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**Contributions to the Molluscan fauna of India, Part III.
Marine molluscs of the Coromandel coast, Palk Bay
and Gulf of Mannar—Gastropoda :
Mesogastropoda (Part-2)**

by

H. P. MOOKHERJEE

**Issued by the Director
Zoological Survey of India, Calcutta**

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H. P. MOOKHERJEE

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सत्यमेव जयते

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CONTRIBUTIONS TO THE MOLLUSCAN FAUNA
OF INDIA, PART III. MARINE MOLLUSCS OF
THE COROMANDEL COAST, PALK BAY AND
GULF OF MANNAR—GASTROPODA
MESOGASTROPODA (Part - 2)

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H. P. MOOKHERJEE

Zoological Survey of India, Calcutta

INTRODUCTION

The third part in the series "Contributions to the Molluscan fauna of India" is presented here. The earlier studies include the orders Archaeogastropoda and Mesogastropoda in part (Rajagopal and Mookherjee, 1978, 1982). This marks the completion of Mesogastropoda.

The material consists of the large back-log of unnamed collections accumulated over 60 years in the Zoological Survey of India and the recent collections of 1968, 1975, 1978 and 1979. The last collection was made by the author with special reference to ecology of some species.

Altogether 25 genera, 60 species and subspecies under 11 families have been dealt with. Six species and subspecies namely, *Pustularia childreni* (Gray), *Erronea pulchella novaebritanniae* Schilder & Schilder, *Diminovula punctata* Duclos, *Polinices* (*Neverita*) *effusa* (Swainson), *Cymatium* (*Gutturium*) *tripus* (Lamarck) and *Cymatium* (*Gutturium*) *vespaceum* (Lamarck) are recorded for the first time from the Indian Coast and another *Polinices* (*Mammilla*) *zanzibarica* (Recluz) is recorded for the first time from the east coast of India. Three other species viz., *Natica pulicaria* (Philippi), *Polinices* (*Neverita*)

peselephanti (Link) and *Sinum tumescens* (Reeve) are very rare in the collections.

The material also includes topotypes of *Eunaticina papilla* (Gmelin) and the species *Eunaticina coarctata* (Reeve) which is a new acquisition for the NZC. of the Zoological Survey of India.

The up-to-date classification is adopted here following Cernohorsky (1967, 1972). The keys of different categories have been prepared mainly on the basis of shell characters. Where necessary, keys to the species are also provided. Distribution for each species is provided completely as recorded by earlier authors.

Abbreviations Used

CMFRI.—Central Marine Fisheries Research Institute; Coll.—Collector(s); colln.—collection; d.—dry; E.—East; ex.—example(s); Id.—Island; I.F.S.—Inshore Fisheries Survey vessel; Is.—Islands; Km.—Kilometre(s); MBS.—Marine Biological Station; N.—North; N.Z.C.—National Zoological Collections; S—South; S.E.—South East; Sta.—Station; W.—West; w.—wet; ZSI—Zoological Survey of India.

Consolidated list of marine molluscs from east coast of India between Madras and Kanyakumari (species arranged alphabetically).

Phylum	MOLLUSCA
Class	GASTROPODA
Order	MESOGASTROPODA
Family	STROMBIDAE

Strombus (Canarium) *dentatus* Linnaeus.

Strombus (Canarium) *erythrinus erythrinus* Dillwyn.

Strombus (Canarium) *labiatus* (Roeding)

* *Strombus* (Canarium) *mutabilis* Swainson.

* *Strombus* (Dolomena) *marginatus marginatus* Linnaeus.

* *Strombus* (Dolomena) *marginatus succinctus* Linnaeus.

Strombus (Euprotomus) *listeri* Gray.

* *Strombus* (Gibberulus) *gibberulus gibberulus* Linnaeus.

* denotes taxa dealt in this paper.

- * *Strombus (Laevistrombus) canarium* Linnaeus.
Lambis (Harpago) chiragra chiragra Linnaeus.
- * *Lambis (Lambis) lambis* (Linnaeus).
Lambis (Lambis) truncata truncata (Humphrey).
Lambis (Millepes) scorpius (Linnaeus).
Lambis (Millepes) scorpius indomeris (Abbott).
Terebellum (Terebellum) terebellum (Linnaeus).
Tibia curta (Lamarck).
Tibia (Tibia) curvirostris (Lamarck).

Family VANICORIDAE

Vanicoro granularis (Recluz).

Family HIPPONICIDAE

Hipponix tricarinata (Linnaeus).

Family CALYPTRAEIDAE

- * *Calyptraea (Crucibulum) extintorium* Lamarck.
Calyptraea pallucida (Reeve).
- * *Cheilea equestris* (Linnaeus).
Cheilea lissa (Smith).
- * *Cheilea undulata* (Roeding).
Crepidula fornicata (Linnaeus).
- * *Crepidula walshi* Hermannson.

Family XENOPHORIDAE

- Xenophora corrugata* (Reeve).
- Xenophora indica* (Gmelin).
- Xenophora pallidula* (Reeve).
- * *Xenophora solaris* (Linnaeus).

* denotes taxa dealt in this paper.

Family CYPRAEIDAE

Subfamily CYPRAEINAE

Chelycypraea testudinaria (Linnaeus).

Cypraea lentiginosa Gray.

Cypraea onyx Linnaeus.

Cypraea tigris Linnaeus.

Talparia talpa Linnaeus.

* *Luria isabella* (Linnaeus).

* *Lyncina lynx* (Linnaeus).

* *Mauritia arabica* (Linnaeus).

Mauritia histrio (Gmelin)

Mauritia mauritiana (Linnaeus).

Subfamily EROSARIINAE

* *Pustularia childreni* (Gray).

Monetaria annulus (Linnaeus).

* *Monetaria moneta* (Linnaeus).

* *Erosaria caputserpentis* (Linnaeus).

Erosaria erosa (Linnaeus).

* *Erosaria ocellata* (Linnaeus).

* *Erosaria poraria* (Linnaeus).

Staphylaea staphylaea (Linnaeus)

Subfamily ERRONEINAE

* *Erronea erronea* (Linnaeus).

* *Erronea erronea* (Linnaeus).

* *Erronea listeri* (Gray)

* *Erronea pulchella novaebritanniae* Schilder & Schilder.

Palmadusta asellus (Linnaeus).

Purpuradusta fimbriata (Gmelin).

Purpuradusta gracilis (Gaskoin).

* denotes taxa dealt in this paper.

Blasicrura pallidula (Gaskoin).

Bistolida hirundo (Linnaeus).

Cribraria cribraria (Linnaeus).

Family OVULIDAE

Ovula birostre (Linnaeus).

Ovula formosa (Adams and Reeve).

Volva volva (Linnaeus).

* *Diminovula punctata* (Duclos).

Family TRIVIIDAE

Subfamily TRIVIINAE

Trivirostra horducea (Kierer).

Trivirostra oryza (Lamarck).

Pusula pilula (Kiener).

Pusula pistum (Gaskoin).

Pusula producta (Gaskoin).

Subfamily ERATOINAE

Lachryma sulcifera (Sowerby).

Family NATICINAE

Subfamily NATICINAE

* *Natica* (*Naticarius*) *alapapilionis* (Roeding).

Natica arachnoidea (Gmelin).

* *Natica lineata* Lamarck.

* *Natica marochiensis* (Gmelin).

Natica picta Recluz.

* *Natica pulicaria* (Philippi).

* *Natica tigrina* (Roeding).

Natica trailli Reeve.

* *Natica vitellus* Linnaeus.

* denotes taxa dealt in this paper.

Subfamily POLINICINAE

- * *Polinices tumidus* (Swainson).
- Polinices melanostomoides* (Quoy & Gaimard).
- * *Polinices* (*Glossaulax*) *didyma* (Roeding).
- * *Polinices* (*Glossaulax*) *lamurckii* (Chenu).
- * *Polinices* (*Neverita*) *effusa* (Swainson).
- * *Polinices* (*Neverita*) *peselephanti* (Link).
- * *Polinices* (*Mammilla*) *melanostomus* (Gmelin).
- * *Polinices* (*Mammilla*) *zanzibarica* (Recluz).

Subfamily SININAE

- * *Eunaticina coarctata* (Reeve).
- * *Eunaticina papilla* (Gmelin).
- Eunaticina pomatiella* (Melvill).
- * *Sinum delesserti* (Recluz).
- * *Sinum neritoideum* (Linnaeus).
- Sinum planilatum* (Roeding).
- * *Sinum tumescens* (Reeve).

Family CASSIDAE

- Cassis* (*Cassis*) *cornuta* (Linnaeus).
- * *Phalium* (*Phalium*) *areola* (Linnaeus).
- Phalium glaucum* (Linnaeus):
- * *Phalium* (*Semicassis*) *basulcatum* (Schubert & Wagner).
- * *Phalium* (*Semicassis*) *canaliculatum* (Bruguiere)
- Casmaria ponderosa ponderosa* (Gmelin).

Family TONNIDAE

- Tonna cepa* (Roeding).
- * *Tonna cumingii* (Reeve).
- * *Tonna dolium* (Linnaeus).
- Tonna perdix* (Linnaeus).

* denotes taxa dealt in this paper.

- * *Tonna sulcosa* (Born).
- Tonna tessellata* (Lamarck).

Family FICIDAE

- Ficus dussumieri* (Reeve).
- * *Ficus ficoides* (Lamarck).
- * *Ficus varieqata* Roeding.

Family CYMATIIDAE

Subfamily CYMATIINAE

- Cymatium chlorostomum* (Lamarck).
- Cymatium labiosum* (Wood).
- Cymatium pileare* (Linnaeus).
- Cymatium rhinoceros* (Lamarck).
- * *Cymatium* (*Gutturnium*) *retusum* (Lamarck).
- * *Cymatium* (*Gutturnium*) *tripus* (Lamarck).
- * *Cymatium* (*Gutturnium*) *vespaceum* (Lamarck).
- * *Distorsio reticulata* Roeding.
- * *Linatella cinqualata* (Lamarck).

Subfamily RANELLINAE

- * *Gyrineum natator* (Roeding).
- Gyrineum* (*Biplex*) *perca* (Perry).
- Gyrineum perca* var. *aculeata* Schepman.

Family BURSIDAE

- Bursa awatii* Ray.
- * *Bursa* (*Bufo*) *crumena* (Lamarck).
- Bursa elegans* (Beck).
- Bursa granularis* (Roeding).
- * *Bursa* (*Bufo*) *rana* (Linnaeus).
- Bursa rubeta* (Linnaeus).

* denotes taxa dealt in this paper.

- * *Bursa spinosa* (Lamarck)
- Bursa prox-subgranosa* (Beck).
- * *Bursa margaritula* (Deshayes).
- Bursa swainsonii* Moersch.
- Bursa tuberculata* (Broderip).

SYSTEMATIC ACCOUNT

Phylum MOLLUSCA

Class GASTROPODA

Subclass PROSOBRANCHIA

Order MESOGASTROPODA

The earlier paper has already been dealt with eight families of Mesogastropoda. Diagnostic characters of the order are provided there. This paper includes remaining eleven families of the order.

Key to the identification of families :—

- | | | |
|--|-----|----------------------|
| 1. Shell limpet-like, without spire and aperture | ... | 2 |
| Shell not like above but with distinct spire and aperture | ... | 3 |
| 2. Shell conical or flat with an internal vertical septum or a horizontal shelf | ... | Calyptraeidae |
| 3. Shell with operculum | ... | 4 |
| Shell without operculum | ... | 9 |
| 4. Shell perforate | ... | 5 |
| Shell imperforate | ... | 6 |
| 5. Shell with low spire, inflated body whorl, aperture lunar ovate, columella thickened by callus | ... | Naticidae |
| Shell with elevated spire, large body whorl, aperture long, columella with a perietal shield, siphonal canal twisted upward, outer lip thick and reflected | ... | Cassidae |
| 6. Shell trochoid in shape, surface agglutinated with foreign particles | ... | Xenophoridae |

* denotes taxa dealt in this paper.

- Shell elongate, absence of any agglutination of any foreign particles ... 7
7. Shell spindle-shaped with the outer lip expanded, sometimes digitated and anteriorly with a notch ... Strombidae
- Shell fusiform with outer lip not expanded but sometimes with spines ... 8
8. Shell fusiformly elongate, varices present at irregular intervals, siphonal canal moderate, anal canal absent; surface prominently sculptured with ridges ... Cymatiidae
- Shell ovately ventricose, varices almost continuous in each whorl, siphonal canal short, anal canal present; surface coarsely sculptured with granular cords and prickles ... Bursidae
9. Shell bilaterally compressed, aperture slit-like extended end to end, inner and the outer lips rolled inward; surface highly polished ... 10
- Shell globular, aperture broad but not extended up to ends; surface sculptured with spiral ridges ... 11
10. Shell cylindrical with spire exerted, extremities produced, lips regularly toothed, anal canal extended; surface smooth ... Cypraeidae
- Shell pyriform with spire involute, extremities produced, outer lip margined, smooth or denticulate, anal canal obsolete or sharply cut; surface with transverse striations ... Ovulidae
11. Shell with body whorl inflated, siphonal canal reduced, columella with a fasciole and occasionally with a parietal shield; surface traversed by broad spiral ribs ... Tonnidae
- Shell pear shaped, siphonal canal drawn out, columella smooth; surface sculptured with fine spiral and transpiral ridges ... Ficidae

Family STROMBIDAE

Two genera *Strombus* Linnaeus and *Lambis* Roeding are represented in the family.

Key to the genera :

Shell with thickened winged outer lip, U-shaped stromboid notch on the edge of the outer lip near the anterior end, posterior mantle filament extended	...	<i>Strombus</i>
Shell with outer lip developed into long digitations, stromboid notch present, posterior mantle filament absent or reduced	...	<i>Lambis</i>

Genus *Strombus* Linnaeus, 1758

Type-species : *Strombus pugilis* Linnaeus,

Key to the species :

1. Shell solid, broad, possesses geometrical shape; outer lip greatly expanded and swollen; stromboid notch inconspicuous ... 2

Shell thin, slender, without any geometrical shape; outer lip not expanded or swollen; stromboid notch prominent ... 3
2. Shell triangular in shape, body whorl with outer lip broader than its height; outer lip winged and stands at a distant at base; columella swollen, glazed; surface smooth, 1 or 2 upper whorls spirally grooved; ornamented with transpiral orange-red lines ... *canarium*

Shell quadrate in shape, spirally deeply incised at base; lip swollen at the upper end; columella with strong spiral lirae; surface axially ribbed, nodulated on shoulder; ornamented with coloured spots ... *mutabilis*
3. Shell thin, whorls angularly keeled; upper part of spire slender, apex acuminate; outer lip entire towards base and feebly notched; surface finely impressed with spiral grooves and marked with interrupted or continuous colour-bands ... *marginatus*

Shell thick, whorls rounded ; upper part of the spire swollen, apex blunt ; outer lip deeply notched at base ; surface transversely ridged and marked with dark spiral bands

... *gibberulus*

Subgenus **Laevistrombus** Kira, 1955

Type-species : *Strombus canarium* Linnaeus, 1758.

Strombus (Laevistrombus) canarium Linnaeus, 1758.

(Pl. I, Fig. 1)

Strombus canarium Linnaeus, 1758, *Syst. Nat.*, Ed. X : 745, sp. no. 438 (Type-locality : "Amboina, Indonesia in O. Asiae") ; Kiener, 1843, *Coq. Viv.*, 4, *Strombus* : 33-34, pl. 29, figs. 1 & 12 ; Reeve, 1851, *Conch. Icon.*, 6, *Strombus*, sp. no. 46, pl. 18, fig. 46 ; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 1(2), pt. 6 : 100 & 101, pl. 8, fig. 2.

Lambis turiturella : Roeding, 1798, *Mus. Bolten.* : 65, sp. no. 833, refers to *Conchyl. Cab.*, 3 fig. 817.

Strombus (Laevistrombus) canarium : Abbott, 1960, *Indo-Pac. Moll.* 1(2) : 48-50, pl. 17, figs. 15, 16 & pls. 12, 22, 23, 24 ; Subba Rao, 1971, *J. mar. biol. Assoc. India*, 12(1 & 2) : 112-113.

Material—(1) 1 ex. (d.) & 4 exs. (w.) Rameswaram beach near Fisheries Bungalow, 3 to 5-3-1925 (Coll. B. Chopra and H. S. Rao) ; (2) 1 ex. (d.) Sta. 2d—Galaxea reef, 4-4-1955, (3) 3 exs. (d.) Sta. 1c—Sea shore about 2.4 km. S. of P.W.D. Inspection Bungalow, Tuticorin, 16-4-1955 (Coll. H. C. Ray) ; (4) 2 exs. (d.), Sta. 1j—Shore colln., N. of Inspection Bungalow, Tuticorin, 24-4-1957 (Coll. A. G. K. Menon & G. Ramakrishna) ; (5) 1 ex. (d.) Sta. 13—Shore colln., Vanthivu Id., Bay of Bengal, off Tuticorin, 23-2-1968, (6) 2 exs. (d.), Sta. 16—Shore colln. near Tamil Nadu Fisheries Extension Unit, Tuticorin, 25-2-1968 (Coll. A. S. Rajagopal) ; (7) 1 ex. (d.), Sta. 8—Shore colln. behind the Circuit House, Tuticorin, 21-1-1978, (8) 1 ex. (d.), Sta. 9—Hare Id., near Port of New Tuticorin 22-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Gulf of Mannar (Pamban, Krusadai Id.), Tuticorin. Andamans.

Elsewhere : Maldives, Sri Lanka, Singapore, Thailand, China, Japan, Philippines, Indonesia, Australia, New Caledonia, New Hebrides.

Remarks—Shell solid, smooth, light brown with a flaring lip ; body whorl along with the expanded outer lip much broader in propor-

tion to its height; spire short, variable; apex with whitish remnants of varices; edge of winged outer lip rounded, stands at a considerable distance; Columella swollen, glazed, enamel white; siphonal canal short; notch shallow; surface glossy, sculptured with wide incised spiral grooves in the upper most whorls; surface with close-set wavy, transpiral orange-red lines.

This species abundantly occurs in the Indo-Pacific.

Measurements (in mm.)	Range (12 exs.)
Length	44.90 — 66.95
Width	32.75 — 50.50
No. of whorls	6 + — 9 +

Subgenus **Canarium** Schumacher, 1817

Type-species : *Strombus urceus* Linnaeus, 1758.

Strombus (Canarium) mutabilis Swainson, 1821.

(Pl. I, Fig. 2)

Strombus mutabilis Swainson, 1821, *Zool. Illust.*, ser. 1, 2, pl. 71 (Type-locality : East Indies).

Strombus (Canarium) mutabilis : Abbott, 1960, *Indo-Pac. Moll.*, 1(2) : 72-74, pl. 20, figs. 15, 16 & 17; Subba Rao, 1971, *J. mar. biol. Assoc. India*, 12(1 & 2) : 115-116.

Material : (1) 4 exs. (d.) Sta. 12—Shore colln., Hare Id., Bay of Bengal, of Tuticorin, 22-2-1968, (2) 3 exs. (d.), Sta. 13—Shore colln., Vanthivu Id., Bay of Bengal, of Tuticorin, 23-2-1968 (Coll. A S. Rajagopal).

Distribution : India : Tuticorin, Maldives, Andamans.

Elsewhere : Natal, Mozambique, Madagascar, Zanzibar, Kenya, Red Sea, Karachi, Seychelles, Sri Lanka, Cocos-Keeling, Atoll, Japan, Ryukyus, Philippines, Indonesia, Australia, Lord Howe Id., Carolines, Marshall Is., Austral Is., Tuamotu Archipelago.

Remarks : Shell solid, smooth, quadrate in shape, sharply incised at the base; spire generally sharp; whorls spirally shouldered aperture oblong, pinkish, bounded on the right by a dilated portion of outer lip; strong spiral lirae present at the base of the columella on the whorls axial ribs or small weak tubercles; colour usually bright maculated, flecked, banded or spotted with brown, yellow, black or orange.

This is clear water species of the submerged areas of the sea round the coral islands with algal vegetations ranging widely in the tropical Indo-Pacific.

<i>Measurements</i> (in mm.)	Range (7 exs.)
Length	18.10 — 25.65
Width	10.75 — 15.20
No. of whorls	6 + — 7 +

Subgenus **Dolomena** Iredale, 1931

Type-species : *Strombus pulchellus* Reeve, 1851.

The species *marginatus* Linnaeus represented by the subspecies :

Key to the subspecies :

Shell with short spire ; whorls with narrow spiral keel on shoulder excepting few earlier whorls ; body whorl sculptured with spiral grooves, with coloured spiral bands of light to dark brown ; aperture smooth ; outer lip incurved

... *marginatus*

Shell with varices on upper whorls, spire acuminate ; body whorl with a rounded nodule on shoulder, not with keel, with spiral colour bands of white, surface not grooved ; aperture spirally striated ; outer lip sinuate, incurled

... *succinctus*

***Strombus (Dolomena) marginatus marginatus* Linnaeus, 1758.**

(Pl. I, Fig. 3)

Strombus marginatus Linnaeus, 1758 *Syst. Nat.*, Ed. X : 744. sp. no. 432 [Type-locality : probably from Sri Lanka (Abbott, 1960)] ; Kiener, 1843, *Coq. Viv.*, 4 : 44-45, pl. 16, fig. 2 ; Reeve, 1851, *Conch. Icon.*, 6, *Strombus*, sp. no. 49, pl. 18, fig. 49 ; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser. (Nat. Hist. Sec.)*, 1(2), pl. 6 : 100, pl. 7, fig. 1.

Lambis carinata : Roeding, 1798, *Mus. Bolten.* : 62, sp. no. 779.

Strombus (Dolomena) marginatus marginatus : Abbott, 1960, *Indo-Pac. Moll.*, 1(2) : 98-99, pl. 18, figs. 6, 7 & pl. 74, fig. 1 ; Subba Rao, 1971, *J. mar. biol. Assoc. India*, 12 (1 & 2) : 119.

Material : (1) 2 exs. (d.), Sta. 2f—Shore of Rameswaram, 6-5-1955, (2) 1 ex. (d.), Sta. 3b—Rocky shore of Gulf of Mannar near

Quarantine Camp, Mandapam, 11-5-1955 (Coll. H. C. Ray) ; (3) 1 ex. (d.), Sta. 8—Shore colln. behind the Circuit House, Tuticorin, 21-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution : India : Maldives, Gulf of Mannar (Pamban, Krusadai Id., Kundugal Point, Shingle Id.), Tuticorin, Tranquebar, Madras, Andamans.

Elsewhere : Diego Garcias, Sri Lanka, Akyab, King Id., Sullivan's Id., Maungmagan, Mergui Archipelago, Gulf of Siam, Sumatra, Indonesia, Philippines, Formosa, China.

Remarks : The species very distinctive by its sharp narrow spiral keel of the shoulder except for two whorls behind outer lip. Shell moderately large, ovately conical; spire short and depressed; apex sharp; posterior canal arching on to the spire; whorls smooth, turreted, grooved towards base; lower part contracted; columella polished and with white callus, faintly wrinkled above and below; aperture narrow; outer lip incurled extended up to first suture forming a beak-like structure; body whorl traversed by spiral grooves being stronger towards base; colour whitish with broad and narrow broken spiral bands of light to dark brown, often with arrow-head shaped marks on white ground.

The species inhabits the low tide line in sandy silt with green algal bottoms and generally near coral reefs limited to nitrogenous shores.

<i>Measurements</i> (in mm.)	Range (4 exs.)
Length	40.15 — 45.95
Width	26.40 — 27.15
No. of whorls	7 + — 10

***Strombus (Dolomena) marginatus marginatus succinctus* Linnaeus, 1767.**

(Pl. I, Fig. 4a & 4b)

Strombus succinctus Linnaeus, 1767, *Syst. Nat.*, Ed. XII : 121, sp. no. 509 (Type-locality : India); Martini, 1777, *Conchyl. Cab.* 3 : 104, pl. 79, fig. 815; Kiener, 1843, *Coq. Viv.*, 4 : 45-46, *Strombus*, pl. 10, fig. 2; Dodge, 1956, *Bull. Amer. Mus. nat. Hist.*, 111, art. 3 : 278-280; Reeve, 1851, *Conch. Icon.*, 6, *Strombus*, sp. no. 43, pl. 17, fig. 43.

Strombus (Dolomena) marginatus succinctus : Abbott, 1960, *Indo-Pac. Moll.*, 1(2) : 99-100, pl. 18, figs. 13 & 14; Subba Rao, 1971, *J. mar. biol. Assoc. India*, 12 (1 & 2) : 119-120.

Material : 1 ex. (d.), Sta. 3b—Rocky shore of Gulf of Mannar near Quarantine Camp, Mandapam, 11-5-1955 (Coll. H. C. Ray).

Distribution : India : Madras.

Elsewhere : Pakistan (Karachi), Sri Lanka, Singapore.

Remarks : Shell with acuminate spire, apical whorls with numerous axial riblets, upper whorls bear varices; body whorl provided with one rounded nodule on the shoulder and on successive whorls, nodules may or may not present; aperture elongate, white and spirally striated; outer lip sinuate and curled inward; posterior canal long, adhering to 2 or 3 whorls; shell colour yellowish-brown with fine reticulated and arrowshaped lines, body whorl with spiral white bands.

Occurrence of this species is rare and generally found close to the low tide mark on sandy beach with algal vegetations.

Measurements (in mm.)

Length	33.55
Width	18.65
No. of whorls	9 +

Subgenus *Gibberulus* Jousseaume, 1888

Type-species : *Strombus gibberulus* Linnaeus, 1758.

(Pl. I, Fig. 5a & 5b)

***Strombus (Gibberulus) gibberulusgibberulus* Linnaeus.**

Strombus gibberulus Linnaeus, 1758, *Syst. Nat.*, Ed. X : 744, sp. no. 433 (Type-locality : "O. Asiae"); Kiener, 1843, *Coq. Viv.*, 4 : 37, *Strombus*, pl. 28, fig. 1; Reeve, 1850, *Conch. Icon.*, 6, *Strombus*, sp. no. 15, pl. 8, figs. 15a & 15b; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser. (Nat. Hist. Sec.)*, 1(2), pt. 6 : 102-103, pl. 7, figs. 5a & 5b.

Strombus (Gibberulus) gibberulus gibberulus : Abbott, 1960, *Indo-Pac. Moll.*, 1(2) : 141-143, pl. 14, fig. 28; pl. 114, figs. 5-7; Subba Rao, 1971 *J. mar. biol. Assoc. India*, 12(1 & 2) : 123.

Material : 1 ex. (d.), Sta. 2g—Submerged coral reefs near Pulli Id, about 8 km. from Krusadai, 5-7-1955 (Coll. H. C. Ray); (2) 1 ex.

(w.), Sta. 10—Shore colln., Dhanuskodi, 28-12-1979 (Coll. H. P. Mookherjee).

Distribution : India : Laksha Dwip, Gulf of Mannar (Kundugal Point), Andaman, Nancouri Harbour.

Elsewhere : Mozambique, Tanganyika, Madagascar, Karachi, Maldivs, Sri Lanka, Mascarene, Singapore, Cocos-Keeling, Hong Kong.

Remarks : Shell solid, fusiform, attenuated towards the base with whorls distorted; spire transversely ridged and striated; penultimate whorl giving last part of the body whorl a descending show and ultimately a distortion to the entire shell; columella smooth, white, flushed with violet; inner edge of outer lip with a purple axial band crossed by whitish spiral lirae; posterior canal short and dark brown at its base; stromboid notch deep; surface colour white to tan with close spiral bands of darker tan.

The subspecies available in Indian Ocean exclusive of South Africa, Red Sea and Australia and mainly inhabits weedy nitrogenous clear water surrounding the coral islands and continents.

Measurements (in mm.)

Length	48.25
Width	26.25
No. of whorls	8+

Genus **Lambis** Roeding, 1798

Subgenus **Lambis** S. S. Roeding, 1798.

Type-species : *Strombus lambis* Linnaeus, 1758.

Lambis (Lambis) lambis (Linnaeus, 1758).

(Pl. II, Fig. 6 & 7)

Strombus lambis Linnaeus, 1758, *Syst. Nat.*, Ed. X : 743, sp. no. 425 (Type-locality : "O. Asiae"); Dillwyn, 1817, *Descr. Cat. Rec. Shells*, 2 : 658-659; Dodge, 1956, *Bull. Amer. Mus. nat. Hist.*, III, art. 3 : 250-251.

Lambis lambis : Roeding, 1798, *Mus. Bolten.* : 66, sp. no. 844.

Pterocera lambis : Reeve, 1851, *Conch. Icon.*, 6, *Pterocera*, sp. no. 8, pl. 5, fig. 8; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 1(2), pt. 6 : 103-104, pl. 7, fig. 6.

Lambis (Lambis) lambis : Abbott, 1961, *Indo-Pac. Moll.*, 1(3) : 151-154, pl. 121, fig. 4; pl. 119; pl. 123, figs. 1-3.

Material : (1) 1 ex. (juvenile) (d.), Sta. 12—Shore colln., Hare Id., off Tuticorin, 22-2-1968 (Coll. A. S. Rajagopal); (2) 1 ex. (w.), Sta. 4—Shore colln., Devipattinam, Palk Bay, 16-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution : India : Bombay, Pamban, Krusadai Id., Andamans

Elsewhere Mozambique, Madagascar, Tanganyika (Zanzibar), Maldives Is., Sri Lanka, Thailand, Singapore, Indonesia, Ryukyu Is., Taiwan, Philippines, Cocos-Keeling, Atoll, Australia, Dutch New Guinea, Admiralty Is., Solomons, New Hebrides, New Caledonia, Bonin Is., Marianas, Palaus, Carolines, Marshall Is., Fiji, Tonga.

Remarks : Shell solid, massive, fusiform, covered with periostracum; spire acuminate; whorls striated, concave above the carinate shoulders; body whorl with strong blunt nodules on shoulder; columella and aperture smooth, polished, pale flesh in colour; siphonal canal slightly twisted to the left; outer lip extends over up to apex and outwardly elongated into seven deeply channeled digits.

The species exhibits sexual dimorphism. The bigger live shell in the collection is easily recognised as a female one by its curved lowest three labial digits, prominently large, pinched, somewhat bilobed knob on the shoulder and the wide gap between two posterior most digits. The shell is found to be cemented with a shell of *Ostrea cuculata* at the base of a digit and collected at a depth of 35 cm. The juvenile shell is turreted, without any nodule or labial digit.

This is a largest dominant species of shallow waters in the weedy coral reef-flats on sandy bottom with a wide range of distribution.

Measurements (in mm.)

Length	175.00
Width	125.00
No. of whorls	7 +

Family CALYPTRAEIDAE

This family is represented here by two genera, *Calyptrea* Lamarck and *Crepidula* Lamarck.

Key to the genera :

Shell conical or bowl-shaped ; aperture widely rounded ; apex off-centric ; internal septum folded ; sculptured concentrically with ribs

... *Calyptraea*

Shell rounded to elongate ovate, much flattened ; apex marginal and more or less beaked ; internal septum forms a horizontal shelf ; surface smooth or radially wrinkled

... *Crepidula*

Genus *Cheilea* Modeer, 1793

Type-species : *Patella equestris* Linnaeus.

Key to the species :

Shell deeply bowl-shaped, thick ; apex spiral folds on the surface strong and eccentric, sharply beaked backware ; rough ; internal appendage large, funnel shaped

... *equestris*

Shell dome-shaped, thin ; apex sub-centric, blunt ; surface wrinkled with spiral grooves ; internal appendage small, horse-shoe shaped

... *undulata*

***Cheilea equestris* (Linnaeus 1758).**

(Pl. II, Fig. 8a & 8b)

Patella equestris Linnaeus, 1758, *Syst. Nat.*, Ed. X : 780, sp. no. 654 (Type-locality : "in O. Indico") ; Roeding, 1798, *Mus. Bolten.* : 4, sp. no. 33

Calyptraea equestris : Reeve, 1858, *Conch. Icon.*, 11, *Calyptraea*, sp. no. 1, pl. 1, figs. 1a, 1b & 1c.

Mitrularia equestris : Tryon, 1886, *Man. Conch.*, 8 : 137-138, pl. 41, figs. 25-32 ; pl. 43, figs. 33-51 ; Dautzenberg & Bouge, 1933, *J. de Conchyl.*, 77 : 373.

Cheilea equestris : Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 1(2), pt. 6 : 94, pl. 6, fig. 4 ; Cernohorsky, 1972, *Mar. Shells Pacific*, 2 : 89, pl. 22, fig. 2.

Material : (1) 2 exs. (d.), Sta. 2c—Shingle Id., 2.4 km. E. of Krusadai Id., 3-5-1955 (2) 2 exs. (d.), 2d—Galaxea reef, 4-5-1955 (Coll. H. C. Ray) ; (3) 17 exs. (d.) Sta. 12—Shore colln., Hare Id., Bay of Bengal, off Tuticorn, 22-2-1968, (4) 8 exs. (d.), Sta. 23—Shore colln., Vanthivu Id., Bay of Bengal, off Tuticorin, 23-2-1968 (Coll.

A. S. Rajagopal) ; (5) 1 ex. (d.) Sta. 13—Shore colln. near Subramaniam Temple, Tiruchendur, 25-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution : India : Krusadai Id., Andaman Is.

Elsewhere : W. Africa, Mekran Coast, Karachi, Sri Lanka, China Sea, Philippines, Prince's Id., West Indies, W. Coast of Central Africa, Galapagos Is., Island of Bohol.

Remarks : Shell thick, asymmetrical, bowl-shaped ; apex eccentric with beak-like prominence directed backward. Surface with raised close-set, sharp-radiating ridges, interstices with finer striae to some extent incrustated and thrown into wrinkle-like spiral folds. Funnel shaped calcareous internal appendage freely suspended from the apex. The animal maintains its attachment with the substratum with the help of concave basal plate obscurely drawn out into wrinkles round the edge.

These molluscs are found in abundance on coral reefs and usually remain attached to the under surface of coral mass taking up the formation of the substratum.

<i>Measurements</i> (in mm.)	Range (30 exs.)
Height	5.50 — 14.65
Maximum Diameter	10.20 — 20.85
Minimum Diameter	10.25 — 19.50

***Cheilea undulata* (Roeding, 1798)**

(Pl. III, Fig. 9a & 9b)

Patella undulata Roeding, 1798, *Mus. Bolten.* : 4, sp. no. 34 (Type-locality : *Calyptraea dormitoria* : Reeve, 1858, *Conch. Icon.*, 11, *Calyptraea*, sp. no. 5, Not known).

Mitrularia neptuni : Schumacher, 1877, *Ess. Nauv. Syst. Test.* : 183.

Calyptraea dormitoria : Reeve, 1858, *Conch. Icon.*, *Calyptraea*, sp. no. 5, pl. 2, figs. 5a & 5b.

Cheilea undulata : Hedley, 1923, *Proc. Linn. Soc. N.S.W.*, 48 : 309 ; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser. (Nat. Hist. Sec.)*, 1(2), pt. 6 : 95, pl. 6, figs. 13a & 13b.

The species *dormitoria* of Dautzenberg & Bouge (1933) is considered to be a synonym of this.

Material : (1) 2 exs.(d.), Sta. 2c—Single Id., 2.4 km. E. of Krusadai Id., 3-5-1955 (Coll. H. C. Ray); (2) 1 ex.(d.), Sta. 13—Shore colln. near Subramaniam Temple, Tiruchendur, 25-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution : India : Krusadai Id., Pamban, Kundugal Point, Andaman Is.

Elsewhere : Island of Burias, Philippines.

Remarks : This is a distinct species from the species *equestris* attributed earlier from the material.

Shell white, irregularly ovate, not so high as in *equestris*; surface striated like earlier species but superficially wrinkled due to the presence of widely separated spiral grooves; apex subcentral, blunt; internal septum comparatively small.

This species usually occur in the same ecological niche.

<i>Measurements</i> (in mm.)	Range (3 exs.)
Height	16.45 — 22.15
Maximum Diameter	29.70 — 39.30
Minimum Diameter	27.25 — 35.85

Genus *Calyptraea* Lamarck, 1799

Type-species : *Patella chinensis* Linnaeus, 1758.

Subgenus *Crucibulum* Schumacher, 1817

Calyptraea (*Crucibulum*) *extinctorium* Lamarck, 1836.

(Pl. III, Fig. 10a & 10b)

Calyptraea extinctorium Lamarck, 1836, *Hist. nat. des Anim. sans Vert.* (Deshayes edit.), 7 : 622-623 (Type-locality : "Atlantic Ocean").

Crucibulum extinctorium : Reeve, 1858, *Conch. Icon.*, 11, *Crucibulum*, sp. no. 14, pl. 5, figs. 14a & 14b; Tryon, 1886, *Man. Conch.*, 8 : 119, pl. 33, figs. 46-51; Crichton, 1941, *J. Bombay nat. Hist. Soc.*, 42 : 329.

Calyptraea (*Crucibulum*) *extinctorium* : Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 1(2), pt. 6 : 96, pl. 6, figs. 14a & 14b.

The species *morbidum* and *lividum* of Reeve (1858) are also included in this.

Material : (1) 1 ex.(d.), Sta. 1c—Shore about 2.4 km. S. of Inspection Bungalow, Tuticorin, 16-1-1955, (2) 1 ex.(d.), Sta. 1j—Shore

colln., N. of Inspection Bungalow, Tuticorin, 24-4-1955, (3) 2 exs.(d.), Sta. 2f—Shore of Rameswaram, 6-5-1955, (4) 1 ex.(d.), Sta. 3b—Rocky shore of Gulf of Mannar near Quarantine Camp, Mandapam, 11-5-1955, (5) 1 ex.(d.), 1k—Rocky and sandy beach of Kanyakumari, 24-5-1955 (Coll. H. C. Ray); (6) 3 exs.(d.), Sea shore near Puduket about 4 km. E. of MBS., Porto Novo, 22-1-1957, (7) 7 exs.(d.), Sta. ?—Sea shore, 4 km. S.E. of MBS., Porto Novo, 25-1-1957, (8) 1 ex.(d.), 4.8 km. N. of Tranquebar, 2-2-1957 (Coll. A. G. K. Menon & G. Ramakrishna); (9) 1 ex.(w.), Sta. 2—Vellengirayan Pettai, 4.8 km. N. of MBS., Porto Novo, Tamil Nadu, 7-4-1960 (Coll. A. Daniel); (10) 3 exs.(d.), Sta. 5—Shore colln. between Killai river and Chinnavayakal village, 13-2-1968, (11) 50 exs.(d.), Sta. 5—Shore colln., Point Calimere, 16-2-1968, (12) 44 exs.(d.), Sta. 8—Shore colln., Agasthiampalli, 17-2-1968, (13) 11 exs.(d.), Sta. 9—Shore colln., Vedaranyam, 10-2-1968 (Coll. A. S. Rajagopal); (14) 1 ex.(w.) Sta. 4—Coastal waters of Madras, N. of Harbour, 6-7 fms., on board "Chota Investigator", 29-1-1975, (15) 1 ex.(d.), Sta. 6—Shore colln., at low tide Rameswaram, 1-2-1975, (16) 6 exs.(d.), Sta. 11—Shore colln., opposite Fort to the mouth of Uppanar, Tranquebar, 11-2-1975, (17) 2 exs.(d.), Sta. 12—Shore colln., N. of Fort, Tranquebar, 12-2-1975, (18) 1 ex.(w.), Sta. 13—Shore colln., 0.4 km. N. of Fort, Tranquebar, 13-2-1975, (19) 1 ex.(d.) Sta. 14—shore colln. beyond Fisherman's village, N. of Fort, Tranquebar, 14-2-1975, (20) 2 exs.(d.), Sta. 15—Shore colln. upto 3 km. S. of Jetty, Pondicherry, 16-2-1975, (21) 2 exs.(d.), Sta. 19—Shore colln., Santhome beach, S. upto the mouth of Adyar river, Madras, 24-2-1975, (22) 3 exs.(d.), Sta. 22—Shore colln. 1 km. S. of Adyar river mouth, Madras, 27-2-1975, (23) 1 ex.(d.), Sta. 2—Shore colln., Mallipattinam, eastward to Pudukattinam, 13-1-1978, (24) 3 exs.(d.), Sta. 8—Shore colln., in front of Circuit House, Tuticorin, 21-1-1978, (25) 1 ex.(d.), Sta. 10—Along the shore near Assistant Collector's Bungalow, Tuticorin, 23-1-1978, (26) 6 exs.(d.), Sta. 11—Shore colln. near Punnakayal, Gulf of Mannar, 24-1-1978, (27) 3 exs.(d.), Sta. 13—shore colln. near Subramaniam Temple, Tiruchendur, 25-1-1978, (28) 4 exs. (d.), Sta. 15—Shore colln., Veerapandianpattinam, 27-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution : India : Karwar, Krusadai Id., Kundugal Point, Madras Coast, Orissa, Andamans.

Elsewhere : Mauritius, Sri Lanka, Penang, Maungmagan, Sullivan's Id., Billiton, Singapore, Gulf of Siam, Sumatra, Malacca, Philippines Japan, West Indies, West Coast of America from Chili to Mazatlan, Real Leijos.

Remarks : Shells extremely variable in shape and colour-pattern. Shell thin, usually smooth, orbicular to squarely ovate, conical with subcentric twisted apex, one side concavely excavated making the apex inclined; surface occasionally sculptured with irregular radial ribs; coloured livid-brown or horny with or without purple radiating lines and chestnut spots; folded internal appendage compressed, curled and attached to the polished side towards which the apex inclined.

These molluscs abundantly inhabits the hard rocky and coral substrate of warmer water. The living shells are found to remain attached to the substratum with the help of foot. They are usually sessile but capable to move about. Their variation in shape and size depends upon the environmental factors.

<i>Measurements</i> (in mm.)	<i>Range</i> (130 exs.)
Height	5.50—19.05
Width (Diameter)	9.05—29.30

Genus **Crepidula** Lamarck, 1799

Type-species *Patella fornicata* Linnaeus, 1758.

Crepidula walshi Hermannson in Reeve, 1858.

(Pl. III, Fig. 11a & 11b)

Crepidula walshi Hermannson in Reeve, 1858, *Conch. Icon.*, 11, *Crepidula*, sp. no. 17, pl. 3, figs. 17a & 17b (Type-locality : Singapore); Tryon, 1886, *Man. Conch.*, 8 : 130, pl. 38, figs. 56-58; Gravey, 1942, *Bull. Madras Govt. Mus. new ser. (Nat. Hist. Sec.)*, 5(2) : 35, fig. 5b; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser. (Nat. Hist. Sec.)*, 1(2), pl. 6 : 96-97, pl. 6, figs. 15a & 15b.

Material : (1) 1 ex.(d.), Shore near Pudupet about 4 km. E. of MBS., Porto Novo, 22-1-1957, (2) 1 ex.(d.), Sta. 11—Sea shore about 3.2 km. E. of MBS., Porto Novo, 25-1-1957 (A. G. K. Menon & G. Ramakrishna); (3) 1 ex.(w.), Sta. II—From coral stone of Galaxea reef, Krusadai Id., 12 km. E. of Mandapam Camp, 21-2-1962 (Coll.) V K. Prem Kumar & P. K. Chakrabarti); (4) 1 ex.(w.), Sta. 13—Shore colln., Vanthivu Id., off Tuticorin, 23-2-1968 (Coll. A. S. Rajagopal); (5) 3 exs. (d), Sta. 11—Shore colln., opposite Fort to the mouth of Uppanar, Tranquebar, 11-2-1975 (6) 1 ex.(d.), Sta. 16—Shore colln., N. of jetty up to Solathandakuppam, 17-2-1975, (7) 3 exs. (d.), Sta. 19—Shore colln., Santhome beach south up to the mouth of Adyar river, Madras, 24-2-1975, (8) 1 ex. (d.), Sta. 20—Coastal waters of Madras

from High Court to Triplicane, on board "Chota Investigator", 6-10 fms., 25-2-1975, (9) 1 ex. (d.), Sta. 21—Coastal waters of Madras from Harbour to University entrance, 26-2-1975, (10) 1 ex. (d.), Sta. 11—Shore colln. near Punnakayal, Gulf of Mannar, 24-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Kutch, Bombay, Mandapam, Pamban, Tuticorin, Puri, Andamans.

Elsewhere : Sri Lanka, Burma (Arakan, Penang), Malaysia (Singapore), China.

Remarks—Shell, whitish, elongately ovate, flattened with eccentric beak-like apex followed by finely concentric striations; upper surface concavely depressed, resembles the operculum of a gastropod; ventral septum shelf-like horizontally fixed towards apical side and the soft animal remains attached to it.

These molluscs are sedentary by nature. Old shells attach to a hard substratum and a chain is formed by subsequent orderly attachment of young shells.

<i>Measurements</i> (in mm.)	Range (12 exs.)
Height	3.15 — 8.45
Maximum Diameter	10.90 — 23.05
Minimum Diameter	8.20 — 14.95

Family XENOPHORIDAE

This is represented by a single genus *Xenophora* Fischer von Waldheim in the collection.

Shell trochoid with granulose oblique folds; foreign particles agglutinated on its surface

... *Xenophora*

Genus *Xenophora* Fischer von Waldheim, 1807

Type-species : *Xenophora pallidula* Reeve.

Key to species :

Shell conical, foreign particles attached to the edges of the whorls; basal margin without any processes

... *corrugata*

Shell depressedly conical, foreign particles arranged along sutural line ;
basal margin with distantly hollow
spout-like processes

... *solaris*

***Xenophora corrugata* (Reeve, 1842).**

(Pl. III, Fig. 12)

Phorus corrugatus Reeve, 1842, *Proc. zool. Soc. Lond.*, pt. 10 : 163 (Type-locality : Not known) & 1843, *Conch. Icon.*, 1, *Phorus*, sp. no. 6, pl. 2, fig. 6.

Xenophora corrugata : Tryon, 1886, *Man. Conch.*, 8 : 159, pl. 45, figs. 81 & 82 ; Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. His. Sec.), 1(2), pt. 6 : 97, pl. 6, figs. 16a & 16b ; Cernohorsky, 1967, *Mar. Shells Pacific* : 89, pl. 23, fig. 2.

Material—1 ex (d.) Sta. —Shore colln., CMFRI., Mandapam Camp to Mandapam, 31-1-1975 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Malabar Coast, Krusadai Id., Madras, Indian Ocean, Orissa (Gopalpore). Sandheads off Calcutta, Eastern Channel.

Elsewhere : Maldivé Is., Japan.

Remarks—This species is easily recognisable by its conical shape with attachment of foreign particles of shells, stones and other debris regularly on the edges of the whorls.

Shell with the base flattened, sculptured with oblique finely granulate, close-set transpiral threads ; base with reticulation of intercrossing deeply curved radial and concentric threads which changes to be granular towards periphery. Shell coloured whitish brown, base tinged with pale yellow and occasionally with brownish streaks.

The species is moderately common and generally a habitat of deep sea water. It ranges from Indian Ocean to Japan and Western Pacific.
Measurements (in mm.)

Height	17.60
Maximum Diameter	26.80

***Xenophora solaris* (Linnaeus, 1767).**

(Pl. III, Fig. 13)

Trochus solaris Linnaeus, 1767, *Syst. Nat.*, Ed. XII : 1229, sp. no. 593 (Type-locality : "in India Orientali").

Phorus solaris : Reeve, 1843, *Conch. Icon.*, **1**, *Phorus*, sp. no. 5, pl. 2, figs. 5a & 5b.

Xenophora solaris : Tryon, 1886, *Man. Conch.*, **8** : 162, pl. 47, figs. 1 & 2 ;
Crichton, 1941, *J. Bombay nat. Hist. Soc.*, **42**(2) : 332, pl. 2, fig. 2 ;
Gravely, 1942, *Bull. Madras Govt. Mus. new ser. (Nat. Hist. Sec.)*,
5(2) : 35, pl. 47, figs. 1 & 2.

Material— 1 ex.(d.), Sta. 5—Shore colln., Mandapam beach. 22-12-1979 (Coll. H. P. Mookherjee).

Remarks—Shell orbicular, depressedly conical, umbilicate, fringed with distantly regular hollow tuber; apex acute; foreign particles agglutinated in a spiral fashion following sutural line starting from a little below the apex; surface sculptured with radiately waved folds and fine obliquely waved granular threads; whorls radiated with distant regular hollow tubes following whorls, excluding periphery where they are free.

This is moderately common and deep-sea form ranging from Indian Ocean to Central Indo-Pacific and available on rocks and shingles.

Measurements (in mm.)

Height	18.80
Maximum Diameter	37.05
(Without spouts)	

Family CYPRAEIDAE

Family Cypraeidae includes the cowries which are essentially tropical species of the Indo-Pacific. They mostly inhabits the warmer waters of coral reefs and widely distributed south up to waters of Southern Australia. Some of them are shallow water and some are deep water foms. Most of them are common and some are very rare.

Three subfamilies, namely Cypraeinae, Erosariinae and Erroneinae are represented in this family.

Key to the Indian subfamilies :

1. Shell small, slightly umbilicate	...	2
Shell more or less large, nonumbilicate	...	3

2. Shell elongate cylindrical, smooth, regularly speckled and sometimes obscurely banded or blotched with colour ; teeth coarse and fine, not produced ; margin calloused ... Erroneinae
- Shell medium, pyriform to ovate, smooth or tuberculate, spotted, obscurely banded or peripherally ringed and marginally blotched ; extremities slightly produced or not ; teeth coarse not produced ; base flattened, spreading ; margin calloused ... Erosariinae
- Shell large, ovate, sometimes swollen, highly polished and brilliantly designed with colour-pattern or spots and arabic marking ; extremities not produced ; teeth coarse and not produced ; base flattened ... Cypraeinae

Subfamily CYPRAEINAE

This is represented here by three genera namely, *Luria* Jousseaume, *Lyncina* Troschel and *Mauritia* Trosche!.

Key to the genera :

- Shell small, cylindrical to oblong-ovate, extremities truncate ; aperture narrow ; teeth fine and short ; base flat to convex ; fossula broad and concave, obsoletely ribbed ; dorsum with bands, lines and spots of colour ... *Luria*
- Shell medium, ovate to cylindrical, occasionally pyriform ; aperture moderately narrow ; teeth prominent ; base flattened or convex ; fossula strong ; dorsum variable in colour with freckles and bands ... *Lyncina*
- Shell moderately large, ovate to cylindrical ; aperture wide or slightly constricted ; teeth generally short ; base flat or slightly convex ; fossula shallow ; dorsum generally ornamented with net-like colour pattern ... *Mauritia*

Genus **Luria** Jousseaume, 1884

Type-species : *Cypraea lurida* Linnaeus, 1758.

Type-species : ***Cypraea lurida*** Linnaeus, 1758.

Luria isabella (Linnaeus, 1758).

(Pl. IV, Fig. 14)

Cypraea isabella Linnaeus, 1758, *Syst. Nat.*, Ed. X : 722, sp. no. 301 (Type-locality : "in Mauritio, Madagascar") ; Reeve, 1845, *Conch. Icon.*, 3, *Cypraea*, sp. no. 51, pl. 21, fig. 51.

Luria (Basilitrona) isabella : Schilder and Schilder 1938, *Proc. malac. Soc. Lond.*, 23, pt. 3 : 176-177.

Luria isabella : Cernohorsky, 1967, *Mar. Shells Pacific* : 65, pl. 8, fig. 32.

Material—1 ex.(d.), Sta. 12—Shore colln., Hare Id, Bay of Bengal, off Tuticorin, 22-2-1968 (Coll. A. S. Rajagopal).

Distribution—India : Laksha Dwip, Pearl banks of Gulf of Mannar, Krusadai Id., Shingle Id., Andaman Is., Car Nicobar Id.

Elsewhere : Port Elizabeth, Mozambique, Madagascar, Comoro Is., Zanzibar, Suej, Aden, Maldive Is., Chagos Archipelago, Reunion, Mauritius, Singapore, Java, Flores, Timor, Misool, Sorong, Aru Is., Western Australia, Queensland, New South Walse, New Guinea, New Hebrides, New Caledonia, Loyalty Is., Moluccas, Gulf of Siam, Philippines, Japan, Midway Id., Hawaiian Is., Marianas, Caroline Is., Ellice Is., Kingsmill, Fiji Is., Viti, Tonga, Samoa, Cook Is., Marquesas Is., Tuamotu Archipelago, Henderson Id., Rivelles, Gagedo, Mazatlan, Tres Marias, Clipperton Id., Cocos Id.

Remarks—The only shell collected is in fair condition and is easily recognisable by its shell-characters.

Shell cylindrical, abruptly acuminate to the extremities ; dorsum polished, greyish brown with three darker transverse bands, ornamented with fine bluish dots and interrupted lines ; extremities orange with black spots ; callus deposition negligible ; base and sides white ; aperture narrow ; teeth short, numerous.

This species generally occurs on coral reefs and distributed in a extended range from East Africa to Mexican Coast.

Measurement (in mm.)

Length	28.90
Height	12.35
Maximum breadth	14.85

Genus *Lyncina* Troschel, 1863

Type-species : *Cypraea lynx* Linnaeus, 1758.

Lyncina lynx (Linnaeus, 1758).

(Pl. IV, Fig. 15)

Cypraea lynx Linnaeus, 1758, *Syst. Nat.*, Ed. X : 721-722, sp. no. 303 (Type-locality : "at Madagascar") ; Reeve, 1845, *Conch. Icons.*, 3, *Cypraea*, sp. no. 33, pl. 9, fig. 33 ; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 1(2), pt. 6, pl. 10, Fig. 4.

Cypraea (Lyncina) lynx : Schilder and Schilder, 1938, *Proc. malac. Soc. Lond.*, 23, pt. 3 : 186.

Lyncina lynx : Cernohorsky, 1967, *Mar. Shells Pacific* : 66, pl. 8, fig. 36.

Material—1 ex. (d.) Sta. 21—Coastal waters of Madras from Harbour old entrance to University, on board, "Chota Investigator", 5 fms., 26-2-1975 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—Mozambique, Madagascar, Comoro Is., Zanzibar, Red Sea, Gulf of Suez, Aden, Karachi, Maldive Is., Chagos Archipelago, Reunion, Mauritius, Seychelles, Sri Lanka, Singapore, Gulf of Siam, China, Japan, Western Australia (Gulf of Exmouth), Northern Australia (Gulf of Exmouth), Northern Australia (Gulf of Carpentaria), Sumatra, Java, Flores, Timor, Borneo, Jolo, Philippines, Sorong, Aru Is., New Hebrides, New Caledonia, Loyalty Is., Palau Is., Marianas, Caroline Is., Kingsmill Hawaiian Is., Christmas Is., Ellice Is., Viti, Tonga, Samoa, Cook Is., Marquesus Is., Tuamotu Archipelago.

Remarks—Single shell present in the collection is little eroded but its identity is discernible from the characters represented.

Shell large, elongately ovate, dorsum elevated; base white and carinated a little away from the aperture; teeth white strong, interstices bright orange-red; surface whitish mottled faintly with brown, but irregular brown spots are not clear; thickened callus on sides marked with clouded brownish spots.

This species is moderately common and occurs on coral reefs in shallow water ranging from African coast to Tuamotu Archipelago in the Indo-Pacific.

Measurements (in mm.)

Length	38.75
Height	21.35
Maximum Breadth	25.10

Genus *Mauritia* Troschel, 1863

Type-species : *Cypraea mauritiana* Linnaeus, 1758.

Mauritia arabica (Linnaeus, 1758).

(Pl. IV, Fig. 16)

Cypraea arabica Linnaeus, 1758, *Syst. Nat.*, Ed. X : 718, sp. no. 286 (Type-locality : "Indian orientali, ad Fretum Sunda or Straits of Sunda") ; Reeve, 1845, *Conch. Icon.*, 3, *Cypraea*, sp. no. 2, pl. 1, fig. 2 ; Gravelly, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 1 (2), pt. 6 : 130.

Mauritia arabica : Schilder and Schilder, 1938, *Proc. malac. Soc. Lond.*, 23, pt. 3 : 183 ; Cernohorsky, 1967, *Mar. Shells Pacific* : 68, pl. 9, fig. 40.

Material—5 exs. (w.), Sta. ?—Krusadai Id., Gulf of Mannar. March, 1850 (Coll. S. L. Hora & A. G. K. Mianon).

Distribution—India : Bombay, Pamban, Krusadai Id., Shingle Id., Tuticorin, Bimlipatam, Andaman and Nicobar Is.

Elsewhere : Madagascar, Somalia, Persian Gulf, Mekran Coast, Maldive Is., Mauritius, Seychelles, Sri Lanka, Akyab, Rangoon, Maungmagan, Tavoy Sea shore, Mergui Archipelago, Gulf of Siam, Singapore, Sumatra, Moluccas, Java, Borneo, Philippines, Luzon, Formosa, Japan, W. Australia, Queensland, New South Wales, Sulu, Aru Is., Tonga, Marshall Is., Tuamotu Archipelago.

Remarks—Shell oblong ovate, heavy, broad with flattened base ; dorsal sulcus plain ; sides less thickened with callus, angulate, cream in colour with purplish tinge and spotted with brown ; base flat, creamy ; teeth larger, outwardly extended on the base, flesh in colour ; dorsum bluish white with inconspicuous brownish blotches, ornamented with hieroglyphic markings, longitudinal brown lines interrupted with irregular circular lacunae.

This species commonly occurs in shallow water on coral reefs and rocks from East Africa to Polynesia.

<i>Measurements</i> (in mm.)	Range (5 exs.)
Length	37.75 — 46.65
Height	18.60 — 21.20
Maximum Breadth	24.25 — 26.96

Subfamily EROSARIINAE

Within this subfamily the genera *Pustularia* Swainson, *Monetaria* Troschel and *Erosaria* Troschel are dealt here.

Key to the genera :

Shell small, globular, extremities beaked; aperture narrow; teeth small, numerous, occasionally produced up to margins, not coloured; fossula weakly ribbed; base flat; dorsum smooth, granular or sometimes ridged and brown spotted in general ... *Pustularia*

Shell not so small, ovate to angulate; sides calloused; aperture moderately wide; teeth few, coarse and not coloured; base almost flat; fossula smooth; dorsum weakly coloured, not banded; sides unspotted ... *Monetaria*

Shell little large, cylindrical to pyriform; sides angulately thickened, aperture uniformly wide; teeth prominently strong, sometimes produced to margins, coloured; base generally convex; dorsum generally ornamented with nebulous white spots ... *Erosaria*

Genus *Pustularia* Swainson, 1840

Type-species : *Cypraea cicercula* Linnaeus, 1758.

Pustularia childreni (Gray, 1825).

(Pl. IV, Fig. 17a & 17b)

Cypraea childreni Gray, 1825, *Zool. Journ.*, 1 : 518 (Type-locality : Pacific); Kiener, (1843-45)*, *Coq. Viv.*, 3 : 155—156, pl. 40, fig. 3; Reeve, 1845, *Conch. Icon.*, 3, *Cypraea*, sp. no. 115, pl. 21, fig. 115.

*The date is determined as per Sherborn, C. D. and Woodward, B. B., 1901, *Proc. malac. Soc. Lond.*, 4(5) : 216-219.

Pustularia childreni : Cernohorsky, 1967, *Mar. Shells Pacific* : 71-72, pl. 10, fig. 48.

Material—(1) 1 ex. (d.), Sta. 1k—Rocky and sandy beach of Kanyakumari, nearly 160 kms. S. of Tuticorin, (2) 1 ex. (d.), Sta. 14—Shore colln., Kanyakumari, 26-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—Reunion, Mauritius, Chagos Archipelago, Malaysia, Japan, Hawaiian Is., Christmas Id., Palau Id., Borneo, Philippines, New Caledonia, Loyalty Is., Kingsmill, Ellice Is., Viti, Tonga, Samoa, Cook Is., Tuamotu Archipelago.

Remarks—Two shells in the material under study are collected from rocks under the influence of splashing waves.

Shell small, cylindrically ovate, broad, extremities beaked and carinately winged; dorsum pale yellowish brown with dark-brown spot above each extremity and transversely closely ribbed throughout; ribs interrupted by a mid-dorsal sulcus; base more or less flat; aperture narrow; teeth fine, extended to margins and almost meeting the ribs.

The species is Indo-Pacific in distribution and found to be a new record from India.

Measurements (in mm.)

Length	6.50
Height	4.75
Maximum Breadth	5.60

Genus *Monetaria* Troschel, 1863

Type-species : *Cypraea moneta* Linnaeus, 1758.

Monetaria moneta (Linnaeus, 1758).

(Pl. IV, Fig. 18)

Cypraea moneta Linnaeus, 1758, *Syst. Nat.*, Ed. X : 723, sp. no. 312 (Type-locality Maldive Is.) ; Reeve, 1845, *Conch. Icon.*, 3, *Cypraea*, sp. no. 74, pl. 15, fig. 74 ; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 1 (2), pt. 6 : 123-124, pl. 9, fig. 7.

Monetaria moneta : Schilder and Schilder, 1938, *Proc. malac. Soc. Lond.*, 23, pt. 3 : 142 ; Cernohorsky, 1967, *Mar. Shells Pacific* : 76, pl. 11, fig. 54.

Material—(1) 1 ex. (d.). Sta. 7—Shore coll'n., Point Calimetre, 16-2-1968 (Coll. A. S. Rajagopal); (2) 1 ex. (d.), Sta. 6—Shore coll'n., Rameswaram, 1-2-1975, (3) 4 exs. (d.), Sta. 11—Shore coll'n., opposite Fort to the mouth of Uppanar, Tranquebar, 11-2-1975 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Bombay, Laksha Dwip, Hare Id., Tuticorin. Mandapam, Pamban, Rameswaram, Krusadai Id., Pulli Id., Shingla Id., Madras, Orissa (Konarak, Chandipore, Mahanadi Estuary), West Bengal Coast, Andaman Is, Car Nicobar Id.

Elsewhere : Mozambique, Zanzibar, Suez, Red Sea, Sumatra, Persian Gulf, Gulf of Oman, Maskat, Maldivé Is., Reunion, Mauritius, Seychelles, Chagos Archipelago, Malaysia (Singapore, Malacca), Java, Torres Strait, N.W. Australia, Queens'and, Palau Is., China, Southern Sea of Japan, Marianas, Caroline Is., Kingsmill, Fiji Is., Aru Is., Sorong, Solomon, New Hebrides, New Caledonia, Loyalty Is., Hawaiian Is., Christmas Id., Ellice Is., Viti, Tonga, Samoa, Cook Is., Marquesas Is., Tuamotu Archipelago.

Remarks—The species varies in shape and colour in different environmental influences. They are easily distinguishable by their pentagonal shape and angulations on its lateral margins.

Shell solid, sides much thickened with the posterior nodular swellings and with a humpy dorsum clearly demarcated by anterior and posterior depressions; teeth close-set and not produced; colour yellowish or greyish white on the dorsum and pale or whitish in the margin; hump occasionally encircled with orange ring.

<i>Measurements</i> (in mm.)	Range (6 exs.)
Length	14.15 — 16.05
Height	6.50 — 8.00
Maximum Breadth	9.65 — 12.00

Genus *Erosaria* Troschel, 1863

Type-species : *Cypraea erosa* Linnaeus, 1758,

Key to the species :

Shell deltoid in shape; margin dark brown all round; dorsum humped, centrally numerously dotted

...

Caputserpentis

Shell broadly ovate ; margin obscurely
spotted ; dorsum not humpy, yellowish
brown with eye-shaped white marks ... *ocellata*

***Erosaria caputserpentis* (Linnaeus, 1758).**

(Pl. IV, Fig. 19a & 19b)

Cypraea caputserpentis Linnaeus, 1758, *Syst. Nat.*, Ed. X : 720-721, sp. no. 298
(Type-locality : Mauritio) : Reeve, 1845, *Conch. Icon.*, 3, *Cypraea*,
sp. no. 44, pl. 11, fig. 44.

Erosaria (Ravitronea) caputserpentis : Schilder and Schilder, 1938, *Proc. malac.*
Soc. Lond., 23, pt. 3 : 135.

Erosaria caputserpentis : Cernohorsky, 1957, *Mar. Shells Pacific* : 78, pl. 12,
fig. 59.

Material—2 exs.(w.), Sta. 6—Shore colln., below boulders,
Rameswaram, 1-2-1975 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Laksha Dwip, Pamban, Krusadai Id.,
Shingle Id, Vishakhapatnam, Madras, Andaman Is., Car Nicobar Id.

Elsewhere : Port Elizabeth, Madagascar, Reunion, Zanzibar,
Mauritius, Seychelles, Chagos Archipelago, Malacca, Singapore, Gulf
of Siam, Sumatra, Java, Flores Id., Timor, Borneo, Jolo, Palau,
Philippines, China, Japan, Formosa, Ryukyu Is., S. W. Australia
(Exmouth Gulf), S.E. Australia (Sydney, Port Jackson), Queensland,
New Zealand (Auckland), Norfolk Id., Aru Id., Sorong, New Hebrides,
New Caledonia, Loyalty Is., Viti, Tonga, Marianas, Caroline Is.,
Samoa, Savage, Cook Is., Midway Is., Hawaiian Is., Palmyra Id.,
Tahiti, Marquesas Is., Tuamotu Archipelago.

Remarks—The species is easily distinguishable by its glossy
brown colour and white lacunar spaces. Shell deltoid, humpy, heavy
with expanded margins ; dorsum brown reticulate in appearance with
irregular white specks ; sides thickened angulate and dark chestnut in
colour ; base and sides of lips buff colour ; teeth large white, inter-
stices greyish white.

This species commonly inhabits the weedy coral-flats in shallow
water and ranges from East Africa to Polynesian islands.

<i>Measurements</i> (in mm.)	Range (2 exs.)
Length	27.50 — 32.55
Height	13.80 — 15.30
Maximum Breadth	22.35 — 24.40

Erosaria ocellata (Linnaeus, 1758).

(Pl. IV, Fig. 20)

Cypraea ocellata Linnaeus, 1758, *Syst. Nat.*, Ed. X : 724, sp. no. 319 (Type-locality : Sri Lanka) ; Reeve, 1845, *Conch. Icon.*, 3, *Cypraea*, sp. no. 73, pl. 15, fig. 73 ; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser* (Nat. Hist. Sec.), 1(2) : 122, pl. 9, figs. 5a. & 5b.

Erosaria (Erosaria) ocellata : Schilder and Schilder, 1938, *Proc. malac. Soc. Lond.* 23, pt. 3 : 138.

Erosaria ocellata : Allan, 1956, *Cowry Shells of World Seas* : 87, pl. 9, figs. 13 & 14.

Material—(1) 1 ex.(d), Sta. 12—Shore colln., Hare Id. off Tuticorin, 22-2-1968, (2) 2 exs.(d.), Sta. 13—Shore colln., Vanthivu Id. off Tuticorin, 23-2-1968 (Coll. A. S. Rajagopal) ; (3) 1 ex.(d.), Sta. 2—Shore colln., Mahabalipuram, S. of Madras, 26-1-1975, (4) 2 exs.(d.), Sta. 3—Shore colln., Kovelong, 55 kms. S. of Madras, 28-1-1975, (5) 1 ex.(d.), Sta. 10—Collection along the shore near Asstt. Collector' Bunglow, Tuticorin, 23-1-1978, (6) 3 exs.(d.), Sta. 13—Shore colln., near Subramaniam Temple, Tiruchendur, 25-1-1978, (7) 3 exs.(d.), Sta. 15—Shore colln., Veerapandianpattinam, 27-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Gujarat (Kathiawar) : Dwarka, Pirotan Id., Maharashtra (Bombay, Ratnagiri), Travancore, Kanyakumari, Hare Id. (off Tuticorin), Mandapam, Pamban, Krusadai Id., Kundugal Point, Shingle Id., Rameswaram, Madras, Vishakhapatnam, Bimlipatam.

Elsewhere : Africa (Port Elizabeth), Gulf of Aden, Persian Gulf, Mekran Coast, Karachi, Sri Lanka, Reunion, Mauritius, Chagos Archipelago, S.W. Java, Siam, Moluccas, Chine, Caroline Is., New Guinea, New Caledonia, Australia.

Remarks—The shell is easily recognised by its ocellated orientation. Shell broadly ovate, margin thickened with callus, reflected up and pitted anteriorly on the side of outer lip ; teeth strong, white and those on the outer lip sometimes tinged with brown ; shell sometimes with a longitudinal line of erosion right to the mid-dorsal line ; shell colour yellowish-brown or reddish-yellow covered with number or rounded white spots.

This group of cowries is common and occurs on sandy shore of coral stones and shingle. It ranges throughout the Arabian Sea, Bay of Bengal and Indian Ocean.

<i>Measurements</i> (in mm.)	Range (9 exs.)
Length	20.70—27.95
Height	11.50—14.50
Maximum Breadth	14.50—17.70

Subfamily ERRONEINAE

Erronea Troschel is the only genus represented in this subfamily.

Shell small, cylindrical to pyriform, aperture anteriorly wide; teeth course, labial teeth longer; fossula narrow, shallow and ribbed; dorsum with transverse bands, spots and sometimes with blotches of colour

... *Erronea*

Genus *Erronea* Troschel, 1863

Type-species *Cypraea erronea* Linnaeus, 1758.

Key to the species :

- Shell with attenuated extremities, outer lip produced at the posterior end ... 2
 Shell not like above ... 3
- Shell elongate, dirty blue; dorsum with three brownish bands and freckles; sides creamy white; columellar teeth closer ... *errones*
 Shell pyriform, white; dorsum with two to three brown bands and rarely blotched; sides scarcely spotted; columellar teeth prominently extended on to base ... *pulchella*
- Shell elongately ovate, bluish white; dorsum depressed with three brownish bands and freckles; sides thickened by callus and spotted; labial teeth well developed ... *caurica*
 Shell cylindrical, bluish grey; dorsum with four to five interrupted transverse bands; sides not thickened by callus out spotted black; extremities with two dark spots; labial teeth short ... *listeri*

Erronea erronea (Linnaeus, 1758).

(Pl. V. Fig. 21)

Cypraea erronea Linnaeus, 1758, *Syst. Nat.*, Ed. X : 723, sp. no. 311 (Type-locality : Amboina) ; Reeve, 1845, *Conch. Icon.*, 3, *Cypraea*, sp. no. 56, pl. 13, fig. 56 ; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 1(2), pt. 6 : 125, pl. 9, figs. 10a & 10b.

Erronea (Erronea) erronea : Schilder & Schilder, 1938, *Proc. malac. Soc. Lond.*, 23, pt. 3 : 152.

Erronea erronea : Cernohorsky, 1967, *Mar. Shells Pacific* : 87, pl. 14, fig. 75.

Material—(1) 3 exs. (w.), Krusadai Id., Gulf of Mannar, March, 1950 (Coll. S. L. Hora & A. G. K. Menon) ; (2) 3 exs. (d.), Sta. 12—Shore colln., Hare Id., Bay of Bengal, off Tuticorin, 22-2-1968 (Coll. A. S. Rajagopal) ; (3) 1 ex. (d.), Sta. 9—Hare Id., near Port of New Tuticorin, 22-1-1978, (4) 1 ex. (d.), Sta. 3—Shore colln., Sethubabachatram, Palk Bay, 14-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Pamban, Krusadai Id., Kundugal Point, Shingle Id., Pearl Banks in the Gulf of Mannar, Madras, Andamans, Nicobars.

Elsewhere : Karachi, Mauritius, Chagos Archipelago, Sri Lanka, Maungmagan, Mergui Archipelago, Malacca, Singapore, Gulf of Siam, Sumatra, Java, Flores Id., Timor, Borneo, Jolo, Palau, Philippines, Japan, Yap, Kei Is., Yen from China, N.W. Australia, Torres Strait, Queensland, Lord Howe Id., Aru Id., New Guinea, New Britain, Solomon Is., New Caledonia, Loyalty Is., Viti, Tonga, Marianas, Caroline Is., Samoa, Kingsmill, Cook Is., Hawaiian Is., Christmas Id., Tuamotu Archipelago.

Remarks—The shell collected from Sethubabachatram was in perfect condition with its colour-pattern and completely agree with the adequate descriptions given by Satyamurti (1952) and Cernohorsky (1967).

Shell pyriformly elongated with narrowed extremities ; outer lip produced at the posterior end ; dorsum bluish grey with three brownish bands, freckled with brownish marks, occasionally with an irregular brownish blotch in the centre ; aperture anteriorly wide ; sides and base uniformly white to creamy-white in colour ; columellar teeth closer than the labial teeth and absent in the siphonal canal.

<i>Measurements</i> (in mm.)	Range (5 exs.)
Length	23.65 — 29.00
Height	11.00 — 14.90
Maximum Breadth	14.20 — 18.00

***Erronea caurica* (Linnaeus, 1758).**

(Pl. V, Fig. 22a & 22b)

Cypraea caurica Linnaeus, 1758, *Syst. Nat.*, Ed. X : 723, sp. no. 313 (Type-locality : Amboina) ; Reeve, 1845, *Conch. Icon.*, 3, *Cypraea*, sp. no. 46, pl. 11, fig. 46 ; Gravely, 1942, *Bull. Madras Govt. Mus. new ser. Nat. Hist. Sec.*, 5(2) : 41 ; Satyamurti, 1942, *Bull. Madras Govt. Mus. new ser. (Nat. Hist. Sec.)*, 1(2) : 125-126.

Erronea (Erronea) caurica : Schilder & Schilder, 1938, *Proc. malac. Soc. Lond.*, pt. 3 : 153-154 ; Cernohorsky, 1967, *Mar. Shells Pacific* : 86, pl. 14, fig. 73.

Material—(1) 1 ex.(d.), Sta. 12—Shore colln., Hare Id., Bay of Bengal, off Tuticorin, 22-2-1968, (2) 1 ex.(d.), Sta. 13—Shore colln., Vanthivu Id., Bay of Bengal, off Tuticorin, 23-2-1968 (Coll. A. S. Rajagopal ; (3) 1 ex.(d.), Sta. 19—Shore colln., Santhome beach S. up to the mouth of Adyar river, Madras, 24-2-1975, (4) 1 ex.(d.), Sta. 9—Shore colln., Hare Id. near Port of New Tuticorin, 22-1-1978, (5) 1 ex.(d.), Sta. 13—Shore colln., near Subramaniam Temple, Tiruchendur, 25-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Laksha Dwip, Gulf of Mannar, Pamban, Shingle Id., Madras, Andaman and Nicobar Is.

Elsewhere : Port Elizabeth, Durban, Mozambique, Madagascar, Zanzibar, Red Sea, Persian Gulf, Mekran Coast, Karachi, Maldive Is., Comoro Is., Seychelles, Reunion, Mauritius, Mergui Archipelago, Malacca, Singapore, Gulf of Siam, Japan, New South Walse, Queensland, Torres Strait, Aru Id., Sorong, New Hebrides, New Caledonia, Loylty Is., Viti, Tonga, Marianas, Caroline Is., Samoa, Kingsmill, Gilbert Is., Cook Is.

Remarks—Shell elongated, cylindrically ovate with depressed dorsum ; sides markedly calloused and prominently spotted with dark-brown spots ; aperture anteriorly wide ; teeth large ; dorsum coloured white with bluish tinge, freckled with brown spots and ornamented

with three brownish transverse bands; sides and base creamy white marging into pale orange colour of interstices of teeth.

This species is not so common and mostly occurs in shallow water of coral reefs and rocks.

<i>Measurements</i> (in mm.)	Range (4 exs.)
Length	28.60 — 41.35
Height	12.50 — 16.85
Maximum Breadth	15.85 — 21.55

***Erronea listeri* (Gray, 1825).**

(Pl. V, Fig. 23)

Erronea listeri Gray, 1825, *Zool. Journ.*, **1** : 507-508, sp. no. 77 (Type-locality : Bengal).

Palmadusta (*Palmadusta*) *felina* race *listeri* Schilder & Schilder, 1938, *Proc. malac. Soc. Lond.*, **23**, pt. 3 : 160-161.

Erronea listeri : Cernohorsky, 1967, *Mar. Shells Pacific* : 87, pl. 15, fig. 77.

Material—1 ex.(d.), Sta. 12—Shore colln., Hare Id., 22-2-1968 (Coll. A. S. Rajagopal).

Distribution—India : Bombay, (Indian Seas), Sea shore off Calcutta, Andaman Is.

Elsewhere : Madagascar, Maldivé Is., Okinawa Id., Loochoos, Malaysia, Japan, W. Papua to Polynesia.

Remarks—Shell small, cylindrical, depressed; sides whitish, spotted with black; base concave towards columella; extremities with a pair of dark blotches; teeth generally short; outer lip thin, not inflected; colour of the dorsum with four to five brown interrupted transverse bands on bluish grey.

Measurements (in mm.)

Length	11.00
Height	4.50
Maximum Breadth	6.00

Subspecies *novaebritanniae* of the species *Erronea pulchella* typical is represented in the collection.

***Erronea pulchella novaebritanniae* Schilder & Schilder, 1937.**

(Pl. V, Fig. 24a & 24b)

Erronea (Adusta) pulchella novaebritanniae Schilder, M. & Schilder, F.A., *Zool. Anz.*, **119** (7/8) : 183-184; Schilder, F.A., 1937, *Proc. malac. Soc. Lond.*, **22**, pt. 6 : 367-368 (Type-locality : North east coast of New Britain).

Gratiadusta pulchella novaebritanniae : Allan, 1956, *Cowry Shells of World Seas* : 59.

*Erronea pulchella novaebritanniae** : Cernohorsky, 1967, *Mar. Shells Pacific* : 88, pl. 15, fig. 80.

Material—1 ex.(d.), Sta. 3—Shore colln., Sethubabachatran, Palk Bay, 14-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—Red Sea, Gulf of Oman, New Britain China (Hong Kong).

Remarks—Single shell present in the collection completely conforms with characters described by Schilder and Schilder (*op. cit.*) and Cernohorsky (*op. cit.*).

Shell pyriform, light, with attenuated extremities; dorsum white, ornamented with two to three interrupted brown bands and with very few brown blotches; sides scarcely spotted with brown; outer lip acuminate produced at the posterior end; base whitish; teeth brownish, a little produced on columella.

The shell was collected from sandy coast in shallow water. This species is recorded first time from India.

Measurements (in mm.)

Length	27.85
Height	14.85
Maximum Breadth	17.25

Family OVULIDAE

This family contains only one genus *Diminovula* Iredale.

Shell small, pyriform, extremities produced; aperture moderately narrow; teeth normally absent; base convex, fossula concave and smooth; dorsum striated, uniformly coloured or with blotches

... *Diminovula*

* Spelling of the species name is supposed to be wrongly given by Cernohorsky (*op. cit.*).

Genus **Diminovula** Iredale, 1930

Type-species : *Ovula punctata* Duclos.

Diminovula punctata (Duclos, 1831).

(Pl. V, Fig. 25a & 25b)

Ovula punctata Duclos, 1831,* *Magas de Zool.* pl. 7.

Primovula (*Diminovula*) *punctata* : Allan, 1962, *Cowry Shells of World Seas* : 122, pl. 15, figs. 21 & 22.

Diminovula punctata : Cernohorsky, 1967, *Mar. Shells Pacific* : 110, pl. 21, fig. 128.

Material—8 exs.(w.), Sta. 5—Coastal waters of Mandapam, Gulf of Mannar, 22-12-1979 (Coll. H. P. Mookherjee).

Distribution—China, Japan, Philippines and Madagascar regions.

Remarks—The shells diagnostically completely agree with the description given by Cernohorsky (*op. cit.*) besides their young stage of growth.

Shells smaller, roundly pyriform with extremities produced; dorsum particularly with three pairs of brown blotches and close-set transverse striae; teeth feebly developed in the outer lip.

The shells were extracted from a soft coral of the genus *Dendronephthya* (Pl. V, Fig. 25c) collected from coastal waters of Mandapam. In between the white stalks of the polyps of the compact reddish coral, the shells were lying concealed.

This is an uncommon species ranging from Madagascar to Fiji Islands and mostly occurs on corals and seaweeds. Cypraeids generally in warmer months lay their eggs in capsular forms on rocks and corals and dead shells and sometimes on weeds. Just after hatching the larvae are discharged in the surrounding water. Finally they settle on some substrate and rapidly develop there. Here the molluscs in the larval stage might have selectively settle on the soft coral and then distributed themselves and had gone deep inside for secured shelter for further development.

* Reference not seen in original.

This species is accounted here to be new record from India with special reference to its habitat in the folds of coral.

Measurements (in mm.)

Length

2—5

Family NATICIDAE

This family includes a large number of sand-dwelling operculate snails. They are common inhabitants of broad sandy beaches and estuarine tidal flats. Their burrowing activity is easily traceable from the trailing marks left on the sand. By nature they feed on the shells with the help of radula aided by glandular secretion. That is why eaten out dead shells are found in their substrate.

This family is represented here by three subfamilies Naticinae, Polinicinae and Sininae which can be identified by the Key below.

Key to the identification of Indian subfamilies :

Shell medium, turbate, subglobose, spire short, columellar callus present and reflected over umbilical opening ; surface almost smooth	...	Naticinae
Shell generally large, heavy, laterally compressed, obliquely elongated, spire exerted.; columellar callus almost filling the umbilicus ; surface highly polished	...	Polinicinae
Shell small, light, much depressed, auricular, spire depressed or elevated ; columella without callus ; umbilicus open ; surface spirally cancellated	...	Sininae

Subfamily NATICINAE

A single genus *Natica* Scopoli represents this in the collection.

Body whorl turbinate globose ; umbilicus reduced by callus formation ; surface smooth	...	<i>Natica</i>
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Genus *Natica* Scopoli, 1777.Type-species : *Nerita canrena* Linnaeus.*Key to the identification of species :*

- | | | |
|---|-----|----------------------|
| 1. Shell turbate, umbilicus filled with callus | ... | 2 |
| Shell globose, umbilicus open | ... | 3 |
| 2. Shell encircled with brownish spiral band of arrow-head marks | ... | <i>marochiensis</i> |
| Shell with close broken lines or dots of colour | ... | <i>tigrina</i> |
| 3. Shell auricular in shape with expanded body whorl | ... | 4 |
| Shell globose with inflated body whorl | ... | 5 |
| 4. Shell with uniform pale and broad band, excavately umbilicated | ... | <i>vitellus</i> |
| Shell with spiral lines and interrupted dark-brown squarish marks, suture plicate | ... | <i>alapapilionis</i> |
| 5. Shell nut-like in appearance, with continuous transpiral wavy lines, umbilicus semicircular round strong columellar callus | ... | <i>lineata</i> |
| Shell neritoid with blotches of orange colour, umbilicus circular and reduced by columellar callus | ... | <i>pulicaria</i> |

Natica vitellus Linnaeus, 1758.

(Pl. VI, Fig. 26a & 26b)

Nerita vitellus : Linnaeus, 1758, *Syst. Nat.*, Ed. X : 776, sp. no. 625 (Type-locality : "in O. Asiae").*Cochlis albula* : Roeding, 1798, *Mus. Bolten.* : 146, sp. no. 1829.*Nerita rufa* : Born, 1780, *Test. Mus. Caes. Vindob.* : 389, pl. 17, figs. 3 & 4.*Natica rufa* : Lamarck ; 1838, *Hist. nat. des Anim. sans Vert.* (Deshayes edit.), 8 : 639-40 ; Reeve, 1855, *Conch. Icon.*, 9, *Natica*, sp. no. 70, pl. 16, fig. 70.*Natica albula* : Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 5(2) : 37 ; Satyamurti, 1952, (*Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 1(2), pt. 6 : 108, pl. 8, fig. 7.*Natica vitellus* : Cernohorsky, 1972, *Mar. Shells Pacific*, 2 : 94, pl. 24, fig. 5.

Material—(1) 3 exs. (d.), Sea shore about 3.2 km. E. of MBS., Porto Novo, 21-1-1957, (2) 4 exs. (d.), on shore near Pudupet about 4 km. E. of MBS., Porto Novo, 22-1-1957 (Coll. A.G.K. Menon & G. Ramakrishna); (3) 3 exs. (d.), Sta. 16—Shore colln., Tamil Nadu State Fisheries Extension Unit, Tuticorin, 25-2-1968 (Coll. A. S. Rajagopal); (4) 1 ex. (w.), Sta. 1—Coastal waters of Thondiarpur on board “Chota Investigator”, 10 fms., 25-1-1975, (5) 1 ex. (w.) & 2 exs. (d.), Sta. 6—Shore colln., Rameswaram, 1-2-1975, (6) 1 ex. (d.), Sta. 21—Coastal waters of Madras Harbour from old entrance to University building, 26-2-1975, (7) 4 exs. (w.) & 9 exs. (d.) Sta. 3—Shore colln., Sethubabachatram, 14-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee); (8) 4 exs. (w.), Sta. 12—Shore colln., Palk Strait, Rameswaram, 30-12-1979 (Coll. H. P. Mookherjee).

Distribution—India : Bombay, Laksha Dwip, Krusadai Id., Madras, Orissa (Gopalpore).

Elsewhere : Karachi, Mauritius, Singapore, Hong Kong.

Remarks—Shell thick, globose, excavately umbilicated with an inflated body whorl; spire reduced; whorls rounded; surface obliquely plicately striated; celumella smooth, white with polished callus extended posteriorly and fused with the body whorl leaving anteriorly the umbilical opening; aperture lunar ovate. Shell colour fulvous-brown, pale band in the middle and whitish in the base and the sutures.

The species occurs on sandy beach near the low tide line and occasionally in weedy places.

<i>Measurements</i> (in mm)	Range (16 exs.)
Height	7.05 — 28.20
Maximum Diameter	10.20 — 43.30
Minimum Diameter	8.45 — 34.20

Natica marochiensis (Gmelin, 1791).

(Pl. VI, Fig. 27a & 27b)

Nerita marochiensis Gmelin, 1791, *Syst. Nat.*, Ed. XIII, 1(6) : 3673, sp. no. 15 (Type-locality : Africa, Marochii, Anlilarium).

Natica marochiensis : Lamarck, 1838, *Hist. nat. des Anim. sans. Vert.* (Deshayes edit.), 8 : 642-643; Reeve, 1855, *Conch. Icon.*, 6 : *Natica*, sp. no. 52, pl. 13, fig. 52; Tryon, 1886, *Man. Conch.*, 8 : 22-23, pl. 5, figs. 74-76;

Gravely, 1942, *Bull. Madras Govt Mus. new ser.* (Nat. Hist. Sec.), 5(2) : 37; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 1(2), pt. 6 : 107, pl. 8, figs. 1a & 1b; Warmke & Abbott, 1961, *Caribbean Seashells* : 96, pl. 3, fig. g.

Material—(1) 4 exs.(d.), Sta. 10—Shore 2.4 km. S. of Inspection Bungalow, Tuticorin, 16-4-1955, (2) 1 ex. (w.), Kundugal Point, Krusadai Id., 3-5-1955 (Coll. H. C. Ray); (3) 3 exs. (d.), Sta. 3—Vellar River bank in front of MBS., Porto Novo, 11-2-1968 (Coll. A. S. Rajagopal); (4) 1 ex.(d.), Sta. 6—Shore colln. Rameswaram, 1-2-1975, (5) 2 exs.(d.), Sta. 6—Shore colln., Keelakkarai, Gulf of Mannar, 18-1-1978, (6) 2 exs.(d.), Sta. 8—Shore colln., behind Circuit House, Tuticorin, 21-1-1978, (7) 3 exs.(d.), Sta. 9—Shore colln. near Part of New Tuticorin, Hare Id., 22-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Krusadai Id., Kundugal Point, Madras, Orissa.

Elsewhere : N. Africa, Sri Lanka, Australia, Philippines, Society Is., Panama, Florida, West Indies.

Remarks—Shell ventricularly globose, umbilicated, spire exerted, whorls smooth; surface transpirally striated, striations being strongly oblique just below the suture; columellar callus enters the umbilicus; aperture semicircular, interiorly coloured brown; surface colour variable, ranges from greyish-brown to greenish-brown encircled with brownish arrow-head markings or almost obscured, base white.

This species mostly found in shallow water with the bottom strewn with coral fragments and shingles and moderately common in the Indo-Pacific zone.

<i>Measurements</i> (in mm.)	Range (16 exs.)
Height	14.65 — 17.10
Maximum Diameter	10.95 — 14.00
Minimum Diameter	8.55 — 11.60

Natica tigrina (Roeding, 1798).

(Pl. VI, Fig. 28)

Cochlis tigrina Roeding, 1798, *Mus. Bolten.* : 147, sp. no. 1843 (Type-locality : Not known).

Natica maculosa : Lamarck, 1838, *Hist. nat. des Anim. sans Vert.* (Deshayes edit.), 8 : 641-42; Reeve, 1855, *Conch. Icon.*, 9, *Natica*, sp. no. 57, pl. 13, fig. 57; Tryon, 1886, *Man. Conch.*, 8 : 16-17, pl. 3, fig. 35; Melvill & Standen, 1901, *Proc. zool. Soc. Lond.*, 2 : 358.

Natica tigrina : Gravely, 1922, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 1(2), pt. 6 : 108, pl. 8, fig. 2.

Material—(1) 1 ex.(w.), Sta. ?—Back water about 2.4 km. from Fisheries Office, Cuddalore, 11-1-1957 (Coll. A. G. K. Menon & G. Ramakrishna); (2) 1 ex.(d.), Sta. 7—Shore colln., Point Calimere, 16-2-1968 (Coll. A. S. Rajagopal); (3) 1 ex.(w.) & 3 exs.(d.), Sta. 6—Shore colln., Rameswaram, 1-2-1975, (4) 1 ex. (d.), Sta. 10—Shore colln., Nagapattinam, 11.2 km. S. of Karaikal, 8-2-1975, (5) 1 ex.(w.) & 1 ex.(d.), Sta. 3—Shore colln., Sethubabachatram, Palk Bay, 14-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Gulf of Kutch (Pirotan Id., Hanuman Dandi), Bombay, Pamban, Madras, Andamans.

Elsewhere : Karachi, Sri Lanka, Hinze Basin, Penang, Akyab, Singapore, Java, Australia, Philippines, China, Japan, Manila.

Remarks—Shell globose, umbilicated, spire conically exerted, whorls rounded; columellar callus very thick especially at its base, aperture lunar-ovate; colour white to cream, dotted all over with close-set purple-brown spots, dots generally arranged in a regular spiral line and occasionally they coalesce with these of adjacent line.

This species generally occurs on sandy mud of shallow water.

<i>Measurements</i> (in mm.)	Range (5 exs.)
Height	10.10—15.80
Maximum Diameter	13.85—21.75
Minimum Diameter	11.05—17.80

Natica lineata Lamarck, 1838.

(Pl. VI, Fig. 29)

Natica lineata Lamarck, 1838, *Hist. nat. des Anim. sans Vert.* (Deshayes edit.), 8 : 640 (Type-locality : Not known); Reeve, 1855, *Conch. Icon.*, 9, *Natica*, sp. no. 24, pl. 7, fig. 24; Tryon, 1886, *Man. Conch.*, 8 : 29, pl. 9, figs. 62 & 63; Melvill & Standen, 1901, *Proc. zool. Soc. Lond.*, 2 : 358; Gravely 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 5(2) : 37; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 1(2), pt. 6 : 109, pl. 8, fig. 4.

Material—(1) 1 ex.(d.), Sta. 1c—Shore about 2.4 km. S. of Inspection Bungalow, Tuticorin, 16-4-1955, (2) 1 ex. (d.), Sta. 1j—Shore colln., N. of Inspection Bungalow, Tuticorin, 24-4-1955 (Coll. H. C. Ray); (3) 1 ex.(d.), Sea shore about 3.2 km. E. of MBS., Porto Novo, 21-1-1957 (Coll. A. G. K. Menon & G. Ramakrishna); (4) 3 exs.(d.), Sta. 16—Shore colln., near Tamil Nadu State Fisheries Extension Unit, Tuticorin, 25-2-1968 (Coll. A. S. Rajagopal); (5) 1 ex.(d.), Sta. 14—Shore colln. beyond Fisherman's village, N. of Fort, Tranquebar, 14-2-1975, (6) 5 exs.(d.), Sta. 8—Shore colln., behind the Circuit House, Tuticorin, 21-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Bombay, Pamban, Madras, Orissa, W. Bengal.

Elsewhere : Karachi, Singapore, Australia, North Queensland, Philippines.

Remarks—Shell more or less globose, moderately large comparatively thin, umbilicated, glazy, spire little elevated, whorls rounded; columella thin; spiral callus extended inward into umbilical groove; aperture semilunar; surface colour livid-white marked with close-set transpiral wavy deep-yellow to orange lines; umbilical space white.

The species are found on the sandy beach at low tide level and not so common.

<i>Measurements</i> (in mm.)	Range (6 exs.)
Height	7.75 — 18.30
Maximum Diameter	13.55 — 26.50
Minimum Diameter	12.30 — 20.49

Subgenus *Naticarius*, Dumeril, 1806

Natica (*Naticarius*) *alapapilionis* (Roeding, 1798).

(Pl. VI, Fig. 30)

Cochlis alapapilionis Roeding, 1798, *Mus. Bolten.* : 146, sp. no. 1834 (Type-locality : Not known).

Natica alapapilionis : Reeve, 1855, *Conch. Icon.*, 9 *Natica*, sp. no. 60. pl. 14, fig. 60; Tryon, 1886, *Man. Conch.*, 8 : 21, pl. 4, figs. 62-67; Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 5(2) : 37, fig. 5g; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 1 (2), pt. 6 : 109, pl. 8, fig. 3.

Natica (*Naticarius*) *alapapilionis* : Cernohorsky, 1972, *Mar. Chells Pacific*, 2 : 96, pl. 25, fig. 5.

Material—(1) 3 exs. (w.), Pearl Bank, 19.2 km. from shore of Tuticorin, 7-10 fms., February—March, 1926 (Coll. H. S. Rao); (2) 1 ex. (d.), Sta. 1j—Shore colln., N. of Inspection Bungalow. Tuticorin, 24-4-1955, (3) 3 exs. (d.), Sta. 1k—Rocky and sandy beach of Kanyakumari, 24-5-1955 (Coll. H. C. Ray); (4) 1 ex. (d.), Sta 11—Shore colln., behind the Circuit House, Tuticorin, 21-2-1968 (Coll. A. S. Rajagopal); (6) 5 exs. (d.), Sta. 14—Shore colln., Kanyakumari, 26-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Bombay, Madras, Krusadai Id.

Elsewhere : Zanzibar, Persian Gulf (Henjam Id.), Gulf of Oman (Maskat, Jask); Mekran Coast, China, Philippines, Australia, Seychelles, Gnaymas, Cape St. Luca, Fiji Is., W. Coast of Mexico.

Remarks—Shell subglobose, umbilicated with exerted spire; whorls smooth with exerted impressed suture, suture obliquely plicated below; body whorl broadly expanded towards aperture; umbilicus large, white; columellar callus extended at an oblique angle inside the groove; shell colour fawn-flesh with four widely separated narrow white spiral bands interrupted with squarish or rectangular dark-brown markings; aperture purpils.

This species occurs at a lower intertidal region on coral-sand.

<i>Measurements</i> (in mm.)	Range (4 exs.)
Height	7.20 — 11.40
Maximum Diameter	6.85 — 9.80
Minimum Diameter	5.60 — 7.65

***Natica pulicaria* (Philippi, 1852).**

(Pl. VII, Fig. 31a & 31b)

Natica pulicaris Philippi, 1852, *Conchyl. Cab.*, 2, abth. 1, *Natica* : 90-91. pl. 13, fig. 9 (Type-locality : Not known); Reeve, 1855, *Conch. Icon.*, 9, *Natica*, sp. no. 63, pl. 15, fig. 63; Tryon, 1886, *Man. Conch.*, 8 : 17-18, pl. 3, figs. 38 & 39; Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 5 (2) : 37.

Natica pulicaria : Subrahmanyam, Karandikar & Murti, 1952, *J. Univ. Bombay*, 21 (new ser.), pt 3(32) : 39, fig. 66.

Material—(1) 10 exs. (d.), Sta. 14—Rocky shore, Kanyakumari, 26-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Bombay, Madras.

Elsewhere : Sri Lanka.

Remarks—Shell globose, neritoid, umbilicated, smooth, spire short, little flattened beneath the suture; body whorl squarely rounded; aperture lunar-ovate; columella calloused at the upper part; surface colour livid-white, painted with fine orange dots and large oblique blotches and also with narrow filleted bands on the middle and lower part.

The species is very rare and mostly occurs on coral-reefs and rocky beach of intertidal zone.

<i>Measurements</i> (in mm.)	Range (12 exs.)
Height	4.45 — 10.85
Maximum Diameter	6.20 — 15.25
Minimum Diameter	5.30 — 13.40

Subfamily POLINICINAE

Only one genus *Polinices* Montfort is represented in this material.

Body whorl expanded; umbilicus reduced by callus deposit; surface polished or radially striated

... *Polinices*

Genus **Polinices** Montfort, 1810.

Type-species : *Nerita mamilla* Linnaeus.

Key to the identification of species :

1. Shell large, heavy, spire depressed; body whorl expanded; columellar callus divided by a groove in anterior and posterior parts ... 2
Shell small, light, spire exerted, body whorl contracted; columellar callus not divided ... 3
2. Shell with anterior part of callus larger than the posterior one; umbilicus open ... *lamarekii*

Shell with posterior part of callus greater than the anterior part, umbilicus covered by callus	...	<i>didyma</i>
3. Columellar callus white and broad Columellar callus dark-brown and narrow	...	6
4. Umbilicus almost closed by callus	...	<i>tumidus</i>
Umbilicus partly closed by callus	...	5
5. Base of the columella with semicircular projection of callus	...	<i>peselephanti</i>
Base of the columella with slight pillar-like projection of callus	...	<i>effusa</i>
6. Shell thick with flesh-brown bands	...	<i>melanostomus</i>
Shell thin with interrupted brown bands	...	<i>zanzibarica</i>

***Polinices tumidus* (Swainson, 1840).**

(Pl. VII, Fig. 32a & 32b)

Mamillaria tumida Swainson, 1840*, *Trea. Malacol.*, : 343 [Type-locality : Barbados (Linnaeus, 1758)].

Natica mamilla : Reeve, 1855, *Conch. Icon.*, 9, *Natica*, sp. no. 27, pl. 7, figs. 27a & 27b; Tryon, 1886, *Man. Conch.*, 8 : 49, pl. 16, fig. 46; Hornell, 1921, *Madras Fish. Bull.*, 14 : 119.

Albula (incl. *Polinices*) *mamilla* : Gravely, 1942, *Bull. Madras Govt. Mus. new ser. (Nat. Hist. Sec.)*, 5(2) : 38.

Polynices mamilla : Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser. (Nat. Hist. Sec.)*, 1(2), pt. 6 : 111, pl. 8, fig. 8.

Polinices tumidus : Cernohorsky, 1972, *Mar. Shells Pacific*, 2 : 98, pl. 25, fig. 10.

Material—(1) 1 ex. (w.), Rameswaram beach near Fisheries Bungalow, Tamil Nadu, 3 to 5-3-1925 (Coll. B. Chopra & H. S. Rao); (2) 1 ex.(d.), Sta. 12—Shore colln., Hare Id., Bay of Bengal, off Tuticorin, 22-2-1968 (Coll. A. S. Rajagopal); (3) 1 ex.(d.), Sta. 13—Shore colln., 0.4 km. N. of Tranquebar, 13-2-1975, (4) 1 ex.(d.), Sta. 13—Shore colln. near Subramaniam Temple, Tiruchendur, 25-1-1978, (5) 2 exs.(d.), Sta. 15—Shore colln., Veerapandianpattinam, 27-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

* Reference not seen in original.

Distribution—India : Bombay, Bassein and Goa, Travancore, Laksha Dwip, Pamban, Krusadai Id., Kundugal Point, Shingle Id., Madras, Andamans, Nankauri.

Elsewhere : Barbados, Persian Gulf, Gulf of Oman, Mekran Coast, Gulf of Akaba, Red Sea, Sheikh, Berkhuda, Perim Id., Aden, Maldives, Mauritius, Diego Suarez, Majunga, Ambatoloka, Bay of Befotaka, Adroka, Antaramaitsy, Tamatave, Nosy Nasatrana, Ambodifotatra, Cap St. Marie, Faux-Cap, Zanzibar, Bourbon, Mascarene, Amirantes, Seychelles, Rodriguez, Chagos, Cargados, Natal, Maungmagan, King Id. Bay, Loloan Bay, Billiton, Singapore, Gulf of Siam, Poulo-Condor, Annam, Cocos-Keeling Is., Sumatra, Java, Borneo, Celebes, Ceram, Misool, Timor, Moluccas, Amboina, Flores, Banka, Macassar, Larantuka, Bay of Bima, Adonara, Papua, Kei Is., New Guinea, Torres Strait, Annesley Bay, Queensland, New Caledonia, Lifu, Fiji Is., Solomon Is., Philippines (Bohol, Cebu, Luzon, Mindanao, Mindoro), Japan, Loochoo, Hong Kong, Fanning Id., Polynesia, Hawaiian Is.

Remarks—Shells are easily distinguishable by its pyriformly ovate shape, glossy ivory-white in appearance and with broad columellar callosity filling the umbilicus. Shell heavy, spire short; aperture semicircular and obliquely inclined.

These molluscs are generally available in the soft sand of the shore.

<i>Measurements</i> (in mm.)	Range (5 exs.)
Height	9.25 — 12.00
Maximum Diameter	14.90 — 32.50
Minimum Diameter	11.65 — 24.00

Subgenus *Neverita* Risso, 1826

Polinices (*Neverita*) *peselephanti* (Link, 1807).

(Pl. VII, Fig. 33a & 33b)

Natica peselephanti Link, 1807*, *Beschr. Nat. Samml. Univ. Rostock* (3) : 140.

Natica columnaris : Recluz, 1850, *Journ. de Conchyl.*, 1 : 394; Reeve, 1855, *Conch. Icon.*, 9, *Natica*, sp. no. 19, pl. 5, figs. 19a & 19b; Tryon, 1886, *Man. Conch.*, 8 : 47, pl. 20, fig. 4.

Albula pes-elephantae : Gravely, 1942, *Bull. Madras Govt. Mus. new ser. (Nat. Hist. Sec.)*, 5(2) : 38.

* Reference not seen in original.

Polinices (Neverita) peselephanti : Cernohorsky, 1972, *Mar. Shells Pacific*, **2** : 99, pl. 26, fig. 5.

Material—(1) 1 ex.(d.), Sta. ?—Sea shore about 3.2 km. E. of MBS., Porto Novo, 21-1-1957 (Coll. A. G. K. Menon & G. Ramakrishna) ; (2) 1 ex. (d.), Sta. 15—Shore colln., Veerapandianpattinam, 27-1-1978, (3) 1 ex. (d.), Sta. 19—Shore colln., Santhome beach, south, up to the mouth of Adyar river, Madras, 24-2-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee)

Distribution—India : Madras.

Elsewhere : Mauritius, Pasacao.

Remarks—Shell ovately ventricose, deeply umbilicated, polished ; aperture large, lunar ovate ; columella with conspicuously broad spirally entering callus, colour of the shell white to cream ; umbilical area and nuclear whorls white.

This is an uncommon species and occurs on sand-flats of intertidal zone.

<i>Measurements</i> (in mm.)	Range (3 exs.)
Height	15.10 — 15.15
Maximum Diameter	24.70 — 28.45
Minimum Diameter	18.00 — 18.65

Polinices (Neverita) effusa (Swainson, 1822).

(Pl. VIII, Fig. 34a & 34b)

Natica effusa Swainson, 1822, *Zool. Illust.*, **2**, pl. 104 (Type-locality : "Probably from India") ; Reeve, 1855, *Conch. Icon.*, **9**, *Natica*, sp. no. 15, pl. 4, figs. 15a & 15b.

Material—(1) 1 ex. (d.), Sta. 15—Shore colln., Veerapandianpattinam, Gulf of Mannar, 27-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—Moluccas.

Remarks—The species is represented in the collection by a single shell. This however possesses the characters as described by Swainson (*op. cit.*).

Shell has close resemblance with *Polinices tumidus* in colour and shine. Shell ovately ventricose, spire short; whorls convex, last whorl effused; umbilicus widely open and deep; columellar callus with a little impression of pillar in the umbilical opening; surface colour semitransparent-white, decussately striated; suture opaquely calloused. The shell under study possesses orange spiral band below the suture and on the left of umbilical periphery; aperture semilunar.

This species is very rare and considered to be a new record from India.

Measurements (in mm.)

Height	15.70
Maximum Diameter	25.00
Minimum Diameter	19.05

Subgenus **Mammilla** Schumacher, 1817

***Polinices (Mammilla) melanostomus* (Gmelin, 1791).**

(Pl. VIII, Fig. 35a & 35b)

Nerita melanostoma Gmelin, 1791, *Syst. Nat.*, Ed. XIII : 3674, sp. no. 19 (Type-locality : "in mari indico") ; Tryon, 1886, *Man. Conch.*, 8 : 50, pl. 21, fig. 13.

Natica melanostoma : Lamarck, 1838, *Hist. nat. des Anim. sans Vert.* (Deshayes edit.), 8 : 631-32 ; Reeve, 1855, *Conch. Icon.*, 9, *Natica*, sp. no. 30, pl. 8, figs. 30a & 30b.

Albula (incl. *Polinices*) *melanostoma* : Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 5(2) : 38.

Polinices (Mammilla) melanostomus : Cernohorsky, 1972, *Mar. Shells Pacific*, 2 : 101, pl. 26, fig. 8.

Material—(1) 2 exs. (d.), Sta. 2c.—Shingle Id., 2.4 km E. of Krusadai Id., 3-5-1955 (Coll. H. C. Ray) ; (2) 1 ex. (d.), Sta. 12—Hare Id., Bay of Bengal, off Tuticorin, 22-2-1968, (3) 2 exs. (d.), Sta. 13—Shore colln., Vanthivu Id., Bay of Bengal, off Tuticorin, 23-2-1968, (4) 1 ex (d.), Sta. 14—Shore colln., Kanyakumari, 24-2-1968 (Coll. A. S. Rajagopal).

Distribution—India : Madras, Andamans.

* Reference not seen in original.

Elsewhere : Madagascar, Mauritius, Seychelles Id., East Indies, Phillippines, Western Polynesia.

Remarks—Shells smooth, thin, fusiformly swollen, spire small; whorls obliquely, rudely striated and impressed with very fine spiral striae; aperture large, oblong-semilunar; columella with enamelled lamina rolled back over the umbilicus; shell colour brownish white, obscurely banded with flesh-brown; columella and umbilicus chocolate colour.

This species is rare and found in the tropical Indo-Pacific coral reefs of shallow water.

<i>Measurements</i> (in mm.)	Range (3 exs.)
Height	8.25 — 18.75
Maximum Diameter	7.15 — 30.70
Minimum Diameter	5.50 — 21.95

***Polinices (Mammilla) zanzibarica* (Recluz, 1843).**

(Pl. VIII, Fig. 36)

Natica zanzibarica Recluz, 1843, *Proc. zool. Soc. Lond.*, Pt. XI; 213 (Type-locality : Zanzibar); Reeve, 1856, *Conch. Icon.*, 9, *Natica*, sp. no. 75, pl. 17, fig. 75.

Natica melanostoma var. *zanzibarica* : Tryon, 1886, *Man. Conch.*, 8 : 50, pl. 21, fig. 15.

Natica (Ruma) zanzibarica : Melvill & Standen, 1898, *J. Conch.*, 9 : 75.

Mamilla zanzibarica : Subrahmanyam, Karandikar & Murti, 1952, *Journ. Univ. Bombay*, 21 (new ser.), pt. 3(32) : 39, fig. 39.

Material—1 ex. (d.), Sta. 8—Shore colln., behind Circuit House, Tuticorin, 21-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Bombay, Andamans.

Elsewhere : Zanzibar, Madagascar, Mauritius, Philippines, Western Polynesia.

Remarks—Shell thin, quadrangularly ovate, spire depressed; whorls longitudinally plicately striated, striae again intersected by fine spirally impressed striae; body whorl very large and inflated; aperture large

and squarely ovate; columella broadly reflected back and almost covers the umbilicus; surface colour white with interrupted brown bands; umbilical area dark chestnut.

This species is moderately uncommon and its occurrence is on coral-reefs and coarsely sandy beach of shallow water.

Measurements (in mm.)

Height	9.85
Maximum Diameter	17.85
Minimum Diameter	10.30

Subgenus **Glossaulax** Pilsbry, 1929

Polinices (Glossaulax) didyma (Roeding, 1798).

(Pl. IX, Fig. 37a & 37b)

Albula didyma Roeding, 1798, *Mus. Bolten.* : 20, sp. no. 245 (Type-locality : Not known).

Natica lamarckiana : Reeve, 1855, *Conch. Icon.*, 9, *Natica*, sp. no. 6, pl. 2, figs. 6a & 6b.

Natica didyma : Crichton, 1941, *J. Bombay nat. Hist. Soc.*, 42(2) : 333, pl. 2, fig. 5, Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 5(2) : 37; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.) 1(2), pt. 6 : 110, pl. 8, fig. 5.

Polinices (Glossaulax) didyma : Cernohorsky, 1972, *Mar. Shells Pacific* : 100, pl. 26, fig. 3.

Material—(1) 1 ex.(d.), Sta. ?—Sea shore, about 3.2 km. E. of MBS., Porto Novo, 21-1-1957 (Coll. A. G. K. Menon & G. Ramakrishna); (2) 2 exs.(d.), Sta. 8—Shore colln., Agasthiampalli, 10 km. N. of Point Calimere, 17-2-1968, (3) 2 exs.(d.), Sta. 16—Shore colln., near Tamil Nadu State Fisheries Extension Unit, Tuticorin, 25-2-1968 (Coll. A. S. Rajagopal); (4) 1 ex.(d.), Sta. 4—Coastal water of Madras, N. of Harbour, on board “Chota Investigator”, 6-7 fms., 29-1-1975, (5) 2 exs. (d.), Sta. 3—Shore colln., Sethubabachatram, Palk Bay, 14-1-1978, (6) 1 exs.(d.), Sta. 6—Shore colln., Keelakkarai, Gulf of Mannar, 18-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Bombay, Pamban Id., Shingle Id., Madras,

Elsewhere : Mekran Coast, Karachi, Indian Ocean (Mauritius)
Japan, Australia.

Remarks—Shell large, thick, globose, umbilicated, laterally slightly compressed, spire a little exerted; whorls rounded with oblique growth-striae and depressedly concave in the upper part; aperture semi-ovate; columellar callus terminates towards umbilical opening in a broad transverse expansion deeply grooved in the middle and the posterior larger part of it fuses with the body whorl; umbilicus partly covered with the callus leaving wide excavated angular opening; surface colour ranges from greyish white to pale brown; callus and the interior of aperture deep chestnut.

<i>Measurements</i> (in mm.)	Range (8 exs.)
Height	5.25 — 26.05
Maximum Diameter	8.80 — 43.20
Minimum Diameter	6.50 — 86.80

Polinices (Glossaulax) lamarckii (Chenu, 1843).

(Pl. IX, Fig. 38a & 38b)

Natica lamarckii Chenu, 1843*, *Illustr. Conch., Natica*, pl. 2 (Type-locality : Not known); Recluz, 1843, MS., *Illustr. Conch., Natica*, pl. 2.

Natica chemnitzii : Reeve, 1855, *Conch. Icon.*, 9, *Natica*, sp. no. 6, pl. 2, figs. 6a & 6b.

Natica lamarckii : Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 5(2) : 37; Satyamurti, 1952, (Nat. Hist. Sec.), 1(2), pt. 6 : 110, pl. 8, fig. 6.

Material—(1) 1 ex. (d.), Sta. 1—Coastal waters of Madras off Thondiyarpet, on board "Chota Investigator", 25-1-1975, (2) 1 ex.(d.), Sta. 11—Shore colln., opposite Fort to the N. of Uppanar, Tranquebar, 11-2-1975 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Bombay, Pamban Id., Shingle Id., Madras.

Elsewhere : Mekran Coast, Karachi, Indian Ocean (Mauritius), Australia, China, Japan.

* Reference not seen in original.

Remarks—Shell large, thick, globose with partially covered umbilicus, spire convex and little exerted; whorls rounded, concave in the upper part, body whorl inflated; columella bears broad transversely expanded callus directed towards body whorl with a median groove but the anterior part of callus here as large as posterior one or little large and also the tip recurved; umbilicus greatly covered leaving an angular opening; surface smooth, obliquely striated and coloured from greyish white to pale brown; callus and the interior of aperture deep chestnut.

The species commonly occurs on sandy beach in intertidal and deeper regions. I agree with Satyamurti (1952) to keep it as a distinct species.

<i>Measurements</i> (in mm.)	Range (2 exs.)
Height	13.90 — 24.40
Maximum Diameter	21.85 — 36.35
Minimum Diameter	17.50 — 29.75

Subfamily SININAE

This group of Naticids are pelagic and the subfamily represented here by two genera *Eunaticina* P. Fischer and *Sinum* (Bolten) Roeding.

Key to the species :

Shell little depressed, spire elevated ; umbilicus deep and circular, sometimes with reflected columellar callus	...	<i>Eunaticina</i>
Shell much depressed, spire short ; umbilicus rudimentary or closed ; columellar lip arched ; surface spirally flatly ridged	...	<i>Sinum</i>

Genus ***Eunaticina*** P. Fischer, 1885

Type-species : *Nerita papilla* Gmelin.

Key to the species :

Shell auricular in shape, spire exerted and demarkated from the body whorl by a shallow sutural groove ; colu- mella weakly calloused ; surface spirally grooved, grooves intersected by tran- spiral growth lines	...	<i>papilla</i>
---	-----	----------------

Shell globose, spire depressed without
any sutural groove; columellar callus
well developed with a medial groove;
surface with regular spiral groove ... *coarctata*

***Eunaticina papilla* (Gmelin, 1791).**

Nerita papilla Gmelin, 1791, *Syst. Nat.*, Ed. XIII, 1(6) : 3675, sp. no. 20 (Type-locality : Tranquebar).

Sigaretus papilla : Reeve, 1864, *Conch. Icon.*, 15, *Sigaretus*, sp. no. 19, pl. 4, figs. 19a & 19b; Tryon, 1886, *Man. Conch.* 8 : 58, pl. 25, figs. 78, 79 & 87.

Eunaticina papilla : Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.) 5(2), pt. 6 : 113, pl. 8, fig. 11; Cernohorsky, 1972, *Mar. Shells Pacific*, 2 : 102, pl. 27, fig. 5.

Material—(1) 1 ex. (d.), Sta. 2d—Galaxea reef, 4-5-1955, (2) 1 ex.(d.), Sta. 3b—Rocky shore of Gulf of Mannar near Quarantine Camp, Mandapam, 11-5-1955 (Coll. H. C. Ray); (3) 1 ex.(d.), Sta. ?—Sea shore about 3.2 km. E. of MBS., Porto Novo, 21-1-1957, (4) 1 ex.(d.), Sea shore near Pudupet, about 4 km. E. of MBS., Porto Novo, 22-1-1957 (Coll. A. G. K. Menon & G. Ramakrishna); (5) 2 exs.(d.), Sta. 7—Shore colln., Point Calimere, 16-2-1968, (6) 11 exs.(d.), Sta. 8—Shore colln., Agasthiampalli, 17-2-1968, (7) 5 exs.(d.), Sta. 9—Shore colln. Vedaraniyam, 18-2-1968, (8) 1 ex.(d.) Sta. 16—Shore colln., Tamil Nadu State Fisheries Extension Unit, Tuticorin, 25-2-1968 (Coll. A. S. Rajagopal); (9) 1 ex.(d.), Sta. 11—Shore colln. opposite Fort to the mouth of Uppanar, Tranquebar, 11-2-1975, (10) 2 exs.(d.), Sta. 14—Shore colln. beyond Fisherman's village, N. of Fort, Tranquebar, 14-2-1975 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India Bombay, Pamban, Madras, Tranquebar.

Elsewhere : Persian Gulf, Gulf of Oman, Mekran Coast (E. of Jask to Chorbar), Karachi, Penang, Moluccas, Japan, Island of Negros, Philippines, Fiji Is.

Remarks—This species is variable in shape. Shell moderately small, auricular in shape, umbilicated, spire exerted leaving a distant shallow groove between body whorl and spire; surface sculptured throughout with fine, regular evenly spaced spiral grooves intersected by finer close-set transpiral growth lines; columella with weak callus; aperture large, ovate, posteriorly narrow.

The shells from Tranquebar represent topotypes of the species and are collected from sandy shore.

<i>Measurements</i> (in mm.)	Range (5 exs.)
Height	7.30 — 15.55
Maximum Length	15.15 — 35.10
Width	12.90 — 25.55

***Eunaticina coarctata* (Reeve, 1864).**

(Pl. X, Fig. 40a & 40b)

Sigaretus coarctatus Reeve, 1864, *Conch. Icon.*, **15** : *Sigaretus*, sp. no. 17, pl. 4, figs. 17a & 17b (Type-locality : Singapore).

Eunaticina coarctata : Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), **5** (2) : 38.

Material—(1) 2 exs.(d.) Sta. 4—Coastal waters of Madras, N. of Harbour, on board “Chota Investigator”, 6-7 fms., 29-1-1975 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Ennur Backwater, Madras, Andamans.

Elsewhere : Singapore.

Remarks—Most distinctive characters of this species are its globose shape and expanded callus on the columella.

Shell thick, globosely ovate, deeply umbilicated, spire short; whorls slopingly contracted above, swollen towards base; body whorl slightly oblique; suture scarcely sunken; remnants of fulvous epidermis present; surface spirally linearly grooved; columellar callus strongly developed with a prominent transverse groove in the middle and anteriorly partly covers the umbilicus; aperture oblong-ovate; surface coloured whitish.

This species is very rare and occurs deeply beyond intertidal zone. Some shells present in the reserve collection of Z.S.I. from Andaman Islands are immature. This collection from Madras is undoubtedly a good acquisition for the NZC. of Zoological Survey of India.

<i>Measurements</i> (in mm.)	Range (2 exs.)
Height	7.80 — 9.10
Maximum Diameter	12.95 — 15.35
Minimum Diameter	9.95 — 10.15

Genus *Sinum* Roeding, 1798.Type-species : *Helix haliotoidea**Key to the species :*

1. Shell openly umbilicated, columella straight ... 2
- Shell with rudimentary umbilicus, columella arched ... 3
2. Shell ventricose, spire short, suture depressed, spirally grooved and transpirally plicated ; columella straight with little callus ; aperture ovate and posteriorly angulated ... *tumescens*
3. Shell depressedly plano-convex, ear-shaped, spire suppressed, apex nearly eccentric, spirally ridged and concentrically wrinkled ; apex livid-brown ; aperture oblong ovate ... *delesserti*
- Shell ovately raised, ear-shaped, spire reduced and with convexity on body whorl, spirally striated and transpirally plicated ; apex brown ; aperture ovate ; umbilicus with long depression ... *neritoideum*

Sinum delessertii (Recluz, 1843)-

(Pl. X, Fig. 41)

Sigaretus delessertii Recluz, 1843*, *Illustr. Conch.*, *Sigaretus* : 21, pl. 3, fig. 8 (Type-locality : Not known) ; Reeve, 1864, *Conch. Icon.*, **15**, *Sigaretus*, sp. no. 10, pl. 2, figs. 10a & 10b ; Tryon, 1886, *Man. Conch.*, **8** : 58, pl. 25, fig. 73 ; Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), **5** (2) : 38-39, fig. 6c.

* Reference not seen in original.

Material—(1) 2 exs. (d.), Sta. 7—Shore colln., Point Calimere, 16-2-1968, (2) 2 exs. (d.), Sta. 9—Shore colln., Vedaranyam, 18-2-1968 (Coll. A. S. Rajagopal); (3) 2 exs. (w.), Sta. 4—Coastal waters of Madras, N. of Harbour, on board “Chota Investigator”, bottom trawl, 6-7 fms., 29-1-1975, (4) 1 ex. (d.), Sta. 22—Shore colln., 1 km. S. of Adyar River mouth, Madras, 27-2-1975 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Kundugal Point in the Gulf of Mannar, Madras.

Elsewhere Madagascar, Burma, Arakan, Maungmagan, Java, Island of Luzon, Philippines.

Remarks—Shell depressedly plano-convex, ear-shaped like *Haliotis*, spine very small and suppressed; whorls spirally, flatly ridged, concentrically plicately wrinkled; aperture elongated; surface colour ash-white with pale interrupted bands of livid-brown; apex livid-violet.

This species is very delicate and occurs on muddy sand-flats where tidal shock is very less.

<i>Measurements</i> (in mm.)	Range (7 exs.)
Height	2.85 — 7.65
Maximum Diameter	11.40 — 31.70
Minimum Diameter	8.90 — 23.25

***Sinum neritoideum* (Linnaeus, 1767)-**

(Pl. X, Fig. 42)

Helix neritoidea Linnaeus, 1767, *Syst. Nat.*, Ed. XII : 1250, sp. no. 711 (Type-locality : Not-known).

Sigaretus neritoideus : Reeve, 1864, *Conch. Icon.*, 15, *Sigaretus*, sp. no. 5, pl. 1, figs. 5a & 5b; Tryon, 1886, *Man. Conch.*, 8 : 55, pl. 22, fig. 35.

Sinum neritoideum : Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 5 (2) : 38-39, fig. 6a; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.) 1 (2), pt. 6 : 112, pl. 8, fig. 10.

Material—(1) 7 exs.(d.), Sta. 7—Shore colln , Point Calimere, 16-2-1968, (2) 22 exs(d.), Sta. 8—Shore colln., Agasthiampalli, 17-2-1968, (3) 17 exs (d.), Sta. 9—Shore colln., Vedaranyam, 18-2-1968 (Coll.

A. S. Rajagopal) ; (4) 1 ex.(d.), Sta. 3—Shore colln., Kovelong, 55 km. S. of Madras, 28-1-1975, (5) 1 ex.(d.), Sta. 19—Shore colln., Santhome beach, S. up to the mouth of Adyar River, Madras, 24-2-1978 (Coll. A. S. Rajagopal & H. P. Mookherje).

Distributioin—India : Kundugal Point, Madras.

Elsewhere : Karachi, Straits of Malacca.

Remarks—Shell thin, ovately ear-shaped, spire exerted as a small convexity and almost terminal ; body whorl ovately depressed ; surface sculptured with close-set spiral striae and finely transpiral plications ; aperture wide, ovate ; interior smooth, glossy ; columella slightly arched with a little callosity ; umbilicus open with an elongated depression ; surface colour all along white with a brownish tinge.

This species is commonly found in Indo-Pacific region and occurs on sand-falts of shallow water.

<i>Measurements</i> (in mm.)	Range (49 exs.)
Height	5.00 — 12.90
Maximum length	12.50 — 32.80
Width	9.65 — 32.85

***Sinum tumescens* (Reeve, 1864).**

(Pl. X, Fig. 43)

Sigaretus tumescens Reeve, 1864, *Conch. Icon.*, **15** : *Sigaretus*, sp. no. 18, pl. 4, .figs. 18a & 18b (Type-locality : Not known) ; Tryon, 1886, *Man. Conch.*, **8** : 58, pl. 25, fig. 82.

Material—1 ex.(d.), Sta. 8—Shore colln., behind Circuit House, Tuticorin, 21-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Sand heads off Calcutta.

Elsewhere : Not known.

Remarks—Shell thin, oblong-ovate, ventricose, umbilicated, spire short ; suture depressed ; body whorl inflated ; surface sculptured with prominent spirally incised grooves and concentrically plicated growth

lines; columella more or less straight with a rudimentary callus; aperture ovate, posteriorly angulated; surface colour whitish.

This species is very rare and occurs on sand-flats in shallow water.

Measurements (in mm.)

Height	9.10
Maximum Length	19.40
Width	14.60

Family CASSIDAE

Only one genus *Phalium* Link is represented in the collection.

Shell moderately large, spire acuminate, sometimes with former varices; aperture angular above and widened below; false and the true umbilicus open; parietal shield moderately developed; anterior canal short; outer lip reflected with row of denticles

... *Phalium*

Genus *Phalium* Link, 1807

Type-species : *Buccinum cornatum* Linnaeus.

Key to the genera :

1. Shell solid, spire elevated, dorsum humped due to an underlying former varix; columellar shield sharp, cemented on lower half of first former varix, plicate and pustulate; true and false umbilicus almost sealed; surface cancellate and ornamented with 5 spiral rows of large squarish marks of yellowish tan or chestnut brown

... *areola*

Shell weak, spire little exerted, without humpy dorsum; columellar shield not like above; true and false umbilicus deeply open; sculpture and ornamentation different

... 2

2. Shell thin, spire exerted, suture wide and angularly channelled in last two whorls; last varix or outer lip heavy and recurved; columellar shield rugose; teeth inside outer lip 17-20 and uniformly strong; surface sculptured with distant spiral incised lines and ornamented with 4-5 squarish yellow-orange marks

... *canaliculatum*

Shell thick, spire depressed, suture impressed, last varix not heavy or recurved; columellar shield lirate; teeth inside outer lip numerous and both of weak and strong; surface sculptured with close-set incised lines and ornamented with 5-6 squarish yellowish brown marks

... *bisulcatum*

Subgenus *Phalium* Link, 1807

Type-species : *Buccinum glaucum* Linnaeus, 1758.

Phalium (*Phalium*) *areola* (Linnaeus, 1758).

(Pl. X, Fig. 44)

Buccinum areola Linnaeus, 1758, *Syst. Nat.*, Ed. X : 736, sp. no. 389 [Type-locality : "M. Mediterraneo" (erroneous) Abbott, 1968].

Cassis alea : Roeding, 1798, *Mus. Bolten.* : 31, sp. no. 374.

Cassis areola : Lamarck, 1844, *Hist. nat. des Anim. sans Vert.* (Deshayes edit.) ; 10 : 27-28 ; Reeve, 1840, *Conch. Icon.*, 5, *Cassis*, sp. no. 24, pl. 9, fig. 24 ; Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 5(2) : 42-43, fig. 7a ; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 1(2), pt. 6 : 136, pl. 11, fig. 1.

Phallum (*Phalium*) *areola* : Abbott, 1968, *Indo-Pac. Moll.*, 2(9) : 86-88, pl. 7, figs. 5-7.

Phalium areola : Cernohorsky, 1972, *Mar. Shells Pacific*, 2 : 104-105, pl. 1, fig. 2.

Material—1 ex. (d.), Sta. 1—Coastal waters of Madras off Thondiyarpeta, on board "Chota Investigator", 25-1-1975 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Pamban, Madras, Vishakhapatnam, Andamans.

Elsewhere : Mediterranean Sea, South Africa, Mozambique, Kenya, Madagascar, Mauritius, Diego Suarez, Antaramaitasy, Fort Dauphin, Tamatave, Seychelles, Rodriguez, Cargados, Sri Lanka, Burma, Maungmagan, Thailand, Singapore, Sumatra, Java, Bachan, Obi, Halmahera, Amboina, Manokwari, Timor, Misool, Port of Sumbawa, New South Wales, Solomon Is., Philippines (Cavite, Cebu, Mindanao, Mindoro, Negros), China, Japan, Ryukyus, Taiwan, Indonesia, New Guinea, Bismarks, Australia, New Caledonia, Gilbert Is., Samoa.

Remarks : Shell moderately large, solid, heavy. The species is easily distinguishable by its spiral rows of large squarish marks of chest-nut brown or yellowish-tan on the body whorl with 2-5 former varices in the spire; post-nuclear whorls with 5-7 spiral rows of beads which is absent in the body whorl; body whorl angularly shouldered with weak axial ridges and with some spiral grooves at the base; aperture elongate; parietal shield moderately developed with oblique plications at the upper end; columella with a series of plications; outer lip strongly reflected with raised teeth on the inner edge; umbilicus almost sealed by a former varix; false umbilicus sealed or minutely open; anterior canal deep, deflected to left.

This species ranges from East Africa to Samoa. It is more common toward Australia and Philippines. This occurs in intertidal region of sand and mud.

Measurements (in mm.)

Height	38.30
Length	71.00
Width	46.20
No. of whorls	6+
No. of varices	4

Subgenus **Semicassis** Moersch, 1852

Type-species : *Phalium bisulcatum* Schubertt & Wagner, 1827.

***Phalium* (Semicassis) canaliculatum** (Bruguere, 1792).

(Pl. XI, Fig. 45a & 45b)

Cassidea canaliculata Bruguere, 1792, *Encycl. Meth. Vers.*, 1(2) : 423 (Type-locality : Not known).

Cassis canaliculata : Lamarck, 1844, *Hist. nat. des Animaux sans Vert.* (Deshayes edit.), **10** : 37 ; Kiener, 1835*, *Coq. Viv.*, **8**, *Cassis* : 32-33, pl. 14, fig. 28 ; Reeve, 1849, *Conch. Icon.*, **5**, *Cassis*, sp. no. 8, pl. 3, fig. 8.

Phalium canaliculatum : Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), **5**(2) : 42-43 ; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), **1**(2), pt. 6 : 137, pl. 11, fig. 3.

Phalium (Semicassis) canaliculatum : Abbott, 1968, *Indo-Pac. Moll.*, **2**(9) : 132-133, pl. 8, figs. 5 & 6.

Material—(1) 1 ex. (d.), Sta. 17—Costal waters of Pondicherry to Nallavarukuppam, on board I.F.S. No. 3, 5-7 fms., 18-2-1975, (2) 1 ex. (d.)', Sta. 15—Shore colln., Veerapandianpattinam, 27-1-1978 (Coll. A S. Rajagopal & H. P. Mookherjee).

Distribution—India : Orissa (Gopalpore), Pamban, Tuticorin, Karaikal, Madras.

Elsewhere : Sri Lanka, Philippines, China (Honkong), Japan.

Remarks—Shell thin, smooth, globose with deeply channeled suture and broadly excavated grooves like *Babylonia spirata* of the family Buccinidae.

Shell thin, smooth, globose with deeply channeled suture, exerted spire having 1-5 former varices and well developed rugose parietal shield ; nuclear whorls smooth, opaque ; few post-nuclear whorls with 6-8 spiral thread lines crossed by oblique axial lines ; body whorl uniformly traversed by 17-20 incised spiral grooves ; aperture anteriorly, broad and posteriorly narrow ; true and false umbilicus small but deep ; left edge of the parietal shield undulating ; outer lip reflected and denticulate inside ; columellar lip strongly but irregularly plicated and with few transverse ridges in the upper part ; surface with 4 or 5 rows of small squarish, light yellow-orange marks on creamy base.

Measurements (in mm.)

Height	24.55
Length	45.40
Width	30.00
No. of whorls	7

* The date is determined as per Sherborn, C. D. and Woodward, B. B., 1901, *Proc. malac. Soc. Lond.*, **4**(5) : 216-219.

Phalium (Semicassis) bisulcatum (Schubert and Wagner).

(Pl. XI, Fig. 46a & 46b)

Cassis bisulcata Schubert & Wagner, 1829, *Conchyl. Cab.*, Nuremberg, 12 : 68, figs. 3081, 3082 (Type-locality : Not known) ; Reeve, 1849, *Conch. Icon.*, 5, *Cassis*, sp. no. 8, pl. 3, fig. 8.

Phalium bisulcatum : Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 5(2) : 42-43 ; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 1 (2), pt. 6 : 137, pl. 11, fig. 4.

Phalium (Semicassis) bisulcatum : Abbott, 1968, *Indo-Pac. Moll.*, 2 (9) : 126-131, pl. 8, figs. 13-21.

Material—(1) 2 exs.(d.), Sea shore near Pudupet about 4 km. E. of MBS., Porto Novo, 22-1-1957, (2) 1 ex.(d.), Sea coast near China tarangapatti, 4.8 km. N. of Tranquebar, 2-2-1957 (Coll. A. G. K. Menon & G. Ramakrishna) ; (3) 1 ex.(d.), Sta. 15—Shore colln., Veerapandianpattinam, 27-1-1978 (Coll. A. S. Rajagopai & H. P. Mookherjee).

Distribution—India : Shingle Id., Madras, Karaikal, Andamians.

Elsewhere : South and East Africa, Zanzibar, Madagascar, Persian Gulf, Gulf of Oman, Burma, Thailand, Malay, Palau Is., Philippines, China, Japan, Ryukyu Is.

Remarks—Shell thick, smooth, ovately globose, spire depressedly conical, spirally striated ; last two whorls rounded but slightly shouldered due to strong spiral cords below the impressed suture ; body whorl smooth with numerous close-set incised lines ; aperture and columella like earlier species but teeth on the inner edge of the outer lip numerous ; characteristic spiral rows of squarish yellow spots clearly discernible in the specimen.

This species is widely distributed in the central Indo-Pacific and occurs on reef edge below low tide line.

Measurements (in mm.)

Height	26.10
Length	48.25
Width	31.30
No. of whorls	6½

Family TONNIDAE

A single genus *Tonna* Bruennich, 1771 is represented in the collection.

Shell large, thin, ovoid or globular with inflated body whorl, spire short ; surface with uniformly distant spiral grooves or ribs, secondary ribs may be present ; aperture with anterior canal

... *Tonna*

Genus *Tonna* Bruennich, 1771

Type-species : *Buccinum galea* Linnaeus.

Key to the species :

1. Shell thin, outer lip fluted and without any denticulation, siphonal fasciole absent

... 2

Shell thick, outer lip fluted and denticulated, sometimes with siphonal fasciole

... 3

2. Shell ovately globose ; surface with cords and intermediate threads ; columella twisted at its lower part ; surface ornamented with quadrate, reddish brown spots on cords

... *dolium*

3. Shell moderate in size, solid ; globosely ovate, canaliculate suture ; surface with spiral cords but intercostal spaces may be smooth or with single thread ; columella with upper half calloused and lower half twisted ; surface ornamented with 3-4 brown bands

... *sulcosa*

Shell moderately large, solid, globose, suture simple ; surface with spiral cords and intercostal spaces twin-grooved ; columella with a siphonal fasciole, prominently twisted at lower half and folded over deep umbilicus ; surface ornamented with brown spots and axial streaks

... *cumingii*

***Tonna dolium* (Linnaeus, 1758).**

(Pl. XII, Fig. 47)

Buccinum dolium Linnaeus, 1758, *Syst. Nat.*, Ed. X : 735, sp. no. 380 (Type-locality : "M. Siculo").

Dolium maculatum : Reeve, 1849, *Conch. Icon.*, 5 : *Dolium*, sp. no. 4, pl. 3, fig. 4 ; Vredenburg, 1919, observations on Doliidae, *Mem. Indian Mus.*, 7 : 150, pl. 4, figs. 1-3, pl. 5, figs. 4-6.

Tonna dolium : Crichton, 1941, *J. Bombay nat. Hist. Soc.*, 49 : 331 ; Gravely, 1942, *Bull. Madras Govt. Mus. new ser. (Nat. Hist. Sec.)*, 5(2) : 45 ; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser. (Nat. Hist. Sec.)*, 1(2), pt. 6 : 146-147, pl. 13, figs. 1a & 1b ; Cernohorsky, 1972, *Mar. Shells Pacific*, 2 : 109-10, pl. 31, figs. 2 & 2a.

Material—(1) 1 ex.(d.), Sta. 1—Sea shore at Agasthiampalli, 10 km. N. of Point Calimere, 8-2-1962 (Coll. V. K. Premkumar & P. K. Chakrabarti) ; (2) 13 exs.(d.), Sta. 16—Shore colln., Point Calimere, 16-2-1968, (3) 10 exs. (d.), Sta. 17—Shore colln., Agasthiampalli, 10 km. N. of Point Calimere, 17-2-1968, (4) 11 exs.(d.), Sta. 18—Shore colln., Vedaraniyam, 18-2-1968 (Coll. A. S. Rajagopal) ; (5) 1 ex.(d.), Sta. 17—Coastal waters of Pondicherry up to Naliavarukuppam on board I.F.S. No. 3, 5-7 fms., 18-2-1975, (6) 1 ex.(d.), Sta. 15—Shore colln., Mallepattinam, eastward to Pudupattinam, 13-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Pamban, Krusadai Id., Shingle Id., Madras, Sand heads near Calcutta.

Elsewhere : Karachi, Indian Ocean, Indonesia, Australia, New Zealand, Philippines, Japan, Fiji.

Remarks—Shell large, moderately thin, ovate ventricose with globular body whorl and depressedly conical spire ; suture impressed and more less canaliculate in bigger shells ; surface ornamented with strong raised distant spiral ribs, 2-4 ribs on the penultimate whorl and 11 to 18 ribs on the body whorl ; intercostal spaces with much finer ridges with the medium one stronger ; columella straight, obliquely produced ; aperture wide, interior with spiral depressions corresponding to external ribs ; outer lip thin, fluted ; surface white or cream in colour, broad spiral ribs marked with quadrate or rectangular reddish-brown spots, nuclear whorls brown.

Specimens were collected in the intertidal zone and some of them with hermit crabs within the shell.

<i>Measurements</i> (in mm.)	Range (35 exs.)
Height	17.25.— 69.10
Length	26.30 — 104.45
Maximum Diameter	20.20 — 84.45

***Tonna sulcosa* (Born, 1778).**

(Pl. XII, Fig. 48)

Buccinum sulcosum Born, 1778*, *Mus.* : 241.

Buccinum fasciatum : Bruguiere, 1789 (non Mueller, 1774) *Encycl Meth. Vers.* : 247.

Dolium fasciatum : Reeve, 1845, *Conch. Icon.*, 5, *Dolium*. sp. no. 11, pl. 7, fig. 11.

Tonna fasciata : Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 5(2) : 46; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 1(2), pt. 6 : 147-148, pl. 13, fig. 3.

Tonna sulcosa : Cernohorsky, 1972, *Mar. Shells Pacific*, 2 : 110-111, pl. 31, fig. 3.

Material—2 exs. (d.), Sta. 8—Shore colln., Agasthiampalli, 10 km. N. of Point Calimere, 17-2-1968 (Coll. A. S. Rajagopal).

Distribution—India : Krusadai Id., Madras, Vishakhapatnam, Orissa (Balasore Bay), Andamans.

Elsewhere : Sri Lanka, Philippines, China (Hongkong).

Remarks—Shell moderately thin, umbilicated, globosely ovate with large ovately inflated body whorl and a short conical spire; suture canaliculate, first post-nuclear whorls sculptured with spiral threads and radiating striae; penultimate whorl with 5 spiral cords with intermediate thread; body whorl traversed by 19-21 close-set flattened spiral ribs and intercostal spaces with a fine intermediate thread; columella calloused, glazy and prominently twisted at the anterior end; aperture wide with flattened outer lip denticulated with pair of denticles; shell colour white, body whorl with 4 brown bands, nuclear whorls purplish brown.

* Reference not seen in original.

This species is not so common and ranges from Indian Ocean and East Australia to Western Pacific. They are generally found in deep-sea water.

Measurements (in mm.)	Range (2 exs.)
Height	36.60 — 43.50
Length	61.65 — 74.70
Maximum Diameter	46.15 — 55.95

***Tonna cumingii* (Reeve, 1849).**

(Pl. XII, Fig. 49)

Dolium cumingii Reeve, 1849, *Conch. Icon.*, 5, *Dolium*, sp. no. 13, pl. 8, fig. 13
(Type-locality : Philippine Islands).

Tonna cumingii : Winckworth and Tomlin, 1933, *Proc. malac. Soc. Lond.*, 20, *Tonna* (=Dolium) : 209; Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 5(2) : 46; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 1 (2), pt. 6 : 148-149, pl. 13, figs. 5a & 5b; Cernohorsky, 1972, *Mar. Shells Pacific*, 2 : 111-112, pl. 30, fig. 5.

Material—(1) 1 ex. (d.), Sta. 12—Galaxea reef. 4-5-1955 (Coll. H. C. Ray); (2) 1 ex. (d.), Sta. 12—Coastal waters of Tuticorin, on board 'Meena Saudagar', Exploratory Fisheries Research Project Vessel, bottom traw, 24-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Krusadai Id., Madras.

Elsewhere : Persian Gulf, Indonesia, East Australia, New Zealand, Philippines, China, Japan.

Remarks—Shell thick, ovate, ventricose, inflated, spire short; penultimate whorl bears intermediate threads; sculptured with 6-7 main spiral cords, body whorl with 21 to 22 flat close-set ribs; intercostal spaces between main ribs on the upper part of the body whorl twin grooved with a single narrow thread; aperture widely open; outer lip fluted and toothed; columella with a sharp callus folded over deep umbilicus; anterior siphonal fasciole twisted; shell cream or light-fawn with brown spots and short axial streaks or brown patches with white V-shaped markings, sometimes they are dark-brown and maculated with white blotches, edge of the outer lip brown.

This species occurs in the deep sea sandy areas beyond the reef edge.

<i>Measurements</i> (in mm.)	Range (2 exs.)
Height	25.30 — 33.80
Length	41.60 — 55.90
Maximum Diameter	29.70 — 39.75

Family FICIDAE

Only one genus *Ficus* Roeding is represented in this family.

Shell long with bulbous body whorl,
spire depressed; surface reticulately
sculptured by ridges; siphonal canal
slender

... *Ficus*

Genus **Ficus** Roeding, 1798

Type-species : *Ficus variegata* Roeding
(= *Murex ficus* Linnaeus, 1758).

Key to the species :

Shell slender, spire depressed, bulbous
at the shoulder; siphonal canal curved
left; surface sculptured with close-set
spiral ridges and crossed by less deve-
loped longitudinal lirae and orna-
mented with white spiral lines macu-
lated with dark brown and white
marks

... *variegata*

Shell more slender, spire flatly de-
pressed not so bulbous at shoulder;
siphonal canal straight; surface sculp-
tured prominently reticulate with spiral
ridges intersected by well developed
longitudinal ridges, ornamented with
white spiral bands and scattered reddish
brown spots on them

... *ficoides*

***Ficus variegata* Roeding.**

(Pl. XII, Fig. 50)

Ficus variegata Roeding, 1798, *Mus. Bolten.* : 148, sp. no. 1852 (Type-locality :
Not known).

Ficula laevigata : Reeve, 1847, *Conch. Icon.*, 4, *Ficula*, sp. no. 4, pl. 1, fig. 4.

Ficus ficus : Gravely, 1942, *Bull. Madras Govt. Mus. new ser. (Nat Hist. Sec.)*, 5(2) : 46, Text-fig. 7f.

Ficus variegata : Cernohorsky, 1972, *Mar. Shells Pacific*, 2 : 113, pl. 33, fig. 1.

Material—(1) 2 exs. (d.), Sta. ?—Sea shore about 3.2 km. E. of MBS., Porto Novo, 25-1-1957, (2) 1 ex. (d.), Sta. ?—Sea coast near Chinna Tarangapatti, 4.8 km. N. of Tranquebar, 2-2-1957 (Coll. A. G. K. Menon & G. Ramakrishna); (3) 1 ex. (d.), Sta. 1—Sea shore, Agasthiampalli, 10 km. N. of Point Calimere, 8-2-1962 (Coll. V K. Premkumar & P. K. Chakrabarti); (4) 35 exs. (d.), Sta. 7—Shore colln., Poin Calimere, 16-2-1968, (5) 62 exs. (d.), Sta. 8—Shore colln., Agasthiampalli, 10 km. N. of Point Calimere, 17-2-1968, (6) 7 exs. (d.), Sta. 9—Shore colln., Vedaraniyam, 12 km. N. of Point Calimere, 18-2-1968, (7) 1 ex. (d.), Sta. 16—Shore colln. near Tamil Uadu State Fisheries Extension Unit, Tuticorin, 25-2-1968 (Coll. A. S. Rajagopal); (8) 3 exs. (w.), Sta. 17—Coastal waters of Pondicherry up to Nallavarukuppam, on board I.F.S. No. 3, Bottom Trawl at 5-7 fms., 18-2-1975, (9) 1 ex. (d.), Sta. 18—Shore colln., Veerapandianpattinam Village, 4 km. S. of Jetty, Pondicherry, 19-2-1975, (10) 2 exs. (d.), Sta. 21—Coastal waters of Madras Harbour old entrance to University building, 26-2-1975, (11) 1 ex. (d.), Sta. 6—Shore colln., Keelakkarai, Gulf of Mannar, 18-1-1978, (12) 2 exs. (d.), Sta. 13—Shore colln., near Subramaniam Temple, Tiruchendur, 25-1-1978, (3) 2 exs. (d.), Sta. 15—Shore colln., Veerapandianpattinam, 27-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India Gulf of Kutch, Bombay, Travancore Coast, Tuticorin, Nagapattinam, Madras, Vishakhapatnam, Puri.

Elsewhere : Persian Gulf (Kais Id.), Mekran Coast, Red Sea, Charbar Bay, Gulf of Aden, Mauritius, Madagascar, Zanzibar, Bourbon, Natal, Saya de Malha Banks, Sri Lanka, Maungmagan, Tavoy Coast, Singapore, Gulf of Siam, Annam, Pedang, Sumatra, Banka, Celebes, Amboina, Obi, Moluccas, Timor, Philippines (Miadanao, Sulu Sea, Zamboanga), New Guinea, Indonesia, China (Hong Kong), Formosa, Japan.

Remarks—Shell thin, pyriformly ventricose, bulbous at the shoulder, spire depressed; surface sculptured with regular close-set spiral ridges with finer intermediate ridges and longitudinal lirae in the interstices; aperture wide, long and violet in colour; columella concave;

siphonal canal turned towards left; surface colour bluish-grey or brown traversed normally by 4-5 conspicuous white bands with brown marks on them and maculated with scattered dark-brown, white blotches; sutural area white.

<i>Measurements</i> (in mm.)	Range (75 exs.)
Length	15.20 — 70.90
Maximum Diameter	9.20 — 45.40
Minimum Diameter	7.10 — 36.80

Ficus ficoides (Lamarck, 1822).

(Pl. XIII, Fig. 51)

Pyrula ficoides Lamarck, 1822, *Hist. nat. des Anim. sans Vert.*, 7 : 142 (Type-locality : "l'Océan des Grandes-Indes ?") : Deshayes edit., 1843, *Hist. nat. des Anim. sans Vert.*, 9 : 511-512.

Ficula reticulata : Reeve, 1847 (not Lamarck, 1822), *Conch. Icon.*, 4, *Ficula*, sp. no. 1, pl. 1, fig. 1.

Ficus ficoides : Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 5(2) : 46; Cernohorsky, 1972, *Mar. Shells Pacific*, 2 : 113, pl. 33, fig. 2.

Material—(1) 8 exs.(d.), Sta. 7—Shore colln., Point Calimere, 16-2-1968, (2) 2 exs. (d.), Sta. 8—Shore colln., Agasthiampalli, 10 km. N. of Point Calimere, 17-2-1968, (3) 3 exs.(d.), Sta. 9—Shore colln., Vedaraniyam, 12 km. N. of Point Calimere, 18-2-1968 (Coll. A. S. Rajagopal).

Distribution—India : Malabar Coast, Tuticorin, Madras, Vishakhapatnam, Orissa (Balasore Bay).

Elsewhere : Persian Gulf, Indian Ocean, Sulu Sea, Northern extremity of Borneo, Australia, China (Hong Kong).

Remarks : Shell much thinner, more slender than the preceding species and not so bulbous at the shoulder, spire flatly depressed; sculptured with regular primary ridges with intermediate finer ridges with intermediate finer ridges in the interstices and with continuous overriding longitudinal ridges; entire surface becomes reticulate in appearance; aperture elongated, glossy and coloured white tinged with violet; siphonal canal slender, surface colour white or pale violet

with 4-5 spiral white bands including distant brownish marks on them scattered with reddish brown blotches and spots.

<i>Measurements</i> (in mm.)	Range (5 exs.)
Length	26.60 — 49.95
Maximum Diameter	14.85 — 29.95
Minimum Diameter	11.70 — 23.25

Family CYMATIIDAE

Two subfamilies, namely Cymatiinae and Ranellinae are dealt in this paper.

Key to the Indian subfamilies

Shell elongated, spire depressed, varices may or may not present ; surface plane or nodularly ribbed ; aperture normally ovate ; anterior canal much produced ; columella often thickened by callus ; outer lip closely denticulate	...	<i>Cymatiinae</i>
Shell ovate, spire exerted, dorso-ventrally depressed, usually with one pair of varices to each whorl ; surface sculptured with granular ridges ; anterior canal short ; columella not thickened by callus ; outer lip distantly denticulate	...	<i>Ranellinae</i>

Subfamily CYMATIINAE

This subfamily is represented by three genera in the collection, namely *Cymatium* (Bolten) Roeding, *Distorsio* (Bolten) Roeding and *Linatella* Gray.

Key to the genera :

Shell club-shaped or trigonal, generally with varices, nodular ribs present ; aperture narrowly ovate ; columella wrinkled ; anterior canal straight and long	...	<i>Cymatium</i>
Shell ovately turreted, distorted ; surface reticulately ribbed ; aperture reduced ; columella plaited and grained ; anterior canal lifted upward	...	<i>Distorsio</i>

Shell more or less *Tonna*-shaped, light ;
 whorls convexly angulate ; surface sculp-
 tured with flat or rounded spiral ridges ;
 aperture wide ; columella denticulate ;
 anterior canal broad, produced and
 recurved

... *Linatella*

Genus **Cymatium** (Bolten) Roeding, 1798.

Type-species : *Cymatium femorale* Roeding

(= *Murex femoralis* Linnaeus, 1758)

Key to the species :

1. Shell thick, club shaped with single
 varix, spire depressed and blunt at
 apex ; strong varix present just behind
 outer lip, columella wrinkled and with
 expanded lip ; outer lip thick outside
 and inside with swollen teeth ; surface
 spirally ribbed and ornamented with
 reddish brown bands on white and
 maculated with dark spots ; siphonal
 canal straight

... *retusum*

Shell comparatively thin fusiform, spire
 raised, 3-4 varices present ; columella
 not expanded to lip ; outer lip simply
 denticulate inside ; surface with ribs
 and riblets, ornamented differently ;
 siphonal canal upturned

... 2

2. Shell thin, triangularly club shaped,
 spire turreted, deeply canaliculate below
 suture, spiral ribs and ridges crenated ;
 columella wrinkled and expanded to
 thin lip ; outer lip denticulate ; siphonal
 canal short, turned upward ; surface
 pale yellowish brown with white blotches

... *tripus*

Shell thick, fusiform with four varices,
 humpy dorsum, contracted whorls, gra-
 nulose with spiral and transpiral ribs
 and riblets ; columella scalloped and
 wrinkled ; siphonal canal comparatively
 long and upwardly turned ; outer lip
 wrinkled and denticulate ; surface yel-
 lowish brown and pale on ribs

... *vespaceum*

Subgenus **Gutturnium** Moersch, 1852.

Cymatium (Gutturnium) tripus (Lamarck, 1843).

(Pl. XIII, Fig. 52a & 52b)

Triton tripus Lamarck, 1843, *Hist. nat. des Anim. sans Vert.* (Deshayes edit.), 9 : 634 (Type-locality : Not known) ; Reeve, 1844, *Conch. Icon.*, 2 : *Triton*, sp. no. 16, pl. 5, fig. 16 ; Tryon, 1881, *Man. Conch.*, 3 : 22, pl. 12, fig. 93.

Material—(1) 1 ex.(d.), Sta. ?—Tuticorin beach, Feb.-Mar., 1926 (Coll. H. S. Rao).

Distribution—India : Indian seas.

Elsewhere : Maskat, Sri Lanka, China.

Remarks—Shell large, thick, triangularly club-shaped with three varices, spire short, turrated ; whorls angulated at the upper part with raised nodules on the angle ; shell deeply canaliculated below the suture ; surface traversed by distant transverse ribs ; depression between ribs bear three or four very fine ridges, both ribs and ridges crenated ; columella wrinkled and little expanded with thin lip ; aperture fusiformly narrow, white ; outer lip with 7 denticles inside ; anterior canal a little upturned ; shell colour pale yellowish brown with blotches of white.

This species is rare in occurrence and inhabits the substrate at a deeper water in the coral sand flats.

This species is found to be a new record from the Indian coast.

Measurements (in mm.)

Height	27.15
Length	68.55
Width	34.50

Cymatium (Gutturnium) vespaceum (Lamarck, 1843).

(Pl. XIII, Fig. 53a & 53b)

Triton vespaceus Lamarck, 1843, *Hist. nat. des Anim. sans Vert.* (Deshayes edit.), 9 : 636 (Type-locality : Not known).

Triton thersites Reeve, 1844, *Conch. Icon.*, 2 : *Triton*, sp. no. 48, pl. 13, figs. 48a & 48b.

Triton vespaceus : Tryon, 1881, *Man. Conch.*, 3 : 22, pl. 12, figs. 94-100.

Lotorium (Gutturium) vespaceum : Melvill & Standen, 1901, *Proc. zool. Soc. Lond.*, 2 : 386.

Cymatium vespaceum : Cernohorsky, 1967, *Mar. Shells Pacific* : 52-53, pl. 4, fig. 15.

Material—(1) ex.(d.), Sta. 1j—Shore colln., N. of Inspection Bungalow, Tuticorin, 24-4-1955, (2) 1 ex.(d.), Sta. 2d—Galaxea reef, 4-5-1955 (Coll. H. C. Ray).

Distribution—India : Indian seas.

Elsewhere : Persian Gulf, Mekran Coast, Karachi, Mauritius, Sri Lanka, Australia, Viti Is., West Indies.

Remarks—Shell thick, fusiform with four varices and humpy dorsum, spire elevated; whorls contracted, traversed by distant granulose transverse ribs, upper part angulated and strongly tuberculated; in between spiral ribs 1 to 3 thin secondary riblets present; close transpiral ridges gives the entire surface finely granulose appearance; columella white, scalloped and wrinkled; siphoral canal comparatively long, turned upward; outer lip little wrinkled and denticulate within; shell colour yellowish brown, pale on ribs.

The species rarely occurs in coral strewn sandy areas of deeper water. The shells are accounted here to be new record from Indian coast.

<i>Measurements</i> (in mm)	Range (2 exs.)
Height	10.40 — 13.50
Length	26.15 — 31.30
Width	13.75 — 15.65

Cymatium (Gutturium) retusum (Lamarck, 1843).

(Pl. XIV, Fig. 54a & 54b)

Triton retusum Lamarck, 1843, *Hist. nat. des Anim. sans Vert.* (Deshayes edit.), 9 : 635 (Type-locality : Sri Lanka); Reeve, 1844, *Conch. Icon.*, 2 : *Triton*, sp. no. 47, pl. 13, fig. 47; Tryon, 1881, *Man. Conch.*, 3 : 23, pl. 13, fig. 108.

Cymatium retusum : Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 5(2) : 43.

Material—(1) 1 ex.(d.), Pearl Bank, 19.2 Km. (12 miles) from shore, 9-10 fms., Tuticorin, Feb.-March, 1926 (Coll. H. S. Rao); (2) 1 ex.(d.), Sta. 9—Hare Id., Shore colln., Port of New Tuticorin, 22-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Madras, Andamans.

Elsewhere : Persian Gulf, Gulf, of Oman (Maskat), Mekran Coast, Maldivé Is., Indian Ocean (Mauritius).

Remarks : Shell thick, club-shaped with a varix, spire depressed, apex generally blunt; whorls rounded, slightly angulated at the upper part; upper ribs obtusely noded and the lower ones faintly; strong varix present just behind the thick outer lip; aperture spindle-shaped; columella wrinkled with a solid expanded lip; anterior canal very narrow, straight, elongated; outer lip outwardly very thick and inwardly with swollen teeth; surface colour white, maculated, and banded with reddish-brown.

Measurements (in mm.)

Height	16.50 — 19.80
Maximum Diameter	20.40 — 24.45
Minimum Diameter	17.00 — 20.30

Genus **Linatella** Gray, 1857

Type-species : *Cassidaria cingulata* Lamarck.

Linatella cingulata (Lamarck, 1844).

(Pl. XIV, Fig. 55a & 55b)

Cassidaria cingulata Lamarck, 1844, *Hist. nat. des Anim. Sans Vert.* (Deshayes edit.), 10 : 9 (Type-locality : Not known).

Triton cingulatus : Reeve, 1844, *Conch. Icon.*, 2 : *Triton*, sp. no. 35, pl. 17, fig. 35; Tryon, *Man. Conch.*, 3 : 15, pl. 8, figs. 55 & 56.

Cymatium cingulatum : Gravely, 1942, *Bull. Madras Govt Mus. new ser.* (Nat. Hist. Sec.), 1(2), pt. 6 : 141, pl. 12, figs. 2a & 2b.

Linatella cingulata Cernohorsky, 1967, *Mar. Shells Pacific* : 58, pl. 7, fig. 25.

Material : (1) 1 ex.(d.), Sta. 1j—Shore colln., N. of Inspection Bungalow, Tuticorin, 24-4-1955 (Coll. H. C. Ray); (2) 1 ex.(d.), Sta. 13—Shore colln., Tiruchendur, 25-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Ratnagiri, Bombay, Pamban, Madras.

Elsewhere : Penang, Philippines.

Remarks—Shell thinner, ovately pyriform with or without varix, spire exerted and conical; whorls distinctly angulated at the shoulders, obsoletely noded; sculptured with regular uniform equidistant flattened spiral ridges; columella smooth with very weak callus; canal twisted; aperture inflated, interior white; outer lip thin, little fimbriated, inside with brown teeth; surface colour more or less orange-brown.

This species is not so common and found on sand with coral pieces and stones in deeper water.

<i>Measurements</i> (in mm.)	Range (2 exs.)
Height	12.30 — 19.90
Length	25.25 — 39.40
Width	15.45 — 24.45

Genus *Distorsio* Roeding, 1798

Type-species : *Murex anus* Linnaeus.

***Distorsio reticulata* Roeding, 1798.**

(Pl. XIV, Fig. 56a & 56b)

Distorsio reticulata Roeding, 1798, *Mus. Bolten.* : 133, sp. no. 1674 (Type-locality : Not known).

Triton cancellinus : Reeve, 1844, *Conch. Icon.*, 2 : *Triton*, sp. no. 45, pl. 12, fig. 45.

Distorsio cancellinus : Tryon, 1881, *Man. Conch.*, 3 : 35, pl. 17, figs. 175-178.

Distorsio reticulata : Rippingales & Mc. Michael, 1961, *Queensland and Great Barrier Reef Shells* : 68, pl. 7, fig. 13; Cernohorsky, 1967, *Mar. Shells Pacific*, pp. 56-58, pl. 6, fig. 24.

The species *Clathrata* Roeding, *dicipiens* Reeve and *cancellinus* Roisy are synonyms of this species.

Material—(1) 1 ex.(w.), Sta. ?—Sea shore about 3.2 km. N. of Tranquebar, 1-2-1957 (Coll. A. G. K. Menon & G. Ramakrishna); (2) 1 ex.(w.), Sta. 1—Coastal water of Thondiarpur, on Board "Chota Investigator", 10 fms., 25-1-1975 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Laksha Dwip, Puri, Sandheads, Andamans.

Elsewhere : Red Sea, Persian Gulf, Gulf of Oman (Maskat), Seychelles; Sri Lanka, China, Philippines, Polynesian Islands, Columbia, West Indies, Monte Criste, Virginea Is., St. Thomas.

Remarks—Shell elongately ovate, distorted, more or less spindle-shaped with 5-6 varices, spire acuminate and proportional to the length of the anterior canal; penultimate and the body whorl dorsally humped; whorls sculptured with narrow distant spiral ridges intersected by decussate ribs making into squares; columella plaited and grained, pinkish in colour; aperture reduced; anterior canal short and little lifted upward; outer lip denticulate inside; surface colour flesh with yellowish tinge and sparsely covered with velvety light brown hairy periostracum.

<i>Measurements</i> (in mm.)	Range (2 exs.)
Height	13.80 — 20.05
Maximum Diameter	18.75 — 26.95
Minimum Diameter	15.65 — 21.20

Subfamily RANELLINEAE

Under this subfamily, the genus *Gyrineum* Link has been dealt with.

Shell small, angulately ovate, dorso-ventrally compressed with vertically continuous varices; sculptured with spiral rows of nodules; aperture ovate; columella smooth or plicate; outer lip flattened; posterior canal absent; siphonal canal short

... *Gyrineum*

Genus *Gyrineum* Link, 1807

Type-species : *Murex gyrinus* Linnaeus.

Gyrineum natator (Roeding, 1798).

(Pl. XV, Fig. 57a & 57b)

Tritonium natator Roeding, 1798, *Mus. Bolten.* : 127, sp. no. 1636 (Type-locality : Not known).

Ranella tuberculata : Reeve, 1844, *Conch. Icon.*, 2 : *Ranella*, sp. no. 36, pl. 7, fig. 36; Tryon, 1881, *Man. Conch.*, 3 : 43, pl. 23, figs. 45-47.

Gyrineum (*Argobuccinum*) *tuberculatum* : Melvill & Standen, 1901, *Proc. zool. Soc. Lond.*, 2 : 419.

Gyrineum natator : Crichton, 1941, *J. Bombay nat. Hist. Soc.*, 42(2) : 336, pl. 2, fig. 9; Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 5(2) : 43; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 1(2), pt. 6 : 139, pl. 11, fig. 6; Cernohorsky, 1972, *Mar. Shells Pacific*, 2 : 117, pl. 32, fig. 2.

Material—(1) 2 exs.(d.), Sta. 1a—Near Guest House, Krusadai Id., 1-5-1955 (Coll. H. C. Ray) ; (2) 1 ex.(d.), Sta. 14—From a rock, shore colln., Kanyakumari, 24-2-1968 (Coll. A. S. Rajagopal) ; (3) 1 ex.(d.), Sta. 7—Shore colln., Pirappanvalasai, 24-12-1979 (Coll. H. P. Mookherjee).

Distribution—India : Gulf of Cambay, Bombay, Deogad Coast, Pamban, Madras, Adyar, Vishakhapatnam, ~~Andamans~~, Nicobars.

Elsewhere : Persian Gulf, Mekran Coast, Red Sea, Karachi, Sri Lanka, Maungmagan, Mergui Archipelago, King Id., Salang, Billiton, Singapore, Gulf of Siam, Sumatra, Java, Tjilatjap, Wijnkoop-sbaai, Semarang, Harang Hawoe, Madura, Misool, Amboina, New Guinea, Timor, Banka, Malacca, Philippines, China, Japan, Manila, Tahiti.

Remarks—Shell smal, solid, pyramidally convex, dorsoventrally compressed, coarse-looking with an elevated conical spire; whorls provided with a pair of varices forming a continuous crest like ridge near the suture; body whorl with a spiral row of small nodules followed by 4-5 rows of larger nodules which may coalesce with the smaller ones; crest of varices transversely ridged; aperture small and ovate; outer lip scalloped and with 7 to 8 denticles; columella with thin smooth callus with feebly oblique folds in the upper part; anterior siphonal canal short; shell colour light brown.

<i>Measurements</i> (in mm.)	Range (3 exs.)
Height	7.80 — 17.40
Maximum Diameter	10.20 — 27.10
Minimum Diameter	7.45 — 18.80

Family BURSIDAE

Bursa (Bolten) Roeding is the only genus represented from the collection.

Shell large, broader, ovate, flatly compressed with diametrically opposite varices; sculptured with spiral nodulose cords; varices occasionally with spines; aperture widely ovate; columella with denticles and plicae; outer lip with denticles; both posterior and siphonal canal present

... *Bursa*

Genus **Bursa** (Bolten) Roeding, 1798

Type-species : *Bursa monetata* Roeding
(= *Murex bufanius* Gmelin, 1791).

Key to the species :

1. Shell oblong-ovate, with spines on both side varices ... 2
- Shell ventricose without spines on both side varices ... 3
2. Shell with long spire, spines on varices long ; body whorl sculptured with spiral ridges and spinose nodes ; posterior canal almost directed backward with a strong spine ; columella glazed ; outer lip with irregular denticulations ... *spinosa*
- Shell with turreted spire, spines short on varices ; body whorl flattened and sculptured regularly with granular ridges, transpiral striae and few rows of nodules ; posterior canal outwardly directed ; columella in upper part granularly ridged ; outer lip grooved and denticulated ... *rana*
3. Shell with raised spire, varices with sharper edges and sharper nodes ; body whorl laterally compressed, sculptured with beaded ridges ; columella calloused and conspicuously plicated at the upper part ; outer lip fluted and denticulated ... *crumena*
- Shell with spire more elevated, varices with rounded edges forming continuous granular ridges, body whorl sculptured with granular spiral cords ; columella with 2-3 tooth like folds ; outer lip foliated and denticulated ... *margaritula*

Bursa spinosa (Lamarck, 1843).

(Pl. XV, Fig. 58)

Ranella spinosa Lamarck, 1843, *Hist. nat. des Anim. sans Vert.* (Deshayes edit.), 9 : 545-46 (Type-locality : "les mers de l'Inde") ; Reeve, 1844, *Conch. Icon.*, 2, *Ranella*, sp. no. 7, pl. 2, fig. 7.

Bursa spinosa : Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 5(2) : 45 ; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 1(2), pt. 6 : 143, pl. 12, fig. 4.

Material—(1) 4 exs.(d.), Sta. ?—Sea coast near China Tarangapatti, 4.8 km. N. of Tranquebar, 2-1-1957, (2) 5 exs.(d.), Sta. ?—Sea shore about 4 km. E. of MBS., Porto Novo, 22-1-1957, (3) 1 ex.(d.), Sta. ?—Sea shore, 4 km. S.E. of MBS., Porto Novo, 25-1-1957, (4) 6 exs.(w.), & 1 ex.(d.), Sta. ?—Sea shore about 3.2 km. N. of Tranquebar Fort, 1-2-1957, (5) 7 exs.(d.), Sta. ?—Sea coast near the mouth of Arasalar, 1.6 km. E. of Madali, Karaikal, 5-2-1957 (Coll. A. G. K. Menon & G. Ramakrishna) ; (6) 1 ex.(d.), Sta. ?—Santhapadi village, 3.2 km. S. of Tranquebar, March, 1958 (Coll. A. G. K. Menon) ; (7) 1 ex.(d.), Sta. IV—Royapuram, 11-9-1965 (Coll. A. Daniel, M. Babu Rao & Party) ; (8) 1 ex.(d.), Sta. 5—Shore colln., between Killai R. mouth and Chinnavaykal, 13-2-1968 (Coll. A. S. Rajagopal) ; (9) 12 ex.(d.), Sta. 1—Coastal waters of Madras off Thondiyarpur, on board “Chota Investigator”, 6-7 fms., Bottom Trawl, 25-1-1975, (10) 1 ex.(d.), Sta. 14—Shore colln., beyond Fisherman’s village, N. of Fort, Tranquebar, 14-2-1975, (11) 8 exs.(d.), Sta. 17—Coastal waters of Pondicherry up to Nallavarukuppam, on board I.F.S. No. 3, Bottom Trawl (5-6 fms.), (12) 7 exs.(d.), Sta. 20—Coastal waters of Madras from High Court to Triplicane on board “Chota Investigator”, 9-10 fms., 25-2-1975 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Gulf of Kutch (Pirotan Id. & Hanuman Dandi, Bombay, Malabar Coast, Pamban, Madras, Balasore Bay.

Elsewhere : Andamans.

Remarks—Shell large, spire conical and more elevated ; varices of each whorl not continuous but developed into outwardly directed strong spines at rather irregular intervals ; shell sculptured with close-set spiral ridges and spinose nodes ; body whorl with one or two spiral rows of widely-spaced spinose nodes ; spine adjacent to posterior canal more or less directed backward ; columella glazed flesh in colour ; aperture oblong, creamy and canaliculate both ways ; siphonal canal flesh colour with whitish maculations and finely denticulate ; outer lip frilled with irregular denticulations ; surface colour fleshy brown.

Shells mostly collected in the intertidal zone with rocks and boulders in the sandy areas.

<i>Measurements</i> (in mm.)	Range (46 exs.)
Length	19.10 — 76.60
Maximum Diameter (without spine)	14.25 — 40.30
Minimum Diameter	9.55 — 29.05

Subgenus **Bufonaria** Schumacher, 1817

Bursa (Bufonaria) rana (Linnaeus, 1758).

(Pl. XV, Fig. 59)

Murex rana Linnaeus, 1758, *Syst. Nat.*, Ed. X : 748, sp. no. 452 (Type-locality : "O. Asiatico").

Ranella albivaricosa : Reeve, 1844, *Conch. Icon.*, 2 : *Ranella*, sp. no. 2, pl. 1, fig. 2.

Bursa rana . Gravely 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 5(2) : 45.

Bursa (Bufonaria) rana : Cernohorsky, 1972, *Mar. Shells Pacific*, 2 : 119, pl. 32. fig. 8.

The species *elegans* Sowerby (1835) & *beckii* Kiener (1841) are synonyms of this species.

Material—(1) 2 exs. (d.) Sta. ?—Sonakuppam village shore, 0.8 km. E. of Cuddalore, 13-1-1957, (2) 8 exs. (d.), Sta. ?—Sea shore about 3.2 km. E. of MBS., Porto Novo, 21-1-1957, (3) 1 ex.(d.), Sta. ?—Sea shore, 4 km. E. of MBS, Porto Novo, 22-1-1957, (4) 1 ex.(d.), Sta. ?—Sea shore, 3.2 km. N. of Tranquebar, 5-2-1957 (Coll. A. G. K. Menon & G. Ramakrishna) ; (5) 2 exs.(d.), Sta. 7—Shore colln., Point Calimere, 16-2-1968, (6) 4 exs.(d.), Sta. 8—Shore colln., Agasthiampalli, 17-2-1968, (7) 2 exs.(d.), Sta. 9—Shore colln., Vedaraniyam, 18-2-1968 (Coll. A. S. Rajagopal) ; (8) 1 ex.(d.), Sta. 4—Coastal waters of Madras on board "Chota Investigator", 6-7 fms., 29-1-1975, (9) 1 ex.(d.), Sta. 7—Shore colln, Palk Bay, Mandapani, 3-2-1975, (10) 1 ex.(d.), Sta. 21—Coastal waters of Madras Harbour old entrance to University, 27-2-1975, (11) 1 ex.(d.), Sta. 2—Shore colln., Mallipattinam eastward to Pudupattinam, 13-1-1978, (12) 7 exs.(d.), Sta. 3—Shore colln., Sethubabachatram, Palk Bay, 14-1-1978, (13) 1 ex.(d.), Sta. 5—Shore colln., Thondi, Palk Bay, 17-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—India : Madras, Chandipore Beach, Balasore Bay. Sandheads, Andamans.

Elsewhere : Mergui Archipelago, Java, N. E. Australia, Manila, China, Japan.

Remarks—Shell oblong-ovate, dorsoventrally depressed, coarsely granular, spire turreted; varices generally continuous on two sides of the whorls and developed into small spinose projections at regular interval; sculptured with transversely elevated close-set granular ridges and nodes; body whorl with two rows of prickly nodes on elevated ridges; ridges at the lower part finely granular and undulated; siphonal canal short; columella not so polished; portion above siphonal canal traversed by spiral granular ridges of the body whorl; aperture oblong-ovate, white; outer lip denticulate and grooved; shell colour white or cream stained with reddish-brown.

<i>Measurements</i> (in mm.)	Range (32 exs.)
Length	17.60 — 80.50
Maximum Diameter (without spine)	12.95 — 48.35
Minimum Diameter	9.35 — 42.60

Bursa (*Bufonaria*) *crumena* (Lamarck, 1843).

(Pl. XV, Fig. 60)

Ranella crumena Lamarck (not Kiener), 1816,* *Encycl. Meth. Vers.*, pl. 412, fig. 3; 1843, *Hist. nat. des Anim. sans Vert.* (Deshayes edit.), 9 : 544-545 (Type-locality : "les mers de l'Inde"); Reeve, 1844, *Conch Icon.*, 2 : *Ranella*, sp. no. 17, pl. 4, figs 17a & 17b.

Bursa crumena : Crichton, 1941, *J. Bombay nat. Hist. Soc.*, 42 (2) : 339, pl. 2, fig. 8.

Bursa (Bufonaria) crumena : Cernohorsky, 1972, *Mar. Shells Pacific*, 2 : 119-120, pl. 34, fig. 2.

Material—1 ex.(d.), Sta. 7—Sea shore, 4 km. E. of MBS., Porto Novo, 22-1-1957 (Coll. A. G. K. Menon & G. Ramakrishna).

Distribution—Indian : Madras, Vishakhapatnam.

Elsewhere : Sri Lanka, Philippines.

* Reference not seen in original.

Remarks—Shell ovate, ventricose, spire short and acuminate; body whorl flattened; varices sharply edged without spines but with sharp nodes at regular interval; whorls sculptured with conspicuous beaded ridges and sharp nodules in the middle; body whorl flattened with three distant rows of sharp nodes and with brown spots close to nodes; columella calloused with a shield and plicate at the upper part and stained with orange-red; aperture large with canal on two sides; outer lip fluted and denticulated; siphonal canal recurved towards aperture; lower part of columella denticulate; shell all along reddish-brown in colour.

This species is common at a depth of 6-10 fms. and found along with other two earlier species.

Measurements (in mm.)

Length	50.05
Maximum Diameter	37.75
Minimum Diameter	30.00

Bursa margaritula (Deshayes in Belanger, 1832).

(Pl. XV, Fig. 61)

Ranella margaritula Deshayes in Belanger, 1832,* *Voy. Indes Orient.*, 6 : 424 (Type-locality : Not known) ; Reeve, 1844, *Conch. Icon.*, 2, *Ranella*, sp. no. 15, pl. 3, fig. 15.

Bursa margaritula : Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 5(2) : 45 ; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 1(2), pt. 6 : 144-145, pl. 12, figs. 6a & 6b ; Cernohorsky, 1972, *Mar. Shells Pacific*, 2 : 120, pl. 34, figs. 3 & 3a.

Material—9 exs.(d.), Sta. 13—Madras Coast. (Coll. ?).

Distribution—India : Gulf of Mannar (Pamban), Madras.

Elsewhere : Fiji Is. westward to Indian Ocean.

Remarks : Shell moderate in size, solid, laterally not compressed like earlier species; granular varices on either side rounded and form continuous ridges; sutures with short oblique axial riblets; shell

* Reference not seen in original.

sculptured with finely granulose spiral striae forming heavy cords on anterior third of body whorl; body whorl with 2-3 spiral rows of nodules; columella calloused, plicate with concave depression in the lower part; siphonal canal straight, anal canal prominent; outer lip foliated and finely denticulate; colour light yellowish brown stains hardly traceable on nodes and ridges because of encrustation over shells.

This species is found in the shallow water of intertidal zone and distributed widely from African Coast to Fiji Island in the Indo-Pacific.

<i>Measurements</i> (in mm.)	Range (9 exs.)
Height	13.40 — 16.90
Length	28.50 — 37.60
Maximum Diameter	20.70 — 26.50

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SUMMARY

The paper presented here with the systematic study of the marine malacofauna of Coromandel Coast, Palk Bay and Gulf of Mannar up to Kanyakumari. This contains a part of Mesogastropoda with eleven families. A total of 56 species and 4 subspecies under 25 genera of marine and estuarine forms is reported here.

Necessary Keys to the identification of families, subfamilies, genera and wherever needed even for species have been incorporated in the paper.

Brief synonymy restricted to important references and the distribution as completely as possible have been provided for each species. The diagnostic shell characters and the ecology of the species are also discussed in the paper.

Among the species under study, six are recorded for the first time from the Indian Coast of which one subspecies is a European form. One species is recorded newly from the east coast of India. A species is represented in its material as topotype. Three species are very rare and they are good acquisition for the NZC, of Zoological Survey of India.

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P L A T E S

PLATE I

- Fig. 1. *Strombus (Lacvistrombus) canarium* Linnaeus, Abapertural view of a shell from Rameswaram.
- Fig. 2. *Strombus (Canarium) mutabilis* Swainson, Abapertural view of a shell from Hare Island off Tuticorin.
- Fig. 3. *Strombus (Dolomena) marginatus marginatus* Linnaeus, Abapertural view of a shell from Rameswaram.
- Fig. 4a & 4b. *Strombus (Dolomena) marginatus succinctus* Linnaeus, 4a. Abapertural view of a shell from Mandapam ; 4b. Apertural view.

PLATE I



1

3 CM.



2

10 mm



3

2 CM



4a



4b

2 CM

PLATE II

- Fig. 5a. & 5b. *Strombus (Gibberulus) gibberulus gibberulus* Linnaeus, 5a. Abapertural view of a shell from Dhanuskodi ; 5b. Apertural view.
- Fig. 6 & 7. *Lambis (Lambis) lambis* (Linnaeus), 6. Abapertural view of a shell from Devipattinam, Palk Bay ; 7. Abapertural view of a juvenile shell from Hare Island off Tuticorin.
- Fig. 8a. & 8b. *Cheilea equestries* (Linnaeus), 8a. Abapertural view of a shell from Krusadai Island ; 8b. Apertural view.

PLATE II



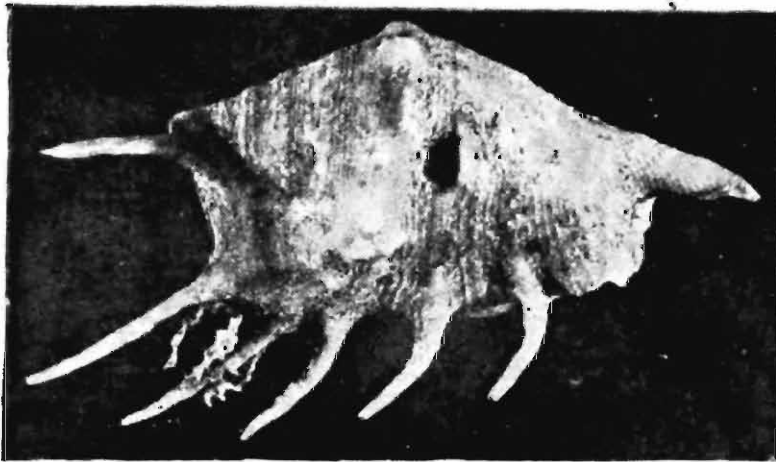
5a



5b

3 CM.

2 CM.



6

5 CM



7



8a



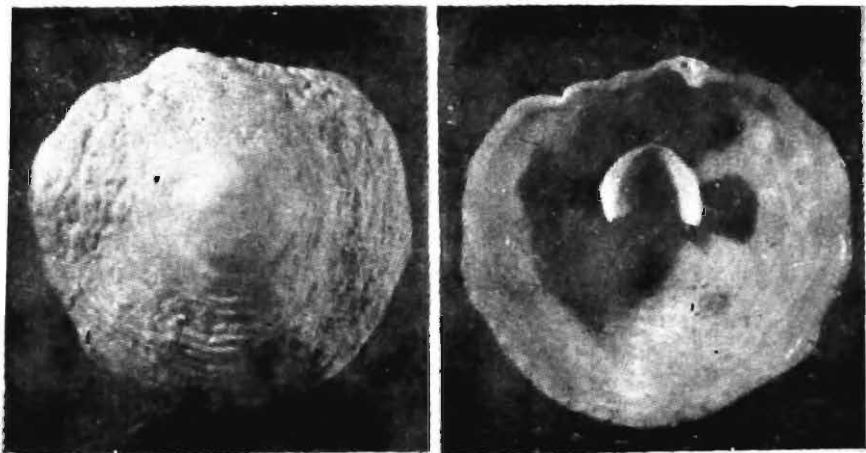
8b

10 mm

PLATE III

- Fig. 9a & 9b. *Cheilea undulata* (Roeding), 9a. Abapertural view of a shell from Shingle Island; 9b. Apertural view.
- Fig. 10a & 10b. *Calyptraea (Crucibulum) extincitorium* Lamarck, 10a. Abapertural view of a shell from Mallipattinam; 10b. Apertural view.
- Fig. 11a & 11b. *Crepidula walshi* Hermanson, 11a. Abapertural view of a shell from Vanthivu Island off Tuticorin; 11b. Apertural view.
- Fig. 12. *Xenophora corrugata* (Reeve), Abapertural view of a shell from Mandapam.
- Fig. 13. *Xenophora solaris* (Linnaeus), Abapertural view of a shell from Mandapam.

PLATE III



9a

9b

3 CM



10a



10b

3 CM



12

3 CM

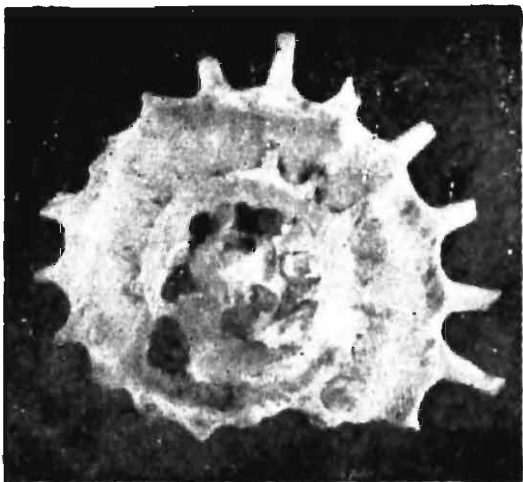


11a



11b

3 CM



13

10 mm

PLATE IV

- Fig. 14. *Luria isabella* (Linnaeus), Apertural view of a shell from Hare Island off Tuticorin.
- Fig. 15. *Lyncina lynx* (Linnaeus), Apertural view of a shell from Coastal waters of Madras.
- Fig. 16. *Nauritia arabica* (Linnaeus), Abapertural view of a shell from Krusadai Island.
- Fig. 17a & 17b. *Pustularia childreni* (Gray), 17a. Abapertural view of a shell from Kanyakumari; 17b. Apertural view.
- Fig. 18. *Monetaria moneta* (Linnaeus), Abapertural view of a shell from Point Calimere.
- Fig. 19a & 19b. *Erosaria caputserpentis* (Linnaeus), 19a. Abapertural view of a shell from Rameswaram; 19b. Apertural view.
- Fig. 20. *Erosaria ocellata* (Linnaeus), Abapertural view of a shell from Veerapandiapattinam.

PLATE IV



14 10 mm



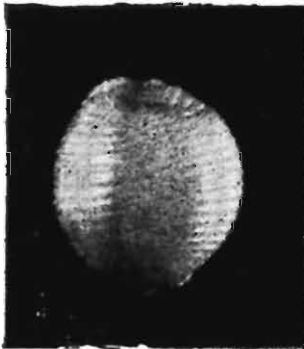
15

3 CM

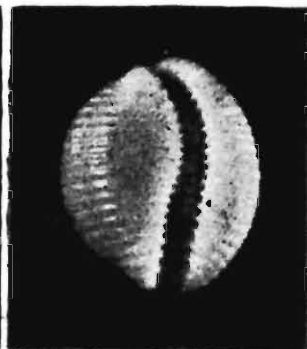


16

3 CM



17a



17b

10 mm

10 mm



18



20

10 mm



19a



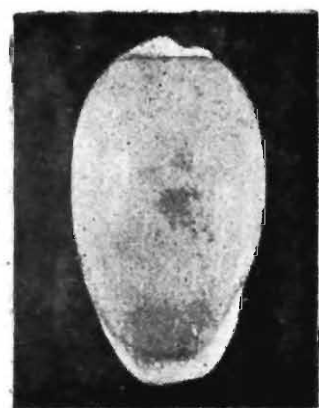
19b

3 CM

PLATE V

- Fig. 21. *Erronea erronea* (Linnaeus), Abapertural view of a shell from Hare Island off Tuticorin.
- Fig. 22a & 22b. *Erronea caurica* (Linnaeus), Abapertural view of a shell from Vanthivu Island, off Tuticorin ; 22b. Apertural view.
- Fig. 23. *Erronea listeri* (Gray), Abapertural view of a shell from Hare Island off Tuticorin.
- Fig. 24a & 24b. *Erronea pulchella novaebritanniae* Schilder & Schilder, 24a. Abapertural view of a shell from Sethubabachatram, Palk Bay ; 24b. Apertural view.
- Fig. 25a, 25b & 25c. *Diminovula punctata* (Duclos), 25a. Abapertural view of a shell from Mandapam waters ; 25b. Apertural view & 25c. view of the coral from which the shell was collected.

PLATE V



21

10 mm

3 CM



22a



22b



10 mm

23



24a



24b

10 mm 5 CM

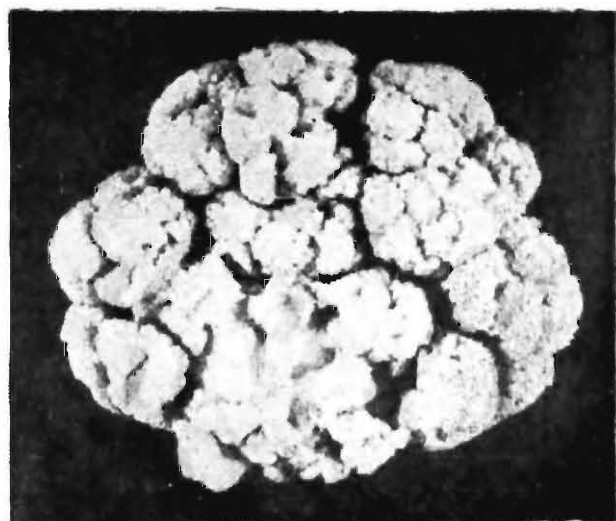
10 mm



25a



25b



25c

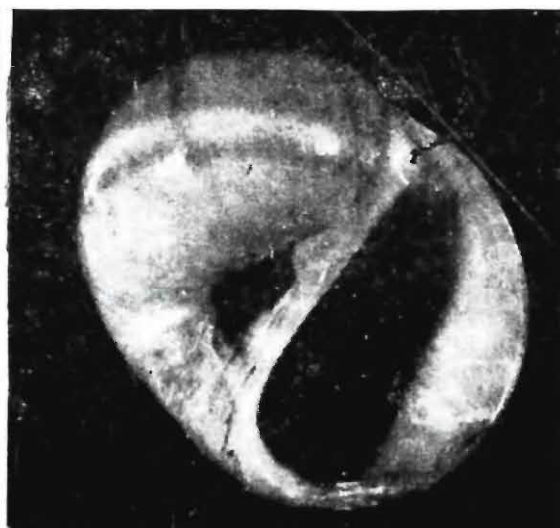
PLATE VI

- Fig. 26a & 26b. *Natica vitellus* Linnaeus, 26a. Abapertural view of a shell from coastal waters of Madras; 26b. Apertural view.
- Fig. 27a. & 27b. *Natica marochiensis* (Gmelin), 27a. Abapertural view of a shell from Hare Island, off Tuticorin; 27b. Apertural view.
- Fig. 28. *Natica tigrina* (Roeding), Abapertural view of a shell from Rameswaram.
- Fig. 29. *Natica lineata* Lamarck, Abapertural view of a shell from Tuticorin.
- Fig. 30. *Natica* (*Naticarius*) *alapapilionis* (Roeding), Abapertural view of a shell from Kanyakumari.

PLATE VI



26a



26b

3 CM



27a



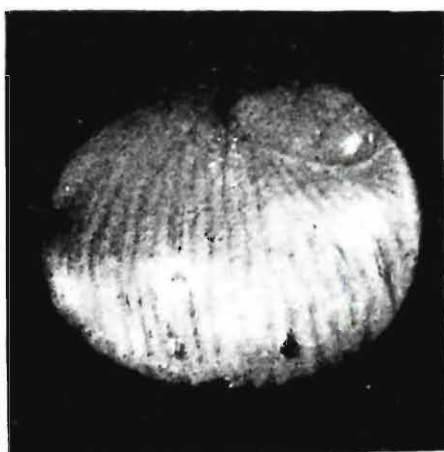
27b

10 mm



28

2 CM



29

2 CM

10 mm



30

PLATE VII

Fig. 31a & 31b. *Natica pullicaria* (Philippi), 31a, Abapertural view of a shell from Kanyakumari; 31b. Apertural view.

Fig. 32a & 32b. *Polinices tumidus* (Swainson), 32a. Abapertural view of a shell from Rameswaram; 32b. Apertural view.

Fig. 33a & 33b. *Polinices* (*Neverita*) *peselephanti* (Link), 33a. Abapertural view. of a shell from Madras; 33b. Apertural view.

PLATE VII



31a



31b

2 CM



32a

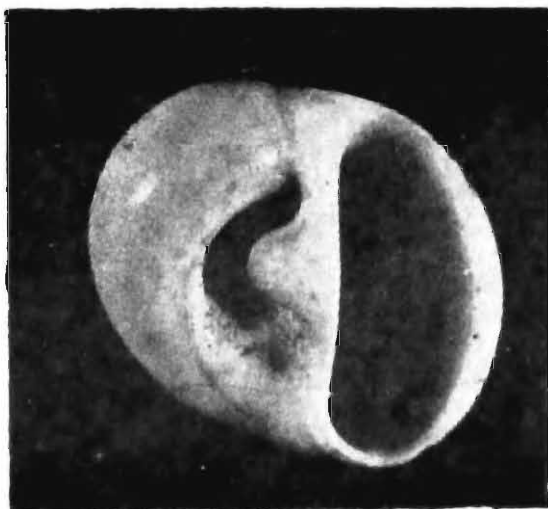


32b

3 CM



33a



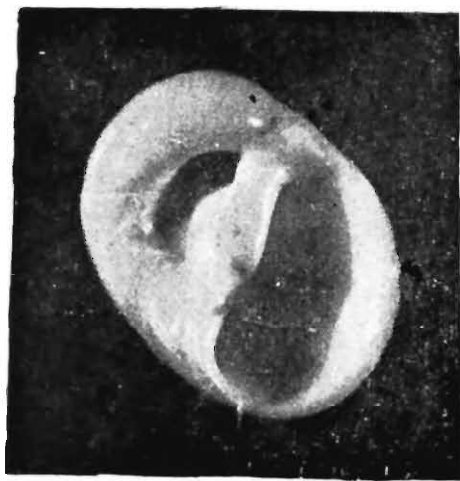
33b

2 CM

PLATE VIII

- Fig. 34a & 34b. *Polinices (Neverita) effusa* (Swainson), 34a. Abapertural view of a shell from Veerapandianpattinam; 34b. Apertural view.
- Fig. 35a & 35b. *Polinices (Mammilla) melanostomus* (Gmelin), 35a. Abapertural view of a shell from Tuticorin; 35b. Apertural view.
- Fig. 36. *Polinices (Mammilla) zanzibarica* (Recluz), Abapertural view of a shell from Tuticorin.

PLATE VIII

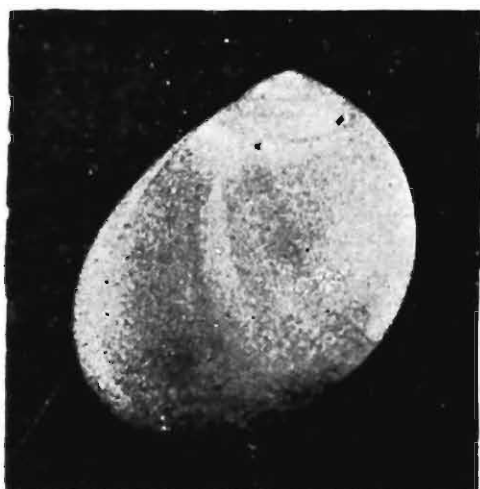


34a



34b

3 CM



35a



35b

2 CM



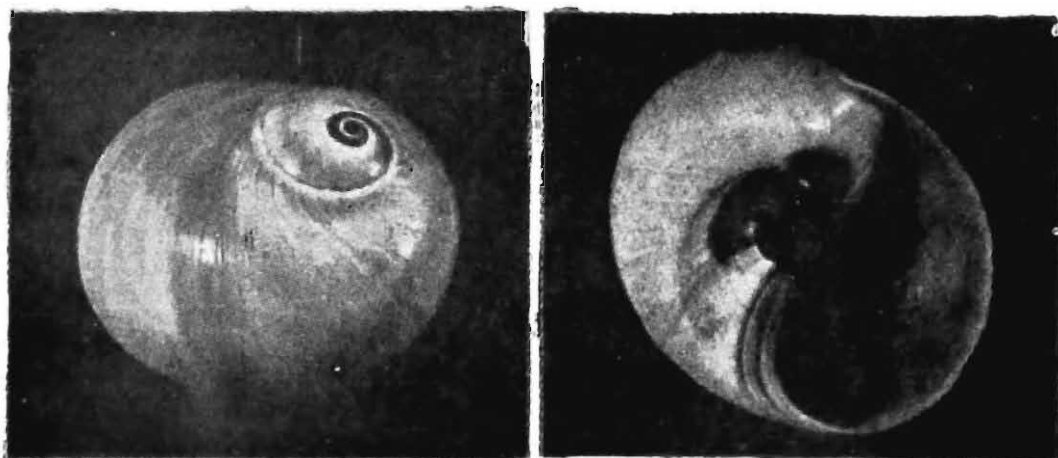
36

10 mm

PLATE IX

- Fig. 37a & 37b. *Polinices (Glossaulax) didyma* (Roeding), 37a. Abapertural view of a shell from Sethubabachatram ; 37b. Apertural view.
- Fig. 38a & 38b. *Polinices (Glossaulax) lamarckii* (Chenu), 38a. Abapertural view of a shell from coastal waters of Madras ; 38b. Apertural view.
- Fig. 39a & 39b. *Eunaticina papilla* (Gmelin), 39a. Abapertural view of shell from Tranquebar ; 39b. Apertural view.

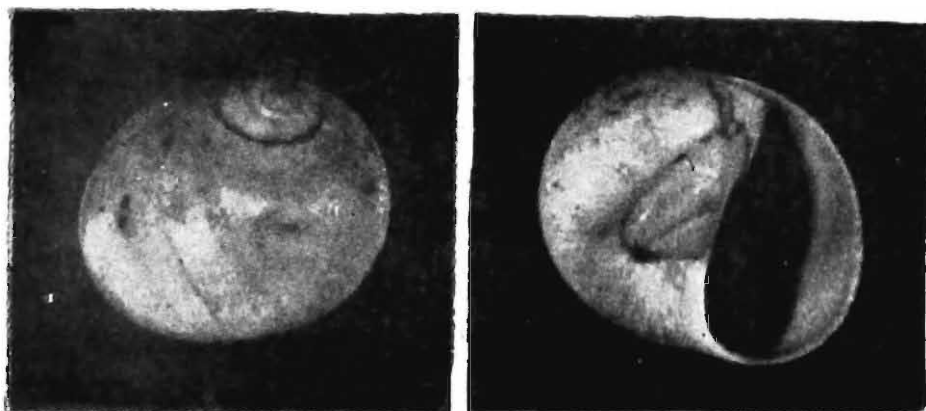
PLATE IX



37a

3 CM

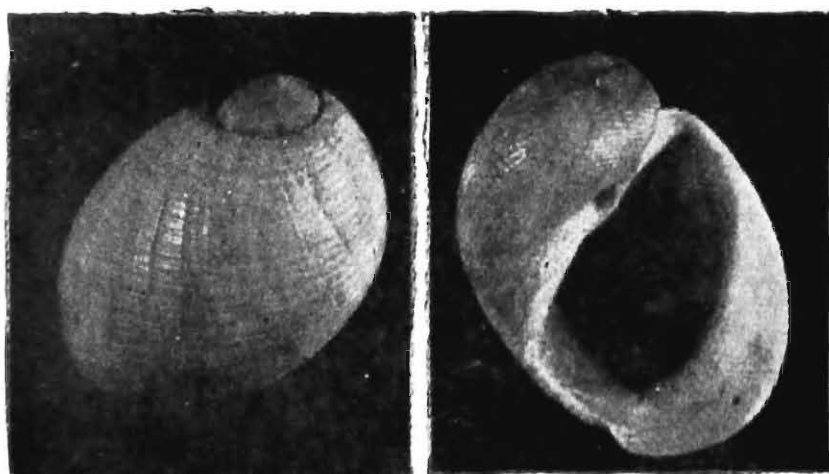
37b



38a

3 CM

38b



39a

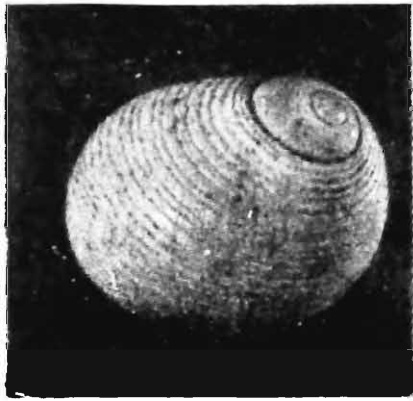
2 CM

39b

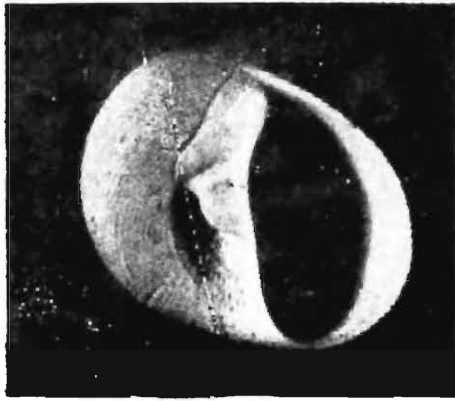
PLATE X

- Fig. 40a & 40b. *Eunaticina coarctata* (Reeve), 40a. Abapertural view of a shell from coastal waters of Madras; 40b. Apertural view.
- Fig. 41. *Sinum delessertii* (Recluz), Abapertural view of a shell from Vedaraniyam.
- Fig. 42. *Sinum netitoideum* (Linnaeus), Abapertural view of a shell from Agasthiampalli.
- Fig. 43. *Sinum tumescens* (Reeve), Abapertural view of a shell from Tuticorin.
- Fig. 44. *Phalium (Phalium) areola* (Linnaeus), Abapertural view of a shell from coastal waters of Madras.

PLATE X



40a



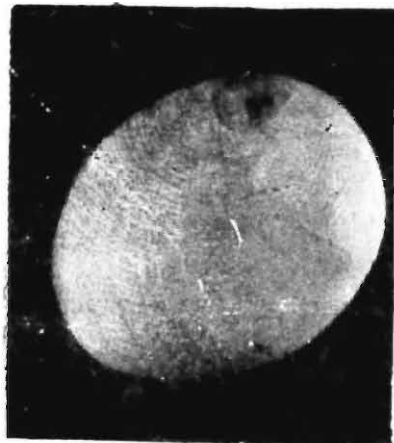
40b

2 CM



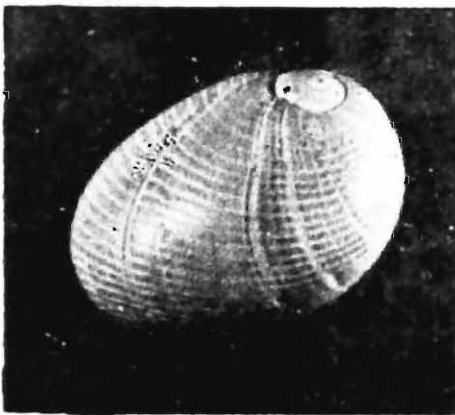
41

2 CM



42

2 CM



43

2 CM



44

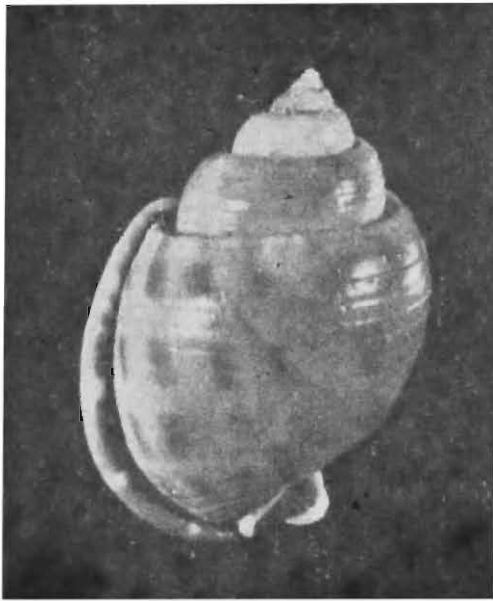
3 CM

PLATE XI

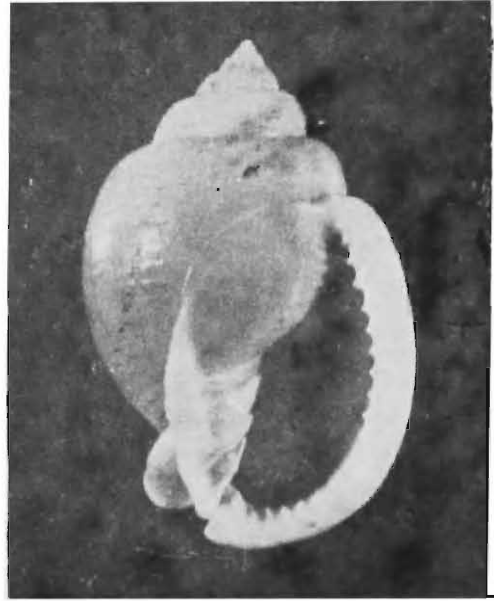
Fig. 45a & 45b. *Phalium* (*Semicassis*) *canaliculatum* (Bruguere), 45a. Abapertural view of a shell from coastal waters of Madras ; 45b. Apertural view.

Fig. 46a & 46b. *Phalium* (*Semicassis*) *bisulcatum* (Schubert and wagner), 46a. Abapertural view of a shell from Chinna Tarangapatti, Tranquebar ; 46b. Apertural view.

PLATE XI

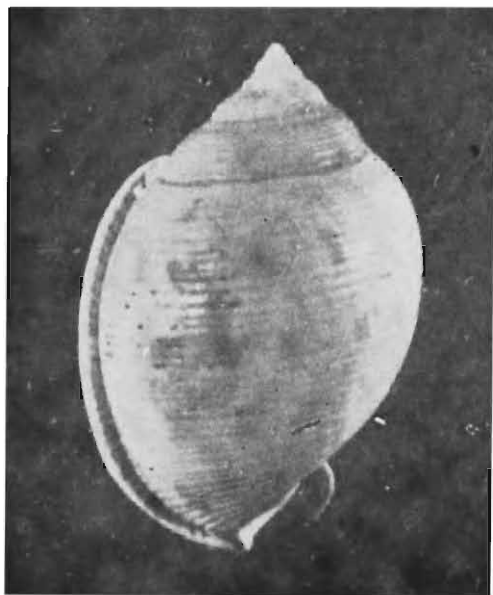


45a

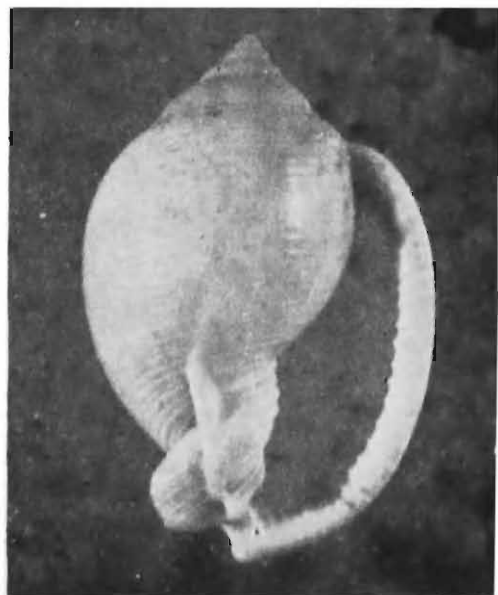


45b

3 CM



46a



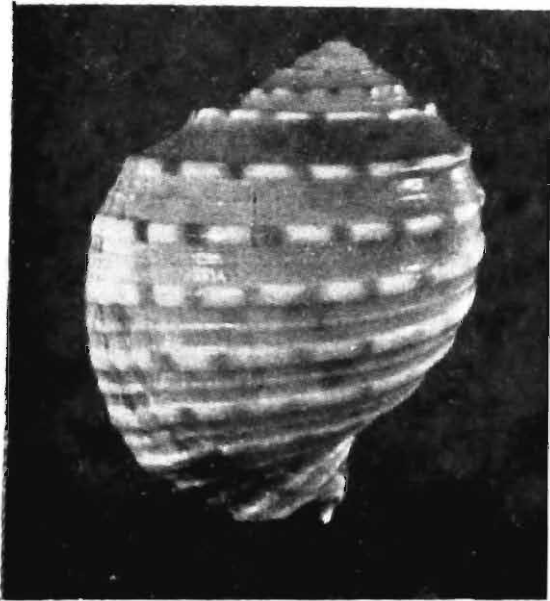
46b

3 CM

PLATE XII

- Fig. 47. *Tonna dolium* (Linnaeus), Abapertural view of a shell from point Calimere.
- Fig. 48. *Tonna sulcosa* (Born), Abapertural view of a shell from Agasthiampalli.
- Fig. 49. *Tonna cumingii* (Reeve), Abapertural view of a shell from Glaxea reef.
- Fig. 50. *Ficus variegata* Roeding, Abapertural view of a shell from Porto Novo.

PLATE XII



47

3 CM



3 CM

48



49

3 CM



2 CM

50

PLATE XIII

Fig. 51. *Ficus ficoides* (Lamarck), Abapertural view of a shell from Point Calimere.

Fig. 52a & 52b. *Cymatium* (*Gutturnium*) *tripus* (Lamarck), 52a. Abapertural view of a shell from Tuticorin ; 52b. Apertural view.

Fig. 53a & 53b. *Cymatium* (*Gutturnium*) *vespaceum* (Lamarck), 53a. Abapertural view of a shell from Galaxea reef, Gulf of Mannar ; 53b. Apertural view.

PLATE XIII



51 2 CM



52a 3 CM 52b



53a 3 CM 53b

PLATE XIV

- Fig. 54a & 54b. *Cymatium (Gutturium) retusum* (Lamarck),
54a. Abapertural view of a shell from Hare Island off Tuticorin ;
54b. Apertural view.
- Fig. 55a & 55b. *Linatella cingulata* (Lamarck), 55a. Abapertural view of a
shell from Tuticorin ; 55b. Apertural view.
- Fig. 56a & 56b. *Distorsio reticulata* Roeding, 56a. Abapertural view of a
shell from Tranquebar ; 56b. Apertural view.

PLATE XIV

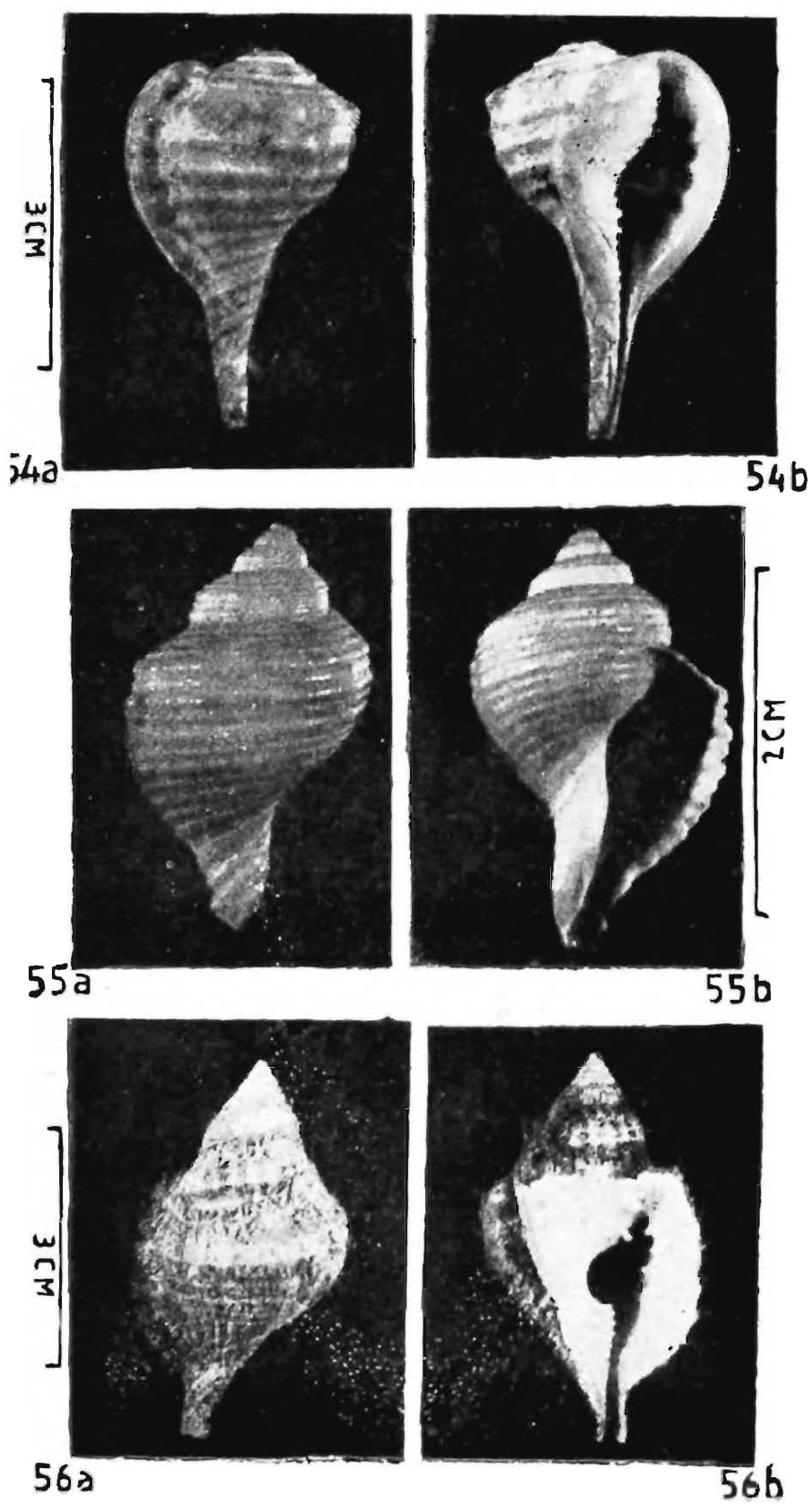


PLATE XV

- Fig. 57a & 57b. *Gyrineum natator* (Roeding), 57a. Abapertural view of a shell from Kanyakumari ; 57b. Apertural view.
- Fig. 58. *Bursa spinosa* (Lamarck), Abapertural view of a shell from coastal waters of Madras.
- Fig. 59. *Bursa (Bufonaria) rana* (Linnaeus), Abapertural view of a shell from Point Calimere.
- Fig. 60. *Bursa (Bufonaria) crumena* (Lamarck), Abapertural view of a shell from Porto Novo.
- Fig. 61. *Bursa margaritula* (Deshayes), Abapertural view of a Shell from Madras Coast.

PLATE XV

