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**Contribution to the Molluscan Fauna of India
Part II. Marine Molluscs of the Coromandel
Coast, Palk Bay and Gulf of Mannar—
Gastropoda : Mesogastropoda
(Partim)**

by
A. S. Rajagopal and H. P. Mookherjee

Issued by the Director
Zoological Survey of India, Calcutta

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सत्यमेव जयते

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INDIA. PART 11. MARINE MOLLUSCS OF THE
COROMANDEL COAST, PALK BAY AND
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INTRODUCTION

This is the second contribution in the series, "Contributions to the molluscan fauna of India." In the earlier part systematic studies on the order Archaeogastropoda was completed by the present authors (Rajagopal and Mookherjee, 1978).

This part deals with systematic studies of eight families namely, Littorinidae, Turritellidae, Architectonicidae, Planaxidae, Potamididae, Cerithiidae, Epitoniidae and Janthinidae under the order Mesogastropoda, all of which are predominantly marine and/ or estuarine in their habitat. The remaining families in the order which also are marine/ estuarine will be dealt with in a later part.

Since a brief review of the earlier works on the molluscan fauna of the east coast of India has already been presented in the previous work of this series, it is omitted here.

The material for this study is provided by the large back-log of unnamed collection accumulated for over 60 years in the Zoological Survey of India. It also includes the collections brought from three tours along the Coromandel Coast, Palk Bay and Gulf of Mannar conducted in 1968, 1975 and 1978 under the leadership of one of the authors (A. S. R.).

On the whole, the study includes 15 genera and 36 species spread over 8 families in the order Mesogastropoda. Included in it are three species, *Turritella (Haustator) trisulcata* Lamarck, *Clypeomorus delectum* (A. Adams) and *Epitonium lamellosum* (Lamarck) which are recorded here for the first time from the Indian coast and another, *Cerithium balteatum* Philippi is recorded for the first time from the coast of mainland India. Two others, i.e., *Torinia straminea* (Gmelin) and *Cerithidea (Cerithideopsilla) cingulata* (Gmelin) are represented in their

respective material by topotypes from Tranquebar. Two other species, viz., *Clypeomorus splendens* (Sowerby) and *Cerithium tenellum* Sowerby are new additions to the National Zoological Collections of the Zoological Survey of India.

The classification adopted in this paper is mainly the one given by Thiele (1931)*

II. 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 ; NZC.—National Zoological Collections ; Reg. No.—Register Number ; S.—South ; S.E.—South-east ; Sta.—Station ; vill.—village ; W.—West ; w.—wet ; ZSI.—Zoological Survey of India.

Consolidated list of marine molluscs reported so far from the east coast of India between Madras and Kanya Kumari (species arranged alphabetically), Taxa marked with asterisk (*) have been dealt with in the paper.

Phylum MOLLUSCA

Class GASTROPODA

Order MESOGASTROPODA

Family LITTORINIDAE

- * *Littorina (Littoraria) kraussi* Rosewater.
- * *Littorina (Littoraria) undulata* Gray.
- Littorina (Littorinopsis) carinifera* (Menke).
- * *Littorina (Littorinopsis) melanostoma* Gray.
- * *Littorina (Littorinopsis) scabra scabra* (Linnaeus).
- Nodilittorina (Granulilittorina) leucosticta leucosticta* (Philippi).
- * *Nodilittorina (Granulilittorina) millegrana* (Philippi).
- * *Nodilittorina (Nodilittorina) pyramidalis pyramidalis* Quoy and Gaimard.

*The attention of the authors was drawn to the creation by Habe T. und Kosuge, S. of the order Heterogastropoda to include families Triphoridae, Architectonicidae, Mathildidae, Epitoniidae and Janthinidae, when the paper was in its final stage. This classification has not been followed here as the authors could not study it in depth.

Family—TURRITELLIDAE

- * *Turritella acutangula* Linnaeus.
- * *Turritella attenuata* Reeve.
Turritella bacillum Kiener.
- * *Turritella columnaris* Kiener.
Turritella triplicata Studer.
- * *Turritella (Haustator) trisulcata* Lamarck.

Family—ARCHITECTONICIDAE

- Architectonica aspera* (Hinds).
- * *Architectonica laevigata* (Lamarck).
Architectonica modesta (Philippi)
- * *Architectonica perspectiva* (Linnaeus)
Architectonica picta (Philippi)
Architectonica purpurata (Hinds).
- * *Torinia dorsuosa* (Hinds)
- * *Torinia straminea* (Gmelin).

Family—VERMETIDAE

- Spiroglyphis spirulaeformis* (de Serres).
- Vermicularia inopertus* (Ruppell).
- Tenagodus lacteus* (Lamarck).
- Tenagodus encausticus* (Morch).

Family—PLANAXIDAE

- Planaxis breviculus* Deshayes var. *tessellata* Nevill.
- Planaxis nigra* Quoy.
- Planaxis similis* Smith.
- * *Planaxis (Planaxis) sulcatus* (Born).

Family—POTAMIDIDAE

- * *Cerithidea (Cerithideopsilla) cingulata* (Gmelin).
Cerithidea obtusa Lamarck.
- * *Telescopium telescopium* (Linnaeus).
Terebralia palustris (Linnaeus).

Subfamily—BATILLARIINAE

- * *Batillaria angulifera* (Sowerby)

Family—CERITHIIDAE

Subfamily—CERITHIINAE

- * *Cerithium balteatum* Philippi.
Cerithium carnaticum Melvill & Standen.

- Cerithium citrinum* Sowerby.
- * *Cerithium columna* Sowerby
 - Cerithium gemma* Sowerby.
 - Cerithium litteratum* Born.
 - Cerithium nodulosum* Bruguiere.
 - Cerithium proditum* Bayle.
 - Cerithium rubus* Martyn.
 - * *Cerithium scabridum* Philippi.
 - * *Cerithium tenellum* Sowerby.
 - Cerithium vulgatum* Bruguiere.
 - * *Clypeomorus delectum* (A. Adams).
 - * *Clypeomorus moniliferus* (Kiener).
 - * *Clypeomorus splendens* (Sowerby).
 - * *Clypeomorus traillii* (Sowerby).
 - Colina selecta* Melvill & Standen.
 - Colina pupaeformis* A. Adams.
 - Rhinoclavis (Proclava) kochi* (Philippi).
 - Rhinoclavis (Rhinoclavis) aspera* (Linnaeus).
 - Rhinoclavis (Rhinoclavis) fasciata* (Bruguiere).
 - * *Rhinoclavis (Rhinoclavis) sinensis* (Gmelin).

Family—TRIPHORIDAE

- Triphora concinna* Hinds.
- Triphora violacea* (Quoy & Gaimard).

Family—EPITONIIDAE

- * *Acrilla acuminata* (Sowerby).
- Eglisia tricarinata* Adams & Reeve.
- * *Epitonium immaculatum* (Sowerby).
- * *Epitonium lamellosum* (Lamarck).
- * *Epitonium latifasciatum* (Sowerby).
- Epitonium melior* (Melvill & Standen).
- * *Epitonium pallasii* (Kiener).
- Epitonium philippinarum* (Sowerby).
- * *Epitonium pyramidale* (Sowerby).
- Epitonium scalaris* (Linnaeus).
- * *Epitonium subauriculatum* (Souverbie)
- Epitonium subtile* (Sowerby).

Family—JANTHINIDAE

- * *Janthina globosa* Swainson.
- Janthina jehennei* Petit.
- * *Janthina roseola* Reeve.

SYSTEMATIC ACCOUNT
 Phylum MOLLUSCA
 Class GASTROPODA
 Sub-class PROSOBRACHIA
 Order MESOGASTROPODA

Mesogastropoda is the second of the three orders of the Prosobranchiate gastropods. It is characterised by a usually conical shell, generally with a siphonal canal and a canal noncalcified operculum. Internally radula is commonly of taenioglossate type, pedal ganglia usually without eords. Only one monopectinate ctenidium, one osphradium, one nephridium and one auricle are retained as a result of torsion. These lie now to the left side of the rectum and anus though they were originally, i e., before torsion members of the right side, the pretorsional members of the left side having disappeared, except that, part of the nephridium of this side has got united with the gonoduct.

Key to the identification of the Indian families of order MESOGASTROPODA :

- | | | | | | |
|-----------|---|-----|-----|-------------------|---|
| | Shell usually conical, small to moderate size ; whorls inflated with spire moderately elevated or depressed ; with or without umbilicus | ... | ... | ... | A |
| | Shells moderate to large ; spire generally elevated with few to many whorls ; umbilicus present | ... | ... | ... | B |
| A | Shell conical, broad ; spire depressed ; umbilicus wide with toothed margin | ... | | Architectonicidae | |
| | Shell not broad ; spire generally elevated ; umbilicus small ; surface either smooth or spirally striated. | ... | ... | ... | 1 |
| 1. | Shell moderately large, thin, fragile ; whorls inflated, smooth, sculptured or faintly striated ; violet in colour ; operculum absent. Generally found in floating condition. | ... | ... | Janthinidae | |
| | Shells are not like above | ... | ... | ... | 2 |
| 2. | Shell generally thick; sculptured with deep striations ; columella bordered with callus ; distinct spiral ridge running inward from the posterior canal. | ... | ... | Planaxidae | |
| | Shell moderately thick, either smooth or sculptured with light striations ; operculum horny with wide turns ; spiral ridge absent and without umbilicus. | ... | ... | Littorinidae | |
| B | Shells thick, elongated with many whorls ; whorls generally inflated with sculpture, | | | | |

	spirally striated ; without siphonal notch and anterior canal.	...	...	...	...	Turritellidae
	Shells are not like above	...	...	...	...	3
3.	Shells variously shaped with rounded whorls ; spire elevated. Whorls bearing longitudinal prominent ribs. Aperture circular.	...	...	...	...	Epitoniidae
	Shells elongated with few to many whorls ; without longitudinal ribs.	...	...	...	...	4
4.	Shells with many whorls, straight sided ; sculpture usually with spiral ridges. Aperture provided with distinct anterior canal. Generally found in brackish water.	...	...	...	...	Potamididae
	Shells with few whorls, rounded ; sculpture generally ornamented with tubercles and ridges. Anterior canal generally present. Generally found in marine, extends to estuarine waters.	...	...	...	...	Cerithiidae

Family LITTORINIDAE

This family morphologically allied to the family Planaxidae is represented here by a single subfamily namely, Littorininae.

Shell in some species nodulose, granulose, or with surface axially folded, in others with surface smooth or spirally folded (carinate).

Subfamily LITTORININAE

Under this subfamily a single genus *Littorina* Ferussac is dealt with here bearing subgenera *Littoraria* Griffith and Pidgeon, *Littorinopsis* Morch, *Nodilittorina* von Martens and *Granulilittorina* Habe and Kosuge.

Shell higher than broad, with more or less rounded whorls ; surface smooth or granulose, conspicuously coloured ; operculum horny ; aperture ovate with its margin thin and unbroken by canals.

... .. *Littorina*

Family LITTORINIDAE

Subfamily LITTORININAE

Genus *Littorina* Ferussac, 1822

Type-species : *Turbo littoreus* Linnaeus, 1758.*

Subgenus *Littoraria* Griffith and Pidgeon, 1834.

Type-species : *Littorina zebra* (Donovan, 1825).

Littorina (*Littoraria*) *undulata* Gray, 1839.

Littorina undulata Gray, 1839†, *Zool. Capt. Beechey's Voy. in H. M. S. Blossom, Mollusks*, p. 140. (Type-locality designated subsequently by Rosewater [1970] :

* Vide, Winckworth, R. (1922) and Mc Michael, D. F. (1959).

† Reference not seen in the original.

Okinawa, Ryukyu Islands) ; Reeve, 1857, *Conch. Icon.*, 10 : *Littorina*, sp. No. 67, pl. 13, figs. 67a to 67d. ; Tryon, 1887, *Man. Conch.*, 9 : 244, pl. 43, figs. 39-41 ; Gravely, 1942, *Bull. Madras Govt. Mus, new Ser. (Nat. Hist. Sec.)*, 5 (2) : 19-20 ; Satyamurti, 1952, *Bull. Madras Govt. Mus. new Ser. (Nat. Hist. Sec.)*, 1 (2), pt. 6 : 66-67, pl. 4, figs. 5a & 5b.

Littorina columna : Philippi, 1847, *Abbild. und beschreib. Conchyl.*, 3 : 14, *Littorina*, sp. No. 12, pl. 6, fig. 15.

Littorina conica subintermedia : Nevill, 1885, *Hand List Moll. Indian Mus.*, pt. 2 : 150.

Littorina (Littoraria) undulata : Rosewater, 1970, *Indo-Pac. Moll.*, 2 (11), pt. 1 : 436-439, pl. 332, figs. 1-17,

For complete synonymy Rosewater (1970) may be consulted.

Material—(1) 3 exs, (w.), Sta. ? : In dead corals, Pamban beach, Feb., 1925, (2) 4 exs. (w.), Sta. 2—Shore, N. of Pamban, March, 1926 (Coll. B. Chopra & H. S. Rao) ; (3) 25 exs. (w), (Sta. 3b—Rocky shore of Gulf of Mannar, S. of Quarantine Camp, Mandapam, 11-5-1955, (4) 4 exs. (d.), Sta. 1c—Shore about 4 Km. S. of Inspection Bungalow, Tuticorin, 16-4-1955, (5) 37 exs. (w.), Sta. ID—In front of Inspection Bungalow, Tuticorin, 17-4-1955 (Coll. H. C. Ray) ; (6) 11 exs. (w.), Sta. II—From the pillars of CMFRI Jetty, Mandapam, 15-2-1962, (7) 4 exs. (w.), Sta. II—From Galaxea reef, Krusadai Id., 12 Km. E. of Mandapam Camp, 21-2-1962 (Coll. V K. Premkumar & P. K. Chakraborty) ; (8) 2 exs. (d.), Sta. XII—Mandapam, 17-9-1965 (Coll. A. Daniel, M. Babu, Rao and party) ; (9) 76 exs, (w.), Sta. II—Behind Circuit House, Tuticorin, 21-2-1968, (10) 86 exs. (w.), Sta. 14—From a rock, Kanya Kumari 24-2-1968, (11) 37 exs. (w), Sta. 16—Shore colln., near Madras State Fisheries Extension Unit, 25-2-1968 (Coll. A. S. Rajagopal) ; (12) 6 exs. (w.), Sta. 2—Shore colln., Mahabalipuram, 26-1-1975, (13) 40 exs. (w.), Sta. 3—Shore colln., Kovelong, 55Km. S. of Madras, 28-1-1975, (14) 127 exs. (w.), Sta. 5—Shore colln., Mandapam Camp, 31-1-1975, (15) 2 exs. (d.), Sta. 6—Shore colln. at low tide, Rameswaram, 1-2-1975, (16) 28 exs. (w.) and 1 ex. (d.), Sta. 7—Shore colln., Palk Bay, Mandapam Camp to Mandapam, 3-2-1975, (17) 144 exs. (w.), Sta. 12—Shore colln. N. of Fort, Tranquebar, 12-2-1975, (18) 51 exs. (w.), Sta. 13- $\frac{1}{2}$ Km. N. of Fort, Tranquebar, 13-2-1975, (19) 21 exs. (w.), Sta. 16—Shore colln., N. of Jetty up to Solathandakuppam, Pondicherry, 17-2-1975 (20) 3 exs. (d.) & 24 exs. (w.), Sta. 9—Hare Id., near the Port of New Tuticorin, 22-1-1978, (21) 3 exs. (w.), Sta. 10—Shore colln., in front of Asstt. Collector's bungalow, Tuticorin, 22-1-1978, (22) 39 exs. (w.), Sta. 13—Shore colln., at Tiruchendur, 25-1-1978, (23) 3 exs. (w.), Sta. 14—Shore colln. at Kanya Kumari, 26-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—In India : Vengurla, N. of Goa, Goa ; Khumpta, N. of

Kanara, Malabar, Cochin, Varkalay, Kanya Kumari, Tiruchendur, Pamban, Gulf of Mannar and Palk Bay, Mandapam Camp ; Royapuram beach, Madras ; Andaman & Nicobar Is ; Lakshadwip.

Elsewhere : Madagascar, Mauritius, Seychelles ; Maldives, Sri Lanka, Arakan, Burma ; Malaysia, Penang, Formosa, Caroline Is., Gilberts, Japan, Ryukyu Is., Viti, Is., Philippines, Sulu Archipelago, Borneo, Celebes, Moluccas, Sumatra, Java, Flores Id., Cocos-Keeling, W. Australia, New South Walse, Queensland, New Guinea, Admiralty Is. Bismarks, Solomons, Santa Cruz.

Remarks—Reeve (*op. cit.*) and Tryon (*op. cit.*) have given descriptions which are brief but adequate. Satyamurti (1952) is in greater detail and following Reeve (*op. cit.*) he has rightly stressed the variable nature of the shell character, Gravely (*op. cit.*) and Rosewater (*op. cit.*) have given a good account of its ecology. The latter (*op. cit.*) also provides elaborate description noting the variable nature of its shell and its extensive distribution in the Indo-Pacific region. He states that it lives intertidally on rocky shores commonly clustering in rock crevices during daylight, becoming active at night and crawling on the rocks.

The large number of shells both dry and wet before us presents a wide range of sizes and colour patterns and agrees with the above descriptions.

Shell nonumbilicate, solid, ovately conoid. Columella though appressed by callus, may or may not be violet. Pody-whorl slightly concavely impressed round the upper part, then convex, evenly rounded without sharp angulation below.

Measurements (in mm.)	Range (100 exs.)
Height	5.05—21.90
Maximum Diameter	3.60—13.20
Minimum Diameter	3.25—12.80

***Littorina (Littoraria) Kraussi* Rosewater, 1970**

Littorina glabrata Philippi, 1845, *Proc. zool. Soc. London*, 13 (154) (1845) : 140 (Payta Peru ; and Cape Natal [South Africa] here restricted to second locality).

Litorina glabrata Philippi, 1848, *Abbild. und Beschreib. Conchyl.*, 3 : 62, *Litorina*, sp. no. 3 pl., 7, fig. 5.

Littorina glabrata Reeve, 1857, *Conch. Icon.*, 10, *Littorina*, sp. no. 104, pl. 18, figs. 104a & 104b.

Littorina (Littoraria) kraussi Rosewater, 1970, *Indo-Pac. Moll.*, 2 (11), pt. 1 : 444-445, pl. 325, fig. 23, pl. 341, figs. 1-12.

Material—(1) 8 exs. (w.), Sta. 11—Shore colln., in front of the Circuit House, Tuticorin, 21-2-1968, (2) 1 ex. (w.), Sta. 14—From a rock, Kanya Kumari, 24-2-1968 (Coll. A. S. Rajagopal) ; (3) 3 exs. (w),

Sta. 5-Shore colln., Mandapam Camp, 31-1-1975 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—In India : Goa.

Elsewhere : South Africa, Mozambique, Tanzania, Kenya, Aden, Madagascar, Seychelles, Maldive Is., Chagos Archipelago, Sri Lanka, Cocos-Keeling Is.

For a detailed distribution list of this species Rosewater (1970) may be consulted.

Remarks—Rosewater (*op. cit.*) has provided the *nomen novum* as above to this species to replace the earlier name, *Littorina glabrata* which has been found to be a secondary homonym of *Paludina glabrata* Pfeiffer [= *Littorina neritoides* (Linnaeus)].

The material under study agreed well with the description of the species given by Rosewater (*op. cit.*).

Shell turbinate, pale flesh colour, non-umbilicate, painted with oblique or zigzag brown streaks. Whorls scarcely convex. Body-whorl moderately weakly keeled at the periphery. Spire whorls above penultimate whorl dark anteriorly and light posteriorly. Aperture oval and outer lip thin in young ones and moderately thick in adults. Columella variable in colour from dark brown to nearly white.

Measurements (in mm.)	Range (8 exs.)
Height	10.25—21.40
Maximum Diameter	6.65—12.25
Minimum Diameter	6.25—11.75

Genus *Littorina* Ferussac, 1822

Subgenus *Littorinopsis* Morch, 1876

Type-species : *Phasianella angulifera* Lamarck, 1822

Littorina (*Littorinopsis*) *scabra scabra* (Linnaeus, 1758).

Buccinum foliorum Rumphius, 1705,* d' *Amboinische Rariteitkamer*, p. 98, pl. 29, sp. Y ; (pre Linnean).

Helix scabra Linnaeus, 1758, *Syst. Nat.* ed. X, 1 : 770 (Type-locality : Amboina, Moluccas) ; Lectotype designated by Rosewater (1970) : Specimen figured by Chemnitz, 11, pl. 210, fig. 2074.

Buccinum lineatum : Gmelin, 1791, *Syst. Nat.*, Ed. XIII, 1 (6) : 3493, refers to Knorr, *Vergu*, 3, pl. 4, fig. 4.

Littorina intermedia : Philippi, 1846, *Proc. zool. Soc. London*, pt. 13 (1845), p. 141 ; *Abbild. und Beschreib. Conchyl.*, 2, p. 223, *Littorina*, sp. no. 3, pl. 5, fig. 8.

Littorina scabra ventricosa : Philippi, 1847, *Abbild. und Beschreib. Conchyl.*, 2 : 222, *Littorina*, pl. 5, fig. 8.

Littorina scabra : Reeve, 1857, *Conch. Icon.*, 10 : *Littorina*, sp. no. 21, pl. 5, figs. 21a to 21c ; Tryon, 1887, *Man. Conch.*, 9 : 243, pl. 42, figs. 18-20, Satyamurti, 1952,

* Reference not seen in the original.

Bull. Madras Govt. Mus. new ser. (Nat. Hist. Sec.), 1 (2), pt. 6 : 66, pl. 4, figs. 3a & 3b.

Littorina (Littorinopsis) scabra : Schepman, 1909, *Siboga Exped. Prosobranchia*, 49b (II) : 193-194.

Littorina (Littorinopsis) scabra scabra : Rosewater, 1970, *Indo-Pac. Moll.*, 2 (11), pt. 1 : 456-461, pl. 352, figs. 1-34.

For a complete synonymy referencce may be made to Rosewater [1970].

Material—(1) 2 exs. (w.) Sta ?—Beach N. of Rameswaram, 21-3-1926 ; (2) 28 exs. (w.), Sta. ?—Shore colln., Tuticorin Harbour, Feb.-Mar., 1926 (Coll. *H. S. Rao*) ; (3) 6 exs. (w.), Sta. 2—Bank of Vellar R., near Porto Novo Jetty, Porto Novo, 6-5-1960 (Coll. *A. Daniel*) ; (4) 7 exs. (w.), Sta. 4—Killai R. estuary, 3 Km. E. of Killai vill., 12-2-1968, (5) 1 ex. (w.), Sta. 16—Shore colln., behind Circuit House, Tuticorin, 25-2-1968 (Coll. *A. S. Rajagopal*) ; (6) 1 ex. (w.), Sta. 7—shore colln., Palk Bay, Mandapam Camp, 3-2-1975, (7) 6 exs. (w.), Sta. 12—Shore colln. N. of the Fort, Tranquebar, 12-2-1975, (8) 1 ex. (w.), Sta. 10—Shore Colln. in front of Asstt. Collector's Bungalow, Tuticorin, 23-1-1978 (Coll. *A. S. Rajagopal & H. P. Mookherjee*).

Distribution—In India : Vengurla, N. of Goa, Khumpta (Kumpta) ; N. of Kanara ; Netraati R., Mangalore ; Cochin Harbour, Kerala ; Tuticorin, Pamban & Krusadai Id. ; Mandapam, Palk Bay, Rameswaram, Madras, Ennur backwater, Adyar R. estuary ; Port Canning, Calcutta ; Andamans.

Elsewhere : Mozambique, Tanzania, Madagascar, Seychelles, Mauritius, Maldive Is., Sri Lanka, Burma : Mergui Archipelago; Thailand, Cambodia, Vietnam, Malaysia, China, Japan, Ryukyu Is., Taiwan, Philippine Is., Sumatra, Java, Bali, Borneo, Celebes, Moluccas, Cocos-Keeling Is., Australia, Northern Territory, New Guinea, Admiralty Is., solomon Is., Santa Cruz Group, New Hebrides, New Caledonia, Fiji Is., Marianas, Palau Is., Caroline Is., Marshall Is., Gilbert Is., Hawaiian Is., Line Is., Ellice Is., Wallis Is., Tonga, Samoa, Society Is., Gambier Is.

A more detailed distribution list is available in Rosewater (1970).

Remarks—Rosewater (*op. cit.*) recognises two subspecies under this, viz., *scabra* which is Pan Indo-Pacific and *angulifera* which is Atlantic. His excellent description of the nominate subspecies is based on both shell characters and animal. He has also dealt with the ecology distinctive to this subspecies, i.e., its preference to stems and leaves of Mangroves in backwaters and estuaries and its avoidance of shore rocks of open seas. Gravely (*op. cit.*) also had noted this point earlier. According to Rosewater (*op. cit.*) this is ovoviviparous and

produces closely related, in bred populations within which variations or mutations may develop and are perpetuated.

The specimens in the collection agree with the description given by Rosewater (*op. cit.*).

Shell thin, turbinately ovate, spirally ridged, spire elevated, suture narrowly channelled in larger shells. Body-whorl sharply angular below, subcarinate to carinate at the periphery. Colour of the shells variable often with mosaic of dark brown blotches arranged axially or zigzag in an oblique order. Columella excavately appressed. Outer lip somewhat expansive.

Measurements (in mm.)	Range (30 exs.)
Height	6.95—20.75
Maximum Diameter	4.55—13.60
Minimum Diameter	4.25—12.90

Littorina (Littorinopsis) melanostoma Gray, 1839

Littorina melanostoma Gray, 1839,* *Zool. Capt. Beechey's Voy. H. M. S. Blossom, Mollusks*, p. 140 (Type-locality : Penang, Malaysia) ; Reeve, 1857, *Conch. Icon.*, 10 : *Littorina*, sp. no. 45, pl. 9, figs. 45a & 45b ; Tryon, 1887, *Man. Conch.*, 9 : 245, pl. 43, figs. 42 & 43 ; Gravely, 1942, *Bull. Madras Govt. Mus. new ser. (Nat. Hist. Sec.)*, 5 (2) : 20 & 21.

Littorina melanostoma articulata : Nevill, 1885, *Hand List. Moll. Indian Mus.*, pt. 2, p. 151.

Littorina (Littorinopsis) melanostoma : Rosewater, 1970, *Indo-Pac. Moll.*, 2 (11), pt. 1 : 462-464, pl. 355, figs. 1-4.

Material—2 exs. (w.), Sta. II—Coast of Pulli Island, Gulf of Mannar, 8 Km. (5 miles) S. of Mandapam Camp, Tamil Nadu, 20-2-1962 (Coll. V K. Premkumar & P. K. Chakrabarty).

Distribution—In India : Matla R., Gangetic Delta, Port Canning, Sunderbans ; False Point, Orissa ; Mandi off Mandapam Camp.

Elsewhere : Sri Lanka, Burma : Akyab, Mergui Archipelago, Malaysia, Singapore, Vietnam, Indonesia : Sumatra, Java, Borneo.

Remarks—Rosewater (*op. cit.*) has given a detailed description of this species. He (*op. cit.*) and Gravely (*op. cit.*) have also dealt with its distinctive habitat in estuarine areas on mangrove trees and grasses.

Shell thin, attenuately conical, spirally distantly incised, oblique axial lines of growth present. Colour yellowish white, elongate-rhomboidal pattern of longitudinal markings in between the spiral striae arranged axially and sometimes obliquely. Body-whorl flattened and weakly keeled. Suture weakly impressed. Aperture oval. Outer lip

* Reference not seen in the original.

thin, inner lip greatly thickened, weakly concave, glazed with dark brown callous.

Measurements (in mm.)	Range (2 exs.)
Height	13.60—21.40
Maximum Diameter	7.15—10.35
Minimum Diameter	6.60— 9.75

Genus *Nodilittorina* von Martens, 1897

Type-species : *Littorina pyramidalis* Quoy and Gaimard, 1833.

Subgenus *Nodilittorina* von Martens, 1897.

Nodilittorina (*Nodilittorina*) *pyramidalis pyramidalis* (Quoy & Gaimard, 1833)

Trochus nodulosus : Gmelin, 1791, *Syst. Nat.*, ed. XIII, 1 (6) : 3582 refers to Chemnitz, *Conchyl. Cab.*, 5, pl. 163, f. 1545, 1546 ; not *T. nodulosus* Solander, 1766 in G. Brander, *Fossilia Himatonensia*, p. 10, pl. 6.

Turbo trochiformis : Dillwyn, 1817, *Descriptive Catalogue of Recent Shells*, 2 : 826 (Southern Ocean); refers to Gmelin, *T. Nodulosus*, p. 3582 and to Chemnitz, *Conchyl. Cab.*, 5, pl. 163, f. 1545, 1546 ; not *T. trochiformis* Brochii, 1814.

Tectarius (*Nodilittorina*) *malaccanus* : Gravely, 1942, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), 5 (2) : 20.

Nodilittorina (*Nodilittorina*) *pyramidalis pyramidalis* : Rosewater, 1970, *Indo-Pac. Moll.*, 2 (11), pl. 370, figs. 1-9.

Regarding the nomenclature Rosewater (*op. cit.*) has given a detailed account of how the earlier names given by Gmelin (*op. cit.*) and Dillwyn (*op. cit.*) are preoccupied and not available. Hence the only name that becomes valid is the one as stated above by the application of the law of priority.

Material—(1) 5 exs. (w.), Sta ?—Pamban bridge, 19-9-1925 (Coll. H. S. Rao) ; (2) 5 exs. (w.), Sta. 3b—Rocky shore, Gulf of Mannar, S. of Quarantine Camp, Mandapam, 11-5-1955 (Coll. H. C. Ray) ; (3) 17 exs. (w.), Sta. II—From the pillars of CMFRI Jetty at Mandapam, 15-2-1962 (Coll. V K. Premkumar & P K. Chkrabarty); (4) 33 exs. (w.), Sta. 11—Behind Circuit House, Tuticorin, 21-2-1968, (5) 1 ex (w.), Sta. 14—From a rock of Kanyakumari, 24-2.1968. (6) 63 exs. (w.), Sta. 16—Shore colln. near State Fisheries Extension Unit, Tuticorin, 25-2-1968 (Coll. A. S. Rajagopal) ; (7) 62 exs. (w.), Sta. 3—Shore colln., Kovelong, 55 Km. S. of Madras, 28-1-1975, (8) 36 exs. (w.), Sta. 5—Shore colln., Mandapam Camp, 31-1-1975 (9) 95 exs. (w.), Sta. 13—Shore colln., 2 furlongs, N. of Fort, Tranquebar, 13-2-1975, (10) 15 exs. (w.), Sta. 9—shore colln., Hare Id, near the Port of New Tuticorin, 22-1-1978 (11) 15 exs. (w.), Sta. 13—Shore colln. at Tiruchendur, 25-1-1978 (Colln. A. S. Rajagopal & H. P. Mookherjee).

Distribution—In India : Bandra, N. of Bombay, Vengurla, N. of Goa ; Goa, Kumpta (Kumta), N. of Kanara, Kanya Kumari, W. of Mandapam Camp, Gulf of Mannar, Rameswaram Is., Pamban, Palk

Strait, Ramen Point, West side of Pamban Pass between Gulf of Mannar and Palk Bay, Tiruchendur, Tamil Nadu.

Elsewhere : Pakistan : Karachi, Sri Lanka, Burma, Penang, Thailand, Malaysia, Vietnam, China, Japan, Ryukyus, Philippine Is., North Borneo, Indonesia, Cocos-Keeling Is., Australia, Queensland, New South Walse, Victoria, Western Australia, Northern Territory, New Guinea, Lord Howe Id., Nerfolk Id., Bonin Is., Marianas, Samoa, Tonga, Marquesas.

Remarks—Shell thick, pyramidally ovate, non-umbilicate. Spire turreted, whorls concavely slanting at the upper part, then angled, conspicuously bearing raised spiral cords with raised white nodules. Microscopic sculpture consisting of overall closely spaced wavy spiral threads. Axial sculpture consisting of oblique growth lines. Aperture roundly oval, dark reddish brown with a narrow yellowish white band going inward from near anterior junction of outer lip and columella. Columella broadly excavated, reddish brown.

Nodules in two rarely in three on body-whorl, a single row on spire whorls, the other row often covered over by the next succeeding whorl. Nodules on peripheral row of body whorl sometimes appearing double by the cord dividing spirally.

Rosewater (*op cit.*) says that this species is found on shore rocks considerably above high tide line a fact which is fully corroborated by the material under study.

Measurements (in mm.)	Range (100 exs.)
Height	3.95—12.50
Maximum Diameter	2.70— 7.85
Minimum Diameter	2.65— 7.35

Genus *Nodilittorina* von Martens, 1897

Subgenus *Granulilittorina* Habe and Kosuge, 1966

Type-species : *Littorina millegrana* Philippi, 1848.

Nodilittorina (*Granulilittorina*) *millegrana* (Philippi, 1848).

Littorina granularis 'Gray' of Authors, non Gray, 1839*

[Gray, holotype, BM (NH) 87. 4. 26.9 is an eastern Atalantic species, *Nodilittorina miliaris* (Quoy & Gaimard)].

Littorina ventricosa : Philippi, 1847, *Abbild. und Beschreib. Conchyl.*, 3 : 15, *Littorina*, sp. no. 15, pl. 6, fig. 19.

Littorina millegrana Philippi, 1848, *Abbild. und Beschreib. Conchyl.* 3 : 65, *Littorina*, sp. no, 13, pl. 7, fig. 15, [Lectotype figure] [Red Sea].

Littorina ventricosa : Reeve, 1858, *Conch. Icon.*, 10, *Littorina* sp. no. 93, pl. 17, fig. 93 ; Tryon, 1887, *Man. Conch.*, 9 : 242, pl. 41, fig. 9.

* Reference not seen in the original.

Littorina eudeli : Sowerby, 1915, *Ann. Mag. nat. Hist.*, Sec. 8, 16 (93) : 167, pl. 10, fig. 5.

Nodilittorina (Granulilittorina) millegrana : Rosewater, 1970, *Indo-Pac. Moll.*, 2 (11), pt. 1 : 491-495, pl. 378, figs. 1-14 & pl. 380, figs. 1-14.

Material—(1) 5 exs. (w.), Pamban bridge, 19-2-1925. (Coll. B. Chopra & H. S. Rao) ; (2) 34 exs. (w.), Sta. II—from the Pillars, CMFRI jetty, Mandapam, 15-2-1962 (Coll. V. K. Premkumar & P. K. Chakrabarty), (3) 82 exs. (w.), Sta. 11—Shore colln., behind Circuit House, Tuticorin, 21-2-1968 ; (4) 127 exs. (w.), Sta. 14—From a rock, Kanya Kumari, 24-2-1968 (Coll. A. S. Rajagopal) ; (5) 71 exs. (w.), Sta. 2—Shore colln., Mahabalipuram, S. of Madras, 26-1-1975 ; (6) 123 exs. (w.), Sta. 3—Shore colln., Kovelong, 55 Km. S. of Madras, 28-1-1975, (7) 15 exs. (w.), Sta. 5—Shore colln., Mandapam Camp, 31-1-1975, (8) 4 exs. (w.), Sta. 7—Shore colln., Palk Bay, Mandapam Camp, 3-2-1975, (9) 100 exs. (w.) Sta. 13—Shore colln., 2 furlongs N. of Fort, Tranquebar, 13-2-1975, (10) 21 exs. (w.), Sta. 16—Shore colln., N. of Jetty upto Solathandakuppam, Pondicherry, 17-2-1975, (11) 1 ex. (w.), Sta. 9—Shore colln., Hare Id., near the Port of New Tuticorin, 22-1-1978, (12) 37 exs. (w.), Sta. 13—Shore colln. at Tiruchendur, 25-1-1978, (13) 14 exs. (w.), Sta. 14—Shore colln. at Kanya Kumari, 26-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—In India : Bandra, North of Bombay, Ratnagiri, Maharashtra ; Goa, South of Kerala, Kanya Kumari, Tiruchendur, Tamil Nadu, Pondicherry, Andamans.

Elsewhere : Red Sea, Gulf of Aden, Madagascar, Indian Ocean Is., Sri Lanka, Arakan, Burma, Thailand, Malaysia, China, Vietnam, Ryukyus, Japan, Philippines, Indonesia, Cocos-Keeling Atolls, Australia : Queensland : New South Wales, Western Australia, Melanesia, Palau Is., Marshall Is.

Remarks—The large collection containing various sizes of shells agrees well with the description given by Rosewater (*op. cit.*).

This species occurs on shore rocks above high tide line.

Shell moderately thick, rounded oval to subturbinata, grayish white with axially prominent reddish brown streaks. Non-umbilicate; surface bearing granulose spiral cords often alternating with non-granulose weaker cords on the body-whorl and spire. Suture well impressed. Body-whorl smoothly rounded at the periphery. Aperture widely oval, flesh coloured, usually with a white band extending inward from near the anterior junction of outer lip and columella. Columella excavated showing a crescent shaped area on base adjacent to columella callus. Outer lip moderately thick.

Measurements (in mm.)	Range (120 exs.)
Height	2.50—14.20
Maximum Diameter	2.20— 9.50
Minimum Diameter	1.85— 8.65

Family TURRITELLIDAE

Only one genus *Turritella* Lamarck is recognised and the same has been represented with four species.

Shell bearing more or less massive, slender and attenuated with spiral ridges weaker towards the body-whorl

... .. *Turritella*

Family TURRITELLIDAE

Marwick (1957) has made a generic revision of this family.

Genus *Turritella* Lamarck, 1799

Type-species : *Turbo duplicatus* Linnaeus.

Turritella acutangula (Linnaeus, 1758)

Turbo acutangulus Linnaeus, 1758, *Syst. Nat.*, ed. X, 766 : sp 559,

(Type-locality : Not given)

Turritella acutangula : Gravely, 1942, *Bull. Madras Govt. Mus. new Ser.* (Nat. Hist.

Sec.), 5 (2) : 22, fig. 3c : Satyamurti, 1952, *Bull. Madras Govt. Mus. new Ser.*

(Nat. Hist. Sec.), 1 (2), pt. 6 : 70-71, pl. 4, fig. 8.

Turritella duplicata : Kiener (1843-44)* *Coq. Viv.*, 10, *Turritella* : 3-4, pl. 1, all figs. :

Reeve, 1849, *Conch. Icon.*, 5, *Turritella*, sp. No. 2, pl. 1, fig. 2.

Turritella (Zaria) duplicata : Tryon, 1886, *Man. Conch.*, 8 : 207, pl. 65, figs. 20-22.

We have followed Gravely (*op. cit.*) in adopting the above name for the species.

Material—(1) 2 exs. (d), Sta. 2f—Shore colln., Rameswaram, 6-5-1955, (2) 1 ex. (d), Sta. 2b—Kundugal Point, Krusadai Id., 8-5-1955, (3) 3 exs. (d.) Sta. 3b—Rocky shore of Gulf of Mannar near Quarantine Camp, Mandapam, 11-5-1955 (Coll. H. C. Ray) ; (4) 1 ex. (d.), Sta. ?—Vaithikuppam, 32 Km. (2 miles) N. of Pondicherry, 8-2-1957 (A. G. K. Menon & G. Kamakrishna) ; (5) 2 exs. (d.), Sta. 3—Vellar river bank in front of MBS., Porto Novo, 11-2-1968, (6) 2 exs. (d.), Sta 5—Shore colln. between Killai R. mouth and Chinnavayakal vill., 13-2-1968, (7) 4 exs. (d.), Sta. 7—Shore colln., Point Calimere, 16-2-1968, (8) 1 ex. (d.), Sta. 16—Shore colln., near Tamil Nadu State Fisheries Extension Unit, Tuticorin, 25-2-1968. (Coll. A. S. Rajagopal) ; (9) 1 ex. (d.), Sta. 1—Coastal waters of Madras off Thondiypet on board “Chota Investigator” (Bottom Trawl), 25-1-1975, (10) 2 exs. (d.), Sta. 3—Shore Colln., Kovelong, 59.2 Km. (37 miles) S. of Madras, 28-1-1975, (11) 2 exs. (d.), Sta. 8—Shore colln., Karaikal, Fisherman’s

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

vill. south to Light House, 6-2-1975, (12) 1 ex. (d.), Sta. 9—Shore colln. in front of Karaikal Medu vill., Karaikal, 7-2-1975, (13) 19 exs. (d.), Sta. 11—Shore colln., opposite to the mouth of Uppanar, Tranquebar, 11-2-1975, (14) 2 exs. (d.), Sta. 12—Shore colln., N. of Fort, Tranquebar, 12-2-1975, (15) 1 ex. Sta. 14—Shore colln., N. of Fort, beyond Fisherman's vill., Tranquebar, 14-2-1975, (16) 1 ex. (d.), Sta. 17—Coastal waters of Pondicherry upto Nallavarukuppam, on board I. F. S. No. 3, 18-2-1975, (17) 3 exs. (d.), Sta. 18—Shore colln. upto Virampattinam vill., 4 Km. S. of Jetty, Pondicherry, 19-2-1975, (18) 1 ex. (w.), Sta. 19—Shore colln., Santhome beach, south upto the mouth of Adyar river, Madras, 24-2-1975, (19) 1 ex. (d.), Sta. 22—Shore colln., from the mouth of Adyar river to 1 Km. south, Madras, 27-2-1975, (20) 36 exs. (w.), & (d.), Sta. 4—Coastal waters of Madras on board "Chota Investigator", N. of Harbour (Bottom Trawl., 6-7 fms.), 29-2-1975, (21) 1 ex. [d.], Sta. 2—Shore colln., 3 Km. eastward along Mallipattinam shore, 13-1-1978 (Coll. *A. S. Rajagopal & H. P. Mookherjee*).

Distribution—In India : Bombay, Devagad, Krusadai Id., Pamban Madras, Nicobars.

Elsewhere : Indian Ocean : Madagascar, Sri Lanka, Maungmagan (Rangoon); Pacific : Indonesia, Philippines.

Remarks—Satyamurti has given an adequate description of the species.

Shell stout, ponderous, turbinately turreted, pale yellowish, non-umbilicate, whorls about 16, markedly bulged in the middle, first few with several subequal keels, later whorls with two or three prominent keels, others disappearing or becoming obsolete. Upper half of whorls light chestnut coloured. Aperture sinuous, columella with thin polished callus.

A large number of shells in different sizes and stages of growth represents the collection for study.

Measurements (in mm.)	Range (35 exs.)
Height	14.45—106.50
Maximum Diameter	4.50— 27.70
Minimum Diameter	4.45— 27.45

Turritella attenuata Reeve, 1849

Turritella duplicata var, Kiener (1843-44)* *Coq. Viv. 10* : pl. 1, Figs. 20 a & b.

Turritella attenuata : Reeve, 1849, *Couch, Icon.*, 5, *Turritella*, sp. No. 4, pl. 1, fig. 4 ; Gravely, 1942, *Bull. Madras Govt. Mus. new Ser. (Nat. Hist. Sec.)*, 5 (2) : 22 ;

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

Satyamurti, 1952, *Bull. Madras Govt. Mus. new Ser. (Nat. Hist. Sec.)*, 1 (2), pt. 6 : 71, pl. 4, fig. 9.

Turritella duplicata var. *attenuata* : Tryon, 1886, *Man. Conch.*, 8 : 206.

Material—(1) 2 exs. (d.), Sta. ?—Sea coast near Chinna Tarangapatti, 4.8 Km. (3 miles) N. of Tranquebar, 2-2-1957 (Coll. A. G. K. Menon & G. Ramakrishana), (2) 1 ex. (d.), Sta. 3—Vellar river bank, in front of MBS., Porto Novo, 11-2-1968, (3) 6 exs. (d.), Sta. 5—Shore colln. between Killai R. mouth and Chinnavayakal vill., 13-2-1968 (Coll. A. S. Rajagopal), (4) 2 exs. (d.), Sta. 1—Coastal waters of Thondiarpit, on board “Chota Investigator”, Madras, 25-1-1975, (5) 17 exs. (d.), Sta. 8—shore colln., Karaikal, Fisherman’s Vill. south to Light house, 6-2-1975, (6) 2 exs. (d.), Sta. 9—shore colln. in front of Karaikal Medu Vill., 7-2-1975, (7) 5 exs. (d.), Sta. 11—shore colln. opposite to the mouth of Uppanar, Tranquebar, 11-2-1975, (8) 2 exs. (d.), Sta. 12—Shore colln. N. of Fort, Tranquebar, 12-2-1975, (9) 2 exs. (d.), Sta. 17—Coastal waters of Pondicherry upto Nallavarukuppam, on board I.F.S. No. 3, 18-2-1975, (10) 1 ex. (d.), Sta. 19—Shore colln. Santhome beach, south upto the mouth of Adyar river, Madras, 24-2-1975, (11) 2 exs. (d.), Sta. 20—Coastal waters of Madras from High Court to Triplicane, on board “Chota Investigator”, 25-2-1975, (12) 5 exs. (w.), & 14 exs. (d.), Sta. 4—Coastal waters of Madras, on board, “Chota Investigator”, N. of Harbour (Bottom Trawl, 6-7 fms.), 29-2-1975. (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—In India : Kundugal Point, Pamban, Madras, Puri, Digha.

Elsewhere : Eastern Sea.

Remarks—Reeve (*op. cit.*) and Satyamurti (*op. cit.*) have provided brief but adequate descriptions to this species.

Shell light brownish or pinkish, attenuate, elongate, whorls with spirally raised striations. Striations similar in size on earlier whorls. In later whorls, i. e., 10th or 12th onwards middle one striation becoming stronger ; others getting gradually weak and obsolete. Whorls strongly single keeled bulged in middle, upper part of whorl sloping, lower part curved and constricted by suture. Upper part of whorls tinged with blue. Aperture sinuate.

A large number of shells of different sizes forms the material under study.

Measurements (in mm.)	Range (35 exs.)
Height	32.20-95.70
Maximum Diameter	9.30-21.30
Minimum Diameter	9.25-19.80

Turritella columnaris Kiener

Turritella columnaris Kiener, (1843-44): *Coq. Viv.*, 10 : 10-11, pl. 7, fig. 1. (Type-locality : unknown); Reeve, 1849, *Conch. Icon.*, 5, *Turritella*, sp. No. 14, pl. 4, fig. 14; Tryon, 1886, *Man. Conch.*, 8 : 200, pl. 63, fig. 76; Gravely, 1942, *Bull. Madras Govt. Mus. new Ser. (Nat. Hist. Sec.)*, 5 (2) : 23, fig. 3d.

Material—1 ex. (d.), Sta. 1—Shore colln., Adirampattinam, 13-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—In India : Madras.

Elsewhere : Mergui Archipelago, Rangoon, California.

Remarks—Brief but adequate descriptions are found in Kiener (*op. cit.*), Reeve (*op. cit.*) and Tryon (*op. cit.*).

Shell elongate sharply lanceolately turreted, of mottled, greyish or brownish colour. Whorls large in number (about 30), not much inflated, sometimes flattened in middle, earlier ones with two strong spiral striations, others with more or less uniform spiral ridges (about 10 in number), ridges obsolete granulated, suture excavated. Base strongly angulated.

A single imperfect shell represents this in the collection.

Subgenus Haustator Montfort, 1810

Type-species : *Turbo imbricataria* Lamarck

Turritella (*Haustator*) *trisulcata* Lamarck, 1822.

Turritella trisulcata Lamarck 1822*, *Hist. nat. Anim. sans Vert.*, Ed. 1, 7 : 58 (Type-locality : ?); Deshayes ed. 1843, *Hist. nat. Anim. sans Vert.*, Ed. II, 9 : 256, Kiener (1843-44) *Coq. Viv.*, 10 : 15-16, pl. 11, fig. 1; Reeve, 1849, *Conch. Icon.*, 5, *Turritella*, sp. No. 17, pl. 5, fig. 17; Tryon, 1886, *Man. Conch.*, 8 : 201, pl. 63, fig. 75.

Material :—(1) 13 exs. (d.), Sta. 5—Shore colln., Mandapam Camp, 31-1-1975. (2) 48 exs. (d.), Sta. 7—shore colln., Sethukkarai, 19-1-1978, (3) 2 exs. (d.), Sta. 8—Shore colln. behind Circuit House, Tuticorin, 21-1-1978, (4) 1 ex. (d.), Sta 9—Shore colln., Hare Id. near the port of New Tuticorin, 22-1-1978, (5) 21 exs. (d.), Sta. 11—Shore colln., Punnakayal, 24-1-1978, (6) 10 exs. (d.), Sta. 13—Shore colln., Tiruchendur, 25-1-1978, (7) 8 exs. (d.), Sta. 15—Shore colln. Veerapandianpattinam, 27-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

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

* Reference not seen in the original.

Distribution—In India : Mandapam Camp.

Elsewhere : Red sea, Persian Gulf, Gwadar (Baluchistan), Mergui Archipelago.

Remarks—Brief but adequate descriptions of this species can be had from Deshayes (*op. cit.*), Reeve (*op. cit.*) and Tryon (1886).

Shell acuminate turreted with dark chestnut to light brown spiral or transpiral markings. Whorls with three ridges, intermediate grooves concave and spirally striated. Aperture subquadrangular, outer lip sinuous. Whorls towards apex whitish tinged with violet or blue.

Most of the shells under study are eroded to varying degrees. A few of them, which are mainly chestnut or brown coloured, are the least eroded; and the rest are bleached. The “Orange-brown transpiral flammules” mentioned by authors are nothing but the unfaded remnants of the original brown colour on eroded shells.

This is the first record of the species from the Indian coast.

Measurements (in mm.)	Range (80 exs.)
Height	14.00—47.55
Maximum Diameter	4.40—12.80
Minimum Diameter	4.25—12.10

Family ARCHITECTONICIDAE

Two genera namely *Architectonica* (Bolten) Roding and *Torinia* Gray have been dealt in this paper.

Shells depressedly conical with sharply angulated margin. Whorls with spiral ridges and grooves; base flattened *Architectonica.*

Shells flatly disc-shaped. Margin with number of spiral ridges; whorls with granular spiral sculpture showing radial lines above and below *Torinia.*

Family ARCHITECTONICIDAE

Genus *Architectonica* (Bolten) Roding, 1798

Type-species : *Trochus perspectivus* Linnaeus.

Architectonica perspectiva (Linnaeus, 1758).

Trochus perspectivus Linnaeus, 1758, *Syst. Nat.*, Ed. X : 757, sp. 503 (Type-locality : “ad O. Asiae littora”);

Architectonica perspectiva : Roding, 1798, *Mus. Bolten.* : 78, No. 1022 ; Gravely, 1942, *Bull. Madras Govt. Mus. new Ser.* (Nat. Hist. Sec.), 5 (2) : 23, fig. 3a ; Satyamurti, 1952, *Bull. Madras Govt. Mus. new Ser.* (Nat. Hist. Sec.), 1 (2), pt. 6 : 72, pl., 4 figs 10a & b ; Cernohorsky, 1972, *Mar. Shells Pacific*, 2 : 194, pl. 3, fig. 9.

Solarium perspectivum: Reeve, 1864, *Conch. Icon.*, 15: *Solarium*, sp. No. 11, pl. 2, fig. 11; Tryon, 1887, *Man. Conch.*, 9: 8, pl. 2, figs. 18-21.

Hinds' (1844) *trochleare* and *formosum* and Philippi's (1848) *zonatum* and *incisum* are considered synonyms of this species (Reeve, *op.cit.*; Tryon, *op. cit.*).

Material—(1) 3 exs. (d.), Sea shore, 4 Km. (2½ miles) S. E. of MBS. Porto Novo, 25-1-1957; (2) 2 exs (d.), Sea shore about 1.6 Km. (1 mile), S. of Fort, Tranquebar, 29-1-1957 (Coll. A. G. K. Menon & G. Ramakrishna); (3) 3 exs. (d.), Sta. 5—Shore colln. between Killai R. mouth and Chinnavayakal Vill. 13-2-1968; (4) 39 exs. (d.), Sta. 7—Shore colln., Point Calimere, 16-2-1968; (5) 29 exs. (d.), Sta. 8—Shore colln., Agasthiampalli, 17-2-1968; (6) 3 exs. (d.), Sta. 9—shore colln., Vedaranyam, 18-2-1968 (Coll. A. S. Rajagopal); (7) 2 exs. (d.), Sta. 8—Shore colln. Karaikal, from Fisherman's village south upto light house, 6-2-1975; (8) 9 exs. (d.), Sta. 11—Shore colln., opposite Fort to the mouth of Uppanar, Tranquebar, 11-2-75; (9) 1 ex. (d.), Sta. 20—Coastal waters of Madras from the High Court to Triplicane, 9-10 fms. on board "Chota Investigator", 25-2-1975, (10) 2 ex. (d.), Sta. 3—Shore colln., Sethubabachatram, Palk Bay, 14-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—In India: Digha, Pamban, Andaman Is.

Elsewhere: Baluchistan coast (Gwadar), Mergui, Arakan & Penang, Indian Ocean, Pacific Ocean: China to Australia.

Remarks—The descriptions given by Reeve (*op. cit.*) and Tryon (*op. cit.*) are brief and inadequate while the same by Satyamurti (*op. cit.*) and Crnohorsky (*op. cit.*) are fairly complete and satisfactory.

Shell conoid, depressed, moderately thick, attractively coloured with spiral bands, widely umbilicated with flattened base and angulated periphery. Whorls scarcely inflated, transpirally obliquely striated throughout, spirally distinctly narrowly grooved below suture. Upper edge of each whorl spirally marked by three prominent unbroken bands in brown, white and chocolate respectively. Along lower edge a spiral rib alternately coloured with interrupted bands of white and brown or dark brown. On body-whorl this rib followed by well defined white slender thread-like groove. Body-whorl sharply angular and bordered by spiral ridge. Basal aspect of shell slightly bulged and radiately striated. Periphery with broad raised margin divided medially by closely-set double spiral ridge. Basal aspect of shell slightly bulged and radiately striated. Periphery with broad raised margin divided medially by closely-set double groove spirally. Umbilicus wide with strongly plicated brown-tinted margin. Immediately next to this beaded spiral rib with channel on

either side. Beaded rib running along side margin of umbilicus deeply inside upto apex. Aperture ventral, subquadrangular. Outer lip sharply angulated at lower margin.

The shells before us are of various sizes and stages of growth and show variations also in shades and colour patterns. In some cases despite the colour pattern having been bleached the sculpture has remained uniform and unaffected.

Measurements (in mm.)	Range (30 exs.)
Height	4.65—18.05
Maximum Diameter	11.20—31.20
Minimum Diameter	10.00—28.50

Architectonica laevigata (Lamarck, 1822)

Solarium laevigatum Lamarck, 1822*, *Hist. nat. Anim, sans Vert.*, 7 : 3 (Type-locality: ?) Deshayes ed. 1893, *Hist. nat. Anim. sans Vert.*, 9 : 98-99 ; Reeve, 1864, *Conch. Icon.*, 15 : *Solarium*, sp. No. 9, pl. 2, fig. 9 ; Tryon, 1887, *Man. Conch.*, 9 : 12 pl. 2, figs. 20, 21.

Architectonica laevigata : Gravely, 1942, *Bull. Madras Govt. Mus. new Ser.* (Nat. Hist. Sec.), 5 (2) : 23 ; Satyamurti, 1952, *Bull. Madras Govt. Mus. new Ser.* (Nat. Hist. Sec.) 1 (2), pt. 6 : 73.

Material—(1) 1 ex. (d.), Sea shore 4 km. (2½ miles) S. E. of MBS., Porto Novo, 25-1-1957, (2) 1 ex. (d.), Sea shore about 1.6 km. S. of Fort, Tranquebar, 29-1-1957, (3) 2 exs. (d.), Sea coast near Chinna Tarangapatti, 4.8 Km. (3 miles) north of Tranquebar, 2-2-1957 (4) 1 ex. (d.), Shore colln., Tranquebar, 3-3-1958, (5) 1 ex. (d.), Vaithikuppam, 3.2 km. (2 miles) north of Pondicherry, 8-2-1958 (Coll. A. G. K. Menon), (6) 2 exs. (d.), S hore colln., Point calimere, 16-2-1968, (7) 3 exs. (d.), Sta. 8—Shore colln., Agasthiampalli, 17-2-1968, (8) 1 ex. (d.), Sta. 9—Shore colln., Vedaranyam, 18-2-1968, (Coll. A. S. Rajagopal) ; (9) 1 ex. (d.), Sta. 4—Coastal waters of Madras, N. of Harbour, 6-7 fms. on board "Chota Investigator", 29-1-1975, (10) 1 ex. (d.), Sta 9—Shore colln. in front of Karaikal Medu vill., Karaikal, 7-2-1975, (11) 1 ex. (d.), Sta. 10—Shore colln., Nagapattinam, 11 km. (7 miles) S. of Karaikal, 8-2-1975, (12) 4 exs. (d.), Sta. 1—Shore colln., opposite Fort to the mouth of Uppanar, Tranquebar, 11-2-1975, (13) 2 exs. (d.), Sta. 14—Shore colln., beyond Fisherman's village, N. of Fort, Tranquebar, 14-2-1975, (14) 1 ex. (d.), Sta. 17—Coastal water of Pondicherry upto Nallavarukuppam, on board I. F. S. No. 3, 5-7 fms., 18-2-1975, (15) 1 ex. (d.), Sta. 22—

* Reference not seen in the original.

Shore colln., from the mouth of the Adyar R. to 1 Km. south, Madras, 27-2-1975, (16) 2 exs. (d.), Sta. 13—Shore colln. near Subramaniam Temple, Tiruchendur, 25-1-1978, (17) 1 ex. (d.), Sta. 15—Shore colln., Veerapandianpattinam, 27-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—In India : Puri, Madras Coast, Kundugal Point (Pamban).

Elsewhere : Persian Gulf (Marine Survey : 26° 4' N. and 56° 2' E.), Karachi, Maungmagan (Burma).

Remarks—Shells of this and the preceding species have sometimes been collected from proximity of the same localities in India. Though the two species are distinct from each other some of the shell characters are so similar that quite often one is mistaken for the other. The description by authors like Reeve (*op. cit.*) and Satyamurti (*op. cit.*) are available, but the one by Tryon (*op. cit.*) clarifies the points of difference and is most helpful in separating this from the preceding one.

The chief diagnostic characters of this species are that the body-whorl in particular, is spirally quadrisulcate (excluding the sulcus below the suture) and the shell covered plentifully with blotches of pinkish purple, orange, brown or yellowish brown. The colour always appears in the form of blotches and never in prominent continuous bands as in the preceding species.

In the material under examination, the shells in good condition are of various sizes and exhibit clearly the above characters. Some are moderately elevated while other are more depressed. In a few cases where the shells are eroded, the coloured blotches are feeble and the transpiral striae and one of the sulcus, i. e., the second from above which runs in the middle or upper half of the body-whorl, are either weakly represented or completely faded.

Measurements (in mm.)	Range (15 exs.)
Height	5.65—23.20
Maximum Diameter	11.15—36.10
Minimum Diameter	7.30—33.55

Genus *Torinia* Gray, 1840, 1842

Type-species : *Trochus cylindricus* Gmelin.

Torinia straminea (Gmelin, 1791)

Trochus stramineus Gmelin, 1791, *Syst. Nat.*, Ed. XIII, 1 (6) : 3575, sp. 59 (Type-locality : Tranquebar coast).

Heliacus stramineus : Gravely, 1942, *Bull. Madras Govt. Mus. new Ser. (Nat. Hist. Sec.)*, 5 (2) : 23.

Solarium fulvum : Hinds, 1844, *Proc. zool. Soc. Lond.*, 12 : 24.

Torinia straminea : Tryon, 1887, *Man. Conch.*, 9 : 19, pl. 6, figs. 93-96.

Torinia fulva : Satyamurti, 1952, *Bull. Madras Govt. Mus. new Ser. (Nat. Hist. Sec.)*, 1 (2) Pt. 6 : 74.

We agree with Tryon (1887) in considering Hinds' *fulva* as a synonym of this species.

Material— (1) 1 ex. (d.), Sea shore, about 3.2 Km. (2 miles) north of Tranquebar, 1-2-1957 (Coll. *A. G. K. Menon & G. Ramakrishna; (2) 1 ex. (d.), Sta. 7—Shore colln., Point Calimere, 16-2-1968; (3) 1 ex. (d.), Sta. 8—Shore colln., Agasthiampalli, 17-2-1968 (Coll. A. S. Rajagopal); (4) 1 ex. (d.), Sta. 17—Coastal waters of Pondicherry upto Nallavarukuppam, on board, I. F. S. No 3, Bottom trawl at 7 fms., 18-2-1975, (5) 1 ex. (d.), Sta. 8—Shore colln., behind Circuit house, Tuticorin, 21-2-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—In India : Tranquebar, Madras, Pamban.

Elsewhere : Indian Ocean, Philippines, New Guinea.

Remarks— In the specimens before us, the periphery of the body-whorl consists of three strong spiral ridges; the middle one having on either side of it a prominent channel beside which a thin thread-like ridge may develop in some specimens. In all other respects they agree with the descriptions given by Tryon (*op. cit.*) and Satyamurti (*op. cit.*).

An example of topotype of the species from Tranquebar is represented in the material.

Measurements (in mm.)	Range (2 exs.)
Height	8.50—13.65
Maximum Diameter	13.25—20.25
Minimum Diameter	12.50—17.65

Torinia dorsuosa (Hinds, 1844)

Solarium dorsuosum Hinds, 1844, *Proc. zool. Soc. Lond.*, 12 : 23-24 (Type-locality : Puerta Galero, Island of Mindoro, Philippines).

Torinia dorsuosa : Tryon, 1887, *Man. Conch.*, 9 : 17, pl. 5, fig. 80, 81 ; Schepman, 1909, *Siboga Exped.*, 49 b (II) : 221 ; Dautzenberg, 1932, *Journ. de Conchyl.*, 76 : 63 ; Lamy, 1938, *Journ. de Conchyl.*, 82 : 139 ; Satyamurti, 1952, *Bull. Madras Govt. Mus. new Ser. (Nat. Hist. Sec.)*, 1 (2), pt. 6 : 73-74, pl. 5, fig. 1a & b.

Heliacus dorsuosus : Gravely 1942, *Bull. Madras Govt. Mus. new Ser. (Nat. Hist. Sec.)*, 5 (2) : 23.

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

Distribution—In India : Madras, Pamban, Andamans.

Elsewhere : Indian Ocean : Madagascar, Sri Lanka, Pacific Ocean : Philippines : Mindoro Id., Easter Id.

Remarks—Adequate description is provided by Tryon (*op. cit.*) and Satyamurti (*op. cit.*).

Shell disc-like and convexly lenticular, superficially resembling *Umbonium vestiarium*. Broadly umbilicate, spirally ribbed, ribs finely beaded by oblique transpiral grooves, lowest rib of each whorl most prominent. Periphery of body-whorl with two prominent ridges with channel in middle. Margin of umbilicus crenulated. Continuous brown bands next to suture and below upper sulcus and interrupted brown bands round periphery and near umbilicus, as stated by Tryon (*op. cit.*), present in fresh shells.

The shell before us is in good condition but without the colour bands. In all other respects it agrees with the above description.

Measurements (in mm.)

Height	5.40
Maximum Diameter	10.10
Minimum Diameter	9.25

Family PLANAXIDAE

A single genus is represented in the family namely, *Planaxis* Lamarck.

The generic character is almost the same as mentioned earlier for the family *Planaxis* (*Planaxis*(

Family PLANAXIDAE

Genus *Planaxis* Lamarck, 1822

Subgenus *Planaxis* S. S.

Type-species : *Buccinum sulcatum* Born.

Planaxis (*Planaxis*) *sulcatus* (Born, 1780)

Buccinum sulcatum Born, 1780, *Test. Mus. Caes. Vindob.* : 258, pl. 10, figs. 5, 6 (Type-locality : not known).

Planaxis sulcatus : Reeve, 1878, *Conch. Icon.*, 20 : *Planaxis*, sp. No. 4, pl. 1, figs. 4a, b, c ; Tryon, 1887, *Man. Conch.*, 9 : 276, pl. 52, figs. 22-27, 31, 32 ; Melvill and Standen, 1898, *J. Conch.*, 9 (2) : 46 ; Schepman, 1909, *Siboga Exped.*, 49b (II) : 171 ; Satyamurti, 1952, *Bull. Madras Govt. Mus. new Ser.* (Nat. Hist. Sec.) 1 (2), pt. 6 : 79-80, pt. 5, figs. 6a & 6b ; Cernohorsky, 1972; *Mar. Shells Pacific*, 2 : 58, pl. 12, fig. 17.

Gmelin's *pyramidalis*, Dunker's *menkeanus*, Lamarck's *undulatus*, Deshayes' *buccinoides* and probably A. Adams *obscurus* are considered synonyms of this species (Reeve, *op. cit.*; Tryon, *op. cit.*).

Material—(1) 3 exs. (d.), Sta. 1C—Shore about 2.4 Km. (1½ miles) S. of Inspection Bungalow, Tuticorin, 16-4-1955 ; (2) 143 exs. (w.), Sta. 2D—In front of P.W.D. Inspection Bungalow, Tuticorin, 17-4-1955; (3) 5 exs. (d.), Sta. 2C—Shore about 2.4 Km. S. of Inspection Bungalow, Tuticorin, 3-5-1955 ; (4) 1 ex. (d.), Sta 2G—Submerged Coral reefs near, Pulli Island, 8 Km. (5 miles) from Krusadai, 7-5-1955 (Coll. H. C. Ray) ; (5) 326 exs. (w.), Sta. 11—Shore colln., behind Circuit House, Tuticorin, 21-2-1968 ; (6) 5 exs. (d.), Sta. 12—Shore colln., Hare Island, off Tuticorin, 22-2-1968 ; (7) 3 exs. (d.), Sta. 13—Shore colln. Vanthivu Id., of Tuticorin, 23-2-1968 ; (8) 329 exs. (w.), Sta. 16—Shore colln. near Madras State Fisheries extension unit, Tuticorin, 25-2-1968 (Coll. A. S. Rajagopal) ; (9) 1 ex. (d.), Sta. 6—Shore colln., Rameswaram, 1-2-1975 ; (10) 63 exs. (w.), Sta. 7—Shore colln., Palk Bay, Mandapam Camp, 3-2-1975 ; (11) 10 exs. (w.) & 3 exs. (d.), Sta. 9—Shore colln., Hare Id. near Port of New Tuticorin, 22-1-1978, (12) 1 ex. (w.), & 1 ex. (d.), Sta. 10—Along the shore near Asstt. Collector's Bungalow, Tuticorin, 23-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—In India : Bombay, Devgarh, Pamban, Pulli reefs, Krusadai and Shingle Is., Madras, Vishakhapatnam, Andamans.

Elsewhere : Gulf of Suez, Indian Ocean : Mauritius, South Africa, Sri Lanka, Arakan, Penang, Singapore, Indonesia, W Coast of Lombok, Australia, Philippines, Hawaii Is.

Remarks—Among the descriptions available in Reeve (*op. cit.*), Tryon (*op. cit.*), Gravely (*op. cit.*), Satyamurti (*op. cit.*) and cernohorsky (*op. cit.*), the most adequate is the one in Satyamurti.

Shell solid, thick, superficially not unlike *Littorina*, spotted or tessellated with chocolate or black and white, spirally uniformly grooved, spire more or less corroded (some times encrusted with barnacles). Whorls five. Body-whorl largest, faintly angular. Aperture subtrigonal, Columella straight, white. Callus thick above, thin and laminate below with a V-shaped canal anteriorly. Outer lip thin and wavy corresponding to groove on body-whorl. Internally white spiral ridges corresponding to external spiral grooves, ridge beside suture internally white and most strongly developed.

A large number of specimens of various sizes represents the material examined.

This species occurs more or less in similar situations as *Littorina* (*Littoraria*) *undulata* Gray. In the littoral parts of the Palk Bay (Mandapam) and Gulf of Mannar (Tuticorin), it was found abundantly in association with species of *Nerita*, *Littorina* and *Cerithium*.

Measurements (in mm.)	Range (120 cxs.)
Height	5.20—23.65
Maximum Diameter	3.50—16.10
Minimum Diameter	2.95—14.50

Family POTAMIDIDAE

This is represented by the two subfamilies Potamidinae and Batillarinae which can be identified by the key given below.

Key to the identification of the Indian subfamilies.

Shells massive, turreted with smooth or nodular spiral ridges. Radula with a central, posteriorly rounded, sometimes with long lappets, upper edge with 5 or more teeth, laterals long and somewhat narrow, mostly with little broader edges, which have many teeth on the external edge. Aperture broader than long. Outer margin somewhat expanded and thickened to form a groove. Lower margin of aperture sinuous, forming a short siphonal canal

... .. *Potamidinae.*

Shells turreted with spiral ridges. Radula with a central tooth of trapezoidal shape on either side with a basal tooth, upper edge with largely triangular middle tooth and on either side 1—4 close teeth, laterals with massive long drawn out ends ; upper edge with a large main tooth and a few other close-set teeth, marginal somewhat long, a little broader in front, with 4 to 6 teeth, the outermost being the largest. Aperture with a sinus or canal at the base. Columellar end has no prolongation

... .. *Batillariinae.*

Subfamily POTAMIDINAE

Under this subfamily two genera *Cerithidea* Swainson and *Telescopium* Montfort have been dealt in this study.

Shells slender. Tubercles present on the spiral ridges form transpiral plaits

... .. *Cerithidea.*

Shells large. Spiral ridges are without tubercles. Transpiral ridges absent. Aperture broader than long

... .. *Telescopium.*

Subfamily BATILLARIINAE

A single genus *Batillaria* Benson is represented here in this subfamily.

The generic character is almost the same as represented earlier for the subfamily *Batillaria*.

Family—POTAMIDIDAE

Subfamily—POTAMIDINAE

Genus *Cerithidea* Swainson, 1840

Type-species : *Murex decollata* Linnaeus.

Subgenus *Cerithideopilla* Thiele, 1929

Type-species : *Cerithium fluviatile* Potiez & Michaud.

Cerithidea (*Cerithideopsilla*) *cingulata* (Gmelin, 1791)

Murex cingulatus Gmelin, 1791, *Syst. Nat.*, Ed. XIII, 1 (6) : 3561, sp. 138 (Type-locality : Tranquebar).

Cerithium fluviatile Potiez and Michaud, 1838, *Cal. des Moll. de Douai*, 1 : 363, pl. 31, figs. 19, 20.

Tympanotonos fluviatilis Reeve, 1866, *Conch. Icon.*, 15 : *Tympanotonos*, sp. No. 9, pl. 2, figs. 9a & 9b.

Potamides (*Tympanotonos*) *fluviatilis* Tryon, 1887, *Man. Conch.*, 9 : 159-60, pl. 31, figs. 38-40 ; pl. 32, figs. 49, 51, 52 ; Schepman, 1909, *Siboga Exped.*, 49b (II) : 168 ; Annandale and Kemp, 1916, *Mem. Indian Mus.*, 5 : 344.

Potamides fluviatilis Annandale, 1918, *Rec. Indian Mus.*, 15 : 164.

Potamides (*Tympanotonos*) *cingulatus* Prashad, 1921, *Rec. Indian Mus.*, 22 : 494-495.

Cerithidea cingulata Crichton 1941, *J. Bombay nat. Hist. Soc.*, 42 (2) : 339. Ray, 1948, *Rec. Indian Mus.*, 46 : 95-96 ; Benthem Jutting 1956, *Treubia*, 23 (2) : 429-431, figs. 98, 99 (radula).

Cerithidea fluviatilis : Gravely, 1942, *Bull. Madras Govt. Mus. new Ser.* (Nat. Hist. Sec.), 1 (2), pt. 6 : 80-81, pl. 5, figs. 7a & 7b.

Reeve (*op. cit.*) has rightly considered *Strombus pictus* (Bolten) Roding as a synonym of his *fluviatilis*. Tryon's (1887) efforts to merge the above species with his *fuscatulus* which is a West African species, are not tenable.

Material—(1) 6 exs. (w.) Ennur Backwater, Madras, 4-5 ft., October, 1913 (Coll. ?), (2) 24 exs. (w.), Sta. 4—Ennur backwater, Madras, 18-1-1915 (Coll. N. Annandale) ; (3) 9 exs. (w.), Sta. ?—Pamban backwater, 18-9-1925 (Coll. S. L. Hora) ; (4) 1 ex. (w.), Sta. ?—Shore colln., Tuticorin Harbour, February—March, 1926, (5) 4 exs. (w.), Sta. ?—On sand and mud round edge of lagoon, Tuticorin, 13-3-1926, (6) 3 exs. (w.), Sta. ?—Tuticorin, 15-3-1926 (Coll. H. S. Rao) ; (7) 4 exs. (d.), Sta. 1c—Shore about 2.4 Km. (1½ miles) S. of Inspection Bungalow, Tuticorin, 16-4-1955 (Coll. H. C. Ray) ; (8) 8 exs. (d.), Sta. ?

—From the backwaters near Manikaran Tope at Hathra about 3.2 Km. (2 miles) S. of Pondicherry, 23-12-1956 (Coll. *A. G. K. Menon & G. Ramakrishna*) ; (9) 16 exs. (w.), Sta. 2—Bank of Vellar R. near MBS., Porto Novo, Tamil Nadu, 5-5-1960 (Coll. *A. Daniel*) ; (10) 907 exs. (w.), Sta. 1—From the mud-flat to the eastern side of Point Calimere Rly. Station and near the sea shore of Point Calimere, Tamil Nadu, 10-2-1962, (11) 51 exs. (w.), Sta. 1—Muddy backshore area of Point Calimere and about 1.6 Km. (1 mile) away from Point Calimere Rly. Station towards west, Point Calimere, 11-2-1962, (12) 20 exs. (w.), Sta. 1—Muddy bank of backwater canal at Tappaturai, 15 Km. N. of Point Calimere, Tamil Nadu, 12-2-1962, (13) 27 exs. (w.), Sta. 11—From Mud-flat of Kundugal Point, 12 Km. from Mandapam Camp, 18-2-1962, (14) 42 exs. (w.), Sta. 11—From sandy beds on the northern coast of Manoli Id. in the Gulf of Mannar, 8 Km. (5 miles) S. of Mandapam Camp, 20-2-1962, (15) 4 exs. (w.), Sta. 3—From the banks of backwater canal to the N. of Subramaniam Temple, Tiruchendur, Tamil Nadu, 27-2-1962 (Coll. *V. K. Premkumar & P. K. Chakrabarty*) ; (16) 122 exs. (w.), Sta. 4—Ennur Estuary, Tamil Nadu, 13-9-1965 (Coll. *A. Daniel, M. Babu Rao & Post Graduate Research Training Party*) ; (17) 107 exs. (w.), Sta. 3—Vellar R. bank in front of MBS., Porto Novo, Tamil Nadu, 12-2-1968, (18) 44 exs. (w.), Sta. 5—On the right bank of Killaiar Estuary, Mujhukuthurai, 8 Km. off Porto Novo, Tamil Nadu, 13-2-1968, (19) 23 exs. (w.), & 3 exs. (d.), Sta. 7—Shore colln., Point Calimere, Tamil Nadu, 16-2-1968, (20) 13 exs. (d.), Sta. 11—Shore colln. behind Circuit House, Tuticorin, 21-2-1968, (21) 5 exs. (d.), Sta. 12—Shore colln., Hare Id., off Tuticorin, 22-2-1968, (22) 6 exs. (d.), Sta. 16—Shore colln., Tamil Nadu State Fisheries Extension Unit, Tuticorin, 25-2-1968 (Coll. *A. S. Rajagopal*) ; (23) 2 exs. (d.), Sta. 6—Shore colln. at low tide, Rameswaram, 1-2-1975, (24) 28 exs. (d.), Sta. 7—Shore colln., Palk Bay, Mandapam Camp to Mandapam, 3-2-1975, (25) 2 exs. (d.), Sta. 11—Shore colln., opposite Fort to the mouth of Uppanar, Tranquebar, 11-2-1975, (26) 3 exs. (w.), Sta. 18—Shore colln., Virampattinam Vill., 4 Km. S. of Jetty, Pondicherry, 19-2-1975, (27) 2 exs. (d.), Sta. 22—Shore colln., 1 Km. S. of Adyar R. mouth, Madras, 27-2-1975, (28) 5 exs. (w.), & 4 exs. (d.), Sta. 1—Sea Coast, Adirampattinam, Palk Bay, 12-1-1978, (29) 3 exs. (d.), Sta. 3—Shore colln., Sethubabachatram, Palk Bay, 14-1-1978, (30) 10 exs. (d.), Sta. 4—Shore colln., Devipattinam, Palk Bay, 16-1-1978, (31) 3 exs. (d.), Sta. 5—Shore colln., Thondi, 17-1-1978, (32) 7 exs. (d.), Sta. 7—Shore colln., Sethukkarai, Gulf of Mannar, 19-1-1978, (33) 23 exs. (w.) & 1 ex.

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

Distribution—The range of distribution extends from the Persian Gulf through the Indian Ocean to the western part of the Pacific, i.e., to the sea of China.

In India : Kathiawar, Bombay, Malabar, Cochin, Kundugal Point, Pamban, Krusadai Id., Madras, Krishna Estuary, Chilka Lake, Konarak, Canning : Matla R., Andamans, Great Nicobar : Casuarina Bay.

Elsewhere : Mesopotamia : Nasariyeh on Euphrates ; Karachi, Sri Lanka, Burma : Irrawaddy, Amherst, Mergui : Indonesia, Sumatra ; Thailand ; Tale Sap ; Lampee, Bushire, Haiphu hong, Annesley Bay.

Remarks—While Reeve (*op.cit.*), Tryon (*op. cit.*) and Gravelly (*op. cit.*) have provided brief descriptions, Satyamurti (*op. cit.*) v. Benthem Jutting (*op. cit.*) are in greater detail and found to be adequate.

Shell small narrow, pyramidal. Whorls flattened, each with flat, spiral ridges. Ridges broad and strongly tuberculated. Thin thread-like ridge running in suture. Tubercles equidistant, falling more or less into regular transpiral rows. Brown, black and white bands running spirally, regularly on whorls. Tubercles obsolete on back of body-whorl, except on uppermost row. Aperture oblique, expanded broadly at outer lip above and below. Distinct varicose elevation present on the body-whorl opposite outer lip.

The radula of this species is described and figured by Troschel (Prashad, 1921).

This is a characteristically brackish water species found abundantly on mud-flats of estuaries and backwaters. Though it can tolerate water of low salinity, it never lives in pure freshwater.

A large number of specimens of various sizes is present in the material studied. Some of the shells are encrusted with barnacles. Empty shells are commonly occupied by hermit crabs.

The material includes two examples representing topotypes of the species from Tranquebar.

Measurements (in mm.)	Range (150 exs.)
Height	4.20—30.75
Maximum Diameter	2.00—10.30
Minimum Diameter	1.90—9.20

Genus *Telescopium* Montfort, 1810

Type-species : *Trochus telescopium* Linnaeus, 1758.

Telescopium telescopium (Linnaeus, 1758)

Trochus telescopium Linnaeus, 1758, *Syst. Nat.*, Ed. X : 760, sp. 521 (Type-locality : Not given).

Cerithium telescopium : Kiener, (1841-42), *Caq. Viv.*, 6 : 88-89, pl. 28, figs. 1.

Telescopium fuscum : Reeve, 1865, *Conch. Icon.*, 15 : *Telescopium*, sp. No. 1, pl. 1, figs. 1a & 1b.

Potamides (Telescopium) telescopium : v. Martens, 1897, *Suss. und Brack w.—Moll.*, in Weber's *Zool. Ergebn. Biederl. Ost. Indien*, 4 : pp. 180-182 ; Prashad, 1921 *Rec. Indian Mus.*, 22 : 493-494.

Telescopium telescopium : Adam et Leloup, 1938, *Mem. Mus. r. Hist. nat. Belg.* 11 (19) : 99 ; Gravely, 1942, *Bull. Madras Govt. Mus. new Ser. (Nat. Hist. Sec.)*, 5 (2) : 25-26, fig. 3c ; Ray, 1948, *Rec. Indian Mus.*, 46 : 96 ; v. Benthem Jutting, 1956, *Treubia*, 23 (2) : 439-441, figs. 100 (Radula), 108 (shell) ; Cernohorsky, 1972, *Mar. shell Pacific*, 2 : 61, pl. 13, fig. 6.

van Benthem Jutting (*op. cit.*) may be consulted for a more detailed synonymy than presented here.

Material—(1) 6 exs. (d.), Sta. 3—Muzhukuthurai, Killai R. estuary, 8 Km. from Porto Novo, 11-2-1968 (Coll. A. S. Rajagopal), (2) 1 ex. (w.), Sta. 8—Shore colln. Karaikal, Fisherman's vill., S. to Light House, 6-2-1975, (3) 1 ex. (d.), Sta. 1—Sea coast, Adirampattinam, 12-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—In India : Arabian Sea Coast : Vengurla near Yangini vill., Malabar, Cochin, Madras, Visakhapatnam, Port Canning, Sundarbans.

Elsewhere : Madagascar, Reunion, Coast of Sri Lanka, Burma : Chaungwa, West Baronga, Malay Peninsula, Singapore, Indonesia : Amboina, Philippines, Coast of N. Australia.

Remarks—von Martens (1897), van Benthem Jutting (*op. cit.*) and Cernohorsky (*op. cit.*) have provided very good descriptions. van Benthem Jutting has also figured the radula elements and given its formula.

This is a common species found along mud-flats in mangrove areas where the water is saline or brackish. The animal stays partly buried in the mud with only the top of the spire exposed. It also occurs in brackish water fish ponds along north coast of Java.

van Benthem Jutting (*op. cit.*) quotes that in Philippines this species is sold in the markets for food.

In the collection examined are examples with very little variation in the shell characters.

Measurements (in mm.)	Range (7 exs.)
Height	79.45—105.05
Maximum Diameter	37.45— 51.10
Minimum Diameter	35.05— 47.20

Subfamily BATILLARIINAE

Genus *Batillaria* Benson, 1842

Type-species : *Batillaria zonalis* (= *Cerithium zonale* Lamarck)

Batillaria anquilifera (Sowerby, 1866)

Lampania anquilifera Sowerby, 1866, in Reeve's *Conch. Icon.*, 15 : *Laupania*, sp. No. 1, pl. 1, fig. 1 (Type-locality : Australia).

Potamides (Lampania) anquilifera Tryon, 1887, *Man. Conch.*, 9 : 167, pl. 35, fig. 17.

Cerithium granosum Gravely, 1942, *Bull. Madras Govt. Mus. new Ser.* (Nat. Hist. Sec.), 5 (2) : 25, 26.

Material— (1) 1 ex. (w.), Sta. 4---Ennur backwater, Madras, 18-1-1915 (Coll. N. Annandale), (2) 14 exs. (w.), Sta. ?—beach N. of Rameswaram, 21-3-1926 (Coll. H. S. Rao); (3) 5 exs. (w.), Sta. 6—Ennur estuary, 13-9-1975 (Coll. A. Daniel, M. Babu Rao, & Post Graduate Research Training Party); (4) 5 exs. (d.), Sta. 11—Shore colln. behind the Circuit house, Tuticorin, 21-2-1968 (Coll. A. S. Rajagopal); (5) 2 exs. (d.), Sta. 6—Shore colln. at low tide, Rameswaram, 1-2-1975, (6) 9 exs. (d.), Sta. 3—Shore colln. Sethubabachatram, Palk Bay, 14-1-1978, (7) 17 exs. (d.), Sta. 4—Shore colln. Devipattinam, 16-1-1978, (8) 9 exs. (d.), Sta. 5—Shore colln., Thondi, Palk Bay, 17-1-1978, (9) 1 ex. (d.), Sta. 6—Shore colln., Keelakkarai, Gulf of Mannar 18-1-1978, (10) 5 exs. (d.), Sta. 7—Shore colln., Sethukkarai, Gulf of Mannar, 19-1-1978, (11) 6 exs. (d.), Sta. 8—Shore colln., behind Circuit house, Tuticorin, 21-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—In India : Madras.

Elsewhere : Australia.

Remarks—Brief descriptions can be had from Sowerby (*op. cit.*) and Tryon (*op. cit.*).

Shell small, slender, turreted, whorls flattened, spirally ribbed, ribs thrown into strong tubercles, sometimes tubercles of upper two rows tending to coalesce. Tubercles more or less evenly spaced, giving transpirally plaited appearance to shell. Suture clearly demarcating whorls. Dark and light brown bands running spirally on whorls. Body whorl slightly angular in middle. Tubercles weak or obsolete on ribs beneath angle. Aperture oblique subtrigonal, longer than broad,

slightly produced anteriorly and ending truncately in a wide canal. Varicose elevation opposite aperture present.

Measurements (in mm.)	Range (70 exs.)
Height	16.40—25.50
Maximum Diameter	6.15— 9.25
Minimum Diameter	5.35— 7.75

A collection in a Card board box labelled *Cerithidea anquilifera* Sowerby (13 exs., Loc.—Madras, Reg. No. 1054) is present in the Zoological Survey of India Collections. Registered on 28-11-1893; it originally belonged to the Asiatic Society of Bengal.

This species occurs in backwaters commonly with *Cerithidea* (*Cerithideopsilla*) *cinquilata* (Gmelin), though not in such abundance as the latter. Shells of this species are often mistaken for the latter due to striking similarity in shell structure.

Family CERITHIIDAE

This is represented here by a single subfamily namely, Cerithiinae. Shell turreted with prominent anterior canal, sculptured with axial and spiral elements; columella calloused; operculum paucispiral with eccentric nucleus; radula taenioglossate; palial gonoducts open; males aphyallic... *Cerithiidae*

Subfamily CERITHIINAE

This subfamily has been represented with three genera *Rhinoclavis* Swainson, *Cerithium* Bruguiere and *Clypeomorus* Josseume.

Shell with columellar callus plaited; siphonal canal upturned.	...	...	...	...	A
Shell without plaits on columellar callus; siphonal canal not upturned	...	...	...	...	B
A. Shell thick, fusiformly turreted with prominently nodulose spiral cords; anterior siphonal canal produced into upturned anal canal; aperture with prominent columellar plait	...	...	...	...	<i>Rhinoclavis</i>
B. Shell moderately thick, turreted, strongly and variously sculptured; Columella bears deposit of callus; anterior siphonal canal produced	...	...	...	...	<i>Cerithium</i>
Shell smaller, pyramidally turreted, sculptured spirally with nodules which may or may not coalesce transversely; anterior siphonal canal not produced.	...	...	...	...	<i>Clypeomorus</i>

Family CERITHIIDAE

Subfamily CERITHIINAE

Genus **Rhinoclavis** Swainson, 1840*Type-species* : *Murex vertagus* Linnaeus, 1758Subgenus *Rhinoclavis* S.S.*Rhinoclavis (Rhinoclavis) sinensis* (Gmelin, 1791)*Murex sinensis* Gmelin (not *Cerithium sinense* Philippi, 1848), 1791, *Syst. Nat.*, Ed. XIII, i (6) : 3542, sp. 54 (Type locality : "in mari Senegaliae allunata").*Murex obeliscus* : Dillwyn, 1817, *Descr. Cat. Rec. Shells*. 2 : 747.*Cerithium obeliscus* : Bruguiere, 1792*, *Encyc. Meth.*, 1 (2) : 472, pl. 443, figs. 4a & 4b; Kiener, 1841-42, *Coq. Viv.*, 6 : 15, pl. 5, fig. 1 : Tryon, 1887, *Man. Conch.*, 9 : 146, pl. 27, fig. 39 ; Satyamurti, 1952, *Bull. Madras Govt. Mus. new Ser. (Nat. Hist. Sec.)*, 1 (2), pt. 6 : 85-86, pl. 6, fig. 3.*Rhinoclavis obeliscus* : Swainson, 1840, *Treat. Malac.*, pt. 2 : 315.*Vertagus obeliscus* : Reeve, 1865, *Conch. Icon.*, 15, *Vertagus*, sp. No. 7, pl. 2, figs. 7a, 7b.*Clava sinensis* : Schepman, 1909, *Siboga Exped.*, 49b, (II) : 164.*Rhinoclavis sinensis* : Cernohorsky, 1972, *Mar. Shells Pacific*, 2 : 67-68, pl. 15, fig. 3.*Rhinoclavis (Rhinoclavis) sinensis* : Houbrick, 1978, *Monogr. Mar. Moll.*, No. 1 : 53-58, pl. 1, figs. 15-24, pls. 23-26.

Material—(1) 8 exs. (d.), Sta. 2—Krusadai Id., Gulf of Mannar, March, 1950 (Coll. *S.L. Hora & A.G.K. Menon*); (2) 3 eds. (d.), Sta. 2c—Shingle Id., 2.4 Km. (1½ miles) E. of Krusadai Id., 3.5.1955, (3) 1 ex. (w.), Sta. 20—Galaxea reef, Krusadai Id., 4-5-1955, (4) 8 exs. (w.), Sta. 2G—Pulli Is. about 8 Km. (5 miles) from Krusadai, 7.5.1955 (Coll. *H. C. Ray*); (5) 2 exs. (d.), Sta. 13—Shore colln., Vanthivu Id., off Tuticorin, 23-2-1968 (Coll. *A.S. Rajagopal*).

Distribution—In India : Port Okha, Gulf of Kutch; Bombay, Goa, Kanya Kumari ; liare Id., S.W. of Mandapam, Pamban, Krusadai Id. ; Waltair, Vizagapatnam ; Andaman Is.

Elsewhere : South Africa, Kenya, Mozambique, Zanzibar, Somalia, Ethiopia, Tanzania, Oman, Israel, Malagasy Republic, Reunion, Mauritius, Seychelles, Maldive Is., Chagos Archipelago, Pakistan (Manora Id., Karachi), Sri Lanka, Cocos-Keeling Is., Christmas Id., Thailand, Malaysia, Indonesia, North Borneo, Japan, Ryukyu Is., Taiwan, Philippines, Northern Australia, Queensland, Papua, Admiralty Is., New Britain, New Ireland, Solomon Is., New Caledonia, Mariana Is., Palau Is., Caroline Is., Marshall Is., Gilbert Is., Ellice Is., New Hebrides, Loalty Is., Fiji Is., Wallis and Horn Is., Samoa Is., Tonga Is., Cook Is., Housland Id., Canton Id., Johnston Is. Atoll, Hawaiian Is., Line Is., Tuamotu Is., Society Is., Austral Is., Rapa, Gambier Is., Pitcairn Is.

* Reference not seen in the original.

The locality records attributed to this species in the Caribbean Sea (Dillwyn *op.cit.*, and Kiener *op.cit.*) may not be reliable, Tryon (*op.cit.*) probably unaware of this, has mentioned only East Indies, Polynesia, Mauritius. Houbrick (1978) has given a more detailed distribution list.

Remarks—Kiener (*op.cit.*) and Tryon (*op.cit.*) are brief in their description of the species. Dillwyn (*op. cit.*), Reeve (*op. cit.*), Satyamurti (*op. cit.*) and Houbrick (*op. cit.*) are in greater detail, but Tryon and Houbrick are most accurate.

This species occurs mostly in sandy spaces of reef-flats in the intertidal zone and often available in the sandy areas with coral fragments and weeds behind the reef.

Shell turreted, ventr cose, generally brownish spotted on spiral cords between nodes and clouded with chestnut chocolate ; whorls angular or slightly shouldered near suture, traversed by spirally beaded ribs (3 or 4 rows) below angle, lower ribs granulated, upper most at angle strongly pointedly tuberculate. Interstices latticed with spiral and transpiral striae. Body whorl with obtuse lateral varix, aperture squarish, columella short, reflected, with heavy deposition of callus all along and laminate anteriorly. Inside strongly plaited. Anterior canal produced as spout-like upturned anal canal. Outer lip round, extending up to anal canal.

Measurements (in mm.)	Range (13 exs.)
Height	36.50—39.00
Maximum Diameter	15.40—16.95
Minimum Diameter	12.15—14.55

Genus *Cerithium* Bruguiere, 1789*

Type-species : *Cerithium adansonii* Bruguiere, 1792 +
Cerithium columna Sowerby, 1834.

Cerithium columna Sowerby, 1834, *Genera of shell*, 1, Part No. 42, fig. 7 (Type-locality : Not given); Kiener, 1841-1842, *Coq. Viv.*, 6, *Cerithium*, 10-11, pl. 4, fig. 1 ; Reeve, 1865, *Conch. Icon.*, 15, *Cerithium*, sp. No. 2, pl. 1, figs. 2a & 2b; Watson, 1886, *Rep. sci. Res. Voy. Challenger*, Zool, 15 : 531 ; Tryon, 1887, *Man. Conch.*, 9 : 123, pl. 20, figs. 17-20 ; Schepman, 1909, *Siboga Exped.* 49 b, (II) : 157 ; Satyamurti, 1952, *Bull. Madras Govt. Mus. new Ser. (Nat. Hist. Sec)*, 1 (2), pt. 6 : 88 ; Cernohorsky, 1972, *Mar. Shells Pacific*, 2 : 63, pl. 14, fig. 1-18.

Cerithium echinatum : Kiener (1841-1842), *Coq. Viv.*, 6, *Cerithium* : 7, pl. 3, fig. 1.

As recommended by Houbrick, R., 1973, *Bull. zool. Nomencl.* 30 (2) : 104-107 to I.C.Z.N. for designation and validation under its plenary powers.

Cerithium menkei : Deshayes, 1863, *Cat. Moll. Reunion* : 97, pl. 11, fig. 15, Also, *C. citrinum* Sowerby and *bicolor* Hombron et Jacquinot are probably varieties of this (Tryon *op.cit.*, p. 123.).

Material—(1) 3 exs. (d.), Sta. 2c—Shingle I., 2.4 Km. (1½ miles) E. of Krusa Iai, 3-5-1957 (Col. H. C. Ray), (2) 1 ex. (d.), Sta. 11—Shore colln., behind Circuit House, Tuticorin, 21-2-1968, (3) 2 exs. (d.), Sta. 12—Shore colln., Hare Id., off Tuticorin, 22-2-1968, (4) 1 ex. (d.), Sta. 13—Shore colln., Vanthuvu Id., off Tuticorin, 23-2-1968 (Coll. A. S. Rajagopal), (5) 1 ex. (d.), Sta. 5—Shore colln., Mandapam Camp, 31-1-1975, (6) 3 exs. (d.), Sta. 6—Shore colln., at low tide, Rameswaram, 1-2-1975, (7) 2 exs. (d.), Sta. 7—Shore colln., Palk Bay, Mandapam Camp to Mandapam, 3-2-1975, (8) 7 exs. (d.), Sta. 4—Shore colln., Devipattinam, Palk Bay, 16-1-1975, (9) 1 ex. (d.), Sta. 6—Shore colln., Keelakkarai, Gulf of Mannar, 18-1-1978, (10) 1 ex. (d.), Sta. 7—Shore colln., Sethukkarai, Gulf of Mannar, 19-1-1978, (11) 1 ex. (d.), Sta. 11—Shore colln., behind Circuit House, Tuticorin, 21-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—In India : Pamban, Andamans.

Elsewhere : Red Sea; Mozambique; Mauritius; Sri Lanka; Indonesia; Borneo Bank (Shore & Reef), North-ubian, S. of Lucipara Id., Banda Ree, Ke Is., Roma Id. Ree; Polynesia; Australia,

Remarks—Reeve's (*op.cit.*) description of the species though brief is better than Tryon's (*op.cit.*) while Satyamurti's and Cernohorsky's descriptions are more elaborate and adequate.

Shell rough, ventricose in some and more turreted in others, reddish brown or pale yellow. Whorls traversed by many rows of larger and smaller spiral ridges with occasional chestnut or chocolate dots, and irregular transpiral undulations; undulations bulged into crest making whorls angular in middle. Body-whorl fairly wide, with prominent varix opposite aperture. Aperture large, expanded, sub-circular, white within. Anterior canal long, oblique and excavated. Posterior canal short, constricted. Outer lip fluted.

A single shell with the animal is represented in the material studied. The animal with its operculum has retreated inside. A major portion of the shell is covered with encrustations. A tiny specimen of *Saptadanta nasika* Prasad and Rao and found anchorage on ventral side of the shell close to posterior canal.

Measurements (in mm.)	Range (13 exs.)
Height	12.95—30.50
Maximum Diameter	6.40—15.00
Minimum Diameter	5.80—11.00

Cerithium tenellum Sowerby, 1855

Cerithium tenellum Sowerby, (not Cernohorsky, 1972) 1855*, *Thes. Conch.*, 2: 857, pl. 188, figs. 88-90, (Type locality: ?); Reeve, 1865, *Conch. Icon.*, 15, *Cerithium*, sp. No. 71, pl. 11, figs. 71a & 71b; Tryon, 1887, *Man. Conch.*, 9: 132, pl. 23, figs. 10, 11; Schepman, 1909, *Siboga Exped.*, 49b (II): 160; Satyamurti, 1952, *Bull. Madras Govt. Mus. new Ser. (Nat. Hist. Sec.)*, 1 (2), pt. 6: 89.

Material—(1) 3 exs. (d.), Sta. 1C—Shore about 2.4 Km. S. of Inspection Bungalow, Tuticorin, 16-4-1955 (Coll. H. C. Ray); (2) 20 exs. (d.), Sta. 11—Shore colln. behind the Circuit House, Tuticorin, 21-2-1968, (3) 8 exs. (d.), Sta. 12—Shore colln., Hare Id., off Tuticorin, 22-2-1968 (Coll. A. S. Rajagopal); (4) 17 exs. (d.), Sta. 6—Shore colln. at low tide, Rameswaram, 1-2-1975, (5) 10 exs. (d.), Sta. 7—shore colln., Mandapam Camp, 3-2-1975, (6) 1 ex. (d.), Sta. 3—Shore colln., Sethubabachatram, Palk Bay, 14-1-1978, (7) 1 ex. (d.), Sta. 5—Shore colln., Thondi, Palk Bay, 17-1-1978, (8) 11 exs. (d.), Sta. -6—Shore colln., Keelakkarai, Gulf of Mannar, 18-1-1978, (9) 1 ex. (d.), Sta. 7—Shore colln., Sethukkarai, Gulf of Mannar, 19-1-1978, (10) 16 exs. (d.), Sta. 8—Shore colln. behind the Circuit House, Tuticorin, 21-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee)

Distribution—In India: Pamban.

Elsewhere: Indonesia: Postillon Is., Borneo Bank shore; Philippines.

Remarks—Reeve (*op.cit.*), Tryon (*op.cit.*) and Satyamurti (*op.cit.*) have given brief description of the species.

Shell small, slender, thin, white or rose coloured, nearly transparent. Numerous irregular, white varices on shell. Whorls angulated above middle with spiral rows of tubercles, tuberculated also on angle and at suture, tubercles white, chestnut or chocolate coloured. One or more slender chocolate lines run spirally on whorls in some shells. Aperture small rounded, anterior canal short, opening widely. Outer lip slightly expanded, simple and thickened outside.

A good number of shells of different sizes represents the collection. Some of the shells bear incrustations on them. Empty shells are often inhabited by hermit crabs. This collection is a new acquisition to the Zoological Survey of India.

Measurements (in mm.)	Range (35 exs.)
Height	5.30—17.20
Maximum Diameter	3.55—6.25
Minimum Diameter	3.10—5.10

* Reference not seen in the original

Cerithium balteatum Philippi, 1848

Cerithium balteatum Philippi (not Cernohorsky, 1972), 1848, *Zeits. f. Malak.*, 5 : 22, 23 (Type-locality : No locality given) : Philippi, 1849, *Abbild. und. Beschreib. Conchyl.* 3, *Cerithium* : 16, pl. 1, fig. 10; Reeve, 1865, *Conch. Icon.* 15, *Cerithium*, sp. no. 72, pl. 11, figs. 72a, 72b ; Watson, 1886, *Rep. Sci. Res. Voy. Challenger*, Zool. 15 : 530-531 ; Tryon, 1887, *Man. Conch.*, 9 : 131, pl. 23, figs. 2, 3; Schepman, 1909, *Siboga Exped.*; 49b (II) : 159.

Material—(1) 6 exs. (d.), Sta. 8—Shore colln. behind Circuit House, Tuticorin, 21-1-1968, (2) 2 exs. (d.). Sta. 16—Shore colln. near Tamil Nadu State Fisheries Extension Unit, Tuticorin, 25-2-1968 (Coll. A. S. Rajagopal) ; (3) 1 ex. (d.), Sta. 3—Shore colln. Sethubabachatram, Palk Bay, 14.1.1978. (4) 7 exs. (d.). Sta. 4—Shore colln., Devipattinam, 16-1-1978, (5) 3 exs. (d.), Sta. 6—Shore colln., Keelakkarai, Gulf of Mannar, 18-1-1978, (6) 1 ex. (d.), Sta. 7—Shore colln., Sethukkarai, Gulf of Mannar, 19-1-1978 (A. S. Rajagopal & H. P. Mookherjee).

Distribution—In India : Andaman Is.

Elsewhere : Indonesia : S. Coast of Rotti Id., Saleh-bay, Philippines. N. Australia, Torres strait.

Remarks—Brief descriptions are available in philippi (*op.cit.*), Reeve (*op.cit.*) and Tryon (*op.cit.*)

Shell moderately small, turreted, acuminate, white with several varices. Whorls well demarcated, spirally ribbed, ribs tuberculated, swelled above, narrowed near suture, Body-whorl with two strong tuberculated ribs below periphery (besides ribs above), narrowed below ribs. Aperture squarish, Columellar, callus thin. Anterior canal narrow and produced. Outer lip internally crenulated and externally thickened.

A number of shells in fairly good condition are represented in the collection. Some of them are covered with encrustations.

This appears to be the first record of the species from mainland India. It extends the distribution from Andaman Islands to the east coast of India.

Measurements (in mm.)	Range (2 exs.)
Height	15.10—19.50
Maximum Diameter	5.85—7.50
Minimum Diameter	4.80—6.10

Cerithium scabridum Philippi, 1848

Cerithium scabridum Philippi, 1848, *Zeits. f. Malac.*, 5 : 23 (Type-locality : Red Sea) ; Philippi, 1849, *Abbild. und Beschreib. Conchyl.*, 3, *Cerithium* : 17, sp, no. 12, pl. 1, fig. 12; Satyamurti, 1952, *Bull. Madras Govt. Mus. new Ser.* (Nat. Hist. Sec.) 1 (2), pt. 6 : 86.

This is *ruppelli* according to Tryon (*op.cit.*) but we consider it to be distinct and agree with Satyamurti in treating it as a separate species.

Material—(1) 1 exs. (d.), Sta. 11—Shore colln. behind Circuit House, Tuticorin, 21-2-1968 (Coll. A. S. Rajagopal); (2) 2 exs. (d.), Sta. 3—Shore colln., Sethubabachatram, 14-1-1978, (3) 11 exs. (d.), Sta. 4—Shore colln., Devipattinam, Palk Bay, 16-1-1978 (Coll. A. S. Rajagopal & H.P. Mookherjee).

Distribution : India : Krusadai Id. and Pulli reef.

Elsewhere : Red Sea, Aden, Persian Gulf, (Annesley Bay).

Remarks—Descriptions for the species are given by Philippi (*op.cit.*) and Satyamurti (*op.cit.*).

Shell oblong-turreted, slender, of moderate size, whorls distinctly demarcated by suture, whorls tuberculated, sometimes tubercles so conspicuous in middle as to give whorl shouldered appearance, tubercles not rounded, nor separated from one another; but coalescing to form continuous spiral ridges. Interstices with spiral striae. Spire with several irregularly arranged varices. Body-whorl with prominent varix opposite aperture. Aperture narrowly obliquely ovate, anterior canal narrow, produced and widening outwardly. Outer lip inwardly crenulated and outwardly thickened.

Measurements (in mm.)	Range (14 exs.)
Height	15.30—22.45
Maximum Diameter	6.5—8.45
Minimum Diameter	5.30—7.20

Genus *Clypeomorus* Jousseume, 1888*

Type-species : *Clypeomorus clypeomorus* Jousseume, 1888

Clypeomorus moniliferus (Kiener, 1841).

Cerithium morus Lamarck, 1822* (non Bruguiere, 1792), *Hist. nat. Anim. Sans Vert.*; 7 : 75 (Type-locality : Not known) Deshayes ed. ; Reeve, 1865, *Conch. Icon.* 15 : *Cerithium*, sp. no. 42, pl. 7, fig. 42 ; Tryon; 1887, *Man. Conch.*, 9 : 133-134, pl. 24, figs. 30-33, 35, 39-41, 43 ; Satyamurti, 1952, *Bull. Madras Govt. Mus. new ser.*, (Nat. Hist. Sec.), 1 (2), pt. 6 : 85, pl. 4, fig. 2.

Cerithium moniliferum : Reeve, 1865, *Conch. Icon.*, 15 : *Cerithium*, sp. no. 20, pl. 4, fig. 23 ; Dufresne in Kiener (1841-42), *Coq. Viv.*, 6, *Cerithium*, 49, pl. 16, fig. 3.

Cerithium morum var. *moniliferum* : Schepman, 1907, *Siboga Exped.*, *Prosobranchia* ; 161.

Cerithium (Clypeomorus) moniliferum : Adam et Leloup, 1938, *Mem. Mus. r. Hist. nat. Belg.*, 2 (19) : 105-106, pl 5, fig. 14.

Clypeomorus moniliferus : Cernohorsky, 1972, *Mar. Shells Pacific*, 2 : 70, pl. 16 figs. 3-5. According to Cernohorsky *variegatum* Quoy and Gaimard, 1834 (non Fischer, 1807), *conclsum* Hombron et Jacquinot, 1854 are synonyms of this species.

* Reference not seen in the original

Material—(1) 32 exs. (d.), Sta. 2—Shore N. of Pamban, March, 1926 (Coll. *H. S. Rao*) ; (2) 13 exs. (w.), Sta. ? —Krusadai Id., Gulf of Mannar, March, 1950 (Coll. *S. L. Hora & A. G. K. Menon*) ; (3) 5 exs. (d.), Sta. 1c—Shore about 2.4 km. (1½ miles) S. of Inspection Bungalow, Tuticorin, 16-4-1955, (4) 3 exs. (w.), Sta. ID—Shore in front of P. W. D. Inspection Bungalow, Tuticorin, 17-4-1955, (5) 4 exs. (w), Sta. ? —Galaxea reef, Krusadai Id., 2-5-1955, (6) 8 exs. (d.), Station. 2C—Shingle Id., 2.4 km. (1½ miles) E. of Krusadai, 3-5-1955, (7) 12 exs. (w), Sta. 2D—Galaxea reef, Krusadai Id., 4-5-1955, (8) 12 exs. (w.), Sta. 2G—Puli Id., about 8 km. (5 miles) from Krusadai Id., 7-5-1955 (Coll. *H. C. Roy*) ; (9) 7 exs. (w.), Sta. 2—Mud-flat of Kanakugal Point, 12 km. from Mandapam Camp, 18-2-1962, (10) 49 exs. (w.), Sta. 2—Muddy water near Pamban bridge, 10 km E. of Mandapam Camp, 19-2-1962, (Coll. *V. K. Premkumar & P. K. Chakrabarty*) ; (11) 107 exs. (d.), Sta. 11—Shore colln., behind Circuit House, Tuticorin, 21-2-1968, (12) 71 exs. (d.), Sta 12—Shore colln., Hare Id., off Tuticorin. 22-2-1968, (13) 18 exs. (d.), Sta. 13—Shore colln., Vanthivu Id., off Tuticorin. 23-2-1968, (14) 1 ex. (d.), Sta. 16—Shore colln., near Tamil Nadu State Fisheries Extension Unit, Tuticorin, 25-2-1968 (coll. *A. S. Rajagopal*) ; (15) 5 exs. (d.), Sta. 6—Shore colln. at low tide, Rameswaram, 1-2-1975, (16) 62 exs. (d.), Sta. 7—Shore colln., Palk Bay, Mandapam Camp to Mandapam 3.2.1975. (17) 2 exs. (d.), Sta. 3—Shore colln., Sethubajashatram, Palk Bay, 4-1-1978, (18) 8 exs. (d.), Sta. 4—Shore colln., Devipattinam, palk Bay, 16-1-1978 ; (19) 6 exs. (d.), Sta. 5—Shore colln., Thondi, Palk Bay, 17-1-1978, (20) 6 exs. (d.), Sta. 3—Shore colln. behind Circuit House, Tuticorin, 21-1-1978, (21) 29 exs. (w), & 4 exs. (d.), Sta. 7—Shore colln., Hare Id. near the port of New Tuticorin, 22-1-1978, (22) 12 exs. (w.) & 2 exs. (d.), Sta. 10—Along the shore near Asstt. Collector's Bungalow, Tuticorin, 23-1-1978 (Coll. *A. S. Rajagopal & H. P. Mookherjee*).

Distribution—In India : Arabian sea coast : Devagad, Pamban and Krusadai Id., Palk Bay, Indian Ocean.

Elsewhere : Red Sea, Djibouti, Persian Gulf, Madagascar, Burma : Maungmagan : Bushire, Philippines, Australia, Viti Is., Vanikoro, Loyalty and Fiji Is.

Remarks—Reeve (*op. cit.*) and Tryon (*op. cit.*) are brief in their description of this species while Satyamurti (*op. cit.*) and Cernohorsky (*op. cit.*) are in greater detail. This species greatly varies in colour, form and sculpture.

Shell elongate-ventricose, whorls with three spiral rows of brown, dark chocolate or black tubercles. Spiral thread-like striae in between each row. Body-whorl with six or rarely seven principal rows of tubercles. Secondary rows of tubercles between principal rows very inconspicuous. Varix opposite aperture present. Aperture short somewhat oval, anterior canal short, deeply excavated. Posterior canal-like groove formed at junction of outer lip. A ridge inside similar to that in *Planaxis sulcatus* present. Outer lip thick, rows of fine ridges within. Operculum brown, flat, oval and horny.

A large number of specimens of various sizes and shades constitutes the collection studied. A few are with the animal inside. Empty shells are generally found with hermit crabs. A considerable number of the shells are either shore worn or encrusted.

Measurements (in mm.)	Ranges (270 exs.)
Height	6.05—26.95
Maximum Diameter	3.50—15.00
Minimum Diameter	3.45—12.20

***Clypeomorus traillii* (Sowerby, 1855)**

Cerithium trailli Sowerby (not Adam et Leloup, 1938), 1855*, *Thes. Conch.*, 2 (16) (Type-locality : ?)

Reeve, 1865, *Conch. Icon.*, 15, *Cerithium*, sp. No. 24, pl. 4, fig. 24 ; Satyamurti, 1952, *Bull. Madras. Govt. Mus, new Ser* (Nat. Hist. Sec.), 1 (2), pl. 6 : 88-89.

Cerithium traillii : Tryon, 1887, *Man. Conch.*, 9 : 135; pl. 25, figs. 47, 54, 56, 59.

Clypeomorus traillii : Cernohorsky, 1972, *Mar. Shells Pacific*, 2 : 71, pl. 16, fig. 10.

Material—(1) 18 exs. (d.), Sta. 12—Shore collection, Hare Id., off Tuticorin, 22-2-1968, (2) 2 exs. (d.), Sta. 13—Shore collection, Vanthivu Id., off Tuticorin, 23-2-1968. (Coll. A. S. Rajagopal.)

Distribution—In India : Pamban, Palk Bay : Lakshadwip.

Elsewhere : Singapore, Java, Philippines.

Remarks—Among the descriptions of the species provided by Reeve (*op. cit.*), Tryon (*op. cit.*), Satyamurti (*op. cit.*) and Cernohorsky (*op. cit.*), the same by the last two authors are best and adequate.

Shell pyramidal, ventricose, with acutely pointed apex. Whorls straight, gradually increasing, penultimate whorl rather tumid, body-whorl largest. White varices present irregularly on different whorls. Whorls traversed by regular spiral rows of beaded-striae alternating with non-beaded fine threadlike striae. Beads chestnut or chocolate coloured. A prominent varix, present opposite aperture. Aperture ovate, white

* Reference not seen in the original.

inside, anterior canal oblique, short. Posterior canal constricted. Outer lip round, expanded, outwardly thickened, finely crenulated inside.

The collection under study consists of shells eroded to various extents.

Measurements (in mm.)	Range (12 exs.)
Height	24.00—36.65
Maximum Diameter	11.25—16.25
Minimum Diameter	8.75—12.95

***Clypeomorus splendens* (Sowerby, 1855)**

Cerithium splendens Sowerby, 1855, **Thes. Conchyl.*, 2 : 872, fig. 171 (Type-locality : ?),
Reeve, 1865, *Conch. Icon.*, 15, *Cerithium*, sp. No. 19, pl. 3, fig. 19 ;
Satyamurti, 1952, *Bul., Madras Govt. Mus. new Ser. (Nat. Hist. Sec.)*, 1 (2), pl.
6, 87-88. fig. 6

Cerithium trilli var. *splendens* : Tryon, 1887, *Man. Conch.*, 9 : 135, pl. 25, figs. 52, 53.
Tryon (1887) considers Sowerby's *purpurascens* as a synonym.

Material—(1) 1 ex. (d.), Sta. ?—Sandy point, Krusadai Id., 2-9-1925 (Coll. S. L. Hora) ; (2) 3 exs. (d.), Sta. 13—Shore colln., Vanthivu Id., off Tuticorin, 23-2-1968 (Coll. A. S. Rajagopal) ; (3) 2 exs. (d.), Sta. 4—Shore colln., Devipattinam, 16-1-1978, (4) 9 exs. (d.), Sta. 6—Shore colln., Keelakkarai, 28-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—In India : Krusadai Id., Pamban.

Elsewhere : Philippines : Id. of Zebu.

Remarks—The brief descriptions provided by Reeve (*op. cit.*), Tryon (*op. cit.*) and Satyamurti (*op. cit.*) give a general account of the shell characters of the species.

Shell moderately short, pyramidal, ventricose. Whorls traversed by spiral ribs with prominent large spiny granules ; one or more in series better developed making whorls subangulate. Granules chestnut or chocolate coloured, in some cases alternating with white, in lighter coloured shells. Fine thread-like striae running spirally between ribs. Aperture ovate. Columella devoid of callus. Outer lip crenulated. Anterior canal short.

The material under study consists of shells which are in fairly good condition though the apex is slightly broken in some and the shells are somewhat shore worn. This is a new acquisition to the collections of the Zoological Survey of India.

* Reference not seen in the original.

Measurements (in mm.)	Range (3 exs.)
Height	16.50—22.35
Maximum Diameter	7.60— 0.95
Minimum Diameter	6.50—9.45

Clypeomorus delectum (A. Adams, 1855)

Cerithium delectum A. Adams, 1855* in Sowerby's *Thes. Conchyl.*, 2: 875 (Type-locality : Galapagos Is. ?) ; Reeve, 1865, *Conch. Icon.* : 15, *Cerithium*, ap. no. 112, pl. 16, figs. 112 a, 112 b; Tryon, 1887, *Man. Conch.*, 9 : 138, pl. 26, figs. 80-82. Reeve (*op.cit.*) has correctly treated this and Kiener's *zebrum* separately, while Tryon (*op.cit.*) has made it a synonym of the latter. With the limited number of specimens before us for study we are inclined to consider that the two species are different.

Material—(1) 1 ex. (d.), Sta. 1C—Shore about 2.4 Km. (1½ miles) S. of Inspection Bungalow, Tuticorin, 16-4-1955 (Coll. H. C. Ray), (2) 1 ex. (d.), Sta. 7—Shore colln., Palk Bay, Mandapam Camp, 3-2-1975 (Coll. A. S. Rajagopal & H. P. Mookherjee)

Distribution—In India : Palk Bay.

Elsewhere : Pacific : Galapagos Is.

Remarks—Reeve's (*op. cit.*) description, though brief is adequate.

Shell small, elongated, moderately stout, light pinkish. Whorls slightly inflated in middle, clearly demarcated by suture, minutely granulated in three rows. Granulations spirally connected and appear in transpirally plaited rows, giving whorls decussated architecture. Varices thick, white. Apex sharp. Aperture small, columella short, obtuse. Canal short, narrow, open. Outer lip thickened outwardly.

Only two shells in tolerably good condition represent this in the collection. No colouration or markings are visible on them.

This appears to be the first record of this species from the Indian Coast.

Measurements (in mm.)	Range (2 exs.)
Height	10.45—11.50
Maximum Diameter	4.35— 4.75
Minimum Diameter	3.65— 3.80

Family EPITONIIDAE

The genera namely, *Epitonium* (Bolten) Roding and *Acrilla* H. Adams have been represented in this family.

* Reference not seen in the original.

Shells encircled by transpiral crests, base of the body-whorl not marked off from the rest of the shell. *Epitonium*

Shells glossy, no transpiral crests present. Transpiral ribs present. Base of the body-whorl is distinct from the rest of the shell. *Acrilla*.

Family EPITONIIDAE

Genus *Epitonium* (Bolten) Roding, 1798

Type-species : *Turbo scalaris* Linnaeus (= *Epitonium brave* Roding),

Epitonium immaculatum (Sowerby, 1844).

Scalaria immaculata Sowerby, 1844, *Proc. zool. Soc. London*, Pt. 12 : 26-27 (Type-locality : Catanuan, Province of Tayabas, Id. Luzon, Philippines); Sowerby, 1844, *Thes. Conchyl.*, 1 (IV) : 93, pl. 33, fig. 58; Reeve, 1873, *Conch. Icon.*, 19, *Scalaria*. sp. No. 24, pl. 4, fig. 24; Tryon, 1887, *Man. Conch.*, 9 : 61, pl. 12, fig. 80.

Material—(1) 1 ex. (d.), Sta. 1J—Shore N. of Inspection Bungalow, Tuticorin, 24-5-1955 (Coll. H. C. Ray), (2) 1 ex. (d.), Sta. 7—Shore of Point Calimere, Tamil Nadu, 16-2-1968, (3) 6 exs. (d.), Sta. 8—Shore of Agasthiampalli, Tamil Nadu, 17-2-1968 (Coll. A. S. Rajagopal)

Distribution—In India : Bombay.

Elsewhere : Catanuan, Luzon Id., Philippines.

Remarks—The descriptions given by Reeve (*op. cit.*) and Tryon (*op. cit.*), though brief are adequate.

Shell elongate, white, subumbilicated. Whorls contiguous, tumid and rounded, spirally minutely striated, crenulated at suture, suture deep, impressed. Varices thin, unequal, irregular, disappearing in the middle of whorls. Aperture ovate, peristome thickened.

The material examined comprises of shells of various sizes.

Measurements (in mm.)	Range (8 exs.)
Height	10.70—17.30
Maximum Diameter	5.10— 7.10
Minimum Diameter	4.40— 5.35

Epitonium latifascium (sowerby, 1874)

Scalaria latifasciata Sowerby, 1874, in Reeves *Conch. Icon.*, 19, *Scalaria*. sp. no. 177, pl. 15, figs. 117a, b. (Type-locality : Maheburg. Mauritius); Tryon, 1887, *Man. Conch.*, 9 : 56, pl. 11, figs. 45, 46.

Material—(1) 2 exs. (d.), Sta. 8—Shore of Agasthiampalli, Tamil Nadu, 17-2-1968 (2) 2 exs. (d.), Sta. 11—Shore colln. behind Circuit House, Tuticorin, 21-2-1968 (Coll. A. S. Rajagopal); (3) 1 ex. (d.),

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

Distribution—In India : Bombay.

Elsewhere : Mauritius.

Remarks—Reeve's (*op. cit.*) description is adequate and slightly more elaborate than Tryon's (*op. cit.*).

Shell pyramidal, narrowly umbilicate, pale fulvous (reddish-yellow) or white ; sometimes with three brown bands spirally on whorls, middle one broadest. Suture deeply impressed, simple. Whorls round, increasing rapidly with numerous thin plate-like transpiral varices. Aperture oval, peristome uniformly slightly thickened.

In the collection studied, there are five shells ; two of them with brown bands and one without. The other two shells are imperfect.

Measurements (in mm.)	Range (4 exs.)
Height	6.95—12.25
Maximum Diameter	3.70— 6.30
Minimum Diameter	3.40— 5.35

Epitonium subauriculatum (Souverbie, 1866)

Scalaria attenuata Sowerby (not Pease, 1860), 1874, in Reeve's *Conch. Icon.*, 19, *Scalaria*, sp. no. 116, pl. 15, fig. 16 (Name invalidated due to preoccupation)

Scalaria subauriculata : Souverbie 1866*, *J. de Conchyl.*, 14 : 147, 260 (Type-locality : ?) Tryon, 1887, *Man. Conch.*, 9 : 67, pl. 14, fig. 21.

Scalaria microsoma : Tapparone-Canefri, 1876, *J. de Conchyl.*, 24 : 152.

Material—1 ex. (d.), Sta. 11—Shore colln. behind Circuit House, Tuticorin, 21-2-1968 (Coll. A. S. Rajagopal)

Distribution—In India : Bombay.

Elsewhere : Singapore, New Caledonia.

Remarks—The descriptions given by Reeve (*op. cit.*) and Tryon (*op. cit.*) are adequate though both are brief.

Shell small, white, narrow, attenuate, non-umbilicate. Whorls round, scarcely in contact. Varices seven, moderately thick, prominent, subreflexed, distant and transpirally obliquely continuous on spire. Aperture round, peristome lamellate.

A single white shell represents the material for this species.

Measurements (in mm.)	
Height	10.65
Maximum Diameter	4.65
Minimum Diameter	4.50

* Reference not seen in the original.

Epitonium lamellosum (Lamarck, 1843)

Scalaria lamellosa (Lamarck, 1843, in Deshayes ed. *Hist. nat. Anim. sans Vert.*, 9 : 73-74 (Type-locality : Mediterranean); Kiener (1838-39)*, *Coq. Viv.*, 10, *Scalaria*, 10-11, pt. 3, figs. 7, 7a, 7b; Tryon, 1887, *Man. Conch.*, 9 : 74-75, pl. 15, figs. 77, 82, 83, 84.

Scala (Opalia) lamellosa : Melvill and Standen, 1901, *Proc. zool. Soc. Lond.*, 2 : 356; Melvill and Standen, 1903, *J. Conch.*, 10 (12) : 348; Schepman, 1909, *Siboga Exped.*, 49b (II) : 226-227.

We have followed Tryon (*op. cit.*), Melvill and Standen (*op. cit.*), and Schepman (*op. cit.*) in retaining the above name for this species, keeping in view its well established usage.

Material—(1) 2 exs. (d.), Sta. 1C—Shore about 2.4 Km. (1½ miles) 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.), Sta. 5—Shore colln., Mandapam Camp, 31-1-1975, (4) 1 ex. (d.), Sta. 8—Shore colln. behind Circuit House, Tuticorin, 21-1-1978 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—In India : Not recorded earlier.

Elsewhere : Mediterranean, Mekran Coast : Charbar, Mauritius, Karachi, Indonesia : W of Kwandang-bay-entrance, Wanoh bay, Hawaii Is.

Remarks—Tryon's (*op. cit.*) description is adequate though brief. Shell pyramidal, non-umbilicate, dark to light brown between varices. Whorls round, contiguous. Body-whorl with a single spiral rib below middle. Varices laminated broad and connected at suture, continued on spire obliquely or in straight line. Aperture obliquely ovate, outer lip broadly thickened, slightly reflected.

Two small shells and two larger ones represent this species in the collection.

This appears to be the first record of the species from the Indian Coast.

Measurements (in mm.)	Range (3 exs.)
Height	11.20—17.05
Maximum Diameter	5.10— 7.10
Minimum Diameter	4.70— 6.85

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

Epitonium pallasii (Kiener, 1838-39)

Scalaria pallasii Kiener, (1838-39)*, *Coq. Viv.*, 10, *Scalaria* : 4, 5, pl. 2, figs. 3 (Type-locality : Not given) ; Sowerby, 1844, *Thes. Conchyl.*, 1 (IV) : 83-84, pl. 32, figs. 14, 15 & 16 ; Reeve, 1873, *Conch. Icon.*, 19, *Scalaria*, sp. No. 40, pl. 6, figs. 40a & b.

Scalaria pallasii : Tryon, 1887, *Man. Conch.*, 9 : 54, pl. 11. fig. 33.

Scala pallasii : Melvill and Standen, 1901, *Proc. Zool. Soc. Lond.*, 2 : 354.

Scala pallasii : Melvill and Standen, 1903, *J. Conch.*, 10 (12) : 345 ; Schepman, 1909, *Siboga Exped.*, 49b (1I) : 223.

According to Tryon (*op. cit.*) *S. neglecta* Reeve (not Adams and Reeve) *subpretiosa* Blainville, *notha* Menke and *nicobarica* Beck, MS., are synonyms of this species.

Material—1 ex. (d.), Sta. 8—Shore colln., Agasthiampalli, 17-2-1968 (Coll. A. S. Rajagopal).

Distribution—In India : Madras.

Elsewhere : Persian Gulf, Gulf of Oman, Mekran Coast; Charbar, Karachi Mauritius, Philippines, Catanuan ; China.

Remarks—The descriptions given by Kiener, (*op. cit.*) Reeve (*op. cit.*) and Tryon (*op. cit.*) are adequate.

Shell pyramidal, umbilicate. Whorls 7 to 8, somewhat disunited. Varices distant on whorls, prominent, regular laminar slightly angular at top of whorls (near suture). Aperture ovate, peristome laminate and reflected.

The material represents a single shell, which is completely bleached and which retains only 3 whorls, rest of the spire having broken off.

Measurements (in mm.)

Height 18.80 (Tip of the shell broken)

Maximum Diameter 13.15

Minimum Diameter 11.30

Epitonium pyramidale (Sowerby, 1844)

Scalaria pyramidalis Sowerby, *Proc. zool. Soc. London*, 1844, pt. 12 : 12 (Type-locality: Caminguing, Philippines, taken in sandy mud at thirty fathoms) ; Sowerby, 1844, *Thes. Conchyl.*, 1 (IV) : 85, pl. 32, fig. 4 ; Reeve, 1873, *Conch. Icon.*, 19, *Scalaria*, sp. No. 17, pl. 3, fig. 17, Tryon, 1887, *Man. Conch.*, 9 : 62, pl. 13, fig. 89.

Epitonium pyramidalis : Gravely, 1942, *Bull. Madras Govt. Mus. new Ser.* (Nat. Hist. Sec), 5 (2) : 28.

Epitonium pyramidale : Cernohorsky, 1972, *Mar. Shells Pacific*, 2 : 196, pl. 56, fig. 4.

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

Material—(1) 1 ex. (d.), Sta. 3b—Rocky shore of Gulf of Mannar, near Quarantine Camp, Mandapam, 11-5-1955 (Coll. H. C. Ray), (2) 2 exs. (d.), Sta. 8—Shore colln., Agasthiampalli, Tamil Nadu, 17-2-1968 (Coll. A. S. Rajagopal).

Distribution—In India : Madras.

Elsewhere : Singapore, Philippines.

Remarks—Tryon's (*op. cit.*) description is very brief and incomplete, while, those of Sowerby (*op. cit.*), Reeve (*op. cit.*) and Cernohorsky (*op. cit.*) are slightly more detailed and adequate.

Shell white, pyramidal. Whorls 9, subventricose, scarcely in contact. Varices laminated, angulated at top of whorl near suture, transpirally connected at suture and continued obliquely on spire. Varices on body-whorl converging below and covering umbilicus. Aperture subcircular, edge laminate. Inner lip touching crests of all varices and produced anteriorly into small beak.

All the three shells in the collection have the apex slightly damaged. One of them has the body-whorl, also slightly damaged.

Measurements (in mm.)	Range (3 exs.)
Height	14.40—18.20
Maximum Diameter	6.40—7.00
Minimum Diameter	5.95—6.65

Genus *Acrilla* H. Adams, 1860

Type-species : *Scalaria acuminata* Sowerby

Acrilla acuminata (Sowerby, 1844)

Scalaria acuminata Sowerby, 1844, *Proc. zool. Soc. Lond.*, pt. 12 : 31 (Type-locality : In sandy mud at seven fathoms at Malacca) ; Reeve, 1873, *Conch. Icon.*, 19, *Scalaria*, sp. No. 74, pl. 10, fig. 74b.

Scalaria (Acrilla) acuminata : Tryon, 1887, *Man. Conch.*, 9 : 83, pl. 17, fig. 30.

Acrilla acuminata : Gravely, 1942, *Bull. Madras Govt. Mus. new Ser. (Nat. Hist. Sec.)*, 5 (2) : 28.

Material—(1) 1 ex. (d.), Sta. 7—Shore colln., Point Calimere, 16-2-1968, (2) 3 exs. (d.), Sta. 8—Shore colln., Agasthiampalli, 17-2-1968 (Coll. A. S. Rajagopal), (3) 1 ex. (d.), Sta. 8—Shore colln., Karaikal, from Fisherman's Vill., S. to Light House, 6-2-1975, (4) 1 ex. (d.), Sta. 11—Shore colln. opposite Fort to the mouth of Uppanar, Tranquebar, 11-2-1975 (Coll. A. S. Rajagopal & H. P. Mookherjee).

Distribution—In India : Madras.

Elsewhere : Sri Lanka, Malacca, Japan.

Remarks—Adequate, though brief descriptions can be had from Sowerby (*op. cit.*), and Tryon (*op. cit.*).

Shell narrow, glossy, elongately turreted, non-umbilicate, acuminate, two brown bands running spirally. Whorls 15 (when full grown), convex. Suture impressed. Whorls traversed by very closely set transpiral ribs. Base of body-whorl keeled. Aperture elongately oval, columella thin, arched, flattened inwardly. Outer lip thin, fragile.

A few shells of different sizes which are collected on shore, from the material for study. In almost all cases, the outer lip and tip of spire are damaged.

Measurements (in mm.)	Range (6 exs.)
Height	11.85—31.40
Maximum Diameter	3.60— 7.50
Minimum Diameter	3.35— 7.25

Family JANTHINIDAE

A single genus *Janthina* (Bolten) Roding represent this family.

Shells violet, darker at the base. Spire globular with minimum whorls, smooth or feebly striated. Aperture wide, columellar border angular.

Janthina

Genus *Janthina* (Bolten) Roding, 1798

Type-species : *Helix janthina* Linnaeus.

Janthina roseola Reeve, 1858.

Janthina roseola Reeve, 1858, *Conch. Icon.* 11, *Janthina*, sp. No, 1 pl. 1, figs. 1a & 1b (Type-locality : Id. of Nicobar).

Janthina roseola : Gravely, 1942, *Bull. Madras Govt. Mus. new Ser. (Nat. Hist. Sec.)* 5 (2) : 28, fig. 3b ; Satyamurti, 1952, *Bull. Madras Govt. Mus. new Ser. (Nat. Hist. Sec.)*, 1 (2), pt. 6 : 91-92 pl. 6, fig. 9.

Material—(1) 1 ex. (d.), Sea shore, 4 Km. (2½ miles) E. of MBS. Porto Novo 22-1-1957, (2) 1 ex. (d.), Sea shore, 1.6 Km. (1 mile) s. of Fort, Tranquebar, 29-1-1957, (3) 2 exs. (d.), Sea Coast near Chinna Tarangapatti, 4.8 Km. (3 miles) N. of Tranquebar, 2-2-1957 (Coll. A. G. K. Menon & G. Ramakrishna), (4) 30 exs. (d.), Sta. 8—Shore colln. Agasthiampalli, 17-2-1968, (5) 23 exs. (d.), Sta. 9—Shore colln., Vedaranyam, 18-2-1968 (Coll. A. S. Rajagopal).

Distribution—In India : Bombay, Krusadai, Pulli Is., Madras, Id, of Nicobar.

Elsewhere : Sri Lanka.

Remarks—Reeve's (*op. cit.*) description is adequate though brief. Satyamurti's (*op. cit.*) is more detailed.

Shell ovately conical, fragile, opaque, outer margin angular, spire slightly elevated, pale, lightly violet-tinged above and deep violet below. Whorls moderately convex, clearly demarcated by suture. Suture not depressed. Surface obliquely plicately striated, spirally, linearly grooved. Grooves appearing as faintly, reticulate markings and these clearer on lower surface. Body-whorl flattened below and angulated at periphery. Aperture large squarish. Columella prolonged and thinly twisted, strongly angulate at junction with outer lip. Outer lip thin, fragile.

A large number of shells of different sizes with damaged outer lip forms the collection studied.

As is well known, members of the genus *Janthina* are inhabitants of the open sea being adapted to pelagic life. During stormy weather conditions in sea, they are cast on shore in very large numbers. This happens only occasionally and infrequently. On such occasions the shells which are very fragile suffer much damage because of the force with which the furious waves wash them ashore.

The collection, mentioned above, was made probably sometime after such a stormy weather.

Janthina globosa Swainson, 1822

Janthina globosa Swainson, 1822, *Zool. Illustr.* 1 Ser. 2 : 85 (Type-locality : Not given); Reeve, 1858, *Conch. Icon.*, 11, *Janthina*, sp. no. 18, pl. 4, figs. 18a & 18b.

Janthina globosa : Gravely, 1942, *Bull. Madras Govt. Mus. new Ser. (Nat. Hist. Sec.)*, 5 (2) : 28; Satyamurti, 1952, *Bull. Madras Govt. Mus. new Ser. (Nat. Hist. Sec.)*, 1 (2), pt. 6 : 92, pl. 6, fig. 10; Abbot, 1954, *Amer. Sea shells* : 160, pl. 4, fig. K; Cernohorsky, 1972, *Mar. Shells Pacific*, 2 : 198, pl. 56, fig 9.

Material—(1) 1 ex. (d.), Sta. 8—Shore colln., Agasthiampalli, 17-2-1968, (2) 4 exs. (d.), Sta. 9—Shore colln., Vedaranyam 18-2-1968 (Coll. A. S. Rajagopal).

Distribution—In India : Bombay, Krusadai Id., Pamban, Madras.

Elsewhere : Singapore, Hongkong, both coasts of United States of America. Cernohorsky (*op. cit.*) has reported it to be world wide in distribution.

Remarks—Very brief description is given by Swainson (*op. cit.*). It is adequate though brief in Reeve (*op. cit.*). Satyamurti (*op. cit.*) are in greater detail.

Shell globose, thin, fragile, narrowly umbilicated, spire short, somewhat sunk. Suture impressed. Whorls swollen. Body-whorl much inflated. Fine transpiral striae on whorls. Body-whorl decussately striated ; point of decussation arising about middle of body-whorl. Light coloured below suture, shade of violet gradually increasing downwards. Aperture large, open. Columella thin, reflected near umbilicus, prolonged. Outer lip slightly sinuate in middle, channelled below.

A few shells represent the collection and in all of them the outer lip is broken.

V. SUMMARY

A systematic study of the marine molluscs of the order Mesogastropoda found along the Coromandel Coast, Palk Bay and Gulf of Mannar upto Kanya Kumari is presented partly, with 8 families.

The material undertaken for the study comprises the three survey collections of Tamil Nadu Coast made in 1968, 1975, 1978 and the entire unnamed collections from the same area, in the Zoological Survey of India accumulated for over 50 years from the period from 1913 to 1966.

A total of 36 species under 15 genera representing 8 families are dealt with.

Necessary Keys to the identification of families, subfamilies and genera have been provided.

The synonymy, of the species is made brief confining to only important references, the distribution is given as completely as possible for each species. Diagnostic shell characters of description of species are included whenever found necessary. Wherever possible their ecology has also been presented.

Among the species dealt with, three are recorded here for the first time from the Indian Coast, one, for the first time from the coast of mainland India, two are represented in their respective material as topotypes and two others are newly added to the National Zoological collections of the Zoological Survey of India. In all the cases efforts have been made to give the correct identity for all the species.

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VII. REFERENCES

- ADAMET LELOUP, 1938. *Prosobranchia* and *Opisthobranchia*, *Mem. Mus. r. Hist. nat. Belg.*, **2** (19) : 1-209, 8 pls.
- BENTHEM JUTTING, W.S.S. van. 1956. Systematic studies on the nonmarine mollusca of the Indo-Australian Archipelago, V Critical Revision of the Javanese Freshwater Gastropods, *Treubia*, Bogor, **23** (2) : 259-477, 135 text figs.
- BORN, I. 1780. *Testacea Mus. Vindos*, 442 pp.
- CERNOHORSKY, W. O. 1972. *Marine Shells of Pacific*, **2** : 1-411, 68 pls.
- CRICHTON, M. D. 1941. *Marine shells of Madras*. *J. Bombay nat. Hist. Soc.*, **42** (2) : 322-341, 4 pls.
- DAUTZENBERG, Ph. 1932. Mollusques Testaces Marine de Madagascar, Supplement. *J. de Conchyl.*, **76** : 5-119, 1 pl., 6 figs.
- DESHAYES, M. G. P. 1863. *Cat. Moll. de L'île de la Reunion*, **1-4** +E1-144, 14 pls.
- DILLWYN, L. W. 1817. *Descr. Cat. Rec. Shells*. **2** : 581-1092+29 (Index)
- FISCHER, H. 1901. Liste des Coquilles Recueilles par M. de gemas A Djibouti et Ali Sabieh Aveola, *J. de Conchyl.*, **49** : 96-130, 1 pl.
- GRAVELY, F. H. 1942. Shells and other animal remains round on Madras Beach, *Bull. Madras Govt. Mus. new ser.* (Nat. Hist. Sec.), **5** (2) : 1-110, 17 text figs.
- HINDS, R. B. 1844. Description of new species of *Triton*, *Solarium* and *Corbula*, *Proc. zool. Soc. Lond.*, pt. **12** : 21-26.
- HOUBRICK, R. S. 1978. The family Cerithiidae in the Indo-Pacific, pt. 1, the genera *Rhinoclavis*, *Pseudovertagus* and *Clavocerithium*, *Monographs of the Marine Mollusca*, No. 1 : 1-130, 98 pls. Inc., Greenville, Delaware.
- KIENER, L. C. 1841-1842. *Coq. Viv.*, **6** : *Cerithium*, 104 pp., 32 pls.
- KIENER, L. C. 1838-1844. *Coq. Viv.*, **10** : *Turritella*, 46 pp. 14 pls. & *Scalaria*, 22 pp., 7 pls.
- LAMY, E. 1938. Mollusques Recueillis A L'île de Paques Par—La, Mission Franco-Belge (1934), *J. de Conchyl.*, **82** : 131-143.
- MEVILL, J. C. and STANDEN, R. 1898. The Marine mollusca of Madras and the immediate neighbourhood, *J. Conch.*, **9** : 38-48 & 75-85, 1 pl.

- MELVILL, J. C. and STANDEN, R. 1901. The mollusca of the Persian Gulf, Gulf of Oman and Arabian Sea, as evidenced mainly through the collections of Mr. F. W. Townsend, 1893—1900, with descriptions of new species—Pt. 1, *Proc. zool. Soc. Lond.*, **2** : 327—460, 4 pls.
- MELVILL, J. C. and STANDEN, R. 1903. The genus *Scala* (Klein) Humphray as presented in the Persian Gulf, Gulf of Oman, and North Arabian Sea, with descriptions of new species, *J. Conch.*, **10** (11 & 12) : 340—351, 1 pl.
- NEVILL, G. 1885. *Hand List Moll. Indian Mus.*, Pt. 2 : Littorinidae, pp. 135—177.
- PHILIPPI, R. A. 1845. Description of new species of *Trochus* and eighteen new species of *Littorina*, in the collection of H. Cuming, Esq., *Proc. zool. Soc. Lond.*, **13** : 138—143.
- PHILIPPI, R. A. 1846. *Abbild. und beschreib. Conchyl.*, **2** : *Litorina*, pp. 145, 167, 222 & 223, pls. 2, 3 & 5.
- PHILIPPI, R. A. 1847. *Abbild. und beschreib. Conchyl.*, **3** : *Litorina*, pp. 14, 15, 62 & 65, pls. 6, 7
- PHILIPPI, R. A. 1848. *Testaceorum novorum centuria Zeits. f. Malak.*, **5** : 17—27.—Cassel (Druck & Verlag vontheodor Fischer).
- POTIEZ, V.-L.-V. & MICHAUD, A.-L.-G. 1838. *Gal. des Moll. on Cat.*, **1** : 1—XXXVI + 1—560 + Errata
- PRASHAD, B. 1921. xxv. Report on a collection of Sumatran molluscs from fresh and brackish water, *Rec. Indian Mus.*, **22** : 461—507, 1 pl.
- RAY, A. C. 1948. On a collection of Mollusca from the Coromandel Coast of India. *Rec. Indian Mus.*, **46** : 87—122, 1 pl.
- REEVE, L. A. 1849. *Conch. Icon.*, **5**, *Turritella*, 65 spp., 9 pls.
- REEVE, L. A. 1857. *Conch. Icon.*, **10**, *Littorina*, 107 spp., 8 pls.
- REEVE, L. A. 1858. *Conch. Icon.*, **11** : *Ianthina*, 25 spp., 5 pls.
- REEVE, L. A. 1864. *Conch. Icon.*, **15** : *Solarium*, 21 spp., 3 pls. ; 149 spp., 20 pls. ; *Vertagus*, 26 spp., 5 pls. ; *Telescopium*, 1 sp., 1 pl. ; *Lampania*, 10 spp., 2 pls. & *Tympanotonos*, 10 spp., 2 pls.
- REEVE, L. A. 1873. *Conch. Icon.*, **19** : *Scalaria*, 125 spp., 16 pls.
- REEVE, L. A. 1878. *Conch. Icon.*, **20** : *Planaxis*, 38 spp., 5 pls.
- RODING, P. F. 1798. *Mus. Bolten.*, 1—64 pp.
- ROSEWATER, J. 1970. The family Littorinidae in the Indo-Pac. *Moll.*, **2** (11) : 417—506, pls. 325—386.
- ROSEWATER, J. 1972. The family Littorinidae in the Indo-pacific, pt. II, the subfamilies Tectarinae and Echininae, *Indo-Pac. Moll.*, **2** (12) : 507—528, pls. 388—408.
- SATYAMURTI, S. T. 1952. The mollusca of Krusadai Island (in the

- Gulf of Mannar), *Bull. Madras Govt. Mus. new ser. (Nat. Hist. Sec.)*, 1 (2), pt. 6 : 1—vii + 1—267, 34 pls.
- SCHEPMAN, M. M. 1909. *Siboga Exped., Prosobranchia*, 49 b (II) : *Cerithium*, 157—164 ; *Cerithidea*, 168-169 ; *Planaxis*, 171 ; *Littorina*, 193—195 ; *Torinia*, 221—223 ; *Scala*, 223—228.
- SOWERBY, J. and SOWERBY, G. B. 1834. *The Gen. Rec. Foss. Shells*, 1, pt. 42 (A-M) : 1820—1825, 279 pls.
- SOWERBY, G. B. 1844. *Thes. Conchyl.*, 1 (iv) : *Scalaria*, pp. 83—85, pl. 32.
- SOWERBY, G. B. 1855. *Thes. Conchyl.*, 2 (16) : *Cerithium*, pp. 857, 872 & 875, pl. 188.
- SOWERBY, G. B. 1844. Contribution of Mr. G. B. Sowerby's description of *Scalaria*. *Proc. zool. Soc. Lond.*, pt. 12 : 26—31.
- SOWERBY, G. B. 1915. *Ann. Mag. nat. Hist.*, Ser. 8, 16 (93) : 167.
- SWAINSON, W 1821—1822, *Zool. Illustr.*, 1 ser., 2, 85 pp., 1 pl.
- TAPPARONE-CANEFRI, C. 1876. Rectifications das la nomenclature de quelques especes du genre *Scalaria*, *J. de Conchyl.*, 24 : 152—156.
- TRYON, G. W. 1886. *Man. Conch.* Philadelphia, 8 : 461 pp. 79 pls
- TRYON, G. W. 1887. *Man. Conch.* Philadelphia, 9 : 488 pp. 71 pls.
- WATSON, R. C. 1886. II-Report on the Scaphopoda and Gastropoda collected by H. M. S. Challenger during the years 1873-76. *Rep. Sci. Res. Voy. Challenger. Zool.*, 15 : I—V + 1—675, 50 pls.