more prominent extension on anterior ; axial sculpture with two to three prominent knobs on shoulder region ; spiral sculpture of body whorl consists of ten primary cords enclosing secondary and tertiary cords, primary cords three on canal.

Colour light brown with three dark reddish brown bands on the body whorl, single band on each whorl of the spire, interior white with light pinkish patch.

**Distribution :** India : Off Gopalpur, Orissa, Andaman Sea. Elsewhere : Off east Africa and Red Sea, (Radwin and D'Attilio, 1976). Philippines (D'Attilio and Hertz, 1987).

<i>Measurements :</i>	L	D	LA	LS	LC
	75.48	30.60	21.68	28.48	30.32 (Type)
	82.35	34.41	22.44	31.65	32.72

### 29. *Naquetia capucina* (Roeding)

(Pl. 7. fig. 4)

1798. *Purpura capucina* Roeding, *Museum Boltenianum* : 143, (Type locality : Not given, refers Martini Chmnitz, 3 fig. 994).  
 1822. *Murex capucinus* : Lamarck, *Hist. nat. Anim. sans. Vert.*, 7 : 164.  
 1845. *Murex capucinus* : Reeve, *Conch. Icon.*, 3 : *Murex* sp. 10, pl. 2, fig. 10.  
 1880. *Murex (Naquetia) capucinus* : Tryon, *Men. Conch.*, 2 : 94, pl. 19, fig. 174.  
 1967. *Chicoreus capucinus* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 120, pl. 25, fig. 149.  
 1976. *Naquetia capucina* : Radwin and D'Attilio, *Murex Shells of the World* : 80, pl. 15, fig. 13.

**Material examined :** 15 exs., Andamans ; 3 exs., Mayabander, North Andaman ; 1 ex., Nicobar ; 1 ex., Perka, Car Nicobar ; 7 exs., Arakan.

**Description :** Shell moderate, fusiform, spire elevated, consisting of six subangulate post nuclear whorls ; suture not clear ; body whorl medium, fusiform ; aperture ovate ; anal sulcus deep, inverted 'V' shaped ; outer lip thick, erect, coarsely dentate ; inner side lirate with seven prominent denticles ; inner lip adherent, smooth, with a prominent knob on posterior side, anteriorly slightly detached ; siphonal canal short, broad, moderately open, distally curved right, body whorl with three rounded, thick varices, thrown into number of folds, laminate ; axial sculpture with one to two low ridges intervarically ; spiral sculpture with alternate major and minor cords, minor cords bordered by narrow thread, intersection of these cords thrown out to low folds or frills and these frills more prominent on the canal, younger shells with a continuous webbing on the varices, touching the preceding whorl.

Colour dark chestnut brown, interior white with light pink margin.

**Remarks :** Most of the shells are seen encrusted with oysters, serpulid tubes, barnacles etc. Shells from Mayabandar are slightly eroded and here the tips of spire broken. Shells from Singapore, New Caledonia, Penang have a short, open spine near the shoulder margin on the varices intercepted by a major cord.

**Distribution :** India : Andaman & Nicobar islands. Elsewhere : Philippines & Singa-

pore to Western Australia (Radwin and D'Attilio, 1976). It is recorded for the first time from Bay of Bengal thus extending its range of distribution further westwards.

<i>Measurements :</i>	L	D	LA	LS	LC
Smallest :	28.10	15.45	7.75	9.90	8.28
Average :	43.10	25.10	18.95	22.25	11.12
Largest :	65.25	31.55	19.40	34.92	17.50

### 30. *Naquetia triqueter* (Born)

(Pl. 7, figs. 5, 6)

1778. *Murex triqueter* Born, *Index rerum naturalium Musei Caesarei Vindobonensis* pt. 1, *Testacea*: 288. (Type locality: ?).
1880. *Murex triqueter*: Tryon, *Man. Conch.* 2: 85, pl. 40, figs. 506 & 515.
1880. *Murex (Pteronotus) trigonulus*: Tryon, *Man. Conch.* 2: 84, pl. 11, fig. 120.
1967. *Pterynotus triqueter*: Cernohorsky, *Marine Shells of the Pacific*, 1: 126, pl. 26, fig. 160.
1968. *Pterynotus (Naquetia) triqueter*: Vokes, *J. Conch. Lond.*, 26: 302, pl. 13, fig. 3-4. (for other synonyms).
1976. *Naquetia trigonula*: Radwin and D'Attilio, *Murex Shells of the World*: 81, pl. 15, fig. 12.
1976. *Naquetia triquetra*: Radwin and D'Attilio, *Murex Shells of the World*: 82, pl. 15, fig. 11.

*Material examined*: 4 exs., Andamans.

*Description*: Shell narrow, fusiform; spire high, consists of five whorls; suture obscure; body whorl moderately large, fusiform; aperture large, ovate, anal sulcus broad and shallow; outer lip erect, finely crenulate, inner side lirate; inner lip smooth, adherent, except for anterior part slightly detached and erect; siphonal canal broad, short, narrowly open, distally curved right, body whorl with three rounded and thick varices; axial sculpture consists of three low, elongated ridges between varices; spiral sculpture with eleven major cords alternate with two to three fine threads, scabrous nature, intersection of varices with these cords develop into prominent nodes; each varix developed into webbing anteriorly, its posterior part overlapping with preceding whorl, demarcation of outer lip with fimbriate membrane on ventral side clear.

Colour of the shell creamy brown with dark brown bands, two to three on body whorl and blotches on rest. Interior of aperture white.

*Remarks*: Vokes (1968) dealt in detail the taxonomic characters of this species and compared it with another closely allied species, *N. trigonula*, and synonymised the latter with former. The distribution of *N. triqueter* and *N. trigonula* overlaps in the Indian Ocean, particularly in the Philippines. Isolated examples of intermediate forms, presumably hybrids have also been noticed (Radwin and D'Attilio, 1976).



**Distribution :** India : Andamans. Elsewhere : Mauritius, Philippines, East Africa (Mozambique) to Fiji island, Philippines and Okinawa (Radwin and D'Attilio, 1976). Throughout the tropical Indo-Pacific, uncommon (Cernohorsky, 1967). It is the first record from Indian waters.

<i>Measurements :</i>	L	D	LA	LS	LC
Smallest :	26.75	12.86	8.84	10.70	9.22
Average :	39.54	19.05	10.55	11.56	15.30
Largest :	56.05	26.70	14.66	29.70	15.00

### Genus *Pterynotus* Swainson, 1833

**Type species :** *Murex pinnatus* Swainson,\* (= *Purpura alata* Roeding, 1798) by monotypy, Swainson, 1833 (text pl. 122).

1833. *Pterynotus* Swainson, *Zoological Illustrations*, (2) 3: expl.

1976. *Pterynotus* Radwin and D'Attilio, *Murex Shells of the World*: 98.

1978. *Pterynotus*: Cernohorsky, *Rec. Auckland Inst. Mus.*, 15: 74.

1983. *Pterynotus*: D'Attilio and Myers, *The Festivus*, 15: (7): 69, fig. 1-2.

Shell with three varices expanded into thin edges, fusiform, columella adherent posteriorly and detached or partly attached anteriorly; siphonal canal short, open, distally recurved right; operculum muricoid; radula muricine, central tooth shows less developed cusps and lateral teeth large with broad base.

**Remarks :** The genus closely resembles other allied genera *Pterochelus* and *Marchia* under Muricinae and *Pteropurpura* under Ocenebrinae, but differs from *Pterochelus* in the absence of shoulder spine; denticles in the aperture as in *Marchia* and fusion of siphonal canal as in *Pteropurpura*. Radwin and D'Attilio (1976) remarked that the genera *Pterochelus* and *Marchia*, can be treated as of equal rank or as subgenera of *Pterynotus*. D'Attilio and Myers (1983) added eight more species under this genus since the publication of *Murex Shells of the World* (Radwin and D'Attilio, 1976). Out of those only two species are represented in Indian waters viz. *P. pinnatus* and *P. albobrunneus*. The latter species is not included in the present studies, as there was no material in hand.

### 31. *Pterynotus pinnatus* (Swainson)

(Pl. 7, figs. 7, 8)

1822. *Murex pinnatus* Swainson, *A catalogue of the shells which formed the collection of Mrs. Bligh, with an appendix containing.....descriptions of many new species*: 17.

1942. *Murex pinnatus*; Gravely, *Bull. Madras Govt. Mus. new Ser.* 5 (2): 98, fig. 8d.

1967. *Pterynotus pinnatus* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 124, pl. 26, fig. 158.  
 1974. *Pterynotus alatus* : Cernohorsky, *Rec. Auckland Inst. Mus.*, 11 : 173, fig. 46 (for synonyms).  
 1976. *Pterynotus alatus* : Radwin and D'Attilio, *Murex Shells of the World* : 98, pl. 26, fig. 158.

**Material examined** : 1 ex., Porto Novo ; 1 ex., Andamans.

**Description** : Shell fusiform, moderately large ; spire high, consisting of six to eight whorls ; body whorl large and fusoid, suture shallow ; aperture ovately broad ; anal sulcus not distinct ; outer lip erect, finely crenulate and interiorly lirate ; inner lip smooth briefly attached and expanded posteriorly and detached and erect anteriorly ; siphonal canal moderate, centrally open, bent towards right and distally curved upwards. Body whorl with three varices expanded into thin flanges continuing along the body and canal ; its margin developed into broad point near shoulder, posterior margin overlaps with the preceding whorl ; ventral part of the extension with scaly appearance ; axial sculpture consists of a single, low knob like ridge, prominent on shoulder, intervarically ; spiral sculpture consists of numerous fine, nodulose threads with alternate major and minor cords.

Colour almost white to very light fawn with few brown patches on the wing. Aperture white.

**Distribution** : India : Porto Novo and Andamans ; Madras (Gravelly, 1942) ; Elsewhere : Hong Kong, China, South Japan, Taiwan (Radwin and D'Attilio, 1976) ; Throughout Tropical Indo west Pacific. Moderately rare (Cernohorsky, 1976).

<i>Measurements</i> :	L	W	LA	LS	LC
	59.22	25.48	14.48	29.35	18.08 (Porto Novo)
	66.65	30.48	14.68	31.00	21.00 (Andamans)

**Subfamily** : MURICOPSINAE Radwin and D'Attilio, 1976

Shell fusiform to biconic, moderately small ; aperture ovate variable, anal sulcus weak, siphonal canal moderate length, narrowly open ; whorls bear prominent varices, variable in number not less than four, each with foliaceous or spinose projections ; gap between body and canal without sculpture ; surface with fine growth of axial lamellae which intersect spiral cords ; operculum unguiculate, marginally thick, depressed centrally, annulate as in Muricinae ; rachidian tooth with large, broad prominent central cusps, base deeper, strong end points, cusps independent and intermediate, denticles represented as wrinkles or folds between lateral cusps and end points.

The subfamily includes 9 genera and 74 species (Radwin and D'Attilio, 1976) distributed in tropical and subtropical waters in depth upto 300 m. World wide.

The following genera viz. *Favartia*, *Murexiella*, *Muricopsis* and *Vitularia* are represented in India and adjacent countries.

Key to the genera

- |  |     |                         |
|--|-----|-------------------------|
| 1. Shell large, pyriform, suture deep, canal partly closed   | ... | <i>Vitularia</i>        |
|  |     | ( <i>V. miliaris</i> )  |
| Shell small, suture not deep, canal open   | ... | 2.                      |
| 2. Body whorl with moderately defined varices, spiral sculpture scabrous   | ... | <i>Favartia</i>         |
| Body whorl with either spinose or foliaceous varices, spiral sculpture not scabrous                                  | ... | 3.                      |
| 3. Shell with shouldered whorls, siphonal canal short, interior of outer lip dentate, varices with scale-like spines | ... | <i>Muricopsis</i>       |
| Shell with rounded whorls, siphonal canal long, interior of outerlip edentate, varices with foliaceous spines        | ... | <i>Murexiella</i>       |
|  |     | ( <i>M. macgintyi</i> ) |

Genus *Favartia* Jousseaume, 1880

Type species : *Murex breviculus* Sowerby by original designation.

1880. *Favartia* Jousseaume, *Le Naturaliste*, 1 (42) : 335.

1976. *Favartia* : Radwin and D'Attilio, *Murex Shells of the World* : 144.

Shell fusiform, spire high, aperture ovate ; siphonal canal short narrowly open, dorsally recurved ; body whorl with three to seven varices, perpendicular to body ; spiral cords scabrous, some times extend beyond varical margin as spines ; gap between body and canal in spiral sculpture.

The genus includes 23 species distributed in tropical and subtropical regions (Radwin and D'Attilio, 1976) ; out of these only four species are found in India and adjacent countries. Three species are included here.

Key to the species

- |   |     |                     |
|---|-----|---------------------|
| 1. Shell large, broad, body whorl with four varices, canal narrowly open      | ... | <i>F. tetragona</i> |
| Shell small, not broad, body whorl more than four varices, canal broadly open | ... | 2.                  |

2. Spire either equal or longer than body whorl including canal ... *F. salmonea*  
 Spire short less than body whorl including canal ... *F. cyclostoma*

### 32. *Favartia cyclostoma* (Sowerby)

(Pl. 7, fig. 9)

1841. *Murex cyclostoma* Sowerby, *Proc. zool. Soc. Lond.*, : 146 (Type locality: Bohol, Philippines); 1841, *Conchological Illustrations (Murex)* sp. 107, pl. 194, fig. 95.  
 1845. *Murex cyclostoma*: Reeve, *Conch. Icon.*, 3, *Murex* sp. 154, pl. 31, fig. 154.  
 1845. *Murex nucula* Reeve: *Conch. Icon.*, 3, *Murex* sp. 131, pl. 29, fig. 131.  
 1880. *Murex cyclostoma*: Tryon, *Man. Conch.*, 2: 121, pl. 36, fig. 426.  
 1880. *Murex nucula*: Tryon, *Man. Conch.*, 2: 122, pl. 36, fig. 420.  
 1901. *Murex (Ocinebra) cyclostoma*: Melvill and Standen, *Proc. zool. Soc. Lond.* pt. 2: 398.  
 1904. *Murex (Ocinebra) sykesi* Preston, *J. Malac.*, 11 (4): 76, pl. 6, figs. 7, 8 (Type locality: Ceylon=Sri Lanka).  
 1976. *Favartia cyclostoma*: Radwin and D'Attilio, *Murex Shells of the World*: 147, pl. 24, fig. 11.  
 1981. *Murex (Ocinebra) sykesi*: D'Attilio, *The Festivus*, 13 (6): 73, 3 figs.  
 1983. *Favartia sykesi*: D'Attilio, *The Festivus*, 15 (4): 40, figs. 1-2.  
 1984. *Favartia cyclostoma*: D'Attilio and Myers, *The Festivus*, 16 (11): 120, figs. 1-12.

**Material examined**: 3 exs., Mauritius and Sri Lanka (Regd. No. 3430, one of the shell marked as 'C' indicating its locality as Ceylon, now Sri Lanka).

**Description**: Shell small, suture impressed, aperture ovate, anal sulcus broad and indistinct, outer lip erect and crenulate, interior lirate, inner lip slightly adherent posteriorly and detached anteriorly, smooth and erect; canal short, broad and narrowly open; sculpture consists of four to six lamellate varices on body, spiral sculpture consists of five cords on body and two on canal and two on spiral whorls; interstices with varices develops into small scales, recurved behind, first varix fimbriate, trailing edge, deeply excavated between cords.

Colour generally white with light brown patches, aperture white with pale pinkish tinge.

**Ramarks**: The present material is a little wornout, hence its fine sculpture is not seen clearly on its varices. Tryon (1880) considered *Murex nucula* Reeve as separate species because of its less crowded ribs, whereas Sowerby (1841) kept it as a variety under *cyclostoma*. D'Attilio and Myers (1984) selected lectotype and discussed about the type status, synonyms and gave redescription of this species.

**Distribution**: Sri Lanka, Mauritius; Red sea, Persian Gulf (Melvill and Standen, 1901); Philippines; Zanzibar, East Africa (Radwin and D'Attilio, 1976), Tanzania, Red Sea, Dar es Salam (D'Attilio and Myers 1984).

<i>Measurements :</i>	L	D	LA	LS
Smallest :	9.90	6.30	6.70	4.50
Average :	10.65	6.95	6.90	5.00
Largest :	12.50	7.40	8.15	6.00 (marked as C)

### 33. *Favartia salmonea* (Melvill & Standen)

(Pl. 7, figs. 10)

1853. *Murex pumilus* A. Adams, *Proc. zool. Soc. Lond.*, : 70 (not Broderip, 1883).  
 1899. *Murex (Ocinebra) salmoneus* Melvill and Standen, *J. Linn. Soc.*, 27 : 162, pl. 10, fig. 2 (Type locality : Torres strait).  
 1906. *Murex (Ocinebra) salmoneus* : Smith, E. A., in : *Gardiner's Fauna and Geography of the Maldive and Laccadive Archipelagoes*, pt. 2 : 608.  
 1976. *Favartia salmonea* : Radwin and D'Attilio, *Murex Shells of the World* : 153, pl. 24, fig. 15.

*Material examined* : 2 exs., Sri Lanka, (Mixed collection Regd. No. 3429, 4 exs., locality given Mauritius and Ceylon = Sri Lanka).

*Description* : Shell moderate in size, not exceeding 25 mm., fusiform, spire elevated and consists of five angular whorls ; body whorl large, broadly fusoid, suture distinctly wavy, aperture ovately rounded, anal sulcus shallow ; outer lip thick, with finely crenulate edge, interior lirate, inner lip partly adherent posteriorly, detached and erect anteriorly, smooth ; canal short, broad, narrowly open and terminally curved right ; axial sculpture consists of six rounded varices, spiral sculpture consists of five distinct cords on middle of body, two on canal ; a distinct gap between spiral cords of body whorl and canal, few distinct cords above shoulder margin and few in between body cords, spiral whorls with two to three cords ; cords elevated on trailing edge of each varix fimbriate.

Colour generally pinkish, more on varices, aperture creamy white with light pink interior.

*Remarks* : The present material is very old and hence the actual colour cannot be made out. Shells from Sri Lanka are narrow and have more elevated spire than those from Mauritius.

*Distribution* : Sri Lanka, Maldives, Mauritius, Zanzibar, Mozambique ; off north eastern and eastern Australia, Queensland (Radwin and D'Attilio, 1976).

<i>Measurements :</i>	L	D	LA	LS
Smallest (*) :	16.14	9.64	9.06	8.24 (* spire broken)
Average :	19.50	10.45	9.00	11.45
Largest :	23.27	14.26	11.87	11.86

34. *Favartia tetragona* (Broderip)

(Pl. 7, figs. 11)

1833. *Murex tetragonus* Broderip, *Proc. zool. Soc. Lond.*, 2: 174. (Type locality: not given).  
 1841. *Murex tetragonus*: Sowerby, G. B., *Conchological Illustrations*, *Murex* sp., 111, figs. 25, 36.  
 1845. *Murex tetragonus*: Reeve, *Conch. Icon.*, 3, *Murex* sp. 118, pl. 26, fig. 118.  
 1880. *Murex (Ocinebra) tetragona*: Tryon, *Man. Conch.*, 2: 121, pl. 36, fig. 425.  
 1967. *Favartia tetragona*: Cernohorsky, *Marine Shells of the Pacific*, pt. 1: 129, pl. 28, fig. 168.  
 1976. *Favartia tetragona*: Radwin and D'Attilio, *Murex Shells of the World*: 153, pl. 14, fig. 3, text fig. 96.

*Material examined*: 2 exs., Andamans & Mauritius, (Regd. No. 3493).

*Description*: Shell medium in size, stumpy, broadly fusiform, spire elevated and consists of five to six angulated whorls; body whorl broad, fusiform, suture indistinct, aperture ovately rounded, anal sulcus indistinct, outerlip erect, crenulate, interior lirate; inner lip strongly erect, smooth, slightly adherent posteriorly; canal short, broad, narrowly open, and terminally recurved upwards towards right; sculpture consists of four varices, spiral sculpture consists of seven to eight strong cords on body and two to three on canal, leading varix is broad and laminate, cords elevated on trailing edge of each varix; Colour light brown, aperture white.

*Remarks*: In the present material colouration cannot be made as the shells are much worn out. One of the specimen has a prominent short and upwardly curved spine on shoulder margin both on body and spiral whorls.

*Description*: India: Andamans. Elsewhere: Mauritius, Polynesia, Bet island, Torres straits, Australia; Australia to Fiji (Cernohorsky, 1967); Wadingi island, Fiji, Bohol, Luzon islands. Philippines (Radwin and D'Attilio, 1976). Tryon (1880) states that this species was reported from Andaman islands by E.A. Smith.

<i>Measurements</i> :	L	D	LA	LS
Smallest:	17.80	15.00	11.15	10.90
Largest:	21.80	15.90	14.10	11.80

Genus *Murexiella* Clench & Perez Farfante, 1845

Type species: *Murex hidalgoi* Crosse, 1869 by Original designation.

1945. *Murexiella* Clench & Perez Farfante, *Johnsonia*, 1 (17): 49.  
 1976. *Murexiella*: Radwin and D'Attilio, *Murex Shells of the World*: 155.

Shell generally small and fusiform, outer margin of aperture without teeth ; anal sulcus indistinct, body whorl with four to eight varices with foliated spines, surface scabrous ; canal long and narrowly open.

The genus includes thirteen species, distributed world wide in tropical and sub-tropical waters (Radwin and D'Attilio, 1976). In India only two species are recorded but the material studied belong to one species only.

### 35, *Murexiella macgintyi* (M. Smith)

(Pl. 8, figs. 1, 2, 3)

1938. *Murex macgintyi* M. Smith, *Nautilus*, 51 (3) : 88, pl. 6. fig. 11 (Type locality : Clewiston, Florida, Pliocene.)  
 1976. *Murexiella macgintyi* : Radwin and D'Attilio, *Murex Shells of the World* : 159, pl. 25, figs. 10, 11.

*Material examined* : 5 exs., Andamans (Regd. No. 3440) ; 2 exs., Ross island, Port Blair, (Regd. No. M 19060/3).

*Description* : Shell generally small in size, fusiform, spire high, acute, consists of four angulated whorls, body whorl globose, suture impressed, aperture oval, anal sulcus indistinct, outer lip erect, margin crenulate interior lirate, inner lip slightly adherent posteriorly, strongly detached anteriorly, smooth ; canal moderately long, : narrowly open, dorsally curved upwards ; sculpture consists of seven to eight frilled, spinose varices, shoulder edge with prominent spines upwardly curved, spiral sculpture consists of five major cords on body whorl, two each on spiral whorls and two on canal, each major cord bordered with fine cords on either side, a gap between cords on body and canal ; interstices developed into open spines, upwardly curved ; canal with two prominent spines.

Colour light brown, aperture white.

*Remarks* : The present material bears the label as *Muricidea cirrosa* Hinds, and was reported earlier by Smith (1878) and Melvill and Sykes (1897) from Andamans under that name. This species closely agrees with *M. cirrosa* (Hinds) but differs in having less number of cords on body whorl and two spines on the canal. The earlier reports also must be referring to this species.

*Distribution* : India : Andamans. Elsewhere : East and west coast of Florida, Bahamas to southern California (Radwin and D'Attilio, 1976). This is the first record from Andamans as well as from Indian waters.

<i>Measurements</i> :	L	D	LA	LS
Smallest :	7.69	4.08	9.98	3.25

Average :	12.15	7.15	8.30	4.80
Largest :	13.92	8.42	9.72	5.44

### Genus *Muricopsis* Bucquoy, Dautzenberg and Dollfus, 1882

Type species : *Murex blainvillei* Payaudeau, 1826 by original designation.

1882. *Muricopsis* Bucquoy, Dautzenberg and Dollfus, *Moll. Mar. Roussillon*, 1 : 16.  
 1976. *Muricopsis* : Cernohorsky, *Rec. Auckland Inst. Mus.*, 13 : 116 (for other synonyms).  
 1976. *Muricopsis* : Radwin and D'Attilio, 1976, *Murex Shells of the World* : 165.

Shell generally small, fusiform, spire high, whorls shouldered ; aperture ovate to lenticular, outer lip denticulate interiorly, inner lip denticulate or pustulose, varices six to seven with scale like spines, spiral cords scabrous.

The genus includes a total of nineteen species. But only one species is known from Indian waters.

### 36. *Muricopsis bombayanus* (Melvill)

(Pl. 8, fig. 4)

1893. *Murex (Ocinebra) bombayanus* Melvill, *Mem. Proc. Manchr. lit. Phil. Soc.*, (4) 7 : 52, pl. 1 fig. 1. (Type locality : Bombay).  
 1901. *Murex (Ocinebra) bombayanus* : Melvill and Standen, *Proc. zool. Soc. Lond.*, pt. 2 : 398.  
 1928. *Murex (Ocinebra) bombayanus* : Melvill, *Proc. malac. Soc. Lond.*, 18 : 104.  
 1951. *Ocinebra bombayana* : Hornell and Tomlin, Appendix in *Indian Molluscs* : 88.  
 1952. *Ocinebra bombayanus* : Subrahmanyam et. al. *J. Univ. Bombay*, 21 (3) : 46, fig. 47.  
 1976. *Muricopsis bombayanus* : Radwin and D'Attilio, *Murex Shells of the World* : 166, pl. 27, fig. 6.

**Material examined** : 5 exs., Gujarat, Madhavpur (North & South) ; 1 ex., Mangrol ; 3 exs., Chorwad ; 2 exs., Kotda ; 1 ex., Navibandar ; 1 ex., Delvada ; 1 ex., Miani ; 1 ex., Porbandar ; 1 ex., Veraval ; 1 ex., Muldwaraka ; 2 exs., Daman-Devka ; 4 exs., Jampore ; 13 exs., Bombay (Regd. No. 3556).

**Description** : Shell fusiform, spire elevated, acute, generally higher than body whorl including siphonal canal, consists of five to six angular whorls ; suture impressed, body whorl moderate, aperture oval, anal sulcus broad 'U' shape, outer lip erect, outer margin feebly crenulate, interior margin with six teeth, inner lip adherent posteriorly, detached anteriorly, smooth with two to three pustules anteriorly ; canal short, open, recurved upwards ; sculpture consists of seven varices, lamellose, shoulder region spinose, spiral sculpture with four major cords with single minor cord in between and scabrous ; canal with



one major cord, bordered with two minor cords, interstices with scale like spines, shoulder ones more prominent.

Colour light brown, aperture white.

*Distribution* : Gujarat, Bombay, Ratnagiri, Goa near Panjim (Melvill and Standen, 1901). Elsewhere : Karachi, Persian Gulf (Melvill, 1928).

<i>Measurements</i> :	L	D	LA	LS
Smallest :	13.72	12.90	7.90	7.05
Average :	30.55	15.85	16.22	16.20
Largest :	35.30	19.13	18.38	19.90

### Genus *Vitularia* Swainson, 1840

Type species : *Vitularia tuberculata* Swainson, 1840 (= *Murex miliaris* Gmelin, 1791) by Monotypy.

1840. *Vitularia* Swainson, *A Treatise on Malacology* : 297.

1929. *Transtrafer* Iredale, *Mem. Queensland Mus.*, 9 (3) : 295 (Type species by O. D. *T. longmani* Iredale, 1929 = *Murex miliaris* Gmelin, 1791).

1976. *Vitularia* : Radwin and D'Attilio, *Murex Shells of the World* : 173.

1980. *Vitularia* : Cernohorsky, *Rec. Auckland Inst. Mus.*, 16 : 171.

Shell pyriform, suture deep, undulate, spire elevated with shouldered whorls, anal sulcus weakly developed or absent ; canal short, outer lip thickened, interior dentate, aperture ovate.

Only two species are present under this genus. Out of which one species is represented in India and adjacent waters.

### 37. *Vitularia miliaris* (Gmelin)

(Pl. 8, fig. 5)

1788. "*Murex purpura scabra*" Chemnitz, *Syst. Conch. Cab.*, 10 : 246, pl. 161, figs. 1532-35 (Type locality : Nicobar island) syntype in Copenhagen Museum (non binom).

1791. *Murex miliaris* Gmelin, *Syst. Nat. ed.* 13 : 3536, (refers Martini Chemnitz op. cit.)

1798. *Purpura onagrina* var. b. Roeding, 1798, *Museum Boltenianum* : 139.

1880. *Murex (Vitularia) miliaris* : Tryon, *Man. Conch.*, 2 : 133, pl. 35, figs. 393 and 397.

1967. *Vitularia miliaris* : Cernohorsky, 1967, *Marine Shells of the Pacific*, pt. 1 : 129, pl. 28, fig. 169.

1974. *Vitularia miliaris* : Cernohorsky, *Rec. Auckland Inst. Mus.*, 11 : 179, fig. 52 (syntype).

1976. *Vitularia miliaris* : Radwin and D'Attilio, *Murex Shells of the World*, 173, pl. 7, figs. 7, 12, and 13 (for other synonyms),

*Material examined* : 3 exs., Andaman & Nicobars ; (2 exs., Regd. No. M 19053/3) ; 1 ex., Neil island.

*Description* : Shell pyriform, spire elevated, acute, consists of five shouldered whorls, body whorl large with nine varices ; aperture broad, lenticular, outer lip thick, flaring, margin crenulate, interior dentate with eleven teeth, eight prominent ; inner lip adherent posteriorly detached anteriorly, projecting outward, smooth, canal short, partially closed in middle, slightly curved, left side of canal with row of vestiges of former canals ; anal sulcus broad, not clear ; axial sculpture consists of nine varices, oblique, lamellose, touching the preceding whorl, broad, spiral depression below shoulder, another one above canal, spiral sculpture consists of fine scabrous threads.

Colour light fawn with chocolate bands in the middle as well as on canal, spiral whorls with single band on their shoulder, aperture white with light brown margin.

*Distribution* : India : Andaman and Nicobar Islands. Elsewhere : West coast of South Africa, Seychelles to Polynesia (Cernohorsky, 1967), generally throughout Indo-West Pacific (Radwin and D'Attilio, 1976).

<i>Measurements</i> :	L	D	LA	LS
Smallest :	41.48	22.38	27.20	18.28
Average :	51.85	35.09	34.76	23.35
Largest :	53.25	33.85	35.46	22.32

#### Subfamily TROPHONINAE Cossmann, 1903

Shell generally fusiform, aperture ovate, devoid of teeth on lips, varices developed into lamellose structures, spiral sculpture weak or absent, siphonal canal short to long, narrowly open, protoconch short, simple, whorls convex, operculum muricine type. Radula resembles that of Muricinae, five independent cusps, crowded towards central tooth, base of central cusp broad, shallow.

Radwin and D'Attilio (1976) listed only best known 29 species stating that their present information was not adequate to deal authoritatively about the group. Cernohorsky (1977 a, b, 1980) added 14 species to this subfamily, distributed worldwide in cooler and deeper waters at a depth range of 0 to 500 metres.

Only two genera viz. *Actinotrophon* and *Boreotrophn* are recorded from Indian and neighbouring waters. The present material is represented by the types only.

## Key to the genera

Shell with flattened spines on whorls	...	...	<i>Actinotrophon</i> ( <i>A. planispina</i> )
Shell without spines on whorls	...	...	<i>Boreotrophon</i>

Genus *Actinotrophon* Dall, 1902

Type species : *Trophon* (*Boreotrophon*) *actinophorus* Dall, 1889, by original designation.

1902. *Actinotrophon* Dall, *Proc. U. S. natn. Mus.*, 24 (1264) : 541.

Shell fusiform with long coronating spines, canal short, open, successive canals curved outward, projecting from siphonal fasciole ; closely resembles *Boreotrophon* but differs in having spines, canal short.

The genus includes two species viz. *actinophorus* Dall and *planispina* Smith. Of these two, *planispina* is recorded from Bay of Bengal.

38. *Actinotrophon planispina* (Smith)

(pl. 8, figs. 6, 7)

1906. *Trophon* (*Boreotrophon*) *planispina* Smith, *Ann. Mag. nat. Hist.* (7) 18 : 168 (Type locality : Stn. 327, W. of Burma (=Mynmar), Bay of Bengal, 766 m.)

*Material examined* : 1 ex., Investigator stn. no. 327, W. of Burma, Bay of Bengal Lat 17°7' 30'' N ; Long 94°5' 30'' E., 766m. (Holotype, Regd. No. M 3772/1).

*Description* : Shell fusiform, thin, white ; spire elongate, consists of seven whorls, angulate in middle ; suture distinct ; aperture narrow, triangularly ovate, continuous with open shoulder spine and canal ; outer and inner lips smooth inside ; canal elongate, narrowly open, terminally curved ; remnants of successive canals present on left side of canal ; spiral sculpture very faint, almost smooth, axial sculpture with lamellose structures formed into flattened spines at shoulder, representing varices, spines open, horizontally extended, curved upwards, appearing as spiral structure on its apex ; body whorl consists of nine spines, eight on preceding whorl, gradually decrease in size and number on spiral whorls.

Colour white.

*Remarks* : This species closely agrees with *A. actinophorus* Dall but differs in having a

larger number of spines on the body whorl and in having less prominent projections of the antecedent canals.

"In as much as the original description of the genus is based on the siphonal possessing the remnants of previous canals it would be seen that placing *Planispina* in *Actinotrophon* does not meet with Dall's description of the genus" (D'Attilio personal communication). It is provisionally treated under the genus *Actinotrophon*.

*Distribution* : Known only from type locality.

<i>Measurements</i> :	L	D	LA	LS
	*36.40	23.34	18.48	91.55
	( * spire broken)			

#### Genus *Boreotrophon* Fischer, 1884

(Type species : *Murex clathratus* Linnaeus, 1767).

1884. *Boreotrophon* P. Fischer, *Man. Conchyl.* : 640.

1976. *Boreotrophon* : Radwin and D'Attilio, *Murex Shells of the world* : 179.

1980. *Boreotrophon* : Cernohorsky, *Rec. Auckland Inst. Mus.*, 16 : 106.

Shell somewhat fusiform with moderate to long canal ; axial sculpture with lamellose plicae weakly developed ; devoid of spines on shoulder margin ; sculpture may or may not be present.

This genus includes four species distributed in circumarctic and boreal coasts of most northern continents, south of Norway, Labrador and Alaska (Radwin and D'Attilio, 1976), Cernohorsky (1980) recorded another species from New Zealand waters. Smith (1899) recorded two species from Bay of Bengal, off Andaman islands.

#### Key to the species

Shell small, narrow, canal elongate devoid of spiral sculpture	...	<i>B. tenuirostratus</i>
Shell large, broad, canal short, spiral sculpture present	...	<i>B. indicus</i>

#### 39. *Boreotrophon tenuirostratus* (Smith)

(Pl. 8, figs. 10, 11)

1899. *Trophon tenuirostratus* Smith, *Ann. Mag. nat. Hist.*, (7) 4 : 241. (Type locality : Investigator Stn. 233, Off Andaman Island, 338m.).

**Material examined :** 1 ex., Off Andaman islands, 338 m. Stn. 233 (Holotype Regd. No. M 944/1).

**Description :** Shell fusiform, spire high, consists of four whorls, angulate in middle, protoconch of one and half whorls, suture impressed, body whorl large, fusoid, aperture ovate, outer lip devoid of teeth inside, inner lip adherent, completely smooth inside, siphonal canal elongate, slender, narrowly open, terminally curved upwards to left ; spiral sculpture absent, axial sculpture with twelve elongate plications on whorls, body whorl with faint transverse ridges at lower half giving faint clathrate appearance.

Colour white.

**Remarks :** This species closely agrees with the type species *B. clathratus* (Linnaeus) but differs in having more slender, elongated canal and body whorl with less number of lamellose plications and presence of faint transverse ridges on lower half of body.

**Distribution :** Known only from type locality.

<i>Measurements :</i>	L	D	LA	LS
	26.40	10.40	11.30	11.48

#### 40. *Boreotrophon indicus* (Smith)

(Pl. 8, figs. 8, 9)

1899. *Trophon indicus* Smith, *Ann. Mat. nat. Hist.*, (7) 4: 241 (Type locality : Investigator Stn. 233, off Andaman Islands, 338m.)

**Material examined :** 1 ex., Off Andaman islands, Investigator Stn. 233, 338 m (Type, Regd. No. M 940/1).

**Description :** Shell broadly fusiform, spire elevated, acute, consists of four angulated whorls, body whorl large, broad and fusoid ; aperture elongately ovate, anal sulcus absent, outer lip smooth inside, inner lip adherent, smooth ; siphonal canal short, broadly open ; axial sculpture consists of eighteen oblique plications on body, gradually fainting towards aperture ; and sixteen on spiral whorls ; spiral sculpture consists of fine lines.

Colour white.

**Remarks :** The present species differs from former species in having short canal and spiral sculpture. The species *B. shirleyi* Cernohorsky, 1980 closely resembles the present species.

**Distribution :** Known only from type locality.

<i>Measurements :</i>	L	D	LS	LA
	*33.36	17.06	21.24	14.70
		(*spire broken)		

#### Subfamily DRUPINAE

The name was first used by Wenz (1941) and he included species some of which are now classified under other subfamilies. Emerson and Cernohorsky (1973) revised the classification of the genus *Drupa* Roeding 1798 and kept it under subfamily Thaidinae. The genus *Morula* has a similar shell morphology like that of *Drupa* and the two were considered to be congeneric or only subgenerically separable. Recent researches on further details of radular structure, digestive anatomy etc. show that they can be separated. Radwin and D'Attilio (1971) states that further intensive study of the animals, shells, radula etc. may establish distinct group that may take Wenz's name. The genera *Drupa*, *Drupella* and *Maculotriton* are included under the subfamily.

#### Key to genera

1. Spire low or depressed ; outer lip margin some times with digitate processes or long spines, interior either simple or with compound teeth ; columella with folds ... .. *Drupa*
- Spire elevated ; outer lip margin simple, interior with simple teeth, columella without folds ... .. 2.
2. Shell small not exceeding 20 mm length, slender, body whorl proportionately narrow ; sculpture nodulose ... .. *Maculotriton*
- Shell large exceeds 20 mm length ; wider, body whorl proportionately broader ; sculpture tuberculose ... .. *Drupella*

#### Genus *Drupa* Roeding, 1798

(Type species : *Drupa morum* Roeding, 1798)

1798. *Drupa* Roeding, *Museum Boltenianum* : 5.

1973. *Drupa* : Emerson and Cernohorsky, *Indo-Pacif. Mollusca*, 3 (13) : (for other synonyms).

Shell sub ovate, spire low sometimes depressed, body whorl tuberculate or spinose ; aperture ovate, narrow, long, sometimes constricted ; outer lip sometimes drawn into processes, interior with teeth either simple or compound ; columella wrinkled with folds ;

siphonal canal short, open ; operculum horny, narrow ; radula rachidian type, lateral teeth small and slender.

The genus is dealt in detail by Emerson and Cernohorsky (1973). It is closely related to the genus *Morula* Schumacher, but differs in having low spire, long aperture and also in radular structure. The genus is widely distributed in Indo-Pacific region and includes three subgenera viz. *Drupa* s. str., *Ricinula* and *Drupina*. All the three subgenera are represented in Indian waters. The species are abundant in shallow-water coral reef habitats of Andaman and Nicobar Islands, Gulf of Mannar and Lakshadweep. The species of *Drupa* are carnivorous and feed upon polychaetes, sipunculids, small crustaceans and molluscs (Taylor, 1978).

#### Key to the subgenera

- |  |     |     |                  |
|--|-----|-----|------------------|
| 1. Columella with double fold, margin of outer lip with two digitate processes, aperture narrow, not constricted | ... | ... | <i>Drupina</i>   |
| Columella with single fold   | ... | ... | 2.               |
| 2. Teeth on outer lip compound, aperture constricted   | ... | ... | <i>Drupa</i>     |
| Teeth on outer lip simple, aperture not constricted  | ... | ... | <i>Ricinella</i> |

#### Subgenus *Drupa* s. str.

Shell small, strong, sub-ovate, spire low, acuminate, sometimes depressed ; whorls with spinose tubercles, some of the tubercles on outer lip margin extend into processes ; aperture narrowly constricted, teeth compound, columella with single axial fold and two or three plications. Radular teeth composed of two slender laterals, central with bifid or quadrifid cusps ; marginals small ; operculum narrow, marginally thickened, nucleus marginal.

The subgenus include three species and four subspecies in the Indo-Pacific region. Only two species with two sub-species are represented in Indian waters.

#### Key to the species

- |  |     |                  |
|--|-----|------------------|
| 1. Outer margin of aperture with digitate processes                                | ... | <i>D. lobata</i> |
| Outer margin of aperture without digitate processes                                | ... | 2.               |
| 2. Teeth on interior of outer lip arranged in groups ; aperture constricted        | ... | 3.               |
| Teeth on interior of outer lip not arranged in groups, aperture not constricted... | ... | 4.               |

3. Shell normally large in size, tubercles short, aperture deep violet in colour  
 ... .. *D. morum morum*
- Shell smaller in size, tubercles long, aperture white with diffused orange yellow  
 ring along the margin of aperture ... .. *D. ricinus ricinus*
4. Interior of aperture purple in colour, outer lip with 9 to 12 teeth, tubercles  
 spinose ... .. *D. rubusidaeus*
- Interior of aperture violet in colour, outer lip with 4 to 6 teeth, tubercles not  
 spinose ... .. *D. clathrata miticula*

#### 41. *Drupa (Drupa) morum morum* Roeding

(Pl. 9, fig. 1, text fig. 19)

1798. *Drupa morum* Roeding, *Museum Boltenianum* : 55, (Type locality : Not given).
1816. *Ricinula horrida* Lamarck, *Ency. Meth.*, : 1, pl. 395, figs. 1a, b.
1906. *Sistrum horridum* : Smith, E.A. 1903, in : *Gardiners' Fauna and Geography of the Maldive and Laccadive Archipelagoes*, pt. 2 : 609.
1938. *Drupa (Drupa) morum* : Adam and Leloup, *Mem. Mus. r. Hist. nat. Belg.*, 2 (19) : 164.
1952. *Drupa horrida* : Satyamurti, *Bull. Madras Govt. Mus. new Ser.* 1 (2), pt. 6 : 160, pl. 15, figs. 6a, 6b.
1967. *Drupa morum* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 132, pl. 29, fig. 176.
1973. *Drupa (Drupa) morum morum* : Emerson and Cernohorsky, *Indo-Pacif. Mollusca*, 3 (13) : 15, pl. 2, figs. 1-3 ; pls. 10, 11.
1991. *Drupa (Drupa) morum morum* : Surya Rao and Subba Rao. *Fauna of Lakshadweep, State Fauna ser.*, 2 : 319.

**Material examined** : 7 exs., Andamans ; 2 exs., Neil island ; 3 exs., Car Nicobar—Ma'acca ; 20 exs., Arong ; 1 ex., between Perka & Tamaloo ; 1 ex., Perka ; 2 exs., Sawai ; 5 exs., Mixed coll. ; (Sri Lanka, Seychelles, Mauritius, Philippines) ; 6 exs., Kavaratti, Lakshadweep islands.

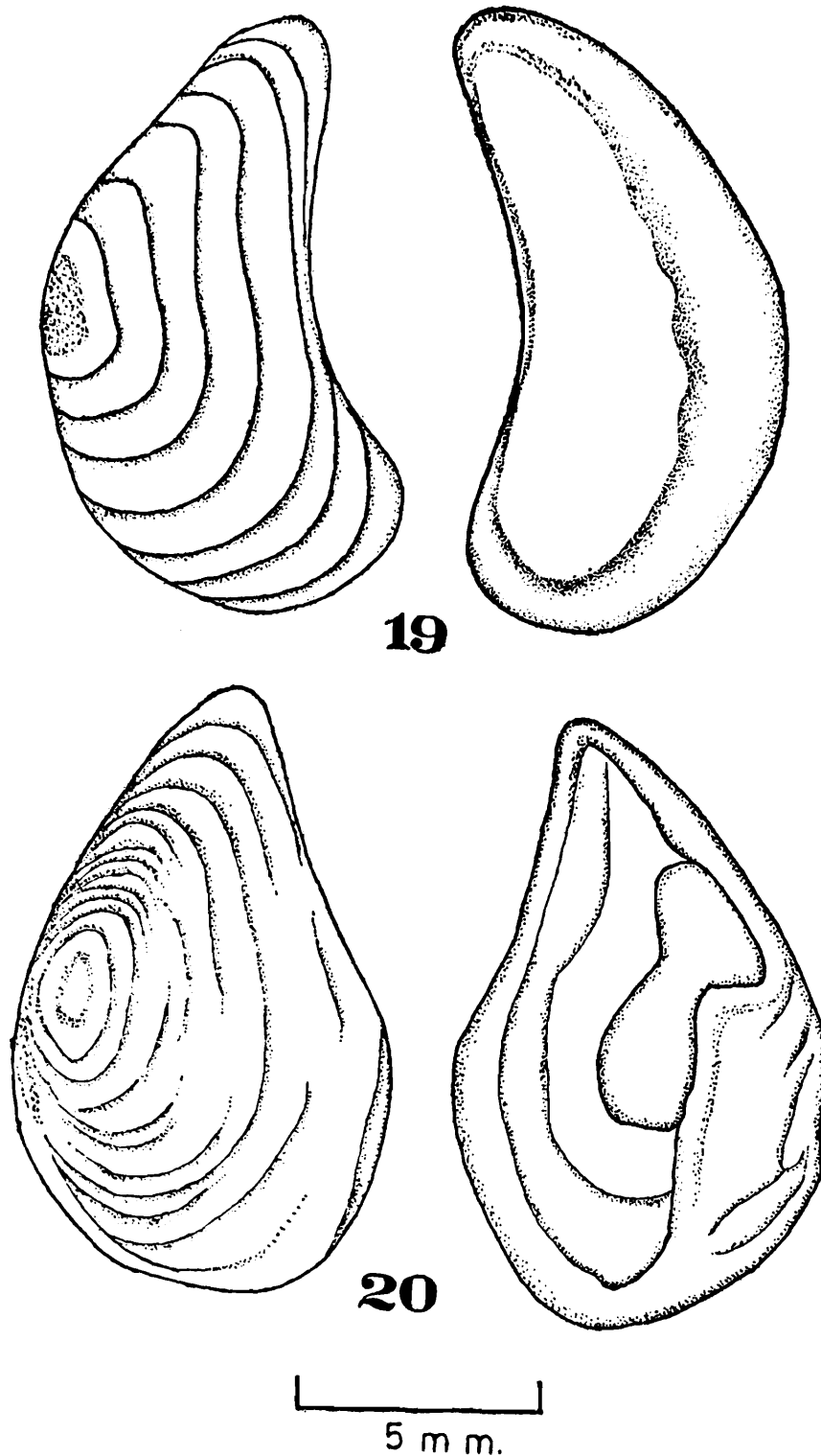
**Description** : Shell globosely ovate, spire acuminate, low ; body whorl large with five rows of spinose tubercles, dark in colour, interstices with two rows of scabrous striations ; aperture narrow, long, constricted ; outer lip bear eight teeth arranged in two groups as four and two, followed by one each, margin crenulate ; first three rows of nodules on the margin extended to small processes ; columella with single axial fold bear three plicate like-ridges, enamelled with callous ; anal sulcus long and deep ; siphonal canal short, deep, recurved obliquely.

Colour generally white with dark brown tubercles, aperture white, violet interiorly.

**Remarks** : Most of the shells covered with either algal or coralline growth concealing its original colour, however the tubercles exhibit dark brown colour. The species closely



agrees with *D. ricinus ricinus* Linnaeus but differs from it in being larger and having blunt tubercles, deep violet aperture without any ring.



Text figs. Operculum 8X—19 : *Drupa morum morum* ;  
20 : *Rapana rapiformis*.

*Distribution* : India : Pamban, Shingle island, Andaman & Nicobars, Lakshadweep.

Elsewhere : Maldives, Red Sea, Tanzania, East Africa to Eastern Pacific including eastern and Clipperton island (Emerson & Cernohorsky, 1973).

<i>Measurements :</i>	L	D	LA (* including canal)
Smallest :	17.46	13.55	8.15
Average :	27.45	24.90	23.40
Largest :	41.15	36.15	37.82

#### 42. *Durpa (Durpa) ricinus ricinus* (Linnaeus)

(Pl. 9, fig. 3)

1758. *Murex ricinus* Linnaeus, *Syst. Nat.* ed. 10 : 750. (Type locality : Asiatic Ocean).  
 1758. *Murex hystrix* Linnaeus, *Syst. Nat.* ed. 10 : 750.  
 1798. *Drupa tribulus* Roeding, *Museum Boltenianum* : 55.  
 1906. *Sistrum ricinus* : Smith, in : *Gardiner's Fauna and Geography of the Maldives and Laccadive, Archipelagoes*, pt. 2 : 609.  
 1913. *Drupa ricinus* : Hedley, *Nautilus*, 27 (7) : 80.  
 1967. *Drupa ricina* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 132, pl. 29, fig. 177.  
 1973. *Drupa (Drupa) ricinus ricinus* : Emerson and Cernohorsky, *Indo-Pacif. Mollusca*, 3 (13) : 19, pl. 2, figs. 6-8, 11 ; pls. 14-16 (for other synonyms).  
 1991. *Drupa (Drupa) ricinus ricinus* : Surya Rao and Subba Rao, *Fauna of Lakshadweep, State Fauna ser.*, 2 : 319.

*Material examined* : 15 exs., Andamans ; 3 exs., Ross island ; 1 ex., Neil island ; 3 exs., Kaudiaghat, South Andaman ; 1 ex., Port Blair, South Andaman ; 4 exs., Malacca ; 6 exs., nr. circuit house ; 1 ex., Sawai ; 2 exs., Arong of Car Nicobar ; 1 ex., West Bay, Katchal island ; 5 exs., Kavaratti, Lakshadweep ; 3 exs., Sri Lanka.

*Description* : Shell small to medium size, ranges between 19 to 25 mm., sub-ovate ; spire acute, low ; body whorl large, consists of five rows of spinose tubercles, spines at outer lip margin more lengthy formed into processes ; interstices between the tubercles are sculptured with two to three rows of scabrous striations ; aperture long, narrow, constricted, inner outer lip side with two sets of compound teeth arranged in four and two, followed by one each towards anterior ; columella with single fold, bear three to four oblique plicae like ridges, callous bearing black dots towards posterior region ; anal sulcus long and deep ; siphonal canal short, deep, open, recurved obliquely.

Colour of the shell generally greyish, aperture white bearing either continuous or broken orange yellow ring, in some cases very faint and completely absent in other cases. Spines sometimes dark brown on its tips.

*Remarks* : It resembles very closely to the preceding species, *D. morum morum* except in its size, in having long spinose tubercles, aperture white with orange ring either

continuous or broken, posterior region of columella bears black dots. It occurs along with the preceding one sharing same habitat. Most of the shells are covered with coral algal growths concealing its natural colour.

*Distribution* : India : Andaman & Nicobar islands ; Lakshadweep. Elsewhere : Maldives, Sri Lanka, Singapore, Mauritius, Tropical Indo-Pacific (Cernohorsky, 1967) ; from East and South Africa to Eastern Pacific (Emerson and Cernohorsky, 1973).

<i>Measurements</i> :	L	D	LA (* including canal)
Smallest :	19.40	18.03	17.42
Average :	23.05	22.60	21.40
Largest :	25.55	25.30	22.30

#### Subgenus *Ricinella* Schumacher, 1817

(Type species : *Drupa rubusidaeus* Roeding, 1798, subsequent designation)

1817. *Ricinella* Schumacher, *Essai vers. testa*, 72 : 240.

1973. *Ricinella* : Emerson and Cernohorsky, *Indo-Pacif. Mollusca*, 3 (13) : 27.

Shell subovate ; spire acute, shorter ; body whorl sculptured with spinose tubercles, interstices with scaly ribs ; aperture narrowly ovate ; outer lip with single row of teeth ; columella with single axial fold with plications on anterior, callous ; operculum sub-elliptical.

It includes three species and two subspecies in the Indo-Pacific region. In India the subgenus is represented by two species viz. *D. rubusidaeus* Roeding and *D. clathrata miticula* (Blainville).

#### 43. *Drupa (Ricinella) rubusidaeus* Roeding

(Pl. 9, fig. 7)

1798. *Drupa rubusidaeus* Roeding, *Museum Boltenianum* : 55. (Type locality : Davao Bay, Mindanao, Philippines, as well as Lectotype designated by Emerson & Cernohorsky, 1973).

1822. *Purpura hystrix* Lamarck, *Hist. nat. anim. sans. Vert.*, 7 : 247.

1913. *Drupa rubusidaeus* ; Hedley, *Nautilus*, 27 (7) : 79.

1967. *Drupina rubusidaea* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 134, pl. 29, fig. 180.

1973. *Drupa (Ricinella) rubusidaeus* : Emerson and Cernohorsky, *Indo-Pacif. Mollusca*, 3 (13) : 27, pl. 2, figs. 13-15, pl. 22 & 23 (for other synonyms).

1991. *Drupa (Ricinella) rubusidaeus* : Surya Rao and Subba Rao. *Fauna of Lakshadweep, State Fauna ser.*, 2 : 320.

*Material examined* : 4 exs., Andamans ; 1 ex., Arong, Car Nicobar ; 3 exs., Sri Lanka.

*Description* : Shell ovately globose ; spire low, acute ; body whorl large, ornamented with five rows of spinose tubercles, interstices with three to four rows of scabrous ridges ; tubercles on the outer margin longer ; aperture narrowly ovate, not constricted ; anal sulcus deep and broad ; outer lip margin crenulate, interior decorated with seven to nine teeth arranged in a single row, leads into lirations ; columella region broad, calloused, anterior part with three to four plications ; siphonal canal short, deep, open.

Colour, interior of the aperture light purple, tips of the tubercles dark brown in colour.

*Remarks* : It agrees closely with *D. speciosa* (Dunker) but differs from it in having less elevated spire and arrangement of teeth on interior of outer margin in a single row, but not in groups. Most of the shells are covered with coral growths concealing its ornamentation. In one of the specimen tubercles are well developed into laminate spines, gradually increasing in their size towards aperture ; teeth arranged in groups of two each on the interior of outer lip. Interior of aperture light purple. This species was reported as *Ricinula hystrix* from Lakshadweep by Hornell, (1922, p. 214).

*Distribution* : India : Andaman & Nicobar islands and Lakshadweep. Elsewhere : From Red Sea and East Africa throughout Indo-Pacific to Hawaii and Tuamotu islands.

<i>Measurements</i> :	L	D	LA (* including siphonal canal)
Smallest :	18.95	15.95	14.58
Average :	25.20	28.40	20.25
Largest :	42.00	40.45	32.75

#### 44. *Drupa (Ricinella) clathrata miticula* (Lamarck)

(Pl. 9, fig. 2)

1822. *Ricinula miticula* Lamarck, *Hist. nat. anim. sans, Vert.*, 7 : 231, (Type locality : not given) ('Mahebourg, Mauritius' as type locality, as well as Lectotype designated by Emerson and Cernohorsky, 1973).
1973. *Drupa (Ricinella) clathrata miticula* : Emerson and Cernohorsky, *Indo-Pacif. Mollusca*, 3 (13) : 33, pl. 2, figs. 19-20 ; pls. 28 & 30 (for synonyms).
1991. *Drupa (Ricinula) clathrata miticula* : Surya Rao and Subba Rao, *Fauna of Lakshadweep, State Fauna ser.*, 2 : 320.

*Material examined* : 1 ex., Maldives.

*Description* : Shell globosely ovate, spire pointed, short ; body whorl large, sculptured with six rows of tubercles, pointed, interstices with three to four scabrous striations ;

aperture ovate, moderately wide, outer lip margin crenulate between tubercles, tubercles at margin slightly larger than the rest ; interior decorated with four to six rounded teeth, some time leads into lirations appearing as second row ; inner lip enamelled, attached posteriorly but detached slightly towards anterior, with three to four plications above siphonal canal ; siphonal canal short, open ; operculum thin, horny, ovately longer, thickened marginally.

Colour light brown, interior of aperture light purple.

*Remarks* : It closely resembles the nominate subspecies *clathrata* in all respects except in the absence of brown marking on inner and outer lips. Emerson and Cernohorsky (1873) dealt in detail on its nomenclature.

*Distribution* : India ; Andaman and Nicobar islands and Lakshadweep. Elsewhere : Maldives ; Madagascar to Timor island in Indonesia (Emerson and Cernohorsky, 1973).

<i>Measurements</i> :	L	D	LA	(* including siphonal canal)
Smallest :	28.50	25.15	22.25	
Average :	28.25	24.45	23.50	(Mauritius)
Largest :	36.05	28.60	30.10	(Mauritius)

#### Subgenus *Drupina* Dall, 1823

1923. *Drupina* Dall, *Proc. Acad. nat. Sci. Philad.*, 75 : 303 (Type species : *Ricinula digitata* Lamarck, 1816, Original designation. (= *Drupa grossularia* Roeding, 1798).

1973. *Drupina* : Emerson & Cernohorsky, *Indo-Pacif. Mollusca.*, 3 (13) : 35.

Shell globosely ovate, spire acute, low ; whorls sculptured with spiral ribs, scabrose ; aperture long, narrow ; columella doubly folded axially ; outer lip drawn into processes ; interior with single row of teeth ; operculum narrow, marginally thickened.

The subgenus includes two species *viz.* *D. grossularia* Roeding and *D. lobata* (Blainville), distributed in tropical Indo-Pacific region. Only the latter species is represented in India.

#### 45. *Drupa* (*Drupina*) *lobata* (Blainville)

(Pl. 9, fig. 6)

1832. *Purpura lobata* Blainville, *Nouv. Ann. Mus. d' Hist. Nat. Paris.* ser. 3, 1 ; 210, pl. 9, fig. 7. (Type locality : Designated as Mogadiscio, Somalia by Emerson and Cernohorsky, 1973).

1906. *Sistrum digitatum* var. *lobata* : Smith, E.A. in : *Gardiners' Fauna and Geography Maldives and Laccadive Archipelagoes* : pt. 2 : 609.

1973. *Drupa (Drupina) lobata* : Emerson and Cernohorsky, *Indo-Pacif. Mollusca*, 3 (13) : 38, pl. 2, figs. 25, 26, pls. 34, 35 (for other synonyms).  
 1991. *Drupa (Drupina) lobata* : Surya Rao and Subba Rao, *Fauna of Lakshadweep, State Fauna ser.*, 2 : 320

**Material examined** : 8 exs., Indian seas ; 1 ex., Neil Island, Andamans ; 3 exs. Arong village, Car Nicobar ; 1 ex., Kavaratti, Lakshadweep.

**Description** : Shell globosely ovate ; spire acute, low, body whorl large, sculptured with spiral ridges, ridges nodulose, interstices with two to three rows of scabrous rings ; aperture narrow, elongate, not constricted ; outer lip margin crenulate, drawn into digitate processes extending from ridges ; first one canaliculate, rest scaly ; interior with six rounded teeth ; columella calloused extending posteriorly, plicated anteriorly, umbelicle formed in some cases.

Colour generally dark brown to chocolate, apertural margin dark chocolate brown, interior white. Operculum typical of the genus, slightly ovate.

**Remarks** : Shells are mostly covered with coral growths. In young shell aperture is more wider than adult. It differ from species *D. grossularia* in apertural colouration where it is golden yellow, the processes some times bifurcate in *grossularia*. Shells from recent collection are much eroded and digitate processes are not developed.

**Distribution** : India : Andamans & Nicobar Islands, Lakshadweep. Elsewhere : Mauritius ; from Red Sea, and East Africa to Thailand, Sumatra & West Australia (Emerson and Cernohorsky, 1973).

<i>Measurements</i> :	L	D	LA (* including canal and processes)
Smallest :	20·30	15·50	13·18
Average :	28·65	25·90	21·55
Largest :	31·10	27·10	26·45

### Genus *Drupella* Thiele, 1925

1925. *Drupella* Thiele, *Wiss. Ergeb, deut. Exp. 'Valdivia'*, 17 : 171 \*(Type species : *Purpura elata* Blainville, 1832, = *Drupa cornus* (Roeding, 1798) (Opinion 1154 of ICZN—1980, *Bull. zool. Nomencl.* 37 (2) : 85).  
 1972. *Drupella* : Cernohorsky, *Marine Shells of the Pacific*, pt. 2 : 125.  
 1978. *Drupella* : Cernohorsky, *Rec. Auckland Inst. Mus.*, 15 : 78.

Shell ovate or fusiform, spire high, acute, equal or more than body whorl ; sculptured with tubercles or ridges ; aperture ovate, outer lip interior dentate or lirate ; columella smooth posteriorly, plicated anteriorly.

The genus includes four species from India and its neighbouring countries. Commonly occurs in tropical waters on rocks and in coral reefs.

#### Key to species

Shell sculptured with pointed tubercles	...	<i>D. cornus</i>
Shell sculptured with rounded tubercles	...	<i>D. concatenata</i>

#### 46. *Drupella cornus* (Roeding)

(Pl. 9, fig. 9)

1777. *Murex mancinella* Martini, *Conch. Cab.*, 3 : pl. 101, fig. 971. cited by Roeding.  
 1791. *Murex mancinella* var. Gmelin, *Syst. nat.* ed. 13 : 3538, *Murex* sp. 47 (also refers Martini, 1777, pl. 101, fig. 971).  
 1798. *Drupa cornus* Roeding, *Museum Boltenianum* : 56, sp. 704 (refers Gmelin, 1791) Type locality : Not known.  
 1832. *Purpura elata* Blainville, *Nouv. Ann. Mus. Hist. nat.*, 1 : 207, pl. 11, fig. 1.  
 1846. *Ricinula elata* : Reeve, *Conch. Icon.*, 3, *Ricinula*, sp. 27, pl. 4, fig. 27.  
 1880. *Ricinula (Sistrum) ochrostoma* (part) : Tryon, *Man. Conch.*, 2 : 187, pl. 57, figs. 223, 224 ; pl. 58, figs. 232, 234.  
 1899. *Sistrum elatum* : Melvill and Standen, *J. Linn. Soc.*, 27 : 163.  
 1906. *Sistrum elatum* : Smlth, in : *Gardiners' Fauna and Geography of Maldive and Laccadive Archipelagoes*, pt. 2 : 609.  
 1913. *Drupa cornus* : Smith, *Proc. malac. Soc. Lond.*, 10 : 288.  
 1969. *Drupella ochrostoma* : Cernohorsky, *Veliger*, 11 (4) : pl. fig.  
 1972. *Drupella cornus* : Cernohorsky, *Marine Shells of the Pacific*, pt. 2 : 125, pl. 35, fig. 7, 7a.  
 1991. *Drupella cornus* : Surya Rao and Subba Rao, *Fauna of Lakshadweep, State Fauna ser.*, 2 : 321.

**Material examined** : 1 ex., Andamans ; 1 ex., Port Cornwallis, North Andaman ; 6 exs., Neil island ; 1 ex., Nicobars ; 1 ex., Arong village, Car Nicobar ; 2 exs., Kiltan island, Lakshadweep ; 10 exs., Sri Lanka (Regd. No. 3574 mixed coll.)

**Description** : Shell spindle shape, moderate size, spire high, acute consisting of four whorls, body whorl large, ovate, suture impressed ; aperture narrowly ovate, anal sulcus deep, inverted 'U' shape ; outer lip thick, margin crenulate, interior denticulate consisting of six to seven teeth ; inner lip adherent posteriorly, detached and erect anteriorly, smooth, callose, two to three oblique plicae anteriorly, canal short, open, terminally curved upwards ; sculpture consists of four rows of prominent pointed tubercles on body, two rows on penultimate whorl, and single row on rest of spiral whorls, spiral sculpture with five cords between tubercular rows.

Colour white, aperture white, some times cream to light purple inside.

**Remarks** : Most of the shells are covered with encrustations concealing the sculpture,

Cernohorsky (1972) distinguished male and female shells and illustrated. He further mentioned that this species *Drupella ochrostoma* reported by him (1972), pl. 35, fig. 8) may belong to the present species. Cernohorsky (1977) proposed this species to be included in official list to the commission (p. 181).

*Distribution* : India : Andaman & Nicobar islands, Lakshadweep : Elsewhere : Sri Lanka, Maldives, Mauritius, Sandwich island, Philippines to Paumotus. Intertidal species. common throughout tropical Pacific (Cernohorsky, 1972).

<i>Measurements</i> :	L	D	LA	LS
Smallest :	10.21	9.00	9.50	7.70
Average :	28.70	17.00	17.00	14.20
Largest :	36.45	19.80	19.80	19.80

#### 47. *Drupella concatenata* (Lamarck)

(Pl. 9, figs. 4, 5)

1822. *Murex concatenatus* Lamarck, *Hist. nat. Anim. sans vert.*, 7 : 176.  
 1832. *Purpura fragum* Blainville, *Nouv. Ann. Mus. Hist. nat.*, 1 : pl. 9, fig. 4.  
 1846. *Ricinula concatenata* : Reeve, *Conch. Icon.*, 3. *Ricinula* sp. 18, pl. 3, figs. 18a, b.  
 1880. *Ricinula (Sistrum) concatenata* : Tryon, *Man. Conch.*, 2 : 189, pl. 59, fig. 269.  
 1897. *Sistrum concatenatum* : Melvill and Sykes, *Proc. malac. Soc. Lond.*, 2 : 170.  
 1897. *Sistrum fragum* : Melvill and Sykes, *Proc. malac. Soc. Lond.*, 2 : 170.  
 1899. *Sistrum concatenatum* : Melvill & Standen, *J. Linn. Soc.*, 27 : 163.  
 1906. *Sistrum concatenatum* : Smith, in : *Gardiners' Fauna and Geography of Maldive and Laccadive Archipelagoes*, pt. 2 : 610.  
 1972. *Drupella rugosa* : Cernohorsky, *Marine Shells of the Pacific*, pt. 2 : 126, pl. 35, fig. 5. (non *Murex rugosus* Born, 1778).  
 1977. *Morula concatenata* : Ray, *Contribution to the knowledge of the Molluscan Fauna of Maungmagan, Lower Burma* : 48 : (for other synonyms and distribution).

*Material examined* : 3 exs., Andamans ; 5 exs., Peel island ; 1 ex., Aberdeen jetty, Port Blair ; 6 exs., Indian seas, (Regd. No. 3580, shells marked as 'A', 'C' & 'Sing.' indicating localities as Andamans, Sri Lanka (Ceylon) and Singapore respectively) ; 12 exs., mixed collections (Regd. No. M 19149/3, localities given on label as Andamans, Bombay, Ceylon and Mauritius) ; 15 exs., mixed collections, (Regd. No. M 19148/3) with localities as Andamans, Ceylon and Mauritius ; 10 exs., Sri Lanka etc. (Regd. No. 3571).

*Description* ; Shell generally moderate size, varies from 25 mm to 31 mm, ovately elongate, spire high, acute, consists of five rounded whorl, body whorls large, ovate, suture impressed, aperture narrowly ovate, anal sulcus deep 'U' shape, outer lip thick, margin crenulate, interior denticulate with six teeth, inner lip adherent, smooth, posteriorly slightly



detached, anteriorly three plicae above canal, canal short, open ; sculpture consists of four to five rows of rounded tubercles, with two to three scabrous spiral ridges in between tubercular rows, sometimes tubercles also traversed by cords on body, penultimate whorl with single row of tubercles.

Colour generally white sometimes tubercles exhibit orange colour, aperture white, light orange or cream interior.

**Distribution :** India : Bombay, Andaman & Nicobars. Elsewhere : Sri Lanka, Myanmar, Singapore and Mauritius. This species is moderately common and widely distributed throughout tropical Pacific (Cernohorsky, 1972), Ray (1977) gave detailed distribution. This species is reported for the first time from Bombay.

<i>Measurements :</i>	L	D	LA	LS
Smallest :	12.80	8.55	8.60	6.00
Average :	22.95	13.65	14.00	11.05
Largest :	31.22	16.50	18.45	15.60

#### Genus . *Maculotriton* Dall, 1904

Type species : *Triton bracteatus* Hinds, 1844

1904. *Maculotriton* Dall, *Smithson misc. Coll.*, 47 (1475) : 136.

Shell axially ribbed, spirally sulcate ; spire elevated, apex obtuse ; sutures appressed ; varices two or three, inconspicuous ; canal short.

One species is included here under this genus.

#### 48. *Maculotriton serriale* (Deshayes in Laborde and Linant, 1834)

1834. *Buccinum serriale* Laborde and Linant, *Voyage de l' Arabie Petrea* : 66, figs. 32-34 (Type locality : Red Sea mentioned by Tomlin & Salisbury, 1928).

1844. *Triton bracteatus* Hinds, *Voyage Sulphur* : 2, pl. 4, figs. 5-6 (Type locality : Marquesas Islands, Philippines).

1844. *Triton bracteatus* : Reeve, *Conch. Icon.*, 2, Triton, sp. 84, pl. 18, fig. 84.

1906. *Colubraria brocteata* : Smith, *In Gardiners' Fauna and Geography of Maldive and Laccadive Archipelagoes*, 2 : 611.

1952. *Maculotriton serriale* : Satyamurti, *Bull. Madras Govt. Mus. new Ser.*, 1 (2) pt. 6 : 161, pl. 15, fig. 7.

1972. *Maculotriton serriale* : Cernohorsky, *Marine shells of the Pacific* 2 : 129, pl. 36, fig. 11.

1991. *Maculotriton serriale* : Surya Rao and Subba Rao, *Fauna of Lakshadweep. State Fauna ser.*, 2 : 318.

**Material examined :** 9 exs., Andamans ; 21 exs., Indian seas (mixed coll. includes Sri Lanka) ; 2 exs., Lakshadweep.

**Description :** Shell small, ranges from 7 to 15 mm in length, slender, elongate ; spire high, consists of seven whorls including protoconch, whorls angulate at middle, body whorl large, sculptured with 13 to 15 axial ribs, 16 to 20 spiral cords, intersections of these become nodulose ; aperture narrowly elongated, outer lip thick followed by varix, interior with six denticles, columella smooth, with two mild plications anteriorly ; canal short, narrow and deep, anal sulcus deep 'U' shape ; colour white with chocolate brown markings in two rows on each whorl on either side of suture ; body whorl with additional row at its lower part.

**Remarks :** Most of the shells are found inhabited by hermit crab. Shells collected from Lakshadweep are encrusted with corals and polychaete tubes.

**Distribution :** India : Pamban, Andamans, Lakshadweep. Elsewhere : Maldives, Aden, Sandwich Island, Philippines. Widely distributed species, moderately common in most Pacific localities (Cernohorsky. 1972).

<i>Measurements :</i>	L	D	LS	LA
Smallest :	7.40	3.40	4.35	4.05
Average :	13.85	5.80	8.60	6.86
Largest :	14.30	5.60	8.30	7.20

#### Subfamily RAPANINAE

Shell usually more or less pyriform, often anteriorly produced, spire short, inner lip convex and smooth ; spiral grooves at base ending in prominent blunt labial tooth, canal short, broadly open, operculum ovate, nucleus elongate forming the outer or hind edge.

Single genus *Rapana* is represented under this subfamily.

#### Genus *Rapana* Schumacher, 1817

Type species : *Buccinum bezoar* Linnaeus, 1758 S. D. Gray, 1847

1817. *Rapana* Schumacher, *Nouv. Gen.* : 214.

1853. *Rapana* : Adams and Adams, *Genera of Recent Mollusca*, 1 : 134.

1880. *Rapana* : Tryon, *Man. Conch.*, 2 : 76.

Shell ventricose, axis perforated at the apex, spire depressed ; aperture oval, anteriorly

narrow, canal short broadly open, slightly curved, inner lip reflected. anteriorly free, umbellicus corrugated, operculum similar to that of *Purpura*.

The animals occurs in coral reefs in tropical seas, most probably feed on polyps (Adams, H. & A. 1853).

#### 49. *Rapana rapiformis* (Born, 1778)

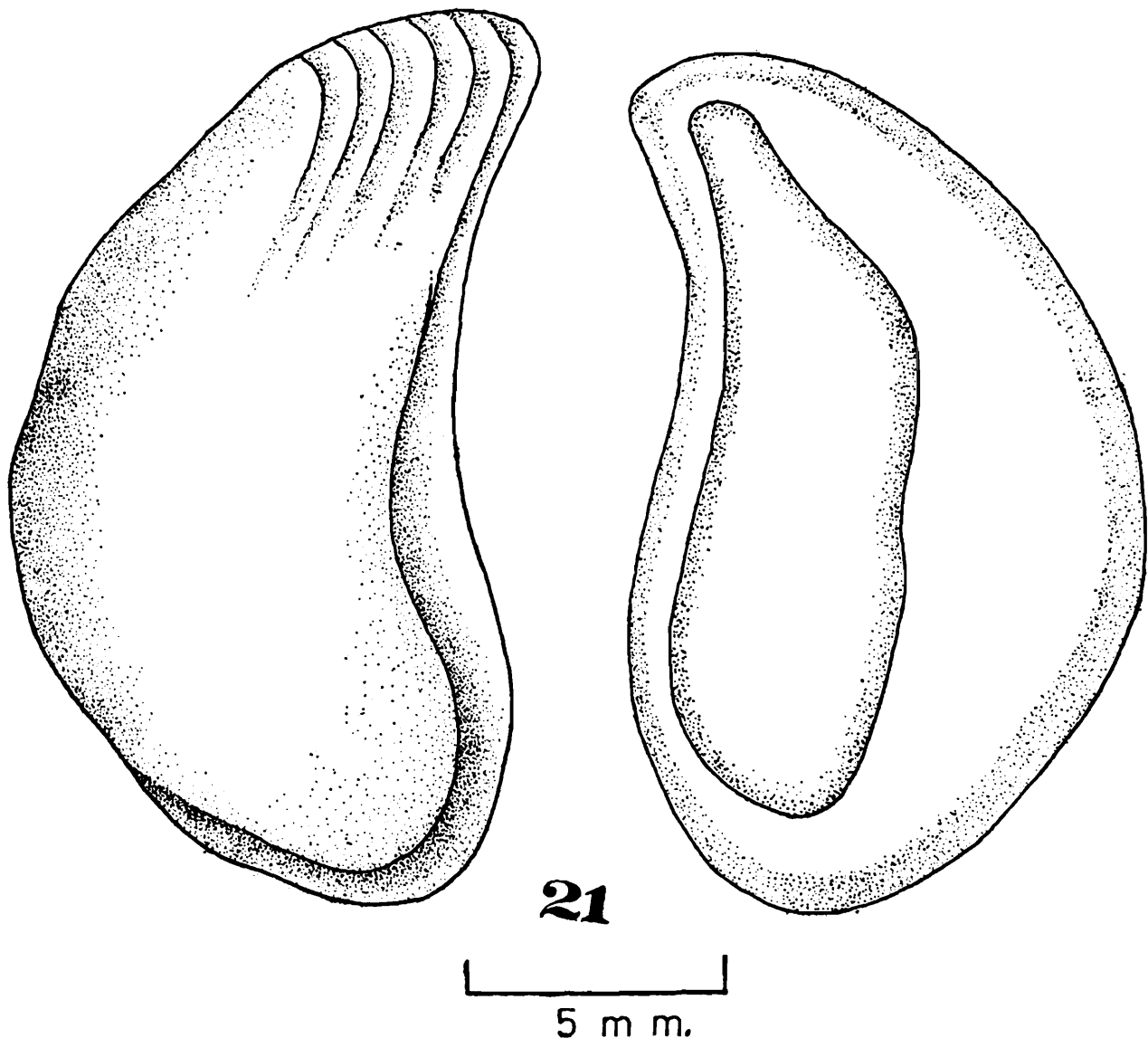
(Pl. 9, fig. 8 ; Pl. 10, fig. 1 ; text fig. 20)

1778. *Murex rapiformis* var. a Born, *Index rerum naturalium Musei, Caesarei Vindobonensis* pt. 1 : (Type locality : ?).
1791. *Murex rapa* Gmelin, *Syst. nat.* ed. 13 : 3545, sp. 68 (non Linnaeus) (Type locality : India).
1817. *Buccinum bulbosum* (Solander, MSS) Dillwyn, *Descriptive Catalogue of Recent Shells*, 2 : 631, sp. 104.
1847. *Pyrula bulbosa* : Reeve, *Conch. Icon.*, 4, *Pyrula*, sp. 14, pl. 4, fig. 14.
1886. *Rapana bulbosa* : Watson, *Challenger' zoology*, 15 : Gastropoda.
1880. *Rapana bulbosa* : Tryon, *Man. Conch.*, 2 : 203, pl. 63, fig. 336.
1898. *Rapana bulbosa* : Melvill & Standen, *J. Conch. Lond.*, 9 : 43.
1901. *Rapana bulbosa* : Melvill and Standen, *Proc. zool. Soc. Lond.*, pt. 2 : 399.
1921. *Rapana bulbosa* : Hornell, *Madras Fish. Bull.*, 14 : 136.
1941. *Rapana bulbosa* : Crichton, *J. Bombay nat. Hist. Soc.* : 42 : 325.
1942. *Rapana bulbosa* : Gravely, *Bull. Madras Govt. Mus. new Ser.*, 5 (2) : 48 ; fig. 8a.
1952. *Rapana bulbosa* : Satyamurti, *Bull. Madras Govt. Mus. new Ser.*, 1 (2), pt. 6 : 151, pl. 14, figs. 2a-b.
1961. *Rapana rapiformis* : Rippingale and McMichael, *Queensland and Great Barrier Reef Shells* : 102.
1972. *Rapana rapiformis* : Cernohorsky, *Marine Shells of the Pacific*, pt. 2 : 124, pl. 35, fig. 6.
1991. *Rapana rapiformis* : Surya Rao and Subba Rao, *Fauna of Lakshadweep. State Fauna ser.*, 2 : 325.

*Material examined* : 2 exs., Okha beach ; 1 ex., Shore nr. Pudupet, 2.5 miles west of Porto Novo ; 4 exs., North of jetty, Solathandakuppam, Pondicherry ; 11 exs., Pondicherry to Nallavarukuppam ; 2 exs., Thodyarpet, Tamil Nadu ; 6 exs., N. of Madras : 1 ex., Sethubaba Chatram, Palk Bay ; 2 exs., Balasore bay, Orissa (M 4676-77/1) ; 6 exs., Indian seas ; (1 ex., inscribed as 'C' indicating Ceylon ; 1 ex., as Sand heads, old lable indicates locality as 'And' of Andamans ; 1 ex., as 'Bimlip' indicating as Bhimilipatnam, Regd. No. 3558), 1 ex., Karachi.

*Description* : Shell large, pyriform, spire short, consists of four to five whorls, suture deep, canaliculate, body whorl large, inflated, aperture broad, oval shape, outer lip margin denticulate, interior lirate and 'U' shaped canal leading inside at shoulder region, inner lip smooth, canal short, open widely. Sculpture consists of three prominent rows of tubercles, one on shoulder, second on middle and last one at lower part, the shoulder row is spinose,

spines hollow, second and third rows gradually decrease in their size, in addition, large number of flattened spiral cords present on body whorl.



Text fig. 21 : *Cronia buccinea*—Operculum 8X.

Colour light brown with three to four chocolate brown bands on body, aperture white, operculum oval in shape, thin, transparent, outer margin thickened on one side, nucleus near outer margin dark brown in colour.

**Remarks :** Generally these forms occur at moderate depths and caught in fisherman's nets in the inshore waters. Most of the shells found attached with barnacles, shell collected from Okha beach is found with large number of capulids, oysters and bryozoans.

**Distribution :** India : Gujarat, Lakshadweep, Pamban, Madras, Pondicherry, Porto Novo, Balasore and Bhimilipatnam. Elsewhere : Philippines, Japan, China, Persian Gulf, Aden, Pakistan, Sri Lanka, Hong Kong.

This species is reported for the first time from the west coast of India and Andamans.

<i>Measurements :</i>	L	D	HA	HS	
Smallest :	23·25	18·72	17·85	8·49	(Balasore)
Average :	79·60	59·95	63·90	28·10	
Largest :	102·60	84·76	83·75	33·68	(Okha)

## Subfamily THAIDINAE JOUSSEAUME, 1888

Shell usually solid, heavy, spire moderately low ; aperture large, columella pustulose. outer margin usually either dentate or lirate ; sculpture either tuberculate or knobby ; operculum trapezoidal, canal short ; radula rachidian, usually three cusps, laterals have smaller points on its inner margin, outside laterals, margin with two to eight small denticles.

Radwin and D'Attilio (1971) gave the radula figure and considered that this subfamily may be elevated to family status. Further researches on the anatomy of some of the common species under the genera may bring out the correct position. We have however treated it as a subfamily and included six genera in it.

## Key to genera

1. Shell small not exceeding 25 mm in length ; spire low, surface smooth except for spiral striae, ornamented with brown spiral bands ; columella twisted at base  
 ... .. *Vexilla* (*V. vexillum*)  
 Shell large, exceeding 25 mm in length ; spire high, surface sculptured either tuberculose or ribbed or both ; without brown bands ; columella not twisted at base  
 ... .. 2.
2. Surface axially ribbed, spiral cords scabrous ; columella narrow pustules present above canal  
 ... .. *Cronia*  
 Surface without axial ribs ; spial cords not scabrous ; ornamented with tubercles or knobs ; columella broad, smooth or plicated  
 ... .. 3.
3. Whorls angulate ; sculptured with rows of tubercles or knobs in addition to spiral ribs  
 ... .. 5.  
 Whorls rounded, tubercles or knobs absent, ribs present  
 ... .. 4.
4. Aperture narrowly ovate, prominent parietal ridge at posterior end ; surface with fine spiral ribs of granulose nature ; ornamented with white blotches on chestnut brown back ground ; columella not flattened  
 ... .. *Nassa* (*N. sarta*)  
 Aperture broadly ovate, without parietal ridge ; surface with coarse spiral ribs and grooves in between ; columella flattened, depressed in middle ; ornamented with rows of white spots on black background on the spiral ribs  
 ... .. *Purpura*

5. Aperture wide, outer lip either smooth or lirated inside ; body whorl much inflated comparative to its size ... .. *Mancinella*  
 Aperture narrow, outer lip with denticles inside ; body whorl not inflated comparative to its size ... .. 6.
6. Shell spindle shape, smaller in size not exceeding 35 mm length ; denticles on outer lip rounded, sometimes paired ; surface with tubercles rounded or squarose but not pointed ... .. *Morula*  
 Shell rhomboidal, large, exceeding 35 mm length ; denticles on outer lip either rounded or horizontal leads into ridges ; surface with pointed tubercles ... .. *Thais*

### Genus *Cronia* H. & A. Adams, 1853

(Type species : *Purpura amygdala* Kiener, 1835)

1853. *Cronia* A. & H. Adams, *Genera of Recent Mollusca*. 1 : 128.

1980. *Cronia* : Cernophorsky, *Rec. Auckland Inst. Mus.* 16 : 172.

Shell ovate, spire acuminate, aperture moderate, inner lip callose at upper part ; columella straight, simple anteriorly, sculpture consists of scabrous cords.

Six species are reported from India and adjacent waters.

### Key to species

- 1 Shell slender, spire high, more than body whorl ; ornamented with white band on middle of body, also seen inside aperture ... .. *subnodulosa*  
 Shell not slender, spire either equal or less than body whorl ; white band on body absent ... .. 2.
2. Spiral cords double or triple stranded ; deep squarose pits in between axial ribs, spiral cords at intersections with ribs pointed ; aperture violet ... .. *fiscella*  
 Spiral cords simple ; pits absent ; intersections with ribs nodulose ... .. 3.
3. Shell small, not exceeds 20 mm in length, gibbose ; anal sulcus shallow ; body whorl with five axial ribs only ... .. *ozenneana*  
 Shell large, exceeds 20 mm in length ; fusoid, anal sulcus deep ; body whorl more than five axial ribs ... .. 4.
4. Axial ribs more prominent, interstices between ribs deep, ribs with either rounded or pointed tubercles ; denticles on outer lip simple ... .. 5.  
 Axial ribs less prominent, interstices between ribs shallow, ribs with dark horizontal tubercles ; denticles on outer lip leads to raised ridges ... .. *konkanensis*

- |                                      |     |     |                   |
|--------------------------------------|-----|-----|-------------------|
| 5. Axial ribs with pointed tubercles | ... | ... | <i>ochrostoma</i> |
| Axial ribs without pointed tubercles | ... | ... | <i>contracta</i>  |

Subgenus *Ergalatax* Iredale, 193150. *Cronia* (*Ergalatax*) *contracta* (Reeve)

(Pl. 10, figs. 2, 3, 4)

1846. *Buccinum contractum* Reeve, *Conch. Icon.*, 3, *Buccinum*, sp. 53, pl. 8, fig. 53, (Type locality : Samar island, Philippines).
1875. *Sistrum undatum* var. *indicum* Nevil, *J. Asiat. Soc. Beng.*, 44 (2) : 83 (Type locality : Singapore).
1898. *Murex* (*Ocenebra*) *contractus* : Melvill and Standen, *J. Conch. Lond.*, 9 (2) : 42.
1901. *Urosalpinx contracta* : Melvill and Standen, *Proc. zool. Soc. Lond.*, pt. 2 : 398.
1928. *Drupa contracta* : Melvill, *proc. malac. Soc. Lond.*, 18 : 105.
1942. *Thais margaritica* : Gravely, *Bull. Madras Govt. Mus. new Ser* 5 (2) : 50, fig. 8.
1948. *Drupa margaritica* Ray, *Rec. Indian Mus.*, 46 : 104.
1952. *Drupa contracta* : Subrahmanyam et. al., *J. Univ. Bombay (new Ser)* 21 (B) : fig. 10.
1952. *Drupa heptagonalis* : Satyamurti, *Bull. Madras Govt. Mus. new Ser.* 1 (2), pt. 6 : 159, pl. 15 fig. 4 a-b.
1952. *Drupa margaritica* : Satyamurti, *Bull. Madras Govt. Mus. new Ser.*, 1 (2). pt. 6 : 158, pl. 15, fig. 3a, b.
1976. *Ergalatax contracta* : Radwin and D'Attilio, *Murex Shells of the World* : 48, pl. 2, figs. 10-12, pl. 19, figs. 13 & 18.
1976. *Cronia* (*Ergalatax*) *contracta* : Cernohorsky, *Rec. Auckland Inst. Mus.*, 13 : 123, fig. 37-47. (for other synonyms).
1991. *Cronia* (*Ergalatax*) *contracta* : Surya Rao and Subba Rao. *Fauna of Lakshadweep, State Fauna ser.*, 2 : 321.

*Material examined* : Gujarat—2 exs., Okha beach ; 2 exs., Hanumandandi, Beyt island ; 3 exs., Pirotan island ; 5 exs., Sika beach ; 8 exs., Rozy port nr. Bedi ; 1 ex., Subhashnagar nr. Porbandar ; 1 ex., Navibandar ; 1 ex., Pata ; 1 ex., Somnath ; Maharashtra—5 exs., Bombay ; Karnataka—17 exs., Devgad island off Karwar ; 1 ex., Karwar ; 3 exs., Kumta ; Tamil Nadu—15 exs., Pamban ; 14 exs., Galaxea reef, Krusadai ; 19 exs., Pulli island ; 38 exs. Pearl Banks, Tuticorin ; Andhra Pradesh—1 ex., Waltair ; Orissa—1 ex., Ganjam coast ; Andaman & Nicobars—52 exs., Andamans ; 1 ex., Chidiyatapu ; 52 exs., Port Blair (South point, Marine jetty, Chatham) ; 1 ex., Rangachang ; 1 ex., Atlanta point ; 3 exs., Ross island ; 1 ex., Rampur beach ; 3 exs., Neil island ; 12 exs., Peel island ; 1 ex., Rangat bay ; 2 exs., Diglipur ; 1 ex., Havelock island ; 39 exs., Car Nicobar, (Malacca, Tee Top) ; 7 exs., Camorta ; 2 exs., Changappa bay, Great Nicobar ; 4 exs., Karachi, 1 ex., Pilai island, Mergui Archipelago ; 5 exs., Trincomale, Sri Lanka ; 1 ex, Penang.

*Description* : Shell fusiform, spire elevated, acute, consists of six subangulated whorls, body whorl large ; aperture large, elongately ovate ; anal sulcus deep inverted 'U' shape,

outer lip slightly erect, finely crenulate, interior denticulate, five to six denticles present ; inner lip smooth, adherent, anterior part with three to four plications ; canal short, broadly open, sculpture consists of prominent axial ribs, eight to ten in number with one to two low rounded varices, shoulder region slightly nodulose at interstices with spiral cords ; spiral sculpture consists of numerous fine scabrous threads.

Colour varies from chestnut brown to dark brown, prominent on ridges and spiral cords, interior of aperture white to pinkish white.

*Remarks* : This species was reported under several names. However Radwin and D'Attilio (1976) kept this species under the genus *Ergalatax*, whereas Cernohorsky (1976) kept under the genus *Cronia* keeping *Ergalatax* as subgenus after observing its radula structure. He further mentioned, "This species closely resembles to *C. margariticola* (Broderip) and both the species are frequently found mislabelled in the collections." However after studying large number of collections we found that this species is variable in its spire, number of axial ridges and colour.

*Distribution* : India : Both east and west coast of India, Lakshadweep and Andaman and Nicobar islands. Elsewhere : Persian Gulf, Karachi, Sri Lanka, Myanmar (=Burma), Indo-west Pacific from Japan to Australia and New Caledonia to east Africa (Zanzibar) (Radwin and D'Attilio, 1976), Philippines.

<i>Measurements</i> :	L	D	LA	LS
Smallest :	13.35	12.75	8.30	6.25
Average :	30.00	14.49	15.64	15.22
Largest :	37.20	21.05	20.45	18.60
Syntypes of	} 29.95	16.55	16.62	15.12
( <i>Sistrum</i>		} 32.62	16.08	18.45
<i>undatum</i> var. <i>indicum</i> Nevill) (Regd. No. 3583)				

### 51. *Cornia fiscella* (Gmelin)

(Pl. 10, fig. 5)

1788. *Murex fiscellum* Chemnitz, *Conch. Cab.*, 10, pl. 160, fig. 1524-1525, (Type locality : Pulo Condor), (non binom).
1791. *Murex fiscellum* : Gmelin, *Syst. Nat.* ed. 13 : 3552, sp. 160.
1845. *Murex fiscellum* : Reeve, *Conch. Icon.*, 3. *Murex* sp. 124, pl. 27, fig. 124.
1875. *Murex (Ocinebra) fiscellum* var. *lienardi* Nevill, *J. Asiat. Soc. Beng.*, 44 (2) : 83.
1880. *Ricinula fiscellum* : Tryon, *Man Conch.*, 2 : 188, pl. 58, figs. 215-257.
1906. *Sistrum decussatum* Reeve var. Smith, In : *Gardiners' Fauna and Geography Maldive and Laccadive Archipelagoes*, pt. 2 : 610.
1972. *Morula (Cronia) fiscella* : Cernohorsky, *Marine shells of the Pacific*, pt. 2 : 128, pl. 36, fig. 7.

*Material examined* : 7 exs., India (Regd. No. 3424), 2 exs., Andamans ; 1 ex. Rampur beach, Andamans.



**Description :** Shell ovate, spire short, acute, consists of five angulated whorls ; body whorl large, ovate, angulated upper region ; aperture narrow, ovate, anal sulcus deep inverted 'U' shape ; outer lip thick, erect, finely crenulate, interior denticulate, with six denticles, inner lip smooth, adherent, except extreme anterior part slightly detached, two to three plications at anterior part ; canal short, open ; sculpture consists of seven broad axial ribs, scabrous with fluted foliations, spiral sculpture with four cords sometimes double or triple stranded, base with two rows of oblique, foliated blunt spines ; interstices of these form into deep pits.

Colour light brown ; aperture white, sometimes light violet in colour.

**Distribution :** India : Andamans. Elsewhere : Sri Lanka, Maldives, Aden, Mauritius. This species is moderately common and occurs throughout the Tropical Pacific (Cernohorsky, 1972).

<i>Measurements :</i>	L	D	LA	LS
Smallest :	14.65	9.55	10.10	6.52
Average :	20.65	14.15	14.66	8.61
Largest :	29.86	17.74	18.95	13.30

## 52. *Cronia konkanensis* (Melvill, 1893)

(Pl. 10, fig. 6)

1893. *Ricinula (Sistrum) konkanensis* Melvill, 1893, *Mem. Proc. Manchr. Soc. lit. Phil.* (4), 7 : 54, pl. 1, fig. 5 (Type locality : Bombay, syntype present in National Museum of Wales).  
 1898. *Sistrum konkanensis* : Melvill and Standen, *J. conch. Lond.*, 9 : 43.  
 1901. *Sistrum konkanensis* : Melvill and Standen *Proc. zool. Soc. Lond.*, pt. 2 : 400.  
 1928. *Drupa konkanensis* : Melvill, *Proc. malac. Soc. Lond.*, 18 : 105.  
 1915. *Drupa Konkanensis* : Hornell and Tomlin, *Appendix : Indian Molluscs* : 88.  
 1952. *Drupa konkanensis* : Subrahmanyam et. al., *J. Univ. Bombay*, 21 (3) : 44, fig. 99.  
 1964. *Drupa konkanensis* : Tikader, *J. Univ. Poona*, 28 : 44, pl. fig.

**Material examined :** 2 exs., Devgad on Arabian sea (Regd. No. M 17252/3) ; 2 exs., Corbyn's cove, South Andamans ; 3 exs., Andamans ; 1 ex., Nicobars ; 4 exs., Sri Lanka ; 1 ex., Karachi.

**Description :** Shell pyramidally fusoid, spire high, acute, consists of five to six rounded whorls, body whorl large, ovate ; aperture longitudinally ovate, anal sulcus deep 'U' shape, outer lip thick, margin crenulate, interior denticulate with five teeth leading to raised lines, inner lip smooth, adherent posteriorly, detach erect anteriorly, two to three plicae above canal ; canal short, broad, open ; axial sculpture consists of longitudinal ridges with horizontal tubercles six to seven rows on body, two rows alternate with single row on spiral.

whorls, spiral sculpture of scabrous cords, three numbers each in between tubercular rows. Colour dark chocolate brown tubercles, cords white, aperture light violet with chocolate margin and dark brown lines interior, teeth white.

*Distribution* : India : Bombay, Devgad on west coast, Madras, Andaman and Nicobar islands. Elsewhere : Sri Lanka, Karachi, Persian gulf, South to Sri Lanka to eastwards (Melvill and Standen, 1898).

<i>Measurements</i> :	L	D	LA	LS
Smallest :	17·24	10·05	10·15	8·50
Average :	20·50	13·15	13·15	11·65
Largest :	26·60	16·50	16·05	13·86

### 53. *Cronia ochrostoma* (Blainville, 1832)

(Pl. 10, fig. 8)

1832. *Purpura ochrostoma* Blainville, *Nouv. Ann. Mus. Hist. Nat.* 1 : 205, (Type locality : Tonga island-error : should be New Ireland).  
 1976. *Cronia ochrostoma* : Cernohorsky, *Rec. Auckland Inst. Mus.* 13 : 122, figs. 31-34 & 35, 36 (for detailed synonyms).  
 1981. *Cronia ochrostoma* : Cernohorsky, *Rec. Auckland Inst. Mus.*, 18 : 196, figs. 8-10.

*Material examined* : 2 exs., Andamans ; 6 exs., Neil island ; 3 exs., Peel island ; 12 exs., Indian seas, 46 exs., Mixed collections (Andamans & Sri Lanka) ; 12 exs., Sri Lanka.

*Description* : Shell small, biconic shape, spire elevated, acute, consists of six sub-angulate whorls ; suture wavy, body whorl gibbose ; aperture narrowly elongate, anal sulcus shallow, outer lip erect, slightly crenulate, interior denticulate, six to seven denticles present, inner lip smooth, adherent, callose posteriorly, slightly detached, three to four denticles posteriorly ; canal short, open, sculpture consists of six to seven angulate axial ribs, spiral sculpture with prominent nodulose, cords interstices with fine scabrous threads three to four in number between cords.

Colour white sometimes with light brown spots in the interstices on the body whorl. Aperture light orange.

*Remarks* : This species resembles *C. ozenneana* but differs in having more number of axial ribs and spiral cords, with wider aperture. Most of the shells in the present collections are either partly eroded or covered with coral encrustations.

*Distribution* : India : Andamans. Elsewhere : Sri Lanka, Annesley bay, Mauritius, Philippines, Tropical Indo Pacific (Cernohorsky, 1976). This is the first record from Indian waters,

<i>Measurements :</i>	L	D	LA	LS
Smallest :	8.35	4.45	4.88	4.48
Average :	16.00	10.05	8.66	8.35
Largest :	20.75	12.70	11.32	10.40

54. *Cronia ozenneana* (Crosse, 1861)

(Pl. 10, fig. 7)

1861. *Ricinula ozenneana* Crosse, *J. Conch. Paris*, 9 : 285,  
 1862. *Ricinula ozenneana* : Crosse *J. Conch. Paris*, 10 : 49, pl. 1, figs. 4 & 5.  
 1865. *Latirus gibbus* Pease, *Proc. zool. Soc. Lond.* : 45 (Type locality : Howland island, Pacific ocean).  
 1868. *Latirus gibbus* : Pease, *Amer. J. Conch.*, 3 (4) : 279, pl. 3, (4) : 279, pl. 23, fig. 17.  
 1873. *Murex crossei* Lienard, *J. Conch. Paris*, 21 : 285.  
 1875. *Murex (Ocinebra) gibba* : Nevill. *J. Asiat. Soc. Beng.*, 44 (2) : 83.  
 1904. *Coralliophila dissumulans* Preston, *J. Malac.* 11 (4) : 77, pl. 7, figs. 5 & 6.  
 1976. *Favartia crossei* : Radwin and D'Attilio, *Murex Shells of the world* ; 146, pl. 24, figs. 17-18.  
 1980. *Cronia gibba* : Cernohorsky, *Rec. Auckland Inst. Mus.* , 16 : 172, figs. 6-10, 11.  
 1982. *Cronia ozenneana* : Cernohorsky, *Rec. Auckland Inst. Mus.* 19 : 125, figs. 1-3 (figd. holotype).

*Material examined* : 2 exs., Andamans, 9 exs., Sri Lanka.

*Description* : Shell small, fusiform, spire elevated, acute, consists of four to five sub-angulate whorls, ribbed, suture wavy, body whorl large, globose ; aperture ovate, anal sulcus shallow, outer lip erect, interior denticulate, five denticles present, inner lip partly detached anteriorly, smooth, with two to three faint pustules above the canal, canal short, open, umbelicus prominent ; axial sculpture consists of five prominent ribs on body whorl and six on penultimate whorl, spiral sculpture with broad cords.

Colour light brown, aperture light pink internally.

*Remarks* : The material agrees with figures given by Cernohorsky (1980 & 1982). Present material is partly eroded and some of the shells covered with coral growths, spiral sculpture not seen clearly. Except for the Nevill's material no fresh material was studied. Cernohorsky (1980 & 1982) gave the taxonomical features of this species.

*Distribution* : India : Andamans. Elsewhere : Sri Lanka, Mauritius, Seychelles, Meagre records show that *Cronia ozenneana* is widely distributed throughout the Indo Pacific, the known range extending from Mauritius to Sri Lanka and the Line islands (Cernohorsky, 1980).

<i>Measurements :</i>	L	D	LA	LS
Smallest :	8.82	6.15	4.50	4.95

Average :	12·65	8·22	7·70	6·65
Largest :	15·18	10·15	8·10	7·60

55. *Cronia subnodulosa* (Melvill, 1893)

(Pl. 10, fig. 9)

1893. *Ricinula (Sistrum) subnodulosa* Melvill, *Mem. Proc. Manchr. lit. phil. Soc.*, (4) 7 : 54, pl. 1, fig. 6  
(Type locality: Bombay: Syntype in National Museum of Wales).
1901. *Sistrum subnodulosum* : Melvill and Standen, *Proc. zool. Soc. Lond.*, pt. 2 : 400.
1942. *Thais subnodulosa* : Gravely, *Bull. Madras Govt. Mus. new Ser.*, 5 (2) : 98.
1951. *Drupa subnodulosa* : Hornell and Tomlin, *Apendix : Indian Molluscs* : 88.
1952. *Drupa subnodulosa* : Subrabamanyam et. al. *J. Univ. Bombay*, 21 (3) : 45, fig. 100.

**Material examined** : 2 exs., Chorwad, Gujarat ; 3 exs., Navidandar ; 1 ex., Diu fort east ; 53 exs., Bombay ; 1 ex., Murderswar ; 1 ex., Kumta ; 1 ex., base of Dolphin's nose, Visakhapatnam ; 7 exs., Andamans ; 1 ex., South point, Port Blair ; 1 ex., Indian seas ; 2 exs., Akyab ; 4 exs., Maungmagan Myanmar.

**Description** : Shell elongately fusoid, spire high, acute consists of six angulated whorls, body whorl large, fusoid, suture impressed ; aperture narrowly elongate, anal sulcus deep 'U' shape, outer lip thick, margin crenulate, interior denticulate with five teeth, inner lip smooth, adherent posteriorly, detach and erect anteriorly, three to four faint plicae above canal ; canal short open broad ; sculpture consists of eight to nine axial ribs, nodulose, spiral sculpture of scabrous cords, five to six numbers in between nodular rows on body, single prominent row of nodules on spiral whorls with scabrous cords on either side ; nodules bisected ;

Colour chocolate brown, nodules dark brown, aperture light violet, margin dark brown with a prominent white band leading interior in middle, coinsides with a white band outside on body.

**Remarks** : This species closely resembles the west Indian species *nodulosa* (C. B. Adams) but differs in having more elongated spire and bisected nodules and a white band in aperture. It also differs from *C. konkanensis* in having rounded nodules and elongate spire.

**Distribution** : India : Gujarat, Bombay, Diu, Kumta, Murdeswar nr. Karwar ; Visakhapatnam, Andamans. Elsewhere : Karachi, Myanmar. This species is reported for the first time from the east coast of India and Andamans.

<b>Measurements</b> :	L	W	HA	HS
<b>Smallest</b> :	11·60	6·45	6·55	5·52

Average :	17.35	9.45	10.00	9.28
Largest :	23.60	11.68	12.85	13.35

Genus *Mancinella* Link, 1807

(Type species : *Mancinella aculeata* Link, 1807 (= *Volema alouina* Roeding, 1798) designated by Iredale, 1915, ICZN Opinion, 911.

1807. *Mancinella* Link, *Beschreibung der Naturalien Sammlung der Universitat zu Rostock* : 115.

Shell thick, oblong, body whorl large, inflated, spiral sculpture with tubercular rows ; aperture large, ovate, outer lip margin crenulate, interior lirate ; columella sometimes calloused. Two species are represented in the present collection.

Two species are reported from Indian waters.

## Key to the species

Shell with short spire, aperture wide, interior without prominent lirations ... *M. bufo*  
 Shell with elevated spire, aperture narrow, interior with prominent lirations  
 ... .. ... *M. alouina*

56. *Mancinella alouina* (Roeding, 1798)

(Pl. 10, figs. 10, 11)

1798. *Volema alouina* Roeding, *Museum Boltenianum* : 58 (Type locality : not given).  
 1836. *Purpura mancinella* : Kiener, *Icon. Coq. Viv.*, 9, *Purpura* : 66.  
 1846. *Purpura mancinella* : Reeve, *Conch. Icon.*, 3, *Purpura* sp. 2, pl. 1, fig. 2.  
 1880. *Purpura mancinella* : Tryon, *Man. Conch.*, 2 : 164, pl. 47, figs. 59-61, 63 & 64.  
 1901. *Purpura (Thalessa) mancinella* : Melvill, *Proc. zool. Soc. Lond.*, 397.  
 1942. *Thais gemmulata* : Gravelly, *Bull. Madras Govt. Mus. new Ser.*, 5 (2) : 98.  
 1961. *Mancinella mancinella* : Rippingale and Mc Michael, *Queensland and Great Barrier Reef shells* ; 99, pl. 12, fig. 23.  
 1967. *Mancinella mancinella* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 134, pl. 29, fig. 182.

*Material examined* : 6 exs., Andamans ; 3 exs., Maldives ; 4 exs., Sri Lanka.

*Description* : Shell ovate, thick, spire short, acute, consists of three to four tuberculated whorls, body whorl ovately broad, ornamented with four to five rows of prominent tubercles ; aperture medium size, ovate, outer lip thick, finely crenulate, interior lirate ; inner lip smooth, one or two plicae anteriorly ; anal sulcus deep, open ; canal short, open ; spiral sculpture consists of five to six cords in between tubercular rows.

Colour creamy white, tubercles reddish in colour, aperture orange yellow, lirations reddish in colour.

*Remarks* : This species closely agrees with *Thais echinata* (Blainville), but differs in having more prominent tubercles of reddish colour, absence of prominent cords in the middle of the spiral cords, aperture orange yellow with reddish lirations. In *T. echinata* number of lirations are less, aperture white in colour. Tryon (1880) remarked that "the more elevated and more sharply tuberculated forms, white without and within are called *Purpura echinata* and might continue to be so designated as variety, but intermediate gradations are very complete." Shells from Maldives are large with more prominent tubercles than Andamans and Sri Lanka. Cernohorsky (1974) said that *Murex pyrum* Dillwyn, 1817 is a primary homonym of *M. pyrum* Linnaeus, 1758 and a synonym of *Mancinella alouina* (Roeding, 1798) (= *M. mancinella* of authors) Indo-Pacific in distribution.

*Distribution* : India : Madras (Gravely, 1942), Andamans. Elsewhere : Karachi, Durban, Natal, Bay of Muskat, Maldives, Sri Lanka, Singapore, Fiji islands, Japan, Australia. Throughout tropical Indo-Pacific moderately common (Cernohorsky, 1972).

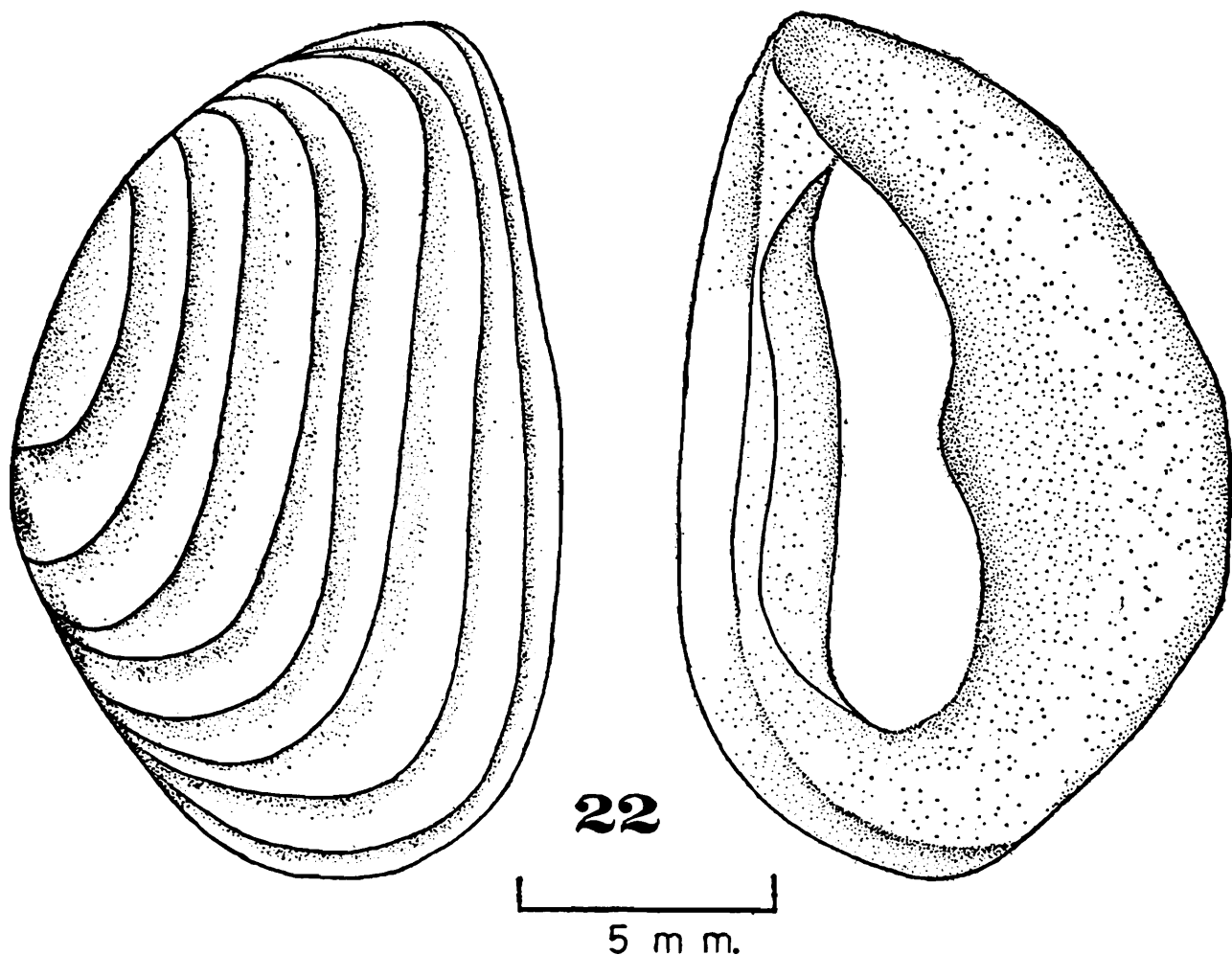
<i>Measurements</i> :	L	D	LA	LS
Smallest :	28·30	21·10	20·18	11·00
Average :	45·02	32·82	32·55	19·65
Largest :	61·42	47·20	38·22	30·05

### 57. *Mancinella bufo* (Lamarck, 1822)

(Pl. 11, figs. 1, 2 ; text fig. 22)

1822. *Purpura bufo* Lamarck, *Hist. anim. sans. Vert.*, ed, 2, 10 : 99, fig. 13.  
 1836. *Purpura bufo* : Kiener, *Icon. Coq. viv.*, 9, *Purpura* : 80, pl. 20, fig. 60, pl. 21, fig. 60a-b.  
 1846. *Purpura bufo* : Reeve, *Conch., Icon.*, 3, *Purpura*, sp. 7, pl. 2, fig. 7.  
 1859. *Purpura bufo* : Kuester, *Syst. Conch. Cab.*, 3, *Purpura* : 111, pl. 20, fig. 3.  
 1880. *Purpura bufo* : Tryon, *Man Conch.* 2 : 165, pl. 48, figs. 66, & 71.  
 1941. *Thais bufo* : Crichton, *J. Bombay nat. Hist. Soc.*, 42 : 333.  
 1942. *Thais bufo* : Gravely, *Bull. Madras Govt. Mus. new Ser.* 5(2) : 52.  
 1948. *Thais bufo* : Ray, *Rec. Indian Mus.*, 46 : 104.  
 1952. *Thais bufo* : Satyamurti, *Bull. Madras Govt. Mus. new Ser.* 1(2) pt. 6 : 165, pl. 16, fig. 2.  
 1952. *Thais bufo* : Subrahmanyam et. al. *J. Univ. Bombay*, 21 (B) : fig. 105.  
 1961. *Thais bufo* : Menon et. al. *J. Bombay nat. Hist. Soc.*, 58 : fig.  
 1961. *Mancinella bufo* : Rippingale and Mc Michael, *Queensland and Great Barrier Reef shells t* 98, pl. 12, fig. 19.  
 1972. *Mancinella bufo* : Cernohorsky, *Marine Shells of the Pacific* 2 : 123, pl. 34, fig. 8.  
 1977. *Thais* (*Stramonita*) *bufo* : Ray, *Contribution to the knowledge of the Molluscan fauna of Maungmagan, Lower Burma* : 58 (for distribution).

*Material examined* : Gujarat : 7 exs., Mandvi, Kutch ; 2 exs., Miani nr. Porbandar ; 24 exs., Porbandar ; 5 exs., Madhi ; 3 exs., Navibandar ; 12 exs., Veraval ; 5 exs., Jaleswar nr. Veraval ; 17 exs., Bedia nr. Veraval ; 11 exs., Somnath ; 3 exs., Mangrol ; 2 exs., Kotda ; Diu : 3 exs., Goghla ; 5 exs., Muldwarka nr. Kodinar ; Maharashtra : 2 exs., Bombay : 7 exs., Devgad, nr. Ratnagiri ; Goa : 1 ex., Cavellosim beach ; 1 ex., Talpam & Palwala beach, Canacona : 1 ex., Baga beach ; Karnataka : 4 exs., Kumta ; 4 exs., Dharieswar nr. Kumta ; 53 exs., Suratkal ; 1 ex., Anjdive island, nr. Malpe ; 2 exs., St. Mary islands ; Kerala : 1 ex., South beach, Calicut ; 10 exs., Narakkal, Vypeen island, Cochin, Kovalam nr. Trivandrum ; Tamilnadu : 1 ex., Kanyakumari ; 8 exs., Covelong ; 12 exs., Vedali coast, nr. Mandapam ; 39 exs., Mandapam camp ; 3 exs., Pamban ; 6 exs., Tranquebar ; 4 exs., Madras ; Andhra Pradesh : 30 exs., Pithapuram



Text fig. 22 : *Mancinella bufo*—Operculum 8X.

beach, Waltair : 1 ex., Waltair point : 8 exs., Dolphin's nose, Visakhapatnam ; 25 exs., Upputeru, Visakhapatnam ; 20 exs., light house, Visakhapatnam : 1 ex., Jalaripeta, Visakhapatnam ; 11 exs., Hawamahal, Visakhapatnam, 19 exs., Rishikonda, Waltair ;

28 exs., light house, Bhimilipatnam ; 36 exs., Intertidal area Bhimilipatnam ; Orissa : 125 exs., Gopalpur : 2 exs., E. of Gopalpur I. B. ; Andaman & Nicobar Islands : 5 exs., Andamans ; 25 exs., Little Andaman ; 1 ex., Nicobars ; 1 ex., Karachi ; 6 exs., Sri Lanka : 1 ex., Maungmagan, 10 exs. Tavoy, coast, Myanmar (=Burma).

*Description* : Shell moderate to large (maximum 55 mm in size), solid, heavy, globose, spire less elevated, acute, consists of three to four rounded whorls, body whorl large, slightly angulated ; aperture large, ovate, outer lip crenulate, interior lirate ; columella smooth, callose extends posteriorly above shoulder ; anal sulcus deep, open, siphonal canal short, broadly open ; sculpture consists of three to four rows of tubercles gradually obsolete anteriorly ; spiral cords in between the rows of tubercles ; aperture creamy white, outer lip margin chocolate brown ; columella creamy yellow extends posteriorly.

*Remarks* : The species closely resembles *Purpura Panama*, but differs from the latter in having short spire, prominent tubercles, more globose body whorl. It occurs in the same habitat along with *P. panama* on intertidal rocks.

Studies were made on the male reproductive system, history and histochemistry of albumen and capsular glands and salivary glands (Rajalakshmi Bhanu *et. al.* 1983, 1982, 1981) and also its breeding habits (Chari, 1950).

The male reproductive system of *T. bufo* is simple and consists of a testis which is connected to the prostate gland by a straight, tube like vas deferens. The prostate is a straight tube leading to the penis, which is flagellate, wide and dorsoventrally flattened. Testicular secretions have mucoproteins and glycolipids whereas prostate secretions are rich in carbohydrates with variable amounts of proteins.

In females the oviduct opens into the albumen gland at a point below the kidney. The gland is creamish white and consists of a large number of tubules lined by secretory cells. The albumen gland opens into the ventral wall of the capsular gland. The capsular gland is creamish yellow and secretes the egg capsule. Both the glands are highly *proteinaceous*. The secretions of albumen gland are PAS positive and do not contain glycogen. They are rich in carbohydrates and protein whereas that of the capsular gland is a mucoprotein.

*M. bufo* has a peak breeding period from December to June at Visakhapatnam.

*Distribution* : India : All along coasts of India except West Bengal coast. Elsewhere : Gulf of Oman, Karachi, Sri Lanka, Maldives, Myanmar. Moderately uncommon and ranges westwards from Queensland, Australia (Cernohorsky, 1972) ; Indo-Pacific and Queensland to northern territory (Rippingale and Mc Michael, 1961).



Measurements :	L	D	LA	LS
Smallest :	16.70	11.55	13.45	15.02
Average :	35.60	25.50	27.10	12.80
Largest :	55.25	42.60	42.85	19.30

Genus *Morula* Schumacher, 1817

Type species : *Morula papillosa* Schumacher, 1817 = *Drupa uva* Roeding, 1798.

1817. *Morula* Schumacher. *Essai. Vers test.* 72 : 227.

1978. *Morula* : Cernohorsky, *Rec. Auckland Inst. Mus.*, 15 : 76.

Shell ovate, spire short less than body whorl in height, whorls nodulose or spinose, inner lip with few plications, outer lip margin thickened crenulate, internally tuberculate or striated.

Key to the species

1. Shell small not exceeding 12 mm in height ... 2.
- Shell large more than 12 mm in height ... 3.
2. Shell narrow, fusoid, axial ribs nodulose, body with seven rows, penultimate whorl with single row of nodules ... *M. funiculata*
- Shell broad, axial ribs with large nodules, four rows on body, gradually decrease in size ... *M.anaxeres*
3. Shell sub-angulate, body whorl with two prominent white bands, single band on spiral whorls ... *M. biconica*
- Shell not sub-angulate, without white bands ... 4.
4. Body whorl with four to five rows of nodules bisected by spiral threads ... *M. nodicostata*
- Body whorl with nodules not bisected by spiral threads ... 5.
5. Body sculpture with deep pits, aperture broad with four raised lines inside ... *M. marginatra*
- Body sculpture without deep pits, aperture narrow, without raised lines inside ... 6.
6. Shell with rectangular tubercles, aperture not angulate ... *M. granulata*
- Shell with spinose tubercles, aperture angulate, first two denticles prominent ... *M. uva*

58. *Morula anaxares* (Kiener, 1836)

(Pl. 11, fig. 6)

1835. *Purpura anaxares* (Duclos MSS) Kiener, *Icon. coq. viv.*, 8 : 26, pl. 7. fig. 17, (Type locality : not given).  
 1901. *Sistrum anaxares* : Melvill and Standen, *Proc. zool. Soc. Lond.*, 2 : 400.  
 1928. *Drupa anaxares* : Melvill, *Proc. malac. Soc. Lond.*, 18 : 105.  
 1942. *Thais anaxeres* : Gravely, *Bull. Madras Govt. Mus., new Ser.* 5 (2) : 98.  
 1972. *Morula anaxeres* : Cernohorsky, *Marine Shells of the Pacific*, 2 : 126, pl. 35, fig. 10.  
 1977. *Morula anaxeres* : Ray, *Contribution to the knowledge of Molluscan fauna of Maungmagan, Lower Burma* : 48.  
 1991. *Morula anaxeres* : Surya Rao and Subba Rao. *Fauna of Lakshadweep—State Fauna ser.*, 2 : 322.

**Material examined** : 2 exs., Andamans ; 3 exs., Corbyns' cove ; 2 exs., Nicobars ; 2 exs., mixed collections (Andamans & Sri Lanka) ; 5 exs., Sri Lanka ; 4 exs., Lampee island, Mergui Archipelago ; 8 exs., Stn. 657, Marine Survey—N. side of E. of Macpherson strait nr. Chidiyatapu.

**Description** : Shell moderately small not more than 14 mm ventricose, spire short, acute, consists of four nodulose, whorls, body whorl obtusely ovate, angulate, aperture narrow, ovately elongate ; anal sulcus open, outer lip thick, erect, crenulate, interior dentate with four rounded denticles ; inner lip smooth, adherent, anterior part with two to three plications ; sculpture consists of four spiral rows of nodules and striae, first two rows with larger nodules giving angular appearance, rest gradually decrease in size, canal short, open.

Colour dirty grey to light brown with white bands, nodules white, aperture light violet streaked with white band, columella light violet in colour, sometimes with white markings.

**Distribution** : India : Lakshadweep, Andaman & Nicobars, Madras. Elsewhere : Persian Gulf, Karachi, Mauritius, Malagasy, Zanzibar, Gulf of Aden, Red sea etc. (Ray, 1977). This species is widely distributed throughout the tropical Pacific (Cernohorsky, 1972).

<i>Measurements</i> :	L	D	LA	LS
Smallest :	7.84	5.75	5.25	3.40
Average :	9.45	6.80	5.30	5.10
Largest :	*13.60	13.28	10.98	9.48

(\* spire broken)

59. *Morula biconica* (Blainville, 1832)

(Pl. 11, fig. 5)

1832. *Purpura biconica* Blainville, *Nouv. Ann. Mus. Hist. Nat.* 1 : 203, pl. 9, fig. 1. (Type locality : not given).  
 1836. *Purpura biconica* : Kiener, *Icon. Coq. viv. Purpura* 9 : 28, pl. 9, fig. 24.  
 1846. *Ricinula bicatenata* Reeve, *Conch. Icon.*, 3 : *Ricinula*, sp. 48, pl. 6, fig. 48.  
 1880. *Ricinula biconica* : Tryon, *Man. Conch.*, 2 : 185, pl. 57, figs. 208-211.  
 1906. *Sistrum biconicum* : Smith, in : *Gardiner's Fauna and Geography Maldive and Laccadive Archipelagoes.* 2 : 610.  
 1972. *Morula biconica* : Cernonorsky, *Marine shells of the Pacific*, 2 : 127, pl. 35, fig. 11.

**Material examined :** 1 ex., Ganjam coast, (43-50M) ; 2 exs., Andamans ; 2 exs., South India ; 13 exs., India ; 8 exs., Sri Lanka ; 8 exs., mixed coll. (Sri Lanka & Mauritius).

**Description :** Shell spindle shape, spire elevated, acute, consists of five subangulated whorls, body whorl large, oblong ; aperture narrowly elongate, angulated ; anal sulcus deep inverted 'V' shape, outer lip margin scabrous, interior denticulate first two teeth large, sometimes combined, inner lip adherent, smooth, plicated anteriorly, sculpture consists of spinose axial ribs eight to nine in number, spiral sculpture consists of fine scabrous cords, two of them prominent, broad, tuberculate, one on the shoulder and other below the middle.

Colour white with chestnut brown on axial ribs, prominent, spiral cords white, two on body whorl and one on each whorl on spire, aperture light violet.

**Distribution :** India : Ganjam coast and Andamans. Elsewhere : Sri Lanka, Mauritius, Maldives. Moderately common and widely distributed throughout tropical Pacific (Cernohorsky, 1972). This is the first record from India.

<i>Measurements :</i>	L	D	HA	HS
Smallest :	9.85	6.32	5.82	5.45
Average :	16.78	8.90	9.64	9.25
Largest :	25.58	16.58	15.56	12.15

60. *Morula granulata* (Duclos, 1832)

(Pl. 11, figs. 3, 4)

1832. *Purpura granulata* Duclos, *Ann. Sci. Nat.*, 2 : fig. 9 (Type locality : ?).  
 1832. *Purpura tuberculata* Blainville. *Nouv. Ann. Mus. Hist. Nat.*, 1 : 204, pl. 9., fig. 5.

1836. *Purpura granulata* : Kiener, *Icon. Coq. Viv.*, 9, *Purpura* : 22, pl. 5, fig. 10.  
 1846. *Ricinula tuberculata* : Reeve, *Conch. Icon.*, 3, *Ricinula*, pl. 2, fig. 11.  
 1880. *Ricinula (Sistrum) tuberculatus* : Tryon, *Man. Conch.*, 2 : 186, pl. 57, figs. 218, 220.  
 1898. *Sistrum tuberculatum* : Melvill, *J. Conch. Lond.*, 9 (2) : 43.  
 1901. *Sistrum tuberculatum* : Melvill & Standen, *Proc. zool. Soc. Lond.*, 2 : 400.  
 1906. *Sistrum tuberculatum* : Smith, in : *Gardiners' Fauna and Geography Maldiva and Laccadive Archipelagoes*, 2 : 609.  
 1908. *Sistrum (Morula) tuberculatum* : Schepman, *The Prosobranchia of the Siboga Expedition*, 49 : 355.  
 1942. *Thais granulata* : Gravely, *Bull. Madras Govt. Mus. new Ser.* 5 (2) : 50.  
 1952. *Drupa tuberculata* : Satyamurti, *Bull. Madras Govt. Mus. new Ser.* 1 (2), pt. 6 : 159, fig. 5,  
 1952. *Drupa tuberculata* : Subrahmanyam et. al. 1952, *J. Univ. Bombay* 21 (3) : 44, fig. 98.  
 1961. *Drupa tuberculata* : Menon, et. al. *J. Bombay nat. Hist. Soc.*, 58 (2) : 486, pl. 8, fig. 60.  
 1964. *Drupa tuberculata* : Tikader *J. Univ. Poona*, 28 : 45, pl. 2, fig. 15.  
 1967. *Morula granulata* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 134, pl. 29, fig. 178.  
 1972. *Morula granulata* : Cernohorsky, *Marine Shell of the Pacific*, 2 : 127, pl. 36, fig. 2.  
 1977. *Morula tuberculata* : Ray, *Contribution to the knowledge of molluscan Fauna of Maungmagan, Lower Burma*, : 50 (for distribution).  
 1991. *Morula granulata* : Surya Rao and Subba Rao. *Fauna of Lakshadweep. State Fauna ser.*, 2 : 322.

**Material examined** : Gujarat : 8 exs., Okha beach ; 8 exs., Mithapur, nr. Okha ; 7 exs., Dwarka ; 6 exs., Beyt island ; 2 exs., Miani ; 2 exs., Lamba shore, nr. Porbandar ; 7 exs., Porbandar ; 3 exs., Subhashnagar, nr. Porbandar ; 8 exs., Madhavpur ; 2 exs., Navibandar ; 2 exs., Chorwad ; 8 exs., Veraval ; 2 exs., Delvada ; 4 exs., Diu fort ; Maharashtra : 4 exs., Bombay ; 3 exs., Devgad island ; Karnataka : 238 exs., St. Mary island ; 63 exs., Anjidiv island ; 1 ex., Suratkal ; Kerala : 21 exs., nr. Cannanore, 7 exs., Kovalam nr. Trivandraum ; Tamil Nadu : 3 exs., Pulli island ; 22 exs., Krusadai, island ; 14 exs., Pamban ; 9 exs., Vadalai coast nr. Mandapam ; 9 exs., Mandapam camp ; Andhra Pradesh : 25 exs., Visakhapatnam, 34 exs., Light house, Waltair ; 20 exs., Rishikonda, Waltair ; 2 exs., Bhimilipatnam ; Orissa : 1 ex., N. of Light house, Gopalpur ; Andaman and Nicobars : 26 exs., Andamans ; 3 exs., Kaudiaghat ; 6 exs., Ross island ; 1 ex., South point ; 21 exs., Nicobar ; 17 exs., Car Nicobar ; 9 exs., Camorta ; 1 ex., Katchal ; 2 exs., Changappa Bay, Great Nicobar ; 2 exs., Lakshadweep ; 1 ex., Kavaratti, Lakshadweep, 6 exs., Agathi coral, Lakshadweep ; 2 exs., Sri Lanka ; Myanmar : 10 exs., Lampee island, 35 exs., Arakan ; 7 exs., Padwa Bay ; 2 exs., Akyab.

**Description** : Shell broadly spindle shape, spire elevated, acute, consists of four to five tuberculated whorls, body whorl large, angulate, aperture narrowly ovate, anal sulcus deep, outer lip thick, margin crenulate, interior denticulate, four teeth, inner margin adherent, smooth, plicated with two to three light pustules above canal, canal short, open, terminally, twisted right ; sculpture consists of prominent spiral rows of tubercles, two each on spiral whorls and four on body whorl, tubercles squarose, more prominent near shoulder followed by fine scabrous threads in between.

Colour dark grey to black, tubercles on white back ground, aperture violet, posterior part of columella with dark brown patch, teeth on outer margin bluish white.

*Remarks* : This species is well distributed on both the coasts of India and reported as *tuberculata* Blainville, commonly occurs on rocky shores. Cernohorsky (1972) and Ray, H. C. (1977) gave synonyms of this species. Shells from south Andamans and Car Nicobar found their spires neither corroded or broken. One of the shell first two teeth in the aperture combined. Shells collected at Okha are with more elevated spire, whereas from Dwarka are with short spire.

*Distribution* : India : Common on rocky shores of both east and west coasts. Andaman & Nicobars Lakshadweep. Elsewhere : Persian Gulf, Mekaran coast, Maldives, Sri Lanka, Myanmar, Malagasy, Java etc. This species is common throughout Tropical Indo-Pacific (Cernohorsky, 1967).

<i>Measurements</i> :	L	D	HA	HS
Smallest :	13.95	10.56	10.02	10.50
Average :	24.10	12.95	13.05	13.58
Largest :	29.05	15.40	15.40	17.75

### 61. *Morula marginatra* (Blainville, 1832)

(Pl. 11, figs. 7, 8)

1832. *Purpura marginatra* Blainville, *Nouv. Ann. Mus. Hist. Nat. Paris*, 1 : 218, pl. 10, fig. 1. (Type locality : Ticopia, Solomon Island).  
 1836. *Purpura cancellata* Kiener, *Icon. Coq. Viv.*, 8, *Purpura* : 25, pl. 17, fig. 16. (refers Blainville).  
 1847. *Purpura atromarginata* Blainville, *Menke. Scit. Mal.* ?  
 1868. *Sistrum squamosum* Pease, *Am. J. Conch.*, 3 (4) : 277, pl. 23, fig. 14.  
 1880. *Ricinula (Sistrum) marginatra* : Tryon, *Man. Conch.*, 2 : 186, pl. 57, figs. 221, 222, 225 to 229 (for other synonyms).  
 1964. *Drupa atromarginata* : Tikader, *J. univ. Poona*. 28 : 45.  
 1987. *Morula marginatra* : Cernohorsky, *Rec. Auckland Inst. Mus.*, 24 : 97, figs. 10, 11.

*Material examined* : 16 exs., Dwaraka ; 11 exs., Porbandar ; 6 exs., Veraval ; 1 ex., Diu Fort ; 10 exs., Goghla ; 2 exs., Devgad on Arabian sea ; (Regd. No. M17248/3) ; 22 exs., Andamans ; 4 exs. Mus Jetty, Car Nicobar ; 4 exs., Indian seas, (Regd. No. 3567, marked as 'And', 'M', 'C' indicating as Andamans, Mauritius and Sri Lanka).

*Description* : Shell pyramidally fusoid, spire elevated, acute, consists of four angulated whorls, body whorl large, ovate, suture distinct aperture narrowly ovate, outer lip margin crenulate, thick, interior denticulate with four prominent teeth leading to raised lines, inner lip smooth, adherent, plicated middle, canal short, broad, open, sculpture consists of

longitudinal ribs broken to squarose tubercles by revolving scabrous cords interstices formed into deep pits, body whorl with four to five rows, spiral whorls have two rows each.

Colour greyish with white horizontal lines in middle on body; aperture light violet with dark chocolate brown lines inside, teeth white, margin chocolate brown.

*Remarks* : Shells are variable in shape. This species closely resembles *M. granulata* but differs in having deep pits and broader aperture. Shells from Diu island are bit narrow in appearance with elevated spire. Also closely resembles with young shells of *Thais hippocastanum* but differs in not having spinose tubercles and presence of deep pits. This species also agrees closely with *D. fenestrata* in having deep pits but differs in having light violet aperture with four brown lines inside.

*Distribution* : India : Dwaraka, Porbandar, Veraval, Diu, Devgad on west coast, Andaman and Nicobars. Elsewhere : Australia, Central Polynesia, Mauritius, Singapore, Durban, Philippines and Queensland.

<i>Measurements</i> :	L	D	LA	LS
Smallest :	19·32	12·90	12·55	10·40
Average :	24·42	16·05	15·65	12·50
Largest :	27·30	16·60	16·60	13·35

## 62. *Morula nodicostata* (Pease, 1868)

(Pl. 11, figs. 11, 12)

1868. *Engina nodicostata* Pease, *Am. J. Conch.*, 3 : 274, pl. 23, fig. 8 (Type locality : Polynesia Paumotu or Tahiti).  
 1909. *Gorgina purpureocincta* Preston, *Rec. Indian Mus.*, 3 : 136. pl. 22, fig. 13 (Type locality : (Ceylon) (plate added subsequently indicated as *Engina purpureocincta*)  
 1972. *Morula nodicostata* : Cernohorsky, *Marine Shells of the Pacific*, 2 : 127, pl. 36, fig. 5.

*Material examined* : 148 exs., Andamans ; 4 exs., Long island ; 6 exs., Aberdeen jetty, Port Blair ; 1 exs., Neil island ; 9 exs., Chatam, Port Blair : 2 exs., Tee Top, Car Nicobar : 2 exs., 8 km. south of circuit house, Car Nicobar : 2 exs., Camorta ; 1 ex., Indian seas ; 85 exs., Tavoy coast, Myanmar : 30 exs., Sri Lanka.

*Description* : Shell small, broad, ovate, spire high, acute, consists of five subangulate whorls, suture obscure, body whorl large, broadly ovate ; sculptured with four to five rows of rounded nodules decreased in size posteriorly, aperture narrowly ovate, anal sulcus deep inverted 'V' shape, outer lip margin thick, denticulate, four to five denticles inside ; inner lip smooth, adherent posteriorly, detached anteriorly with three light plicae above canal, canal short, open ; sculpture consists of scabrous spiral cords, three to four cords between nodular rows, nodules bisected by three to four cords.

Colour light chocolate brown, nodules white, alternate by purplish brown bands, aperture light violet with broad white band interior, columella with dark brown blotch posteriorly.

*Ramarks* : Preston (1909) reported this species from Sri Lanka as *Gorgina purpureocincta*, recorrected *Gorgina* to *Engina* in 'Erratum' which is later synonymised by Cernohorsky, (1972). Most of the old collections from Andamans are very small and covered with encrustations hiding its sculpture. Recent collections include shells which are quite moderate in size with beautiful sculpture. Some of the shells are small with deep pits in between nodules.

*Distribution* : Andaman & Nicobar islands. Elsewhere : Myanmar & Sri Lanka.

<i>Measurements</i> :	L	D	LA	LS
Smallest :	9.95	3.25	2.68	2.48
Average :	18.14	10.85	10.74	9.60
Largest :	21.25	12.74	14.65	9.18

### 63. *Morula funiculata* (Reeve, 1846)

(Pl. 11, figs. 13, 14)

1846. *Ricinula funiculata* Reeve, *Proc. zool. Soc. Lond.* (1846); *Conch. Icon.*, 3, *Ricinula* sp. 16. pl. 3, fig. 16. (Type locality : not given).

1880. *Ricinula funiculata* : Tryon, *Man. Conch.*, 2 : 191.

*Material examined* : 1 ex., Pearl Bank, Tuticorin, 4 exs., Mergui Archipelago.

*Description* : Shell small not more than 10 mm in height, spindle shape, spire elevated, acute, consists of five whorls, body whorl large ; aperture narrow, elongately ovate, outer lip thick, margin crenulate, interior denticulate with five to six denticles gradually decreases in size ; inner lip adherent, columella with three pustules above canal ; anal sulcus deep inverted 'U' shape margined by ridge ; sculpture consists of spiral cords, nodulose, two to three on spiral whorls, six to seven on body whorl ; axial sculpture with prominent ribs, interstices formed to nodules, suture deep, penultimate whorl consists of a single row of nodules.

Colour white with orange brown nodules alternate with bands, aperture white with brown markings on columella.

*Remarks* : Shells covered with coral growths, this species closely resembles the genus *Engina*, but differs in the absence of plications.

*Distribution* : India : Tuticorin. Elsewhere : Mergui Archipelagoes. This is the first record from the Indian Ocean.

<i>Measurements</i> :	L	D	LA	LS
Smallest :	8.52	4.34	4.65	4.75
Average :	9.80	4.95	5.38	5.80
Largest :	11.60	5.60	5.98	6.32

#### 64. *Morula uva* (Roeding, 1798)

(Pl. 11, figs. 9, 10)

1798. *Drupa uva* Roeding, *Museum Boltenianum* : 56 sp. 703 (Type locality : Not given).

1972. *Morula uva* : Cernohorsky, *Marine Shells of the Pacific.*, 2 : 127, pl. 36, fig. 3 (for other synonyms).

1991. *Morula uva* : Surya Rao and Subba Rao. *Fauna of Lakshadweep. State Fauna ser.*, 2 : 323.

*Material examined* : 1 ex., Neil island ; 2 exs., Arong, Car Nicobar ; 17 exs., Kiltan, Lakshadweep, 4 exs., Kavaratti, Lakshadweep ; 18 exs., Mauritius & Sri Lanka (mixed Regd. no. M 19165/3, (2 exs., inscribed as C indicates Ceylon (=Sri Lanka) and 4 exs., as 'M' indicating Mauritius) ; 7 exs., Indo-Pacific, (no. 3563). 7 ex., (4 exs. marked as 'M' 1 ex. as 'C' and 1 ex. as 'S' indicating Mauritius, Ceylon (=Sri Lanka) and Seychelles respectively).

*Description* : Shell more or less spindle shape, spire elevated acute, consists of five to six whorls of spinose nodules, body whorl large, ovate ; aperture narrowly elongate, constricted in middle, outer lip thick, margin crenulate, interior four to five denticles, upper two large, sometimes combined, gradually decrease in size, anal sulcus deep, extends posteriorly, inner lip adherent, with three short plicae anteriorly, ridge in middle forming an angle, canal short, open, sculpture consists of five rows of nodules, sometimes spinose on body whorl, two rows on spiral whorls, two to three cords in between rows of scabrous nature.

Colour white, nodules dark brown or black, aperture light violet to purplish black, denticles white.

*Remarks* : This species very closely resembles *M. granulata* but differs in having spinose nodules, first two denticles inside aperture prominent, others decrease in size, shells from Lakshadweep are with worn out spines, apertural margin dark purplish black. One of the shell from Mauritius having axial row of dark brown markings as in the figure given by Cernohorsky (1972, pl. 35, fig. 3).

*Distribution* : India : Andaman & Nicobar islands, Lakshadweep. Elsewhere : Sri Lanka, Mauritius, Seychelles, Formosa, Taihati. Slightly less common and occurs throughout



the tropical Pacific (Cernohorsky, 1972). This species is reported for the first time from India.

<i>Measurements :</i>	L	D	LA	LS
Smallest :	10·85	7·66	7·14	5·60
Average :	18·45	12·30	12·42	9·88
Largest :	23·68	16·45	14·90	12·00

### Genus *Nassa* Roeding, 1798

Type species : *Buccinum sertum* Bruguiere, 1789

1798. *Nassa* Roeding, *Museum Boltenianum* : 132.  
 1853. *Jopas* H. & A. Adams, *Genera recent Mollusca* : 128, pl. 13, fig. 4.  
 1880. *Jopas* : Tryon, *Man. Conch.*, 2 : 76.  
 1967. *Nassa* : Cernohorsky, *Marine shells of the Pacific*, 1 : 135.

Shell ovate, rugose, body whorl large, spire acute ; aperture moderate, emarginate, channeled in front ; columellar lip covered with thin enamel ; prominent ridge at posterior part, outer lip sinuous, crenulate. Only one species is reported from Indian waters.

Single species is included under this genus.

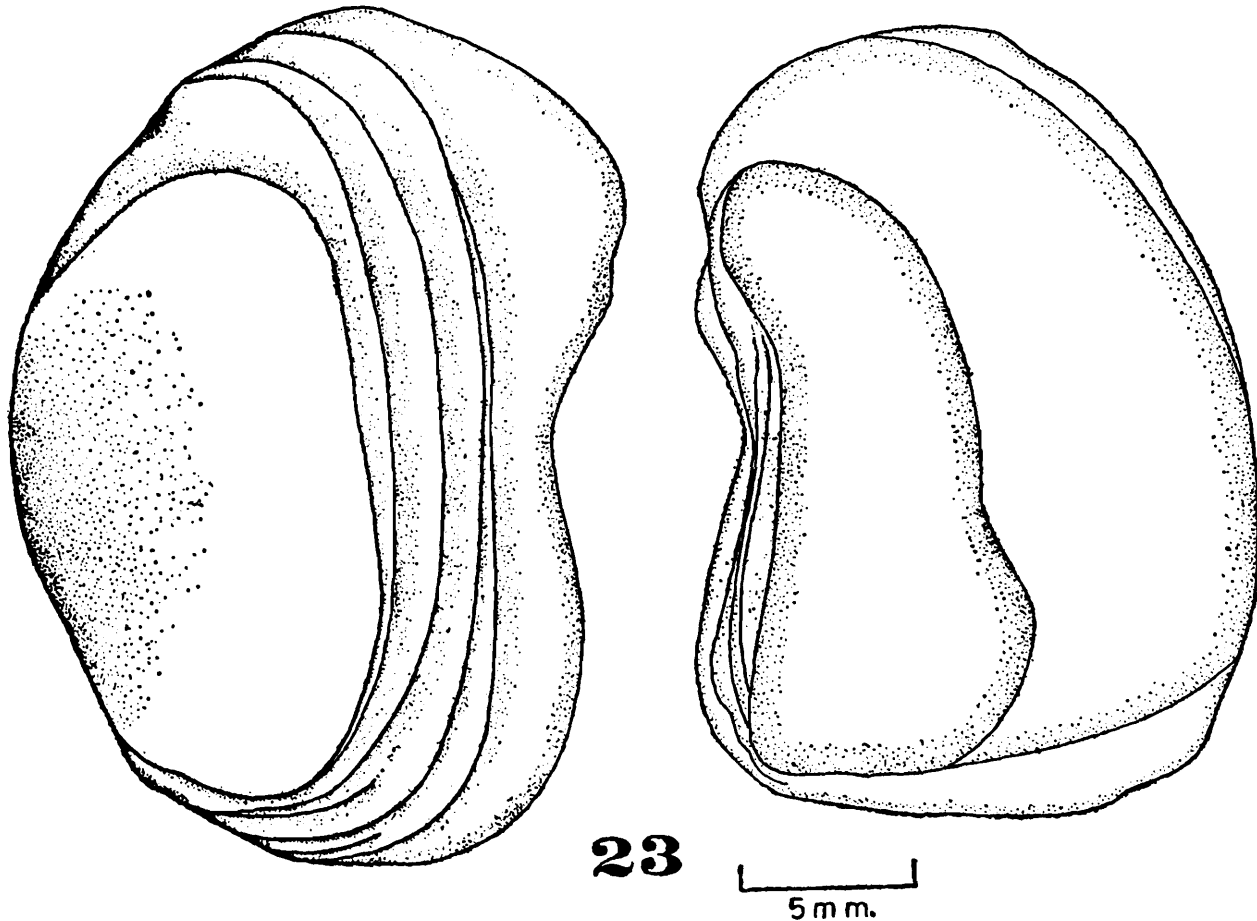
### 65. *Nassa sertata* (Bruguiere)

(Pl. 12, figs. 1, 2 ; Text fig. 23)

1789. *Buccinum sertum* Bruguiere, *Ency. Meth.*, 262 (Type locality : ?).  
 1836. *Purpura sertum* : Kiener, *Icon. Coq. Viv.*, 9 : *Purpura*, 133.  
 1866. *Purpura sertum* : Reeve, *Conch. Icon.* 3 *Buccinum*. sp. 42 pl. 6, fig. 42a-b.  
 1880. *Jopas sertum* : Tryon, *Man. Conch.*, 2 : 180, pl. 55, figs. 181, 188-190.  
 1901. *Jopas sertum* Var. *francolina* : Melvill, *Proc. zool. Soc. Lond.* 2 : 400.  
 1906. *Jopas sertum* : Smith, in : *Gardiners' Fauna and Geography Maldivé and Laccadive Archipelagoes*, pt. 2 : 609.  
 1906. *Jopas situla* : Smith, in : *Gardiner's Fauna and Geography Maldivé and Laccadive Archipelagoes*, pt. 2 : 609.  
 1908. *Jopas sertum* : Schepman, *Siboga Expd. Monogr.*, 49 : 353.  
 1952. *Jopas sertum* : Satyamurti, *Bull. Madras Govt. Mus. new Ser.*, 1 (2) pt. 6 : 162, pl. 15, fig. 8.  
 1967. *Nassa sertata* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 135, pl. 29, fig. 138, text fig. 15 (radula).

*Material examined* : 4 exs., Andamans ; 1 ex., South point, Port Blair ; 1 ex., Katchal ; 1 ex., Car Nicobar ; 1 ex., Galathea Bay, Great Nicobar ; 6 exs., Indian seas ; 1 ex., Lagoon Reef Addu Atoll ; 2 exs., Maldives ; 1 ex., Martin island, Bangladesh.

*Description* : Shell ovately oblong, spire short, acute, consists of five whorls slightly rounded, body whorl oblong, aperture medium, ovate, outer lip margin finely crenulate without denticles or lirations inside ; columella smooth with fold anteriorly ; parietal ridge strong posteriorly ; anal sulcus open, deep inverted 'V' shaped, margined by ridges, canal short, broad open.



Text fig. 23 : *Nassa sarta*—Operculum 6X.

Colour chestnut brown with white irregular blotches in the middle of body whorl in a transverse row, few scattered towards anterior, aperture white, outer lip margin and columella brown.

*Distribution* : India : Andaman and Nicobars, Pamban and Shingle island (Satyamurti, 1952). Elsewhere : Red sea to Paumotau, Makran coast, Maldives, Seychelles, Bangladesh. Throughout tropical Indo-Pacific, moderately uncommon (Cernohorsky, 1967).

<i>Measurements</i> :	L	D	LA	LS
Smallest :	10.65	5.25	7.70	3.61
Average :	41.00	21.91	30.15	13.75
Largest :	56.50	31.35	41.55	19.76

Genus *Purpura* Bruguiere, 1789Type species : *Buccinum persicum* Linnaeus, 1758 (ICZN Opinon, 866).

Shell oblong, spire short, body whorl inflated, sculpture granulate, aperture ovate, large, interior lirate, columella depressly flattened, outer lip denticulate.

Only three species are represented from Indian waters.

## Key to the species

- |   |                    |
|---|--------------------|
| 1. Spire low ; body whorl globose, much inflated, whorls rounded ...  | <i>P. persica</i>  |
| Spire high ; body whorl not rounded, less inflated, whorls angulate   | 2                  |
| 2. Columella with an oblique ridge in middle ; outer lip with prominent denticles leading to raised ridges inside ; shell brown in colour without rows of white markings ...        | <i>P. buccinea</i> |
| Columella without ridge in middle, but depressed into groove ; outer lip with mild denticles not leading to ridges ; shell deep chocolate in colour with rows of white markings ... | <i>P. panama</i>   |

66. *Purpura buccinea* Deshayes

(Pl. 12, figs. 3, 4)

1844. *Purpura buccinea* Deshayes, *Hist. nat. Anim. sans, Vert.*, ed. 2, 10 : 92, sp. 55, (Type locality : New Guinea).

1846. *Purpura buccinea* : Reeve, *Conch. Icon.*, 3, *Purpura*, sp. 16, pl. 4, fig. 16.

1880. *Purpura* (*Cronia*) *buccinea* : Tryon, *Man. Conch.*, 2 : 179, pl. 55, fig. 176.

**Material examined** : 5 exs., Andamans ; 1 ex., Ross island ; 2 exs., Little Andaman ; 2 exs., Bumula creek, Little Andaman ; 1 ex., Nicobars (Regd. No. 3522) ; 1 ex., Malacca, Car Nicobar.

**Description** ; Shell oblong, fusiform, thick, spire high, acute, consists of four to five rounded whorls, body whorl large, oblong ; aperture narrow, lineate, outer lip margin thick, finely crenulate, interior dentate, leading to ridges, eight to nine numbers, columella almost straight, smooth with an oblique fold in middle making an angle, anteriorly plicated, anal sulcus deep, inverted 'V' shaped ; axial sculpture with eight to nine broad ridges more prominent on spire, feebly visible on body whorl ; spiral sculpture consists of both broad and narrow scabrous cords, each broad cord followed by three narrow cords, seven to eight broad cords on body whorl.

Aperture creamy white, outer lip margin dark chocolate brown, interior light brown, columella chocolate brown as well as body whorl.

*Remarks* : In young shells from Little Andamans the interstices of axial and spiral sculpture appear like broad nodules. This species closely agrees with *C. amyglala* (Kiener) but differs in having a fold on columella, feeble axial ridges on body whorl and prominent plications on anterior part of columella. Shell from Malacca, Car Nicobar is tumid, aperture white with yellowish tinge interior, no fold on columella present. Shells from Port Blair found attached with oysters *saccostrea cucullata* and on its surface.

*Distribution* : India : Andamans & Nicobar islands. Elsewhere : New Guinea. This is the first record from India (Andaman & Nicobars).

<i>Measurements</i> :	L	D	LA	LS
Smallest :	43.93	23.32	24.85	20.60
Average :	45.35	23.65	28.30	*19.90
Largest :	53.76	27.95	30.35	28.45

(\* shell with broken spire)

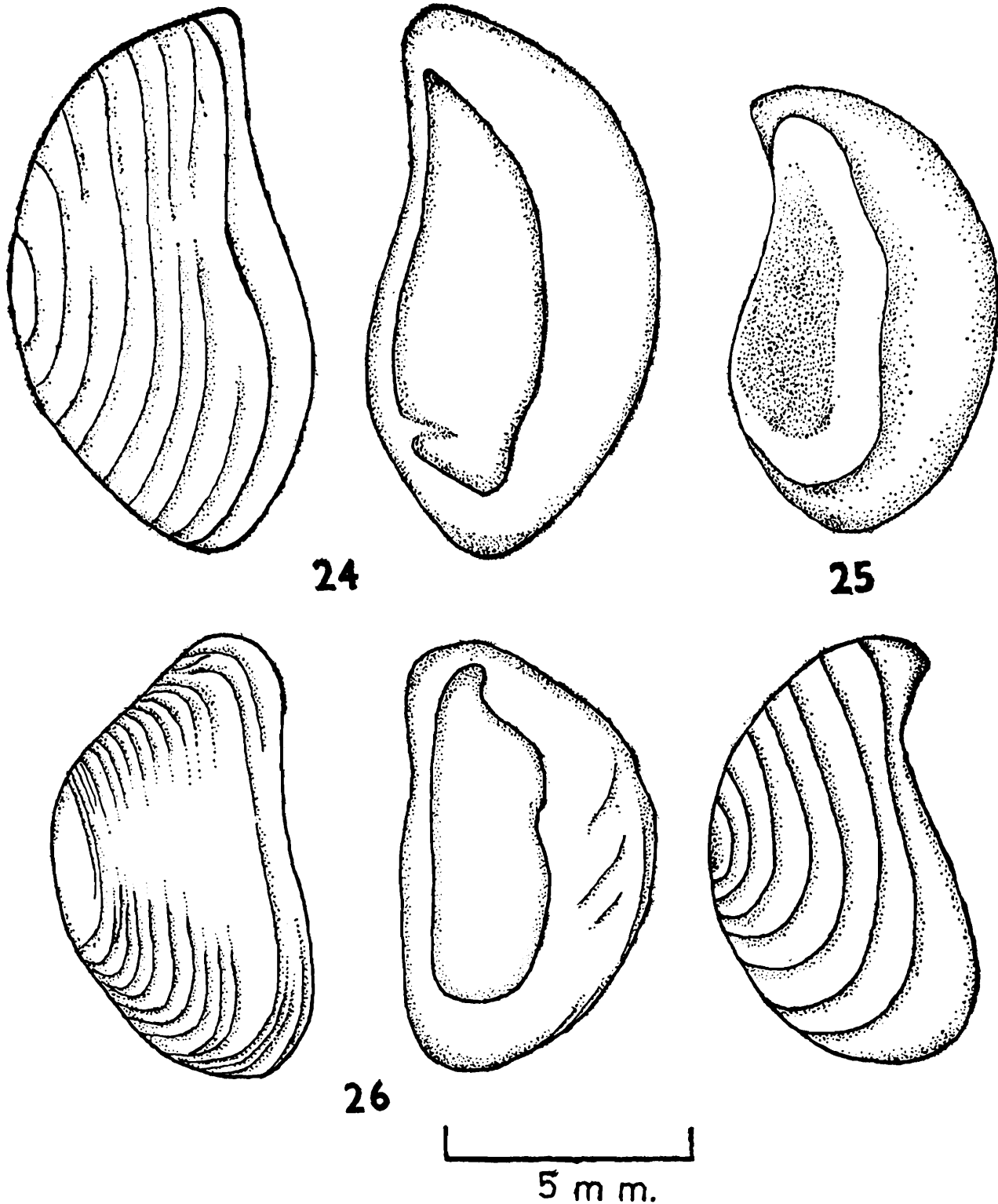
### 67. *Purpura panama* (Roeding, 1798)

(Pl. 12, figs. 8, 9 ; text fig. 24)

1798. *Thais panama* Roeding, *Museum Boltenianum*, : 54 (refers Chemnitz, vol. 10, pl. 154, figs. 1467, 1468. (Type locality : Tranquebar),
1822. *Purpura rudolphi* Lamark, *Hist. anim. sans. Vert.*, 7 : 235.
1846. *Purpura rudolphi* Reeve, *Conch. Icon.*, 3, *Purpura*, sp. 10, pl. 2, fig. 10.
1921. *Thais rudolphi* : Hornell, *Madras Fish Bull.*, 14 (6) : 135.
1941. *Thais rudolphi* : Crichton, *J. Bombay nat. Hist. Soc.*, 42 : 338.
1942. *Thais rudolphi* : Gravely, *Bull. Madras Govt. Mus. new Ser.*, 5 (2) : 49.
1948. *Thais rudolphi* : Ray, *Rec. Indian Mus.*, 46 : 103.
1952. *Thais rudolphi* : Subrahmanyam *et. al. J. Univ. Bombay*, 21 (B) pt. 3 : 45, fig. 104.
1952. *Thais rudolphi* : Satyamurti. *Bull. Madras Govt. Mus. new. Ser.*, 1 (2), pt. 6 : 164, pl. 16, fig. 1.
1961. *Thais rudolphi* : Menon *et. al.*, *J. Bombay nat. Hist. Soc.*, 58 (2) : 489. pl. 7, fig. 58.
1991. *Purpura panama* : Surya Rao and Subba Rao. *Fauna of Lakshadweep. State Fauna ser.*, 2 : 323.

*Material examined* : Gujarat : 5 exs., Okha ; 3 exs., Hanumandandi, Beyt island ; 10 exs., Dwarka ; 2 exs., Madhi ; 11 exs., Porbandar ; 8 exs., Navibandar ; 1 ex., Odedhad ; 2 exs., Sil ; 1 ex., Pata ; 5 exs., Chorwad ; 14 exs., Veraval ; 3 exs., Somnath ; 5 exs., Muldwarka ; Diu : 1 ex., Vanakbara ; 2 exs., Magoa ; Maharashtra : 1 ex., Bombay ; 2 exs., Devgad nr. Ratnagiri ; Tamil Nadu : 21 exs., Mandapam Camp ; 11 exs.,

Krusadai island; 38 exs., Pamban; 1 ex., Tuticorin; 2 exs., Madras; 1 ex., Seven Pagodas; Andhra Pradesh: 3 exs., Visakhapatnam; Andaman and Nicobars: 1 ex., Nicobars; 4 exs., Karachi; 5 exs., Sri Lanka.



Text figs. Operculum : 24 : *Purpura panama*—8X ; 25 : *Thais blanfordi*—8X ; 26 : *Thais echinata*—8X.

**Description :** Shell large, broad, spindle shape, spire high, consisting of three to four whorls, body whorl large, angulate ; aperture ovate, outer lip margin crenulate, interior lirate, columella broad, obliquely grooved ; anal sulcus deep 'U' shape ; siphonal canal short, broad, open ; sculpture consists of five broad spiral ridges, each followed by four to five narrow ridges, first two broad with low raised tubercles, dark chestnut brown.

Colour chestnut brown alternate with white ; tubercles more prominent on the spire ; aperture light orange, outer lip margin with dark brown ; impression of spiral ridges seen inside.

**Remarks :** This species closely agrees with former species but differs in having high spire, angulated whorls, heavy and in having tuberculated ridges. It is common in the middle parts of the eulittoral zone.

**Distribution :** India : Gujarat, Diu, Maharashtra, Tamil Nadu, Andhra Pradesh and Lakshadweep. Elsewhere : Karachi, Sri Lanka, Philippines.

<i>Measurements :</i>	L	D	LA	LS
Smallest :	30.25	20.46	22.76	11.95
Average :	51.45	31.90	33.95	22.95
Largest :	76.45	49.55	53.02	32.86

#### 68. *Purpura persica* (Linnaeus, 1758)

(Pl. 12, figs. 5, 6, 7)

1758. *Buccinum persicum* Linnaeus, *Syst. Nat.*, ed. 10 : 738 (Type locality : "O'Asiatico" (Asiatic Ocean)).  
 1798. *Thais persica* : Roeding, *Museum Boltenianum* : 54.  
 1845. *Purpura Persica* : Reeve, *Conch. Icon.*, 3, *Purpura*, sp. 8, pl. 2.  
 1880. *Purpura persica* : Tryon, *Man. Conch.*, 2 : 160, pl. 43, figs. 23-24.  
 1972. *Purpura persica* : Cernohorsky, *Marine Shells of the Pacific*, 2 : 124, pl. 35, fig. 1.

**Material examined :** 12 exs., Andamans ; 4 exs., Corbyns' cove, South Andamans ; 1 ex., Porbandar.

**Description :** Shell large, oblong, spire acute, short, consists of three whorls, body whorl large inflated, oblong, aperture large oval, outer lip margin crenulate, interior with dark grooves, border dark chocolate brown, enamelled ; columella flattened, slightly twisted, grooved, calloused posteriorly ; anal sulcus wide, deep, siphonal canal short, wide open ; sculpture with broad and narrow ridges, alternate ridges with white and brown bands, posterior part of columella with dark brown blotch, not found in young shells, operculum oblong, chitinous, margin thickened.

**Remarks :** Largest specimen in the collection had a dark brown blotch on the interior of the aperture instead of brown grooves which disappear in the shell. This species

closely agrees with *panama* but differs in having wide aperture and low spire. Young shells have tubercles on the ridges.

*Distribution* : India : Andaman and Nicobars, Porbandar. Elsewhere : Mauritius, Philippines. Moderately common and ranges west wards from the New Hebrides (Cernohorsky, 1972). It is recorded for the first time from Indian waters.

<i>Measurements</i> :	L	D	LA	LS
Smallest :	56.50	38.90	46.70	20.55
Average :	82.70	60.10	66.85	31.80
Largest :	104.75	72.30	88.30	40.75

### Genus *Thais* Roeding, 1798

Type species : *Murex fucus* Gmelin, 1791, (Opinion, 866, ICZN)

1798. *Thais* Roeding, *Museum Boltenianum* : 54.

Shell solid, thick, spire high, whorls angulate, spinose or nodulose ; aperture moderately wide ; columella rounded, outer lip nodulose internally.

This genus is represented by nine species from Indian waters, generally found on rocky and coralline substratum in both tropical and temperate seas.

### Key to species

- |  |     |     |                  |
|--|-----|-----|------------------|
| 1. Shell umbilicate  | ... | ... | 2.               |
| Shell non umbilicate   | ... | ... | 5.               |
| 2. Shell large, exceeds 30 mm in height ; whorls ornamented with tubercles at least one to two rows prominent  | ... | ... | 3.               |
| Shell small, not exceeds 30 mm in height ; whorls not ornamented with tubercles, if present inconspicuous  | ... | ... | 4.               |
| 3. Shell sculptured with spiral cords, shoulder with single or two rows of spinose tubercles on body, rest with single row ; colour light brown ; aperture white to light brown inside                   | ... | ... | <i>T. lacera</i> |
| Shell sculptured with sharp spiral ridges and cords in between ; shoulder with single row of scaly tubercles on body, rest with gradual decrease in size ; colour chocolate brown, aperture white inside | ... | ... | <i>T. rugosa</i> |

4. Body whorl sculptured with four sharp spiral ridges with bisulcated deep grooves in between, others with single ridge with deep grooves ; ridges mildly tuberculated at least first two on body ; outer lip lirate, denticles in single row *T. tissoti*
- Body whorl and others sculptured with rounded spiral cords, shoulder cord much prominent ; aperture lirate, denticles arranged in pairs ... *T. blanfordi*
5. Shell either rhomboidal or ovate ; ornamented with tubercles ; spine acute ; inner lip with denticles leading to ridges ... 6.
- Shell fusoid ; tubercles absent ; spire blunt ; inner lip with rounded denticles without leading to ridges ... *T. intermedia*
6. Shell rhomboidal body whorl with two prominent rows long tubercles 7.
- Shell ovate, body whorl with four rows of short tubercles ... 8.
7. Spire high, aperture white, with yellow border ; columella plicated anteriorly ... *T. armigera*
- Spire low ; aperture white with chocolate brown blotches on columella and outer lip ; columella smooth ... *T. tuberosa*
8. Spire elevated ; tubercles pointed ; aperture white, outer lip with more than four denticles ... *T. echinata*
- Spire low ; tubercles blunt ; aperture white with purple blotches around ; outer lip with four denticles ... *T. hippocastanum*

#### 69. *Thais armigera* (Link, 1807)

(Pl. 13, fig. 1)

1796. *Buccinum armigerum* Chemnitz, *Syst. Conch. Cab.*, 11 : 82, pl. 117, figs. 1798, 1799 (non binom).
1807. *Purpura armigera* Link, *Beschr. Natur. Samm. Univ. Rostock.* 8 : (Refers : Chemnitz, 1796. Pl. 117, figs. 1798, 1799.)
1836. *Purpura armigera* : Kiener, 1836, *Icon. Coq. Vio*, 9 : *Purpura* pl. 11, fig. 31.
1845. *Purpura armigera* : Lamarck *Hist. anim. sans. Vert.* (Deshayes' ed.), 10 : 64.
1906. *Purpura armigera* : Smith, In : *Gardiners' Fauna and Geography Maldive and Laccadive Archipelagoes*, pt. 2 : 609.
1967. *Thais armigera* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 130, pl. 28, fig. 170.
1991. *Thais armigera* : Surya Rao and Subba Rao. *Fauna Of Lakshadweep, State Fauna ser.*, 2 : 323.

*Material examined* : 2 exs., Andamans ; 2 exs., Infront of Circuit house, Malacca, Car Nicobar,



**Description :** Shell ovate, spire high, acute, consists of five whorls, body whorl large ; aperture ovate, outer lip with seven to eight denticles, interior leading to lirations, columella smooth, slightly wrinkled with two to three weak denticles on the posterior part ; body whorl with two prominent rows of tubercles followed by two rows of smaller tubercles ; canal short, broadly open.

Colour fawn to brown, aperture white interior, outer margin yellowish brown.

**Remarks :** It closely resembles *T. tuberosa* but differs in having high spire, aperture without lirations, brown blotches and zones on columella. It is less common than *T. tuberosa*.

**Distribution :** India : Lakshadweep, Andaman and Nicobar Islands. Elsewhere : Maldives, Mauritius, Philippines, Paumotu ; Throughout tropical Indo-Pacific, uncommon (Cernohorsky, 1967). It is the first record from Andamans.

<i>Measurements :</i>	L	D	LA	LS
Smallest :	48.50	36.95	29.35	24.05
Average :	66.35	51.55	39.95	32.75
Largest :	77.80	65.25	52.20	35.05

#### 70. *Thais blanfordi* (Melvill, 1893)

(Pl. 13, fig. 2, 3 ; text fig. 25)

1893. *Purpura (Stramonita) blanfordi* Melvill, *Mem. Proc. Manchr, Lit. Phil. Soc.*, (4) 7 : 53, pl. 1 fig. 3 (Type locality : Bombay and Ratnagiri).  
 1901. *Purpura (Stramonita) blanfordi* : Melvill and Standen, *Proc. zool. Soc. Lond.*, 2 : 398,  
 1952. *Thais blanfordi* : Subrahmanyam *et. al. J. Univ. Bombay*, 21 (B) : 46, fig. 108.

**Material examined :** Gujarat : 16 exs., Mandvi, Kutch ; 16 exs., Bhadreswar, Kutch ; Maharashtra : 6 exs., Mahim beach, Bombay ; Goa : 1 ex., Colva beach, 1 ex., Gaigibag, Karnataka : 1 ex., Dharieswar, nr. Kumta ; 130 exs., Kumta ; 13 exs., Murdeswar nr. Bhatkal, 4 exs., St. Mary islands nr. Malpe ; Kerala : 40 exs., South beach, Calicut ; 8 exs., Cannanore ; 54 exs., Quilon ; 63 exs., Narakkal nr. Vypeen island, Cochin ; 2 exs., Andamans ; 6 exs., Sri Lanka.

**Description :** Shell ovately fusiform, spire high, acute, consists of four angulated whorls, body whorl large with distinct angulation at shoulder, aperture ovate, anal sulcus broad inverted 'U' shape margined by ridge ; outer lip crenulate, interior lirate, eight in number arranged in pairs, inner lip smooth, slightly twisted anteriorly ; canal short, broadly open ; spiral sculpture consists of six major threads above shoulder, followed by four, first thread followed by a minor thread each ; axial sculpture consists of eleven to twelve tubercles, low, sometimes inconspicuous.

Colour generally light brown, interior white, dark blotches on columella (on shells from Andamans).

*Remarks* : It closely resembles *T tissoti* but differs in the absence of deep bisulcate transverse grooves and revolving ridges with dark brown nodules. Both the species occur in the same habitat. It is more common in the west coast, and there is no record from the east coast.

*Distribution* : India : Along West coast and Andamans. Elsewhere : Persian Gulf, Karachi, Sri Lanka, Singapore. It is a first record from Andamans.

<i>Measurements</i> :	L	D	LA	LS
Smallest :	19.25	11.90	11.50	9.40
Average :	22.90	14.70	14.25	10.60
Largest :	30.00	18.60	18.45	14.05

#### 71. *Thais echinata* (Blainville, 1832)

(Pl. 13, fig. 7 ; text fig. 26)

1832. *Purpura echinata* Blainville, *Nouv. Ann. Mus. Hist. nat.*, 1 (2) : 222, pl. 11, fig. 2 (Type locality : unknown).  
 1846. *Purpura echinata* : Reeve, *Conch. Icon.*, 3, *Purpura*, sp. 33, pl. 7, fig. 33.  
 1967. *Thais echinata* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 130, pl. 28, fig. 171.  
 1971. *Mancinella echinata* : Kuroda et al. *Sea Shells of Sagami Bay* : 145, pl. 42, fig. 3.

*Material examined* : 2 exs., Veraval ; 3 exs., Visakhapatnam ; 4 exs., Andamans ; 4 exs., Sri Lanka.

*Description* : Shell ovate, spire acute, moderately high, consists of three to four tuberculated whorls, body whorl large, ovate ; aperture ovate, outer lip crenulate, interior dentate, seven to eight teeth leading to ridges inside, inner lip margined by ridge ; canal short and open ; sculptured with five rows of prominent blunt spines, spiral ridges scabrous of both major and minor in between, each major cord is encircled by six minor on either side.

Colour generally light brown, interior of aperture white with yellowish margin.

*Remarks* : This species closely agrees with *Mancinella alouina* but differs in not having reddish brown lirations inside the aperture and presence of prominent rows of spines on the body.

*Distribution* : India : Veraval, Visakhapatnam and Andamans. Elsewhere : Sri Lanka, Singapore, Philippines, Western Pacific, uncommon (Cernohorsky, 1967), Japan (Kuroda, 1971). It is a first record from India.

<i>Measurements :</i>	L	D	HA	HS
Smallest :	24.50	18.95	20.34	8.55
Average :	43.75	34.38	35.00	16.05
Largest :	47.85	33.02	28.15	24.28

72. *Thais hippocastanum* (Linnaeus, 1758)

(Pl. 13, figs. 8, 9, 10)

1758. *Murex hippocastanum* Linnaeus, *Syst. nat. ed. 10* : 751, sp. 471 (Type locality : "O. Asiae").  
 1822. *Purpura hippocastanum* : Lamarck, *Hist. anim, sans. Vert.*, 2 ed., 10 : 65, sp. 9 (part).  
 1901. *Purpura (Thalessa) hippocastanum* : Melvill, *Proc. zool. Soc. Lond.*, 1901, pt. 2 : 397.  
 1906. *Purpura hippocastanum* : Smith, in : *Gardiners' Fauna and Geography Maldives Archipelagoes*, pt. 2 : 609.  
 1952. *Thais hippocastanum* : Subrahmanyam *et. al. J. Unvi Bombay*, 21 (B) : 46, fig. 107.  
 1967. *Thais hippocastanum* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 130, pt. 28, fig. 172.  
 1991. *Thais hippocastanum* : Surya Rao and Subba Rao. *Fauna of Lakshadweep, State Fauna ser.*, 2 : 324.

*Material examined* : Andhra Pradesh : 10 exs., Rishikonda, Waltair ; 1 ex., Jalaripeta, Visakhapatnam ; Andamans : 255 exs., Port Blair (Aberdeen, Chatam) ; 2 exs., South point ; 1 ex., Rangachang ; 6 exs., Wandur ; 3 exs., Corbyns' Cove ; 86 exs., Mannar Ghat ; 3 exs., Kaudia Ghat ; 4 exs., Chidiyatapu ; 16 exs., Ross island ; 4 exs., Guptapara ; 34 exs., Neil island ; 1 ex., Havelock island ; 4 exs., Long island ; 6 exs., John Lawrence island ; 1 ex., Port Cornwallis ; 4 exs., Mayabunder ; 24 exs., Rangat ; 2 exs., Diglipur ; 15 exs., Little Andaman ; Nicobars : 30 exs., Car Nicobar (Malacca, Tee Top, Mus jetty, Sawai, Arong) ; 48 exs., Camorta (Chota Inaka, Naval Garrison) ; 23 exs., Great Nicobar (Changappa bay, Galathea bay, Pygmalion) ; 4 exs., Lakshadweep, 1 ex., Kavaratti, Lakshadweep ; 1 ex., Maldiva ; 2 exs., Sri Lanka ; 49 exs. Mergui Archipelago ; 30 exs., Akyab ; 3 exs., Maungmagan ; 3 exs., Pilai island.

*Description* : Shell ovate, spire high, acuminate, consists of four angulated whorls, body whorl ornamented with four rows of spines, aperture ovately narrow, outer lip crenulate, interior with four to five prominent teeth leading into ridges, columella smooth, slightly folded anteriorly ; anal sulcus deep, open, canal short, open ; sculptured with four to seven spiral threads between spiral rows, scabrous. Colour chocolate brown, vertical bands and dark brown spines, aperture bluish white tinged with brown at margins, denticles and ridges chocolate brown.

*Remarks* : It is highly variable. Some of the specimens from Andamans are smaller in size with short spire, tubercles smaller, less prominent, whereas specimens from Little Andaman, Neil island, Car Nicobar and Lakshadweep are larger with elevated spire, and first two rows of spines distinct which are slightly twisted upwards, there is a distinct gap

between first two rows of spines. Tryon (1880) mentioned that *Purpura bitubercularis* is a blackish variety, where first two rows of spines are more prominent. He also mentioned that *P. distinguisheda* is a depauperate form.

It is more common in Andaman and Nicobar islands. From main land it was reported from Bombay only (Subrahmanyam *et. al*, 1952), whereas there is no report from the east coast. The present record from Visakhapatnam extends its distribution towards east coast. Subrahmanyam's report (1952) of *T. bitubercularis* from Bombay may be the same.

*Distribution* : India : Bombay, Visakhapatnam, Andaman and Nicobar islands, Lakshadweep. Elsewhere : Sri Lanka, Mergui Archipelago, Akyab, Maungmagan, Penang, Mauritius, Maldives. Throughout tropical Indo-Pacific (Cernohorsky, 1967).

<i>Measurements</i> :	L	D	LA	LS
Smallest :	18.85	13.25	11.85	9.95
Average :	39.90	30.40	25.50	20.60
Largest :	62.70	44.85	35.55	31.80

### 73. *Thais intermedia* (Kiener, 1836)

(Pl. 14, figs. 1, 2)

1836. *Purpura intermedia* Kiener, *Icon. Coq. Viv.*, 9, *Purpura* : 51, pl. 12, fig. 34 (Type locality ; Senegal).  
 1846. *Purpura intermedia* : Reeve, *Conch. Icon.*, 3 *Purpura*, sp. 38, pl. 8, fig. 38.  
 1941. *Thais intermedia* : Crichton, *J. Bombay nat. Hist. Soc.*, 42 : 338.  
 1942. *Thais intermedia* : Gravely, *Bull. Madras Govt. Mus. new Ser.*, 5 (2) : 49.  
 1952. *Thais intermedia* : Satyamurti, *Bull. Madras Govt. Mus. new Ser.*, 1 (2), pt. 6 : 167, pl. 16, fig. 5.  
 1967. *Thais intermedia* : Cernohorsky, *Marine Shells of the Pacific*, 1 : 130, pl. 28, fig. 173.  
 1991. *Thais intermedia* : Surya Rao and Subba Rao. *Fauna of Lakshadweep, State Fauna ser.*, 2 : 324.

*Material examined* : 5 exs., Andamans ; 1 ex., Tavoy coast ; 2 exs., Maldives.

*Description* : Shell ovately oblong, spire elevated, acute, consists of three whorls, slightly angulate ; body whorl large, distinctly angulated, slightly depressed above the shoulder, ornamented with tubercles ; aperture ovate, outer lip thick, margin crenulate, interior denticulate, teeth twelve in number, columella smooth, upper region callous, plicated anteriorly, anal sulcus deep and open ; body whorl sculptured with spiral striations of four major cords and four to five minor cords in between, only major cord ornamental with low tubercles.

Colour chocolate brown, tubercles dark brown interpolated with white bands, aperture

white, outer margin chocolate brown with white blotches in between indicating the position of major cords, columella with brown streaks and blotches at anal sulcus.

**Remarks :** Most of the shells are either partly eroded or covered with coral growths. In one of the shell from Andamans, tubercles arranged in pairs in the upper half of the apertural margin. Satyamurti (1952) reported the same in a shell from Trincomalee. Tryon (1880) considers this species as an intermediate form of *T hippocastanum*, whereas Reeve (1846) considered it as well defined and distinct.

**Distribution :** India : Madras, Pamban, Andamans, Lakshadweep. Elsewhere : Maldives, Tavoy coast, Myanmar. Throughout tropical Indo-Pacific, uncommon (Cernohorsky, 1967).

<i>Measurements :</i>	L	D	LA	LS
Smallest :	20·85	16·30	16·85	10·92
Average :	32·60	21·65	22·62	13·90
Largest :	48·58	31·66	29·50	21·70

#### 74. *Thais lacera* (Born, 1788)

(Pl. 13, figs. 4, 5, 6)

1778. *Murex lacera* Born, *Index rerum naturalium Musei Caesarei Vindobonensis* : 308.  
 1822. *Purpura carinifera* Lamarck, *Hist. nat. anim. sans. Vert.*, 7 : 241, sp. 19.  
 1901. *Cuma carinifera* : Melvill and Standen, *Proc. zool. Soc. Lond.*, pt. 2 : 400.  
 1914. *Thais carinifera* : Preston, *Rec. Indian Mus.*, 10 : 299.  
 1916. *Thais carinifera* : Preston, *Rec. Indian Mus.*, 12 : 29.  
 1916. *Thais carinifera* : Annandale and Kemp, *Mem. Indian Mus.*, 5 : 343.  
 1922. *Cuma disjuncta* Annandale, *Mem. Asiat. Soc. Beng.*, 7 : 266, fig. 2A. (Type locality :—Kyd island Andaman).  
 1924. *Cuma disjuncta* var. *obliterata* Annandale, *Mem. Indian Mus.*, 5 : 870 (Type locality : Barkuda, Chilka Lake).  
 1951. *Thais carinifera* Hornell, *Indian Mollusca* : 31.  
 1952. *Thais carinifera* Subrahmanyam et. al. *J. Univ. Bombay*, 21 : 45, fig. 102.  
 1975. *Cymia carinifera* : Subba Rao and Mookherjee, *Recent Rescarches in Estuarine Biolgy* : 170.  
 1977. *Thais (Cymia) carinifera* : Ray, *Contribution to the knowledge of the Molluscan fauna of Maungmagan, Lower Burma* ; 51.

**Material examined :** Gujarat : 9 exs., Mandvi, 3 exs., Bhadreswar ; 47 exs., Kandla ; 2 exs., Mundra mangroves ; 28 exs., Sika port ; 6 exs., Pirotan island ; 32 exs., Balapur, Beyt island ; 2 exs., Hanumandandi, Beyt island ; 8 exs., Salaya port nr. Jamnagar ; 3 exs., Rozy port nr. Bedi ; 6 exs., Nayabandar, Bedi nr. Jamnagar ; 1 ex., Dwarka ; 3 exs., Subhashnagar, nr. Porbandar ; 7 exs., Miani ; 1 ex., Kotda ; 2 exs.,

Madhvad ; 1 ex., Madhavpur ; 4 exs., Delvada ; 2 exs., Navibandar ; 1 ex., Muldwarka nr. Kodinar ; 2 exs., Veraval ; 1 ex., Jaleswar nr. Veraval ; 1 ex., Gopnath south of Bhavanagar ; Diu : 1 ex., Goghla ; Daman : 7 exs., Jampur ; 126 exs., Nanidaman ; 12 exs., Marwad ; Maharastra : 9 exs., Mahim beach, Bombay ; Goa : 6 exs., Siridion beach ; 2 exs., Betul bay ; 2 exs., Baina bay ; 1 ex., Zouari River mouth ; Karnataka : 4 exs., Malpe ; 12 exs., Mangalore ; 15 exs., Sadashivgarh nr. Karwar ; 11 exs., Murdeswar nr. Bhatkal ; Kerala : 1 ex., Cochin back waters ; Tamil Nadu : 2 exs., Point Calimere ; 3 exs., Ennur back waters ; Andhra Pradesh : 3 exs., Pithapuram beach, Waltair ; Orissa : 119 exs., Barkuda, Breakfast, Samal, Gopkuda and Rambha in Chilka Lake ; 1 ex., Mahanadi river mouth ; 16 exs., Hukitola ; West Bengal : 3 exs., Digha beach ; 4 exs., Chamaguri in Sagar island ; 6 exs., Dariknagar nr. Namkhana ; 1 ex., Frajergunge ; 1 ex., Port Canning ; Andamans : 1 ex., Kyd island (type *Cuma disjuncta* Annandale) ; 1 ex., South Andaman ; 8 exs., Mergui Archipelago ; 7 exs., Tavoy coast ; 48 exs., Akyab.

**Description :** Shell ovate, spire acute, consists of four whorls angulated, tuberculated, body whorl large, ovate tuberculated on shoulder, aperture large, ovate, outer lip finely crenulate, interior lirate ; columella smooth, callose, partly close the umbellicus ; anal sulcus deep inverted 'U' shape, margined by parietal ridge ; sculpture consists of transverse striations flat, mildly scabrous, two rows of tubercles on upper part of the body whorl, sometimes much prominent like spines sometimes single row of tubercles present.

Colour ashy brown, aperture light brown, margin white.

**Remarks :** It is very common in the harbour jetties, back waters and river mouths found attached to the rocks, boulders and jetty piles. It is highly variable. Shells are either with single or double rows of tubercles or often without any such, shells from Sunderbans are generally smaller in size, without any tubercles on the body whorl. Shells from Andamans, Chilka lake and west coast i. e. from Malpe, Goa are with the mouth detached from the body whorl and described as *C. disjuncta* by Annandale (1922). Tryon (1880) mentioned that "this species rejoices in eleven specific names, representing essentially different degrees of spinose development and age and the characters proved the identity of all these forms and that none of the names can stand even as designation of varieties."

**Distribution :** Very common in both the coasts of India in the river mouths and back waters. Elsewhere : Pakistan, Myanmar, Sri Lanka, Persian Gulf, Israel.

<i>Measurements :</i>	L	D	LA	LS
Smallest :	25.52	17.80	15.24	10.95
Average :	44.14	29.10	27.15	19.35
Largest :	15.25	35.55	28.40	26.32

75. *Thais rugosa* (Born, 1778)

(Pl. 14, figs. 3, 4)

1778. *Murex rugosus* Born, *Index rerum nat uralium Musei Caesarei Vindobonensis* : 303.  
 1788. *Murex sacellum* Chemnitz, *Conch. Cab.*, 10 : 267, pl. 163, figs. 1561, 1562 (non binom)  
 (Type locality : Nicobar islands).  
 1791. *Murex sacellum* : Gmelin, *Syst. Nat.*, ed. 13 : 3530, sp. 164 (refers Chemnitz, op. cit.).  
 1822. *Purpura sacellum* : Lamarck, *Hist. anim. sans. Vert.*, 2 ed., : 10.  
 1901. *Purpura (Polytrapa) sacellum* : Melvill and Standen, *Proc. zool. Lond.*, pt. 2 : 399.  
 1942. *Thais rugosa* : Gravely, *Bull. Madras Govt. Mus. new Ser.* 5 (2) : 52, fig. 8.  
 1952. *Thais rugosa* : Satyamurti, *Bull. Madras Govt. Mus. new Ser.* 1 (2), pt. 6 : 166, pl. 16, fig. 3.  
 1952. *Thais sacellum* : Subrahmanyam, *J. Univ. Bombay.* 21 (B) : 46, fig. 109.  
 1974. *Thais sacellum* : Cernohorsky, *Rec. Auckland Inst. Mus.*, 11 : 176, fig. 49.

**Material examined** : Gujarat : 3 exs., Okha ; 1 ex., Dwaraka ; 2 exs., Porbandar ; 2 exs., Kotda ; 2 exs., Madhi ; 2 exs., Delvada ; 2 exs., Navibandar ; 3 exs., Veraval ; 2 exs., Jaleswar nr. Vernval ; 1 ex., Somnath ; 1 ex., Muldwarka nr. Kodinar ; Diu : 1 ex., Fort area ; 1 ex., Goghla ; 2 exs., Vanakbara ; 4 exs., Nagoa ; Maharashtra : 7 exs., Bombay ; Goa : 1 ex., Dona Paula beach ; 1 ex., Siridion beach ; Karnataka : 2 exs., Murdeswar nr. Bhatkal ; 1 ex., Malpe ; Tamil Nadu : 1 ex., Madras ; Orissa : 1 ex., Black Pagoda 27.4 M ; 1 ex., Chatrapur ; 8 exs., Karachi ; 9 exs., Sri Lanka ; Myanmar : 1 ex., Tavoy coast, 12 exs., Akyab ; 1 ex., Pilai Island, Mergui Archipelago.

**Description** : Shell ovately fusiform, appears like pagoda, spire high, acute, consists of four angulated whorls, upper part rounded, body whorl large, ovate, slope above shoulder ; aperture moderately ovate, outer lip crenulate, grooved interior, corresponding to the external sculpture, denticulate, eight to nine denticles present, columella smooth, slightly folded anteriorly, anal sulcus broad, shallow, canal short, broadly open, umbellicus wide and deep ; sculpture consists of four prominent ridges below shoulder, ornamented with compressed scales, partly raised upwards, shoulder ones are larger in size, gradually decreased towards lower part of body, interstices between these ridges are with fine scabrous threads.

Colour generally light brown, scales and striations dark brown in colour, aperture white.

**Remarks** : This species commonly occurs along with *Thais lacera* on rocks. Highly variable species but distinctly known by a sloping shoulder, margined by a row of scaly tubercles. The type of *Thais rugosa* (Born) in the Vienna Nat. Hist. Museum is a worn but recognizable specimen of *Murex sacellum* Gmelin (Cernohorsky, personal communication).

**Distribution** : India : Both east and west coasts. Elsewhere : Karachi, Sri Lanka, Myanmar, Mergui Archipelago, Singapore, Philippines, Moluccas and Java,

<i>Measurements :</i>	L	D	LA	LS
Smallest :	18.65	12.95	10.50	10.40
Average :	33.60	23.80	21.18	16.70
Largest :	42.10	28.75	24.56	22.10

76. *Thais tissoti* (Petit, 1852)

(Pl. 14, fig. 5 ; text fig. 27)

1852. *Purpura tissoti* Petit, *J. Conch. Paris*, 3 : 163, pl. 7, fig. 4. (Type locality : Bombay, India).  
 1893. *Purpura tissoti* : Melvill and Abercrombi, *Mem. Proc. Manchr. lit. Phil. Soc.*, (4) 7 : 31.  
 1898. *Purpura tissoti* Melvill and Standen, *J. Conch. Lond.*, 9 : 43.  
 1942. *Thais tissoti* : Gravely, *Bull. Madras Govt. Mus. new Ser.*, 5 (2) : 51, fig. 8g.  
 1952. *Thais tissoti* : Satyamurti, *Bull. Madras Govt. Mus. new Ser.* 1 (2), pt. 6 : 166, pl. 16, fig. 4.  
 1952. *Thais tissoti* : Subrahmanyam *et. al. J. Univ. Bombay*, 21 (3) : 46, fig. 106.  
 1961. *Thais tissoti* : Menon *et. al. J. Bombay nat. Hist. Soc.*, 58 (2) : 48, fig.  
 1977. *Thais tissoti* : Ray, *Contribution to the knowledge of the molluscan fauna of Maungmagan, Lower Burma* : 52.

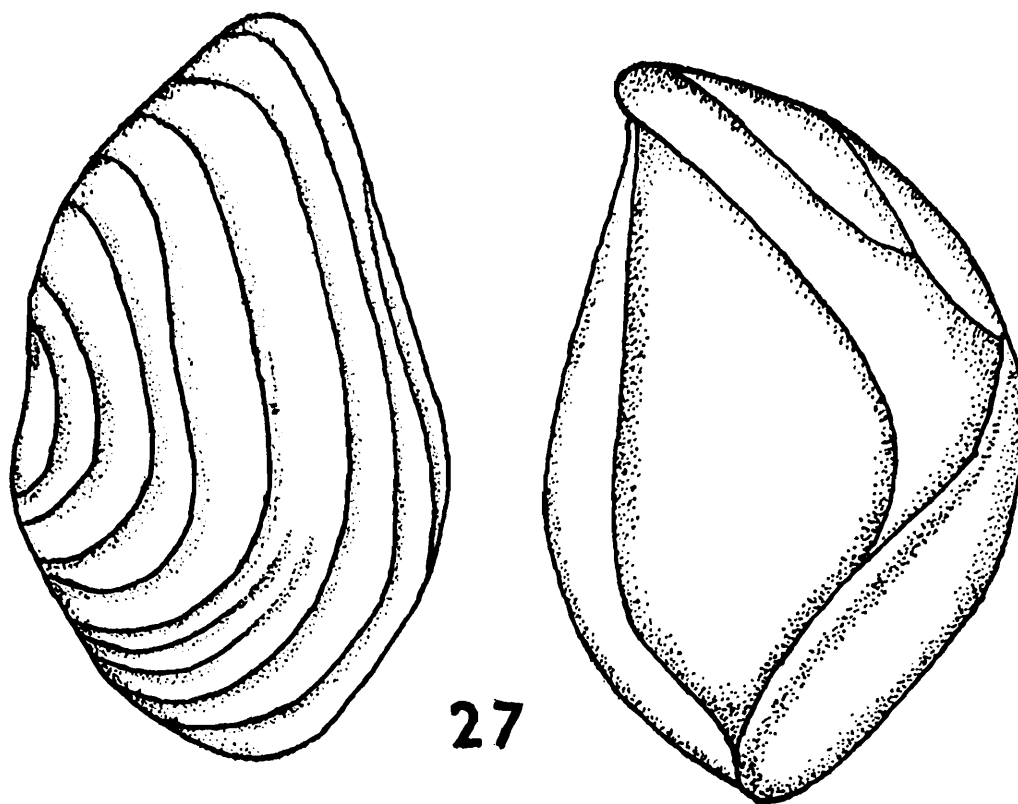
*Material examined* : Gujarat : 2 exs., Mandvi, Kutch ; 8 exs., Bhadreswar, Kutch ; 15 exs., Kandla port ; 2 exs., Mithapur nr. Okha ; 1 ex., Okha beach ; 1 ex., Hanumandandi, Beyt island ; 1 ex., Sika beach ; 4 exs., Miani nr. Porbandar ; 10 exs., Porbandar ; 74 exs., Somnath ; 1 ex., Veraval ; 1 ex., Holiday camp nr. Veraval ; 2 exs., Chorwad ; Daman : 58 exs., Devka ; 9 exs., Marwad ; Maharashtra : 10 exs., Bombay ; 9 exs., Devgad nr. Ratnagiri ; Goa : 1 ex., Covellisim beach ; Karnataka : 422 exs., Murdeswar nr. Bhatkal ; 113 exs., Kumta ; 8 exs., St. Mary islands nr. Malpe ; Kerala : 16 exs., South beach, Calicut ; 6 exs., Narakkal, vypeen island, Cochin ; Tamil Nadu : 1 ex., Tranquebar, 1 ex., Shingle island, Gulf of Mannar ; 1 ex., Madras ; Andhra Pradesh : 1 ex., Visakhapatnam ; Orissa : 2 exs., Paradip ; 5 exs., Sri Lanka ; Myanmar : 23 exs., Tavoy coast ; 7 exs., Akyab ; 4 exs., Maungmagan ; 1 ex., Karachi ; 6 exs., Gwadar, Baluchistan.

*Description* : Shell small, spindle shape, thick, spire elevated, acute, body whorl large oblong, aperture narrowly ovate, outer margin crenulate, interior lirate, columella smooth, plicated anteriorly, margined posteriorly by ridge, anal sulcus deep inverted 'U' shape, sculpture consists of four thick spiral ridges with bisulcated grooves and two narrow cords in between first two ridges, ornamented with low tubercles, other two ridges gradually weak, spiral cords scabrous, umbellicus small almost closed ; canal short, open.

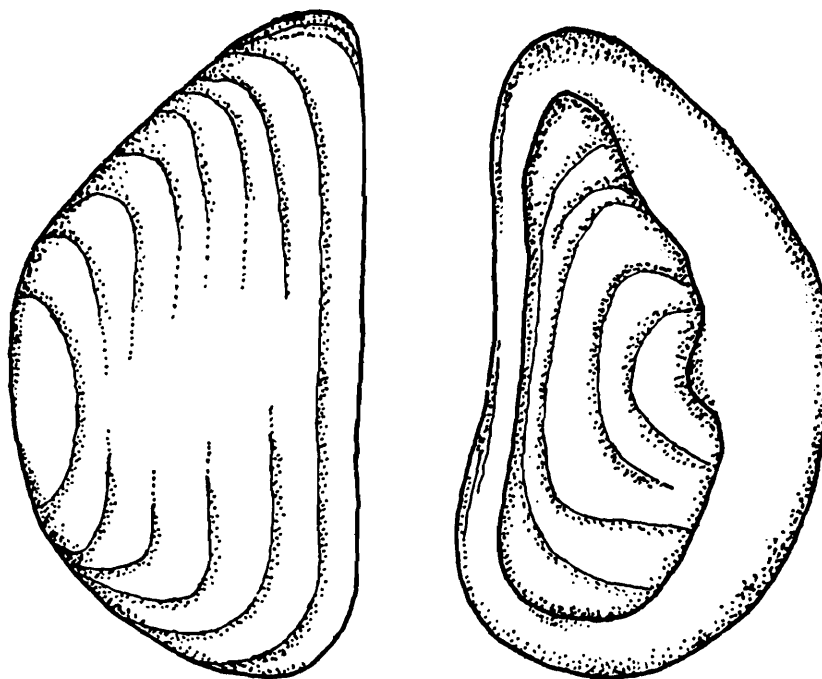
Colour light brown with dark brown tubercles, aperture white.

*Remarks* : It closely resembles *T. blanfordi*, but differs in having four strong spiral ridges interesticed with two cords and deep bisulcated grooves. In the shells from St. Mary





27



28



5 m m.

Text figs. Operculum 8X—27 : *Thais tissoti* ;  
28 : *Thais tuberosa*.

island and Myanmar the first two ridges raised upwards as in *Thais rugosa* but less prominent. It occurs along with *T. blanfordi* on the rocks in the intertidal zone.

**Distribution :** India : Coasts of Gujarat, Maharashtra, Daman, Goa, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh. Elsewhere : Sri Lanka, Pakistan, Baluchistan, Myanmar and Persian Gulf.

<i>Measurements :</i>	L	D	LA	LS
Smallest :	13.00	8.75	9.00	6.10
Average :	20.10	13.70	14.10	9.25
Largest :	26.40	16.80	16.70	13.25

### 77. *Thais tuberosa* (Roeding, 1798)

(Pl. 14, fig. 6 ; text fig. 28)

1798. *Purpura tuberosa* Roeding, *Museum Boltenianum* : 141 (Type locality : Not given).  
 1846. *Purpura pica* : Reeve, *Conch. Icon.*, 3, *Purpura*, sp. 36, pl. 8, fig. 36.  
 1906. *Purpura pica* : Smith, In : *Gardiners' Fauna and Geography Maldive and Laccadive Archipelagoes*, pt. 2 : 609.  
 1967. *Thais tuberosa* : Cernohorsky, *Marine Shells of the Pacific*, pt. 1 : 130, pl. 28, fig. 174 (other synonyms).  
 1991. *Thais tuberosa* : Surya Rao and Subba Rao, *Fauna of Lakshadweep, State Fauna ser.*, 2 : 325.

**Material examined :** 16 exs., Andamans ; 2 exs., Rangachang ; 3 exs., South point ; 2 exs., Aberdeen jetty, Port Blair ; 1 ex., Cellular jail area, Port Blair ; 4 exs., Neil Island ; 1 ex., Arong, Car Nicobar ; 6 exs., Malacca, Car Nicobar ; 1 ex., Galaxea Reef, Krusadai island.

**Description :** Shell oblong, heavy, thick, spire elevated, consists of four whorls, spinose, body whorl large with three rows of thick blunt spines, gradually decreases in size ; aperture ovate, outer lip margin crenulate, interior lirate, columella smooth, callose with three to four light plications anteriorly, anal sulcus short, deep inverted 'V' shaped, canal short, broadly open, sculpture consists of broad, scaly spiral cords in between spiral rows.

Colour white with three to four black bands, aperture creamy white, outer lip with three to four black blotches, columella mottled with two dark brown zones, lirae reddish brown.

**Remarks :** It closely resembles *T. armigera* but differs in having short spire and absence of denticles on interior of outer lip, dark brown blotches on apertural margin and reddish brown lirations. It also closely resembles *T. hippocastanum* but differs from the latter in the absence of denticles on the interior of outer lip, and having more lirations in the aperture.

**Distribution :** India : Gulf of Mannar, Andaman and Nicobar islands and Lakshadweep. Elsewhere : Maldives (Smith, 1905). Throughout tropical Indo-Pacific, moderately common (Cernohorsky, 1967).

<i>Measurements :</i>	L	D	LA	LS
Smallest :	37.18	27.78	24.95	15.50
Average :	44.15	37.20	29.25	19.72
Largest :	50.95	48.15	32.90	23.10

Genus *Vexilla* Swainson, 1840

Type species : *Purpura vexillum* Gmelin, 1791

1840. *Vexilla* Swainson, *A Treatise on Malacology* : 300.

1880. *Vexilla* : Tryon, *Man. conch.*, 2 : 181.

Shell small, pyriform, smooth, spire short, aperture long, wide, outer lip thickened, dentate, inflected, inner lip flattened and depressed. One species is represented in Indian waters.

### 78. *Vexilla vexillum* (Gmelin, 1791)

(Pl. 14, fig. 7)

1788. *Strombus vexillum* Chemnitz, *Syst. Conchy. Cab.* 10 : 222, pl. 157, fig. 1504, 1505 (non binom).

1791. *Strombus vexillum* : Gmelin, *Syst. Nat.*, 13 ed. : 3520, sp. 52 (Type locality : Oceano Indico).

1822. *Purpura vexillum* : Lamarck, *Hist. nat. Anim. Sans. Vert.*, 2 ed : 88 sp. 48.

1880. *Vexilla vexillum* : Tryon, *Man. Conch.*, 2 : 181, pl. 55, fig. 186.

1901. *Vexilla vexillum* . Melvill and Standen *Proc. zool. Soc. Lond.*, pt. 2 : 400.

1961. *Vexilla vexillum* : Rippingale and Mc Michael, *Queens land and Great Barrier reef shells* : 98, pl. 12, fig. 15.

1972. *Vexilla vexillum* : Cernohorsky, *Marine shells of the Pacific*, 2 : 129, pl. 36, fig. 11.

**Material examined :** 2 exs., Bombay.

**Description :** Shell small, ovate, smooth, spire short, acute, consists of three rounded whorls, body whorl, large oblong, aperture long, narrow, outer lip with thirteen denticles ; columella smooth, calloused, twisted anteriorly ; canal short, broadly open,

Colour yellowish brown with dark brown bands, eight in number on body whorl, two to three in spiral whorls, aperture white.

**Remarks :** *Vexilla taenita* Powis is synonymised with the present species by Cernohorsky (1972).

*Distribution* : India : Bombay. Elsewhere : Mauritius, Philippines, Mekaran coast (Melvill and Standen 1901). It is moderately uncommon and widely distributed throughout the tropical Pacific (Cernohorsky, 1972). Indo Pacific and Queensland to northern territory of Australia (Rippingale and Mc Michael, 1961).

<i>Measurements</i> :	L	D	LA	LS
Smallest :	15.55	4.05	12.70	4.30
Average :	18.66	9.80	14.10	6.30
Largest :	23.65	12.75	19.22	6.00

### SUMMARY

A total of 99 species classified under 7 subfamilies and 28 genera are reported from seas around India. Of these, 78 species under 25 genera are recorded on the basis of material available in the National Zoological Collections and the rest are records from literature. Seven species, namely *Attiliosa orri*, *Haustellum dolichourus*, *Murex adunco-spinosus*, *Favartia brevicula*, *Pterynotus barclayanus*, *Pterynotus albobrunneus*, and *Talityphis bengalensis* are reported recently; the first six from Andamans, the last but one from Lakshadweep and the last one from off Visakhapatnam. The identity of 10 species reported in the literature needs confirmation.

There are 13 new records for Indian waters. Majority of the species are recorded from Andaman and Nicobar Islands. Two species namely, *Muricanthus kuesterianus* and *Muricopsis bombayanus* are restricted to Arabian Sea and Persian Gulf. Three species namely *Actinotrophon planispina*, *Boreotrophon tenuirostratus* and *Boreotrophon indicus* are not collected recently after their original discovery during the last century. These are represented by type collections only and no subsequent collections exist.

There are 14 new records for India. Keys are given to subfamilies, genera and species.

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## INDEX

[ Valid species are given in roman types, synonyms are in italics. Generic names are in capitals ; subgeneric names in parenthesis. Family and Subfamily names are in Italic capitals. ]

## A

- aciculata*, *Ocinebra* 6  
*actinophorus*, *Actinotrophon* 63  
**ACTINOTROPHON** 7, 62, 63, 64  
*aculeata*, *Mancinella* 89  
*aduncospinosus*, *Murex* 6, 40, 120  
*adustus*, *Murex* 17  
*alatus*, *Pterynotus* 54  
*albobrunneus*, *Pterynotus* 7, 53, 120  
*alouina*, *Mancinella* 9, 89, 110, pl. 10  
*amygdala*, *Cronia* 8, 104  
*anaxeres*, *Morula* 9, 93, 94, pl. 11  
*anguliferus*, *Murex* 48  
*annandalei*, *Naquetia* 7, 50, pl. 7  
*armigera*, *Thais* 9, 108, 118, pl. 13  
**ASPELLINAE** 10  
*atromarginata*, *Purpura* 97  
**ATTILIOSA** 5, 12, 14  
*axicornis*, *Chicoreus* 5, 13, fig. 15, pl. 1

## B

- badius*, *Murex* 6  
*banksii*, *Chicoreus* 5, 13, fig. 15, 16, 19, 20,  
 pl. 1  
*barclayanus*, *Pterynotus* 7, 120

CM 17

- bengalensis*, *Talityphis* 8, 120  
*bezor*, *Buccinum* 78  
*bicatenata*, *Ricinula* 95  
*biconica*, *Morula* 9, 93, 95, pl. 11  
*bitubercularis*, *Purpura* 112  
*blainvillei*, *Murex* 60  
*blanfordi*, *Thais* 9, 105, fig. 116, 108, 109,  
 118, pl. 13  
*bombayanus*, *Muricopsis* 7, 60, pl. 8  
**BOREOTROPHON** 7, 62, 63, 64  
*bracteatus*, *Triton* 77  
*brevicula*, *Favartia* 7, 120  
*brevispina*, *Murex* 6, 31, 32, pl. 3  
*brunneus*, *Chicoreus* 5, 13, fig. 15, 17, 18 fig,  
 pl. 1  
*buccinea*, *Purpura* 9, 80 fig. 103, pl. 12  
*bufo*, *Mancinella* 3, 9, 89, 90, 91, 92, pl. 11  
*bulbosa*, *Rapana* 79

## C

- capucina*, *Naquetia* 7, 50, 51, pl. 7  
*cancellata*, *Purpura* 97  
*carbonnieri*, *Acupurpura* 33  
*carbonnieri*, *Murex* 3, 6, 31, 33, pl. 4  
*carinifera*, *Thais* 3

CHICOREUS 5, 11, 14, 20  
 chrysostoma, Morula 9  
 cichoreum, Hexaplex 5  
 cirrosa, Murexiella 7, 59  
 clathrata miticula, Drupa (Ricinella) 8, 68,  
 72, 73, pl. 9  
 clathratus, Boreotrophon 65  
 cnissodus, Chicoreus 5, 13, fig. 15, 19, pl. 1  
 concatenata, Drupella 8, 75, 76, pl. 9  
 contracta, Cronia (Ergalatax) 8, 83, pl. 10  
 cornus, Drupella 8, 75, pl. 9  
 cornuta, Cassis 26  
*corrugatus*, Murex 20  
 crocatus, Chicoreus 5, 15, 20, pl. 2  
 CRONIA 8, 81, 82, 84  
*crossei*, Murex 87  
 cucullata, Saccostrea 104  
 cyclostoma, Favartia 7, 56, pl. 7  
 CYMIA 113

## D

*decussatum* var., *Sistrum* 84  
 denudatus, Chicoreus 5, 13, fig. 15, 20, 21,  
 pl. 2  
*digitatum* var. lobata, *Sistrum* 73  
*disjuncta* var. *obliterata*, *Cuma* 113  
*dissumulans*, *Coralliophila* 87  
*distingueda*, *Purpura* 112  
 dolichourus, *Haustellum* 5, 120  
 DONACIDAE 1  
 DRUPA 1, 8, 66, 67  
 (DRUPA S. S.) 67  
 (DRUPINA) 67, 73

DRUPINAE 8, 10, 11, 16

DRUPELLA 8, 66, 74

## E

*echinata*, *Thais* 9, 90, 105, fig. 110, pl. 13  
*echinulata*, *Thais* 9  
*elata*, *Purpura* 74, 75  
 ENGINA 99  
 (ERGALATAX) 84  
 EUPLEURA 3  
*extraneus*, *Chicoreus* 21

## F

FAVARTIA 7, 55  
*fenestrata*, *Drupa* 98  
*fiscella*, *Cronia* 8, 82, 84, pl. 10  
*fiscellum lienardi* (var.), *Murex (Ocinebra)* 84  
*fragum*, *Purpura* 76  
*francolina*, *Nassa* 3  
*fucus*, *Murex* 107  
*funiculata*, *Morula* 9, 93, 99, pl. 11

## G

*gemmulata*, *Thais* 89  
*gibba*, *Cronia* 87  
*gibbus*, *Latirus* 87  
 GORGINA 99  
*granulata*, *Morula* 9, 93, 95, 98, 100, pl. 11

## H

HAUSTELLUM 3, 4, 11, 26  
*haustellum*, *Haustellum* 5, 26, 27 fig., pl. 3  
*heptagonalis*, *Drupa* 83  
 HEXAPLEX 5

*hidalgoi*, *Murex* 58

*hippocastanum*, *Thais* 9, 98, 108, 111, 113,  
118, pl. 13

**HOMALOCANTHA** 6, 12, 28

*horrida*, *Ricinula* 68

*hystrix*, *Murex* 70

*hystrix*, *Purpura* 71, 72

### I

*incarnatus*, *Murex* 25

*incompta*, *Coralliophila* 12

*indicus*, *Boreotrophon* 7, 64, 65, 120, pl. 8

*intermedia*, *Thais* 9, 108, 112 pl. 14

### J

**JOPAS** 101

### K

*kilburni*, *Chicoreus* 5, 13 fig., 15, 22, 23,  
pl. 2

*konkanensis*, *Cronia* 8, 82, 85, 88, pl. 10

*kuesterianus*, *Muricanthus* 6, 47, 49, 120,  
pl. 6

### L

*lacera*, *Thais* 3, 9, 107, 113, 115, pl. 13

*lobata*, *Drupa* (*Drupina*) 8, 67, 73, 74, pl. 9

*longmani*, *Translrafer* 61

### M

*macgintyi*, *Murexiella* 7, 55, 59, pl. 8

**MACULOTRITON** 8, 66, 77

*malabaricus*, *Murex* 6, 31, 34, pl. 4

**MANCINELLA** 9, 82, 89

*mancinella*, *Murex* 75

*mancinella*, *Purpura* 89

**MARCHIA** 53

*margarticola*, *Thais* 83

*marginatra*, *Morula* 9, 93, 97, pl. 11

*martinianus*, *Murex* 42

*maurus*, *Murex* 22, 23, 24

*microphyllus*, *Chicoreus* 5, 15, 18, fig. 23,  
pl. 2

*miliaris*, *Vitularia* 7, 55, 61, pl. 8

*mindanaoensis*, *Murex* 6, 34

*miticula*, *Ricinula* 72

**MITRIDAE** 1

**MORULA** 9, 66, 82, 93

*morum*, *Drupa* 8, 66, 68, fig. 69, 70, pl. 9

**MUREX** 2, 3, 4, 6, 11, 30

**MUREXIELLA** 7, 55, 58

**MURICANTHUS** 6, 12, 46, 49

**MURICIDAE** 1, 5

**MURICINAE** 1, 5, 6

**MURICOPSINAE** 7, 10, 54

**MURICOPSIS** 7, 55, 60

*musiva*, *Morula* 9

### N

**NAQUETIA** 7, 12, 49

**NASSA** 9, 81, 101

*nigrispinosus*, *Murex* 41

*nodicostata*, *Morula* 9, 93, 98, pl. 11

*nodulifera*, *Attiliosa* 5, 12, 13 fig., pl. 1

*nodulifera*, *Poiriera* 12

*nodulosa* 88

*nucula*, *Murex* 56

## O

- occa, *Murex* 6, 31, 35, pl. 4  
 ochrostoma, *Cronia* 8, 83, 86, pl. 10  
 ochrostoma, *Drupella* 75, 76  
**OCENEBRINAE** 10  
*onagrina*, var. *b Purpura* 61  
 orri, *Attiliosa* 5, 120  
 ozenneana, *Cronia* 8, 82, 86, 87, pl. 10

## P

- palmarosae, *Chicoreus* 5, 15, 18, fig. 24, pl. 2  
*palmiferus*, *Murex* 21  
 panama, *Purpura* 9, 92, 103, 104, 105, fig. 107, pl. 12  
 pecten, *Murex* 6, 27, fig. 30, 31, 36, 46, pl. 4  
 persica, *Purpura* 9, 103, 105, pl. 12  
*pica*, *Purpura* 118  
 pinnatus, *Pterynotus* 7, 53, 54, pl. 7  
 planispina, *Actinotrophon* 7, 63, 64, 120, pl. 8  
*ponderosa*, *Murex* 3, 4, 48, 49  
**PTERONOTUS** 50  
**PTERYNOTUS** 7, 12, 53  
*pumilus*, *Murex* 57  
**PURPURA** 9, 79, 81, 103  
*purpura scabra*, *Murex* 61  
*purpureocincta*, *Engina* 98, 99  
**PTEROCHELUS** 53  
*Pyrum*, *Murex* 90

## R

- radix, *Murex* 46  
 ramosus, *Chicoreus* 5, 14, 18 figs., 25, 44, pl. 2, 3

*rapa*, *Murex* 79

**RAPANA** 8, 78

**RAPANINAE** 8, 10, 78

*rapiformis*, *Rapana* 8, 69, fig. 79, pl. 9, 10

*rarispinga*, *Murex* 42

*rectirostris*, *Murex* 6

(**RICINELLA**) 67, 71

*ricinus*, *Drupa* 8, 68, 69, 70, pl. 9

*rosaria*, *Triplex* 24

*rubusidaeus*, *Drupa* (*Ricinella*) 8, 68, 71, pl. 9

*rudolphi*, *Thais* 104

*rugosa*, *Thais* 9, 107, 115, pl. 14

*rusticus*, *Murex* (*Phyllonotus*) 6

## S

*sacellum*, *Murex* 115

*salmonea*, *Favartia* 7, 56, 57, pl. 7

*scolopax*, *Murex* 6, 31, 35, 36, 37, 38 fig., pl. 5

*scorpio*, *Homalocantha* 6, 28, 29, pl. 3

*secunda*, *Homalocantha* 6, 29, 30, pl. 3

*serratospinosus*, *Murex* 34

*serriale*, *Maculotriton* 8, 77, pl. 9

*serta*, *Nassa* 9, 81, 101, 102 fig., pl. 12

*serta francolina* (var), *Jopas* 101

*situla*, *Jopas* 101

**SIRATUS** 49

*speciosa*, *Drupa* 72

*squamosum*, *Sistrum* 97

*subnodulosa*, *Cronia* 8, 82, 88, pl. 10

*submissus*, *Murex* (*Ocinebra*) 6

*sykesi*, *Favartia* 56



## T

*taenata*, Vexillum 119

## TALITYPHIS 8

*tenuirostratus*, Boreotrophon 8, 64, 120,  
pl. 8

*tenuirostrum*, Murex 6, 31, 39, pl. 5

*tenuispina* Murex 36

*ternispina*, Murex 6, 32, 39, 40, 41, 43, 44,  
pl. 5

*tetragona*, Favartia 7, 55, 58, pl. 7

## THAIDIDAE 2

THAIDINAE 2, 3, 8, 10, 11, 66, 81

THAIS 1, 9, 82, 107

*tissoti*, Thais 3, 4, 9, 108, 110, 116, 117,  
pl. 14

*torrefactus*, Murex 23, 24

## TRANSTRAFER 61

*trapa*, Murex 3, 6, 31, 36, 38 fig., 42, 43,  
pl. 5

*tribulus*, Drupa 70

*tribulus*, Murex 6, 30, 32, 33, 34, 36, 39, 40,  
41, 42, 43, 44 fig., pl. 6

*triremis*, Murex 36

*trigonula*, Naquetia 52

*triqueter*, Naquetia 7, 50, 52 pl. 7

TROPHONINAE 7, 10, 11, 62

*troscheli*, Murex 6, 31, 45, pl. 6

*trunculus*, Phyllonotus 6

*tuberculata*, Drupa 96, 97

*tuberosa*, Thais 9, 108, 109, 117, 118 pl. 14

*turbinatus*, Murex (Phyllonotus) 6

TYPHINAE 8, 10

TYPHIS 10

## U

*undatum* var. *indicum*, Sistrum 83, 84

UROSALPINX 2, 3

*uva*, Morula 9, 93, 100, pl. 11

## V

*ventricosulum*, Cronia 9

VEXILLA 10, 81, 119

*vexillum*, Vexilla 10, 81, 119, pl. 14

*virgineus*, Murex 3, 47, 49

*virgineus*, Muricanthus 6, 47, 48, pl. 6

VITULARIA 7, 55, 61

## X

*xuthedra*, Cronia 9



# **P L A T E S**



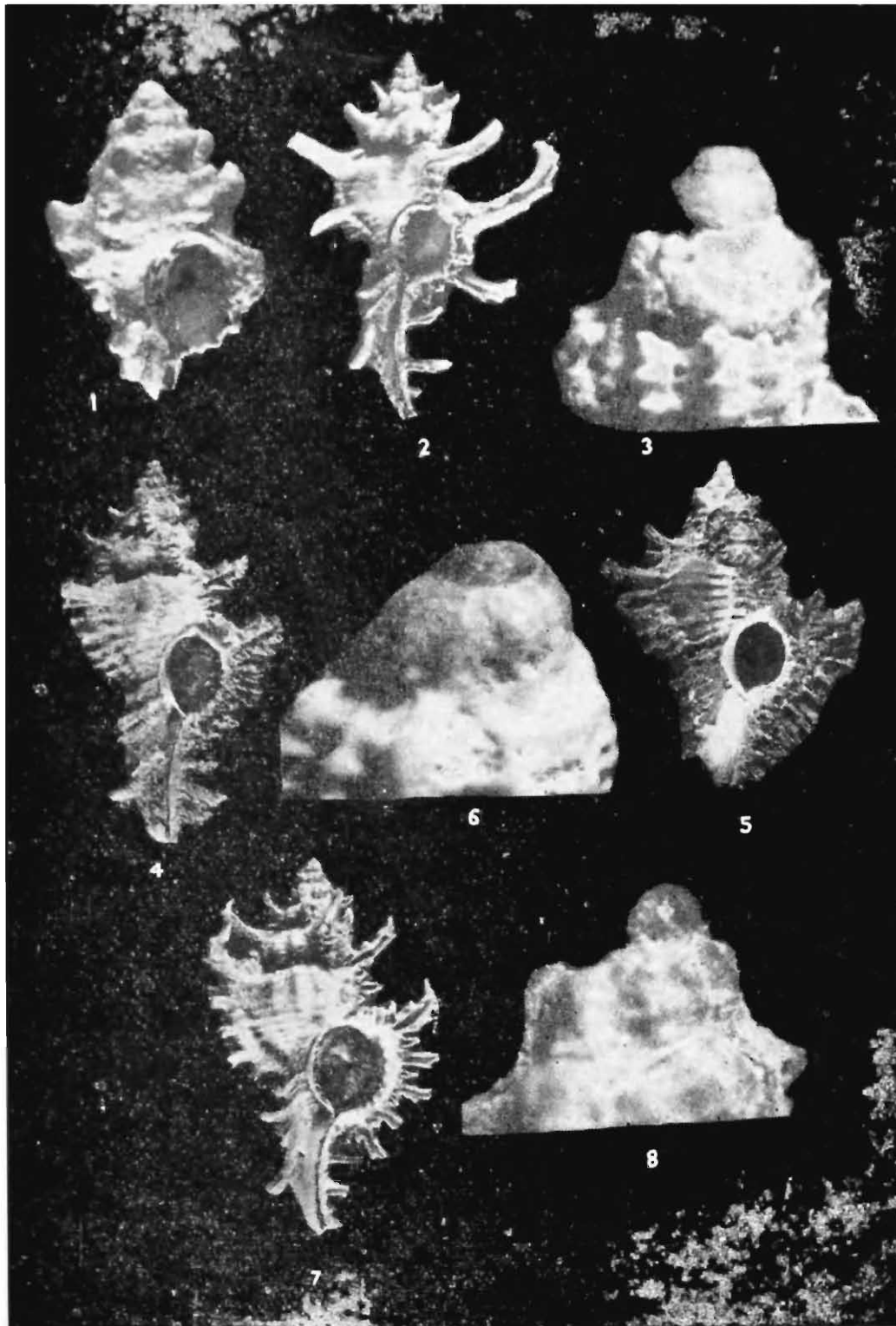


PLATE: 1

1. *Attiliosa nodulifera*, 27.70 × 11.96 mm
- 2, 3. *Chicoreus axicornis*. Shell — 52.30 × 36.90 mm & Protoconch
4. *Chicoreus banksii*. 56.40 × 31.00 mm
- 5, 6. *Chicoreus brunneus*. Shell — 51.85 × 40.85 mm & Protoconch
- 7, 8. *Chicoreus cnissodus*. Shell — 54.45 × 32.42 mm & Protoconch

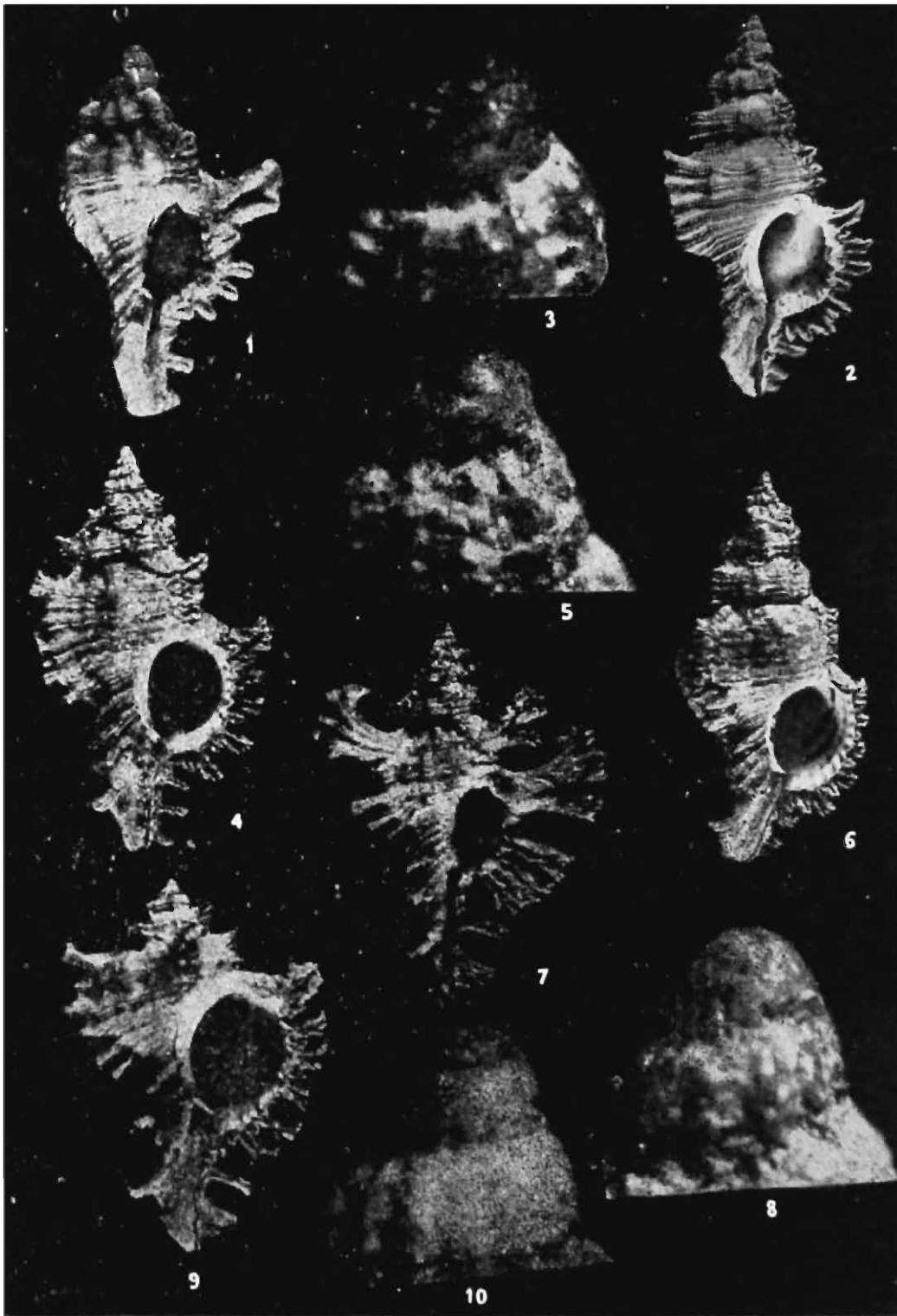


PLATE : 2

1. *Chicoreus crocatus*. 32.95 × 20.95 mm
- 2, 3. *Chicoreus denudatus*. Shell — 57.55 × 29.30 mm & Protoconch
- 4, 5. *Chicoreus kilburni*. Shell — 68.00 × 40.50 mm & Protoconch
6. *Chicoreus microphyllus*. 91.10 × 43.20 mm
- 7, 8. *Chicoreus palmarosae*. Shell — 80.96 × 62.88 mm & Protoconch
- 9, 10. *Chicoreus ramosus*. Shell — 96.36 × 63.45 mm & Protoconch

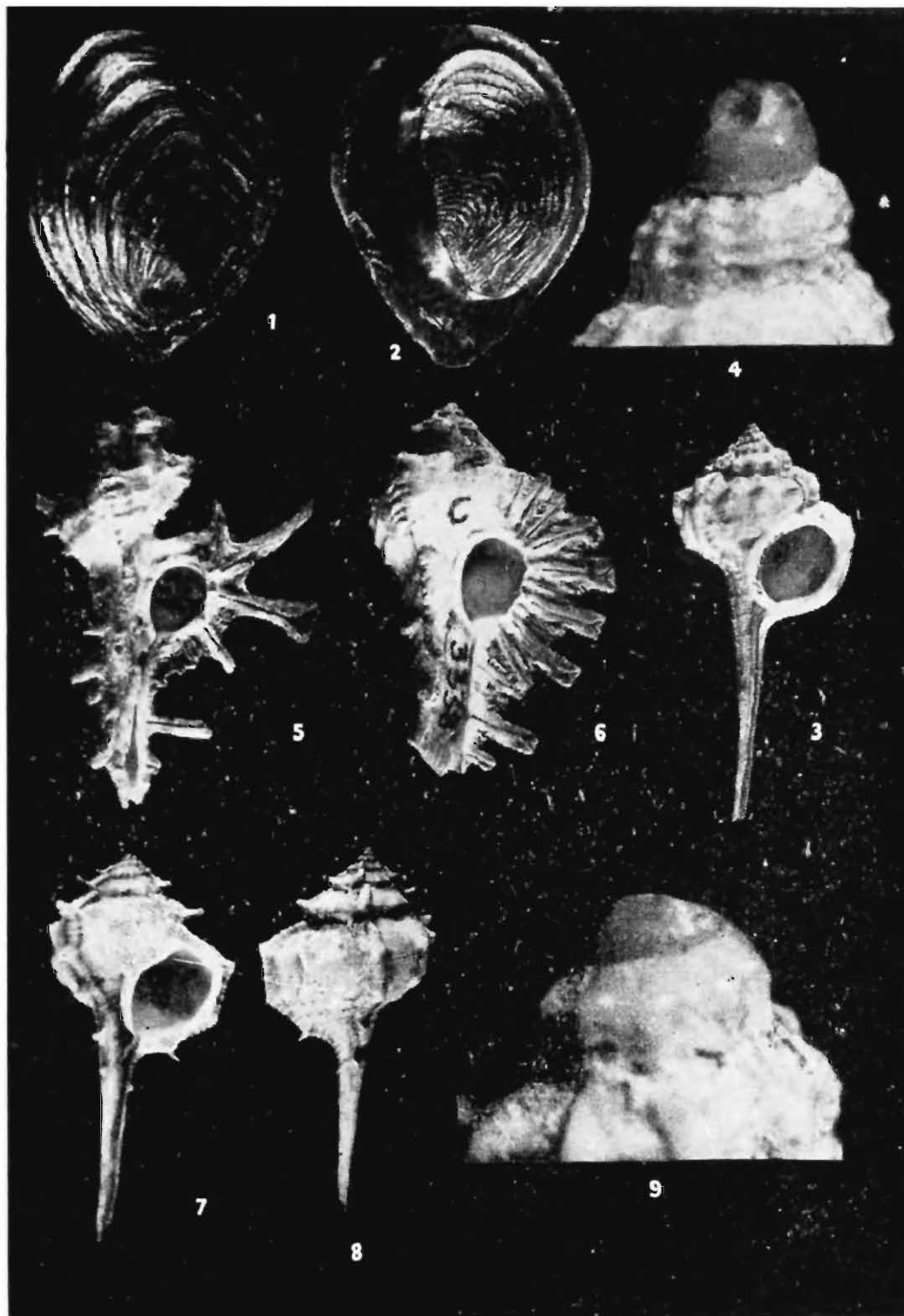


PLATE : 3

- 1, 2. *Chicoreus ramosus*. Operculum —  $32.98 \times 25.35$  mm  
3, 4. *Haustellum haustellum*. Shell —  $87.65 \times 39.35$  mm & Protoconch  
5. *Homalocantha scorpio*.  $44.84 \times 32.58$  mm  
6. *Homalocantha secunda*.  $32.92 \times 21.80$  mm  
7, 8, 9. *Murex brevispina*. Shell —  $68.55 \times 32.55$  mm & Protoconch

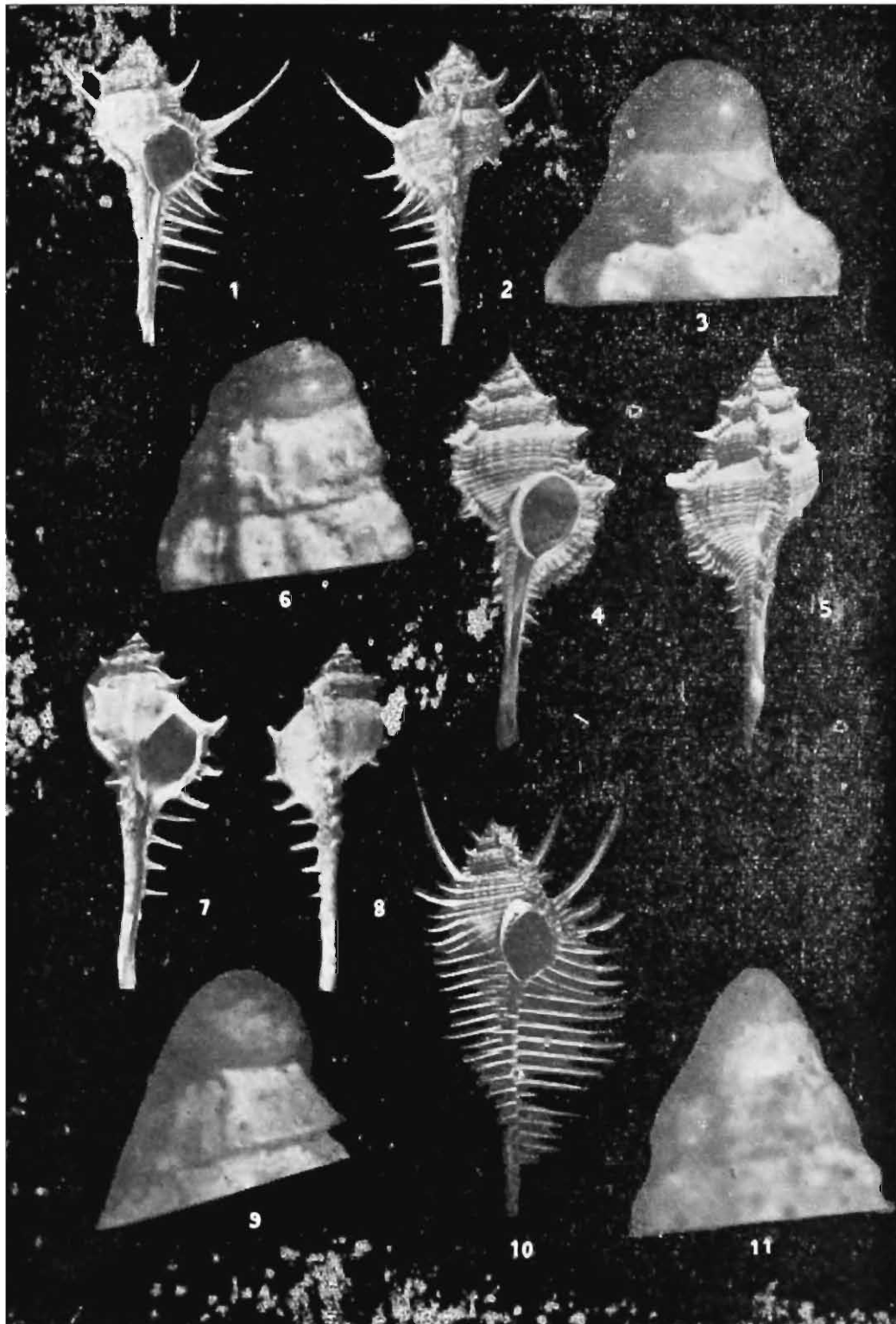


PLATE : 4

- 1, 2, 3. *Murex carbonieri*. Shell —  $69.85 \times 52.25$  mm & Protoconch  
4, 5, 6. *Murex malabaricus* (Type) Shell --  $108.32 \times 44.96$  mm &  
Protoconch  
7, 8, 9. *Murex occa*. Shell —  $80.92 \times 32.42$  mm & Protoconch  
10, 11. *Murex pecten*. Shell —  $95.86 \times 46.90$  mm & Protoconch



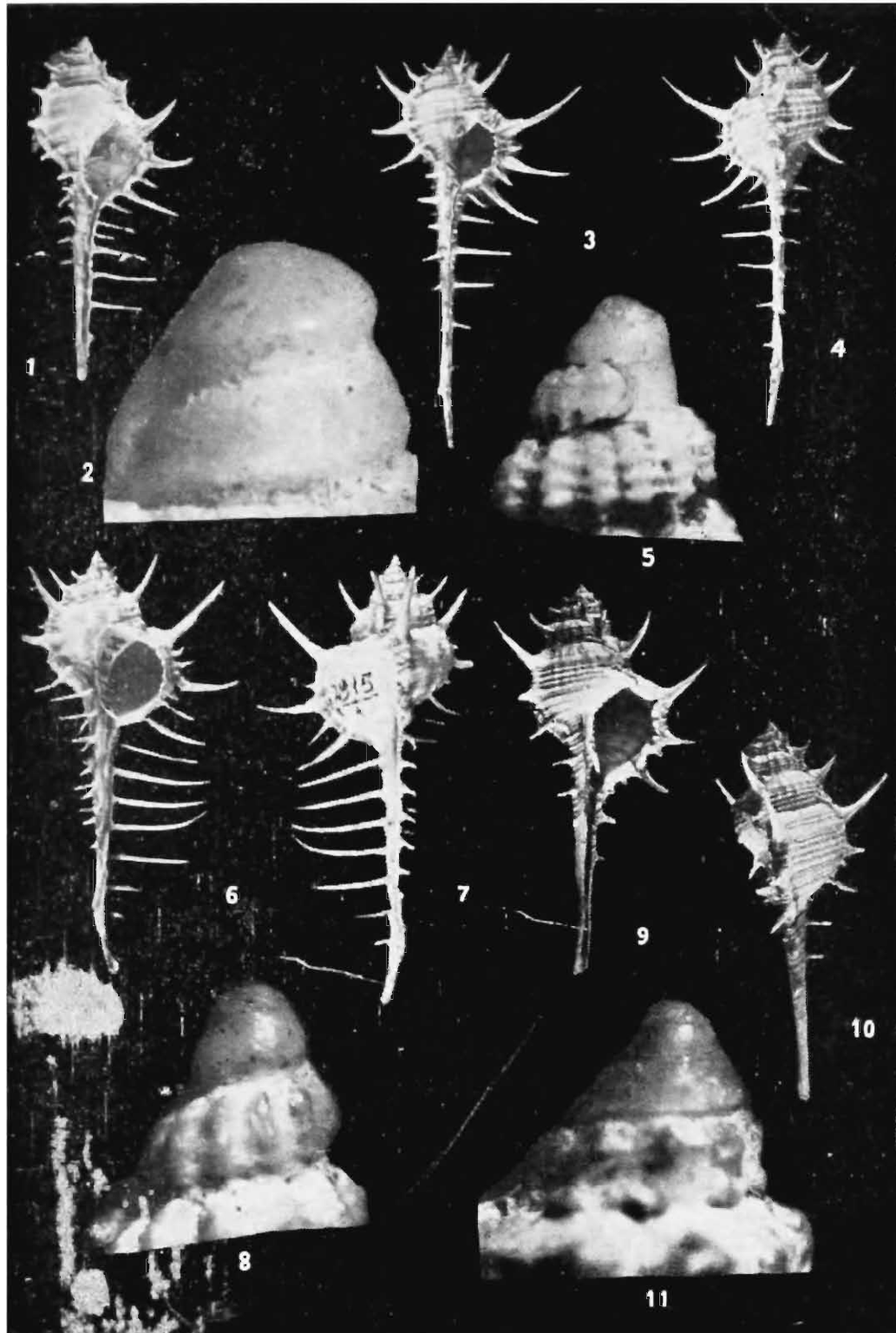


PLATE : 5

- 1, 2. *Murex scolopax*. Shell — 84·88 × 38·98 mm & Protoconch  
3, 4, 5. *Murex tenuirostrum tenuirostrum*. Shell — 90·72 × 47·76 mm &  
Protoconch  
6, 7, 8. *Murex ternispina*. Shell — 92·80 × 48·22 mm & Protoconch  
9, 10, 11. *Murex trapa*. Shell — 92·82 × 47·74 mm & Protoconch

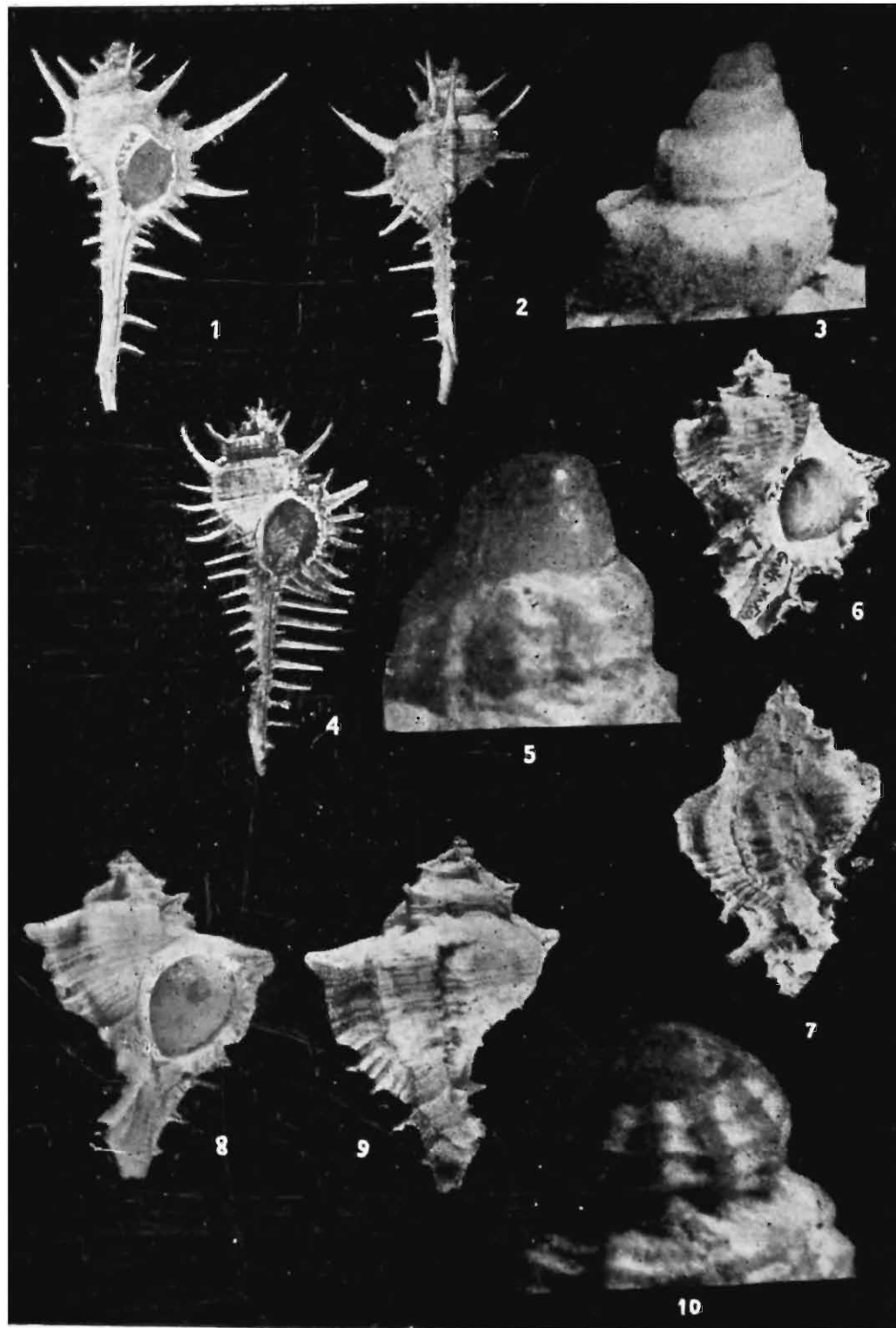


PLATE : 6

- 1, 2, 3. *Murex tribulus*. Shell —  $86.42 \times 58.66$  mm & Protoconch  
4, 5. *Murex troscheli*. Shell —  $107.95 \times 52.14$  mm & Protoconch  
6, 7. *Muricanthus kuesterianus*.  $56.85 \times 41.66$  mm  
8, 9, 10. *Muricanthus virgineus*. Shell —  $81.05 \times 59.70$  mm & Protoconch

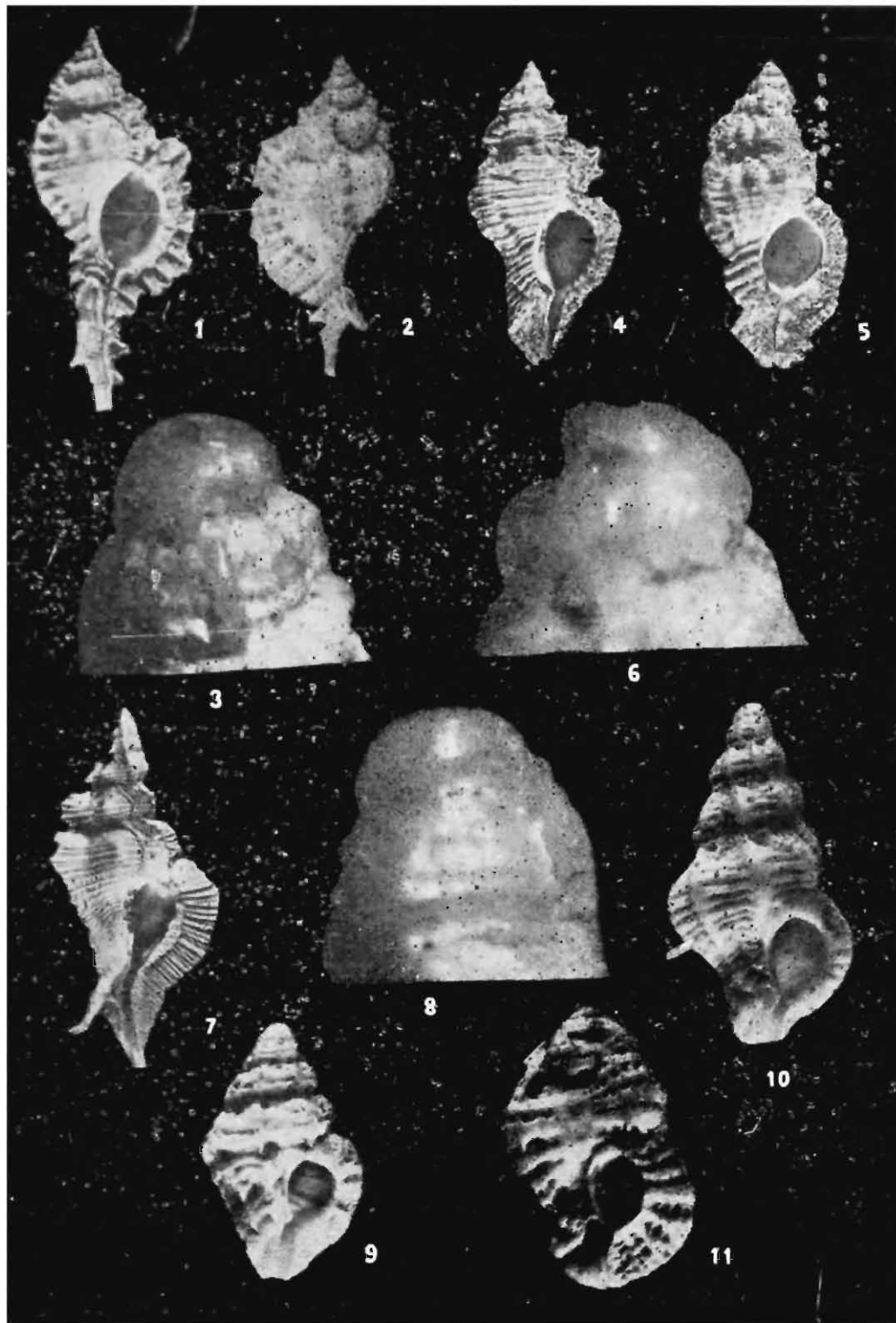


PLATE : 7

- 1, 2, 3. *Naquetia annandalei*. Shell —  $82.20 \times 30.80$  mm & Protoconch  
4. *Naquetia capucina*.  $60.24 \times 29.85$  mm  
5, 6. *Naquetia triquetra*. Shell —  $55.95 \times 27.29$  mm & Protoconch  
7, 8. *Pterynotus pinnatus*. Shell —  $66.58 \times 29.64$  mm & Protoconch  
9. *Favartia cyclostoma*.  $12.35 \times 7.30$  mm  
10. *Favartia salmonea*.  $19.52 \times 10.42$  mm  
11. *Favartia tetragona*.  $21.88 \times 13.40$  mm

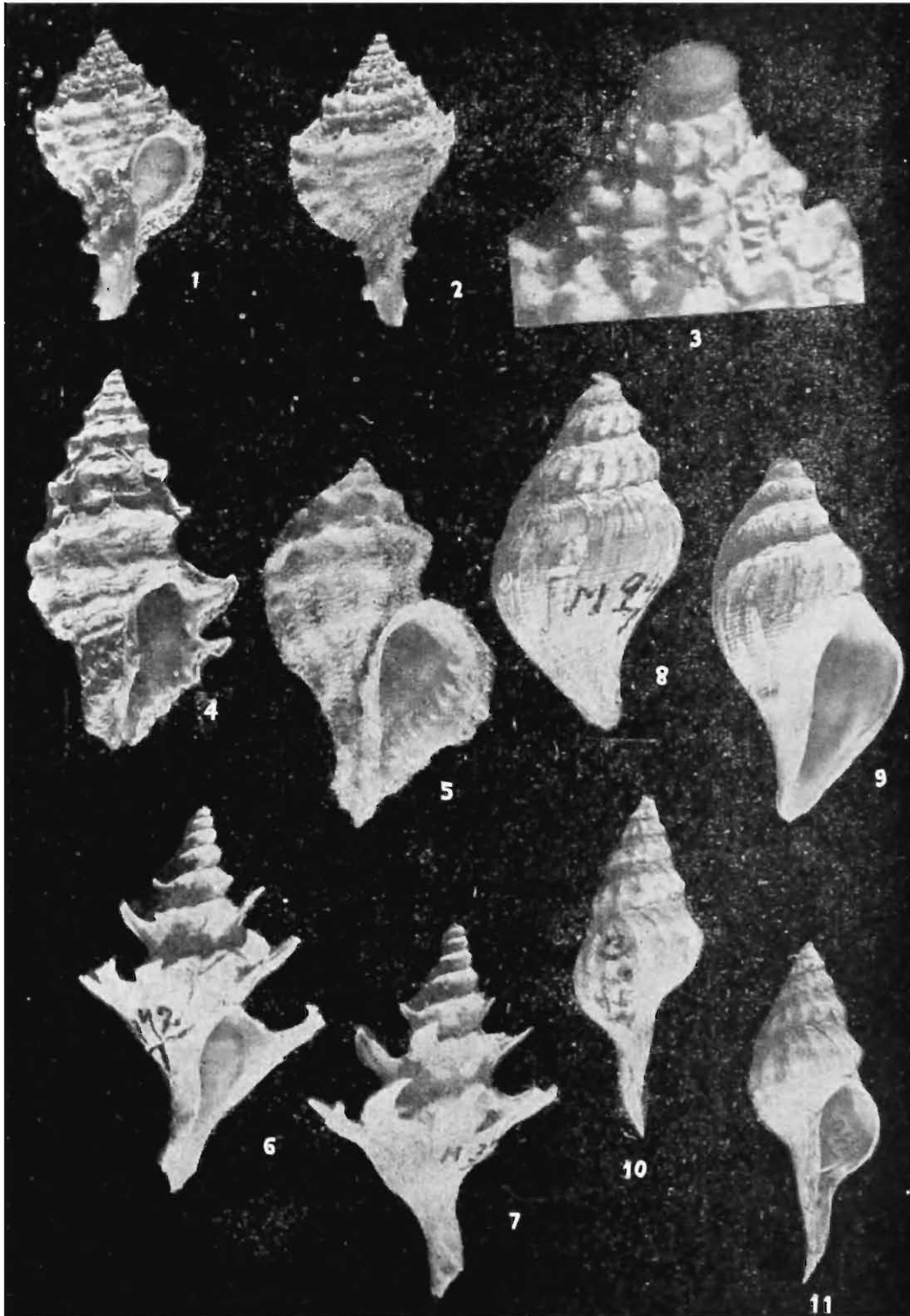


PLATE : 8

- 1, 2, 3. *Murexiella macgynti*. Shell —  $13.12 \times 12.05$  mm & Protoconch  
 4. *Muricopsis bombayanus*.  $33.24 \times 17.62$  mm  
 5. *Vitularia miliaris*.  $51.80 \times 31.40$  mm  
 6, 7. *Trophon* (*Boreotrophon*) *planispina*. (Type)  $36.40 \times 23.34$  mm  
 8, 9. *Trophon indicus*. (Type)  $33.36 \times 17.06$  mm  
 10, 11. *Trophon tenuirostratus*. (Type)  $26.40 \times 10.40$  mm

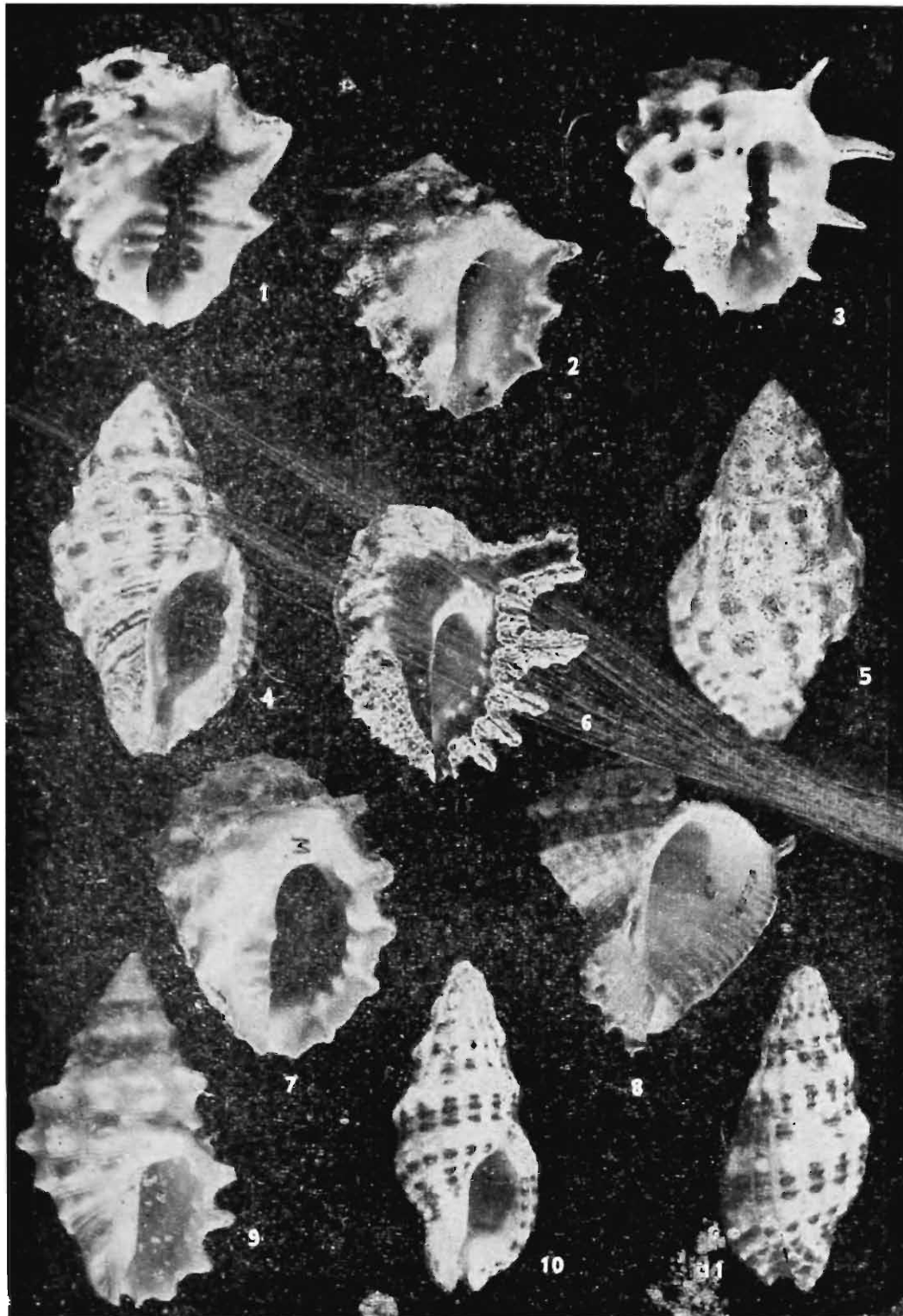


PLATE : 9

1. *Drupa morum morum*. 37·38 × 35·20 mm
2. *Drupa (Ricinella) clathrata miticula*. 35·90 × 28·26 mm
3. *Drupa ricinus ricinus*. 24·46 × 25·15 mm
- 4, 5. *Drupella concatenata*. 31·78 × 16·55
6. *Drupa lobata*. 24·08 × 25·30 mm
7. *Drupa (Ricinella) rubusidaeus*. 35·70 × 34·95 mm
8. *Rapana rapiformis*. 63·96 × 52·90 mm
9. *Drupella cornus*. 31·30 × 20·40 mm
- 10, 11. *Maculotriton serriale*. 10·32 × 4·20 mm

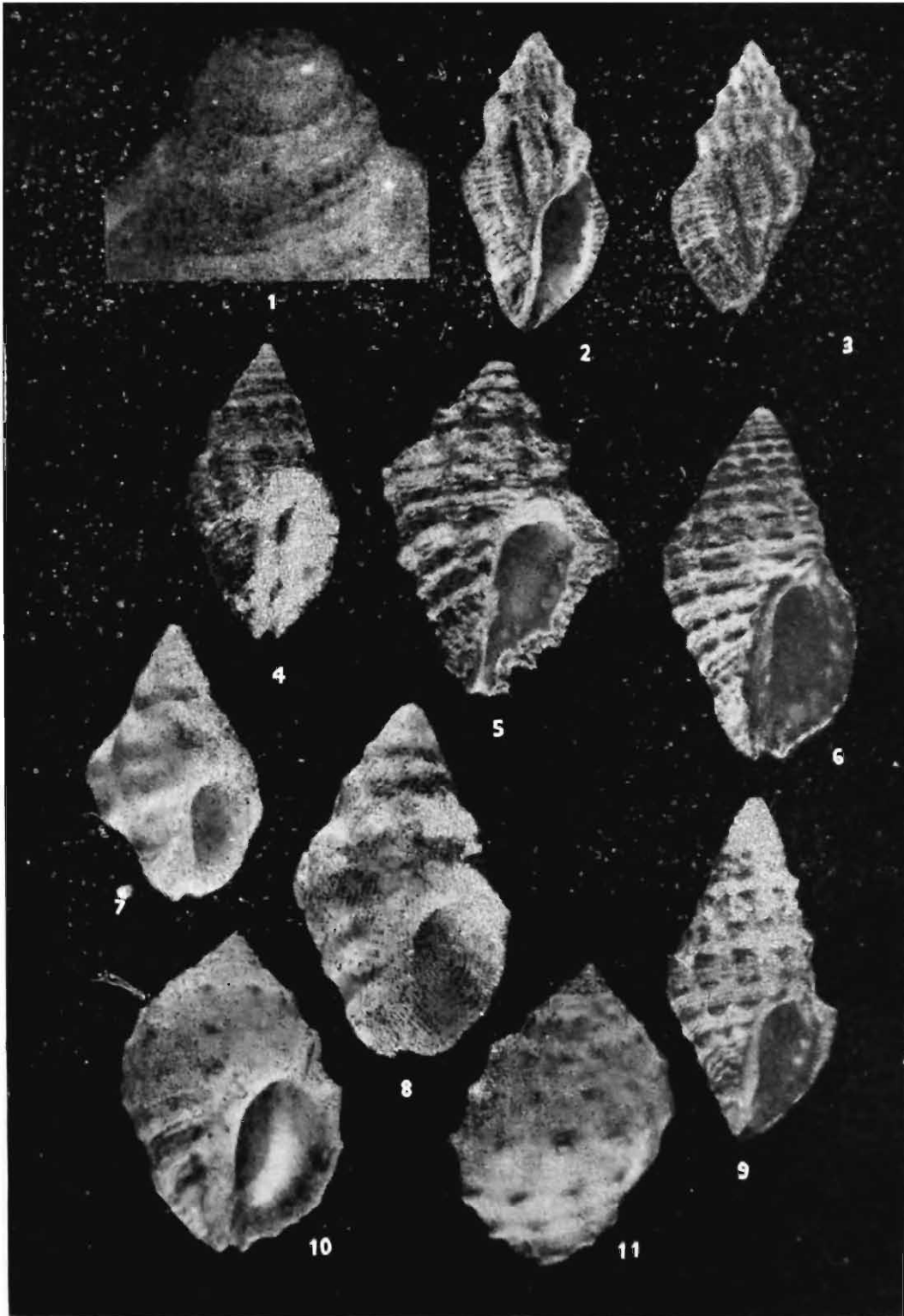


PLATE : 10

1. *Rapana rapiformis* Protoconch
- 2, 3. *Sistrum undatum* var. *indicum* Nelvill (Type) 32.56 × 35 mm
4. *Cronia (Ergalatax) contracta* 37.10 × 21.20 mm
5. *Cronia fiscella* 21.56 × 16.06 mm
6. *Cronia konkanensis* 22.48 × 13.05 mm
7. *Cronia ozenneana* 12.60 × 8.02 mm
8. *Cronia ochrostoma* 19.65 × 11.92 mm
9. *Cronia subnodulosa* 21.40 × 11.28 mm
- 10, 11. *Mancinella alouina* 45.14 × 32.70 mm

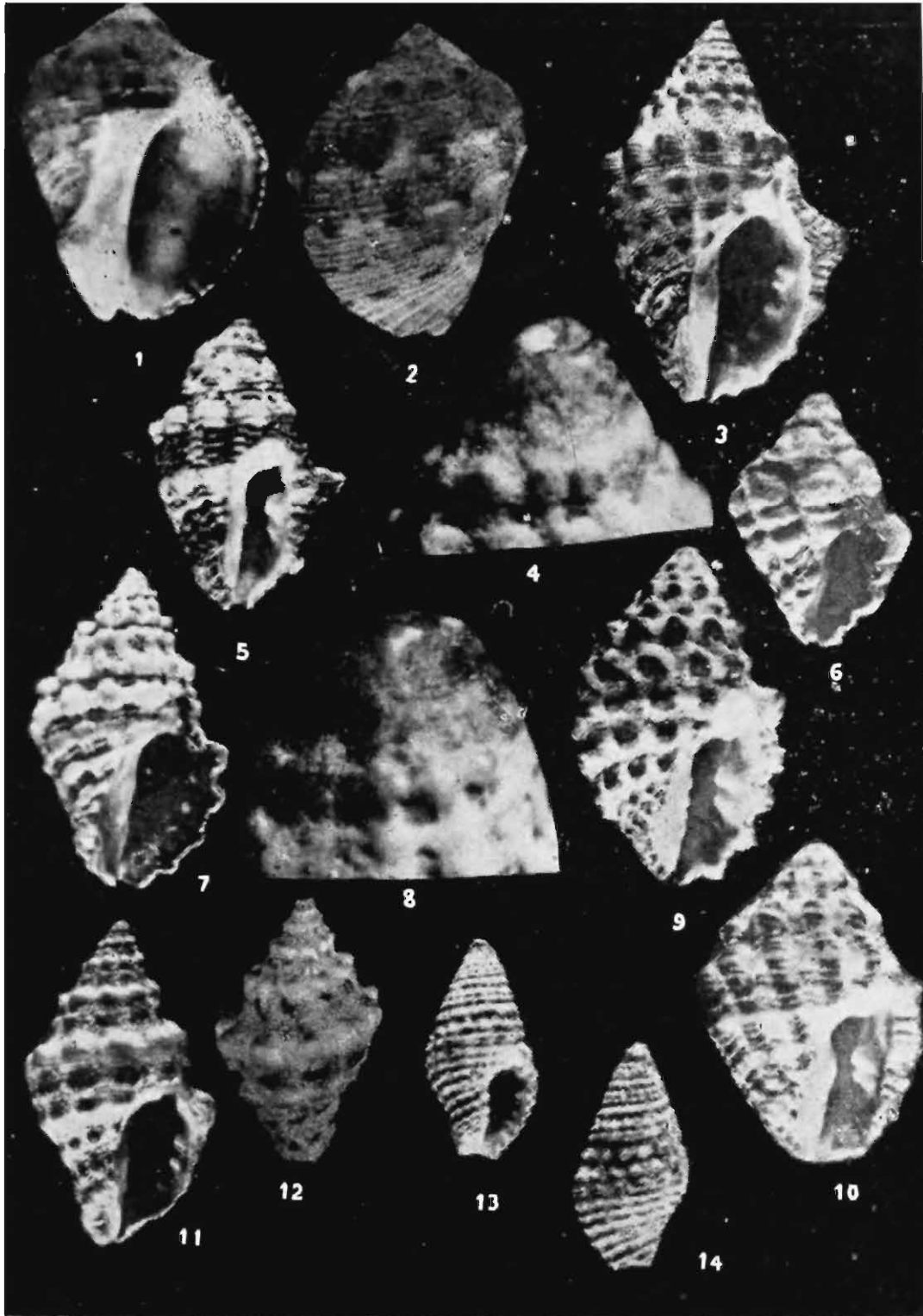


PLATE : 11

- 1, 2. *Mancinella bufo*. 43.35 × 36.65 mm  
 3, 4. *Morula granulata*. 24.25 × 15.60 mm  
 5. *Morula biconica*. 21.22 × 13.00 mm  
 6. *Morula anaxeres*. 11.40 × 8.40 mm  
 7, 8. *Morula marginatra*. Shell — 22.30 × 14.50 mm & Protoconch  
 9, 10. *Morula uva*. 23.66 × 16.04 mm & Variety  
 11, 12. *Morula nodicostata*. 22.42 × 15.32 mm  
 13, 14. *Morula funiculata*. 9.85 × 5.05 mm

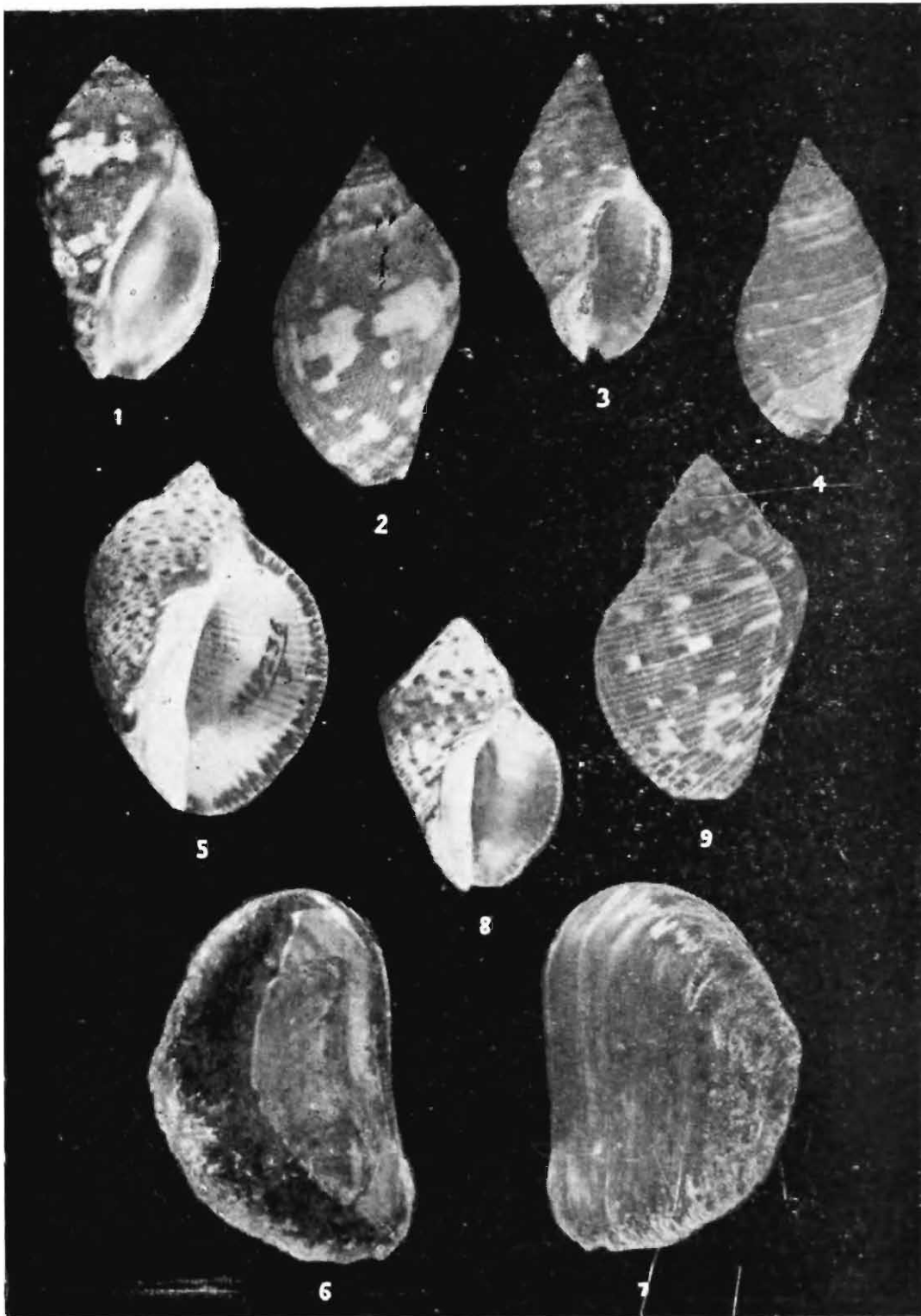


PLATE : 12

- 1, 2. *Nassa sarta*. 38.65 × 21.50 mm  
3, 4. *Purpura buccinea*. 44.70 × 23.40 mm  
5, 6, 7. *Purpura persica*. Shell — 72.72 × 47.38 mm & Operculum  
8, 9. *Purpura panama*. 51.45 × 33.10 mm



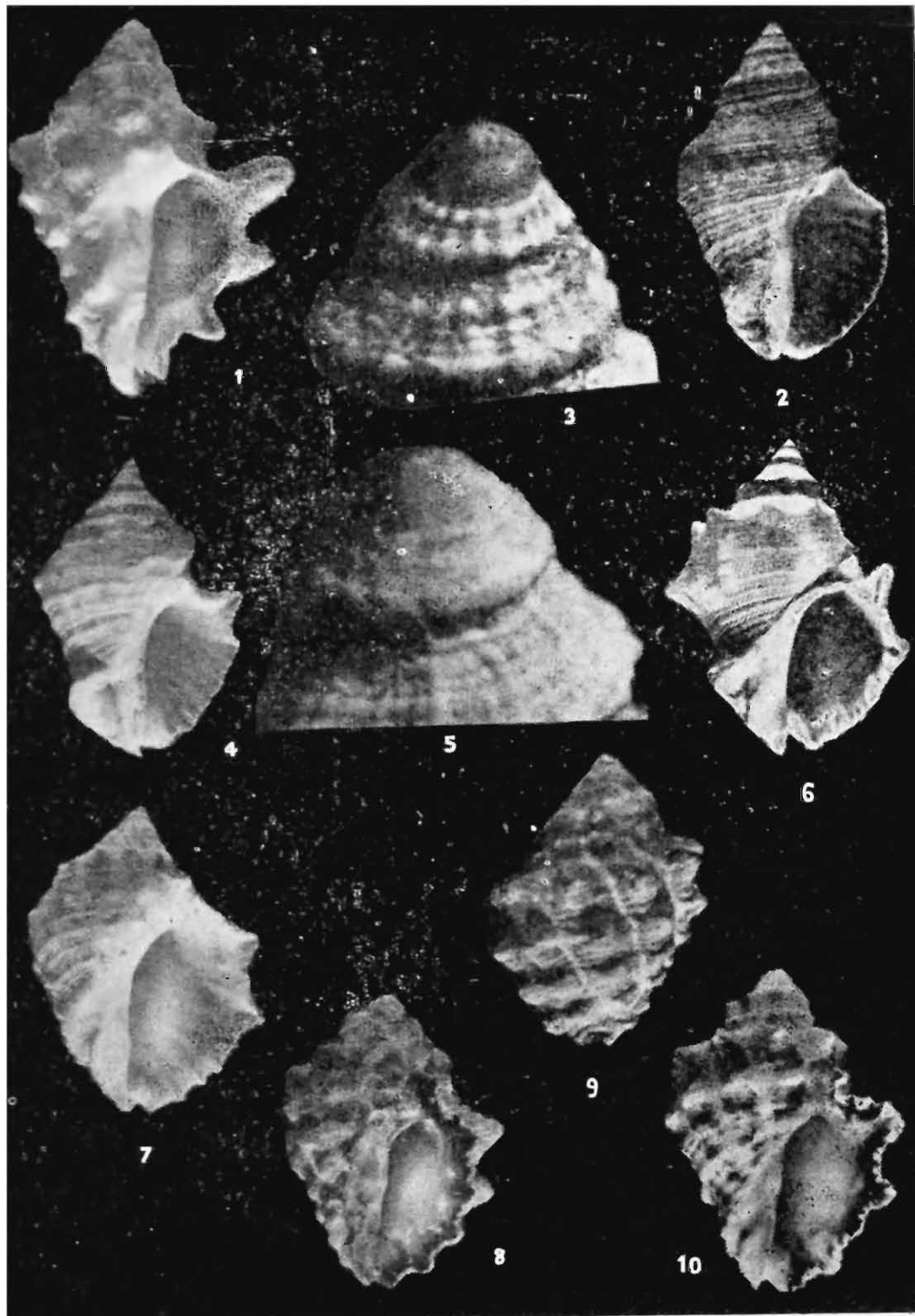


PLATE : 13

1. *Thais armigera*. 65.75 × 49.52 mm
- 2, 3. *Thais blanfordi*. Shell — 25.70 × 15.70 mm & Protoconch
- 4, 5. *Thais lacera*. Shell — 51.52 × 36.10 mm & Protoconch
6. *Cuma disjuncta* (Type) 42.34 × 32.85 mm
7. *Thais echinata*. 43.60 × 35.00 mm
- 8, 9, 10. *Thais hippocastanum*. 34.94 × 26.20 mm & form.

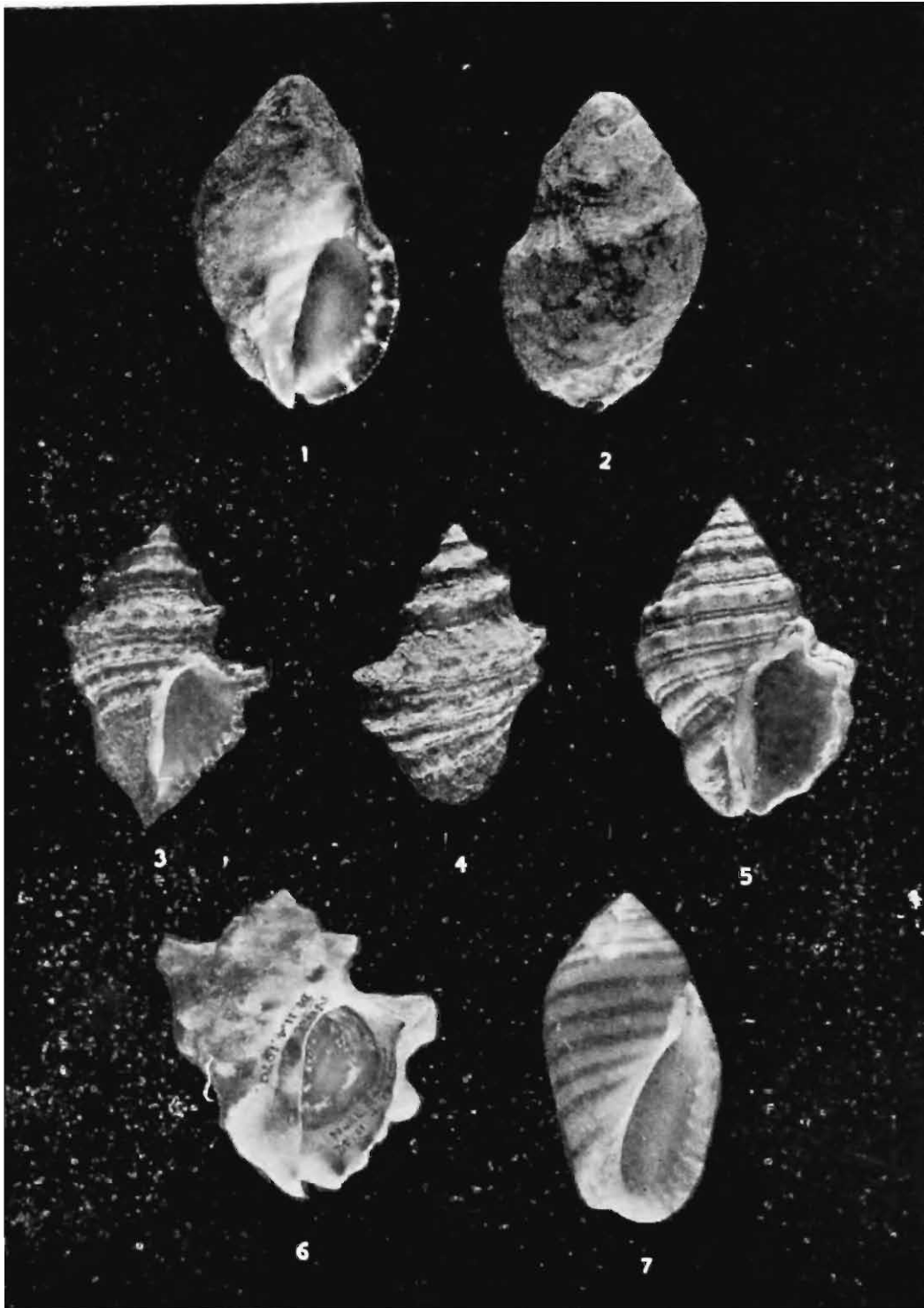


PLATE : 14

- 1, 2. *Thais intermedia*. 48·40 × 31·50 mm
- 3, 4. *Thais rugosa*. 33·12 × 24·95 mm
5. *Thais tissoti*. 23·00 × 15·15 mm
6. *Thais tuberosa*. 48·25 × 44·30 mm
7. *Vexillum vexillum*. 18·60 × 9·80 mm