

STATE FAUNA SERIES 3

FAUNA OF WEST BENGAL

PART-9

**ZOOLOGICAL SURVEY OF INDIA
1992**

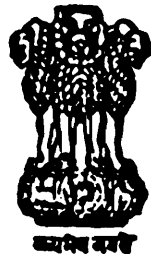


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PART - 9 (MOLLUSCA)

Edited by the Director
Zoological Survey of India
Calcutta



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PART - 9
(MOLLUSCA)

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LAND AND FRESHWATER MOLLUSCS (PART - I)

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INTRODUCTION

The molluscs, one of the most definitely characterised and successful groups of animals, have a very important role in the ecosystem. Their occupation of all possible habitats marine, freshwater and land (also arboreal in some cases), enable them to participate in and regulate the modes of life of other organisms.

Besides mantle and radula, the two features not found elsewhere, other typical characters of the molluscs consist of a head, a mouth, eyes, tentacles, a ventral muscular foot and a shell (absent in slugs).

This highly adaptive group of organisms has invaded all possible habitats and in number of species is exceeded only by insects. In general, land and freshwater molluscs (approx. 34,000 and 8,000 respectively) continue nearly 40% of the total number of species of molluscs in the world. India harbour an approximate total of 1,714 species of land and freshwater molluscs spread over nearly 198 genera and 46 families, the corresponding figures for the state of West Bengal read 199 species (including a number of infra-specific categories) under 72 and 34 families.

Though conforming to a general morphological plan, the molluscs depending upon their structural modification, Gastropoda and Bivalvia.

GASTROPODA

Gastropoda are chiefly characterised by a head, a foot, tentacles, eyes, a visceral mass and a shell (excepting the slugs).

A typical gastropod shell encloses the soft part of the snail entirely, the foot and only the anterior part of the body being proutusible. Shells, the most important among the identifying characters of molluscs, display an array of shape and size and are generally of the following types; limpet like (Neritidae and Ancyliidae), globose (Piliidae), ovate (Achatinidae) turbinate (Cyclophoridae), cylindricalturreted (Thiaridae, Subulinidae), depressedly trochiform (Trochomorphidae) and discoidal (Planorbidae).

Excepting a few species (c.g. *Gulella bicolor*) the land and freshwater gastropods of West Bengal are herbivorous. The mouth is situated at the antero-ventral side of head. The buccal mass consists of a jaw (single or paired) and an odontophore containing the radula. The number of teeth in the radula varies being usually less in prosobranchs and higher in pulmonates. The number and mode of arrangement of the radular teeth form a very important taxonomic character. Feeding is done by the help of radula. The foot in the prosobranchs (operculates), at its posterior dorsal end, bears an usually shelly operculum used for closing the shell. The freshwater prosobranchs respire by means of gills and in terrestrial adaptation (Cyclophoridae) the gills gradually give way to a vascularised area of the mantle roof.

The sexes in prosobranchs are separate, in some cases (Viviparidae) male and female can be distinguished by the size. In the male, a penis is situated at the base of right tentacle. The oviduct in the female is separated into visceral oviduct and pallial oviduct. In viviparids and thiarids the pallial oviduct serve as a brood pouch.

The pulmonates (non operculates) are provided with two pairs of tentacles (a single pair with eyes at base in Basommatophora), the posterior pair bear the eyes at the tips. The mantle cavity is fused with the neck region to produce a pulmonary sac replacing the gills.

Among the pulmonates, the slugs form a highly specialised group and occupy an unique position by virtue of their often being completely devoid of shells. This form has been adopted by several groups of molluscs obviously through parallel and perhaps convergent evolution. The slug family Veronicellidae is represented in West Bengal by a single genus *Laevicaulis*.

In pulmonates, the sexes are united (usually simultaneous hermaphrodites, some are protandrous) and mating is not always essential. The male and female organs have separate gonopores in Basommatophora and Solcolifera, the male opening being anterior in position, but common in Stylommatophora. The copulatory organs serve as important taxonomic characters in Planorbids and Veronicellids.

While the freshwater species usually lay eggs as a gelatinous mass; the terrestrial forms lay loose spherical eggs varying in numbers (e.g. *Lamellaxis gracile*) or sometimes the eggs are attached together in a gelatinous string (e.g. *Laevicaulis alte*). Some species (e.g. *Bellamya bengalensis*, *Thiara tuberculata*, *Glossula gemma*) produce young ones.

BIVALVIA

Bivalves chiefly differ from the gastropods in being completely enclosed in a shell that consists of two lateral valves. The valves are dorsally united by a hinge. The animal lacks a discernible head, the tentacles, the eyes, a buccal mass and the radula. The foot is typically an axe-shaped structure, but in a sedentary adaptation it becomes obsolete. Two siphons (one ventral and one dorsal) are present through which water is taken in and pumped out.

In the bivalves, the mouth is situated below the anterior adductor muscle; close to the mouth on both sides, the labial palp is present. The palps which are bilobed and ciliated, create water currents and guide food particles into the mouth. The water finally finds its way out through the intestine, rectum and the exhalant siphons.

Respiration in bivalves is carried out by help of paired gills. The structure of the gills varies and forms one of the important taxonomic characters.

Sexes are usually separate. Paired gonads are situated on either side of the intestine and open into the pallial cavity through the genital apertures. Fertilization and early developments take place in the branchial cavity, young ones are released as 'veliger' larva.

BIOECOLOGY

Freshwater molluscs inhabit all possible aquatic bodies like stagnant ponds, canals, lakes, streams, rivers and so on. Members of the families like Viviparidae, Lymnaeidae, Planorbidae etc. are the

typical stagnant water dwellers. Snails belonging to the families Neritidae, Thiariidae, Ancyliidae etc., inhabit rivers and streams. While gastropods mostly remain attached to vegetations, the bivalves remain partly buried in the sand mud.

Mainly restricted to humid situations the land molluscs abundantly occur under low vegetations, vegetable debris, dead leaves etc. in gardens, parks and on damp walls. A few species are known tree dwellers (e.g. *Indosuccinea semiserica*). While the plains of lower Bengal have their own fauna of land molluscs, the forest-clad hilly tracts of upper Bengal show their own fauna. Many genera of land operculates like *Alycaeus*, *Dioryx*, *Diplommata* etc., are restricted to Darjeeling in West Bengal.

In general, terrestrial molluscs are nocturnal and they hide during the day under the logs, rocks or in crevices.

Land and freshwater molluscs have to encounter an annual dry unfavourable season. They do this through aestivation. Most of the freshwater species bury themselves in the mud in order to tide over the situation. The capacity to avoid desiccation varies in different species. Land operculates aestivate by closing the operculum and pulmonates secrete thin membranaceous epithriagms to close themselves in. The slugs do so by burying inside the soil.

ECONOMICS

Quite a few species of freshwater molluscs are widely used as food in many parts of the state. Some of the snails like *Brotia costula*, *Bellamya bengalensis* etc., serve as a regular item for sale in many village markets. On the other hand, some of the common freshwater gastropods are notorious for their role as the intermediate hosts of trematode parasites spreading diseases in live stock and also in human being.

Achatina fulica fulcia, *Lamellaxis gracile*, *Macrochlamys indica* cause extensive damage to wide variety of crops and are implicated as pestiferous snails (Raut and Ghosh, 1984).

EARLIER REPORTS AND THE PRESENT WORK

West Bengal, with her varied ecological condition, offers an ideal habitat to a rich fauna of molluscs. But till date, no comprehensive taxonomic report dealing with the land and freshwater molluscs of the state in particular is available. Our knowledge on this group is still dependent upon the general accounts provided by Hanley and Theobald (1876) and the Fauna of British India : Mollusca, series by Blanford and Godwin-Austen (1908), Gude (1914, 1921) and Preston (1915) and a more recent brief report by Mitra and Dey (1977).

Some of the more common species of molluscs of this region have recently been biologically investigated. These include works like studies on population density of *Achatina fulica* and *Macrochlamys indica* in West Bengal, Raut (1979); besides authors like Subba Rao *et al.* (1980, 81) on the growth rate and fecundity of *Lamellaxis gracile*; Subba Rao *et al.* (1984) on growth rate of *Glossula gemma*; on the habit and habitat of *Indosuccinea semiserica*, Raut and Ghosh (1985); on the population density of *Glossula gemma*, Raut and Mitra (1985); and on the growth rate, population density etc. of *Thiara tuberculata* and *T. lineata*, Subba Rao and Mitra (1982).

The present work attempts to provide an up-to-date document on the land and freshwater molluscs of the lower Bengal, taking into account the recent changes made in the nomenclature and classification. It is based on the bulk of named and unnamed material present in the National

Zoological collection of Zoological Survey of India representing the districts of Calcutta, 24-Parganas (North and South), Medinipur, Hugli, Haora, Bankura, Murshidabad, Birbhum, Puruliya, Bardhaman and Nadia.

The classification followed here is that of Taylor and Sohl (1962) for gastropods and Newell (1965) for bivalves.

TOPOGRAPHY

Work of Maity (1983) and Bhowmick (1984) may be referred.

ABBREVIATIONS USED

Coll. - Collectors; ex. - examples(s); Is. - Islands; ZSI - Zoological Survey of India.

SYSTEMATIC ACCOUNT

A consolidated list of land and freshwater molluscs so far recorded from the areas mentioned above, is presented below. (*Species known from literature.)

A. FRESHWATER MOLLUSCS

Class GASTROPODA
Order ARCHEOGASTROPODA
Family NERITIDAE
Genus *Nerita* Lamarck

1. *Neritina smithi* Wood 2. *Neritina violacea* (Gmelin)

Genus *Clithon* Montfort

3. *Clithon reticularis* (Sowerby)

Genus *Septaria* Ferussac

4. *Septaria lineata* (Lamarck)

Order MESOGASTROPODA
Family VIVIPARIDAE
Genus *Bellamya* Jousseaume

5. *Bellamya bengalensis* f. *typica* (Lamarck); 6. *Bellamya bengalensis* phase *annandalei* (Kobelt); 7. *Bellamya bengalensis* race *doliaris* (Gould); 8. *Bellamya bengalensis* race *mandiensis* (Kobelt); 9. *Bellamya bengalensis* race *eburnea* (Annandale); 10. *Bellamya bengalensis* race *gigantea* (Reeve); 11. *Bellamya dissimilis* (Mueller); 12. *Bellamya crassa* (Benson).

Family PILIDAE
Genus *Pila* Roeding

13. *Pila globosa* (Swainson); 14. *Pila globosa* var. *incrassatula* (Nevill); 15. *Pila globosa* var. *minor* (Nevill).

Family BITHYNIIDAE
Genus *Digoniostoma* Annandale

16. *Digoniostoma pulchella* (Benson); 17. *Digoniostoma cerameopoma* (Benson).

Genus *Gabbia* Tryon

18. *Gabbia orcula* var. *production* (Nevill)

Family ASSIMINEIDAE
Genus *Assiminea* (Leach Flemming)

19. *Assiminea francessi* (Wood)

Family THIARIDAE
Genus *Thiara* Roeding

20. *Thiara* (*Thiara*) *scabra* (Mueller); 21. *Thiara* (*Melanoides*) *tuberculata* (Mueller); 22. *Thiara* (*Tarebia*) *lineatas* (Gray); 23. *Thiara* (*Tarebia*) *granifera* (Lamarck).

Genus *Brotia* H. Adams

24. *Brotia costula* (Rafinesque)

Order BASOMMATOPHORA
Family LYMNAEIDAE
Genus *Lymnaea* Lamarck

25. *Lymnaea* (*Pseudosuccinea*) *acuminata* f. *typica* (Lamarck); 26. *Lymnaea* (*Pseudosuccinea*) *acuminata* f. *gracilior* Martens; 27. *Lymnaea* (*Pseudosuccinea*) *acuminata* f. *patula* (Troschel); 28. *Lymnaea* (*Pseudosuccinea*) *acuminata* *rufescens* Gray; 29. *Lymnaea* (*Pseudosuccinea*) *acuminata* f. *chlamys* Benson; 30. *Lymnaea* (*Pseudosuccinea*) *luteola* f. *typica* Lamarck; 31. *Lymnaea* (*Pseudosuccinea*) *luteola* f. *australis* Annandale & Rao; 32. *Lymnaea* (*Pseudosuccinea*) *luteola* f. *ovalis* Gray; 33. *Lymnaea* (*Pseudosuccinea*) *luteola* f. *ovalis* Gray; * 33. *Lymnaea* (*Pseudosuccinea*) *luteola* f. *impura* Troschel.

Family PLANORBIDAE
Genus *Indoplanorbis* Ammandal & Rao

34. *Indoplanorbis exustus* (Deshayes);

Genus *Gyraulus* Charpentier

35. *Gyraulus convexiusculus* (Hutton); 36. *Gyraulus labiatus* (Benson); 37. *Gyraulus barrackporensis* (Clessin).

Genus *Segmentina* Flemming

*38. *Segmentina cantori* (Benson); *39. *Segmentina trochoides* (Benson).

Class BIVALVIA
Order ARCOIDA
Family ARCIDAE
Genus *Scaphula* Benson

40. *Scaphula celox* Benson; 41. *Scaphula deltae* Blanford.

Order UNIONOIDA
Family UNIONIDAE
Genus *Lamellidens* Simpson

42. *Lamellidens corrianus* (Lea); 43. *Lamellidens lamellatus* (Lea); 44. *Lamellidens marginalis* (Lamarck).

Genus *Parreysia* Conard

45. *Parreysia (Parreysia) corrugata* (Mueller); *46. *Parreysia (Parreysia) corrugata* var. *nagporensis* (Lea); 47. *Parreysia favidens* (Benson); 48. *Parreysia favidens* var. *deltae* (Benson); 49. *Parreysia favidens* var. *marcens* (Benson); 50. *Parreysia favidens* var. *plagiosoma* (Benson); 51. *Parreysia favidens* var. *viridula* (Benson); 52. *Parreysia rajahensis* (Lea); 53. *Parreysia sikkimensis* (Lea); 54. *Parreysia tavoyensis* var. *triembolus* (Benson); 55. *Parreysia (Radiatula) bonnaeudi* (Eydoux); 56. *Parreysia (Radiatula) caerulea* (Lea); 57. *Parreysia (Radiatula) gaudichaudi* (Eydoux); 58. *Parreysia (Radiatula) occata* (Lea); 59. *Parreysia (Radiatula) pachysoma* (Benson).

Order VENEROIDA
Family CORBICULIDAE
Genus *Corbicula* Megerle von Muehlfeld

60. *Corbicula striatella* Deshayes; 61. *Corbicula bensoni* Deshayes.

Genus *Polymesoda* Rafinesque

62. *Polymesoda (Geloia) bengalensis* (Lamarck).

Family PSIDIIDAE
Genus *Pisidium* Pfeiffer

63. *Pisidium clarckeanum* G. & H. Nevill.

Family CULTELLIDAE
Genus *Tanysiphon* Benson

64. *Tanysiphon rivalis* Benson.

Family SOLECURTIDAE
Genus *Novaculina* Benson

65. *Novaculina gangetica* Benson.

B. LAND MOLLUSCS

Class GASTROPODA
Order MESOGASTROPODA
Family CYCLOPHORIDAE
Genus *Cyclophorus* Montfort

66. *Cyclophorus* (*Lito stylus*) *polynema* (Pfeiffer)

Order STYLOMMATOPHORA
Family PUPILLIDAE
Genus *Pupilla* Turton

67. *Pupilla barraackporensis* Gude; *68. *Pupilla brevicostis* Gude

Family VERTIGINIDAE
Genus *Boysia* Pfeiffer

*69. *Boysia boysii* (Pfeiffer)

Family Valloniidae
Genus *Pupisoma* Stoliczka

70. *Pupisoma orcula* (Benson)

Family ENIDAE
Genus *Rachis* Albers

71. *Rachis bengalensis* Lamarck; *72. *Rachis praetermissus* (Blanford); *73. *Rachis punctatus* (Anton).

Family SUCCINEIDAE
Genus *Succinea* Draparnaud

74. *Succinea daucina* Pfeiffer; 75. *Succinea daucina* f. *hraswasikhara* Rao; 76. *Succinea crassinuclea* Pfeiffer; 77. *Succinea crassinuclea* f. *vitrea* Pfeiffer; *78. *Succinea hanleyi* Gude; 79. *Succinea snigdha* Rao; 80. *Succinea godivariana* f. *vangiya* Rao.

Genus *Quickia* Odhner

81. *Quickia bensoni* (Pfeiffer); *82. *Quickia* (*Burchella*) *calcuttensis* Patterson; 83. *Indosuccinea semiserica* (Gould); 84. *Indosuccinea semiserica* f. *sthulasiras* Rao.

Family GLESSULIDAE
Genus *Glessula* Von Martens

85. *Glessula gemma* (Reeve); *86. *Glessula gemma* var. *frumentum* (Reeve); *87. *Glessula notigena* (Benson); *88. *Glessula amentum* (Reeve); *89. *Glessula sarissa* (Reeve)

Family SUBBULINIDAE
Genus *Lamellaxis* Strebel

90. *Lamellaxis gracile* (Hutton)

Family ACHETINIDAE
Genus *Achatina* Lamarck

91. *Achantina (lassachatina) fulica fulica* (Bowdich)

Family STREPTAXIDAE
Genus *Gulella* Pfeiffer

92. *Gulella (Huttonella) bicolor* (Hutton)

Family ARIOPHANTIDAE
Genus *Ariophanta* Desmoulins

93. *Ariophanta interrupta* (Benson); 94. *Ariophanta laidlayana* (Benson).

Genus *Macrochlamys* Gray

*95. *Macrochlamys anonae* Godwin-Austen; *96. *Macrochlamys hardwickii* Godwin-Austen;
97. *Macrochlamys indica* Godwin-Austen; 98. *Macrochlamys petrosa* (Hutton).

Genus *Kaliella* Blanford

99. *Kaliella barrackporensis* Pfeiffer; *100. *Kaliella nana* Hutton

Genus *Cryptaustenia* Cockrell

101. *Cryptaustenia bensoni* (Pfeiffer); *102. *Cryptaustenia ovata* (Blanford); *103. *Cryptaustenia panchatensis* (Godwin-Austen)

Genus *Cryptozona* Moersch

*104. *Cryptozona (Nilgiri) semirugata* (Beck)

Genus *Sitala* H. Adams

105. *Sitala infula* (Benson)

Family TROCHOMORPHIDAE
Genus *Sivella* Blanford

106. *Sivella castra* (Benson)

Family CAMAENIDAE
Genus *Planispira* Beck

*107. *Planispira ruginosa* (Ferussac)

Family FRUTICICOLIDAE
Genus *Bradybaena* Beck

*108. *Bradybaena similis* (Ferussac)

Order SOLEOLIFERA
Family VERONICELLIDAE
Genus *Laevicaulis* Simroth

109. *Laevicaulis alte* (Ferussac)

A. FRESHWATER MOLLUSCS

Key to the Families

1. Shell with a single valve 2
Shell with two valves 9
2. Shell with an operculum 3
Shell without an operculum 8
3. Shell subglobular or subpatelliform, columellar area expanded, aperture ovate or subcircular...4
Shell globose or elongate, columellar area not expanded, aperture ovate or subcircular 4
4. Shell moderately large to large, last whorl more inflated, operculum with concentric growthlines 5
Shell small to moderately large, last whorl less inflated, operculum with spiral growthlines ...6
5. Shell large, globose, aperture ovate, operculum calcereous leaders PILIDAE
Shell moderately large, pyramidal, aperture subcircular operculum horny VIVIPARIDAE
6. Shell above 10 mm; sculpture distinct, animal with brood-pouch THIARIDAE
Shell below 10 mm, sculpture not distinct, animal without a brood-pouch 7
7. Shell with subangulate last whorl, aperture ovate, animal with eye at tip of the tentacle
.....ASSIMINEIDAE
Shell with rounded last whorl, aperture subcircular, animal with eye at base of tentacle
.....BITHYNIIDAE
8. Shell elongate with a distinct spire, columellar axis typically twisted LYMNAEIDAE
Shell discoisal, spire depressed, columellar axis not twisted PLANORBIDAE
9. Hinge margin with numerous small teeth ARCIDAE
10. Pallial sinus absent 11
Pallial sinus present 12
11. Shell small, thin, hinge curved PISIDIIDAE
Shell moderate to large, thick hinge not curved 12
Shell sub-rhomboid or transversely elongate without concentric striae, ligament internal.....
.....UNIONIDAE
12. Shell ovately trigonal, distinct concentric striae, ligament external CORBICULIDAE
Shell sub-rhomboid or transversely elongate without concentric striae, ligament internal.....
.....UNIONIDAE
13. Shell cylindrical, beak almost at anterior end SOLECUTIDAE
Shell elongate-ovate, beak in front of midline (not terminal) CULTELLIDAE

Order ARCHAEOGASTROPODA
Family NERITIDAE

Shell thick, small to moderately large, imperforate, usually globose, limpet like in some cases, spire short; aperture D shaped, columella flat and expanded, innerlip usually with dentition, operculum thick, sometimes with apophyses.

Marine, estuarine and freshwater in habit. World wide.

Key to the Genera

1. Shell symmetrical, cap-like, without whorls, aperture very wide, operculum not closing the aperture completely *Septeria* Ferussac
Shell asymmetrical with one or more whorls, aperture less wide, operculum closing the aperture completely 2
2. Shell smaller, pea-shaped, usually coarsely striate, sometimes with spines
..... *Clithon* Montfor
Shell comparatively bigger, usually smooth or finely striate *Neritina* Lamarck

Genus 1. *Neritina* Lamarck, 1816

Shell ovately rounded, very thick, with a strongly last whorl, operculum with a projection.
Asia, Africa, North and South America and Australia.

Key to the Species

- Spire and columellar projection comparatively better developed *N. Smithi* Wood
Spire and columellar projection poorly developed *N. violacea* (Gmelin)

1. *Neritina (Vittina) smithi* Wood

1828. *Neritina smithi*, Wood. *Index Test. Suppl.* p. 28, pl. 8, fig. 11.

Material examined : i) 3 exs., Pulta, Barrackpore, N. 24-Parganas 1937 (Coll. Pulta Survey Party)
ii) 2 exs., Falta, S. 24-Parganas (Coll. P. Roy Chowdhury) iii) 29 exs., Calcutta (Coll. ?)

Distribution : India : West Bengal (Gangetic estuary). Elsewhere : Burma.

Measurements (in mm) : Length : 20.00 Width : 17.40; Height of the aperture : 14.50

2. *Neritina (Dostia) violacea* (Gmelin)

1791. *Nerita violacea* Gmelin, *Syst. Nat.* ed. 13 : 3683, No. 68.

Material examined : i) ex., Kidderpore dock, Calcutta 15.3.63 ii) 6 exs., Bagbazar canal, Calcutta 16.3.63. (Coll N.V. Subba Rao and A Biswas) iii) 4 exs., Falta, S. 24-Parganas, 21.7.64 (Coll. P. Roy Chowdhury) iv) 7 exs., Lakhikantapur, S. 24-Parganas C. 22.7.64. (Coll. H.P. Mookherjee) v) 28 exs., Diamond Harbour, S. 24-Parganas, 28.10.65. vi) 9 exs., Frasergunj, S. 24-Parganas, 9.12.65 (Coll. K.V. Surya Rao.)

Distribution : Widely distributed. Range extends from India to New Caledonia and from South West Australia to South Japan.

Measurements (in mm) : Length : 29.80; Width : 31.50-19.60; Height of the aperture 8.70

Genus 2. *Clithon* Montfort, 1810

Small usually with striations, aperture narrower, columellar callous curved.

Asia, Australia.

3. *Clithon reticularis* (Sowerby)

1838. *Neritina reticularis* Sowerby, *Conch. Illus.*, no 51, fig. 44.

Material examined : i) ex., Pulta, Barrackpore, N. 24-Parganas 30.9.37 (Coll. Pulta Survey Party)
ii) 4exs. Diamond Harbour, S. 24-Parganas 17.6.64. (Coll. H.P. Mookherjee)

Distribution : India : West Bengal, Tamil Nadu.

Measurements (in mm) : Lrngth : 10.85 Width : 11.75 Height of the aperture : 8.50

Genus 3. *Septaria* Ferussac, 1807

Shell limpet like, without whorls, with a small apex and very wide aperture.

Indo Pacific.

4. *Septaria lineata* Lamarck

1816. *Navicella lineata* Lamarck, *Encyl. Meth. vers. Expl. planches*, pl. 456, fig. 2.

Material examined : i) ex., Sajnakhali, Sunderbans, S. 24-Parganas 27.4.61 (Coll. A. S. Rajagopal)
ii) 9 exs., Diamond Harbour, S. 24-Parganas 17.4.64 (Coll. N.V. Subba Rao) iii) 1 ex., Frasergunj, S. 24-Parganas, 9.12.65. (Coll. P. Roy Choudhury).

Distribution : India : West Bengal (S. 24 Parganas), Andaman and Nicobar Islands, Tamil Nadu.
Elsewhere : Sri Lanka, Indoneasa, Philippines, Fiji, Celebes, Malaccus, New Guinea.

Remarks : The shape of the shell in this species varies depending on the nature of substratum. Considerable colour variations are also shown by it.

Order MESOGASTROPODA

Family VIVIPARIDAE

Shell moderately large, elongately turbinate, narrowly perforate or imperforate, with inflated whorls (rarely keeled), usually without sculpture. Aperture subcircular, peristome simple, operculum thin. Right tentacle in male is short and curved ovoviviparous in nature.

Palaearctic, Ethiopian, Oriental, Australian and Nearctic regions.

Genus 4. *Bellamya* Jousseaume, 1886

Shell rather thin, smooth, with bands or with faint spiral striae, last whorl usually rounded, sometimes subangulate, operculum with a sublateral nucleus, closer to inner margin. Inhabitants of stagnant water with aquatic vegetations.

Of the three species of *Bellamya* occurring in West Bengal, shells of *B. bengalensis* show much variations. Basing on this number of forms have been named, 8 of which are recorded from

W. Bengal. These include two species (f. *pheostoma* and f. *canaliculata*) described by Nevill. The following forms have been indentified among the material studied.

Africa, Asia.

Key to the Species

1. Shell with distinct spiral bands *B. Bengalenris* Lamarck
Shell without spirals bands 2
2. Shell ovate, last whorl subangulate, imperforate *B. dissimilis* (Muller)
Shell sugblose, thicker, with subcanaliculate umbilicus *B. crassa* (Benson)

5. *Bellamya bengalensis* f. *typica* (Lamarck)

1822. *Paludina bengalensis* Lamarck, *Hist. nat. Anim. Sans. verb.*, 6(2) : 174.

1980. *Bellamya bengalensis* f. *typica* : Subba Rao, Das and Mitra, *Rec. zool. Surv. India*, 77 : 228.

Material examined : i) exs., Pond at Puruliya, 1926 (Coll. S.L. Hora) ii) 17 exs., Narkelbaagan, Tollyganj, Calcutta 21.6.62 iii) 50 exs., pond at Jadavpur, Calcutta 2.8.62 iv) 20 exs., Pond at Digha 19.9.79 (Coll. N.V. Subba Rao) v) 10 exs., Botanical Garden Shibpur, 4.3.63 (Coll. A.T. Biswas) vi) 20 exs., Patipukur Lake, DumDum, 21.2.64 vii) 23 exs., Barisa, 24.3.64 viii) 3 exs., Lakhikantapur, S. 24-Parganas, 10.8.65 (Coll. P. Roy Chowdhury) ix) 5 exs., Kakdwip, S. 24-Parganas, 11.11.65. (Coll. K.V. Surya Rao) x) 7 exs., Kalyani, Nadia, 11.11.65 (Coll. H.P. Mookherjee) xi) 3 exs., Bankura, 31.5.71 8 exs., Pond near Medinipore 1971 (Coll. S Khara) xii) 12 exs., Konnagar, Hugli 30.5.78 Coll. A. Dey.

Distribution : India : Common through. Elsewhere : Bangladesh, Burma, Sri Lanka.

Remarks : Shell ovately conoid with acuminate spire, whorls strongly inflated, last whorl broader than high, sutures impressed, aperture semicircular.

The two varieties, *pheostoma* and *canaliculata* described by Nevill from Calcutta and Raniganje respectively, are known by their Holotypes only and have no subsequent records. The shells closely agree with the typical forms, while *pheostoma* has a black lip, the sutures in form *canaliculata* are a little canaliculate. We have not been able to examine fresh material however, they may actually belong to the typical form.

Measurements (in mm) : Length : 14.40-34.85; Width : 7.80-24.25; Height of the aperture : 5.70-18.35

6. *Phase annandalei* (Kobelt)

1908. *Vivipara annandalei* Kobelt, *Malak. Ges.* 60 : 161.

Material examined : i) 6 exs., Nabadwip, Nadia, 28.3.37 (Coll. ?) ii) 25 exs., Pulta, Barrackpore, N. 24-Parganas, 1937 (Coll. Pulta Survey Party) iii) 6 exs., Tollygunj, Calcutta 27.6.62 (Coll. N.V. Subba Rao) iv) exs., Garia, 29.6.62 v) 13 exs., Habra, N. 24-Parganas, 20.12.63 vi) exs., Rabindra Sarobar, Calcutta 22.5.64 (Coll. P. Roy Chowdhury) vii) 7 exs., Shibpur, Haora, 11.11.64 (Coll. K.K. Tiwari) viii) 12 exs., Behala, Calcutta 25.6.65 (Coll. H.P. Mookherjee) ix) 11 exs., Konnagar, Hugli, 5.11.80 (Coll. S.C. Mitra and A. Dey)

Distribution : India : West Bengal (Calcutta, N. 24 Parganas Hugli) Andhra Pradesh, Tamil Nadu.

Remarks : Shell thinner, whorls gradually increasing, less rounded and with rather straight sides, sutures shallow.

Measurements (in mm) : Length : 14.58-31.45; Width : 10.70-19.25; Height of the aperture : 7.75-14.50.

7. race *doliaris* (Gould)

1843. *Paludina doliaris* Gould, *Proc. Boston Soc. nat. Hist.*, 1 : 144.

Material examined : i) 13 exs., Scrampore Hugli, 1931 (Coll Pulta Survey Party) ii) exs., Pulta Barrackpore, N. 24-Parganas 1937 iii) 17 exs., Shibpur, Haora, 1964 iv) 9 exs., Barisa, Calcutta 24.3.64 (Coll P. Roy Chowdhury) v) 2 exs., Kakdwip, S. 24-Parganas 11.11.65 (Coll. K.V. Surya Rao) vii) 4 exs. Lakhikantapur, S. 24-Parganas (Coll. H.P. Mookherjee) viii) 9 exs., Pond near Dak Bunglow, Puruliya, 30.5.71 (Coll. S. Khara) ix) exs., Rampurhat, Birbhum, (Coll. D.K. Thakur and A. Dey) x) 5 exs., Rampurhat, Murshidabad (Coll. Capt. Lloyd).

Distribution : India : West Bengal, (N. 24 Parganas, S. 24-Parganas, Birbhum, Hugli, Murshidabad, Puruliya), Maharashtra.

Remarks : Shell smaller and more conical, last whorl distinctly biangulate.

Measurements (in mm) : Length : 12.60-21.35; Width : 9.00-14.75; Height of the aperture : 7.50-11.35

8. race *eburnea* (Annandale)

1921. *Viviparus bengalensis* race *eburnea* Annandale, *Rec. Indian Mus.*, 22 : 274, pl. 2, figs x 1 & 2.

Material examined : i) 8 exs., Uttarpara Hugli, 16.9.64 ii) 10 exs., Budge-Budge, S. 24-Parganas, 19.10.65 (Coll P. Roy Chowdhury) iii) exs., Pond near Dak Bunglow, Puruliya 30.5.71 (Coll. S. Khara).

Distribution : India : West Bengal (Hugli, S. 24 Parganas, Puruliya), Andhra Pradesh, Orissa.

Remarks : Shell narrow with smaller aperture, whorls much less inflated with distinct flattening below the sutures.

Measurements (in mm) : Length : 27.70; Width : 18.25; Height of the aperture : 14.70.

9. race *gigantea* (Reeve)

1862. *Paludina gigantea* (von dem Bush MSS) Reeve, *Conch. Icon.*, 14, *Paludina*, pl. 12, fig. 7.

Material examined : i) 1 ex., Port Canning, S. 24-Parganas ii) exs., Kalyani, Nadia, 11.11.65 (Coll. H.P. Mookherjee) iii) 3 exs., Ranigung, Bardhaman, (Coll. F. Stoliczka)

Distribution : India : West Bengal (S. 24 Parganas, Nadia, Bardhaman), Bihar, Rajasthan.

Remarks : Most of the shells examined appear to be young, but with typical large, subcircular aperture, wide umbilicus, deep sutures and prominent spiral bands.

Measurements (in mm) : Length : 47.83; Width : 30.72; Height of the aperture 22.00.

10. race *Mandiensis* (Kobelt)

1909. *Viviparus bengalensis* var. *mandiensis* Kobelt, in Martini Chemnitz, *Conch. Cab.* 2 : 414, pl. 77, figs. 8-9.

Material examined : i) 2 exs., Barrackpore, N. 24-Parganas 25.6.37 (Coll. Pulta Survey Party) ii) exs., Uttarpara, Hugli, 16.9.64 (Coll. P. Roy Chowdhury) iii) 14 exs., Pond at Brahman Sasan, Medinipur, 3.6.71 (Coll. S. Khera) iv) 3 exs., Ranaghat, Nadia, (Coll. A.K. Das)

Distribution : India : West Bengal (Hugli, Medinipur, Nadia, N. 24 Parganas), Bihar, Gujarat, Madhya Pradesh, Punjab, Rajasthan, Uttar Pradesh.

Remarks : Shell resembles that of *anandalei*, differs in being thinner, paler and more conical in shape with a proportionately broader last whorl.

Measurements (in mm) : Length : 21.22-29.50; Width : 17.30-23.24; Height of the aperture : 11.75-16.00

11. *bellamya dissimilis* (Mueller)

1774. *Nerita dissimilis* Mueller, *Hist. Verm. Test.*, 2 : 184.

Material examined : i) 9 exs., Uttarpara, 1961 ii) exs., Sibpur, 1961 (Coll. P. Roy Chowdhury) iii) 9 exs., Kalyani, Nadia, 11.11.65 (Coll. H.P. Mookherjee) iv) 11 exs., Puruliya (Coll. S. Khera) v) 12 exs., Konnagar, Hugli, 1980 (Coll. S.C. Mitra and A. Devy) vi) 7 exs., Narainpur, Murshidabad vii) 3 exs., Kakdwip, S. 24-Parganas viii) 5 exs., Port Canning S. 24-Parganas ix) 4 exs., Sunderbans, S. 24-Parganas x) 5 exs., Dum Dum, Calcutta, (Coll. J. Robertson) ix) 9 exs., Kharagpur, Medinipur, xii) 21 exs., Calcutta xiii) 9 exs., Patipukur Calcutta (Coll. F. Stoliczka).

Distribution : India : Common throughout. Elsewhere : Bangladesh, Burma, Pakistan, Malaysia, Sri Lanka.

Remarks : Shell greenish, broadly ovate, last whorl rather indistinctly angulate, sculptured by very fine microscopic spiral striae, peristome blackish.

Measurement (in mm) : Length : 10.90-36.00; Width : 9.50-17.90 Height of the aperture : 7.00-12.85

12. *Bellamya crassa* (Benson)

1836. *Paludina crassa* Benson, *J. Asiat. Soc. Beng.*, 745, (refers to Hutton's MSS).

Material examined : i) 5 exs., Churni river, Ranaghat, Nadia (Coll. A.K. Das)

Distribution : India : West Bengal (Nadia), Assam, Gujarat, Karnataka, Orissa, Uttar Pradesh.

Remarks : Shell thick, yellowish-green, with fine transverse, striations, spire short, apex bluent, umbilical opening prominent, suture deep, often canaliculate.

This species is reported to be burrowing in mud or sand in shallow waters, often in groups (Preston, 1915).

Measurement (in mm) : Length : 19.35; Width : 15.81 Height of the aperture : 12.55

Family PILIDAE

Shell moderately large to very large, more or less globosely turbate, usually dextral, with a large, ovate aperture, perforate or imperforate, operculum concentric and rather thin, except in the genus *Pila*.

Asia, Africa and North and South America.

Genus 5. *Pila* (Bolten) Roeding, 1798

Shell large to very large, usually dextral, inflated, globose, spire little raised, usually smooth, aperture rather large but not much expanded, outer lip a little thickened, umbilicus subcanaliculate, operculum calcareous, with a lateral nucleus, placed on the columellar side.

Inhabits ponds, canals, rice fields swamps etc. with aquatic weeds.

South West Asia and Africa.

13. *Pila globosa* (Swainson)

1822. *Ampullaria globosa* Swainson, *zool. Illust.*, 2 (1) : pl..

Pila globosa : Prashad, 1925. *Mem. Indian Mus.*, 8 : 70, pl 13, figs., 1-7.

Material examined : i) 5 exs., Nalhati, Birbhum, 193 ii) 3 exs., Nabadwip, Nadia, 28.3.37 iii) 6 exs., Patipukur, Calcutta iv) 19 exs., Bandel Hugli v) 6 exs., Alambazar, Birbhum (Coll ?) vi) 5 exs., Garia, S. 24-Parganas 8.8.62 (Coll. N.V. Subba Rao) vii) 36 exs., Gobra, S. Calcutta, 6.9.62 (Coll. A. Mukherjee) viii) 10 exs., Barisa, Calcutta, 24.3.64 ix) 17 exs., Lakhikantapur, S. 24-Parganas, (Coll. P. Roy Chowdhury) x) 18 exs., Thakurpukur, 13.8.64 xi) 3 exs., Kakdwip, S. 24-Parganas, 11.11.65 (Coll. K.V. Surya Rao) xii) 5 exs., Rabindra Sarovar, Calcutta 8.10.65 (Coll. R.N. Mukherjee) xiii) 10 exs., Bardhaman 9.8.67 (Coll. A.K. Das) xiv) 4 exs., Bankura xv) 8 exs., Bramhan Sasan, Medinipur (Coll. S. Khera) svi) 5 exs., Narainpur, Murshidabad (Coll. J. Robertson) xvii) 12 exs., Konnagar, Hugli 17.9.81 (Coll. A Dey)

Distribution : Throughout India except southern India and Punjab.

Remarks : This is a very common freshwater snail of West Bengal. This inhabits all freshwater bodies including drains, canals, wet fields etc.

Shell in this species shows remarkable variation in shape and elevation of the spire and also in the form of last whorl. However, the following two varieties are constant and have been recognised by Prashad (1925).

Measurements (in mm) : Length : 11.00-56.20; Width : 9.50-45.40; Height of the aperture : 9.00-36.35

14. var. *incrassatula* (Nevill)

1877. *Ampullaria globosa* var. *incrassatula* Nevill, *Hand list Moll. Indian Mus.*, part. 2 : 4.

Material examined : 1) 1 exs., (Holotype), Dum-Dum, Calcutta (Coll. G.H. Nevill) ii) 13 exs., Konnagar, Hugli, 12.9.79 (Coll. A. Dey)

Distribution : India : West Bengal (Calcutta, Hugli).

Remarks : It differs from typical form in having smaller shells with more produced spire and narrower umbilical opening.

Measurements (in mm) : Length : 31.95; Width : 27.50; Height of the aperture : 20.80.

15. var. *minor* (Nevill)

1877. *Ampullaria globosa* var. *minor* Nevill, *Hand list Moll. Indian Mus.*, pt. 2 : 4.

Material examined : i) 3 exs., (Syntypes) Dum Dum, Calcutta (Coll. Major Welmer) ii) 7 exs., Falta, S. 24-Parganas (Coll. P. Roy Chowdhury) iii) 6 exs., Sonarpur, S. 24-Parganas, 12.1.65 (Coll. H.P. Mookherjee).

Distribution : India : West Bengal (Calcutta, S. 24 Parganas).

Remarks : We have examined fresh collections of this variety from Sonarpur and Falta (S. 24-Parganas). These shells agree well with the type. The shells are thin with chocolate bands inside the mouth.

Measurements (in mm) : Length : 33.10; Width : 27.55; Height of the aperture : 22.50.

Family BITHYNIIDAE

Shell small, thin, usually smooth, imperforate or narrowly perforate, conical or fusiform, aperture small, peristome sometimes thickened. Operculum concentric with a subcentral nucleus.

Inhabits ponds etc. with submerged vegetations but also found in slow moving canals with muddy substratum.

Asia, Africa, Australia, Europe and North America.

Key to The Genera

Shell comparatively more elongate outer lip slightly thickened, umbilicus usually with an oblique channel *Digoniostoma* Anandale

Shell smaller, subglobose, outer lip thin, umbilicus usually closed..... *Gabbia* Tryon

Genus 6. *Digoniostoma* Anandale, 1920

Shell small, ovate, perforate, umbilicus usually with a channel running below, outer lip slightly thickened, angulate at inner extremity, operculum thin with a more or less central nucleus.

India, Burma, South China, Malaya Penninsuls, New Guinea and Philippines.

Key to the Species

Shell ovately conical, narrowly perforate with indistinct channel, lip at base of columella angulate but not reflexed *D. pulchella* (Benson)

Shell ovate-oblong, deeply umbilicate with distinct oblique channel, lip at base of columella strongly reflexed *D. cerameopoma* (Benson)

16. *Digoniostoma pulchella* (Benson)

1836. *Paludina pulchella* Benson, *J. Asiat. Soc. Beng.*, 5 : 746, (refers to No. 9 *Valvata* ? Hutton, *J. Asiat. Soc. Beng.*, 3: 90).

1921. *Digoniostoma pulchella* : Anandale, *Rec. Indian Mus.* 22 : 541.

Material examined : i) 25 exs., Rabindra Sarobar, Calcutta 22.5.6 (Coll. P. Roy Chowdhury) ii) 8 exs., Sibpur, (Haora) 1964 (Coll. A.T. Biswas) iii) 7 exs., Bandel, Hugli 1962 iv) 7 exs., Kidderpore (Coll. N.V. Subba Rao) v) 89 exs., Pond opp. Park St., Calcutta, 17.12.63 (Coll. N.V. Subba Rao) vi) 21 exs., Bardhaman, 9.8.63 (Coll. A.K. Das) vii) 63 exs., Port Canning, S. 24-Parganas, 10.3.65, viii) 12 exs., Kalyani, Nadia, 11.11.65 (Coll. H.P. Mookherjee) ix) 13 exs., Bankura, May, 1971 (Coll. S. Khara).

Distribution : India : Common throughout. Elsewhere : Burma, Malaya Penninsula.

Remark : Shell elongate, subumbilicate, spire conical, whorls rounded, sutures impressed, aperture oval.

Measurements (in mm) : Length 3.50-6.00; Width : 3.00-4.25; Height of the aperture : 1.48-2.50.

17. *Digoniostoma cerameopoma* (Benson)

1830. *Paludina cerameopoma* Benson, *Gleaning in Since*, 2 : 15.

Material examined : i) 10 exs., Berhampur, Murshidabad, 3.1.08 Coll. ? ii) 11 exs., Dakshineswar, 29.3.63 (Coll. N.V. Subba Rao) iii) 21 exs., Maniktala Lake area, 11.2.64 iv) 20 exs., Patipukur, Dum Dum, 21.2.64 v) exs., Barrackpore, 22.2.64 vi) 75 exs., Shibpur Haora, 1964 (Coll. P. Roy Chowdhury) vii) 20 exs., Garia, S. 24-Parganas, 16.9.64 (Coll. K.P. Singh) viii) 15 exs., Uttarpara, Hugli 16.9.64 (Coll. K.N. Nair).

Distribution : India : West Bengal (Calcutta, Haora, Hugli, N. 24-Parganas), Assam, Bihar, Madhya Pradesh, Punjab, Rajasthan. Elsewhere : Pakistan.

Remarks : Shell ovate-onlong, with blunt apex, last whorl proportionately larger in comparison to that in *D. pulchella*, umbilicus distinctly open, outer lip reflected.

We have examined a few examples of this species collected from Maniktala, Calcutta, which are uniformly larger in size. Largest of this lot has 6 whorls and measures 12.03 mm in length and 7.17 mm in width. Possibly these are the forms named by Nevill (1884) as var. *gigantea* from Calcutta and also referred to by Preston (1915).

Measurement (in mm) : Length : 9.00-12.03; Width : 6.75-7.17; Height of the aperture : 5.00-5.75.

Genus 7. *Gabbia* Tryon

Shell small, subglobose to globose, imperforate or subperforate, whorls perfectly rounded, sutures deep and straight, aperture ovately circular, outer lip thin, operculum thin with a basal nucleus.

India, Australia, Africa and Mesopotamia.

18. *Gabbia orcula* var. *producta* (Nevill)

1877. *Bythinia orcula* var. *producta* Nevill, *Hand list Moll. India* pt. 2 : 37.

1963. *Alocinma orcula* var. *producta* : Ray and Mukherjee, *Rec. zool. Surv. India*, 61 : 420, pl. 19 figs. 1, 1a.

Material examined : i) 111 exs., Rabindra Sarobar, Calcutta, 21.6.62, ii) 2 exs., Tollygunj, Calcutta, 21.6.62, iii) 36 exs., Shibpur, Haora, 4.3.63. (Coll. A.T. Biswas) iv) 73 exs., Habra, N. 24-Parganas, 25.2.65, v) 192 exs., Lakhikantapur, S. 24-Parganas, 18.8.65, (Coll. K.P. Singh) vi) 9 exs., Chandannagar, 14.12.65 (Coll. V.D. Srivastava) vii) 21 exs., Puruliya, 29.6.71, (Coll. S. Khera) viii) 20 exs., Konnagar, Hugli, (Coll. S. Barua) ix) 17 exs., Rampurhat, Birbhum (Coll. D.K. Thakur and A. Dey) x) 26 exs., Narainpur, Murshidabad (Coll. J. Robertson) xi) 7 exs., Ranaghat, Nadia, (Coll. A.K. Das) xii) 1 exs., Bankura (Coll ?) xiii) 8 exs., Pond at Digha Coll. A. Dey and S. Barua.

Distribution : India : West Bengal (Calcutta, N. & S. 24 Parganas, Bankura, Birbhum, Hugli, Medinipur, Nadia, Purulia). Assam, Bihar, Maharashtra, Punjab, Rajasthan.

Remarks : This variety is distinguished from the typical form by its narrower and more elongated shell.

Measurement (in mm) : Length : 4.85-6.20; Width : 3.80-4.60; Height of the aperture : 2.80-3.00

Family ASSIMINEIDAE

Shell small (upto 10 mm), subglobose to conical, perforate to deeply umbilicate, sometimes with a keel around umbilicus, usually smooth, aperture ovately rounded, angular above, operculum horny.

Genus 8. *Assiminea* (Leach) Flemming, 1882

Shell perforate, usually smooth, sometimes, with bands, operculum thin, nucleus sub-lateral.

Inhabits estuarine water, (except *A. francessi*, which is near freshwater in habit) abounding on exposed mud-flats, extends upto midwater mark.

19. *Assiminea francessi* (Wood)

1828. *Turbo francisoi* Gray, in Wood's Index Test. Suppl. taf 6, fig. 28.

Material examined : i) 33 exs., Hugli river bank, Konnagar, Hugli, 1971. ii) 15 exs., Bathing Ghat at Dakshineswar, N. 24-Parganas (Coll. H.P. Mookherjee) iii) 2 exs., Bank of river, Sagar island, S. 24-Parganas Sept., 1980 (Coll. K.V. Surya Rao) iv) 23 exs., Outram ghat, Calcutta, 1980. (Coll. S. Maitra and S. Barua)

Distribution : India : West Bengal (Calcutta, N. & S. 24-Parganas). Elsewhere : Burma, Bangladesh.

Remarks : Shell elongate, apex pointed, whorls seven, rapidly increasing in width; aperture oblique, ovate.

It is the only species of *Assiminea*, which is freshwater in habit. It occurs in ponds, canals having link with the Hugli river and extends as far north as Bandel.

Measurements : (in mm) : Length : 6.80-8.80; Width : 4.10-5.00; Height of the aperture : 3.15-4.10

Family THIARIDAE

Shell thick, small to large, ovately conical to elongate-turreted, imperforate, whorls rounded, variously sculptured with axial ribs, ridges, nodules, tubercles etc., aperture ovate, sometimes with a groove or canal below, operculum corneous, multispiral.

Inhabits stagnant or slow moving waters.

Tropical to temperate regions. Asia, Africa, Central and South America, islands of the Pacific and Caribbean Sea.

Key to the Genera

Shell larger, broader, operculum round, multispiral, with a Central nucleus*Brotia* H. Adams.

Shell smaller, narrower, operculum pear shaped, few whorled with a basal nucleus.....

..... *Thiara* Roeding

Genus 9. *Thiara* Rodding, 1798

Shell moderately large (upto 5 cms), variously sculptured with striae, nodules usually with spines, aperture ovate, without canals or grooves, operculum thin, angulate above with a basal nucleus.

Tropical, subtropical Asia and Africa, extending as far north as Formosa and the Ryu Kyu islands and to South upto N. Australia.

Key to Subgenera

1. Shell pagoda like, spire descending in regular steps, with spines *Thiara* s. str.
Shell more elongated, spire evenly descending, without spines 2
2. Shell with more number of whorls (upto 12), crisscrossing striae giving a tubercled appearance *Melanoides* Oliver
3. Shell with less number of whorls (upto 9), crisscrossing ridges giving a granular appearance *Tarebia* H. & A. Adams

Subgenus *Thiara* s. st.20. *Thiara (Thiara) scabra* (Mueller)

1774. *Buccinum scabra* Mueller, *Verm. Terr. Fluv. Hist.*, 2 : 126.

1973. *Thiara (Thiara) scabra* : Pace, *Malacological Review Suppl.*, 1: 52, pl. 12, figs. 1, 2.

Material examined : i) 147 exs., Pulta, Barrackpore, N. 24-Parganas, 1937 (Coll. Pulta Survey Party) ii) 43 exs., Tollygunj, Calcutta, 21.6.62 (Coll. N.V. Subba Rao) iii) 8 exs., Bandel, Hugli, 1962 (Coll. A.T. Biswas) iv) 17 exs., Bramhan Sasan, Medinipur, 1971 (Coll. S. Khera) v) 2 exs., Konnagar, Hugli 1979 (Coll. S.C. Mitra and A. Dey) vi) 13 exs., Bardhaman, (Coll. A.K. Das) vii) 1 exs., Behala, Calcutta (Coll. ?).

Distribution : India : West Bengal (Calcutta, Bardhaman, Hugli, Medinipur, N. 24 Parganas), Kerala, Madhya Pradesh, Maharashtra, Pondicherry, Tamil Nadu. Elsewhere : Indonesia, Java, Mauritius, Seychelles, Timor.

Remarks : Shell short and broad, whorls angularly shouldered at the upper part, rows of spines present on the whorls.

Measurements : (in mm) : Length : 15.40-27.25; Width : 8.30-14.90; Height of the aperture : 8.30-13.25.

Subgenus *Melanoides* Oliver, 180721. *Thiara (Melanoides) tuberculata* (Mueller)

1774. *Nerita tuberculata* Mueller, *Verm. Terr. Fluv. Hist.*, 2 : 91.

1976. *Melanoides (Melanoides) tuberculata* : Starmuchlar, *Ann. Natur. Hist. Mus. Wien*, 80 : 591.

Material examined : i) 2 exs., Nalhati, Birbhum, 1931 (Coll. S. Rebeiro) ii) 88 exs., Pulta, Barrackpore, N. 24-Parganas, 1937 (Coll. Pulta Survey Party) iii) 9 exs., Rabindra Sarobar, Calcutta, 22.5.62 iv) 22 exs., Barisa, Calcutta, 14.3.64 (Coll. P. Roy Chowdhury) vi) 19 exs., Tollygunj, Calcutta, 21.6.62 (Coll. N.V. Subba Rao) vi) 3 exs., Bagbazar, Calcutta, 9.1.63 (Coll. A.T. Biswas) vii) 22 exs., Uttarpara, Hugli, 19.9.63 (Coll. H.P. Mookherjee) viii) 13 exs., Bardhaman 9.8.65 (Coll. A.K. Das) ix) 6 exs., Puruliya, 26.6.71 x) exs., Bankura, 1971 (Coll. S. Khera) xi) 16 exs., Konnagar,

Hugli, 12.7.79 (Coll. S.C. Mitra and A. Dey) xii) 7 exs., Kakdwip, S. 24-Parganas, 11.11.65 (Coll. K.V. Surya Rao) xiii) 18 Kidderpore, Calcutta, 15.3.68 xiv) 14 exs., Shibpur, Haora, 24.3.68 (Coll ?)

Distribution : India : Widely distributed. Elsewhere : North Africa, Pacific Islands, Australia, China.

Remarks : Shell narrowly elongate with rounded whorls, sculptured with varical ribs and spiral striae.

It abundantly occurs in ponds, tanks, canal,s drains, even in water mains and occupies as varied habitats as low saline water near sea level to freshwater at 1600 meters altitude (Jutting, 1956).

Measurement (in mm) : Length : 15.75-30.40

Subgenus *Tarebia* H. and A. Adomes, 1854

Key to the Species of Subgenus

Shell narrower with spiral rows of noudles.....*T granifera* (Lamarck)

Shell broader with raised spiral lines.....*T lineata* (Gray)

22. *Thiara (Tarebia) lineata* (Gray)

1828. *Helix lineatus* Gray, in Wood's Index Test. Suppl. fig. 68.

1915. *Thiara (Tarebia) lineata* : Preston, *Fauna British India, Molluscs* (Freshwater gastropoda & Pelecypoda) : 34.

Material examined : i) 17 exs., Pond near Jodhpur Park, Calcutta 21.6.62 ii) 150 exs., Tollygunj, Calcutta, 22.5.65 iii) 118 exs., Eden Garden, Calcutta, 5.2.63 (Coll. N.V. Subba Rao) iv) 3 exs., Shibpur, Haora, 4.3.63 v) 76 exs., Sonarpur, S. 24-Parganas, 8.8.65, vi) 148 exs., Rabindra Sarobar, Calcutta, 22.5.65 vii) 14 exs., Lakshmikantapur, S. 24-Parganas, 10.8.65 (Coll. P. Roy Chowdhury) viii) 76 exs., Shibpur, Haora, 19.9.64 ix) 47 exs., Uttarpara, Hugli 21.9.64 (Coll. A.T. Biswas) x) 37 exs., Kakdwip, S. 24-Parganas, 11.11.65 (Coll. K.V. Surya Rao) xi) 3 exs., Nadia xii) exs., Ranigunj, Barddhaman (Coll. F. Stoliczka)

Distribution : India : West Bengal (Barddhaman, Calcutta, Haora, Hugli, Nadia, N. & S. 24 Parganas), Assam, Bihar, Madhya Pradesh, Maharashtra, Orissa, Uttar Pradesh. Elsewhere : Bhutan, Burma, Sri Lanka.

Remarks : Biocological studies of this species, including brood pouch count, population, growth rate etc. were made by Subba Rao and Mitra (1982).

Shell broad with dark, raised spiral lines.

Measurements (in mm) : Length : 11.0-28.50; Width : 4.20-12.00; Height of the aperture : 4.50-13.00.

Subgenus *Tarebia* H. and A. Adams, 1854

23. *Thiara (Tarbia) granifera* (Lamarck)

1822. *Melania granifera* Lamarck, *Ilist. nat. Anim. Sans. Vert*, 6 (2) : 167.

Material examined : i) 4 exs., Nalhati, Birbhum, 23.11.31 (Coll. S. Ribeiro) ii) 25 exs., Pulta, Barrackpore, N. 24-Parganas, 19.9.38 (Coll. Pulta Survey Party) iii) 7 exs., I.S.I. compound, N. Calcutta

(Coll. Alex Comfort) iv) 60 exs., Rabindra Sarovar, Calcutta, 22.5.62 (Coll. P. Roy Chowdhury v) 10 exs., Uttarpara, Hugli, 16.9.64 (Coll. ?) vi) 21 exs., Pond at Daksineswar, N. 24-Parganas 29.3.63 (Coll. N.V. Subba Rao) vii) 6 exs., Puruliya, 30.5.71 (Coll. S. Khera) viii) 20 exs., Ranaghat, Nadia (Coll. A.K. Das).

Distribution : India : West Bengal (Birbhum, Calcutta, Hugli, Nadia, Puruliya, N. 24-Parganas), Andaman and Nicobar Islands, Bihar, Madhya Pradesh. Elsewhere : Burma, Malagasy, Malaysia, Philippines, Formosa and Pacific Islands.

Remarks : This is distinguished from the preceeding species by its narrower and glandular shell.

Measurements (in mm) : Length : 13.25-2.00; Widths : 5.50-8.20; Height of the aperture : 5.40-8.30

Genus 10. *Brotia* H. Adams, 1866

Shell large, strongly sculptured with prominent axial ribs, often with spinous outgrowths, operculum circular with a central nucleus.

Distribution : India, Malaya Archipelago and Phillippines.

24. *Brotia costula* (Rafinesque, 1833)

1833. *Melania costula* Rafinesque, *Atlantic J.*, p. 166.

1836. *Melania variabilis* Benson, *J. Asiat. soc. Beng.*, 5 : 746.

1956. *Brotia costula* : von Benthem Jutting, *Treubia*, 23 (2) : 374, fig. 76.

Material examined : i) 20 exs., Eden Gardens, Calcutta, 5.2.62 (Coll. N.V. Subba Rao) ii) 4 exs., Tollygunj, Calcutta, 21.6.62 (Coll. P. Roy Chowdhury) iii) 6 exs., Uttarpara, Huglie, 5.9.64 (Coll. ?) iv) 5 exs., Diamond Harbour, S. 24-Parganas, 11.11.65 (Coll. K.V. Surya Rao) v) 50 exs., Bagher Khal, S. 24-Parganas, 10.5.82 (Coll. A. Dey).

Distribution : India : West Bengal (Calcutta, Huglie, N. & S. 24 Parganas), Assam, Manipur, Meghalaya, Uttar Pradesh, Elsewhere : Bhutan, Burma, Pakistan Sumatra.

Remarks : Elongately turreted, whorls 12-14 with spiral nodulose ridges, and prominent axial ribs sometimes with spines. This species shows remarkable variations in shell characters resulting in a large number of varieties and subvarieties being named by different authors. Five different varieties, namely *cincta* (Hanley & Theobald), *echineta* (Hanley and Theobald), *subspinosa* (Nevill), *menkeana* (Lea) and *subtuberculata* (Nevill) are recorded from W. Bengal. However as Annadale (1921), remarked, these varieties are by no means constant.

Measurements (in mm) : Length : 21.75-49.25; Width : 9.7-22.65; Height of the aperture : 9.3-20.65

Material examined : i) 11 exs., Rabindra Sarobar, Calcutta, 21.6.62 (Coll. A.T. Biswas) ii) 2 exs., Tollygunj, Calcutta, 21.6.62

Order BASOMMATOPHORA

Family LYMNÆIDAE

Shell moderately large, thin, ovate-oblong, spire more or less pointed, aperture variable but usually wide, columellar axis distinctly twisted.

Inhabits stagnant waters with vegetation.

World-wide.

Genus 11. *Lymnaea* Lamarck, 1911

Shell ovate or pyramidal, thin and light with a large strongly inflated lastwhorl, spire pointed, columella spirally twisted.

Key to the Species

Spire comparatively shorter but more acuminate, outer lip widely expanded
*L. acuminata* (Lamarck)
 Spire comparatively large, less acuminate, outer lip more or less straight (not expanded)
*L. luteola* (Lamarck)

Basing on variations in shell characters a large number of forms have been described under both the species. The following forms have been identified among the material studied.

25. *Lymnaea (Pseudosuccinea) acuminata* f. *typica* Lamarck

1822. *Limnaea acuminata* Lamarck, *Hist. nat. Anim. Sans. Vert.*, 6 (2) : 160.

1925. *Limnaea acuminata* : Annandale & Rao, *Rec. Indian Mus.*, 27 : 177.

Material examined : i) 22 exs., Puruliya, 1926 (Coll. S.L. Hora) ii) 4 exs., Nalhati, Birbhum, 23.11.31 (Coll. S. Ribeiro) iii) 26 exs., Shibpur, Haora, 4.3.62 iv) 12 exs., Dum Dum, Calcutta, 15.2.64 (Coll. P. Roy Chowdhury) v) 72 exs., Kiddrepore, Calcutta, 15.3.63 (Coll. N.V. Suba Rao) vi) 21 exs., Tollygunj, Calcutta, 1965 vii) 7 exs., Konnagar Medinipore 1.6.71 x) 3 exs., Bankura, 29.5.71 (Coll. S. Khera) xi) 9 exs., Ranigunj, Bardhaman (Coll. F. Stoliczka) xii) 5 exs., Ranaghat, Nadia (Coll. A.K. Das)

Distribution : India : Widely distributed. Elsewhere : Pakistan, Bangladesh, Burma.

Remarks : Shell ovate, spire short, acuminate, lastwhorl much inflated, a little angular above, with a large aperture.

Measurements (in mm) : Length : 9.00-20.40; Width : 5.50-13.00; Height of the aperture : 6.40-17.50

26. f. *chlamys* Benson

1836. *Limnaea chlamys* Benson, *J. Asiat. Soc. Beng.*, 5 : 44.

Material examined : i) 2 exs., Tollygunj, Calcutta 15.3.63 (Coll. N.V. Subba Rao) ii) 1 ex., Serampore, Hugli, (Coll. ?)

Distribution : India : Widely distributed. Elsewhere : Bangladesh and Burma.

Remarks : Spire a little larger but narrower than in *typica*, columella more twisted, colour usually golden yellow.

Measurements (in mm) : Length : 17.65; Width : 11.00 Height of the aperture : 14.65

27. f. *gracilior* Martens

1881. *Limnaea acuminata* var. *gracilior* Martens, *Conch. Mitheil*, 1 : 77.

Material examined : i) 5 exs., Ichapur, N. 24-Parganas, 14.9.23, (Coll. B. Prasad) ii) 17 exs., Ballygunj, Calcutta, 24.8.62, iii) 1 ex., Thakurpur, 13.8.64 iv) 2 exs., Uttarpara, Hugli, 16.9.64 (Coll. P. Roy Chowdhury) v) 2 exs., Dum Dum, Calcutta, 21.11.64 (Coll. K.P. Singh) vi) 3 exs., Barasat, N. 24-Parganas, 6.12.65 (Coll. A.K. Das) vii) 1 ex., Barrackpore, N. 24-Parganas, 9.2.66 (Coll. H.P. Mookherjee).

Distribution : India : West Bengal (Calcutta, Hugli, N. 24 Parganas) Assam, Bihar, Kerala, Maharashtra, Orissa, Uttar Pradesh. Elsewhere : Burma.

Remarks : Shell linear with a long narrow spire, colour of shell varies between greyish to light pink.

Measurements (in mm) : Length : 12.15-23.80; Width : 5.80-12.75; Height of the aperture : 9.15-17.70

28. f. *patula* (Troschel)

1837. *Limnaea patula* Troschel, in Weigman's *Archiv. fur. Naturg.* 3 : 167.

Material examined : i) 11 exs., Dum Dum, Calcutta 21.2.64 ii) 15 exs., Thakurpukur, 24.8.64 (Coll. K.N. Nair).

Distribution : India : Widely distributed. Elsewhere : Pakistan, Nepal, Burma.

Measurements (in mm) : Length : 12.15-23.80; Width : 5.80-12.75; Height of the aperture : 9.15-17.60

Remarks : Shell narrower than in typica, spire relatively large, anterior extremity of aperture tapering.

29. f. *rufescens* Gray

1820. *Limnaea rufescens* Gray, in Sowerby's *Genera of Shells*, 1 : *Limnaea* fig. 2.

Material examined : i) ex., Calcutta, 6.6.27 ii) 5 exs., Rabindra Sarovar, Calcutta 22.5.62 iii) 22 exs., Shibpur, Haora, 4.3.63 (Coll. P. Roy Chowdhury) iv) 21 exs., Bardhaman, 9.8.63 (Coll. A.K. Das) v) 10 exs., Kidderpore, Calcutta, 21.7.64 (Coll. N.V. Subba Rao) vi) 2 exs., Falta S. 24-Parganas, 21.7.64 (Coll. K.P. Singh) vii) 3 exs., Kalyani, Nadia, 11.11.65 (Coll. H.P. Mookherjee) viii) 5 exs., Large pond, Puruliya, 30.5.71 ix) 6 exs., Bankura, 29.5.71 (Coll. S. Khara) x) 13 exs., Konnagar, Hugli, 11.9.79 (Coll. S.C. Mitra and A. Dey) xi) 3 exs., Narainpur, Murshidabad (Coll. J. Robertson).

Distribution : India : Common throughout. Elsewhere : Pakistan, Bangladesh, Burma.

Remarks : Shell narrower than in preceeding species with a larger spire, aperture shorter and uniformly less expanded, colour redish.

Measurements (in mm) : Length : 20.50-32.00; Width : 10.00-15.90; Height of the aperture : 14.90-25.90.

30. *Limnaea (Pseudosuccinea) luteola* f. *typica* (Lamarck)

1822. *Limnaea luteola* Lamarck, *Hist. nat. Anim. Sans. Vert.*, 6 (2) : 160.

1925. *Limnaea luteola* : Annandale and Rao, *Rec. Indian Mus.*, 27 : 183.

Material examined : i) 16 exs., Narkeldanga, Calcutta, 11.3.61 (Coll. B. Mookherjee) ii) 13 exs., Barisha, Calcutta, 24.3.61 iii) 16 exs., Uttarpara, Hugli, 19.4.64 (Coll. P. Roy Chowdhury) iv) 7 exs., Tollygunj, Calcutta, 21.6.62 v) exs., Diamond Harbour, S. 24-Parganas, 12.6.64 (Coll. N.V. Subba Rao) vi) 24 exs., Kidderpore, Calcutta, 15.3.63 (Coll. A.T. Biswas) vii) 51 exs., Dum Dum, Calcutta, 21.2.64 (Coll. K.P. Singh) viii) 11 exs., Ranaghat, Nadia, 11.11.65 (Coll. H.P. Mookherjee) ix) 2 exs., Calcutta, 14.11.65 x) 12 exs., Canning, S. 24-Parganas (Coll. K.V. Surya Rao) xi) exs., Pond at Puruliya, 30.5.71 (Coll. S. Khera) xii) 8 exs., Birbhum (Coll. J. Woodmason)

Distribution : Common throughout. Elsewhere : Pakistan, Nepal, Bangladesh, Burma.

Remarks : Shell less inflated, thin and glossy, relatively smaller and laterally compressed, spire gradually tapering and more produced, aperture narrow.

Measurements (in mm) : Length : 13.00-24.80; Width : 7.90-14.50; Height of the aperture : 10.50-17.58.

31. f. *australis* Annandale and Rao

1925. *Limnaea (Pseudosuccinea) luteola* f. *australis* Annandale and Rao, *Rec. Indian Mus.*, 27 : 184-85.

Material examined : i) 7 exs., Calcutta, 19.4.27 (Coll. ?) ii) 10 exs., Ballygunj, Calcutta, 24.8.62 (Coll. P. Roy Chowdhury) iii) 5 exs., Bardhaman, 9.8.63 (Coll. A.K. Das) iv) 7 exs., Kakdwip, S. 24-Parganas, 11.11.65 (Coll. K.V. Surya Rao) v) 7 exs., Konnagar, Hugli 1965 vi) 3 exs., Kalyani, Nadia, 11.11.65 (Coll. H.P. Mookherjee) vii) 1 ex., Puruliya, 30.5.71 viii) 3 exs., Medinipur, 1.6.71 (Coll. Khera)

Distribution : India : Common throughout. Elsewhere : Pakistan, Sri Lanka, Bangladesh, Burma.

Remarks : Shell smaller than in *typica*, spire comparatively longer, last whorl well rounded, suture shallow.

Measurements : (in mm) : Length : 9.50-14.90; Width : 5.85-9.00; Height of the aperture : 6.40-11.00

32. f. *ovalis* Gray.

1820. *Limnaea ovalis* Gray, in Sowerby's, *Genera of Shells*, 1 : *Limnaea*, fig. 4.

Material examined : i) 3 exs., Nalhati, Birbhum, 28.11.31 (Coll. S. Ribeiro) ii) 3 exs., Nabadwip, Nadia, 28.3.37 (Coll. ?) iii) 19 exs., Narkeldanga, Calcutta, 11.3.61 (Coll. B. Mookherjee) iv) 7 exs., Kidderpore, Calcutta, 22.2.63 v) 1 ex., Port Canning, S. 24-Parganas (Coll. N.V. Subba Rao) vi) 182 exs., Behala, Calcutta, 20.3.63 (Coll. P. Roy Chowdhury) vii) 24 exs., Park Circus, Calcutta, 23.12.63 (Coll. K.P. Singh) viii) 51 exs., Habra, N. 24-Parganas, (Coll. H.P. Mookherjee) ix) 4 exs., Pond near Puruliya, 30.5.71 (Coll. S. Khera) x) 11 exs., Konnagar, Hugli, 11.9.79 (Coll. S.C. Mitra and A. Dey).

Distribution : India : Common throughout.

Remarks : Shell larger than in preceeding species, last whorl much inflated without any compression, spire short and abruptly acuminate.

Measurements : (in mm) : Length : 12.60-19.00; Width : 9.80-18.00; Height of the aperture : 10.00-18.95.

Family PLANORBIDAE

Shell flattened, discoidal, small to moderately large, spire seldom raised, openly umbilicate.

Inhabits stagnant or sluggish waters.

World wide.

Key to the Genera

Shell comparatively large (more than 10 mm in width), with convex whorls, aperture ear shaped
.....*Indoplanorbis* Annandale and Prashad.

Shell smaller (less than 10 mm in width), paucispiral, depressed with flattened whorls, aperture wide
.....*Gyraulus* Charpentier

Genus 12. *Indoplanorbis* Annandale and Prashad, 1920.

Shell moderately large, thick, discoidal with rounded whorls, spire sunken below the plane, aperture ear shaped.

India, Pakistan, Sri Lanka, Burma, Malay Peninsula and Archipelago, Thailand, China, Tibet and Iran.

33. *Indoplanorbis exustus* (Deshayes)

1834. *Planorbis exustus* Deshayes, *Voy. Belang. Indo. Orient. zool.*, p. 417 pl. 1, figs. 11-13.

1921. *Indoplanorbis exustus* : Annandale and Prashad, *Rec. Indian Mus.*, 22 : 472.

Material examined : i) 18 exs., Berhampur, Murshidabad, 1908 (Coll. Capt. Ltod) ii) 17 exs., Narkeldanga, Calcutta 12.3.61 (Coll. B. Mookherjee) iii) 14 exs., Tollygunj, Calcutta, 22.6.62 (Coll. K.P. Singh. iv) 24 exs., Kidderpore, Calcutta, 15.3.63 (Coll. N.V. Subba Rao) v) 15 exs., Maniktala, Calcutta, 24.3.64 (Coll. J. Das Gupta) vi) 7 exs., Barisha, Calcutta, 24.3.64 vii) 7 exs., Uttarpara, Hugli, 19.6.64, viii) 2 exs., Port Canning, S. 24-Parganas, 10.3.65 ix) 27 exs., Lakhikantapur, S. 24-Parganas, 10.8.65 (Coll. P. Roy Chowdhury) x) 36 exs., Baruipur, S. 24-Parganas, 8.9.65 xi) 90 exs., Kalyani, Nadia 11.11.65 (Coll. H.P. Mookherjee) xii) 11 exs., Bardhaman, 9.8.63 (Coll. A.K. Das) xiii) 18 exs., Pond at Medinipur, 1.6.71 xiv) 21 exs., Bankura, 29.5.71 (Coll. S. Khera) xv) 12 exs., Saithia, Birbhum (Coll. D.K. Thakur and A. Dey).

Distribution : India : Widely distributed. Elsewhere : Pakistan, Sri Lanka, Bangladesh, Burma, Malay Peninsula and Archipelago, Thailand, China, Tibet and Iran.

Remarks : It is a known vector snail and is the intermediate host for the largest number of parasites.

Measurements (in mm) : Height of shell : 4.50-6.80; Width of shell : 6.40-16.80

Genus 13. *Gyraulus* Charpertier, 1837

Shell small, thin, paucispiral, flattened, deeply umbilicate, whorls rapidly increasing in width, last whorl usually angulate or subangulate, aperture rather wide.

World wide.

Key to the Species

1. Last whorl distinctly wide and descending in front of aperture *G. labiatus* (Benson)
 Last whorl not much wide and not descending in front of aperture 2
2. Whorls 4-5, last whorl subangulate at the periphery *G. convexisculus* (Hutton)
 Whorls, 3.5, last whorl rounded at the periphery *G. barrackporensis* (Clessin)

34. *Gyraulus convexisculus* (Hutton)

1849. *Planorbis convexisculus* Hutton, *J. Asiat. Soc. Beng.*, 18(2) : 657.

Material examined : i) 9 exs., Ichapur, N. 24-Parganas, 14.9.28 (Coll. B. Prashad) ii) 54 exs., Narkeldanga, Calcutta 2.4.61 (Coll. B. Mookherjee) iii) 28 exs., Jodhpur Park, Calcutta, 8.8.62, (Coll. N.V. Subba Rao) iv) 11 exs., Bardhaman 9.8.63 (Coll. A.K. Das) v) 17 exs., Chandannagar, Hugli, 1965 vi) 9 exs., Kalyani, Nadia, 11.11.65 (Coll. H.P. Mookherjee) vii) 3 exs., Pond at Puruliya 30.5.71 (Coll. S. Khera)

Distribution : India : Common throughout. Elsewhere : Iran to Philippines and Japan.

Remarks : Shell small, discoidally flattened, semi-transparent, whorls 4-5, last whorl subangulate at the periphery.

Measurement (in mm) : Height of shell : 1.20-1.68; Width of shell : 3.25-7.00

35. *Gyraulus labiatus* (Benson)

1850. *Planorbis labiatus* Benson, *Ann. Mag. nat. Hist.* (2)5 : 350.

Material examined : i) 4 exs., Nalhati, Birbhum, 28.11.31 (Coll. S. Reneiro) ii) 2 exs., Kidderpore, Calcutta, 16.6.62 (Coll. N.V. Subba Rao) iii) 4 exs., Shibpur, Haora, 4.3.63 (Coll. P. Roy Chowdhury)

Distribution : India : West Bengal (Birbhum, Calcutta, Haora), Tamil Nadu, Uttar Pradesh. Elsewhere : Burma.

Remarks : Differs from the preceding species in the form of last whorl which descends near the aperture and also by the presence of a rib inside the lip.

Measurement : (in mm) : Height of shell : 0.85; Width of shell : 4.00

36. *Gyraulus barrackporensis* (Clessin)

1886. *Planorbis barrackporensis* Clessin, *Die Familie der Limaeiden* in Martini-Chemnitz, *Conch. Cab.*, 17 : 125, no. 95, taf. 18, fig. 7.

Material examined : i) 146 exs., Serampore, Hugli 2.3.31 (Coll. S. Rebeiro) ii) 462 exs., Pulta, Barrackpore, N. 24-Parganas, 1937, (Coll. Pulta Survey Party) iii) 28 exs., Pond opposite to Park Street, Calcutta, 17.12.63 (Coll. N.V. Subba Rao)

Distribution : India : West Bengal (Calcutta, Hugli, N. 24-Parganas). Elsewhere : Tibet.

Measurements (in mm): Height of shell : 1.25-1.38; Width of shell : 4.00-5.20.

Class BIVALVIA

Order ARCOIDA

Family ARCIDAE

Shell trapezoid, inflated, decussately costate, usually longer than high. Umbonal ridge present, dental series straight or slightly arched with numerous small, more or less transverse, subequal teeth; myophoric ridges or shelves absent; byssal gape present.

Though primarily a marine family, it is represented in freshwater by a single genus *Scaphula*.

Genus 14. *Scaphula* Benson, 1834

Subtrapezoidal, elongate, small, inequilateral without ornamentation with high and narrow posterior umbonal carina.

Inhabits fresh and brackish water.

India, Burma, Thailand.

Key to the Species

Hinge teeth more oblique, posterior teeth further from extremity.....*S. celox* Benson

Hinge teeth less oblique, posterior teeth nearer to extremity*S. deltae* Blandford

37. *Scaphula celox* Benson

1836. *Scaphula celox* Benson, *J. Asiat. Soc. Beng.*, 5 : 750 (figured in *Gleanings in Science*, 1 pl. 7, figs. 2 & 3).

Material examined : i) 3 exs., and 20 valves, Barrackpore, N. 24-Parganas, 30.4.37 (Coll. Pulita Survey Party)

Distribution : India : West Bengal (N. 24-Parganas), Orissa, Uttar Pradesh.

Remarks : Shell small, tumid, inside of the valves white, elongately rhomboidal with a prominent keel along the diagonal length of the valves, umbo much prominent.

Measurement (in mm) : Length : 8.00-9.25; Width : 3.75-5.20; Height : 2.50-3.45.

38. *Scaphula deltae* Blandford

1876. *Scaphula deltae* Blandford, *J. Asiat. Soc. Beng.*, 36 (2) : 71, pl. 14, figs. 7, 10.

Material examined : i) 203 exs., Pulita, Barrackpore, N. 24-Parganas, 30.4.37 (Coll. Pulita Survey Party) ii) 11 exs., Dhakuria, Calcutta, 18.9.37 (Coll. ?) iii) 1 ex., 3 valves Shibpur, Haora, 25.7.63, iv) 25 exs., Habra, N. 24-Parganas, 20.10.63 (Coll. P. Roy Chowdhury).

Distribution : India : West Bengal (Calcutta, Haora, N. 24-Parganas). Elsewhere : Pegu.

Remarks : Shell smaller and more tumid nearly twice as broad in their diameter from side to side as they are from the dorsal to the ventral margin). Inside of the valves bluish, Keel on the valve more raised and sharply angled. Covered by a thick radiately ribbed epidermis. Umbo less prominent.

Measurement (in mm) : Length : 7.65; Width : 2.60; Height : 3.60.

Order UNIONOIDA
Family UNIONIDAE

Equivalve, nacreous, outline varies from circular to elongate with various thickness. Hinge with two cardinal and two posterior lamellar teeth in left valve and one each in right valve.

Key to the Genera

Shell round to subrhomboid, beak with strong sculpture, cardinals rugged and vertically straight *Parreysia* Conrad
Shell elongate, beak without sculpture, cardinals compressed, elongate *Lamellidens* Simpson

Genus 15. *Lamellidens* Simpson, 1900

Shell elongate, elliptical and pointed behind, with smooth shiny periostracum; beaks with curved radiating ridges, concentric or zig-zag, reaching half way from the beak and fading gradually; cardinal teeth elongated, compressed; lamellar teeth long.

India, Bangladesh, Burma, Sri Lanka.

Key to the Species

Shell broad, umbo prominent, colour brown with a lighter band along the margin *L. marginalis* (Lamarck)
Shell less broad, umbo less prominent, colour uniformly dark *L. corrianus* (Lea)

39. *Lamellidens corrianus* (Lea)

1834. *Unio corrianus* Lea, *Trans. Amer. Phil. Soc.*, (2) 5: 65, pl. 9, fig. 25.

1912. *Lamellidens narainporensis* Preston, *Rec. Indian Mus.*, 7 : 305-306.

1922. *Lamellidens corrianus* : Prashad, *Rec. Indian Mus.*, 24 : 106.

Material examined : i) 2 exs., Birbhum (Coll. J. Woodmason) ii) 3 exs., Murshidabad (Coll. Capt. Lloyd) iii) 21 exs., Tollygunj, Calcutta 21.6.62 (Coll. N.V. Subba Rao) iv) 33 exs., Pond near Gariahata, Calcutta, 8.8.62 (Coll. P. Mondal) v) 32 exs., Rabindra Sarovar, Calcutta, 20.12.63 (Coll. K.P. Singh) vi) 32 exs., Habra, N. 24-Parganas, 20.12.63 (Coll. A.T. Biswas) vii) 12 exs., Bagnan, Haora, 24.3.64 viii) 28 exs., Barisa, Calcutta, 24.3.64 (Coll. P. Roy Chowdhury) ix) 10 exs., Serampore, Hugli, 1964 (Coll. K.K. Tiwari) x) 1 ex., Puruliya, 30.9.71 (Coll. S. Khera) xi) 1 ex., Narainpore Bhil, Murshidabad (Coll. C.J. Robertson).

Distribution : India : Common throughout. Elsewhere : Bangladesh, Burma.

Remarks : Shell usually of darker colour, umbonal region inflated, narrowly ovate with posterior margin subangulately pointed, dorsal margin rather straight.

Measurement (in mm) : Length : 60.30-93.75; Width : 32.80-44.85; Height : 19.50-30.85.

40. *Lamellidens marginalis* (Lamarck)

1919. *Unio Marginalis* Lamarck, *Hist. nat. Anim. Sans. Vert.*, 6 : 79.

1921. *Lamellidens marginalis* : Prashad, *Rec. Indian Mus.*, 22 : 606, fig. 294.

Material examined : i) 3 exs., Museum tank, Calcutta, 9.5.39 (Coll Mus. Collector) ii) 7 exs., Eden Garden, Calcutta, 22.2.63, (Coll N.V. Subba Rao) iii) 3 exs., Narkeldanga, Calcutta, 20.3.63 (Coll. P. Roy Chowdhury) iv) 2 exs., Bardhaman, 9.8.65 (Coll. A.K. Das) v) 2 exs., Kalyani, Nadia, 11.11.65 (Coll. H.P. Mookherjee) vi) 1 ex., Bankura, 29.5.71 vii) 2 exs., Medinipur, 1.6.71 (Coll. S. Khera) viii) 5 exs., Pond at Digha, Medinipur, Sept. '83 (Coll. A. Dey and S. Barua).

Distribution : India : Widely distributed. Elsewhere : Sri Lanka, Burma.

Remarks : Differs from the preceding species by having a broader Shell which is usually brown with lighter border along the margin, anterior end short and narrow, posterior roundly angular, a short post-dorsal wing present.

Measurements (in mm) : Length : 63.50-92.80; Width : 34.00-48.85; Height : 20.00-31.70.

Gem 16. *Parreysia* Conrad, 1853

Shell round to rhomboidal, heavy, inflated with zig-zag ribs on beaks ; periostracum smooth, bright, rayed ; sculpture extending over disc ; cardinal teeth heavy, rugged or vertically striate, lamellar teeth short, duplicating in right valve.

South-east Asia and Central Africa.

Key to the Subgenera

Shell oval to elliptical ; thick, with a convex ventral margin *Parreysia* s. str.
Shell elongate, thinner, with a rather straight ventral margin *Radiatula* Simpson

Subgenus *Parreysia* s. str.

Shell with swollen central of ventral margin ; sculpture strong at beak, with central ridges united at their lower points to form chevron shaped markings.

South-east Asia.

Key to the Species

1. Cardinal teeth very strong, 3 or more in number..... *P. favidens* (Benson)
Cardinal teeth strong, less than 3 in number 2
2. Periostracum greenish yellow 3
Periostracum black 4

3. Shell more oval, periostracum more yellowish, beak less prominent.....*P. rajahensis* (Lea)
Shell a little elongate, periostracum less yellowish, beak more
.....*P. tavoyensis* var. *triembolus* (Benson)
4. Shell more elongate, posterior ridge not prominent, beak inflated.....*P. sikkimensis* (Lea)
Shell less elongate, posterior ridge more prominent, beak more inflated...*P. corrugata* (Mueller)

41. *Parreysia corrugata* (Mueller)

1774. *Mya corrugata* Mueller, *Hist. Verm. Terr. Flur.*, p. 214.

Material examined : i) 6 exs., 5 valves, Behrampur, Murshidabad, 29. 4. 10 (Coll. S. W. Kemp) ii) 2 exs., Port canning, S. 24-Parganas, 29. 5. 63 (Coll. P. Roy Chowdhury) iii) 1 ex., Puruliya (Coll. ?)

Distribution : India : Throughout. Elsewhere : Sri Lanka, Burma.

Remarks : Shell thick, shape varies between elliptical to oval, distinctly sculptured with oblique radiating ridges on umbonal region, cardinal teeth strong, not lamellar.

Measurements (in mm) : Length : 42.28 ; Width : 30.40; Height : 21.86.

42. *Parreysia favidens* (Benson)

1862. *Unio favidens* Benson, *Ann. Mag. nat. Hist.*, 10 : 188.

Material examined : i) 4 exs., Port Canning, S. 24-Parganas, 1924 (R. Hodgert) ii) 1 ex., Barrackpore, N. 24-Parganas, 30. 40. 37. (Coll. Pulta Survey Party) iii) 2 exs., Puruliya, 30 5. 71 (Coll. S. Khera) iv) 7 exs., I. S. I. compound, Calcutta v) 4 exs., Calcutta vi) 8 exs., 2 valves, Sunderbans, S. 24-Parganas (Coll ?)

Distribution : India : Throughout. Elsewhere : Pakistan, Bangladesh.

Remarks : Thicker and larger, shape greatly variable, more inequilateral, anterior margin more sloping.

Measurements (in mm) : Length : 42.80-64.85; Width : 28.60-40.00; Height : 18.75-26.74.

The following varieties are identified among the material studied.

43. var. *deltæ* (Benson)

1862. *Unio flavidens* var. *deltæ* Benson, *Ann. Mag. nat. Hist.*, 10 : 189.

Material examined : i) 1 ex., Pulta, Barrackpore, N. 24-Parganas 27. 2. 37 (Coll. Pulta Survey party) ii) 3 exs., Uttarpara, Hugli, 27. 4. 64 (Coll. P. Roy Chowdhury) iii) 8 exs., 2 valves, Calcutta, (Coll. ?).

Distribution : India : West Bengal (Calcutta, Hugli, N. 24-Parganas), Uttar Pradesh.

Remarks : Shell less elongate, greenish yellow, posterior margin subangulate, umbonal region strongly sculptured, cardinal teeth narrower.

Measurements (in mm) : Length : 28.65; Width : 19.80; Height : 15.40

44. var. *marcens* (Benson)

1862. *Unio favidens* var. *marcens* Benson, *Ann. Mag. nat. Hist.*, (3) 10 : 188.

Material examined : i) 2 exs., Calcutta, 10 3. 24 (Coll. S. L. Hora) ii) 2 exs., Ranigunj, Bardhaman. (Coll. ?)

Distribution : India : West Bengal (Bardhaman, Calcutta), Assam, Maharashtra.

Remarks : Shell larger, more elongate, dark brown, umbonal region weakly sculptured, posterior margin broadly rounded.

Measurements (in mm) : Length : 61.30; Width : 40.92; Height : 29.25.

45. var. *plagiosoma* (Benson)

1862. *Unio plagiosoma* Benson, *Ann. Mag. nat. Hist.*, (3) 10 : 191.

Material examined : i) 18 exs., Calcutta ii) 15 exs., Birbhum (Coll. J. J. Woodmason).

Distribution : India : West Bengal (Birbhum), Assam, Bihar.

Remarks : Thinner, smaller, ovately trigonal, anterior margin well rounded, posterior elongately rounded, dorsal margins evenly sloping, sculptured on beaks only.

Measurements (in mm) : Length : 30.00-54.50; Width : 20.90-29.65; Height : 12.70-21.00.

46. var. *viridula* (Benson)

1862. *Unio favidens* var. *viridula* Benson, *Ann. Mag. nat. Hist.*, (3) 10 : 189.

Material examined : i) 1 ex., Calcutta ii) 1 ex., Ranigunj, Bardhaman, iii) Purulia (Coll. ?)

Distribution : India : West Bengal (Bardhaman), Andhra Pradesh, Assam, Bihar.

Remarks : Rather compressed, with strongly rugose beak, cardinal teeth broad.

Measurements (in mm) : Length : 39.15; Width : 27.10; Height : 16.72.

47. *Parreysia rajahensis* (Lea)

1841. *Unio rajahensis* Lea, *Proc. Amer. Phil. Soc.*, 2 : 30.

Material examined : i) 5 exs., 1 valve, Puruliya (Coll. ?)

Distribution : India : West Bengal (Puruliya), Bihar, Madhya Pradesh.

Remarks : Shell trigonal, thick, inflated, smooth, posterior margin slightly angulate.

Measurements (in mm) : Length : 40.00; Width : 33.20; Height : 22.80.

48. *Parreysia sikkimensis* (Lea)

1859. *Unio sikkimensis* Lea, *Proc. Acad. nat. Sci. Philad.*, 3 : 151.

Material examined : i) 5 exs., Puruliya (Coll. ?).

Distribution : India : West Bengal, Assam, Uttar Pradesh.

Remariss : Rather short and squarish, both anterior and posterior margins, broad and rather obtusely angulate.

Measurements (in mm) : Length : 33.10; Width : 24.25; Height : 16.50.

49. *Parreysia tavoyensis* var. *triembolus* (Benson)

1862. *Uhio triembolus* Benson, *ann. Mag. nat. Hist.*, (3) : 10 : 190.

Material examined : i) 1 ex., 1 valve, Murshidabad (Coll. T. Southwell).

Remarks : Moderately large, thickly built, subtrigonal, tumid, greatly inequilateral, umbo very prominent, umbonal cavity deep, teeth distinctly large.

Measurements (in mm) : Length : 50.00; Width : 41.45; Height : 29.40.

Subgenus *Radiatula* Simpson, 1900

Shell triangularly oval, beaks little inflated; sculptured with radiating or zig zag or divaricating ridges separated into nodules by concentric sulcations.

Key to the Species

1. Shell with more convex dorsal margin, umbo nearer to the middle.....*P. bonneaudi* (Eydoux)
Shell with more or less straight dorsal margin, umbo nearer to anterior end.....2
2. Shell with prominent posterior umbonal carina, beak cavity less prominent*P. occata* (Lea)
Shell with prominent posterior umbonal carina, beak cavity more prominent 3
3. Shell more inflated, divaricate ridges, restricted to umbonal region.....*P. pachysoma* (Benson)
Shell less inflated, divaricate ridges extend throughout upper half of shell.....*P. caerulea* (Lea)

51. *Parreysia (Radiatula) caerulea* (Lea)

1838. *Unio bonneaudi* Eydoux, *Mag. de Zool.*, 150, V, pp. 10-11, pl. 119, figs. 1, 1a.

Material examined : i) ex., Calcutta (Coll. Indian Museum Collector).

Distribution : India : Widely distributed. Elsewhere : Pakistan, Bangladesh, Burma, Nepal.

Remarks : Shell elongate, variable in shape and sculpture, posterior margin gradually tapering, strongly sculptured at the umbonal region with zig zag ribs, sculpture extending to the upper half of the valve, posterior umbonal carina present.

Measurements (in mm) : Length : 30.00-43.90; Width : 16.45-22.00; Height : 11.40-13.10.

52. var. *gaudichaudi* (Eydoux)

1838. *Unio gaudichaudi* Eydoux, *Mag. de Zool.*, 150, V, p. 10, pl. 118. fig. 3.

Material examined : i) 11 exs., Puruliya (Coll. N. Annandale).

Distribution : India : Rivers of West Bengal.

Remarks : Anterior margin shorter, posterior more pointed, sculpture much finer.

Measurements (in mm) : Length : 47.50; Width : 29.30; Height : 15.25.

53. *Parreysia (Radiatula) occata* (Lea)

1860. *Unio occata* Lea, *Proc. Acad. nat. Sci. Philand.*, 4 : 307.

Material examined : i) 2 exs., Calcutta (Coll. ?).

Distribution : India : West Bengal (Calcutta), Assam, Madhya Pradesh, Rajasthan, Uttar Pradesh, Elsewhere : Bangladesh, Burma, United Kingdom.

Remarks : Shell rather rhomboidal and typically sculptured with granular ridges throughout the surface.

Measurements (in mm) : Length : 33.00; Width : 20.40; Height : 19.00.

54. *Parreysia (Radiatula) pachysoma* (Benson)

1862. *Unio pachysoma* Benson, *Ann. Mag. nat. Hist.*, (3) 10 : 186.

Material examined : i) 2 exs., Museum tank, Calcutta (Coll. N. Annandale).

Distribution : India : West Bengal (Calcutta), Assam, Orrisa, Elsewhere : Burma.

Remarks : Shell much inflated and devoid of radiating corrugations on the slopes.

Measurements (in mm) : Length : 44.50; Width : 23.25; Height : 20.80.

Order VENEROIDA
Family CORBICULIDAE

Shall small to moderately large, roundly trigonal to ovate, thick with well developed periostracum. Hinge with strong cardinal and lateral teeth.

South America, Africa, Asia, Australia.

Freshwater to brackish water.

Key to the Genera

Shell smaller (less than 50 mm in length), lateral teeth serrated.....*Corbicula* Megerle von Muehlfeld
.....*Polymesoda* Rafinesque
Shell larger (more than 50 mm in length), lateral teeth smooth

Genus 17. *Corbicula* Megerle von Muehlfeld, 1811

Shell thick, subtrigonal, strongly sculptured with concentric striae, umbo central ; lateral teeth elongately compressed and striate.

Asia, Africa, Australia.

Freshwater.

Key to the Species

Shell thin, concentric striae very fine, almost microscopic.....*C. bensoni* Deshayes
Shell thick, concentric striae very strong and prominent.....*C. striatella* Deshayes

55. *Corbicula striatella* Deshayes

1854. *Corbicula striatella* Deshayes, *Proc. zool. Soc. Lond.*, p. 344.

1928. *Corbicula striatella* : Prashad, *Mem. Indian Mus.*, 18, pl. 3, figs. 9-11.

Material examined : i) 239 exs., Pulta, Barrackpore, N. 24-Parganas 30. 4. 37 (Coll. Pulta Survey Party) ii) 12 exs., Uttarpara, Hugli, 16. 9. 64 (Coll. P. Roy Chowdhury) iii) 3 exs., Bankura, 29. 5. 71 (Coll. S. Khera) iv) 7 exs., Churni river, Nadia (Coll. A. K. Das) v) 35 exs., 11 valves, Calcutta vi) 57 exs., Kharagpur, Medinipur vii) 6 exs., Puruliya (Coll. ?).

Distribution : India : Common throughout. Elsewhere : Burma, Pakistan.

Measurements (in mm) : Length : 11.00-20.88; Width : 9.00-18-25; Height : 5.50-11.00.

56. *Corbicula bensoni* Deshayes

1854. *Corbicula bensoni* Deshayes, *Proc. zool. Soc. Lond.*, p. 345, (type locality, Bengal).

Material examined : i) 21 exs., Hugli river, Nabadwip, Nadia, 28. 2. 32 (Coll. ?).

Distribution : India : West Bengal (Hugli, Nadia), Bihar. Elsewhere : Bangladesh.

Remarks : It can be distinguished from the preceeding species by its thinner shell and fine, almost microscopic, striations. Prashad (1928) has given complete descriptions and figures for both the species.

Measurements (in mm) : Length : 10.78 ; Width : 8.60; Height : 6.60.

Genus 18. *Polymesoda* Rafinesque, 1828

Shell large, heavy ; lateral teeth short and smooth ; pallial line entire.

India, Burma, Sri Lanka, Malay Archipelago, China, Philippines, Australia, Estuarine backwaters, extending to freshwater.

57. *Polymesoda (Geloina) bengalensis* (Lamarck)

1818. *Cyrena bengalensis* Lamarck, *Hist. nat. Anim. Sans. Vert.*, 5 : 554.

1921. *Cyrena bengalensis* : Prashad, *Rec. Indian Mus.*, 22 : 128.

Material examined : i) 8 exs., Sunderbans, S. 24-Parganas (Coll. N. Annandale).

Distribution : India : West Bengal (Gangetic Delta), Orissa (Mahanadi estuary), Elsewhere : Common in Indo-Pacific region.

Remarks : Shell large, solid, subtriangular, roughly striate, dorsal margin rather angulate, posterior margin abruptly sloping, anterior rather concave.

Measurements (in mm) : Length : 60.45 ; Width : 53.10 ; Height : 35.00.

Family PISIDIIDAE

Shell small, oval or quadrate to subtriangular ; texture thin to opaque. Ligament partly or wholly internal ; hinge curved, narrow with anterior and posterior lateral in both valves ; cardinal small, not

more than two in right valve, straight or united into an inverted 'V', one anterior and one posterior in left valve.

Freshwater in habit.

Genus 19. *Pisidium* Pfeiffer, 1821

Shell small, orbicular or ovoid, inequilateral ; beaks nearer to posterior end ; hinge with 2 cardinals and 2 laterals in right valve 1 cardinal and 1 lateral in left valve.

Cosmopolitan.

58. *Pisidium clarckeanum* G. & H. Nevill

1871. *Pisidium clarckeanum* G. & H. Nevill, *J. Asiat. Soc. Beng.*, 40 (2) : 9, pl. 1, figs 4, 4e.

1925. *Pisidium clarckeanum* : Prashad, *Rec. Indian Mus.*, 27 : 408.

Material examined : i) 15 exs., 8 valves, Rabindra Sarovar, Calcutta, 22. 5. 62 (Coll. P. Roy Chowdhury) ii) 29 exs., Port Canning, S. 24-Parganas (Coll. N. V. Subba Rao) iv) 25 exs., Museum Tank, Calcutta, 17. 7. 22 (Coll. R. Hodgart).

Distribution : India : West Bengal (Calcutta, S. 24-Parganas), Tamil Nadu. Elsewhere : Burma, Bangladesh, Thailand.

Remarks : Shell minute, oblong, inflated, finely and closely striate, posterior margin short, anterior roundedly truncate, umbo prominently tumid.

Family CULTELLIAE

Shell elongate, compressed with gaps on both the ends ; hinge with strong cardinals and weak laterals ; cardinals 1 to 3 each valve.

Europe, Asia, Indo-pacific.

Genus 20. *Tanysiphon* Benson, 1858

Shell thin, elongately ovate ; periostracum greenish ; beaks in front of middle ; hinge with 2 small anterior, posterior flattened ; pallial sinus large, rounded extended beyond mid line.

South Asia. Estuarine forms.

59. *Tanysiphon rivalis* Benson,

1858. *Tanysiphon rivalis* Benson, *Ann. Mag. nat. Hist.*, (3) 1 : 408, pl. 12b, fig. 1-3.

Material examined : i) 9 exs., 1 valve, Sagar Island, S. 24 Parganas, 25. 5. 81 (Coll. K. V. Surya Rao) ii) 9 exs., Calcutta, (Coll ?).

Distribution : India : West Bengal (Gangetic delta).

Remarks : Shell thin, small, transversely elongate, pallial sinus large.

This species belongs to an estuarine family and is known from West Bengal only. All the examples studied by us are collected from river Hugli, around Calcutta.

Measurements (in mm) : Length : 14.5 ; Width : 6.8 ; Height : 4.8.

Family SOLECURTIDAE

Shell elongately quadrate with a large gap at both the ends ; hinge plate weak, narrow ; pallial sinus shallow or deep.

Represented in the Oriental region by the subfamily Neosoleninae.

Genus 21. *Novaculina* Benson, 1830

Shell transversely elongate, uniformly wide throughout the length ; periostracum present ; hinge with 3 cardinals in left valve, 2 in right valve ; pallial sinus of moderate depth.

Fresh water in habit.

60. *Novaculina gangetica* Benson

1830. *Novaculina gangetica* Benson, Gleaning in Science, 2 : 63.

Material examined : i) 210 exs., Pulta, barrackpore, N. 24-parganas, 30 4. 37 (Coll. Pulta Survey Party) ii) 3 exs., 5 valves, River Hugli, Calcutta (Coll. ?).

Distribution : India : West Bengal (River Ganges), Bihar, Uttar Pradesh. Elsewhere : Bangladesh.

Remarks : Shell thin, olivaceous, oblong, finely striate, anterior margin straight, posterior rounded.

Measurements (in mm) : Length : 31-6 ; Width : 11.5 ; Height : 7.15.

B. LAND MOLLUSCS

Key to the Families

1. Animal slug like, without a shell VERONICELLIDAE
Animal covered by a shell 2
2. Shell widely umbilicate, with an operculum CYCLOPHORIDAE
Shell imperforate or narrowly umbilicate, without an operculum 3
3. Shell with denticulate aperture 4
Shell with simple aperture 5
4. Shell minute, seldom exceeding 3 mm in length, last whorl convex PUPILLIDAE
Shell larger, seldom below 5 mm in length, last whorl laterally compressed ... STRPTAXIDAE
5. Shell with distinctly curved columellar margin which is truncate at base 6
Shell with more or less straight columellar margin which is not truncate at base 7
6. Shell large (seldom below 50 mm in length), thick, usually brightly coloured
..... ACHATINIDAE
Shell smaller (seldom reaching 40 mm in length), thin, usually drab coloured
..... GLESSULIDAE
7. Shell minute, seldom exceeding 4 mm in diameter VALLONIIDAE
Shell larger always more than 4 mm in diameter 8
8. Spire distinctly shorter than last whorl SUCCINEIDAE
Spire distinctly longer than last whorl 9

9. Shell elongately-ovate to turreted, distinctly higher than broad 10
 Shell depressed to depressedly turbinate, broader than high 11
10. Shell broad, ovate, usually with bands ENIDAE
 Shell narrow, cylindrically turreted without bands SUBULNIDAE
11. Shell strongly depressed, widely umbilicate.....TROCHOMORPHIDAE
 Shell depressedly turbinate to conoid, imperforate or narrowly umbilicate ...ARIOPHANTIDAE

Class GASTROPODA
 Subclass PROSOBRANCHIA
 Order MESOGASTROPODA
 Family CYCLOPHORIDAE

Shell small to large, variable, usually subglobose to turbinate, widely umbilicate, smooth or sculptured, aperture circular, peristome usually continuous, very often with onches, tubes or other modifications, operculum horny or calcareous.

South and East Asia, Indo-Australian Archipelago, Philippines, Pacific islands, Australia.

Terrestrial. Found in vegetable debris or in shady places under vegetation.

Genus 22. *Cyclophorus* Montfort, 1810

Shell thick, moderately large, depressedly turbinate, usually broader than high, with a large circular aperture, peristome continuous, often expanded; operculum thin, circular, multispiral with a central nucleus, convex externally.

South and East Asia, Malay Archipelago, Philippines

61. *Cyclophorus (Litostylus) polynema* (Pfeiffer)

1854. *Cyclophorus (Cyclophorus) polynema* Pfeiffer, Proc. zool. Soc. Lond., p. 126.

1921. *Cyclophorus (Litostylus) polynema* : Gude, *Fauna British India, Mollusca*, 3 : 53.

Material examined : i) 1 ex., Medinipur (Coll. F. Stoliczka) ii) 2 exs., Medinipur, 1978 (Coll. S. K. Raut).

Distribution : India : West Bengal (Medinipur, Puruliya), Kerala, Orissa.

Remarks : Shell depressedly turbinate, deeply umbilicate, solid, whorls-4-5 with strong spiral striae on upper side, smooth below, a broad chocolate band below the periphery and zig-zag, brown splashes on the surface.

Measurements (in mm) : Length : 25.50 ; Width : 30.00 ; Height : 13.25.

Order STYLOMMATOPHORA
 Family PUPILLIDAE

Shell small, ovately conoid to cylindrical, rimate on narrowly umbilicate, smooth or with striae or fine ribs, aperture with various modifications like folds, lamellae, denticles etc.

World wide

Genus 23. *Pupilla* Turton, 1831

Shell small, seldom exceeding 2-3 mm, ovately cylindrical, narrowly umbilicate, usually with striae, last whorl seldom larger than the previous one, aperture with one or more denticles.

Asia, Africa, Europe.

62. *Pupilla barrackporensis* Gude

1854. *Pupa indica* Pfeiffer, *Proc. zoo. Soc. Lond.*, p. 295, (not *Pupa indica* Benson, 1849)

1914. *Pupilla barrackporensis* Gude, *Fauna British India, Mollusca*, 2 : 285.

Material examined : i) 1 ex., Barrackpore, N. 24-parganas (Coll. ?).

Distribution : India : West Bengal (N. 24 Parganas).

Remarks : Shell minute, measuring 2 mm in length, ovately -cylindrical with faint striae, apex blunt, whorls five, last whorl and the penultimate whorl almost equal, flatly concave on the base aperture with four denticles.

Since, *Pupa indica* Pfeiffer was a junior homonym of *Pupa indica* Benson, the new name *P. barrackporensis* was proposed by Gude (1914), basing on its type locality.

Measurements (in mm) : Length : 2.00 ; Width : 1.30

Family VALLONIDAE

Genus 24. *Pupisoma* Stoliczka, 1873

Shell minute, thin perforate, pupiform to globose conoid, whorls rounded, usually finely ribbed.

Aperture oval to round, peristome thin, simple or a little reflected, columella dilated obliterating the perforation.

India, Sri Lanka, Borneo, Philippines, Japan and South Africa.

63. *Pupisoma orcula* (Benson)

1850. *Helix orcula* Benson, *Ann. Mag. nat. Hist.*, Ser. 2, 6 : 251.

1914. *Pupisoma orcula* : Gude, *Fauna Brit. India, Mollusca*, 2 : 37.

Measurements (in mm) : Length : 60.45 ; Width : 53.10 ; Height : 35.00.

Distribution : India : West Bengal (Calcutta, S. 24-Parganas), Bihar, Sikkim, Uttar Pradesh. Elsewhere : Japan, S. Africa.

Remarks : Shell minute, measuring upto 2 mm in length, thin perforate, conically globose with 3-4 whorls, obliquely and irregularly striate.

Gude (1914) reports its abundant occurrence on trunks, leaves and bark of large trees like mango etc.

Measurements (in mm) : Height : 2.00; Width : 1.98.

Family ENIDAE

Shell dextral or sinistral, ovate to fusiformly cylindrical, whorls rather convexly flattened, smooth or sculptured. Peristome straight, thickened, expanded or reflected, columellar margin straight.

Europe, Asia and Africa.

Genus 25. *Rachis* Albers, 1850

Shell elongate, deeply umbilicate, dextral, smooth usually with bands, aperture ovately elongate, columellar margin straight, expanded and strongly reflected partially covering the umbilicus. Peristome simple, with straight margins.

India, Tropical Africa. Many species are arboreal in habit.

64. *Rachis bengalensis* (Lamarck)

1822. *Bulimus bengalensis* Lamarck, *Anim. Sans. nat. Vert.*, 6 (2) 124.

1914. *Rachis bengalensis* : Gude, *Fauna British India, Mollusca*, 2 : 273.

Material examined : i) 1 ex., Ballygunj, Calcutta, 22.1.74 (Coll. H.C. Ray) ii) 4 exs., Budge Budge, S. 24-Parganas (Coll. S.K. Raut) iii) 6 exs., Barrackpore, N. 24-Parganas (Coll. W. Mainwaring) iv) 23 exs., Chandannagar, Hugli, v) 8 exs., Ranigunj, Bardhaman (Coll. F. Stoliczka) vi) 8 exs., Serampore, Hugli, (Coll. ?)

Distribution : India : West Bengal (Bardhaman, Calcutta, Hugli, N. & S. 24 Parganas), Maharashtra, Orissa, Tripura. Elsewhere : Burma, Bangladesh.

Remarks : Shell ovate, thin, perforate, yellowish white, with 2-3 chocolate bands encircling the whole length, whorls 6 with flattened surface.

This species is very commonly found attached to stems, branches or leaves of trees like woodapple (*Aegle marmelos* Correa) etc.

Measurements (in mm) : Length : 15.75-20.65; Width : 8.00-11.70; Height of the aperture : 7.80-11.45.

Family SCCINEIDAE

Shell thin, translucent, small to moderately large, ovate or oval, with a large aperture, spire very short, surface rather rough but without strong sculpture, whorls rapidly increasing in size, aperture oval, peristome thin, not reflected.

World wide. Amphibious in habit, some are arboreal.

Key to the Genera

1. Shell thinner, spire poorly develop, columellar fold thin and minute *Indosuccinea* Rao
Shell comparatively thicker, with a better developed spire and impressed suture, columellar fold with a distinct ridge 2
2. Penis with a penial sheath *Succinea* Draparnaud
Penis without a penial sheath *Quickia* Odhner

Genus 26. *Succinea* Draparnaud, 1801

Shell imperforate, thin, oval with a small conical spire, aperture large, 2-3. Penis lacks a sucker and an appendix and is covered by a sheath.

World wide.

65. *Succinea daucina* Pfeiffer

1854. *Succinea daucina* Pfeiffer, *Proc. zool. Soc. Lond.*, p. 298.

Material examined : i) 5 exs., Uttarpara, Hugli, 22.6.65 (Coll. P. Roy Chowdhury) ii) 20 exs., Calcutta iii) 9 exs., Port Canning S. 24-Parganas (Coll ?).

Distribution : India : West Bengal (Calcutta, Hugli, S. 24-Parganas). Elsewhere : Sri Lanka.

Measurements (in mm) : Length : 8.80-11.30; Width : 5.20-7.10; Height of the aperture : 5.80-8.10.

66. f. *hraswasikhara* Rao

1924. *Succinea daucina* f. *hraswasikhara* Rao, *Rec. Indian Mus.*, 26 : 397.

Material examined : i) 2 exs., Calcutta ii) 9 exs., Port Canning, S. 24-Parganas (Coll ?).

Distribution : West Bengal (Calcutta, S. 24-Parganas), Tamil Nadu.

Remarks : Differentiated from the typical form by its smaller shell with a relatively shorter spire, and a less tumid penultimate whorl.

Measurements (in mm) : Length : 6.18-7.35; Width : 3.56-4.18; Height of the aperture : 4.25-5.40.

67. *Succinea crassinuclea* Pfeiffer

1849. *Succinea crassinuclea* Pfeiffer, *Zeit. Malak.*, 6 : 110.

Material examined : i) 7 exs., Barrackpore, N. 24-Parganas, 9.2.66 (Coll. H.P. Mookherjee) ii) 5 exs., Calcutta iii) 3 exs., Port Canning (Coll ?) S. 24-Parganas.

Distribution : India : West Bengal : (N. & S. 24 Parganas), Himachal Pradesh, Punjab. Elsewhere : Pakistan.

Remarks : Shell variable in colour, size and shape of last whorl.

Measurements (in mm) : Length : 6.65-10.80; Width : 4.10-6.30; Height of the aperture : 4.55-7.95.

68. *Succinea snigdha* Rao

1924. *Succinea snigdha* Rao, *Rec. Indian Mus.*, 26 : 397.

Material examined : i) ex., Calcutta ii) 17 exs., Port Canning, S. 24-Parganas (Coll. ?)

Distribution : India West Bengal (Calcutta, S. 24 Parganas).

Remarks : Resembles *S. daucina*, differing in being smaller, thicker and narrower, also in having a longer spire and a distinct columellar ridge.

Measurements (in mm) : Length : 8.25; Width : 5.00; Height of the aperture : 6.10.

69. *Succinea godivariana* f. *vangiya* Rao

1924. *Succinea godivariana* f. *vangiya* Rao, *Rec. Indian Mus.*, 26 : 405.

Material examined : i) 1 ex., Port Canning, S. 24-Parganas (Coll ?)

Distribution : India : West Bengal.

Remarks : Differs from the typical form in being narrower and less convex and in having a coarser sculpture. As observed by Rao (1924), the species *S. godivariana* shows a discontinuous distribution being recorded from Andhra Pradesh in India and Burma. The form *vangiya*, which extends the distribution range of the species, perhaps deserves a subspecific status.

Genus : 27. *Quickia* Odhner, 1950

Shell ovately conical, less fragile with a proportionately larger spire, aperture ovate, usually a columellar fold present. Penis with retractor muscles but lacks a penial sheath.

Amphibious in habit. India and Africa.

As reported by Patterson (1971) this genus is represented in W. Bengal by two species *Q. bensoni* (Pfeiffer) and *Q. calcuttensis* Patterson. But the latter could not be studied by us.

70. *Quickia bensoni* (Pfeiffer)

1849. *Succinea bensoni* Pfeiffer, *Proc. zool. Soc. Lond.*, p. 133.

1971. *Quickia bensoni* : Patterson, *Mal. Rev.*, 4 : 165.

Material examined : i) 22 exs., Fort William, Calcutta ii) 1 ex., Eden Garden, Calcutta iii) 1 ex., Shibpur, Haora (Coll. H.S. Rao).

Distribution : India : West Bengal (Calcutta, Haora), Maharashtra, Uttar Pradesh. Elsewhere : Pakistan.

Measurements (in mm) : Length : 5.80-8.00; Width : 3.70-4.55; Height of the aperture : 4.15-5.35.

Genus 28. *Indosuccinea* Rao, 1924

Shell very fragile with a proportionately larger last whorl and a smaller spire, having fine growth striae, whorls 1 - F(1,2).

A highly vascular lung present, penis bulbous, of moderate length, covered by a sheath, lacks a retractor muscle.

Aroborcal in habit. India and Burma.

71. *Indosuccinea semiserica* (Gould)

Succinea semiserica Gould, *Proc. Boston, Soc. nat. Hist.*, 2 : 100.

Material examined : i) 8 exs., Calcutta ii) 4 exs., Scrampore, Hugli (Coll ?).

Distribution : India : West Bengal (Calcutta, Hugli), Maharashtra. Elsewhere : Burma, Bangladesh.

Remarks : Shell elongate, very thin and fragile, spire relatively short, last whorl large, obliquely striate, aperture large, oval.

Measurements (in mm) : Length : 11.50-18.35; Width : 7.10-9.60; Height of the aperture : 9.85-16.00.

72. *f. sthulasiras* Rao

1924. *Indosuccinea semiserica* f. *sthulasiras* Rao, *Rec. Indian Mus.*, 26 : 376.

Material examined : i) 1 ex., Ballygunj, Calcutta (Holotype) (Coll. H.S. Rao) ii) 21 exs., Ballygunj, Calcutta (Coll. H.S. Rao).

Distribution : India : West Bengal (Calcutta). Elsewhere : Burma.

Remarks : Shell smaller, spire shorter but more tumid. The oblique striae irregular, spire comparatively thicker than last whorl.

Measurements : (in mm) : Length : 7.35; Width : 4.65; Height of the aperture : 5.80.

Family GLESSULIDAE

Shell small to moderate, imperforate, rather narrowly elongate to cylindrical, with a blunt apex, smooth (without strong sculpture) aperture ovate, peristome simple, columella deeply concave, truncate at the base.

India (except N.W. Himalayas), Sri Lanka, Burma, S.W. China, Sumatra.

Following Godwin-Austen (1920) the genus *Glessula* is placed under a separate family. Accordingly the distributional range is also kept limited to the Oriental region.

Genus 29. *Flesula* Von Martens, 1850

Shell characters same as in the family. Sole of foot without distinct median area, no pedal margin.

Inhabits moist shady places with plenty of foliage etc. Many of the species are ovo-viviparous in nature.

73. *Glessula gemma* (Reeve)

1850. *Achatina gemma* Benson MS Reeve, *Conch. Icon.* 5, *Achatina*, pl. 22, fig. 123.

1860. *Achatina gemma* Benson, *Ann. Mag. nat. Hist.*, (3) 5 : 464.

1909. *Glessula gemma* : Pilsbry, in Tryons, *Man. Conch.*, 20 : 97, pl. 13, figs. 1-3.

Material examined : i) 15 exs., Gangajal bati, Bankura, 24.8.76 (Coll. S.K. Raut). ii) 6 exs., Uttarpara, Hugli, 21.9.65 (Coll. P. Roy Chowdhury) iii) 10 exs., Baranagar, Calcutta, 10.7.80, (Coll. S.C. Mitra).

Distribution : Indian : West Bengal (Bankura, Calcutta, Hugli), Bihar, Kerala, Maharashtra, Meghalaya. Elsewhere : Burma, Bangladesh.

Remarks : Shell oblong-conical, Chocolate brown, glossy, whorls 6, convex, aperture oval, peristome thin, unexpanded.

Measurements (in mm) : Length : 4.70-8.30; Width : 2.00-4.50; Height of the aperture : 2.60-4.00.

Family SUBULINIDAE

Shell small to moderate, usually cylindrically turreted, many whorled, imperforate or very narrowly perforate, uniformly coloured, whorls rather flat-sided, usually finely and regularly concave or straight, truncated or rounded below.

World wide.

Genus 30. *Lamellaxis* Strebel 1882

Shell small, usually narrowly perforate with a blunt apex, whorls flatly convex, microscopically sculptured, aperture widely ovate, outer lip thin, columella usually concave and rounded below, margin slightly reflected.

Oviparous in nature, produces small spherical eggs.

Tropical and subtropical regions of the world, except Australia.

74. *Lamellaxis gracile* (Hutton)

1834. No. 5, *Bulimus* ? Hutton, *J. Asiat. Soc. Beng.*, 3 : 84.

No. 5 *Bulimus* ? (mihi) *gracile* ? p. 93.

1914. *Opeas gracile* Hutton, *Fauna British India Mollusca*, 2 : 335.

1966. *Lamellaxis (Allopeas) gracile* : Solem, *Spolia, zool. Mus. Haum.*, 24 : 94.

Material examined : i) 9 exs., Nabadwip, Nadia, 28.3.37 (Coll ?) ii) 17 exs., Sibpur Haora, 8.5.65, iii) 6 exs., Bardhaman, 8.8.65 (Coll. P. Roy Chowdhury) iv) 25 exs., Kakdwip, S. 24-Parganas, 12.10.66 (Coll. K.V. Surya Rao) v) 5 exs., Puruliya, 31.5.71 (Coll. S. Khara) vi) 14 exs., Gol Park, Calcutta, 6.7.72 (Coll. A. Srivastava) vii) 11 exs., Serampore, Hugli, (Coll. A.T. Biswas. viii) 12 exs., Tourist cottage Compound Digha, Medinipur, 10.8.83 (Coll. A. Dey and S. Barua)

Distribution : India : Common throughout. Elsewhere : East Africa, Pakistan, Sri Lanka, Burma, Malay Peninsula and Archipelago, Japan, China Philippines and Polynesia.

Remarks : Animal light yellow, very commonly seen in active condition in shady parts of the garden, moist wall etc., particularly in rainy season.

Growth rate and fecundity of this species have been studied by Subba Rao et. al. (1980, 1981).

Family ACHATINIDAE

Shell moderately large to very large, ovately conical, imperforate, whorls convex, aperture ovate, outer lip thin, unexpanded, columella concave or straight, usually truncate below.

Africa.

Genus 31. *Achatina* Lamarck, 1799

Shell large to very large, thick, elongately ovate, spire more or less conoid, apical whorls smooth with an obtuse apex. Aperture widely ovate, outer lip simple, rather rounded, columella concave and abruptly truncate below.

Africa (one species subsequently introduced and established in other countries including India.)

75. *Achatina (Lissachatina) fulica fulica* (Bowdich)

1821. *Helix fulica* Ferussac, *Tabl. Syst. Limacons.*, p. 49, no. 347 (nom. nud.).

1950. *Achatina (Lissachatina) fulica fulica* : Bequart, *Bull. Mus. Com. zool. Harvard*, 105 (1) : 1-216, pl. 8.

Material examined : i) 12 exs., Barrackpore, N. 24-Parganas, 2.3.37 (Coll. H.S. Rao) ii) 1 ex., Barasat, N. 24-Parganas, 6.12.65 (Coll. A.K. Das) iii) 19 exs., Baruipur, S. 24-Parganas, (Coll. H. P. Mookherjee) iv) 1 ex., Ballygunj, Calcutta (Coll. N.V. Subba Rao) v) 1 ex., Ranikuti, Calcutta, 21.6.62 vi) 13 exs., Garia, 29.9.62, vii) 1 ex., Shibpur, Haora, 4.3.63 viii) 3 exs., Kidderpore, Calcutta ix) 5 exs., Barisa, Calcutta 24.3.64 x) 6 exs., Uttarpara, Hugli, 19.9.64 xi) 8 exs., Budge Budge, S. 24-Pargana, 19.10.65 (Coll. P. Roy Chowdhury) xii) 25 exs., Medinipur, 13.9.65 xiii) 5 exs., Calcutta xiv) 1 ex., Port Canning, S. 24-Parganas (Coll. ?) xv) 5 exs., Konnagar, Hugli, 23.11.78 (Coll. A. Dey).

Distribution : India : West Bengal (all districts), Andhra Pradesh, Assam, Andaman and Nicobar Islands, Bihar, Gujarat, Karnataka, Kerala Maharashtra, Manipur Mizoram, Nagaland Orissa, Tamil Nadu, Tripura, Uttar Pradesh. Elsewhere : Madagascar, Secyelles, Zanzibar, Mauritius, Singapore.

Remarks : Shell large, ovately conoid, inflated, pale yellowish to whitish with brown streaks; whorls 8 rapidly increasing in width, last whorl large equalling nearly half of entire length, smooth except short spiral striae just below the sutures.

It is known agri-horticultural pest taking a rather serious proportion in many parts of India, particularly in the eastern part of the country. It abundantly occurs in West Bengal. Haora, Calcutta, North and South 24-Parganas being the worst infested districts. Population density in some of these areas is as high as between 18-32/m² Raut, 1979).

Measurements (in mm) : Length : 45.00-77.25; Width : 27.00-42.50; Height of the aperture : 29.00-42.60

Family STREPTAXIDAE

Shell small, depressedly conoid to cylindrically narrow, transparent to whitish, smooth, straight or with radiating furrows.

Carnivorous in habit.

Tropical regions of the world.

Genus 32. *Gulella* Pfeiffer, 1856

Shell small, cylindrical, usually thin and transparent, smooth or ribbed, suture deep and crenulate, aperture greatly distorted as a result of presence of teeth, peristome thickened and usually expanded.

Africa, South and East Asia, West Indies.

Although the species *Gulella (Huttonella) bicolor* was placed under *Sinoennea* by von Bruggen (1967), following Dance (1970) we prefer to retain this species with a cylindrically turreted shell under the present combination.

76. *Gulella (Huttonella) bicolor* (Hutton)

1834. *Pupa bicolor* Hutton, *J. Asiat. Soc. Beng.*, 3 : 86 and 93.

1970. *Huttonella bicolor* : Dance, *J. Conch.*, 27 : 153.

Material examined : i) 2 exs., Museum compound, Calcutta, 15.7.22 (Coll. H. Hodgart) ii) 6 exs., Baranagar, Calcutta, 21.5.78 (Coll. S.C. Mitra).

Distribution : India : Common throughout. Elsewhere : Whole of S.E. Asia, Seychelles, Mascarene, West Indies.

Remarks : Shell small, subcylindrical, slender with a blunt apex, whorls 7-8, rather compressed and indented externally on both sides, upper whorls distinctly ribbed, aperture with two parietal folds and two rather obtuse teeth.

It is a carnivorous species, *Lamellaxis gracile*, which usually occurs in association with it, being the most common prey.

Measurements (in mm) : Length : 6.00-6.50; Width : 1.50-1.70; Height of the aperture : 1.40-1.60.

Family ARIOPHANTIDAE

Shell small to large, external or rarely internal, thin membranaceous to fairly solid, variable in shape, usually helicoid or globosely inflated to turbate, sometimes trochiform or even ear shaped, dextral or sinistral. smooth to variously sculptured, usually umbilicate, aperture, wide, peristome thin or slightly thickened, columella sometimes reflected over the umbilicus.

Animal with a narrow foot, pedal groove double. Caudal gland at the extremity of foot with or without on plants like mango, lemon etc.

Key to the Genera

1. Shell comparatively large, with distinct, coarse sculpture, sinistral.....*Ariophanta* Desmoulins
Shell comparatively smaller, without distinct sculpture, dextral 2
2. Shell trochiform with a keeled last whorl*Kaliella* Blanford
Shell depressed, with a rounded last whorl 3
3. Shell perforate with 5-6 whorls*Macrochalamys* Gray
Shell imperforate, with 3-4 whorls*Cryptaustenia* Cockrell

Genus 33. *Ariophanta* Desmoulins, 1829

Shell large, solid, helicoid or depressedly turbate, sinistral, umbilicate, with convex whorls, last whorl rounded or angulate striate or decussate above, smoother below, aperture oblique, wide, peristome thin, umbilicus partly obliterated by reflected columella.

Animal broad and depressed. Right dorsal lobe distinctly divided into two.

Key to the Species

- Shell more conoid, solid encircled by a chocolate band, last whorl more or less rounded.....
.....*A. laidlayana* (Benson)
- Shell more depressed, horny, without chocolate band, last whorl sharply angulate
.....*A. interrupta* (Benson)

77. *Ariophanta interrupta* (Benson)

1834. *Helix interrupta* Benson, *Proc. zool. Soc. Lond.*, p. 90.

1908. *Ariophanta interrupta* : Blanford and Godwin-Austen, *Fauna British India, Mollusca*, p. 31.

Material examined : i) ex., Tollygunj, Calcutta, 10.5.22 (Coll. C. Dhar) ii) 2 exs., Pulta, Barrackpore, N. 24-Parganas, 30.4.37 (Coll. Pulta survey Party) iii) 8 exs., Barasat, S. 24-Parganas,

6.9.65 (Coll. A.K. Das) ix) 25 exs., Baruipur, S. 24-Parganas, 8.9.65 (Coll. H.P. Mookherjee) v) 9 exs., Calcutta vi) 3 exs., Puruliya (Coll. F. Stoliczka).

Distribution : India : West Bengal (Calcutta, N. & S. 24 Parganas, Puruliya), Andhra Pradesh, Bihar, Maharashtra, Orissa. Elsewhere : Bangladesh.

Remarks : Shell thick, sinistral, flatly convex, coarsely and obliquely striate, decussated by fine spiral lines which are often obsolete, smooth and tumid at base, narrowly but deeply umbilicate, whorls 4-5, last whorl angulate at the periphery. Aperture lunate, oblique, peristome slightly thickened.

Measurements (in mm) : Length : 10.00-16.50; Width : 15.00-27.80; Height of the aperture : 8.60-14.20.

78. *Ariophanta laidlayana* (Benson)

1856. *Ilelix laidlayana* Benson, *Ann. Mag. nat. Hist.*, (2) 18 : 253.

1908. *Ariophanta laidlayana* : Blandford & Godwin-Austen, *Fauna British India, Mollusca*, p. 30.

Material examined : i) 2 exs., Ranigunj, Bardhaman ii) 2 exs., Puruliya (Coll. ?).

Distribution : India : West Bengal (Bardhaman, Puruliya), Andhra Pradesh, Bihar, Orissa.

Remarks : Shell similar to the preceding species, differs in the oblique striations being much finer and also in possessing a chocolate band. In addition, usually a chocolate patch is present in the umbilical region and also on the parietal wall of the aperture.

Measurements : Length : 16.60; Width : 24.90; Height of the aperture : 13.80.

Genus 34. *Macrochlamys* Gray, 1847

Shell thin and glossy, moderately large, perforate, depressedly helicoid to subglobosely turinate, smooth or finely striate with convex whorls, last whorl rounded or rarely subangulate, aperture more or less wide and crescent shaped, peristome thin, sometimes internally thickened, columella a little reflected.

Animal with a large mucous pore with a overhanging horn-like process, at the end of foot.

South East Asia (limited by moist warm climate, not occurring in comparatively drier N.W. India).

Key to the Species

Shell comparatively more depressed and broader, columella less reflected, umbilical region excavated *M. petrosa* (Hutton)

Shell comparatively more conoid and less broad, columella more reflected, umbilical region not excavated *M. indica* Godwin Austen

79. *Macrochlamys indica* Godwin-Austen

1883. *Macrochlamys indica* Godwin-Austen, *Land and Freshwater Mollusca of India*, 1 : 97, pl. figs. 1-8b.

1908. *Macrochlamys indica* : Blandford and Godwin-Austen, *Fauna British India, Mollusca*, p. 95.

Material examined : i) 20 exs., Pulta, Barrackpore, N. 24-Parganas, 24.5.36 (Coll. Pulta Survey Party) ii) 1 ex., Sripur, S. 24-Parganas 25.7.62 (Coll. A. Mookherjee) iii) 2 exs., Naskar hat, near

Bandel Gate, 24.8.62 iv) 15 exs., National library compound, Calcutta. 15.2.63 v) 4 exs., Uttarpara, Hugli, 16.9.64 (Coll. P. Roy Chowdhury) vi) 4 exs., Kidderpore dock, Calcutta, 14.3.63 vii) 19 exs., Dakshineswar, 16.3.63 (Coll. N.V. Subba Rao) viii) 1 ex., Habra, N. 24-Parganas, 25.2.65 ix) 19 exs., Baruipur, 8.9.65 x) 1 ex., Barrackpore, N. 24-Parganas, 9.2.66 (Coll. H.P. Mookherjee) xi) 6 exs., Bardhaman, 9.8.66 (Coll. A.K. Das) xii) 2 exs., Birbhum (Coll. J. Woodmason).

Distribution : India : Common throughout (except N.W. parts of the country). Elsewhere : Bangladesh.

Remarks : Shell depressed with a little raised spire, perforate pale brownish, whorls 5-6, polished with fine spiral striae. Aperture broadly lunate, a little oblique, columellar margin reflected.

In W. Bengal the highest population density of this species 22-34/m² is recorded from the district of Nadia (Raut, 1979).

Measurements (in mm) : Length : 8.50-11.90; Widths : 15.60-18.25; Height of the aperture : 7.20-8.40.

80. *Macrochlamys petrosa* (Hutton)

1834. *Helix ? petrosa* Hutton, *J. Asiat. Soc. Beng.*, 3 : 96.

1908. *Macrochlamys petrosa* : Blanford and Godwin-Austen, *Fauna British India, Mollusca*, p. 96.

Material examined : i) 8 exs., Bardhaman, 9.8.66 (Coll. A.K. Das) ii) 2 exs., Raniganj, Bardhaman iii) 1 ex., Barrackpore, N. 24-Parganas iv) 7 exs., Calcutta (Coll ?).

Distribution : India : West Bengal (Bardhaman, Calcutta, N. 24 Parganas), Assam, Bihar, Himachal Pradesh, Maharashtra, Sikkim, Uttar Pradesh.

Remarks : Differs from the preceeding species in being more depressed and broader; the spiral striae being faint or totally absent and also by being excavated at the umbilical region and having a broader umbilicus.

Measurements : Length : 68.00-10.60; Width : 14.00-23.45; Height of the aperture : 6.10-9.45.

Genus 35. *Kaliella* Blanford, 1863

Shell small usually thin, conoid to typically trochiform, obliquely costulate or strait.

Asia, Africa.

81. *Kaliella barrackporensis* Pfeiffer

1852. *Helix barrackporensis* Pfeiffer, *Proc. zool. Soc. Lond.*, p. 156

1908. *Kaliella barrackporensis* : Blanford and Godwin-Austen, *Fauna British India, Mollusca*, p. 258.

Material examined : i) 20 exs., Calcutta (Coll. G.H. Nevill).

Distribution : India : Common throughout. Elsewhere : Africa, Bangladesh, Burma, Pakistan, Sri Lanka.

Remarks : Shell small, trochiform, thin, narrowly perforate, obliquely and finely ribbed above, closely, spirally strait below, whorls 6, a little convex, last whorl keeled, perforation partly concealed by reflected columella. Aperture quadrately lunuate.

Measurements (in mm) : Length : 3.50; Width : 3.50; Aperture : 1.60.

Genus 36. *Cryptaustenia* (Cockrell, 1981)

Shell small, imperforate, thin transparent, depressed, with rapidly increasing whorls, aperture wide, peristome simple, thin, almost membranaceous.

Retractor muscle of the penis lacks a coil for attachment.

Eastern Himalayas to West Bengal.

81. *Cryptaustenia bensoni* (Pfeiffer)

1848. *Vitrina bensoni* Pfeiffer, *Proc. zool. Soc. Lond.*, p. 107.

1908. *Cryptaustenia bensoni* : Blanford and Godwin-Austen, *Fauna British India, Mollusca*, p. 187.

Material examined : i) 2 exs., Shibpur, Haora, 27.8.65 ii) 10 exs., Chandannagar, Hugli (Coll ?) iii) 2 exs., Baranagar, Calcutta, 10.2.73 (Coll. S.C. Mitra)

Distribution : India : West Bengal (Calcutta, Haora, Hugli). Elsewhere : Bangladesh.

Remarks : Shell depressed, thin, translucent, spire scarcely raised, whorls 3-4 convex, sutures shallow, aperture oblique, widely lunate, columella acutely curved.

Measurements : (in mm) : Length : 6.10-8.35; Width : 9.15-12.86; Height of the aperture : 6.20-7.00

Family TROCHOMORPHIDAE

Shell moderate, depressedly trochiform, thin, apex blunt, whorls rather flat, usually closely striate, periphery angulate or carinate, edges of umbilicus sometimes angulate, aperture depressed, oblique, peristome thin or thick, often arcuate.

India, Burma, China, Japan, Malaysia, Philippines, New Guinea and other Pacific Islands.

Genus 37. *Sivella* Blanford, 1863

Shell depressed, acutely keeled, thin, with a wide umbilicus.

India and China.

Following Solem (1966) *Sivella* is given a generic status here.

83. *Sivella castra* (Benson)

1852. *Helix castra* Benson, *Ann. Mag. nat. Hist., Ser. 2* : 10 : 349.

1914. *Trochomorpha (Sivella) castra* : Guide, *Fauna British India, Mollusca*, 2 : 3.

Material examined : i) 6 exs., Calcutta (Coll. ?) ii) 3 exs., Barrackpore, N. 24-Parganas, 31.7.65 (Coll. P. Roy Chowdhury).

Distribution : West Bengal : (Calcutta, N. 24 Parganas), Assam, Arunachal Pradesh, Meghalaya, Sikkim. Elsewhere : Burma, Malaysia, Malay Peninsula.

Remarks : Shell thin, depressedly conoid, widely umbilicate, acutely keeled, rather strongly, obliquely striate whorls, 6, a little convex, sutures shallow.

Measurements (in mm) : Length : 4.15-5.3; Width : 11.61-15.5; Height of the aperture : 4.15-4.55

Order SOLEOLIFERA

Animal without shell, elongately oval, dorsally convex, the eye bearing pair of tentacles is contractile (not retractile) and the other pair is bilobed. Mantle covers the whole back of the body. Foot transversely grooved. The male genital opening is on the anterior right side of the body, and the female opening is just below the middle.

Tropical regions of Asia, Africa, America, Australia, W. Polynesia. Nocturnal and herbivorous in habit. Living on grounds between low vegetations, under decaying leaves etc.

Genus 38. *Laevicaulis* Simroth, 1913

Body elongated, when contracted oblong, narrower when extended. A deep furrow present around the margin separating the mantle from the foot. Head, which can be withdrawn under the mantle, possesses two pairs of tentacles, upper pair longer and cylindrical, lower pair shorter. Foot when contracted, does not extend over the anus, anal opening slit like and not covered by a flap.

These slugs are voraciously herbivorous and often become a pest in cultivated areas.

Harmaphrodite, both self and cross fertilisation take place, lay eggs numbering upto more than hundred at a time.

Africa, Asia, Australia, New Calendonia and Loyalty islands.

84. *Laevicaulis alte* (Ferussac)

1821. *Vaginulus alte* Ferussac, *Tabl. Syst. Limaces.*, P. 14.

1961. *Laevicaulis alte* : Ray, *Treubia*, 25 (3) : 275.

Material examined : i) 5 exs., Garden at Alipur, Calcutta, 21.2.62 (Coll. N.V. Subba Rao) ii) 7 exs., Basirhat, S. 24-Parganas (Coll. Ramdas Das) iii) 3 exs., from leaves and soil, Barddhaman, 9.8.65 (Coll. A.K. Das) iv) 2 exs., Kalyani, Nadia, 19.9.65 (Coll. H.P. Mookherjee) v) 7 exs., Port Canning, S. 24-Parganas, 19.8.66 (Coll. P. Roy Chowdhury).

Distribution : India : West Bengal (Barddhaman, S. 24 Parganas, Nadia), Andhra Pradesh, Bihar, Gujarat, Maharashtra, Orissa, Rajasthan, Tamil Nadu, Pondicherry. Elsewhere : East Africa, Mauritius, Reunion, Madagascar, Sri Lanka, Hongkong, China, Formosa, Indonesia, New Caledonia and Loyalty Island, Malay Peninsula and Archipelago, Australia.

Remarks : Mantle pigmented with dark brown colour, usually with a yellowish band down the middle. The exceptionally wide distribution of this species is perhaps due to accidental transport through plants etc. According to Verdcourt (1972), this does not indicate an ancient species but a recent artificial extension of distribution from an unknown region.

It is the most common species of land slug in West Bengal. It usually inhabits cultivated gardens and voraciously feeds on the plants causing extensive damage to the same.

Measurement (in mm) : Length : 25.80-63.00; Width : 10.25-22.75

SUMMARY

The taxonomic account presented here includes 109 specific and infra-specific categories of land and freshwater molluscs (23 families and 49 genera) which are known to occur in the areas of lower West Bengal, mentioned earlier.

Freshwater molluscs were adequately collected and the rather impressive list may well serve as an exhaustive list for entire West Bengal in general. Out of the 65 species listed, 60 (14 families and 21 genera) species have been studied by us and 17 among them have their type localities within West Bengal.

The most important factor from the faunistic point of view is that several marine and estuarine families like, Neritidae, Assimineidae, Arcidae, Cultellidae, Solceturidae etc. are represented in the Hugli river and in other water bodies connected to it. As such, species like *Nerita violacea*, *N. smithi*, *Clithon reticularis*, *Septaria lineata*, *Assiminea francessi*, *Tanysiphon rivalis* etc. are not primarily freshwater in nature, but quite abundantly occur in the Hugli river or water bodies linking it and show euryhaline adaptation.

Among the species studied, *Pila globosa* var. *incrassatula*, *P. globosa* var. *minor*, *Assiminea francessi*, *Parreysia (Radiatula) caerulea* var. *gaudichaudi* and *Tanysiphon rivalis* are known only from West Bengal.

However, the list of land molluscs present a meager 44 specific and infra-specific categories out of which 24, involving 12 families and 16 genera were studied. This compares rather poorly with the total number of land molluscs (120 approx.) recorded from the whole of West Bengal.

Out of the 24 species studied, only six viz. *Pupilla barrackporensis*, *Succinea daucina*, *S. singdha*, *S. godivariana* f. *vangiya*, *Indosuccinea semiserica* f. *stulasis* and *Cryptaustenia bensoni* are endemic to West Bengal.

A few species like *Laevicaulis alte*, *Pupisoma orcula*, *Lamellaxis gracile*, *Achatina fulica*, *Kaliella barrackporensis* and *Gulella bicolor* have more or less cosmopolitan distribution. The exceptional distribution of some of these species is attributed to human agency.

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LAND AND FRESHWATER MOLLUSCS, PART - II

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INTRODUCTION

The present report deals with the land and freshwater molluscs of the five northern districts of West Bengal viz. Maldah, West Dinajpur, Koch Bihar, Jalpaiguri and Darjiling. Land and freshwater molluscs occurring in the remaining districts were separately dealt in Land and freshwater molluscs of West Bengal Part - I (Mitra & Dey, 1992). Species which were included in Part - I are briefly dealt here just giving the additional material studied at present.

The arrangement of Subba Rao (1989) has been followed for the classification of freshwater molluscs and that of land molluscs is after Taylor and Sohl (1962).

List of molluscs recorded from North Bengal

Class GASTROPODA
Order MESOGASTROPODA
Family VIVIPARIDAE

1. *Bellamya bengalensis* f. *balteata* (Benson, 1836)
 2. ** *B. bengalensis* race *doliaris* (Gould, 1843)
 3. ** *B. bengalensis* f. *typica* (Lamarck, 1822)
 4. ** *B. crassa* (Hutton, 1836)
 5. *B. dissimilis* (Mueller, 1774)
- Family CYCLOPHORIDAE
6. *Alycaeus (Cyclorhynchus) bembex* Benson, 1859
 7. *A. (C.) constrictus* Benson, 1851
 8. *A. (C.) graphicus* Blanford, 1862
 9. *A. cotiphorus* Benson, 1858
 10. *A. (Dicharax) crenulatus* Benson, 1859
 11. *A. (D.) digitatus* H. Blanford, 1871
 12. *A. (D.) gemmula* Benson, 1859
 13. *A. (D.) lectus* Godwin-Austen, 1914
 14. *A. (D.) lenticulus* Godwin-Austen, 1874

15. *A. (D.) plectochilus* Benson, 1859
16. * *A. (D.) subhumilis* Mollendorff, 1897
17. *A. (D.) stylifer* Benson, 1857
18. *Chamalycaeus physis* (Benson, 1859)
19. *Cyclophorus (Glossostylus) aurora* Benson, 1851
20. * *C. (G.) exul* Benson, 1854
21. *C. (G.) himalayanus* Pfeiffer, 1851
22. * *C. (G.) tryblium* Benson, 1854
23. *C. (Litostylus) pyrotrema* Benson, 1854
24. *Dioryx urnula* Benson, 1853
25. *Pterocyclus rupestris* Benson, 1832
26. *Lagochilus tomotrema* (Benson, 1857)
27. *Theobaldius phaenotopicus* (Benson, 1851)
- Family DIPLOMMATINIDAE
28. *Diplommata blanfordiana* Benson, 1860
29. * *D. oviformis* Fulton, 1901
30. *D. pachychilus* Benson, 1857
31. *D. polypleuris* Benson, 1857
32. *D. pullula* Benson, 1859
33. * *D. regularis* Fulton, 1901
34. *D. semisculpta* Blanford, 1868
35. * *D. theobaldi* Godwin-Austen, 1886
36. *D. unguata* Blanford, 1871
- Family PUPINIDAE
37. *Pseudopomatias himalayae* (Benson, 1859)
38. *Rhaphaulus blanfordi* (Benson, 1857)
39. *Schistoloma funiculatum* (Sowerby, 1850)
- Family PILIDAE
40. ** *Pila globosa* (Swainson, 1822)
- Family BITHYNIIDAE
41. ** *Digoniostoma cerameopoma* (Benson, 1830)
42. ** *D. pulchella* (Benson, 1836)
43. ** *Gabbia orcula* (Frauenfeld, 1862)
- Family THIARIDAE
44. ** *Thiara (Thiara) scabra* (Mueller, 1774)
45. ** *T. (Melanoides) tuberculatus* (Mueller, 1774)

46. ** *T (Tarebia) lineata* (Gray, 1828)
47. ** *Brotia (Antimelania) costula* (Rafinesque, 1833)
48. *Paludomus (Paludomus) blanfordiana* Nevill, 1857
49. *P. (P.) regulata* Benson, 1856
- Order BASOMMATOPHORA
- Family LYMNAEIDAE
50. ** *Lymnaea (Pseudosuccinea) acuminata* f. *typica* Lamarck, 1822
51. ** *L. (P.) acuminata* f. *rufescens* Gray, 1820
52. ** *L. (P.) luteola* f. *australis* Annandale & Rao, 1925
53. ** *L. (P.) luteola* f. *ovalis* Gray, 1820
- Family PLANORBIDAE
54. ** *Indoplanorbis exustus* (Deshayes, 1834)
55. ** *Gyraulus labiatus* (Benson, 1850)
56. ** *G. convexiusculus* (Hutton, 1849)
- Family ANCYLIDAE
57. *Ferrissia baconi* (Bourguignat, 1853)
- Order STYLOMMATOPHORA
- Family VALLONIIDAE
58. ** *Pupisoma orcula* (Benson, 1850)
59. * *P. seriola* (Benson, 1863)
- Family ENIDAE
60. * *Ena (Subzebrinus) boysiana* (Reeve, 1849)
61. ** *Rhachis bengalensis* (Lamarck, 1822)
62. * *R. praetermissus* (Blanford, 1861)
- Family CLAUSILIIDAE
63. * *Phaedusa ios* (Benson, 1852)
64. *P. loxostoma* (Benson, 1836)
- Family CORILLIDAE
65. *Plectopylis (Endothyra) blanda* Gude, 1898
66. *P. (E.) Minor* Godwin-Austen, 1899
67. *P. (E.) pinacis* (Benson, 1859)
- Family SUBULINIDAE
68. *Bacillum erosum* (Blanford, 1871)
69. * *Curvella blanfordi* Gude, 1914
70. *C. khasiana* (Godwin-Austen, 1872)

71. *C. sikkimensis* (Reeve, 1850)
72. * *Glessula baculina* (Blanford, 1871)
73. * *G. crassilabris* (Benson, 1836)
74. *G. crassula* (Reeve, 1850)
75. ** *G. gemma* (Reeve, 1850)
76. * *G. hastula* (Benson, 1860)
77. * *G. orobia* (Benson, 1860)
78. * *G. tenuispira* (Benson, 1836)
79. ** *Lamellaxis gracile* (Hutton, 1834)
80. * *L. latebricola* (Reeve, 1849)
Family ACHATINIDAE
81. ** *Achatina (Lissachatina) fulica fulica* (Bowdich, 1822)
Family PHILOMYCIDAE
82. *Incillaria campestris* Godwin-Austen, 1876
Family STREPTAXIDAE
83. * *Gulella (Huttonella) bicolor* (Hutton, 1834)
Family TROCHOMORPHIDAE
84. ** *Sivella castra* (Benson, 1852)
Family ARIOPHANTIDAE
85. ** *Ariophanta interrupta* (Benson, 1834)
86. *Austenia annandalei* Godwin-Austen, 1910
87. * *A. sikkimensis* (Godwin-Austen, 1888)
88. *Bensonina camura* (Benson, 1859)
89. *B. mainwaringi* (Godwin-Austen, 1822)
90. *Cryptozona ligulata* (Ferussac, 1819-21)
91. ** *Kaliella barrakporensis* (pfeiffer, 1852)
92. * *K. nana* (Hutton, 1838)
93. *K. nevilli* Godwin-Austen, 1883
94. * *Macrochlamys darjilingensis* Godwin-Austen, 1883
95. * *M. evidens* Godwin-Austen, 1883
96. ** *M. indica* Godwin-Austen, 1883
97. *M. hodgsoni* (Benson, 1859)
98. *M. lubrica* (Benson, 1852)
99. *M. pipara* Godwin-Austen, 1883
100. *M. patane* (Benson, 1859)
101. *M. petasus* (Benson, 1859)

102. ** *M. petrosa* (Hutton, 1834)
103. *M. rorida* (Benson, 1859)
104. *M. sequax* (Benson, 1859)
105. * *M. sequins* Godwin-Austen, 1907
106. *M. superflua* (Blanford, 1904)
107. *M. tugurium* (Benson, 1852)
108. *Oxytes blanfordi* (Theobald, 1859)
109. *O. cycloplax* (Benson, 1852)
110. *O. orobia* (Benson, 1852)
111. *Rahula bascauda* (Benson, 1848)
112. *R. macropleuris* (Benson, 1859)
113. *Sitala infula* (Benson, 1848)
114. * *Sitala rimicola* (Benson, 1859)
Family HELICARIONIDAE
115. *Cryptaustenia heteroconcha* (Blanford, 1871)
116. *C. ovata* (H. Blanford, 1871)
117. *Durgella salius* (Benson, 1859)
118. * *D. seposita* (Benson, 1859)
Family CAMAENIDAE
119. *Chloritis (Trichochloritis) delibrata* (Benson, 1836)
120. *Ganesella acris* (Benson, 1859)
Family BRADYBAENIDAE
121. * *Bradybaena similaris* (Ferussac, 1822)
122. *Plectotropis tapeina* (Benson, 1836)
Order SOLEOLIFERA
Family VERONICELLIDAE
123. ** *Laevicaulis alte* (Ferussac, 1821)
Class BIVALVIA
Order UNIONOIDA
Family UNIONIDAE
124. ** *Lamellidens marginalis* (Lamarck, 1819)
125. ** *L. corrianus* (Lea, 1834)
Family AMBLEMIDAE
126. ** *Parreysia (Parreysia) favidens* (Benson, 1862)
127. ** *P. (P.) favidens* var. *marcens* (Benson, 1862)
128. ** *P. (P.) favidens* var. *plagiosoma* (Benson, 1862)

129. ** *P. (Radiatula) caerulea* (Lca, 1834)
 130. *P. (R.) lima* (Simpson, 1990)
 131. *P. (R.) lima* var. *siliguriensis* (Preston, 1908)
 Order VENEROIDA
 Family PISIDIIDAE
 132. *Pisidium atkinsonianum* Theobald, 1876
 133. *Sphaerium indicum* Deshayes, 1854
 Family CORBICULIDAE
 134. ** *Corbicula striatella* Deshayes, 1854

* *Species recorded in literature*

** *Species included in Part - I*

MOLLUSCS OF NORTH BENGAL

A. FRESH WATER

Key to the families

1. Shell with a single valve..... 2
 Shell with two valves..... 8
2. Shell with an operculum..... 3
 Shell without an operculum..... 6
3. Operculum with concentric growth markings..... 4
 Operculum with spiral growth markings..... 5
4. Shell large, globose; aperture ovate with an calcareous operculum..... Pilidae
 Shell moderate, pyramidal; aperture sub-circular, with a horny operculum..... Viviparidae
5. Shell above 10 mm in length, turreted or globose, with sculptures; animal with a brood pouch... Thiariidae
 Shell below 10 mm in length, ovate, without sculpture, animal without a brood pouch..... Bithyniidae

6. Shell limpet-like, without spirally coiled whorls..... Ancyliidae
 Shell with spirally coiled whorls..... 7
7. Shell elongate, with a raised spire, columella twisted..... Lymnacididae
 Shell discoidal, spire not raised, columella not twisted..... Planorbidae
8. Shell subrhomboid or transversely elongate, without concentric sculpture..... 10
 Shell ovately trigonal, with concentric sculpture..... 9
9. Shell thick, hinge straight, lateral teeth serrated..... Corbiculidae
 Shell thin, hinge curved, lateral teeth smooth..... Pisidiidae
10. All four gills marsupial, beak sculpture radial and well developed..... Amblemididae
 Only the outer two gills marsupial, beak sculpture concentric-radial and rudimentary.....
 Unionidae

SYSTEMATIC ACCOUNT

Order MESOGASTROPODA

Family VIVIPARIDAE

Genus 1. *Bellamya* Jousseaume, 1886

1. *Bellamya bengalensis f. balteata* (Benson)

1836. *Paludina bengalensis f. balteata* Benson, *J. Asiat. Soc. Beng.*, 2 : 745.

Material examined : 9 exs., Siliguri, Darjiling (Coll. ?).

Measurements (in mm) : Height : 20.75-26.65 ; Diameter : 17.0-20.0 ; H. of Aperature : 11.65-14.25

Distribution : India : West Bengal (Darjiling), Assam, (eastern part of Brahmaputra Valley).

Remarks : No recent material of this form could be studied. It is included here on the basis of the specimens present in the National Zoological Collection. However, a doubt regarding the authenticity of the locality "Siliguri" (Whether it was a misspelling for Silcuri) as given in the Register (2289), was expressed by Annandale (1921).

2. *Bellamya bengalensis race doliaris* (Gould)

Material examined : West Dinajpur District : 7 exs., Tangon river near Banshihari (Coll. D.K.

Thakur, 1.4.85), 4 exs., Chiramati river, Harirampur (Coll. D.K. Thakur, 31.3.85), 2 exs., Atreyi river at Patiram, (Coll. D. K. Thakur, 1.4.85). Jalpaiguri district; 1 ex., Bank of Chela nadi, Chilapata (Coll. R.K. Ghosh, 10.3.85); Koch Bihar district; 1 ex., Satanga river, Mathabhanga (Coll. S.C. Mitra, 13.4.86).

3. *Bellamya bengalensis f. typica* (Lamarck)

Material examined : West Dinajpur district : 2exs., Pond near Kulik river, Raigunje, 2exs., pond behind hospital, Islampur; 5 exs., canal near Mahananda bungalow, Harischandrapur (Coll. D. K. Thakur & S.C. Mitra, 1985). Jalpaiguri district : 10 exs., bank of Chela nadi, Chilapata; 7 exs., Nal Rajar Garh, Chilapata (Coll. R.K. Ghosh, 1985). 2exs., Satanga river at Mathabhanga, W. of Koch Bihar (Coll. S.C. Mitra & S. Barua, 1986). Koch Bihar district : 4 exs., Banidaha river near Dinhata, 1986). (Coll. S.C. Mitra & S. Barua, 1986). Darjiling district : 2 exs. Mahananda river near Siliguri, Darjiling (Coll. Teesta Valley Survey, 1953).

4. *Bellamya crassa* (Hutton)

Material examined : Maldah district : 7 exs., Bank of Mahananda river, Maldah, 3 exs. Tangon river at Bangshihari, 6 exs. Atreyi river, Patiram; 2 exs. Punarvaba river at Gangarampur (Coll. D.K. Thakur & S.C. Mitra, 1985); Koch Bihar district : 12 exs. Tara river at Taraganje, east of Toofangunje, (Coll. S.C. Mitra & S. Barua, 1986).

Remarks : This species with a strongly built subglobose shell is essentially a riverine form and occurs in rivers with sandy beds, boulders etc. From the lower part of the state it has been collected only from the Churni river at Nadia (Nadia district).

5. *Bellamya dissimilis* (Mueller)

Material examined : West Dinajpur district : 2 exs. Tangon river near Banshihari; 1 ex. Atreyi river near Banshihari; 1 ex. Atreyi river near Patiram; 2 exs. Under a wooden bridge near Shanti colony (Coll. D.K. Thakur & S. C. Mitra, 1985). Jalpaiguri; (Coll. S.C. Mitra & S. Barua, 1986) Koch Bihar district : 4 exs. Pond at Dinhata, Koch Bihar (Coll. S.C. Mitra & S. Barua, 1986).

Family PILIDAE

Genus 2. *Pila* (Bolten) Roeding, 1798

6. *Pila globosa* (Swainson)

Material examined : Maldah district : 2 exs. Canal near Mahananda bungalow, Harishchandrapur, Maldah, West Dinajpur district : 1 ex., Atreyi river at Patiram, W. Dinajpur (Coll. D.K. Thakur & S.C. Mitra, 1985). Jalpaiguri district : 1 ex. Edge of Teesta river (Coll. H.S. Rao, 1920). Koch Bihar district : 2 exs. paddy field at Gitaldaha, Dinhata (Coll. S.C. Mitra, & S. Barua, 1986).

Family BITHYNIIDAE

Genus 3. *Digoniostoma* Annandale, 19207. *Digoniostoma cerameopoma* (Benson)

Material examined : Maldah district : 2 exs. Bank of Mahananda river (Coll. D.K. Thakur & S.C. Mitra, 1985). West Dinajpur district : 2 exs. near tourist lodge, Raigunje (Coll. D.K. Thakur & S.C. Mitra, 1985). Koch Bihar district : 1 ex. Bairagi dighi, in front of Madan Mohun temple, (Coll. S.C. Mitra & S. Barua, 1986).

8. *Digoniostoma pulchella* (Benson)

Material examined : Maldah district : 3 exs. Dried up ditch at Gour, Maldah (Coll. D.K. Thakur & S.C. Mitra, 1985).

Genus 4. *Gabbia* Tryon, 18659. *Gabbia orcula* (Frauenfeld)

Material examined : Koch Bihar district : 6 exs. Bairagi dighi, in front of Madan Mohun temple, Koch Bihar (Coll. S.C. Mitra & S. Barua, 1986).

Family THIARIDAE

Key to the genera of Thiaridae

1. Shell elongate-turreted, spire longer than last whorl..... 2
 Shell oblong-globose, spire shorter than last whorl..... *Paludomus*
2. Shell upto 5 cms., operculum pear shaped with a basal nucleus..... *Thiara*
 Shell above 5 cms., operculum circular with a central nucleus..... *Brotia*

Genus 5. *Thiara* Roeding, 1798Key to the subgenera of *Thiara*

1. Shell pagoda like, spire descending in regular steps, with spines..... *Thiara s. str.*
 Shell narrowly elongate, spire evenly descending, without spines..... 2
2. Shell with crisscrossing striae giving it a tubercular appearance..... *Malanoides*
 Shell with crisscrossing ridges giving it a granular appearance..... *Tarebia*

10. *Thiara (Thiara) scabra* (Mueller)

Material examined : Maldah district : 4 exs. Banks of Mahananda river, Maldah (Coll. D.K. Thakur & S.C. Mitra, 1985). West Dinajpur district : 12 exs. Kulik river Kharmuja Ghat, Raigunje (Coll. D.K. Thakur & S.C. Mitra, 1985). Jalpaiguri district : 1 ex. Kaljani river at Birpara, S. of Alipurduar (Coll. S.C. Mitra & S. Barua, 1986). Koch Bihar district : 2 exs. Satanga river at Mathabhanga, 1 ex. Tara river at Taragunje (Coll. S.C. Mitra & S. Barua, 1986).

11. *Thiara (Melanoides) tuberculatus* (Mueller)

Material examined : Maldah district : 1 ex. Mahananda river bank, (Coll. D.K. Thakur & S.C. Mitra, 1985). West Dinajpur district : 2 exs. Kulik river at Kharmuja ghat, 1 ex. Road side canal at Santi colony, Kaliagunje (Coll. D.K. Thakur & S.C. Mitra, 1985). Koch Bihar district : 6 exs. Singhimari river at Gitaldaha near Dinhata; 2 exs. Satanga river at Mathabhanga, 42 kms. West of Koch Bihar; 2 exs. Tara river, near Toofangunje (Coll. S.C. Mitra & S. Barua, 1986). Jalpaiguri district : 3 exs. Poll, Western side of Hasimara E. Range Wild Life Div. Office, Hasimara; 2 exs. Kaljani river, Birpara, South of Alipurduar (Coll. S.C. Mitra & S. Barua, 1986). Darjiling district : 1 ex. Mahananda river at Siliguri (Coll. B.N. Chopra, 1926).

12. *Thiara (Tarebia) lineata* (Gray)

Material examined : Maldah district : 3 exs. Mahananda river banks (Coll. D.K. Thakur & S.C. Mitra, 1985); West Dinajpur district : 2 exs. Dhonaipur village, Harirampur; 3 exs. Tangon river at Banshihari; 2 exs. Atreyi river at Patiram; 4 exs. Kulik river, Kharmuja Ghat, Raigunje (Coll. D.K. Thakur & S.C. Mitra, 1985). Koch Bihar district : 1 ex. Singhimari river at Gitaldaha near Dinhata; 2 exs. Roydak river at Toofangunje, S.E. of Koch Bihar (Coll. S.C. Mitra & S. Barua, 1986). Jalpaiguri district : 1 ex. Kaljani river at Chapatali S. of Alipurduar; 4 exs. Daria river, 6 of Rajabhatkhawa (Coll. S.C. Mitra & S. Barua, 1986). Darjiling district : 32 exs. Mahananda river, 1 km. from Siliguri (Coll. Teesta Valley Survey, 1953).

Genus 6. *Brotia* H. Adams, 1866Subgenus *Antimelania* Crosse & Fischer, 189213. *Brotia (Antimelania) costula* (Rafinesque)

Material examined : 4 exs. Maldah river bank, Maldah (Coll. D.K. Thakur & S.C. Mitra, 1985). West Dinajpur district : 5 exs. Tangon river at Banshihari; 2 exs. Punarvaba river at Gangarampur; 4 exs. Atreyi river at Patiram; 6 exs. Kulik river at Raigunje (Coll. D.K. Thakur & S.C. Mitra, 1985). Koch Bihar district : 2 exs. Satanga river at Mathabhanga, Koch Bihar; 1 ex. Mujnai river at Kalibari near Mathabhanga, 1 ex. Torsa river at Ghughumari south of Koch Bihar (Coll. S.C. Mitra & S. Barua, 1986). Jalpaiguri district : 3 exs. stagnant pool west of Hasimara E. Range Wild Life Div. Office ; 2 exs. Nonai river south of Rajabhatkhawa; 5 exs. Bamnijhora stream S.W. of Rajabhatkhawa, Jalpaiguri (Coll. S.C. Mitra & S. Barua, 1986).

Genus 7. *Paludomus* Swainson, 1840

Shell thick, strong, oblong-globose, smooth or sculptured, spire shorter than last whorl; aperture large, ovate, usually grooved below, columella much thickened.

India, Burma, Sri Lanka.

In West Bengal this genus is restricted to the northern part of the state and is represented by a single subgenus *Paludomus* s. str. and two species.

Key to the species of *Paludomus*

Shell globosely ovate, with irregular, fine striae, concentrated near the suture..... *P. blanfordiana*

Shell acuminate ovate, with irregular, groove-like striae, uniform throughout..... *P. regulata*

14. *Paludomus (Paludomus) blanfordiana* Nevill

1877. *Paludomus blanfordiana* Nevill, *J. Asiat. Soc. Beng.*, 46 (2) : 37.

1915. *Paludomus blanfordiana* : Preston *Fauna Brit. India*, Mollusca (Freshwater Gastropoda & Pelecypoda) p.43.

Material examined : Jalpaiguri district : 5 exs., Nonai river eastern side of bridge at Highway Crossing, Rajabhatkhawa; 5 exs., Chaitanyajhora at Checkpost, N.E. of Rajabhatkhawa (Coll. S.C. Mitra & S. Barua, 1986). Darjiling district : 2 exs. Mahananda river near Siliguri (Coll. B. N. Chopra, 1924).

Measurements (in mm) : Length : 9.3-13.1 ; Diameter : 7.4-10.5 ; H. of Aperture : 6.8-10.1.

Diagnosis : Shell small, ovately globose with much inflated last whorl, yellowish brown, irregularly spirally striate, more distinctly near the sutures, with prominent transpiral growth markings, a number of chocolate bands present on the last whorl.

Distribution : India : West Bengal (Darjiling new record), Assam, Meghalaya. Elsewhere : Burma.

15. *Paludomus (Paludomus) regulata* Benson

1856. *Paludomus regulata* Benson, *Ann. Mag. nat. Hist.*, (2) 17 : 496.

1915. *Paludomus regulata* : Preston, *Fauna Brit. India*, Mollusca (Freshwater Gastropoda & Pelecypoda) p.42.

Material examined : West Dinajpur district : 13 exs. Tangon river near Bangshihari; 4 exs., Kulik river at Raigunje (Coll. D. K. Thakur & S. C. Mitra, 1985). Koch Bihar district : 1 ex. Raidak river at Toofangunje (Coll. S.C. Mitra & S. Barua, 1986). Jalpaiguri district : 4 exs. stagnant pool of water near Hasimara E. Range Wild Life Office; 6 exs. Bamnijhora, a stream S.W. of Rajabhatkhawa; 7 exs., Daria river 6 kms. from Rajabhatkhawa; 1 ex. Chaitanyajhora at Check Post near Rajabhatkhawa; 4 exs. Raidak river at Barobisha, 17 kms. E. of Rajabhatkhawa (Coll. S.C. Mitra & S. Barua, 1986) Darjiling district : 5 exs. Mahananda river at Siliguri (Coll. H.A. Hafiz, 1945).

Measurements (in mm) : Length : 16.75-29.4 ; Diameter : 11.5-23.25 ; H. of Aperture : 11.1-19.15.

Diagnosis : Shell larger, thicker, ovate with an acute spire, light brownish with rather broad chocolate bands, regularly spirally striate throughout. Operculum with a lateral nucleus.

Distribution : India : West Bengal (Darjiling, Jalpaiguri, Koch Bihar, West Dinajpur). Elsewhere: Bangladesh, Burma.

(This species was hitherto known from Burma, now it is for the first time recorded from West Bengal, India).

Order BASOMMATOPHORA
Family LYMNAEIDAE
Genus 8. *Lymnaea* Lamarck 1799
Subgenus *Pseudosuccinea*

16. *Lymnaea (Pseudosuccinea) acuminata f. typica* Lamarck

Material examined : West Dinajpur district : 6 exs. Pond at Raigunje; 2 exs. Punarvaba river near Gangarampur (Coll. D.K. Thakur & S.C. Mitra, 1985). Koch Bihar district : 3 exs. Singhimari river at Gitaldaha S. of Dihhata; 3 exs. Satanga river at Mathabhanga; 5 exs. freshwater pool at Kalibari near Mathabhanga; 3 exs. Mujnai river at Mathabhanga; 1 ex. Torsa river at Ghughumari S. of Koch Bihar (Coll. S.C. Mitra & S. Barua, 1985). Jalpaiguri district : 3 exs., Kaljani River at Chapatali S. of Alipurduar, 3 exs. Chaitanyajhora, a stream at Checkpost N.E. of Rajabhatkhawa; 5 exs., Bamnijhora stream S.W. of Rajabhatkhawa; 2 exs. Sankosh river at Sankosh, 53 kms. E. of Rajabhatkhawa (Coll. S.C. Mitra & S. Barua, 1986).

17. *Lymnaea (Pseudosuccinea) acuminata f. rufescens* Gray

Material examined : 1 ex. Mahananda river at Maldah, Coll. D.K. Thakur & S.C. Mitra, 1985). Koch Bihar district : 1 ex. Raidak river at Mathabhanga S.E of Koch Bihar (Coll. S.C. Mitra & S. Barua, 1986). Jalpaiguri district : 2 exs. stagnant water pool near Hasimara E. Range Wild Life Div. Office; 2 exs. Bamnijhora stream SW. of Rajabhatkhawa (Coll. S.C. Mitra & S. Barua, 1986).

18. *Lymnaea (Pseudosuccinea) luteola f. australis* Annandale & Rao

Material examined : West Dinajpur district : 5 exs. Pond near B.D.O. Office Islampur (Coll. D.K. Thakur & S.C. Mitra, 1985).

19. *Lymnaea (Pseudosuccinea) luteola f. ovalis* Gray

Material examined : West Dinajpur district : 2 exs. Pond near Kulik river at Raigunje (Coll. D.K. Thakur & S.C. Mitra, 1985).

Family PLANORBIDAE

Genus 9. *Indoplanorbis* Annandale & Prashad, 192120. *Indoplanorbis exustus* (Deshayes)

Material examined : Maldah district : 2 exs. Mahananda river, Maldah; (Coll. D.K. Thakur & S.C. Mitra, 1985). West Dinajpur district : 2 exs. Islampur; 1 ex. Wayside pond at Santi Colony, Kaliaganje; 3 exs. Pond near Kulik river at Raiganje; 1 ex. Pond near Siliguri Rd. at Raiganje; 1 ex. Canal Forest Tourist lodge at Raiganje; 3 exs. Punarvaba river at Gangarampur (Coll. D.K. Thakur & S.C. Mitra, 1985). Koch Bihar district : 6 exs. Satanga river at Mathabhanga; 4 exs. Raidak river at Toofanganje. Jalpaiguri district : 2 exs. Kaljani river at Birpara near Alipurduar; 2 exs. Sankosh river at Sankosh 53 kms. E. of Rajabhatkhawa (Coll. S.C. Mitra & S. Barua, 1986); 2 exs. Bank of Chela nadi, Chilapata, Jalpaiguri (Coll. R. K. Ghosh, 1985).

Genus 10. *Gyraulus* Charpentier, 183721. *Gyraulus labiatus* (Benson)

Material examined : Maldah district : 1 ex. Small ditch at Maldah; 2 exs. (Coll. D.K. Thakur, 1985). West Dinajpur district : 2 exs. Dhonaipur Vill. Harirampur (Coll. D.K. Thakur, 1985). Jalpaiguri district : 1 ex. Kaljani river at Birpara, Alipurduar (Coll. S.C. Mitra & S. Barua, 1986).

22. *Gyraulus convexiusculus* (Hutton)

Material examined : Koch Bihar district : 4 exs. Raidak river at Toofanganje, 25 kms. of Koch Bihar (Coll. S.C. Mitra & S. Barua, 1986). Jalpaiguri district : 2 exs. Kaljani river at Birpara near Alipurduar; 3 exs. Sankosh river at Sankosh 53 kms. of Rajabhatkhawa (Coll. S.C. Mitra & S. Barua).

Family ANCYLIDAE

Genus 11. *Ferrissia* Walker, 1903

Shell small, cap like with radiately striate apex.

Australia, New Zealand, S.E. Africa.

It inhabits streams and rivers with a moderate flow of water and remains attached to submerged stones or leaves etc. In West Bengal (Jalpaiguri district) it is represented by a single species.

Though *Ferrissia* was treated as a subgenus of *Ancylus* by Annandale & Prashad (1921), following Burch (1965) and Subba Rao (1989) it is given a generic status here.

23. *Ferrissia baconi* (Bourguignat)

1853. *Ancylus baconi* Bourguignat, *J. Conch.*, 4 : 181.

1921. *Ancylus (Ferrissia) baconi* : Annandale & Prashad, *Rec. Indian Mus.* 22 : 592.

Material examined : Jalpaiguri district : 6 exs. Chaitanyajhora, Rajabhatkhawa; 5 exs. Kaljani river, Birpara, 3 kms. S. of Alipurduar (Coll. S.C. Mitra & S. Barua, 1986).

Measurements (in mm) : Length : 2.65 ; Diameter : 1.4.

Distribution : India : West Bengal (Jalpaiguri), Orissa. Elsewhere : Burma, Philippines.

Class BIVALVIA
Order UNIONOIDA
Family UNIONIDAE
Genus 12. *Lamellidens* Simpson, 1900

24. *Lamellidens marginalis* (Lamarck)

Material examined : Maldah district : 1 ex. Pond near bank of Kulik river, Raigunje (Coll. D.K. Thakur & S.C. Mitra, 1985); 2 exs. Chiramati river at Harirampur (Coll. D.K. Thakur & S.C. Mitra, 1985). Jalpaiguri district : 1 ex. Stagnant water pool at Rajabhatkhawa, (Coll. S.C. Mitra & S. Barua, 1986) Koch Bihar district : 2 exs. Bairagi dighi near Madan Mohun temple, Koch Bihar (Coll. S.C. Mitra & S. Barua, 1986).

25. *Lamellidens corrianus* (Lca)

Material examined : Maldah district : 1 ex. Pond at Gangarampur (Coll. D.K. Thakur) West Dinajpur district : 2 exs., at Raigunje (Coll. D.K. Thakur, 1985). Jalpaiguri district : 3 exs. Stagnant water pool at Rajabhatkhawa (Coll. S.C. Mitra & S. Barua, 1986). Koch Bihar district : 1 ex., Bairagi dighi at Koch Bihar (Coll. S.C. Mitra & S. Barua, 1986). Darjiling district : 1 ex. Siliguri (M 50.16/1, Holotype of *L. mainwaringi* Preston).

Family AMBLEMIDAE

This family differs from Unionidae in soft part anatomy. Following Subba Rao (1989) the genus *Parreysia* is placed under Amblemidae.

Genus 13. *Parreysia* Conrad, 1853

26. *Parreysia (Parreysia) favidens* (Benson)

Material examined : West Dinajpur district : 1 ex. pool under a wooden bridge at Kaliagunje (Coll. D.K. Thakur, 1985). Jalpaiguri district : 1 ex. Stagnant water pool at Rajabhatkhawa (Coll. S.C. Mitra & S. Barua, 1986).

27. *Parreysia (P.) favidens* var. *marcens* (Benson)

Material examined : West Dinajpur district : 2 exs. Atreyi river at Patiram; 3 exs. Tangon river near Banshihari (Coll. D.K. Thakur & S.C. Mitra, 1985).

28. *Parreysia (P.) favidens var. plagiosoma* (Benson)

Material examined : Jalpaiguri district : 2 exs. Stagnant water pool at Rajabhatkhawa (Coll. S.C. Mitra & S. Barua, 1986).

Subgenus *Radiatula* Simpson, 1900Key to the species of subgenus *Radiatula*

Posterior end angulately pointed..... *P. (R.) caerulea*

Posterior end broadly pointed..... *P. (R.) Lima*

29. *Parreysia (Radiatula) caerulea* (Lea)

Material examined : West Dinajpur District : 2 exs. Pond near Kulik river, Raigunje; 3 exs. Pond near Itakhor village, Harirampur; 3 exs. Chiramati river, Harirampur; 2 exs. Atreyi river at Patiram; 1 ex. Punarvaba river at Gangarampur; 2 exs. Pool under a wooden bridge at Kaliaganje (Coll. N.K. Thakur & S.C. Mitra, 1985). Koch Bihar district : 5 exs. Pool by the side of Panchanan Setu, Kalibari, Mathabhanga; Jalpaiguri district : 6 exs. Among weeds at edge of river Teesta, Jalpaiguri (Coll. S.C. Mitra & S. Barua, 1986).

30. *Parreysia (Radiatula) lima* (Simpson)

1900. *Nodularia (Radiatula) lima* Simpson, *Proc. U.S. Nat. Mus.*, 22 : 820.

1921. *Indonaia lima* : Prashad, *Rec. Indian Mus.*, 22 : 601.

Material examined : Darjiling district : 17 valves, Siliguri, (Coll. ?).

Measurements (in mm) : Length : 21.0-33.90 ; Width : 12.40-24.50

Diagnosis : Shell narrow, greenish with a broad posterior end, umbo much anterior in position; distinctly sculptured with zig-zag lines, transverse lines prominent on posterior side.

Distribution : India : West Bengal (Darjiling), Assam, Sikkim.

31. *Parreysia (Radiatula) lima var. siliguriensis* (Preston)

1908. *Unio siliguriensis* Preston, *Rec. Indian Mus.*, 2 : 47

1915. *Nodularia (Radiatula) lima var. siliguriensis* : Preston, *Fauna Brit. India*, Mollusca (Freshwater Gastropoda & Pelecypoda) p.148.

Material examined : Darjiling district : 1 ex., (M 6099/1, Holotype), Siliguri (Coll. ?).

Measurements (in mm) : Length : 37.65 ; Width : 21.0

Distribution : India : West Bengal (Darjiling).

Remarks : Shell resembles the typical form except being reddish brown in colour.

Order VENEROIDA

Family PISIDIIDAE

Key to the genera

Shell posteriorly more elongated umbo closer to anterior end..... *Sphaerium*

Shell anteriorly more elongated umbo closer to posterior end.....*Pisidium*

Genus 14. *Pisidium* Pfeiffer, 1821

32. *Pisidium atkinsonianum* Theobald

1876. *Pisidium atkinsonianum* Theobald, *J. Asiat. Soc. Beng.*, 45 (2) : 189

1925. *Pisidium atkinsonianum* : Prashad, *Rec. Indian Mus.*, 27 : 417, pl. 7-8.

Material examined : Darjiling district : 2 exs., Darjiling (Coll. ?).

Measurements (in mm) : Length : 3.50 ; Width : 3.10

Diagnosis : Shell orbiculate-ovate, rather swollen, irregularly striate, umbo not much prominent, posterior slope of the dorsal margin with a well marked shoulder, anterior margin sub-truncate and broadly arched.

Distribution : India : West Bengal (Darjiling), Sikkim.

Genus 15. *Sphaerium* Scopoli, 1777

Shell small, thin, ovate, smooth or concentrically striate, umbo anteriorly inclined, anterior margin shorter; cardinal teeth small, that in the right valve bifid, lateral teeth compressed, double in the right valve, single in the left; ligament external.

Worldwide.

33. *Sphaerium indicum* Deshayes

1854. *Sphaerium indicum* Deshayes, *Proc. zool. Soc.*, London, 22 : 342.

1921. *Sphaerium indicum* : Prashad, *Rec. Indian Mus.*, 22 : 615, fig. 34.

Material examined : Jalpaiguri district : 2 exs. Kaljani river near Chapatali vill., S. of Alipurduar; 1 ex. Kaljani river at Birpara, near Alipurduar (Coll. S.C. Mitra & S. Barua, 1986). Darjiling district : 22

exs. Darjiling (Coll. S.W. Kemp, 1918).

Measurements (in mm) : Length : 5.25-7.0 ; Width : 4.45-5.7.

Diagnosis : Shell small ovately rhomboid, finely, concentrically striate, tumid, anteriorly rounded, obtusely truncate at posterior end.

Distribution : India : West Bengal (Jalpaiguri, Darjiling), Arunachal Pradesh.

Remarks : This species was wrongly attributed to A. Adams by Preston (1915). Deshayes (1854) named the species with proper description.

Family CORBICULIDAE

Genus 16. *Corbicula* Magerle von Muhlfield, 1811

34. *Corbicula striatella* Deshayes

Material examined : West Dinajpur district : 1 ex. Tangon river near Bansihari; 6 exs. Chiramati river, Harirampur; 2 exs. Atreyi river near Patiram; 3 exs. Pool under wooden bridge at Santi Colony, Kaliagunje (Coll. D.K. thakur & S.C. Mitra, 1985). Koch Bihar district : 10 exs. Satanga river at Mathabhanga, W. of Koch Bihar; 6 exs. Mujnai river near Mathabhanga (Coll. S.C. Mitra & S. Barua, 1986).

B. LAND

Key to the families

1. Animal not covered by a shell..... Philomycidae
Animal covered by a shell..... 2
2. Shell with an operculum..... 3
Shell without an operculum..... 5
3. Shell flatly conoid to turbate broader than high, widely umbilicate..... Cyclophoridae
Shell cylindrically elongate, higher than broad, imperforate or very narrowly perforate..... 4
4. Body whorl laterally compressed, columellar margin with an entering lamella, operculum paucispiral..... Diplommatinidae
Body whorl rounded, columellar margin without an entering lamella, operculum multispiral..... Pupinidae

5. Shell ovate to elongately turreted, higher than broad..... 6
 Shell low conical or depressedly turbinate, broader than high or as high as broad..... 9
6. Shell sinistral, with apertural process..... Clausiliidae
 Shell dextral, without apertural process..... 7
7. Shell deeply umbilicate, columellar margin strongly reflected, with coloured bands, arboreal in habit..... Enidae
 Shell imperforate, or very narrowly perforate, columellar margin simple or very feebly reflected, without spiral bands, terrestrial in habit..... 8
8. Shell brightly coloured, broader, exceeding 20mm. in width..... Achatinidae
 Shell never brightly coloured, narrower, below 20 mm. in width..... Subulinidae
9. Shell with simple peristome, body whorl not descending in front..... 10
 Shell with reflected peristome, body whorl descending in front..... 12
10. Shell flatly depressed, aperture depressedly subquadrate. Extremity of foot without a caudal gland Trochomorphidae
 Shell depressedly turbinate, aperture lunate. Extremity of foot with a caudal gland..... 11
11. Shell thicker, distinctly perforate. Dart apparatus present..... Ariophantidae
 Shell thinner, imperforate. Dart apparatus usually absent..... Helicarionidae
12. Shell sinistral, with spiral sculpture..... Corillidae
 Shell dextral, without spiral sculpture..... 13
13. Shell very coarsely sculptured, without any band..... Bradybaenidae
 Shell finely sculptured, with bands..... Camaenidae

Class GASTROPODA
Order MESOGASTROPODA
Family CYCLOPHORIDAE

Though represented in the lower part of the state by a lone species (*C. polynema*), Cyclophoridae, the largest family of Indian land operculates, is rather rich in the northern part of W. Bengal and is represented by 7 genera and 22 species.

Key to the genera of *Cyclophoridae*

1. Body whorl irregularly inflated and constricted, sutural tube present..... 2
 Body whorl without such inflation and constriction, sutural tube absent.....4
2. Shell more conical (nearly as broad as high), constriction and sutural tube closer to the aperture, aperture vertical..... *Dyorix*
 Shell more depressed (broader than high), constriction and sutural tube distant from the aperture, aperture oblique..... 3
3. Shell more broad (above 5 mm. in width), umbilicus broader..... *Chamalycaeus*
 Shell less broad (less than 5 mm. in width), umbilicus narrower..... *Alycaeus*
4. Shell discoid, whorls visible on both sides..... 5
 Shell conoid, whorls not visible on both sides..... 6
5. Peristome with a wing-like protrusion.....*Pterocyclus*
 Peristome without any such protrusion..... *Theobaldius*
6. Shell smaller (below 10 mm. in width), with an incision in the peristome, close to suture.....
 *Lagochilus*
 Shell larger (above 10 mm. in width), without any such incision..... *Cyclophorus*

Genus 17. *Alycaeus* Gray, 1850

Shell conoid, rather narrowly umbilicate, whorls convex, body whorl irregularly inflated and constricted. A short sutural tube present along the suture on the body whorl. Peristome usually double, thickened and expanded. Operculum horny, flat or slightly concave.

India, Burma, Malaya, Greater Sunda islands.

In West Bengal it is restricted to the Darjiling district and is represented by 2 subgenera, *Dicharax* and *Cyclorhynchus* and 9 species.

Key to the subgenera

Shell with an internally hollow ridge on the constricted portion of the body whorl; sutural tube thread-like, about 1mm. or more in length..... *Dicharax*

Shell without any ridge on the constricted portion of the body whorl; sutural tube extremely short, point-like or club shaped..... *Cyclorhynchus*

Subgenus *Dicharax* Kobelt & Mollendorff, 1859

Key to the species of subgenus *Alycaeus*

1. Peristome with plications..... 2
Peristome without plications..... 4
2. Ridge on the body whorl present plications on peristome strong..... 3
Ridge on the body whorl absent plications on peristome feeble..... *A. crenulatus*
3. Shell above 5 mm. in width..... *A. digitatus*
Shell below 3 mm. in width..... *A. plectochilus*
4. Shell above 5 mm. in width, peristome single..... *A. stylifer*
Shell less than 4 mm. in width, peristome double..... 5
5. Body whorl angulate at the base near umbilicus..... *A. lectus*
Body whorl rounded at base near umbilicus..... 6
6. Umbilicus narrower, peristome distinctly emarginated below..... *A. gemmula*
Umbilicus broader, peristome simple and rounded below..... *A. lenticulus*

35. *Alycaeus (Dicharax) gemmula* Benson

1859. *Alycaeus gemmula* Benson, *Ann. Mag. nat. Hist.* (3)3 : 170.

1921. *Alycaeus (Dicharax) gemmula* : Gude, *Fauna Brit. India*, Mollusca (land operculates) p.252.

Material examined : Darjiling district : 18 exs., (Coll. ?).

Measurements (in mm) : Height : 2.90 ; Diameter : 2.90 ; H.of aperture : 1.50

Diagnosis : A smaller form with a distinct depression in the peristome at the lower part corresponding to the well-marked ridge on the body whorl.

Distribution : India : West Bengal (Darjiling), Sikkim. Endemic to E. Himalayas.

36. *Alycaeus (Dicharax) digitatus* H. Blanford

1871. *Alycaeus digitatus* Blanford, *J. Asiat. Soc. Beng.*, 40 (2) : 41, pl.2, figs. 4, 4a, 4b.

1921. *Alycaeus (Dicharax) digitatus* : Gude, *Fauna Brit. India*, Mollusca, (land operculates) p.248.

Material examined : Darjiling district : 4 exs., (Coll. ?).

Measurements (in mm) : Height : 3.0-4.25 ; Diameter : 4.0-5.75 ; H. of aperture : 1.65-2.65.

Diagnosis : The long digit like folds in the peristome make it distinct from all other Darjiling species.

Distribution : India : West Bengal (Darjiling), Sikkim. Endemic to the E. Himalayas. Elsewhere: Bhutan.

37. *Alycaeus (Dicharax) lectus* Godwin-Austen

1878. *Alycaeus* n.sp. Nevill, *Hand List Moll. Indian Mus.*, 1 : 294, No. 48.

- 1914 *Alycaeus lectus* Godwin-Austen, *Land and Freshwater Moll. India*, 2 : 340, pl. 136, figs. 5, 5a, 5b.

- 1921 *Alycaeus (Dicharax) lectus* : Gude, *Fauna Brit. India*, Mollusca (land operculates) p. 259.

Material examined : Darjiling district : 1 ex., Chaukkalan, Darjiling (Coll. F. Stoliczka).

Measurements (in mm) : Height : 3.0 ; Diameter : 3.20 ; H. of aperture : 2.35

Diagnosis : Though allied to *A. lenticulus* it differs in being distinctly angulate at the umbilical region below.

Distribution : India : West Bengal (Darjiling), known by the holotype only.

Remarks : This species was described by Godwin-Austen (1914) basing on a single shell which was originally referred to by Nevill (1878) in his Hand List. It is known by its holotype and has no subsequent record.

38. *Alycaeus (Dicharax) lenticulus* Godwin-Austen

1874. *Alycaeus lenticulus* Godwin-Austen, *J. Asiat. Soc. Beng.* 43(2) : 147.
 1914. *Alycaeus lenticulus* : Godwin-Austen, *Land and Freshwater Moll. India*, 2 : 340, pl.135, figs. 2, 2a, 4, 4a & 4b.
 1921. *Alycaeus (Dicharax) lenticulus* : Gude, *Fauna Brit. India*, Mollusca (land operculates) p.259.

Material examined : Darjiling district : 5 exs., (Coll. ?)

Measurements (in mm) : Height : 2.65-3.0 ; Diameter : 3.55-.390 ; H. of aperture : 1.55-1.80

Diagnosis : Closely resembles *A. lectus* differing in not being angulate at the base.

Distribution : India : West Bengal (Darjiling), Sikkim. Elsewhere : Bhutan.

39. *Alycaeus (Dicharax) plectochilus* Benson

1859. *Alycaeus plectochilus* Benson, *Ann. Mag. nat. Hist.*, (3) 3 : 180.
 1921. *Alycaeus (Dicharax) plectochilus* : Gude, *Fauna, Brit. India*, Mollusca (land operculates) p. 264.

Material examined : Darjiling district : 73 exs., Darjiling (Coll. ?).

Diagnosis : Differs from *A. digitatus*, the other species with strongly plicate peristome in being smaller and the constriction being narrower.

Distribution : India : West Bengal (Darjiling). Elsewhere : Bhutan.

Measurements (in mm) : Height : 1.5-3.0 ; Diameter : 3.0-4.85 ; H. of aperture : 1.40-1.60

40. *Alycaeus (Dicharax) stylifer* Benson

1857. *Alycaeus stylifer* Benson, *Ann. Mag. nat. Hist.*, (2) 19 : 204.
 1921. *Alycaeus (Dicharax) stylifer* : Gude, *Fauna Brit. India*, Mollusca, (land operculates) p.269, fig. 35.

Material examined : Darjiling district : 33 exs. Darjiling, (Coll. ?).

Measurements (in mm) : Height : 3.25-3.90 ; Diameter : 4.35-6.0 ; H. of aperture : 2.15-2.80

Diagnosis : Of all the species of *Alycaeus* from Darjiling, *A. stylifer* is most distinct being broadest and having a single peristome, which is thickened and reflected.

Distribution : India : West Bengal (Darjiling), Sikkim. Elsewhere : Bhutan.

41. *Alycaeus (Dicharax) crenulatus* Benson

1858. *Alycaeus crenulatus* Benson *Ann. Mag. nat. Hist.* (3) 3 : 180.
 1859 *Alycaeus crenulatus* Benson *Ann. Mag. nat. Hist.*, (3) 3 : 180.
 1921. *Alycaeus (Dicharax) crenulatus* : Gude, *Fauna Brit. India*, Mollusca, (land operculates) p.242.

Material examined : 28 exs., Darjiling (Coll. ?).

Measurements (in mm) : Height : 2.25-4.0 ; Diameter : 3.0-4.85 ; H. of aperture : 1.65-2.0

Diagnosis : *A. crenulatus* is distinct in lacking a ridge and also in the crenulation of the peristome being of much less magnitude. However following Gude (1921) it is retained under the subgenus *Dicharax*.

Distribution : India : West Bengal (Darjiling), Sikkim. Elsewhere : Bhutan.

Subgenus *Cycloryx* Godwin-Austen, 1914Key to the species of subgenus *Cycloryx*

1. Columella with a projection obliterating the umbilicus..... 2
 Columella without any such projection..... 3
2. Shell as high as broad, distantly costulate on the ultimate and the penultimate whorls.....
*A. graphicus*
 Shell marginally higher than broad, closely striate on all the whorls.....*A. otiphorus*
3. Shell without distinct sculpture, aperture emarginate at the upper angle.....*A. bembex*
 Shell with distinct sculpture, aperture not emarginate at the upper angle.....*A. constrictus*

42. *Alycaeus (Cycloryx) bembex* Godwin-Austen

1859. *Alycaeus bembex* Benson, *Ann. Mag. nat. Hist.*, (3) 3 : 178.
 1921. *Alycaeus (Cycloryx) bembex* : Gude, *Fauna Brit. India*, Mollusca, (land operculates) p. 276.

Material examined : Darjiling district : 14 exs., Darjiling, (Coll. ?).

Measurements (in mm) : Height : 4.10 - 4.60 ; Diameter : 3.30-3.85 ; H. of aperture : 2.05

Diagnosis : Shell conical, whorls compressed without strong sculpture, openly umbilicate; peristome simple, a little emarginate at the upper angle.

Distribution : India : West Bengal (Darjiling). Elsewhere : Bhutan.

43. *Alycaeus (Cycloryx) constrictus* (Benson)

1851. *Cyclostoma constrictum* Benson, *Ann. Mag. nat. Hist.*, (2) 8 : 188.
 1921. *Alycaeus (Cycloryx) constrictus* : Gude, *Fauna, Brit. India*, Mollusca (land operculates) p.277.

Material examined : Darjiling district : 15 exs., Darjiling (Coll. ?).

Measurements (in mm) : Height : 2.10-3.10 ; Diameter : 2.10-2.60 ; H. of aperture : 1.20-1.75

Diagnosis : Differs from the preceeding species by being smaller, having less number of whorls and also in being a little constricted behind the aperture.

Distribution : India : West Bengal (Darjiling), Sikkim.

44. *Alycaes (Cycloryx) graphicus* Blanford

1862. *Alycaeus graphicus* Blanford, *J. Asiat. Soc. Beng.*, 31 : 137
 1914. *Alycaeus (Cycloryx) graphicus* : Godwin-Austen, *Moll. India*, 2 : 419, pl. 146, figs. 1, 1a & 1b.
 1921. *Alycaeus (Cycloryx) graphicus* : Gude, *Fauna Brit. India*, Mollusca (land operculates) p. 280.

Material examined : Darjiling district : 6 exs., (Coll. ?).

Measurements (in mm) : Height : 3.85-4.60 ; Diameter : 3.95-4.60 ; H. of aperture : 2.0-2.15

Diagnosis : Distinguished from other species from Darjiling under this subgenus by its more globose form and stronger sculpture, particuarly on the tumid portion of the body whorl.

Distribution : India : West Bengal (Darjiling), Assam, Arunachal Pradesh, Meghalaya. Elsewhere: Burma.

Remarks : Shells from India including Darjiling differ slightly from those of Burma in having a small projection like reflection of the columella at the umbilical region.

45. *Alycaeus (Cycloryx) otiphorus* Benson

1859. *Alycaeus otiphorus* Benson, *Ann. Mag. nat. Hist.*, (3) 3 : 178.
 1914. *Alycaeus (Cycloryx) otiphorus* : Godwin-Austen, *Moll. India*, 2 : 349, pl.147, 2.2a,2b.
 1921. *Alycaeus (Cycloryx) otiphorus* : Gude, *Fauna Brit. India*, Mollusca (land operculates), p. 283.

Material examined : Darjiling District : 3 exs., (Coll. ?).

Measurements (in mm) : Height : 3.4-4.3 ; Diameter : 2.3-4.15 ; H. of aperture : 1.5-1.7

Diagnosis : Resembles the preceeding species in having a reflected columella which obliterates the umbilicus, differs in being more conical and marginally higher than broad.

Distribution : India : West Bengal (Darjiling), Meghalaya, Sikkim. Elsewhere : Burma.

Genus 18. *Chamalycaeus* Kobelt and Mollendorff, 1897.

Shell much depressed, widely umbilicate, body whorl strongly and rather distortedly inflated, conspicuously ribbed, with a sutural tube. Peristome usually double, thickened and expanded. Operculum horny or calcareous, externally concave, multispiral with a central nucleus.

India, Burma, China, Malaya Peninsula, Great Sunda islands, The Philippines.

Though treated as a subgenus by Gude (1921), following Benthem Jutting (1948) *Chamalycaeus* is elevated to a generic rank.

46. *Chamalycaeus physis* (Benson)

1859. *Alycaeus physis* Benson, *Ann. Mag. nat. Hist.*, (3) 3 : 179.

1914. *Alycaeus physis* : Godwin-Austen, *Moll. India*, 2 : 342, pl. 134, figs. 1, 1a.

1921. *Alycaeus (Chamalycaeus) physis* : Gude, *Fauna, Brit. India*, Mollusca (land operculates), p. 231.

Material examined : Darjiling district : 47 exs. Darjiling (Coll. F. Stoliczka).

Measurements (in mm) : Height : 6.35-7.25 ; Diameter : 9.25-10.65 ; H. of aperture : 4.0-4.15

Diagnosis : Shell greatly depressed, openly umbilicate, closely and coarsely striate, faint spiral markings visible on the inflated portion, body whorl very much tumid.

Distribution : India : West Bengal (Darjiling).

Genus 19. *Dioryx* Benson, 1859

Shell conoidly turbinate, narrowly umbilicate, the constriction very narrow and immediately behind the peristome; the sutural tube arises proportionately nearer to the aperture than in *Alycaeus*.

India, Burma, China.

47. *Dioryx urnula* Benson

1853. *Alycaeus urnula* Benson, *Ann. Mag. nat. Hist.*, (2) 6 : 284.

1859. *Alycaeus (Dioryx) urnula* : Benson, *Ann. Mag. nat. Hist.*, (3) 3 : 284.

1921. *Dioryx urnula* : Gude, *Fauna Brit. India*, Mollusca (land operculates) p.201.

Material examined : Darjiling district : 6 exs., Darjiling (Coll. ?).

Measurements (in mm) : Height : 5.30-6.35 ; Diameter : 3.85 - 5.0 ; H. of aperture : 1.30-2.40

Diagnosis : Shell globosely conical, narrowly perforate, very finely striate; constriction and sutural tube close to the aperture; body whorl tumid and wide equalling more than half of the total height of the shell.

Distribution : India : West Bengal (Darjiling), Arunachal Pradesh, Meghalaya, Sikkim. Elsewhere: Burma.

Genus 20. *Cyclophorus* Montfort, 1810

Shell globosely conical, broader than high, usually spirally striate; peristome continuous (rarely discontinuous), thickened, expanded or reflected. Operculum multispiral, with a central nucleus.

South and East Asia, Malaya Archipelago, The Philippines.

Key to the subgenera of *Cyclophorus*

Shell with spiral keels.....*Glossostylus*

Shell with spiral striae.....*Litostylus*

Key to the species of subgenus *Glossostylus*

Body whorl with 5-6 prominent raised ridges.....*C. himalayanus*

Body whorl with 10-12 prominent raised ridges.....*C. aurora*

48. *Cyclophorus (Glossostylus) aurora* (Benson)

1851. *Cyclostoma aurora* Benson, *Ann. Mag. nat. Hist.*, (2) 8 : 186.

1886. *Cyclophorus aurora* : Godwin-Austen, *Moll. India*, 1 : 205, pl.51, figs. 1,2,2d.

1921. *Cyclophorus (Glossostylus) aurora* : Gude, *Fauna Brit. India*, Mollusca (land operculates) p.57.

Material examined : Darjiling district : 2 exs., Ghum, 7500 ft. (Coll. ?, May, 1918); 2 exs., Darjiling, (Coll. ?).

Measurements (in mm) : Height : 28.40-43.60 ; Diameter : 32.75 - 49.60 ; H. of aperture : 18.0-25.5

Diagnosis : Shell globosely turbinat with spiral keels, 5-6 of which are more prominent and raised; body whorl obsoletely angulate at the periphery. Aperture circular, peristome expanded and reflected.

Distribution : India : West Bengal (Darjiling), Arunachal Pradesh, Sikkim.

49. *Cyclophorus (Glossostylus) himalayanus* Pfeiffer

1851. *Cyclophorus himalayanus* Pfeiffer, *Proc. zool. Soc. Lond.*, p. 242.

1921. *Cyclophorus (Glossostylus) himalayanus* : Gude, *Fauna Brit. India*, Mollusca (land operculates) p.63.

Material examined : Jalpaiguri district : 1 ex., Sipchu Forest Beat, Upper Tandoo Forest Range (Coll. R.K. Ghosh, 1985); 4 exs., Nal Rajar Garh, Bania Forest Block, Chilapata (Coll. R.K. Ghosh, 1985). Darjiling district : 1 ex., Ghumti, Darjiling (Coll. F. Gravely, 1910).

Measurements (in mm) : Height : 37.6-44.0 ; Diameter : 44.85-553.0 ; H. of aperture : 24.35-26.0

Diagnosis : Closely allied to the preceeding species, differs in possessing 10-12 prominent keels on the body whorl (instead of 5-6).

Distribution : India : West Bengal (Darjiling and Jalpaiguri). Endemic to the Eastern Himalayas.

Remarks : The present report of the species from Jalpaiguri district is its first from outside Darjiling.

50. *Cyclophorus (Litostylus) pyrotrema* Benson

1854. *Cyclophorus pyrotrema* Benson, *Ann. Mag. nat. Hist.*, (2) 14 : 412.

1921. *Cyclophorus (Litostylus) pyrotrema* : Gude, *Fauna Brit. India*, Mollusca (land operculates) p.54.

Material examined : 1 ex., Gôur, Maldah (Coll. D.K. Thakur and S.C. Mitra, 1985).

Diagnosis : Shell turbinately conoid, spirally striate, decussated by close oblique markings; whitish with light brown markings above; a number of darker bands present below the periphery. Whorls 5, convex, bodywhorl obsoletely subangulate. Aperture sub circular, peristome double, a little expanded.

Measurements (in mm) : Height : 21.20 ; Diameter : 23.15 ; H. of aperture : 12.45

Distribution : India : West Bengal (Maldah), Bihar. Elsewhere : Bangladesh, Burma.

Genus 21. *Pterocyclus* Benson, 1832

Shell discoid, spire nearly flat, whorls narrowly wound, whitish with chocolate markings and usually a band below the periphery; widely umbilicate showing subsequent whorls. Aperture circular; peristome double, the inner interrupted at the upper angle by an incision, the outer producing a 'wing' like protrusion over-hanging the incision. Operculum multispiral with a central nucleus, externally convex.

India, Burma, Sri Lanka, China, Malaya Peninsula, Greater Sunda islands.

51. *Pterocyclus rupestris* Benson

1832. *Pterocyclus rupestris* Benson, *J. Asiat. Soc. Beng.*, 1 : 13, pl.2, fig.1.
 1863. *Pterocyclus rupestris* : Reeve, *Conch. Icon.*, 14, pl.2, fig.8
 1921. *Pterocyclus rupestris* : Gude, *Fauna Brit. India*, Mollusca (land operculates) p. 110.

Material examined : Maldah district : 19 exs., Fateh Khan's Samadhi, Gour, Malda; 4 exs. Gour, Maldah (Coll. D.K. Thakur, 1985). Jalpaiguri district : 2 exs., Forest inside Rajabhatkhawa Central Depot., Jalpaiguri (Coll. S.C. Mitra, & S. Barua, 1986).

Measurements (in mm) : Height : 4.60-5.80 ; Diameter : 10.65-13.45 ; H. of aperture : 3.90-4.60

Diagnosis : shell whitish, nearly transparent, depressed with a scarcely raised spire; closely and finely striate, marked with zig-zag chocolate lines, a dark band at the periphery; 'wing' at the peristome well formed taking the shape of an incomplete tube.

Distribution : India : West Bengal (Maldah & Jalpaiguri), Bihar (Pareshnath hills), Orissa.

Remarks : The abundance of this species at Gour (Maldah) is obvious since its original home is the Rajmahal range. But whether the same species extends to Jalpaiguri is not clear. The two shells collected at Rajabhatkhawa (Jalpaiguri) are damaged and have only been tentatively identified as *P. rupestris*.

Genus 22. *Lagochilus* Blanford 1864

Shell small, conoid, narrowly perforate, usually spirally ribbed and covered by a hairy epidermis. Aperture circular, peristome continuous with a small incision above, close to the suture. Operculum thin, flat and multispiral.

Japan, S. & E. China, India, Sri Lanka, Burma, Thailand, Malay Archipelago, The Philippines, New Guinea, Fiji.

Though treated as subgenus under *Japonia* by Gude (1921), following Benthem Jutting (1948), *Lagochilus* is given a generic status here.

52. *Lagochilus tomotrema* (Benson)

1857. *Cyclophorus tomotrema* Benson, *Ann. Mag. nat. Hist.*, (2) 19 : 206.
 1876. *Lagochilus tomotrema* : Godwin-Austen, *J. Asiat. Soc. Beng.*, 45 (2) : 174.
 1921. *Japonia (Lagochilus) tomotrema* : Gude, *Fauna Brit. India*, Mollusca (land operculates) p.12.

Material examined : Darjiling district : 7 exs. Darjiling (Coll. ?).

Measurements (in mm) : Height : 4.25-4.55 ; Diameter : 4.0-4.55

Diagnosis : Shell conoidly turbinate, narrowly perforate, coarsely sculptured with spiral ribs and

radiate striae throughout. Aperture circular with a small incision above. Peristome double, expanded and reflected.

Distribution : India : West Bengal (Darjiling), Arunachal Pradesh, Meghalaya.

Genus 23. *Theobaldius* G. Nevill, 1878

Shell small, depressed and discoidal, widely and deeply umbilicate. Whorls rounded and rather narrowly wound. Aperture circular, peristome usually double. Operculum thin, multispiral.

India and Sri Lanka.

53. *Theobaldius phaenotopicus* (Benson)

1851. *Cyclostoma phaenotopicus* Benson, *Ann. Mag. nat. Hist.*, (2) 7 : 190.

1878. *Cyclophorus (Theobaldius) phaenotopicus* : Nevill, *Hand List Moll. Indian Mus.*, 1 : 277.

1921. *Theobaldius phaenotopicus* : Gude, *Fauna, Brit. India, Mollusca* (land operculates) p. 40.

Material examined : Darjiling district : 32 exs., Darjiling (Coll. F. Stoliczka).

Measurements (in mm) : Diameter : 7.2-13.55 ; Height : 3.8-7.35 ; H. of aperture : 2.7-5.0

Diagnosis : Shell subdiscoid, rather narrowly umbilicate, scabrously sculptured with close radiate striae and spiral lines, more pronounced on the inner margin of the whorls close to the sutures. Whitish with zig-zag chocolate markings above. Peristome double, the outer a little reflected.

Distribution : India : West Bengal (Darjiling), Sikkim.

Family DIPLOMMATINIDAE

Genus 24. *Diplommata* Benson, 1849

Shell small, dextral or sinistral, cylindrically turreted to spindle shaped; whorls 6-8, the penultimate usually the widest, the last ascending a little in front; obliquely ribbed. Aperture mostly with a thin parietal callous, columellar margin with an entering lamella. Peristome usually double, reflected; operculum thin, paucispiral.

India, Burma, Japan, China, Malay Archipelago, Malay Peninsula, New Guinea, N. Australia, the Philippines, and the Pacific Islands.

Key to the species of *Diplommata*

1. Peristome sharply angled at the lower left corner..... 2
 - Peristome rounded at the lower left corner..... 4
2. The two peristomes close together without a clear gap in between..... *D. pachycheilus*

- The two peristomes separated from one another with a clear gap in between..... 3
3. Sculpture uniformly strong throughout the shell..... *D. blanfordiana*
- Sculpture absent or very feeble on lower whorls..... *D. semisculpta*
4. Peristome with an angular protrusion at the top right corner..... *D. unguata*
- Peristome without any such protrusion..... 5
5. Aperture rather angular, 6th whorl slightly constricted giving the shell a 'wasp-shape'.....
- *D. pullula*
- Aperture circular, 6th whorl not constricted..... *D. polypleuris*

54. *Diplommatina blanfordiana* Benson

1860. *Diplommatina blanfordiana* Benson, *Ann. Mag. nat. Hist.*, (3) 5 : 460.
1897. *Diplommatina (Eudiplommatina) blanfordiana* : Kobelt & Mollendorff, *Nachr. Deuts. Malak. Ges.*, 30 : 135.
1921. *Diplommatina blanfordiana* : Gude, *Fauna Brit. India*, Mollusca (land operculates) p. 304.

Material examined : Darjiling district : 17 exs., Darjiling (coll. ?).

Measurements (in mm) : Diameter : 20.10-2.15 ; Height : 4.50-5.0

Diagnosis : Shell small, dextral, ovately acuminate, strongly obliquely costulate, with 7-8 whorls, body whorl ascending a little near the aperture. Columellar lip reflected entirely concealing the umbilicus. Aperture with an entering lamella on the columellar side. Peristome double, the outer running distinctly shorter than the inner leaving a clear gap in between and merging with the latter near the umbilicus.

Distribution : India : West Bengal (Darjiling). Elsewhere : Bhutan.

55. *Diplommatina pachycheilus* Benson

1857. *Diplommatina pachycheilus* Benson, *Ann. Mag. nat. Hist.*, (2) 19 : 203.
1868. *Diplommatina pachycheilus* : Godwin-Austen, *J. Asiat. Soc. Beng.*, 37 : 83, pl.1, fig.5.
1921. *Diplommatina pachycheilus* : Gude, *Fauna Brit. India*, Mollusca (land operculates) p. 327.

Material examined : Darjiling district : 42 exs., Darjiling (coll. ?).

Measurements (in mm) : Height : 5.0-5.10 ; Diameter : 2.25-2.55

Diagnosis : Differs from the preceeding species in being faintly costulate and the two peristomes being close together without any gap in between and also the columellar base being shortly angled.

Ditribution : India : West Bengal (Darjiling). Endemic to Darjiling.

56. *Diplommatina polypleuris* Benson

1857. *Diplommatina polypleuris* Benson, *Ann. Mag. nat. Hist.*, (2) 19 : 203.
 1898. *Diplommatina (Eudiplommatina) polypleuris* : Kobelt & Mollendorff, *Nachr. Deuts. Malak. Ges.*, 30 : 137.
 1921. *Diplommatina polypleuris* : Gude, *Fauna Brit. India*, Mollusca, (land operculates) p. 328.

Material examined : Darjiling district : 15 exs., Darjiling (Coll. ?).

Measurements (in mm) : Height : 2.65-2.90 ; Diameter : 1.40-1.50

Diagnosis : Shell small, ovate, imperforate, finely obliquely costulate, whorls 6, convex, the last laterally compressed. Aperture vertical, subcircular; columellar margin with a feebly developed entering lamella. Peristome double, expanded and reflected.

Distribution : India : West Bengal (Darjiling), Assam, Aruncahal Pradesh, Meghalaya. Elsewhere: Burma.

57. *Diplommatina pullula* Benson

1859. *Diplommatina pullula* Benson, *Ann. Mag. nat. Hist.*, (3) 3 : 182
 1898. *Diplommatina (Eudiplommatina) pullula* : Kobelt & Mollendorff, *Nachr. Deuts. Malak. Ges.*, 30 : 137.
 1921. *Diplommatina polypleuris* : Gude, *Fauna Brit. India*, Mollusca (land operculates) p. 328.

Material examined : Darjiling district : 63 exs., Darjiling (Coll. ?).

Measurements (in mm) : Height : 2.80-3.20 ; Diameter : 1.30-1.75

Diagnosis : Shell elongate, turreted, imperforate, whitish, obliquely costulate, with 6-7 convex whorls, body whorl markedly ascending towards the aperture pressing the penultimate which is rather eccentric. Aperture subvertical, columellar base roundly angulate.

Distribution : West Bengal (Darjiling), Sikkim.

58. *Diplommatina semisculpta* Blanford

1868. *Diplommatina semisculpta* Blanford, *J. Asiat. Soc. Beng.*, 37 (2) : 78, pl.1, fig.6.
 1876. *Diplommatina semisculpta* : Godwin-Austen, *J. Asiat. Soc. Beng.* 45 (2) : 178.
 1921. *Diplommatina semisculpta* : Gude, *Fauna Brit. India*, Mollusca (land operculates) p.333.

Material examined : Darjiling district : 95 exs., (Coll. ?).

Measurements (in mm) : Height : 2.90-4.10 ; Diameter : 1.40-2.10

Diagnosis : Shell ovately conical, dextral, imperforate, obliquely costulate; whorls 7, last whorl without any sculpture. Aperture vertical, parietal callus thin, entering lamella prominent, columellar base sharply angulate; peristome double, reflected and separated from one another leaving a gap in between.

Distribution : India : West Bengal (Darjiling), Arunachal Pradesh, Sikkim.

59. *Diplommatina ungulata* Blanford

1871. *Diplommatina ungulata* Blanford, *J. Asiat. Soc. Beng.*, 40 : 42, pl. 2, figs. 5,5a.

1899. *Diplommatina (Eudiplommatina) ungulata* : Kobelt & Mollendorff *Nachr. Deuts. Malak. Ges.*, 30 : 138.

1921. *Diplommatina ungulata* : Gude, *Fauna, Brit. India*, Mollusca (land operculates) p. 338.

Material examined : Darjiling district : 4 exs., (Coll. ?).

Measurements (in mm) : Height : 3.70 ; Diameter : 2.10

Diagnosis : Shell ovately conical, small, scarcely perforate, faintly sculptured, whorls 7. Aperture subglobose, entering lamella feebly developed; peristome double, reflected with an angular outward projection above, on the right.

Distribution : India : West Bengal (Endemic to Darjeeling).

Family PUPINIDAE

In West Bengal this family is restricted to the Darjiling district and is represented by 3 genera and 3 species.

Key to the genera of *Pupinidae*

1. Shell larger (above 20 mm. in length), peristome slightly grooved at the upper margin, edge of umbilicus carinate..... ***Schistoloma***
 Shell smaller (below 20 mm. in length), peristome without any groove, edge of umbilicus not carinate..... 2
2. Shell cylindrically ovate, provided with a sutural tube..... ***Rhaphaulus***
 Shell pyramidally turreted, without a sutural tube..... ***Pseudopomatias***

Genus 25. *Schistoloma* Kobelt, 1902

Shell cylindrically ovate, narrowly umbilicate with a solute body whorl, inner peristome usually grooved at the upper margin. Operculum circular, multispiral, flat.

India, Sumatra, Borneo, The Philipppines.

60. *Schistoloma funiculatum* (Sowerby)

1838. *Cyclostoma funiculatum* (nom. nud.) Benson, *J. Asiat. Soc. Beng.*, 7 : 217.
 1850. *Cyclostoma funiculatum* Sowerby, *Thes. Conch.* 1 : 166, pl. 31, b, figs. 316, 317.
 1921. *Schistoloma funiculatum* : Gude, *Fauna Brit. India*, Mollusca (land operculates) p. 169.

Material examined : Darjiling district : 1 ex., Ghum, 7500 ft. (Coll. A.S.K., May, 1918); 107 exs. Darjiling (Coll. ?, 1933).

Measurements (in mm) : Length : 24.80 ; Diameter : 9.70 ; H. of aperture : 7.75

Diagnosis : Shell cylindrically turreted, shining with very fine striations, whorls 7, body whorl decussately sculptured; peristome much thickened and reflected; edge of umbilicus bluntly carinate.

Distribution : India : West Bengal (Darjiling), Meghalaya.

Genus 26. *Rhaphaulus* Pfeiffer, 1856

Shell elongate-ovate or cylindrical, perforate, usually smooth or finely striate. Aperture circular, peristome double, thickened, provided with two tubes, a short one at the columellar margin and the other at the suture. Operculum thin, a little concave.

India, Borneo.

61. *Rhaphaulus blanfordi* (Benson)

1857. *Streptaulus blanfordi* Benson, *Ann. Mag. nat. Hist.*, (2) 19 : 201.
 1886. *Rhaphaulus blanfordi* : Godwin-Austen, *Land and Freshwater Moll. India*, 1 : 202, pl. 47, fig. 4.
 1921. *Rhaphaulus blanfordi* : Gude, *Fauna Brit. India*, Mollusca (land operculates) p. 164.

Material examined : Darjiling district : 11 exs., Darjiling (Coll. ?).

Measurements (in mm) : Height : 5.0-7.50 ; Diameter : 3.05-4.30 ; H. of aperture : 1.80-2.60

Diagnosis : Shell oblong, glossy, perforate, finely obliquely striate, decussated by spiral lines which are rather obsolete. Whorls 5, convex; aperture vertical, peristome simple, reflected, margins joined by a thin parietal callus. Two tubes, a short one just on the columellar margin, the other, a fairly long one starting at the upper margin of peristome and running along the suture.

Distribution : India : West Bengal (Darjiling), Arunachal Pradesh.

Remarks : These tubes are used as a breathing device during aestivation (Subba Rao, et al. 1989).

Genus 27. *Pseudopomatias* Mocellendorff, 1885

Shell turreted, pyramidal, regularly ribbed, costulate, aperture subvertical, peristome thickened, reflected, usually double; operculum thin.

India, China.

62. *Pseudopomatias himalayae* (Benson)

1859. *Pomatias himalayae* Benson, *Ann. Mag. nat. Hist.*, (3) 3 : 123.

1917. *Pseudopomatias himalayae* : Godwin-Austen, *Rec. Indian Mus.*, 8 : 579, text-fig. 60.

1921. *Pseudopomatias himalayae* : Gude, *Fauna Brit. India*, Mollusca (land operculates) p. 159.

Material examined : Darjiling district : 4 exs., Darjiling (Coll. S.K. Raut).

Measurements (in mm) : Height : 5.75 ; Diameter : 2.85 ; H. of aperture : 1.80

Diagnosis : Shell attenuated-turreted, perforate, obliquely costulate, whorls moderately convex, body whorl rounded. Aperture vertical, ovately rounded, peristome double, the outer expanded and slightly reflected, the inner continuous. Operculum membranaceous, paucispiral.

Distribution : India : West Bengal (Darjiling), Arunachal Pradesh.

Order STLYOMMATOPHORA

Super Family PUPILLACEA

Family ENIDAE

Genus 28. *Rachis* Albers 1859

63. *Rachis bengalensis* (Lamarck)

Material examined : Maldah district : 1 ex., From mango garden, Harishchandrapur, Maldah (Coll. D.K. Thakur, 1985).

Super Family CLAUSILIACEA

Family CLAUSILIIDAE

Genus 29. *Phaedusa* H. A Adams, 1855

Shell fusiform, sinistral, usually exceeding 12 mm, sculptured with wavy striae, distinct on the last whorl; fairly solid, spire with rather straight lateral sides.

Lunule absent and replaced by a number of small parallel plicae. Spiral lamella usually disjoined. Last whorl appressed. Duct of the receptaculum seminis with an appendix.

India, Burma, China, Japan, Malaya Archipelago.

Mostly mountain dwellers, tree climbing forms are also recorded.

Following Loosjes (1953), *Phaedusa* is elevated to a generic rank here.

64. *Phaedusa loxostoma* (Benson)

1836. *Clausilia loxostoma* Benson, *J. Asiat. Soc. Beng.*, 5 : 353.

1842. *Clausilia bengalensis* : Pfeiffer : *Symb.*, 2 : 60.

1914. *Clausilia (Phaedusa) loxostoma* : Gude, *Fauna Brit. India*, Mollusca p. 324.

Material examined : 6 exs. 'N. Bengal' (Coll. ?).

Measurements (in mm) : Height : 19.80 - 25.55 ; Diameter : 4.85-5.40 ; H. of aperture : 4.70-5.20

Diagnosis : Shell fusiform, sinistral, obsoletly striate on the spire, distinctly so on the last whorl, whorls 9-10, convex, sutures oblique and rather distantly crenulate; aperture elongate, oblique, bi-plicate, angulate above, dilated below; outer lip strongly reflected. Palatal folds 5, visible from outside behind the aperture.

Distribution : India : West Bengal (Darjiling), Assam, Meghalaya. Endemic to the E. Himalayas.

Remarks : Though the locality of the shells are given as 'N. Bengal' obviously they are from Darjiling.

Super Family CORILLACEA
Family CORILLIDAE
Genus 30. *Plectopylis* Benson, 1860

Shell dextral or sinistral, widely umbilicate, depressed, spire flat or low conical, upper surface with spiral sculpture. Aperture lunate mostly with an elevated parietal callus also sometimes with an entering lamella. The interior part of the last whorl provided with a set of transverse plate on the parietal wall and denticles on the outer wall.

India, Burma, China, Thailand, Loo Choo Archipelago.

Key to the species of *Plectopylis*

1. Shell larger, exceeding 10 mm. in diameter, with 7-8 whorls; denticles on parietal wall in one series *P. pinacoides*
- Shell smaller, upto 6 mm. in diameter; with 5-6 whorls; denticles on parietal wall in two series
.....
2. Spire a little raised, a horizontal plate present above the parietal fold.....*P. blanda*

Spire flat, horizontal plate above the parietal fold absent..... *P. minor*

65. *Plectopylis (Endothyra) minor* Godwin-Austen

1879. *Helix (Plectopylis) minor* Godwin-Austen, *Ann. Mag. nat. Hist.*, (5)4 : 164.

1897. *Plectopylis minor* : Gude, *Science Gossip*, N.S. 4 : 11, fig. 47.

1914. *Plectopylis minor* : Gude, *Fauna Brit. India*, Mollusca, 2 : 75.

Material examined : Darjiling district : 40 exs., Darjiling (Coll. ?).

Measurements (in mm) : Height : 1.40-2.40 ; Diameter : 3.0-5.10

Diagnosis : Shell sinistral, discoidal, openly umbilicate, coarsely sculptured with oblique ribbings and raised spiral lines. Whorls 5, narrowly and flatly round. Aperture lunate, oblique and descending in front, peristome reflected with a depression at the upper margin, inner margin joined by a raised callus.

The parietal armature consists of a vertical plate with two minute denticles and a thin horizontal fold below. The palatal denticles are arranged in two series.

Distribution : India : West Bengal (Darjiling), Meghalaya, Manipur, Sikkim.

66. *Plectopylis (Endothyra) blanda* Gude

1898. *Plectopylis blanda* Gude, *Science Gossip*, N.S. 4 : 264, fig. 70.

1914. *Plectopylis (Endothyra) blanda* : Gude, *Fauna Brit. India*, Mollusca, 2 : 77, fig. 28.

Material examined : Jalpaiguri district : 4 exs., Jayanti, 16 kms. from Rajabhatkhawa, Jalpaiguri (Coll. S.C. Mitra & S. Barua, 1986).

Measurements (in mm) : Height : 3.10 ; Diameter : 6.10 ; H. of aperture : 2.85

Diagnosis : shell sinistral, depressed, openly umbilicate, regularly and obliquely ribbed, faint spiral lines are also present; whorls 6, last whorl scarcely descending in front. Aperture lunate, peristome reflected.

Differs from the preceeding species in the spire being a little more raised, the spiral lines being very faint and also in having a short horizontal fold above the vertical plate in the parietal armature.

Distribution : India : West Bengal (Darjiling), Meghalaya.

67. *Plectopylis (Endothyra) pinacis* Benson

1859. *Helix pinacis* Benson, *Ann. Mag. nat. Hist.*, (3) 3 : 268.

1860. *Helix (Plectopylis) pinacis* : Benson, *Ann. Mag. nat. Hist.* (3) 5 : 247.

1914. *Plectopylis (Endothyra) pinacis* : Gude, *Fauna Brit. India*, Mollusca, 2 : 86, fig. 35.

Material examined : Darjiling district : 21 exs., Darjiling (Coll. F. Stoliczka).

Measurements (in mm) : Height : 5.0-5.4 ; Diameter : 11.70-14.10 ; H. of aperture : 4.75-5.40

Diagnosis : Shell larger than in the other two species. Widely umbilicate, coarsely sculptured with oblique plications and raised spiral lines; whorls 7-8, the last subcarinate above the periphery. Aperture oblique, peristome expanded and reflected.

The parietal armature consists of a strong vertical plate which gives off two small supports one on either side above and one club shaped support on the posterior side below. A thin horizontal fold occurs below the vertical plate. The palatal armature consists of six horizontal folds arranged one above another.

Distribution : India : West Bengal (Darjiling), Sikkim.

Super Family ACHATINACEA

Family SUBULINIDAE

In West Bengal this family is represented by two subfamilies Subulininae and Opeatinac.

Key to the genera

1. Shell imperforate, columella truncate at base..... 2
 Shell narrowly perforate, columella rounded at base..... 3
2. Spire a little contracted just below the apex, length of last whorl less than half of total length of shell
 *Bacillum*
 Spire not contracted below the apex, length of last whorl equal or more than the total length of shell
 *Glessula*
3. Shell ovately turreted, above 3 mm. in width, distinctly striate, columella sinuate below.....
 *Curvella*
 Shell narrowly elongate, below 3 mm. in width, smooth, columella not sinuate below.....
 *Lamellaxis*

Sub Family SUBULININAE

Genus 31. *Bacillum* Theobald, 1870

Shell large, turreted, imperforate, a little contracted towards the apex, obliquely ribbed. Aperture oblique, columella concave and truncate below; outer lip simple, expanded.

Eastern Himalayas.

68. *Bacillum erosum* (Blanford)

1871. *Glessula erosa* Blanford, *J. Asiat. Soc. Beng.*, 40 : 43, pl. 2, fig. 7.

1914. *Bacillum erosum* : Gude, *Fauna Brit. India*, Mollusca, 2 : 344.

Material examined : Darjiling district : 2 exs., Dhobi Jhora, Kurseong, Darjiling (Coll. Mhd. Shariff, 11.3.26)

Measurements (in mm) : Length : 28.50 ; Diameter : 8.65 ; H. of aperture : 8.10

Diagnosis : Shell elongate, turreted, straw coloured, closely and somewhat obliquely striate, whorls 11, flatly convex; columellar strongly curved and truncated below, outer lip simple.

Distribution : India : West Bengal (Darjiling), Sikkim. Endemic to the E. Himalayas.

Genus 32. *Glessula* von Martens, 1860

The genus *Glessula* was treated under the family Ferussacidae by both Pilsbry (1909) and Gude (1914). Godwin-Austen (1920), while expressing his preference to place the genus in a family of its own, Glessulidae, pointed out to the closeness of the two genera *Glessula* and *Bacillum*, both conchologically and anatomically. Keeping this observation in view and with reference to the more recent arrangement of Solem (1966), the genus is now being treated under the subfamily Subulininae along with *Bacillum* in the family Subulinidae.

Key to the species of *Glessula*

Shell larger (above 15 mm. in length) distinctly striate..... *G. crassula*

Shell smaller (upto 10 mm. in length), smooth and glossy..... *G. gemma*

69. *Glessula crassula* (Reeve)

1850. *Achatina crassula* (Benson) Reeve, *Conch. Icon.*, *Achatina*, pl. 22, 120.

1909. *Glessula crassula* : Pilsbry, *Man. Conch.*, (2) 20 : 98, pl. 13, fig. 4.

1914. *Glessula crassula* : Gude, *Fauna Brit. India*, Mollusca, 2 : 429.

Material examined : Darjiling district : 3 exs. Kurseong, Darjiling (Coll. Mhd. Shariff, 1926-27).

Measurements (in mm) : Length : 19.40 ; Diameter : 8.90 ; H. of aperture : 8.20

Diagnosis : Shell rather large, pyramidally conical, vertically striate, whorls 7-8, flatly convex.

Distribution : India : West Bengal (Darjiling), Arunachal Pradesh, Meghalaya.

Restricted to the hills of N.E. India including Darjiling in West Bengal.

Remarks : The shells examined are considerably larger than the Khasi Hills specimens in the British Museum referred to by Gude (1914).

70. *Glessula gemma* (Reeve)

Material examined : Maldah district : 62 exs., from wild plant patches, near Fatch Khan's Samadhi, Gour, Maldah (Coll. D.K. thakur & S.C. Mitra, 1985). West Dinajpur district : 9 exs., Santi colony, Kaliaganje, W. Dinajpur (Coll. D.K. Thakur & S.C. Mitra, 1985).

Sub Family OPEATINAE
Genus 33. *Curvella* Chapcr, 1885

Shell elongate-ovate, imperforate, usually with vertical striae, sutures impressed, whorls moderately convex, 7-8 in number; columella frequently sinuate below, often twisted, outerlip simple.

India, China, The Philipplines, West, East and South Africa.

Key to the species of *Curvella*

1. Length of body whorl less than half of total length, columellar margin twisted but not curved forward..... *C. sikkimensis*
- Length of body whorl more than half of total length, columellar margin curved forward and not twisted..... *C. khasiana*

71. *Curvella khasiana* (Godwin-Austen)

1872. *Bulimus (Harpalus) khasianas* Godwin-Austen, *Proc. zool. Soc.*, p. 516, pl. 30, fig. 7.

1876. *Bulimus (Harpalus) khasiacus* : Godwin-Austen, *J. Asiat. Soc. Beng.*, 45 : 317.

1914. *Curvella khasiana* : Gude, *Fauna Brit. India*, Mollusca, 2 : 353.

Material examined : Darjiling district : 10 exs., Darjiling (Coll. ?).

Measurements (in mm) : Length : 8.65-10.35 ; Diamater : 3.7-5.15 ; H. of aperture : 4.0-5.40

Diagnosis : Shell ovately turreted, narrowly perforate, thin, dull white, finely striate, whorls 6-7, scarcely convex; aperture vertical, semioval, outer lip thin, rounded and arched forward above; columellar margin curved.

Distribution : India : West Bengal (Darjiling), Meghalaya, Nagaland, Sikkim.

72. *Curvella sikkimensis* (Reeve)

1830. *Bulimus sikkimensis* Reeve, *Conch. Icon.*, 5, *Bulimus*, pl. 87, fig. 651.
 1906. *Curvella sikkimensis* : Pilsbry, *Man. Conch.*, (2) 18 : 66, pl. 9, figs. 59,60.
 1914. *Curvella sikkimensis* : Gude, *Fauna Brit. India*, Mollusca, 2 : 349.

Material examined : Darjiling district : 6 exs., Darjiling (Coll. ?).

Measurements (in mm) : Length : 16.65-30.30 ; Diameter : 6.60-11.25 ; H. of aperture : 7.50-12.30

Diagnosis : Shell ovate, imperforate, vertically striate, decussated by faint irregular spiral markings, whorls 7. Aperture oblong, columella twisted and a little reflected, outer lip forwardly arched.

Distribution : India : West Bengal (Darjiling), Sikkim.

Genus 34. *Lamellaxis* Strebel & Pfeiffer, 1882

73. *Lamellaxis gracilis* (Hutton)

Material examined : Maldah district : 17 exs., Garden inside Bungalow compound, Harishchandrapur (Coll. D.K. Thakur & S.C. Mitra, 1985). West Dinajpur district : 2 exs. Dhonaipur Vill., near Harirampur; 3 exs., Forest near Tourist Lodge, Raigunje; 1 ex., From a garden at Raigunje town; 9 exs., From a garden at Hilli (Coll. D.K. thakur & S.C. Mitra, 1985).

Family ACHATINIDAE

Genus 35. *Achatina* Lamarck, 1799

74. *Achatina (Lissachatina) fulica fulica* (Bowdich)

Material examined : West Dinajpur district : 1 ex., Kaliagunje; 1 ex., Garden at Islampur; 2 exs., From a garden at Tapan vill.; 2 exs., Raigunje town; 1 ex., Garden behind Rice Mill, Harirampur. Maldah district : 1 ex., Garden inside Bungalow compound, Harishchandrapur (Coll. D.K. Thakur & S.C. Mitra, 1985). Koch Bihar district : 1 ex., From a garden at Koch Bihar town; 1 ex., Forest Bungalow garden at Jayanti, 16 kms. from Rajabhatkhawa (Coll. S.C. Mitra & S. Barua, 1986).

Remarks : This species is a notorious agri-horticultural pest and abundantly occurs in all the districts of North Bengal except Darjiling. Koch Bihar town is the worst infected pocket with a population density of 33/m². (Raut & Ghose, 1984).

Super Family ENDODONTACEA

Family PHILOMYCIDAE

It is a family of land slugs, which occurs in the tropical parts of the world. It is represented in the Oriental region by a single genus *Incillaria*.

Genus 36. *Incillaria* Benson, 1842

Body spindle shaped, completely lacking a shell, mantle covering the whole back, foot equalling the body in width and demarcated by the pedal groove, extremity of foot pointed, sole of foot undivided. Genital orifice on the right of the head.

India, China.

Hitherto known from the Daffa and the North Cachar Hills, this genus is now for the first time recorded from West Bengal (Jalpaiguri).

75. *Incillaria campestris* Godwin-Austen

1867. *Philomycus (Incillaria) campestris* Godwin-Austen, *J. Asiat. Soc. Beng.*, 45 : 315, pl. 8, fig. 3.

1914. *Incillaria campestris* : Gude, *Fauna Brit. India*, Mollusca, 2 : 480.

Material examined : Jalpaiguri district : 1 ex., from under a log of wood in a garden at Rajabhatkhawa : 1 ex., From under the leaf of a plant on way side near Garo Basti, Rajabhatkhawa (Coll. S.C. Mitra & S. Barua, 1986).

Measurements (in mm) : Length : 16.30

Diagnosis : Animal yellowish with brown longitudinal bands, one down the middle on the dorsal side and two lateral on both sides. Sole of foot transversely wrinkled but longitudinally undivided.

Distribution : India : West Bengal (Jalpaiguri), Arunachal Pradesh.

Remarks : The juvenile specimens are too young and are only tentatively identified and placed under the above species.

Super Family ARIOPHANTACEA

Family TROCHOMORPHIDAE

Genus 37. *Sivella* Blanford, 1863

76. *Sivella castra* (Benson)

Material examined : Darjiling district : 7 exs., Darjiling, (Coll. ?).

Family HELICARIONIDAE

Key to the genera

Shell imperforate, shell lobes strongly pebbled and almost completely covering the shell when expanded *Cryptaustenia*

Shell usually narrowly perforate, shell lobes weakly pebbled and only partially covering the shell when expanded..... *Durgella*

Genus 38. *Cryptaustenia* Cockerell, 1898

Shell thin, fragile, transparent, depressed, imperforate, whorls 3-4, rapidly increasing in width; body whorl large and rounded, aperture wide and oblique, peristome simple and membrane like.

Animal with a very elongated tail, caudal gland with a prominent overhanging lobe; shell lobes large and strongly pebbled.

India, Burma, Bhutan, Thailand.

Key to the species of *Cryptaustenia*

Body whorl descending near the aperture height of aperture equal to the height of shell..... *C. ovata*

Body whorl not descending near the aperture, height of aperture more than the height of shell.....
..... *C. heteroconcha*

77. *Cryptaustenia ovata* (H. Blanford)

1871. *Helicarion ovata* H. Blanford, *J. Asiat. Soc. Beng.*, 2 : 44, pl. 2, fig. 9.

1908. *Cryptaustenia ovata* : Blanford & Godwin-Austen, *Fauna Brit. India*, Mollusca, p. 182.

Material examined : W. Dinajpur district : 1 ex., Santi Colony, Kaliagunje, W. Dinajpur (Coll. D.K. Thakur & S.C. Mitra, 1985). Jalpaiguri district : 11 exs., Forest bungalow garden at Jayanti, 16 kms. N. of Rajabhatkhawa, Jalpaiguri (Coll. S.C. Mitra & S. Barua, 1986). Darjiling district : 3 exs., Forest Office, Kurseong at 5366 ft. (Coll. ?).

Measurements (in mm) : Height : 5.50-6.65 ; Diameter : 8.60-12.20 ; H. of aperture : 5.50-6.70

Diagnosis : Shell depressed, smooth-polished, spire flattened, whorls 3 1/2, body whorl slightly descending in front; aperture oblique, ovately lunate, peristome simple with an arcuate upper margin, columellar margin vertical and sinuate below.

Distribution : India : West Bengal (W. Dinajpur, Darjiling & Jalpaiguri).

Remarks : This species is endemic to the northern part of W. Bengal. The other localities included by Nevill (1878) were perhaps the result of the shell being confounded with those of *C. panchatensis* and *C. bensoni*, the species occurring in the gangetic plains of Bihar and W. Bengal.

78. *Cryptaustenia heteroconcha* (Blanford)

1871. *Helicarion heteroconcha* Blanford, *J. Asiat. Soc. Beng.*, 2 : 45, pl. 2, figs. 8, 8b.

1908. *Cryptaustenia heteroconcha* : Blanford & Godwin-Austen, *Fauna Brit. India*, Mollusca p. 183.

Material examined : Darjiling district : 4 exs., Eagles' Crag, Kurseong, Darjiling (Coll. B.N. Chopra, 1924).

Measurements (in mm) : Height : 8.50-9.80 ; Diameter : 15.65-18.15 ; H. of aperture : 10.0-12.70

Diagnosis : Shell depressed, thin, membranaceous, greenish yellow, polished, obsolete striae, spire flat, whorls 3, body whorl inflated; aperture oblique, oblong-ovate, peristome simple, membranaceous, columellar margin a little curved.

Distribution : India : West Bengal (Darjiling).

Genus 39. *Durgella* Blanford, 1863

Shell globose or depressed, thin, often membranaceous, very narrowly perforate, rarely imperforate, whorls 3-4, rapidly increasing. Aperture lunate, oblique, peristome simple, shell lobes fairly large, partially covering the shell when expanded.

India, Burma, Thailand.

79. *Durgella salius* (Benson)

1859. *Vitrina salius* Benson, *Ann. Mag. nat. Hist.*, (3) 3 : 189.

1883. *Austenia salius* : Godwin-Austen, *Moll. India*, 1 : 152, pl. 37, fig. 1.

1908. *Durgella salius* : Blanford & Godwin-Austen, *Fauna Brit. India*, Mollusca p. 217.

Material examined : Darjiling district : 2 exs., Darjiling (Coll. ?).

Measurements (in mm) : Height : 4.75 ; Diameter : 7.0 ; H. of aperture : 4.25

Diagnosis : Shell rather thin, subglobose depressed, imperforate, smooth with indistinct striae, pale yellowish, spire a little raised, whorls 3 1/2, body whorl rounded; aperture widely lunate, peristome simple, slightly arcuate above, columellar margin subvertically descending.

Distribution : India : West Bengal (Darjiling), Meghalaya, Sikkim.

Family ARIOPHANTIDAE

Ariophantidae, the largest family of Indian land pulmonates, is represented in the north Bengal by 9 genera and 23 species.

Key to the genera of *Ariophantidae*

1. Shell partly internal, thin, membranaceous, imperforate, whorls upto 2..... *Austenia*

- Shells wholly external, thick, perforate, whorls more than 2..... 2
2. Shell conical, about as broad as high..... 3
- Shell depressed, distinctly broader than high..... 5
3. Shell obliquely striate above..... 4
- Shell spirally striate above..... *Sitala*
4. Shell imperforate or very narrowly perforate, convex around umbilicus..... *Kaliella*
- Shell usually deeply perforate, angulate around umbilicus..... *Rahula*
5. Shell sinistral..... *Ariophanta*
- Shell dextral..... 6
6. Shell more or less inflated, with indistinct coloured bands; sole of foot without distinct longitudinal markings..... *Cryptozona (ligulata)*
- Shell rather depressed, without coloured bands; sole of foot with distinct longitudinal markings..... 7
7. Shell usually with decussate sculpture above, caudal gland at the extremity of foot without an overhanging lobe..... *Oxytes*
- Shell usually without decussate sculpture above, caudal gland at the extremity of foot with an overhanging lobe..... 8
8. Peristome internally thickened, left shell lobe absent..... *Bensoniella*
- Peristome not internally thickened, left shell lobe present..... *Macrochlamys*

Genus 40. *Ariophanta* Desmoulin, 1829

80. *Ariophanta interrupta* (Benson)

Material examined : Maldah district : 1 ex., Mango garden at Harishchandrapur, Maldah (Coll. D. K. Thakur, 1985). West Dinajpur district : 3 exs., Santi Colony, Kaliaganje (Coll. D.K. Thakur & S.C. Mitra, 1985).

Remarks : *A. interrupta*, which is fairly common in the lower parts of W. Bengal extends upto W. Dinajpur in the northern part. Incidentally it is one of the few species by which *Ariophanta*, an essentially peninsular Indian genus is represented in eastern India.

Genus 41. *Austenia* Nevill, 1878

Shell imperforate, ovate, partly covered by the mantle lobes, thin rather membranaceous, whorls about 2, rapidly increasing.

Animal slug-like, not retractile within the shell. Mantle lobes large, united around the shell. Extremity of foot sharply carinate above, truncate behind by the caudal gland.

India, Burma, China, Thailand, Vietnam.

81. *Austenia annandalei* Godwin-Austen

1910. *Austenia annandalei* Godwin-Austen, *Land and Freshwater Moll. India*, 2 : 288, pl. 128, figs. 15, 15a.

Material examined : Darjiling district : 1 ex., Siliguri, Reg. No. M 4841/1, Holotype (Coll. N. Annandale); 1 ex., Kurseong (4700 ft.) (Coll. ?).

Measurements (in mm) : Length : 19.55-21.05 ; Diameter : 12.20-12.60

Diagnosis : Shell thin, ovate, olivaceous with a small, flattened, whitish spire which does not project much beyond the peristome; whorls 2, very rapidly increasing. Body whorl large, rather membranaceous.

Distribution : India : West Bengal (Darjiling).

Remarks : Animal not seen.

Genus 42. *Bensonina* Pfeiffer, 1855

Shell depressed, thin, perforate, usually obliquely striate, sometimes with decussating sculpture; aperture lunate, peristome thin but with a thickened callosity inside.

India (The Himalayas), Afghanistan.

Essentially a western Himalayan genus, represented in the E. Himalayas by two species.

Key to the species of *Bensonina*

Last whorl angulate at the periphery..... *B. camura*

Last whorl rounded at the periphery..... *B. mainwaringi*

82. *Bensonnia camura* (Benson)

1868. *Bensonnia camura* Benson, *Ann. Mag. nat. Hist.*, (3) 3 : 260.

1908. *Bensonnia camura* : Blanford & Godwin-Austen, *Fauna Brit. India*, Mollusca, p. 175.

Material examined : Darjiling district : 2 exs., Takdah, 1650 M., 1 ex., Palmajua, 2250 M. (Coll. H.K. Khajuria ; 1958); 1 ex., Kurseong, (4700-5000 ft.) (Coll. N. Annandale, 1910); 10 exs., Darjiling (Coll. F. Stoliczka).

Measurements (in mm) : Height : 4.98-11.0 ; Diameter : 9.60-18.70 ; H. of aperture : 4.75-7.0

Diagnosis : Shell conoidly depressed, perforate, carinate, obliquely plicate above, smoother below, whorls 6-1/2, flatly convex, aperture oblique, widely lunate, columellar margin descending in a curve.

Distribution : India : West Bengal (Darjiling), Sikkim.

Remarks : As observed by Blanford & Godwin-Austen (1908), this species shows striking resemblances with *Macrochlamys tugurium*. While the animal chiefly differs in lacking the shell lobes the shell can be distinguished by its sharper keel, flatter base, more prominent sculpture and above all the internally thickened peristome.

83. *Bensonnia mainwaringi* (Godwin-Austen)

1878. *Nanina* (*Bensonnia*) n.sp. Nevill, *Hand List Moll. Indian Mus.*, 1 : 49.

1882. *Macrochlamys mainwaringi* : Godwin-Austen, *J. Asiat. Soc. Beng.*, 69, pl. 5, fig. 3.

1908. *Macrochlamys mainwaringi* : Blanford & Godwin-Austen *Fauna Brit.* Mollusca, p. 83.

Material examined : Darjiling district : 11 exs., Darjiling (Coll. F. Stoliczka & G.D. Mainwaring).

Measurements (in mm) : Height : 8.60-16.80 ; Diameter : 15.40-27.95 ; H. of aperture : 6.90-18.50

Diagnosis : Shell depressedly subglobose, pale fulvous, thin, translucent finely decussate above, smooth beneath, whorls 6-7, the last round and broad; aperture oblique, roundly lunate, columella reflected, curved. Peristome with a clear labiation inside. Transverse markings indicating the formation of former lips during the period of rest, are also present on the last whorl.

Distribution : India : West Bengal (Darjiling), Sikkim.

Remarks : Though the species was included under *Macrochlamys* by Blanford & Godwin-Austen (1908), in consideration of its distinctly labiate peristome and also the fact that Stoliczka's drawing of the animal did not show any shell lobe, here it is placed under *Bensonnia*.

Genus 43. *Cryptozona* Moerch, 1872

Shell globose or globosely depressed, perforate with an inflated bodywhorl, obliquely striate;

aperture oblique, lunate, peristome simple.

India, Sri Lanka, Thailand.

84. *Cryptozona ligulata* (Ferussac)

1819. *Helix ligulata* Ferussac, *Hist. nat.* p. 31, fig. 2

1908. *Ariophanta (Nilgiria) ligulata* : Blanford & Godwin-Austen, *Fauna Brit. India*, Mollusca, p. 38.

1960. *Cryptozona ligulata* : Satyamurti, *Bull. Madras Govt. Mus.*, 6 (4) : 117, pl. 15, figs. 1a-1c.

Material examined : Maldah district : 33 exs., Harishchandrapur Rly. Quarter, Maldah (Coll. D.K. Thakur, 1977).

Measurements (in mm) : Height : 14.50-22.0 ; Diameter : 18.40-25.95 ; H. of aperture : 10.65-11.55

Diagnosis : Shell rather globose, thick, narrowly perforate, finely and rather flexuously plicate, decussated by subdistant spiral lines, whitish with a brownish band running above the periphery and extending all along the sutures; whorls 5-6, convex, aperture oblique, lunate, peristome thin, columellar margin a little reflected.

Distribution : India : West Bengal (Maldah), Andhra Pradesh, Bihar, Orissa, Tamilnadu.

Remarks : This species is for the first time recorded from West Bengal.

Genus 44. *Kaliella* Blanford, 1863

Shell small, conical, narrowly perforate or imperforate, obliquely costulate, whorls scarcely convex; aperture oblique, subquadrately lunate, columellar margin a little reflected.

Indo-Malayan region, Madagascar.

Of the two species included here *K. barrakporensis* has a world-wide distribution but the other species *K. nevilli* is known from Darjiling only and has rather an uncertain position. Since it has not been possible to examine fresh material it is retained here following Blanford and Godwin-austen (1908).

Key to the species of *Kaliella*

Shell trochiform, as high as broad, columellar margin descending vertically.....*K. barrakporensis*

Shell depressedly conical, slightly broader than high, columellar margin descending in a curve.....
..... *K. nevilli*

85. *Kaliella barrakporensis* (Pfeiffer)

Material examined : Jalpaiguri district : 1 ex., From a road side bush at Garo-basti near

Rajabhatkhawa, Jalpaiguri, (Coll. S.C. Mitra & S. Barua, 1986).

86. *Kaliella nevilli* Godwin Austen

1883. *Kaliella nevilli* Godwin-Austen, *Land & Freshwater Moll. India*, 1 : 70, pl. 13. fig. 6.

Material examined : Darjiling district : 14 exs., Darjiling (Coll. F. Stoliczka).

Measurements (in mm) : Height : 2.70-4.45 ; Width : 3.60-5.60 ; H. of aperture : 1.60-2.85

Diagnosis : Shell thin, depressedly conoid, umbilicate, obliquely costulate above and finely radiately striate below; whorls 4-5, body whorl subangulate at the periphery. Aperture oblique, roundly lunate, columellar margin slightly reflected above.

Distribution : India : West Bengal (Darjiling).

Remarks : Judging by its shell character, it is unlikely that this species actually belongs to *Kaliella*. The rugose sculpture above and the fairly wide umbilicus make it nearer to *Rahula*.

Genus 45. *Macrochlamys* Gray, 1847

Shell thin, glossy, perforate, (rarely imperforate), depressedly or subglobosely turbate, smooth or very finely striate; whorls convex, the last rounded or subangulate; aperture rather wide, crescent shaped, peristome thin, columella a little thickened.

Animal large, foot narrow, with a tripartite sole, mucous pore large with a large overhanging fleshy horn-like process, peripodial groove distinct; shell lobes well developed.

South-east Asia (limited by moist warm climate, not occurring in drier N.E. India).

Macrochlamys, the largest genus of Indian land pulmonates is represented by 15 species in the northern part of West Bengal. Eleven species have been studied here and the remaining 3 are included from literature records. *M. indica* has a very wide range of distribution occurring commonly throughout India including the bay islands. *M. petrosa* is a fairly common species in the lower part of the state reaching Maldah (Gangetic Plains) to the north. The remaining 14 species are endemic to the north-eastern region ranging between north Bengal to Sikkim. A single species *M. petasus* extends to Arunachal Pradesh and Burma.

Key to the species of *Macrochlamys*

1. Peristome thickened inside..... 2
 - Peristome not thickened inside 4
2. Last whorl angulate..... 3

- Last whorl rounded..... *M. opipara*
3. Shell conspicuously sculptured ; above 10mm. in width..... *M. tugurium*
- Shell smooth; upto 10 mm. in width..... *M. petasus*
4. Shell below 10 mm. in width..... 10
- Shell above 10 mm. in width..... 5
5. Shell without spiral sculpture..... 9
- Shell with distinct spiral sculpture..... 6
6. Columellar margin subvertical, indistinctly reflected..... 7
- Columellar margin oblique, distinctly reflected..... 8
7. Shell proportionately more broad, excavated around umbilicus..... *M. petrosa*
- Shell proportionately less broad, not excavated around umbilicus..... *M. indica*
8. Shell with close spiral lines, number of whorls 5..... *M. sequax*
- Shell with distant spiral lines number of whorls 6..... *M. superflua*
9. Shell smooth without distinct sculpture, columella briefly reflected..... *M. lubrica*
- Shell with rugose transverse sculpture, columella broadly reflected..... *M. patane*
10. Shell with spiral sculpture around perforation..... *M. rorida*
- Shell without spiral sculpture around perforation..... *M. hodgsoni*

87. *Macrochlamys hodgsoni* (Benson)

1859. *Helix hodgsoni* Benson, *Ann. Mag. nat. Hist.*, (3) 3 : 267

1908. *Macrochlamys hodgsoni* : Blandford & Godwin-Austen, *Fauna Brit. India*, Mollusca, p. 85.

Material examined : Darjiling district : 16 exs., Darjiling (Coll. ?).

Measurements (in mm.) : Height : 3.0-4.55 ; Diameter : 4.80-7.10 ; H. of aperture : 2.20-3.40

Diagnosis : Shell small, depressedly subglobose, pale yellowish, narrowly perforate, very finely

decussate above, convex and smooth beneath; whorls 5, aperture very slightly oblique, roundly lunate, columellar margin curved, triangularly reflected.

Distribution : India : West Bengal (Darjiling), Sikkim.

88. *Macrochlamys indica* Godwin-Austen

Material examined : Maldah district : 14 exs. Garden at Tarabagan, Harishchandrapur; 4 exs. Gour, Maldah (Coll. D.K. Thakur and S.C. Mitra, 1985); West Dinajpur district : 5 exs., Balurghat, (Coll. D.K. Thakur & A. Dey, 1977). Jalpaiguri District : 2 exs., Garden at Forest bungalow, Jayanti, 16 kms. from Rajabhatkhawa (Coll. S.C. Mitra and S. Barua, 1986). Darjiling district : 1 ex. Kurseong (Coll. N. Annandale.)

89. *Macrochlamys lubrica* (Benson)

1852. *Helix lubrica* Benson, *Ann. Mag. nat. Hist.*, (2) 10 : 349.

1908. *Macrochlamys lubrica* : Blanford & Godwin-Austen, *Fauna Brit. India*, Mollusca, p. 83.

Material examined : Darjiling district : 11 exs., Darjiling (Coll. W.T. Blanford).

Measurements (in mm.) : Height : 6.35-10.90 ; Diameter : 10.35-24.0 ; H. of aperture : 4.65-10.40

Diagnosis : Shell perforate, depressed, polished, smooth with obsolete growth striae, yellowish, shining beneath, whorls 5, convex, the last very broad; aperture subvertical, lunate, peristome thin, columellar margin slightly reflected, roundly curved.

Distribution : India : West Bengal (Darjiling), Sikkim.

90. *Macrochlamys opipara* Godwin-Austen,

1883. *Macrochlamys opipara* Godwin-Austen, *Land and Freshwater Moll. India*, 1 : 108, pl. 23, fig. 6.

1908. *Macrochlamys opipara* : Blanford & Godwin-Austen, *Fauna Brit. India*, Mollusca, p. 84.

Material examined : Darjiling district : 2 exs., Darjiling (coll. ?).

Measurements (in mm) : Height : 13.30-13.50 ; Diameter : 22.25-22.35 ; H. of aperture : 10.50-10.70

Diagnosis : Shell subglobose depressed, perforate, yellowish chestnut, finely and microscopically sculptured with spiral impressed lines, whorls 5 1/2-6, convex; aperture oblique, peristome thin; a labiation mark present a little distant inside the aperture; columellar margin broadly reflected.

Distribution : Not recorded outside Darjiling district of West Bengal.

92. *Macrochlamys petasus* (Benson)

1859. *Helix petasus* Benson, *Ann. Mag. nat. Hist.*, (3) 3 : 388.

1908. *Macrochlamys ? petasus* : Blanford & Godwin-Austen, *Fauna Brit. India*, Mollusca, p. 115.

Material examined : Darjiling district : 11 exs. (Coll. ?).

Measurements (in mm) : Height : 2.15-4.30 ; Diameter : 4.70-9.15 ; H. of aperture : 1.80-4.0

Diagnosis : Shell small, very narrowly perforate, depressed, smooth, polished, yellowish; whorls 5-6, flatly convex above, the last subangulate at the periphery, tumid beneath; aperture subvertical, lunate, peristome blunt, thinly labiate inside, columellar margin briefly reflected.

Distribution : India : West Bengal (Darjiling), Arunachal Pradesh, Assam, Maharashtra. Elsewhere : Burma.

Remarks : Blanford & Godwin-Austen (1908) expressed doubt regarding the occurrence of this species in Darjiling. But the shells examined from Darjiling perfectly agree with the description and also the material from other localities present in the National Zoological Collection.

93. *Marchochlamys petrosa* (Hutton)

Material examined : Maldah district : 12 exs., From below wild plants near Fateh Khan's Samadhi, Gour, Maldah (Coll. D.K. Thakur & S.C. Mitra, 1985).

94. *Marchochlamys rorida* (Benson)

1859. *Helix rorida* Benson. *Ann. Mag. nat. Hist.*, (3) 3 : 206.

1908. *Macrochlamys rorida* : Blanford & Godwin-Austen, *Fauna Brit. India*, Mollusca, p. 94.

Material examined : Darjiling district : 17 exs., Darjiling (Coll. ?).

Measurements (in mm) : Height : 3.80-4.75 ; Diameter : 5.0-7.10 ; H. of aperture : 3.10-3.70

Diagnosis : Shell small, globosely depressed, narrowly perforate, smooth shining, with traces of spiral markings above and around the perforation below; whorls 5, convex, the last considerably broader, tumid beneath, aperture widely lunate, oblique, peristome thin, columellar margin a little reflected, nearly vertical.

Distribution : India : West Bengal (Darjiling), Sikkim.

95. *Macrochlamys sequax* (Benson)

1859. *Helix sequax* : Blanford & Godwin-Austen, *Fauna Brit. India*, Mollusca, p. 86.

Material examined : Maldah district : 3 exs., Fatch Khan's Samadhi, Maldah; 6 exs., Harishchandrapur, Maldah (Coll. D.K. Thakur & S.C. Mitra, 1985). West Dinajpur district : 15 exs., Hilli (Coll. D.K. Thakur & A. Dey, 1977). Jalpaiguri district : 5 exs., Garden at Forest Bungalow, Jayanti (Coll. S.C. Mitra & S. Barua, 1986). Darjiling district : 1 ex., Kurseong (Coll. B.N. Chopra, 1937); 16 exs., Darjiling (Coll. ?).

Measurements (in mm) : Height : 5.70-7.50 ; Diameter : 13.20-15.30 ; H. of aperture : 5.20-6.70

Diagnosis : Shell perforate, depressed, polished, finely decussate by close oblique striae and spiral lines, whorls 5, the last rounded; aperture oblique, roundly lunate, peristome thin, columellar margin briefly reflected, scarcely vertical.

The animal has a greenish tint on the neck, pinkish towards caudal region, the shell lobe tongue-like.

Distribution : India : West Bengal (Darjiling, Jalpaiguri, Maldah).

96. *Macrochlamys superflua* Blanford

1904. *Macrochlamys superflua* Blanford, *Proc. zool. Soc.*, 2 : 442, pl. 25, fig. 7.

1908. *Macrochlamys superflua* : Blanford & Godwin-Austen, *Fauna Brit. India*, Mollusca, p. 89.

Material examined : Jalpaiguri district : 4 exs., Garden at the Forest Bungalow, Jayanti, Jalpaiguri (Coll. S.C. Mitra & S. Barua, 1986).

Measurements (in mm.) : Height : 8.50-8.65 ; Diameter : 14.30-15.40 ; H. of aperture : 6.90-7.20

Diagnosis : Shell depressed, perforate, pale yellowish, marked with rather distant spiral lines both above and below; whorls 6, convex; aperture oblique, ovately lunate, columellar margin rather broadly reflected, vertical above then obliquely descending.

Distribution : India : West Bengal (Jalpaiguri), Sikkim.

Remarks : It differs from *M. sequax* in having distant spiral markings and also by being proportionately higher.

97. *Macrochlamys tugurium* (Benson)

1852. *Helix tugurium* Benson, *Ann. Mag. nat. Hist.*, (2) 10 : 348.

1908. *Macrochlamys tugurium* : Blanford & Godwin-Austen, *Fauna Brit. India*, Mollusca p. 81.

Material examined : Darjiling district : 22 exs., Darjiling (Coll. F. Stoliczka); 6 exs., Darjiling district (Coll. S.K. Rauth); 1 ex., Palmajua 2250 m (Coll. H. Khajuria, 1958; 1 ex., Kurseong (Coll. ?, 1926).

Measurements (in mm) : Height : 7.80-12.80 ; Diameter : 12.65-22.95 ; H. of aperture : 5.90-10.0

Diagnosis : Shell depressedly conoid, lenticular, perforate, fulvous horny, rather rugosely striate, decussated by impressed spiral lines, smoother beneath, whorls 6, flatly convex, the last angulate at the periphery; aperture broadly lunate, peristome conspicuously labiate inside, columellar margin briefly reflected above.

Remarks : Though this species is close to *Bensonia* in shell character, the well developed shell lobes justify its inclusion under *Macrochlamys*.

Genus 46. *Oxytes* Pfeiffer, 1856

Shell moderately large to large, thick, depressed, narrowly perforate to widely umbilicate, usually angulate or keeled at the periphery, smooth or striate.

Animal as a rule, lacking a lobe above the mucous pore.

India, Burma, Laos, Thailand.

Key to the species of *Oxytes*

1. Last whorl rounded or bluntly subangulate at the periphery; peristome a little thickened inside...
..... *O. orobia*
- Last whorl sharply carinate at the periphery; peristome not thickened inside.....2
2. Shell without distinct decussating sculpture, narrowly umbilicate; peripheral keel extending upto the aperture..... *O. blanfordi*
- Shell with distinct decussating sculpture, widely umbilicate; peripheral keel becoming obsolete near the aperture..... *O. cycloplax*

98. *Oxytes orobia* (Benson)

1848. *Helix orobia* Benson, *Ann. Mag. nat. Hist.*, (2) 2 :

1883. *Helix orobia* : Godwin-Austen, *Land and Freshwater Moll. India*, 1 : 129, pl.30, fig.4, pl.32, figs.1-5.

1908. *Oxytes orobia* : Blanford & Godwin-Austen, *Fauna Brit. India*, Mollusca, p. 169.

Material examined : 1 ex., Ghum, Darjiling (Coll. ?, 1918) : 5 exs., Darjiling (Coll. F. Stoliczka).

Measurements (in mm) : Height : 9.80-21.70 ; Diameter : 18.40-39.50 ; H. of aperture : 8.40-21.70

Diagnosis : Shell globosely depressed, perforate, finely sculptured with oblique striae and spiral

markings, yellowish with a narrow rufous band on the periphery, whorls 5-6, convex, the last bluntly subangulate; aperture slightly oblique, lunate, columellar margin reflected, peristome a little thickened inside.

Distribution : India : West Bengal (Darjiling), Sikkim.

Remarks : The shell in the species, with an internally thickened peristome and the marks of former lips across the last whorl, is closer to that of *Bensonia*, but the animal lacks an overhanging lobe to the caudal gland.

99. *Oxytes cycloplax* (Benson)

1852. *Helix cycloplax* Benson, *Ann. Mag. nat. Hist.*, (2) 10 : 348.

1908. *Oxytes cycloplax* : Blanford & Godwin-Austen, *Fauna Brit. India*, Mollusca, p. 168.

Material examined : Darjiling district : 3 exs., Around Darjiling (Coll. H. Khajuria, 1958); 2 exs., Kursong (Coll. Mhd. Shariff, 1926), 8 exs., Darjiling (Coll. ?).

Measurements (in mm) : Height : 8.30-22.75 ; Diameter : 17.65-43.45 ; H. of aperture : 7.20-18.25

Diagnosis : Shell more depressed, widely umbilicate (exposing subsequent whorls), angulate at the periphery, the angulation becoming blunt and obsolete near the aperture; granularly decussate above, moderately swollen and smoother below, pale yellowish with a rufous band just below the angulation. Aperture oblique, roundly lunate, columellar margin triangularly reflected.

Distribution : India : West Bengal (Darjiling), Sikkim.

100. *Oxytes blanfordi* (Theobald)

1859. *Helix blanfordi* Theobald, *J. Asiat. Soc. Beng.*, 28 : 308

1883. *Helix blanfordi* : Godwin-Austen, *Land and Freshwater Moll. India*, 1 : 128.

1908. *Oxytes blanfordi* : Blanford & Godwin-Austen, *Fauna Brit. India*, Mollusca, p. 168.

Material examined : Darjiling district : 5 exs., (Coll. ?).

Measurements (in mm) : Height : 7.15-12.40 ; Diameter : 16.80-26.90 ; H. of aperture : 5.75-10.55

Diagnosis : Shell thin, lenticular, sharply carinate, rather narrowly umbilicate, obliquely striate, the striae becoming rather distant towards the apical region; whorls 5-6, flattened; aperture oblique, angulately lunate, peristome thin, columellar margin briefly reflected.

Distribution : India : West Bengal (Darjiling), Sikkim.

Genus 47. *Rahula* Godwin-Austen, 1907

Shell pyramidal, radiately costulate above, deeply umbilicate, angulate around the umbilicus, rather flat on base, usually angulate or carinate at the periphery.

India, Burma (Eastern Himalayas).

Key to the species of *Rahula*

Shell closely costulate with 6 whorls..... *R. bascauda*

Shell distantly costulate, with 8 whorls..... *R. macropleuris*

101. *Rahula bascauda* (Benson)

1859. *Helix bascauda* Benson, *Ann. Mag. nat. Hist.*, (3) 3 : 168.

1908. *Rahula bascauda* : Blanford & Godwin-Austen, *Fauna Brit. India*, Mollusca, p. 251.

Material examined : Darjiling district : 5 exs., Darjiling (Coll. ?).

Measurements (in mm) : Height : 2.80-3.63 ; Diameter : 3.35-4.40 ; H. of aperture : 1.55-2.10

Diagnosis : Shell trochiform, deeply umbilicate, sculptured with oblique raised ribs above and closer, finer ribs below; whorls 6-6 1/2, convex, the last keeled at the periphery, swollen below, angulate around the umbilicus; aperture oblique, roundly lunate, columellar margin a little expanded.

Distribution : India : West Bengal (Darjiling), Meghalaya.

102. *Rahula macropleuris* (Benson)

1859. *Helix macropleuris* Benson, *Ann. Mag. nat. Hist.*, (3) 3 : 265.

1907. *Helix macropleuris* : Godwin-Austen, *Land and Freshwater Moll. India* 2 : 216, pl.103, fig.1

1908. *Rahula macropleuris* : Blanford & Godwin-Austen, *Fauna Brit. India*, Mollusca, p. 249.

Material examined : Darjiling district : 2 exs., Darjiling (Coll. ?).

Measurements (in mm.) : Height : 6.0 ; Diameter : 3.70 ; H. of aperture : 2.0

Diagnosis : Shell pyramidally attenuate, umbilicate, flattened at base, marked with distant oblique raised ribs above and close fine striae below; whorls 8, carinate near the sutures; aperture slightly oblique, subquadrate, columellar margin obliquely reflected, edge of umbilicus angulate.

Distribution : India : West Bengal (Darjiling).

Genus 48. *Sitala* H. Adams, 1865

Shell conoid, thin, narrowly perforate, spirally ribbed above, convex beneath, usually angulate at the periphery; aperture oblique, peristome thin, unexpanded, columella reflected.

Animal long, narrow, tentacles short, peripodial groove double.

Indo-Malay region.

Some species occurring on leaves and stems of shrubs.

103. *Sitala infula* (Benson)

1848. *Helix infula* Benson, *Ann. Mag. nat. Hist.*, (2) 2 : 160.

1908. *Sitala infula* : Blanford & Godwin-Austen, *Fauna Brit. India*, Mollusca, p. 225.

Material examined : Maldah district : 6 exs., From mango garden, Harishchandrapur (Coll. D.K. Thakur, A. Dey & S.K Raut, 4.10.77.). West Dinajpur district : 11 exs., From a garden at Hili (from Banana plants and also from moist walls). (Coll. D.K. Thakur & S.C. Mitra, 1985).

Measurements (in mm) : Height : 4.0-7.40 ; Diameter : 4.30-7.10 ; H. of aperture : 3.60-4.10

Diagnosis : Shell trochiform, thin, very narrowly perforate, finely spirally marked with raised lines, both above and below. Whorls 6 1/2 convex, last whorl carinate at the periphery, swollen below; aperture slightly oblique, lunate, peristome simple, columellar margin reflected and vertical above.

Distribution : India : West Bengal (W. Dinajpur, Maldah), Bihar, Orissa, Sikkim.

Super Family HELICACEA

Family CAMAENIDAE

Key to the genera

Shell trochiform (as high as broad), narrowly perforate..... *Ganesella*

Shell depressed (distinctly broader than high), widely umbilicate..... *Chloritis*

Genus 49. *Chloritis* Beck, 1837

Shell widely umbilicate, depressed, spire usually low or sunken. Mostly covered with a hairy epidermis, shell surface with minute pit. Aperture broadly lunates. Peristome disrupted, thickened and reflected.

India, China, Japan, Burma, Thailand, Malaya Peninsula and Archipelago, The Philippines, Papua islands and N. Australia.

104. *Chloritis (Trichochloritis) delibrata* (Benson)

1836. *Helix delibrata* Benson, *J. Asiat. Soc. Beng.*, 5 : 352
 1906. *Chloritis (Trichochloritis) delibrata* : Gude, *Proc. malac. Soc.*, London, 7 : 115.
 1914. *Chloritis (Trichochloritis) delibrata* : Gude, *Fauna Brit. India*, Mollusca, 2 : 172.

Material examined : Jalpaiguri district : 1 ex., Garden at Forest Bungalow, Jayanti, N. of Rajabhatkhawa, (Coll. S.C. Mitra & S. Barua, 1986).

Measurements (in mm) : Height : 8.60 ; Diamater : 17.40 ; H.of aperture : 7.40

Diagnosis : Shell discoid, widely umbilicate, semitransparent, finely striate, spire depressed or scarcely raised, suture deep; whorls 3-4, suddenly increasing in width the last being twice as broad as the penultimate; body whorl slightly dilated and a little descending towards the mouth. Aperture widely lunate, peristome reflected, columella obliquely expanded. Edge of umbilicus angulate.

Distribution : India : West Bengal (Jalpaiguri), Arunachal Pradesh, Assam, Meghalaya. Elsewhere : Bangladesh, Burma.

Remarks : This species is for the first time recorded from West Bengal.

Genus 50. *Ganesella* Blanford, 1863

Shell conical, usually high, perforate, obliquely striate obsoletely granulate, body whorl carinate and scarcely descending in front. Aperture rhomboid, oblique, peristome not continuous, expanded and reflected.

India, China, Japan, Malaya, Sumatra, Java, Borneo, The Philippines, Vietnam and New Guinea.

105. *Ganesella acris* (Benson)

1859. *Helix acris* Benson, *Ann. Mag. nat. Hist.*, (3) 3 : 387
 1876. *Helix (Trochomorphoides) acris* : Godwin-Austen, *J. Asiat. Soc. Beng.*, 45 : 312.
 1914. *Ganesella acris* : Gude, *Fauna Brit. India*, Mollusca, 2 : 194

Material examined : Jalpaiguri district : 2 exs., Forest inside Rajabhatkhawa Central Depot, Jalpaiguri (Coll. S.C. Mitra & S. Barua, 1986).

Measurements (in mm.) : Height : 7.70 ; Diamater : 7.55 ; H. of aperture : 3.60

Diagnosis : Shell trochiform, perforate, whitish with a rufous border along the peripheral keel and also the suture on the body whorl; obliquely striate above and with microscopic spiral markings below; spire conical, whorls 6-7, body whorl carinate. Aperture rhomboid, peristome expanded, columellar margin strongly reflected.

Distribution : India : West Bengal (Jalpaiguri), Arunachal Pradesh, Meghalaya.

The present report from Jalpaiguri district in W. Bengal is a new record for this species and it extends the southern limit of distribution of the same.

Family BRADYBAENIDAE
Genus 51. *Plectotropis* Von Martens, 1860

Shell depressed, widely umbilicate, carinate, covered by a shaggy cuticle usually with a fringe of hairs. Whorls narrowly wound. Aperture angularly lunate, oblique.

India, Burma, China, Japan, Malay Archipelago.

Following Solem (1966) the genus *Plectotropis* is placed here under the family Bradybaenidae.

106. *Plectotropis tapeina* (Benson)

1836. *Helix tapeina* Benson, *J. Asiat. Soc. Beng.*, 5 : 352.
1876. *Helix tapeina* var. *tapeina* : Godwin-Austen, *J. Asiat. Soc. Beng.*, 45 : 312.
1914. *Plectotropis tapeina* : Gude, *Fauna Brit. India*, Mollusca, 2 : 214.

Material examined : Jalpaiguri district : 9 exs., Garden at Forest Bungalow at Jayanti, N. of Rajabhatkhawa (Coll. S.C. Mitra & S. Barua, 1986).

Measurements (in mm) : Height : 4.40-5.90 ; Diameter : 7.10-9.90 ; H. of aperture : 3.15-4.0

Diagnosis : Shell depressedly conoid, convex and coarsely striate above, swollen and spirally marked below; whorls 5-6, body whorl angulate at the periphery, slightly descending in front and subangulate at the umbilicus. Aperture lunate, peristome expanded, columellar margin oblique.

Distribution : India : West Bengal (Jalpaiguri), Arunachal Pradesh, Meghalaya, Assam.
Elsewhere : Bangladesh, Burma.

The present report from Jalpaiguri in West Bengal is a new record for the species.

Remarks : This species shows considerable variation in the elevation of spire and size.

SUMMARY AND GENERAL DISCUSSION

As revealed by our study, a total of 134 species of land and freshwater molluscs are recorded from the five districts of north Bengal mentioned before. Of these, 106 (34 freshwater and 72 land) species have been studied at present and the remaining 28 are incorporated on the basis of literature records. *Incillaria*, the terrestrial slug genus and 6 species are recorded from West Bengal for the first time. Twelve species (all land forms) are endemic to the north Bengal.

Freshwater molluscs are represented by 34 species, 16 genera and 11 families. The fauna of freshwater molluscs does not show much deviation from that of lower Bengal. The only point of interest is that the presence of a number of fast flowing streams and rivers with sandy beds, stones, boulders have resulted in fairly abundance of the thiarid genus *Paludomus* and the freshwater limpet genus *Ferrissia*. Both these genera are absent in the plain districts of the state. Besides, another gastropod species *Bellamya crassa*, which is recorded only from the river Churni (Nadia) in the South, occurs rather widely in all the rivers of north Bengal. The bivalve species *Parreysia (Radiatula) lima* does not occur in the southern part of West Bengal.

Land molluscs are represented by 100 species, 41 genera and 17 families. Of these, 72 comprising 35 genera and 14 families, have been studied. In contrast to the drab projection of the fauna of freshwater molluscs, land molluscs of north Bengal present a fauna, entirely distinctive from that of the lower part of the state. The lofty Himalayas and its foot hills with innumerable tracts and valleys providing a gully topography make an enormous impact on the distribution of land molluscs in this region. The subtropical to subtemperate climatic conditions with dense warm temperate to tropical evergreen forests producing deep leaf and foliage litters, offer an ideal situation particularly to the land operculates which show a great degree of sympatric diversity. Out of the 34 species (13 genera, 3 families) of land operculates 32 are endemic to the eastern Himalayas ranging between Assam, Arunachal Pradesh, Meghalaya, Sikkim and Darjiling in West Bengal, 14 among them are confined to the Darjiling -Sikkim belt and 7 are endemic to Darjiling. Among the pulmonates, Ariophantidae (30 species) and Subulinidae (14 species) are the two largely represented families. Three genera (*Oxytes*, *Bacillum*, and *Incillaria*) and 22 species in all, are endemic to the eastern Himalayas. The slug *Incillaria*, hitherto known from the Dafla hills, is now for the first time recorded from the Jalpaiguri district in West Bengal.

Only 11 species of land molluscs out of 100 are common to both parts of West Bengal and these include such ubiquitous species as *L. gracile* (Hutton), *A. fulica* (Bowdich), *L. alte* (Ferussac), *K. barrakporensis* (Pfeiffer) etc. Incidentally all these species have their ranges of distribution extending into other parts of the country. Darjiling with its 38% forest cover stands unique among all the districts harbouring 79 species of land molluscs. Out of the 12 species endemic to the whole of north Bengal, Darjiling alone accounts for 10. *Bensonina* is the only genus which is common to the both eastern and western Himalayas.

The districts of Maldah and West Dinajpur do not show much variation from the lower Bengal in the distribution of land molluscs in general. But Maldah being close to the Rajmahal range harbours a few species like, *Cyclophorus pyrotrema*, *Pterocyclus rupestris*, *Cryptozona ligulata* etc. which are absent in the southern districts of the state.

Total number of species of land and freshwater molluscs so far recorded from West Bengal is 199 (75 freshwater and 124 land).

Number of species recorded from southern part of the state is 106 (65 freshwater and 41 land) and that from the northern part is 134 (34 freshwater and 100 land).

In all, 41 species (30 freshwater and 11 land) are common to both parts.

ACKNOWLEDGEMENTS

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LIST OF COLLECTING LOCALITIES

1. Darjiling	41. Illambazar
2. Darjiling	42. Barddhaman
3. Ghum	43. Burdwan
4. Kurseong	44. Raniganje
5. Siliguri	45. Galsi
6. Kalimpong	46. Satgachia
7. Jalpaiguri	47. Bankura
8. Rajabhatkhawa	48. Gangajalbati
9. Alipurduar	49. Raipur
10. Hasimara	50. Purulia
11. Birpara	51. Purulia
12. Kalchini	52. Jhaldah
13. Jayanti	53. Baghmundi
14. Jaldapara	54. Nadia
15. Jalpaiguri	55. Nabadwip
16. Koch Bihar	56. Ranaghat
17. Mathabhanga	57. Kalyani
18. Koch Bihar	58. Narayanpur
19. Dinhata	59. Hugli
20. Gitaldah	60. Arambagh
21. Tufangunje	61. Uttarpara
22. Mekligunje	62. Scrapore
23. West Dinajpur	63. Bandel
24. Islampur	64. Haora
25. Goalpukhur	65. Sibpur
26. Lodhan	66. Bagnan
27. Raiganj	67. Medinipur
28. Kaliaganj	68. Midnapur
29. Harirampur	69. Kharagpur
30. Bansihari	70. Digha
31. Balurghat	71. Jhargram
32. Hili	72. Datan
33. Patiram	73. Tamluk
34. Maldah	74. N. 24 Parganas
35. Harishchandrapur	75. Habra
36. Maldah	76. Basirhat
37. Ratua	77. Barrackpore
38. Gour	78. Dum Dum
39. Murshidabad	79. Calcutta
40. Berhampur	80. S. 24 Parganas
41. Murshidabad	81. Budge Budge
42. Jangipur	82. Falta
43. Kandi	83. Diamond Harbour
44. Birbhum	84. Lakshikantapur
45. Rampurhat	85. Kakdwip
46. Nalhati	86. Fresergunje
47. Saithia	

Districtwise distribution of land and freshwater molluscs of West Bengal (based on available material and literature records)

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	Bankura	Bardhaman	Birbhum	Calcutta	Darjiling	Haora	Hugli	Jalpaiguri	Koch Bihar	Maldah	Medinipur	Murshidabad	Nadia	North 24-Parganas	Purulia	South 24-Parganas	W. Dinajpur
Name of the Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
A. Freshwater Molluscs																	
1. <i>Neritina smithi</i> Wood			-	+	-						-	-	-	+	-	+	-
2. <i>N. (Dostia) violacea</i> (Gmelin)				+		-						-	-	-		+	
3. <i>Clithon reticularis</i> (Sowerby)				+		-					-	-	-	+	-	+	-
4. <i>Septaria lineata</i> (Lamarck)						-		-				-	-	-		+	
5. <i>Bellamya bengalensis</i> f. <i>typica</i> (Lamarck)	+			+	+	+	+	+	+		+	-	+	+	+	+	+
6. <i>B. bengalensis</i> phase <i>annandalei</i> (Kobelt)				+	+	+	+				-	-	+	+	-	-	-
7. <i>B. bengalensis</i> <i>balteata</i> (Benson)				-	+	-	-					-	-	-	-	-	-
8. <i>B. bengalensis</i> race <i>doliaris</i> (Gould)			+		-	-	+	+	+		-	+	-	+	+	+	+
9. <i>B. bengalensis</i> race <i>eburnea</i> (Annandale)				-	-	-	+	-			-	-	-	-	+	+	-
10. <i>B. bengalensis</i> race <i>gigantea</i> (Reeve)		+	-	-	-	-	-	-	-	-	-	-	+	-	-	+	-
11. <i>B. bengalensis</i> race <i>mandiensis</i> (Kobelt)		-	-	-	-	-	+	-	-	-	+	-	+	+	-	-	-
12. <i>B. dissimilis</i> (Mueller)			-	+		+	+	+	+			+	+	-	+	+	+

Name of the Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
13. <i>B. crassa</i> (Benson)					-			-	+	+		-	+	-	-	-	-
14. <i>Pila globosa</i> (Swainson)		+	+	+	-	+	+	+	+	+	+	+	+	+		+	+
15. <i>P. globosa incrassatula</i> (Nevill)				+	-		+						-				-
16. <i>P. globosa minor</i> (Nevill)				+						-	-	-				+	-
17. <i>Digoniostoma pulchella</i> (Benson)	+	+		+	-	+	+		-	+	-	-	+	+		+	-
18. <i>D. cerameopoma</i> (Benson)			-	+	-	+	+		-	-	-	+	-	+		+	-
19. <i>Gabbia orcula</i> (Fraunfeld)			-	-	-				+	-	-	-	-			-	-
20. <i>G. orcula</i> var. <i>producta</i> (Nevill)	+	-	+	+	-	+	+		-	-	+	+	+	+	+	+	-
21. <i>Assiminea francessi</i> (Wood)			-	+	-	-	+		-	-	-	-	-	+	-	+	-
22. <i>Thiara (T.) scabra</i> (Mueller)		+		+			+	+	+	+	+	-	-	+			+
23. <i>T. (Melanoides) tuberculata</i> (Mueller)	+	+	+	+	+	+	+	+	+	+	-	-	-	+	+	+	+
24. <i>T. (Tarebia) lineata</i> (Gray)		+	-	+	+	+	-	+	+	+	-	-	-	+	-	+	+
25. <i>T. (Tarebia) granifera</i> (Lamarck)			+	+	-		+	-		-	-	-	+	+	+	-	-
26. <i>Brotia costula</i> (Rafinesque)			-	+	-	-	+	+	+	+	-	-	-	+	-	+	+
27. <i>Paludomus (P.) blanfordiana</i> (Nevill)	-		-	-	+	-	-	+	-	-	-	-	-	-	-	-	-
28. <i>P. (P.) regulata</i> Benson		-	-	-	+	-		+	+	-	-	-	-	-	-	-	+
29. <i>P. (P.) stephanus</i> (Benson)	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-

Name of the Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
30. <i>Lymnaea (Pseudosuccinea) acuminata</i> f. <i>typica</i> Lamarck	+	-	+	+	-	+	+	+	+		+	-	+	-	+	+	+
31. <i>L. (P.) acuminata</i> f. <i>chlamys</i> Benson	-	-	+			+			-	-	-	-	-	-	-	-	-
32. <i>L. (P.) acuminata</i> f. <i>gracilior</i> Martens	-	-	-	+	-		+	-		-	-	-		+		-	-
33. <i>L. (P.) acuminata</i> f. <i>patula</i> Troschel	-	-	-	+	-	-		-	-	-	-	-		-	-	-	-
34. <i>L. (P.) acuminata</i> f. <i>rufescens</i> Gray	+	+	-	+	-	+	+	+	+	+	-	+	+	-	-	-	-
35. <i>L. (P.) luteola</i> f. <i>typica</i> Lamarck	-	+	-	+					-	-	+	-	+	+	+	-	-
36. <i>L. (P.) luteola</i> f. <i>australis</i> Annandale & Rao	-	+	-	+	-	-		-	-	+	+			+	+	-	+
37. <i>L. (P.) luteola</i> f. <i>ovalis</i> Gray	-	+	-	+	-	-	+	-	-	-	-	+	+	+	+	+	+
38. <i>L. (P.) luteola</i> f. <i>impura</i> Troschel	-	-	-	+	-	-		-	-	-	-	-	-	+	-	-	-
39. <i>Indoplanorbis exustus</i> (Deshayes)	+	+	+	+	-	-	+	+	+	-	+	+	+	+	-	+	+
40. <i>Gyraulus barrackporensis</i> (Clessin)	-	-	-	+	-	-	+	-	-	-	-	-		+	-	-	+
41. <i>Segmentina cantori</i> (Benson)	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-
42. <i>G. convexiusculus</i> (Hutton)	-	+	-	+	-	+	+	+	+	-	-	-	+	+	+	-	-
43. <i>G. labiatus</i> (Benson)	-	-	+	+	-	+	-	+	-	+	-	-	-	-	-	-	+
44. <i>S. trochoideus</i> (Benson)	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-
45. <i>Ferrissia baconi</i> (Bouruignat)	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
46. <i>Scaphula celox</i> Benson	-	-	-	+	-	+	-	-	-	-	-	-	-	+	-	-	-

Name of the Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
47. <i>S. deltae</i> Blanford	-	-		+		+	-	-	-	-		-	-	+	-	-	-
48. <i>Lamellidens corrianus</i> (Lea)	-		+	+	+	+	+	+	+	+	-	+	-	+	+	-	+
49. <i>L. Lamellatus</i> (Lea)			-	+	-		-	-				-		-	-	-	-
50. <i>L. marginalis</i> (Lamarck)	+	+		+		-	-	+	+	+	+	-	+	-	-	-	+
51. <i>Parreysia</i> (<i>P.</i>) <i>corrugata</i> (Mueller)	+	+	-			-	-	-	-			-	-	-	-	+	-
52. <i>P. (P.) corrugata</i> var. <i>nagpoorensis</i> (Lea)	-	-	-			-	-	-	-	-		-	-	+	-	-	-
53. <i>P. (P.) favidens</i> (Benson)	-	-		+		-	-	+	-	-		-	-	+	+	+	+
54. <i>P. (P.) favidens</i> var. <i>deltae</i> (Benson)	-	-	-	+	-		+	-	-	-	-	-	-	-	+	-	-
55. <i>P. (P.) favidens</i> var. <i>marcens</i> (Benson)	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+
56. <i>P. (P.) favidens</i> var. <i>plagiosoma</i> (Benson)	-	-	+	+			-	+	-	-	-	-	-	-	-	-	-
57. <i>P. (P.) favidens</i> var. <i>viridula</i> (Benson)	-	+	-	+		+	-	-	-	-	-	-	-	-	+	-	-
58. <i>P. (P.) rajahensis</i> (Lea)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-
59. <i>P. (P.) sikkimensis</i> (Lea)	-	-	-	-			-	-	-	-	-	-	-	-	+	-	-
60. <i>P. (P.) tavoyensis</i> var. <i>triembolus</i> (Benson)	-	-		-	-	-	-	-	-	-	-	+	-	-	-	-	-
61. <i>P. (Radiatula) bonneaudi</i> (Eydoux)	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
62. <i>P. (R.) caerulea</i> (Lea)	-	-	-	+	-	+	+	+	+	-	+	+	+	+	+	-	+
63. <i>P. (R.) caerulea gaudichaudi</i> (Eydoux)	-	-	-		-	-	-	-	-	-	-	-	-	-	+	-	-
64. <i>P. (R.) lima</i> (Simpson)	-	-	-	-	+		-	-	-	-	-	-	-	-	-	-	-

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Name of the Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
81. <i>A. (D.) digitatus</i> H. Blandford	-	-	-	-	+	-	-	-		-	-	-	-	-	-	-	
82. <i>A. (D.) gemmula</i> Benson	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
83. <i>A. (D.) lectus</i> Godwin-Austen	-	-	-	-	+	-		-		-	-	-	-	-	-	-	-
84. <i>A. (D.) lenticulus</i> Godwin-Austen	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
85. <i>A. (D.) plectochilus</i> Benson	-	-	-	-	+	-	-	-		-	-	-	-	-	-	-	-
86. <i>A. (D.) stylifer</i> Benson	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
87. <i>A. (D.) subhumilis</i> Mollendorff	-	-	-	-	+	-	-	-		-	-	-	-	-	-	-	-
88. <i>Chamalyscaeus physis</i> (Benson)	-	-	-	-	+	-	-	-		-	-	-	-	-		-	
89. <i>Cyclophorous (Glossostylus) aurora</i> Benson	-	-	-	-	+	-	-	-		-	-	-	-	-	-	-	-
90. <i>C. (G.) himalayanus</i> Pfeiffer	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
91. <i>C. (G.) exul</i> Benson	-	-	-	-	+	-	-		-	-	-	-	-	-	-	-	-
92. <i>C. (G.) tryblium</i> Benson	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
93. <i>C. (Litostylus) polynema</i> (Pfeiffer)	-	-	-	-	-	-	-	-	-		+	-	-	-	+	-	-
94. <i>C. (L.) pyrotrema</i> Benson	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
95. <i>Dioryx urnula</i> Benson	-	-	-	-	+	-	-	-		-	-	-	-	-	-	-	-
96. <i>Lagochilus tomotrema</i> (Benson)	-	-	-	-	+	-	-	-		-	-	-	-	-	-	-	-
97. <i>Pterocyclus rupestris</i> Benson	-	-	-	-	-	-	-			+	-	-	-	-	-	-	-
98. <i>Theobaldius phaenotopicus</i> (Benson)	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-

[illegible]

Name of the Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
117. <i>Rachis bengalensis</i> (Lamarck)		-		+		-	+	-	-	+	-		-	+	+	+	-
118. <i>R. praetermissus</i> (Blanford)										-	+				-	-	-
119. <i>R. punctatus</i> (Anton)		-		+		+						-		-	-	-	-
120. <i>Succinea crassinuclea</i> Pfeiffer		-	-	+			-		-	-	-	-		+	-	+	-
121. <i>S. crassinuclea</i> var. <i>vitrea</i> Pfeiffer		-	-	+			-		-	-	-	-	-	-	-	-	-
122. <i>S. daucina</i> Pfeiffer			-	+		-	+		-	-	-		-	-	-	+	-
123. <i>S. daucina</i> f. <i>hraswasikhara</i> Rao		-	-	+				-		-	-		-	-	-	+	-
124. <i>S. godivariana</i> f. <i>vangiya</i> Rao							-	-	-	-	-	-	-	-	-	+	-
125. <i>S. hanleyi</i> Gude	-	-	-	+		-	-	-	-	-	-	-	-	-	-	-	-
126. <i>S. snigdha</i> Rao	-	-		+		-	-	-	-	-	-	-	-	-	-	+	-
127. <i>Quickia bensoni</i> (Pfeiffer)		-	-	+		+	-	-	-	-	-	-	-	-	-	-	-
128. <i>Q. calcuttaensis</i> Patterson	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
129. <i>Indosuccinea semiserica</i> (Gould)	-	-	-	+	-		+	-	-	-	-	-	-	-	-	-	-
130. <i>I. semiserica</i> f. <i>sthulasiras</i> Rao		-	-	+		-	-		-	-	-	-			-	-	-
131. <i>Clausilia ios</i> Benson		-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
132. <i>C. loxostoma</i> Benson		-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
133. <i>Plectopylis flavida</i> Gude		-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
134. <i>P. minor</i> Godwin-Austen	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-

[illegible]

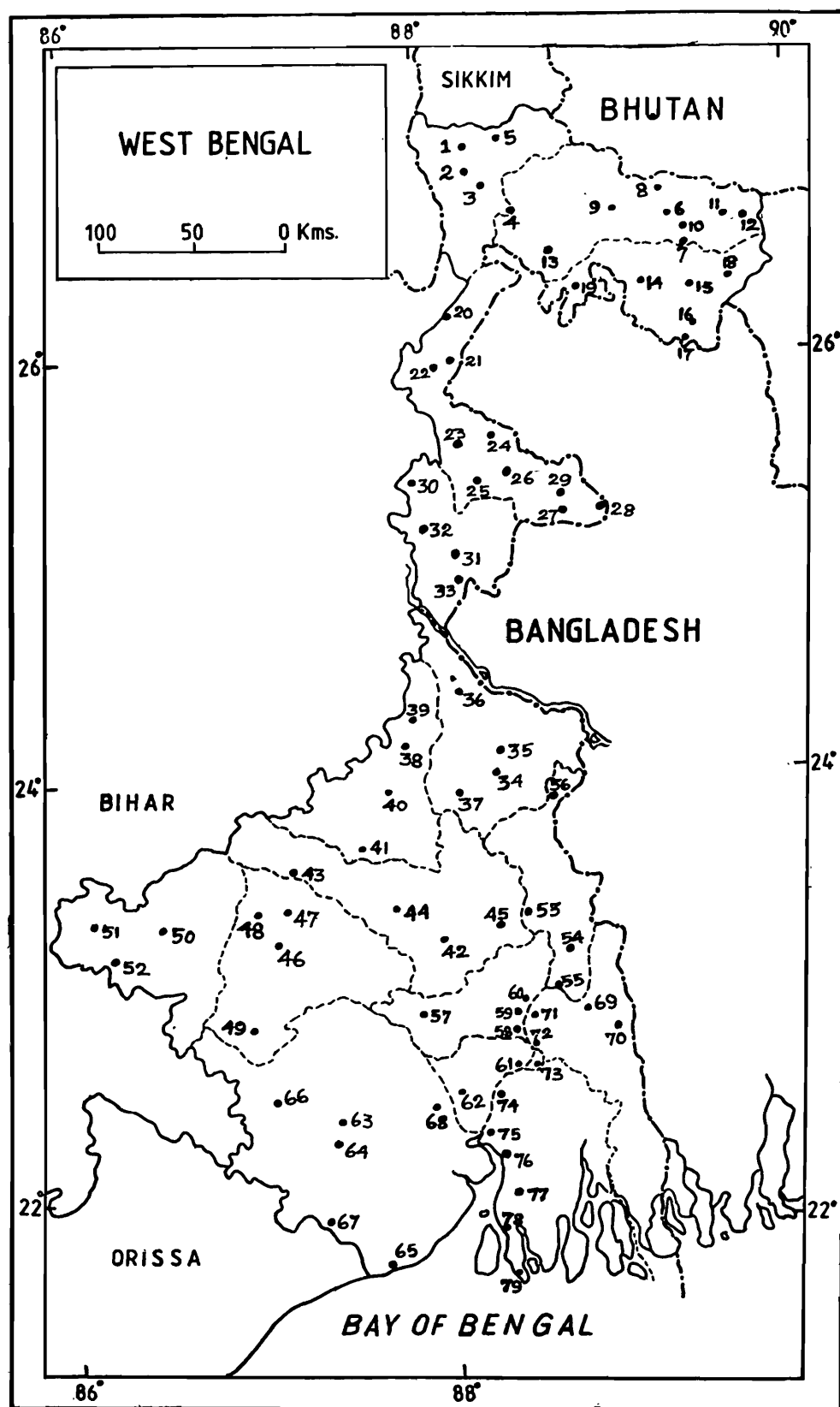
Name of the Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
153. <i>M. superflua</i> Blanford	-	-	-	-		-	-	+	-	-	-	-	-	-	-	-	-
154. <i>M. tugurium</i> (Benson)					+	-	-	-			-	-	-	-	-	-	-
155. <i>Microcystina cryptomphalus</i> Godwin-Austen	-	+	-		-	-	-	-	-	-	-	-	-	-	-	-	-
156. <i>Oxytes blanfordi</i> (Theobald)	-		-		+	-	-	-	-	-	-	-	-	-	-	-	-
157. <i>O. cycloplax</i> (Benson)				-	+	-	-	-	-	-		-	-	-	-	-	-
158. <i>O. orobia</i> (Benson)	-			-	+	-	-	-	-	-	-	-	-	-	-	-	-
159. <i>Rahula bascauda</i> (Benson)		-			+	-	-	-	-	-	-	-	-	-	-	-	-
160. <i>R. macropleuris</i> (Benson)		-	-	-	+	-	-	-		-	-	-	-	-	-	-	-
161. <i>Sitala infula</i> (Benson)	-		-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
162. <i>S. rimicola</i> (Benson)				-	+	-	-	-	-	-		-	-	-	-	-	-
163. <i>Chloritis delibrata</i> (Benson)			-		+	-	-	+	-	-	-	-	-	-	-	-	-
164. <i>Planispira ruginosa</i> (Ferussac)	-		-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
165. <i>Ganesella acris</i> (Benson)	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
166. <i>Bradybaena similaris</i> (Ferussac)	-	-	-	-	+	-	-	-	-		-	-	-	-	-	-	-
167. <i>Plectotropis tapeina</i> (Benson)	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
168. <i>Glessula amentum</i> (Rceve)	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-
169. <i>Glessula baculina</i> (Blanford)	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
170. <i>G. crassilabris</i> (Benson)	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-

[illegible]

Name of the Species	1	2	3	4	5	6	7	8	9	10'	11	12	13	14	15	16	17
189. <i>Cryptaustenia bensoni</i> (Pfeiffer)				+		+	+				-						
190. <i>C. heteroconcha</i> (Benson)			-														
191. <i>C. ovata</i> (H. Blanford)					+			+									
192. <i>Durgella salius</i> (Benson)					+				-								
193. <i>D. seposita</i> (Benson)					+												
194. <i>Cryptozona ligulata</i> (Ferussac)										+							
195. <i>Kaliella barrakporensis</i> (Pfeiffer)				+				+									
196. <i>K. nana</i> (Hutton)					+												
197. <i>K. Nevilli</i> Godwin-Austen					+												
198. <i>Incillaria campestris</i> Godwin-Austen									+								
199. <i>Laevicaulis alte</i> (Ferussac)		+		+									+			+	-

+ = Present

= Absent



Map showing collecting localities (district-wise)

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ESTUARINE AND MARINE MOLLUSCS

N. V. SUBBA RAO, A. DEY AND S. BARUA

Zoological Survey of India, Calcutta

INTRODUCTION

West Bengal has a small stretch of coast line and a vast expanse of estuary covering Sunderbans. The coastal ecosystem mainly includes mangroves and mud flats in the Sunderbans and sandy beach extending from Bakkhali to Digha. The malacofauna includes a few epifaunal elements found on the mud flats or attached to trees and wooden structures and a number of infaunal elements burrowing into the soft mud or sand. A few offshore forms such as cephalopods, nudibranchs and a few bivalve shells are also recorded.

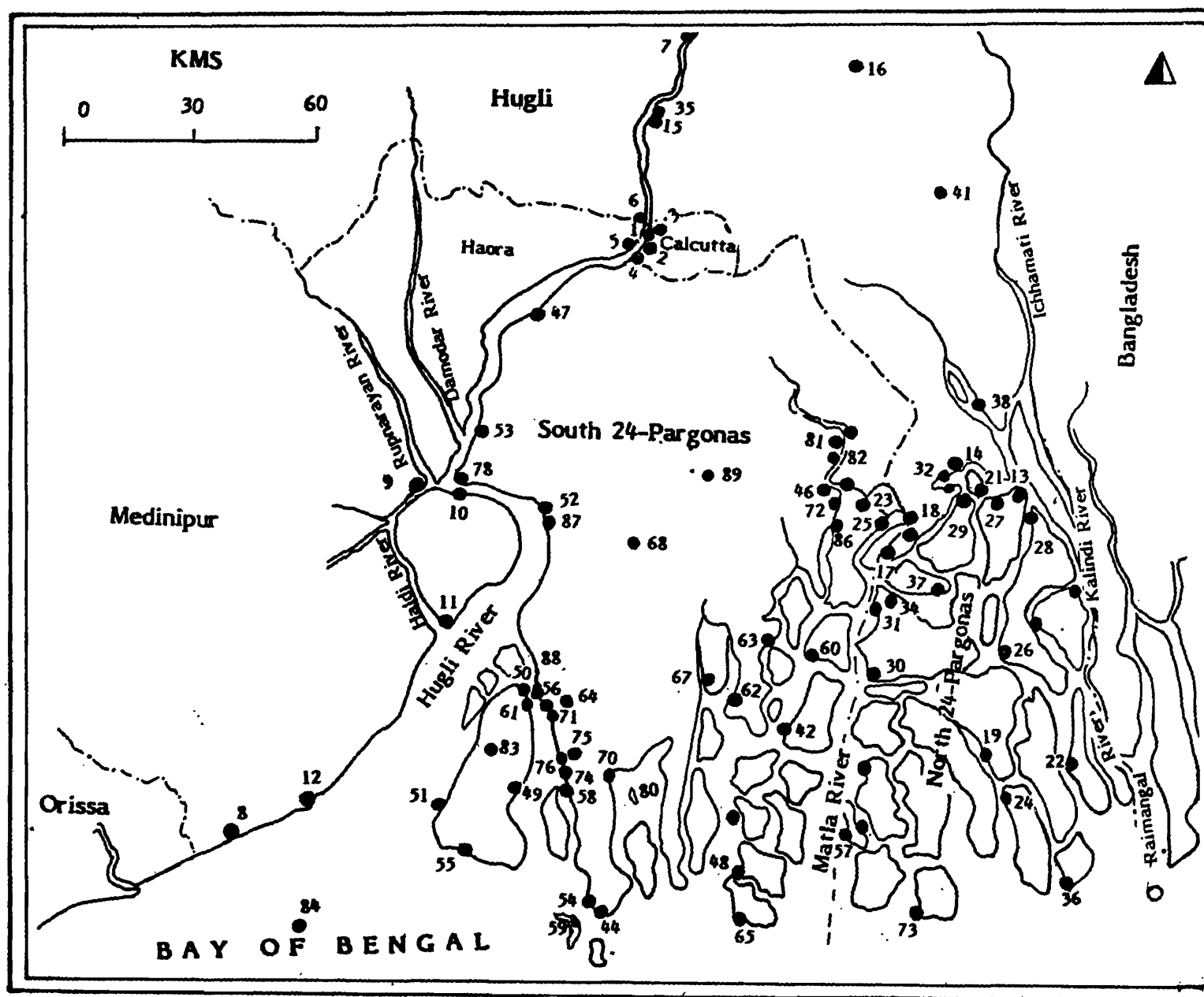
The material studied by us includes collections accumulated over years, the earliest collections were made by the vessels of the Fisheries Department of Bengal, namely, Lady Goschen, Golden Crown which had trawled the littoral region off the Bengal coast, especially Sandheads. RIMS Investigator also made some collections in the shallow waters off the coast. Majority of the collections were made by the authors themselves during various surveys conducted by them along the coast.

Some of the earlier collections were identified and published. The brackishwater molluscs from the outskirts of Calcutta and Port Canning were studied (Nevill, 1880; Preston, 1915; Annandale, 1922 and Annandale & Prashad, 1919). Malacology of lower Bengal was attempted by Stoliczka (1869). General fauna and molluscs collected by the "Golden Crown" were studied (Jenkins, 1912, Das *et. al.* 1979). A list of molluscs of Digha coast was published recently (Subba Rao, 1977 a, b). Molluscs of the Muriganga estuary and Sagar Island in the Sunderbans were studied recently (Subba Rao *et. al.* 1983, 1987).

This is the first comprehensive report on the molluscs of West Bengal and it includes 226 species represented by 145 genera and 77 families.

ABBREVIATIONS USED

Capt.	=	Captain
Coll.	=	Collector
ex.	=	example
exs.	=	examples
m	=	meter
mm	=	millimeter
m ²	=	per square meter area
nos.	=	numbers
Reg. No.	=	Registration number
ZSI	=	Zoological Survey of India



Map 1. Showing the collecting localities

LIST OF COLLECTING LOCALITIES (District wise)

District - Calcutta

1. Calcutta
2. Chandpal Ghat
3. Chingrighata
4. Khidirpur

District - Haora

5. Sibganj
- District Hugli

6. Ballykhal
7. Tribeni

District - Medinipur

8. Digha
9. Gadiwara
10. Geonkhali
11. Haldia
12. Junput

District North 24 Parganas

13. Arbesy
14. Baghbagan
15. Barrackpore
16. Basirhat
17. Bidya River
18. Birajmonichar
19. Champta
20. Chhota Hardi
21. Chhotamullahkhali
22. Chulkati
23. Dakshineswar
24. Gona
25. Gosaba
26. Haldibari
27. Jhingakhali
28. Khatuajhuri
29. Marichjhapi
30. Matla Island
31. Netidhpoani
32. Pargumti
33. Parseymari
34. Pirkhali
35. Palta
36. Saimari
37. Sajnakhali
38. Sandeshkhali
39. Soladanar Char
40. Sudhyanyakhali
41. Taki

District - South 24 Parganas

42. Ajmalmari
43. Bagmarakhal
44. Bakkhali
45. Barakara
46. Basanti
47. Budge Budge
48. Bulcherry
49. Chemaguri
50. Costola
51. Dakinsagar
52. Diamond Harbour
53. Falta
54. Fraserganj
55. Ganga Sagar
56. Ghiapata
57. Halliday Island
58. Haribhangachara
59. Jambu deep
60. Jharkhali
61. Kachubeira
62. Kaikalmari
63. Kaikhali
64. Kakdwip
65. Kalas
66. Keorasulti
67. Kishorimohanpur
68. Lakhikantapur
69. Laskarpur Khal
70. Madanganj
71. Mainapara
72. Masjidbari
73. Mayadeep
74. Nadabhangachara
75. Namkhana
76. Narayanganj
77. Nikarikhali
78. Nurpur
79. Patikhali
80. Prentice Island
81. Port Canning
82. Purandar
83. Sagar Island
84. Sandhead
85. Silpara
86. Sonakhali
87. Sultanpur
88. Susnichara
89. Uttarbhang

List of Estuarine and Marine Molluscs
*** Indicates species reported in literature only**

Class GASTROPODA

Order ARCHAEOGASTROPODA

1. Family ACMAEIDAE

1. Genus *Potamacmea* Peile

1. *Potamacmea fluviatilis* (Blanford)

2. Family CYCLOSTREMATIDAE

2. Genus *Tubiola* A. Adams

2. *Tubiola microscopia* (Nevill)

3. Family TROCHIDAE

3. Genus *Solariella* S. Wood

3. *Solariella satparaensis* Preston

4. Genus *Umbonium* Link

4. *Umbonium vestiarius* (Linnaeus)

4. Family NERITIDAE

5. Genus *Nerita* Linnaeus

5. *Nerita articulata* Gould

6. Genus *Neritina* Lamarck

6. *Neritina smithi* Wood

7. *N. violacea* (Gmelin)

7. Genus *Pseudonerita* Baker

8. *Pseudonerita obtusa* (Benson)

9. *P. sulculosa* (von Martens)

8. Genus *Clithon* Montfort

10. *Clithon reticularis* (Sowerby)

9. Genus *Septaria* Fe'russac

11. *Septaria caerulescens* (Sowerby)

12. *S. lineata* (Lamarck)

Order MESOGASTROPODA

5. Family LITTORINIDAE

- 10. Genus *Littorina* Fe'russac
- 13. *L. (Littoraria) melanostoma* Gray
- 14. *L. (L.) undulata* Gray
- 15. *Littorina (Littorinopsis) scabra scabra* (Linnaeus)

6. Family IRAVADIIDAE

- 11. Genus *Iravadia* Blanford
- 16.* *Iravadia princeps* Preston
- 17. *Iravadia ornata* Blanford

7. Family STENOTHYRIDAE

- 12. Genus *Stenothyra* Benson
- 18. *Stenothyra blanfordiana* Nevill
- 19. *S. deltae* (Benson)
- 20.* *S. nana* Annandale & Prashad
- 21.* *S. ornata* Annandale and Prashad
- 22. *S. soluta* Annandale and Prashad
- 23. *S. woodmasoniana* Nevill

- 13. Genus *Gangetia* Ancey
- 24. *Gangetia miliacea* (Nevill)

8. Family ASSIMINEIDAE

- 14. Genus *Assiminea* Fleming
- 25. *Assiminea beddomeana* Nevill
- 26. *A. brevicula* (Pfeiffer)
- 27. *A. francesiae* (Wood)
- 28.* *A. hungerfordiana* Nevill
- 29. *A. microsculpta* Nevill
- 30. *A. theobaldiana* Nevill
- 31. *A. woodmasoniana* Nevill

9. Family ARCHITECTONICIDAE

15. Genus *Architectonica* Roeding32. *Architectonica perspectiva* (Linnaeus)16. Genus *Heliacus* d'Orbigny33. *Heliacus (Heliacus) stramineus* (Gmelin)

10. Family TURRITELLIDAE

17. Genus *Turritella* Lamarck34. *Turritella attenuata* Reeve

11. Family THIARIDAE

18. Genus *Thiara* Bolten35. *Thiara (Mainwaringia) paludomidea* Nevill19. Genus *Larina* A. Adams36. *Larina burmana* Blanford

12. Family POTAMIDIDAE

20. Genus *Telescopium* Montfort37. *Telescopium (T) telescopium* Montfort21. Genus *Cerithidea* Swainson38. *Cerithidea (Cerithideopsis) cingulata* (Gmelin)39. *C. (Cerithidea) obtusa* Lamarck22. Genus *Terebralia* Swainson40.* *Terebralia palustris* (Linnaeus)

13. Family EPITONIIDAE

23. Genus *Acrilla* H. Adams41. *Acrilla acuminata* (Sowerby)42. *Acrilla gracilis* (Sowerby)

14. Family EULIMIDAE

24. Genus *Niso* Risso43. *Niso pyramidelloides* G. & H. Nevill25. Genus *Eulima* Risso44. *Eulima cuspidata* A. Adams

15. Family XENOPHORIDAE

26. Genus *Xenophora* Fischer von Waldheim45. *Xenophora solaris* (Linnaeus)

16. Family NATICIDAE

27. Genus *Natica* Scopoli46. *Natica gualteriana* Recluz47. *N. lineata* (Roeding)48.* *N. manceli* Jousseaume49. *N. tigrina* (Roeding)50. *N. vitellus* (Linnaeus)28. Genus *Polinices* Montfort51. *Polinices didyma* (Roeding)52. *P. tumidus* (Swainson)29. Genus *Sinum* Roeding53. *Sinum neritoideum* (Linnaeus)

17. Family CASSIDAE

30. Genus *Phalium* Link54. *Phalium bisulcatum* (Schuber & Wagner)

18. Family CYMATIIDAE

31. Genus *Gyrineum* Link55. *Gyrineum natator* (Roeding)

19. Family BURSIDAE

32. Genus *Bursa* Roeding56. *Bursa spinosa* (Lamarck)

20. Family TONNIDAE

33. Genus *Tonna* Bruennich57. *Tonna dolium* (Linnaeus)58. *T. sulcosa* (Born)

21. Family FICIDAE

34. Genus *Ficus* Roeding

59. *Ficus gracilis* (Sowerby)

60. *F. variegata* Roeding

Order NEOGASTROPODA

22. Family MURICIDAE

35. Genus *Cymia* Moersch

61. *Cymia lacera* (Born)

36. Genus *Mancinella* Link

62.* *Mancinella bufo* (Lamarck)

37. Genus *Rapana* Schumacher

63. *Rapana rapiformis* (Born)

38. Genus *Murex* Linnaeus

64. *Murex tribulus* Linnaeus

23. Family PYRENIDAE

39. Genus *Columbella* Lamarck

65. *Columbella duclosiana* Sowerby

24. Family MELONGENIDAE

40. Genus *Pugilina* Schumacher

66. *Pugilina cochlidium* (Linnaeus)

25. Family NASSARIIDAE

41. Genus *Nassarius* Dumeril

67.* *Nassarius ennurensis* Preston

69* *N. fossae* Preston

69. *N. foveolatus* (Reeve)

70.* *N. nodifera* Powis

71. *N. orissaensis* Preston

72. *N. stolatus* (Gmelin)

73.* *N. subconstrictus* Sowerby

26. Family OLIVIDAE

42. Genus *Amalda* H and A Adams

74. *Amalda ampla* (Gmelin)

- 43. Genus *Olivancillaria* d'Orbigny
- 75. *Olivancillaria gibbosa* (Born)
- 44. Genus *Oliva* Bruguiere
- 76.* *Oliva ispidula* Linnaeus
- 27. Family CANCELLARIIDAE
- 45. Genus *Cancellaria* Lamarck
- 77.* *Cancellaria crenilifera* (Sowerby)
- 46. Genus *Scalptia* Jousseaume
- 78. *Scalptia scalariformis* (Lamarck)
- 28. Family MARGINELLIDAE
- 47. Genus *Persicula* Schumacher
- 79. *Persicula ventricosa* (Fischer)
- 29. Family TURRIDAE
- 48. Genus *Brachytoma* Swainson
- 80. *Brachytoma crenularis* (Lamarck)
- 49. Genus *Gemmula* Weinkauff
- 81.* *Gemmula speciosa* (Reeve)
- 50. Genus *Lophiotoma* Casey
- 82.* *Lophiotoma indica* (Roeding)
- 51. Genus *Turricula* Schumacher
- 83. *Turricula javana* (Linnaeus)
- 52. Genus *Turridrupa* Hedley
- 84. *Turridrupa bijubata* (Reeve)
- 53. Genus *Asthenotoma* Harris and Burrows
- 85. *Asthenotoma vertebrata* (Smith)
- 30. Family TEREBRIDAE
- 54. Genus *Terebra* Bruguiere
- 86. *Terebra durgella* Ray
- 87. *T. tenera* A. Adams
- 88. *T. tricineta* Smith

55. Genus *Duplicaria* Dall

89.* *Duplicaria duplicata* (Linnaeus)

Order ENTOMOTAENIATA

31. Family PYRAMIDELLIDAE

56. Genus *Pyramidella* Lamarck

90. *Pyramidella dolabrata terebellum* (Mueller)

57. Genus *Turbonilla* (Leach) Risso

91. *Turbonilla felicitata* Laceron

58. Genus *Odostomia* Fleming

92. *Odostomia oxia* Watson

93. *O. babylonica* Winckworth

32. Family RINGICULIDAE

59. Genus *Ringicula* Deshayes

94.* *Ringicula caeca* Annandale and Prashad

95. *R. encarpiferens* de Folin

96. *R. propinquans* Hinds

33. Family CYLICHNIDAE

60. Genus *Tornatina* A. Adams

97.* *Tornatina estriata* Preston

61. Genus *Cylichna* Loven

98. *Cylichna protracta* Gould

34. Family AGLAJIDAE

62. Genus *Melanochlamys* Cheeseman

99. *Melanochlamys* sp.

35. Family ATYIDAE

63. Genus *Haminea* (Leach) Gray

100. *Haminea crocata* Reeve

36. Family RETUSIDAE

64. Genus *Retusa* T. Brown

101. *Retusa pyramidata* (A. Adams)

Order BASOMMATOPHORA

37. Family ELLOBIIDAE

65. Genus *Cassidula* Fe'russac102.**Cassidula bensoni* (Pfeiffer)103. *C. nucleus* (Gmelin)66. Genus *Ellobium* (Bolten) Roeding104. *Ellobium aurisjudae* (Linnaeus)105. *E. (Auricula) gangeticum* (Pfeiffer)106.**E. (A.) pusilla* A. Adams107.**E. (A.) translucens* Annandale and Prasad67. Genus *Melampus* Montfort108. *Melampus pulchella* Petit109.**M. singaporensis*68. Genus *Pythia* (Bolten) Roeding110. *Pythia plicata* (Fe'russac)

Order NOTAPSIDEA

38. Family PLEUROBRANCHIDAE

69. Genus *Pleurobranchia* Lauc111. *Pleurobranchia* sp.

Order NUDIBRANCHIA

Sub Order DORIDACEA

39. Family POLYCERIDAE

70. Genus *Kalinga* Alder and Hancock112. *Kalīnga ornata* Alder and Hancock

Sub Order ARMINACEA

40. Family ARMINIDAE

71. Genus *Armina* Rafinesque113. *Armina* sp.

41. Family CUTHONIDAE

72. Genus *Cuthona* Alder and Hancock

114.**Cuthona annandalei* Eliot

Order SOLEOLIFERA

42. Family ONCHIDIIDAE

73. Genus *Onchidium* Buchannan115.**Onchidium pallidum* Stoliczka116. *O. tenerum* Stoliczka117. *O. tigrinum* Stoliczka118. *O. typhae* Buchannan

Class SCAPHOPODA

43. Family SIPHONODONTALIIDAE

74. Genus *Cadulus* Philippi119. *Cadulus clavatum* Gould

44. Family DENTALIIDAE

75. Genus *Dentalium* Linnaeus120. *Dentalium octangulatum* Donovan121.**D. variable* Deshayes

Class BIVALVIA

Order NUCULOIDA

45. Family NUCULIDAE

76. Genus *Nucula* Lamarck122. *Nucula (Leionucula) convexa* Hinds123. *N. (Nucula) mitralis* Hinds77. Genus *Acila* H. and A. Adams124.**Acila fultoni* Smith

46. Family NUCULANIDAE

78. Genus *Nuculana* Link125. *Nuculana (Sacella) fragilis* Chemnitz79. Genus *Yoldia* Mueller126. *Yoldia nicobarica* (Bruguier)

Order ARCOIDA

47. Family ARCIDAE

80. Genus *Scaphula* Benson127. *Scaphula deltae* Blanford81. Genus *Anadara* Gray128. *Anadara granosa* (Linnaeus)82. Genus *Scapharca* Gray129. *Scapharca deyrollei* Joussacume130. *S. inequivalvis* (Bruguier)83. Genus *Trisidos* (Bolten) Roeding131.**Trisidos semitorta* (Lamarck)

48. Family NOETIIDAE

84. Genus *Striarca* Conard132. *Striarca lactea* (Linnaeus)

Order MYTILOIDA

49. Family MYTILIDAE

85. Genus *Perna* Retzius133. *Perna viridis* (Linnaeus)86. Genus *Modiolus* Lamarck134. *Modiolus striatulus* (Hanley)135. *M. tulipa* (Lamarck)136. *M. undulatus* (Dunker)87. Genus *Musculista* Yamamoto and Habe137.**Musculista senhausia* Benson

50. Family PINNIDAE

88. Genus *Pinna* Linnaeus138. *Pinna (Atrina) pectinata pectinata* Linnaeus

Order PTERIOIDA

51. Family PECTINIDAE

89. Genus *Pecten* (Klein) Osbeck

139.**Pecten (Chlamys) tranquebarica* (Gmelin)

52. Family ANOMIIDAE

90. Genus *Placuna* Bruguiere140. *Placuna (P.) placenta* (Linnaeus)91. Genus *Anomia* Linnaeus141. *Anomia aethaeus* (Gray)92. Genus *Enigmonia* Iredale142. *Enigmonia aenigmatica* (Holten)

53. Family OSTREIDAE

93. Genus *Crassostrea* Sacco143.**Crassostrea denticulata* Born144. *C. cuttackensis* Newton and Smith145. *C. gryphoides* (Schlotheim)146.**C. imbricata* Lamarck147.**C. mytiloidea* (Lamarck)148.**C. palmipes* Sowerby94. Genus *Saccostrea* Dallfus and Dautzenberg149. *Saccostrea cucullata* (Born)

Order VENEROIDA

54. Family LUCINIDAE

95. Genus *Eamesiella* Chavan150. *Eamesiella philippinarum* (Hanley)

55. Family CARDIIDAE

96. Genus *Trachycardium* Moersch151. *Trachycardium asiaticum* Bruguiere97. Genus *Cardium* Linnaeus152.**Cardium coronatum* Spengler

56. Family MACTRIDAE

98. Genus *Macra* Linnaeus153.**Macra elegans* Sowerby

- 154. *M. (Mactra) luzonica* Deshayes
- 155.**M. mectriciformis* Deshayes
- 156. *M. (M.) mera* Reeve
- 157. *M. (Mactrinula) plicataria* (Linnaeus)
- 158.**M. reevesi* Gray
- 159. *M. (Coelomactra) turgida* Gmelin
- 160. *M. violacea* Gmelin

57. Family SOLENIDAE

99. Genus *Solen* Linnaeus

- 161. *Solen brevis* Gray
- 162.**S. kemp* Preston

58. Family CULTELLIDAE

100. Genus *Cultellus* Schumacher

- 163. *Cultellus subelliptica* Dunker

101. Genus *Pharella* Gray

- 164. *Pharella javanicus* (Lamarck)

102. Genus *Siliqua* Megerle von Muchfeld

- 165. *Siliqua albida* Dunker

- 166. *S. radiata* (Linnaeus)

103. Genus *Tanysiphon* Benson

- 167. *Tanysiphon rivalis* Benson

59. Family TELLINIDAE

104. Genus *Tellina* Linnaeus

- 168. *Tellina corbuloides* (Hanley)

- 169. *T. irridescens* (Benson)

- 170. *T. sinuata* Spengler

105. Genus *Strigilla* Turton

- 171. *Strigilla splendida* (Anton)

106. Genus *Macoma* Leach

172. *Macoma birmanica* (Philippi)
173. *M. truncata* Jonas
107. Genus *Apolymetis* Salisbury
174. *Apolymetis edentula* Spengler
60. Family DONACIDAE
108. Genus *Donax* Linnacus
175. *Donax incarnatus* Gmelin
176. *D. scortum* Linnacus
61. Family PSAMMOBIIDAE
109. Genus *Gari* Schumacher
177.**Gari acuminata* (Philippi)
110. Genus *Sanguinolaria* Lamarck
178. *Sanguinolaria (Soletellina) acuminata* (Deshayes)
62. Family SEMELIDAE
111. Genus *Theora* H. and A. Adams
179. *Theora opalina* (Hinds)
63. Family SOLECURTIDAE
112. Genus *Novaculina* Benson
180. *Novaculina gangetica* Benson
64. Family CORBICULIDAE
113. Genus *Polymesoda* Rafinesque
181. *Polymesoda (Geloina) bengalensis* (Lamarck)
65. Family TRAPEZIIDAE
114. Genus *Trapezium* Megerle von Muchlfeld
182. *Trapezium sublevigatum* (Lamarck)
66. Family VENERIDAE
115. Genus *Dosinia* Scopoli
183.**Dosinia eduli* Fischer-Petit
184.**D. prostata* (Linnacus)

116. Genus *Clementia* Gray
- 185.**Clementia annandalei* Preston
117. Genus *Gafrarium* (Bolten) Roeding
186. *Gafrarium pectinatum* (Linnaeus)
118. Genus *Meretrix* Lamarck
187. *Meretrix meretrix* (Linnaeus)
119. Genus *Pitar* Roemer
188. *Pitar alabastrum* (Reeve)
120. Genus *Pelecypora* Dall
189. *Pelecypora trigona* Reeve
- 190.**P. jukes-browniana* Preston
121. Genus *Tapes* Megerle von Muchfeld
- 191.**Tapes luzonica* Deshayes
192. *T. bruguiera* (Hanley)
122. Genus *Paphia* (Bolten) Roeding
193. *Paphia malabaricus* (Schoerter)
- 194.**P. pinguis* (Dillwyn)
- 195.**P. undulata* (Born)
196. *P. textile* (Gmelin)
123. Genus *Sunetta* Link
- 197.**Sunetta scripta* (Linnaeus)
124. Genus *Timoclea* Brown
198. *Timoclea imbricata* (Sowerby)
67. Family GLAUCONOMIDAE
125. Genus *Glaucanome* Gray
- 199.**Glaucanome cerea* Reeve
200. *G. sculpta* (Sowerby)
- Order MYIODA
68. Family MYIDAE
126. Genus *Sphenia* Turton

201. *Sphenia perversa* Blanford

69. Family CORBULIDAE

127. Genus *Corbula* Bruguiere

202. *Corbula abbreviata* Preston

203. *C. calcarea* Preston

204. *C. gracilis* Preston

70. Family PHOLADIDAE

128. Genus *Martesia* Sowerby

205. *Martesia fragilis* Verrill and Bush

129. Genus *Lignopholas* Turner

206. *Lignopholas fluminalis* (Blanford)

130. Genus *Barnea* Leach

207. *Barnea candida* (Linnaeus)

131. Genus *Pholas* Linnaeus

208. *Pholas orientalis* Gmelin

71. Family TEREDINIDAE

132. Genus *Bactronophorus* Tapparone-Canefri

209. *Bactronophorus thoracites* (Gould)

133. Genus *Dicyathifer* Iredale

210. *Dicyathifer manni* (Wright)

134. Genus *Bankia* Gray

211.**Bankia carinata* (Gray)

212. *B. compenellata* Moll and Roch

213. *B. nordi* Moll

214. *B. rochi* Moll

135. Genus *Nausitora* Wright

215. *Nausitora dunlopei* Wright

136. Genus *Uperotus* Guettard

216. *Uperotus clavus* (Gmelin)

Order PHOLADOMYOIDA

72. Family PANDORIDAE

137. Genus *Pandora* Bruguiere

217. *Pandora ceylonica* Sowerby

73. Family LATERNULIDAE

138. Genus *Laternula* Roeding

218. *Laternula truncata* (Lamarck)

74. Family CUSPIDARIIDAE

139. Genus *Cuspidaria* Nardo

219. *Cuspidaria chilkaensis* (Preston)

Class CEPHALOPODA

Order SEPIOIDEA

75. Family SEPIIDAE

140. Genus *Sepia* Linnaeus

220. *Sepia aculeata* d'Orbigny

141. Genus *Sepiella* Gray

221. *Sepiella inermis* (d'Orbigny)

Order TEUTHOIDEA

76. Family LOLIGINIDAE

142. Genus *Loligo* Schneider

222. *Loligo duvauceli* d'Orbigny

143. Genus *Doryteuthis* Neaf

223. *Doryteuthis singhalensis* Ortmann

144. Genus *Loliolus* Steenstrup

224. *Loliolus investigatoris* Goodrich

Order OCTOPODA

77. Family OCTOPODIDAE

145. Genus *Octopus* Lamarck

225. *Octopus macropus* Risso

226. *Octopus rugosus* (Bosc)

Keys to the Families

A. GASTROPODA

1. Animal covered with spirally coiled univalve shell..... (6)
 Animal not covered with a shell.....(2)
2. Animal with an internal shell and well developed head and posterior shield..... Aglajidae
 Animal without an internal shell and without head or posterior shield (3)
3. Dorsal integument of the body very hard, surface beset with numerous hard protuberances giving tufted appearance; mantle with small eyes scattered on its surface..... Onchidiidae
 Dorsal integument of the body soft, dorsal surface without hard protuberances; mantle without eyes (4)
4. Gill situated on the right side in the space between foot and mantle..... Pleurobranchacidae
 Gill situated either on both the sides in the space between foot and mantle and or on the dorsum (5)
5. Gill may be absent or when present found on both the sides of the body between foot and mantle; head with a velum; dorsal surface of mantle smooth..... Arminidae
 Gills branched, bipinnate, situated on the posterior dorsal region; head without an expanded oral velum; dorsal surface with definite projecting appendages..... Polyceridae
6. Shell minute not exceeding 10 mm..... (7)
 Shell more than 10 mm..... (12)
7. Shell porcellaneous; umbilicus wide..... Cyclostrematidae
 Shell not porcellaneous; umbilicus narrow..... (8)
8. Shell turreted or ovate; operculum present..... (9)
 Shell conical or cylindrical; operculum absent..... (10)
9. Aperture oval; whorls with strong spiral ridges..... Iravadiidae
 Aperture subcircular; whorls either smooth or with faint spiral ridges..... Stenothyridae

10. Shell conical, aperture large, outer lip thick, anteriorly notched; columella with plaits..... Ringiculidae
 (11)
 Shell cylindrical, aperture small, narrow; outer lip thin, simple, without anterior notch; columella simple..... (11)
11. Spire sunken, outer lip extends beyond the body whorl; suture distinct..... Retusidae
 Spire not sunken, outer lip does not extend beyond spire and body whorl; suture indistinct..... Cylichnidae
 (12)
12. Shell cup shaped; spire absent; aperture large in proportion to the size of shell..... Acmaeidae
 Shell globose or elongated but not cup shaped; spire distinct; aperture considerably small in proportion to the size of the shell..... (13)
13. Shell cone shaped with flattened base whorls rapidly diminishing in diameter; aperture small, oblique..... (14)
 Shell globose, body whorl large; aperture moderate..... (16)
14. Umbilicus large, margin dentate..... Architectonidae
 Umbilicus small or absent..... (15)
15. Shell dull coloured, internally non nacreous; always attached with foreign bodies..... Xenophoridae
 Shell brightly coloured, internally nacreous; not attached with foreign bodies..... Trochidae
16. Spire reduced, often almost on the same level; body whorl inflated and globular; aperture semicircular..... (17)
 Spire elongate; bodywhorl not inflated and globular; aperture not semicircular..... (18)
17. Umbilicus present, completely filled by a callous, sometimes exposed as concentric depression; columella not flattened..... Naticidae
 Umbilicus absent; columellar margin richly callous and flattened..... Neritidae
18. Shell glossy and brightly coloured; aperture narrow elongated; operculum absent..... Olividae
 Shell not like above..... (19)

19. Spire concealed or invaginated within bodywhorl; aperture almost the length of the body-whorl; surface smooth or polished..... (20)
- Spire elevated; aperture less than the length of the body-whorl; surface sculptured but not polished (21)
20. Shell thin; aperture wide anteriorly and narrow posteriorly; columella without folds..... Atyidae
- Shell thick; aperture narrow throughout; columella with folds..... Marginellidae
21. Shell with distinct notch towards its posterior end at the outer lip of aperture..... Turridae
- Shell without a distinct notch towards the posterior end at the outer lip of the aperture..... (22)
22. Shell elongate, length of the spire more than twice of the bodywhorl..... (23)
- Shell less elongate; spire length less than twice of the body whorl..... (23)
23. Columella twisted; anterior canal present..... Potamidae
- Columella not twisted; anterior canal absent..... (24)
24. Aperture rounded; whorls distinctly keeled; suture more deep..... Turritellidae
- Aperture ovate; whorls not keeled; suture not deep..... Terebridae
25. Shell without operculum (26)
- Shell with operculum..... (30)
26. Anterior canal present..... (27)
- Anterior canal absent..... (29)
27. Columella with strong plications..... Cancellariidae
- Columella without plications (28)
28. Shell globose, anterior canal short; columella twisted..... Tonnidae
- Shell pear shaped; anterior canal long; columella straight..... Ficidae
29. Columella with teeth Ellobiidae
- Columella without teeth Eulimidae

30. Anterior canal absent (31)
 Anterior canal present (35)
31. Shell turreted (32)
 Shell not turreted (34)
32. Columella with distinct fold Pyramidellidae
 Columella without a distinct fold (33)
33. Body with definite, prominent sculpture Epitonidae
 Body without definite sculpture Thiaridae
34. Shell ovately conical, sub-globose with horny epidermis; aperture ovate..... Assimincidae
 Shell turbate, solid without horny epidermis; aperture subcircular Littorinidae
35. Shell with continuous varices on either side (36)
 Shell without continuous varices, if present (37)
36. Shell spinose, posterior canal open Bursidae
 Shell with granules; posterior canal absent Cymatidae
37. Columella smooth (38)
 Columella with plications or with postules (39)
38. Shell pear shaped; upper part of bodywhorl smooth; anterior canal wide Melongenidae
 Shell not pear shaped; bodywhorl sculptured; anterior canal narrow Muricidae
39. Shell globose; suture deep; columella twisted and plicated; sculpture with only spiral grooves ...
 Cassidae
 Shell pyriform; suture not deep; columella not twisted; sculpture with axial ribs..... (40)
40. Aperture narrow, elongate Pyrenidae
 Aperture wide; Nassariidae

B. BIVALVIA

1. Shell greatly reduced covering only anterior tip of the animal; animal elongated and worm like, with two pallets at the posterior end *Teredinidae*
 Shell comparatively well developed and encloses the entire animal; animal laterally compressed and of different shapes but never elongated and worm-like, pallets absent (2)
2. Hinge with numerous undifferentiated teeth (3)
 Hinge with not more than five teeth when present or reduced or absent (6)
3. Shell radiately striated or ribbed; hinge straight, scarcely arched; teeth arranged in straight line; ligamental pit absent (4)
 Shell concentrically striate or smooth; hinge arched, teeth in lateral rows on either side of the ligamental pit (5)
4. Muscle scar without myophoric ridge or shelf *Arcidae*
 Muscle scar with myophoric ridge or shelf..... *Noetiidae*
5. Shell nacreous internally, posterior margin obtuse or rounded, pallial line entire..... *Nuculidae*
 Shell non nacreous internally, posterior margin more or less drawn out or beaked pallial sinus broken *Nuculanidae*
6. Anterior adductor muscle scar reduced or absent; hinge teeth scarcely developed or absent.... (7)
 Anterior adductor muscle scar well developed; hinge teeth also well developed and differentiated (10)
7. Umbo terminal or subterminal; ligament without nodules; shell attached with byssus thread or free (8)
 Umbo central; ligament with nodules, shell attached to substratum with one valve (9)
8. Shell comparatively small (upto 60 mm) mytiliform; ventral margin without any gape *Mytilidae*
 Shell large (more than 60 mm) wedge or horn shaped; ventral margin with narrow gape *Pinnidae*

9. Shell strong, very thick; right valve without any foramen Ostreidae
 Shell thin; right valve with a foramen Anomiidae
10. Shell elongate, cylindrical or flattened; gaping at both the ends (11)
 Shell trigonal to ovate, never cylindrical; gape absent (13)
11. Shell with one hinge teeth, straight, margins parallel Solenidae
 Shell with more than one hinge tooth, not straight; margins not parallel (12)
12. Shell elongately quadrate; widely gaping at both the ends Solecurtidae
 Shell more wide and compressed; gape narrow Cultellidae
13. Shell with more than one cardinal teeth; sometimes with laterals (14)
 Shell with one cardinal tooth or edentulous (24)
14. Hinge with inverted V-shaped, cardinal tooth in the left valve Mactridae
 Hinge without inverted V-shaped cardinal tooth on left valve (15)
15. Cardinal teeth lucinoid type; cardinals two in each valve, 3a and 3b in the right valve and 2, 4b in the left valve (16)
 Cardinal teeth other than the lucinoid type, either cyrenoid or arcticoid type (17)
16. Sculptured with radial ribs; lateral teeth present Cardiidae
 Sculptured with concentric striae only (except *Codakia*); lateral teeth absent Lucinidae
17. Hinge with well developed cardinal and lateral teeth; cardinals two in each valve (18)
 Hinge with three cardinal teeth (cyrenoid type) 3a, 1 and 3b in the right and 2a, 2b and 4b in the left valve (22)
18. Cardinal teeth two in either valve, tending to be bifid; pallial line connected to adductor muscle scar by distinct pallial sinus (19)
 Cardinal teeth two in either valve, but not bifid; pallial line mostly entire Trapeziidae
19. Hinge plate without rounded socket (20)
 Hinge plate with rounded socket (21)

20. Shell with posterior flexure; radial striae not present; somewhat elongate Tellinidae
- Shell without posterior flexure; radial striae present at least as marginal crenulations; trigonal ...
..... Donacidae
21. Hinge weak with only one cardinal tooth; shell smooth, without periostracum Semelidae
- Shell strong with two cardinal teeth; shell with very fine concentric striae, with periostracum
..... Psammobiidae
22. Hinge with strong anterior and posterior lateral teeth Corbiculidae
- Hinge with weak anterior and posterior lateral teeth or absent (23)
23. Shell trigonal, ovate or rounded; thick without periostracum; lateral teeth present Veneridae
- Shell elongate, thin with periostracum, lateral teeth absent Glauconomidae
24. Shell with accessory plates Pholadidae
- Shell without accessory plates (25)
25. Shell with strongly rostrated posterior end Cuspidariidae
- Shell without rostrated posterior end (26)
26. Hinge edentulous or with one cardinal tooth in each valve but never with buttresses or denticles;
periostracum thin; inner surface non nacreous (27)
- Hinge without regular dentition but hinge margin variously reinforced by buttresses or denticles;
with periostracum; inner surface nacreous (28)
27. Shell concentrically ribbed; without pallial sinus Corbulidae
- Shell not concentrically ribbed; pallial sinus small to large Myidae
28. Shell sub cylindrical, thin posterior and roundly gaping; hinge edentulous; ligament on two
projecting spun shaped chondrophores, supported by oblique clavicle Laternulidae
- Shell compressed, thick dorsal boarder of one valve overlapping the other; dorsal margin edentulous
but with laminar buttresses beside the resilium Pandoridae

C. CEPHALOPODA

1. Cephalopoda with ten arms, eight oral and two tentacular; suckers stalked and have horny rings Octopodidae
- Cephalopoda with eight arms; suckers sessile, no horny rings (2)
2. Tentacles retractile into pockets, internal shell calcified' body wide, fine narrow Sepiidae
- Tentacles not retractile internal shell chitinous or lacking; body elongated; fin large...Loliginidae

D. SCAPHOPODA

- Shell with longitudinal ribs maximum diameter at the anterior aperture..... Dentaliidae
- Shell smooth or with annular markings; maximum diameter near the anterior aperture..... Siphonodentaliidae

SYSTEMATIC ACCOUNT

Class GASTROPODA

Order ARCHAEOGASTROPODA

Family ACMAEIDAE

1. Genus *Potamacmaea* Peile, 1922

1. *Potamacmaea fluviatilis* (Blanford)
(Pl.1, figs 1 & 2, Text fig. 1)

1868. *Tectura fluviatilis* Blanford, *J. Asiat. Soc. Beng.*, 36(2) : 62, pl. 13, figs. 2-4.

Material examined : i) 1 ex., Port Canning, 12.1.58, ii) 8 exs., Sajnakhali, 28.4.61, iii) 10 exs., Sudhanyakali, 2.5.61, Coll. A.S. Rajagopal; iv) 1 ex., Basirhat, 6.9.84, v) 9 exs., Gomati river, Pargumti, 9.9.84, vi) 2 exs., Chhotamullakhali, 12.9.84, vii) 5 exs., Jharkhali, 24.9.84, Coll. B.P. Halder & party; viii) 4 exs., Purandar, 26.2.86, ix) 5 exs., Sandeshkhali, x) 7 exs., Port Canning, Reg. No. M 12862/2 Coll. ?.

Measurements (in mm): Length 14.75 - 11.50 ; Diameter 12.20 10.00

Diagnosis : Shell somewhat round, apex anterior, periostracum olive brown with a number of radiating striae.

The radula is of docoglossate type. The ribbon measures about 0.87 cms. and consists of 65 transverse rows of teeth. The central is absent. There are two pairs of lateral teeth one behind the other and each lateral bears six cusps. There are three marginals on either side bearing 13 cusps (Text fig. I).

Distribution : India : West Bengal : North and South 24 Parganas, Andaman and Nicobar Islands. Elsewhere : Burma (in Irawaddy delta).

Remarks : It usually occurs in the crevices of bricks, wooden poles and on *Avicinnia* plant upto the height of one meter from the ground level, on the banks in the Hugli-Matla estuary. They are partially inundated during the hightides. Young ones were observed in brick crevices mainly with the profuse algal growth, during the month of September.

Family CYCLOSTREMATIDAE

2. Genus *Tubiola* A. Adams, 1863

2. *Tubiola microscopica* (Nevill)

(Pl. 1, figs. 326)

1877. *Valvata* (?) *microscopica* Nevill, *Cat. Moll. Ind. Mus. fasc. E.*, P.21 (type locality; Port Canning).

1915. *Cyclostrema* (*Tubiola*) *innocens* Preston, *Rec. Indian Mus.*, 11 : 296, fig.9.

Material examined : 1) ex., Matla river bed, Saimari, 23.8.87. Coll. S. Barua.

Diagnosis : Shell discoidal, small and brown : whorls three, the body whorl rapidly increases and marked with strong growth striae; suture well impressed; umbilicus wide; labrum continuous and simple, aperture suborbicular.

Measurements (in mm) : Length 1.30 ; Diameter 2.70, Maximum height of the aperture 1.00

Distribution : West Bengal : North 24 Parganas, Orissa (Chilka Lake).

Remarks : This species was collected after 110 years after its original discovery by Nevill in 1877.

Family TROCHIDAE

Key to the genera

Shell orbicular small; umbilicus deep and wide..... *Solariella*

Shell conical; umbilicus covered by callous deposit *Umbonium*

3. Genus *Solariella* Wood, 1842

3. *Solariella sataparaensis* Preston

1914. *Solariella sataparaensis* Preston, *Rec. Indian Mus.*, 10 : 302, figs. 11, 11a.

1968. *Solariella utkalensis* Ray, *Bull. Indian Mus.*, 3 (1-2) : : 16, 2 text figs.

Material examined : i) 5 exs., Sandhead Coll.?, ii) 23 exs., Sandhead, Reg. No. 172, Coll. J. Barnett.

Measurements (in mm) : Length 5.00 - 2.90; Diameter 6.05 - 5.05; maximum height of the aperture 2.65 - 1.75.

Diagnosis : Shell small, turbinate, umbilicus bordered by beaded ridge, aperture subquadrate, shining bluish grey.

Distribution : India : West Bengal : South 24 parganas, Kerala, Maharastra, orissa. Elsewhere : Burma.

4. Genus *Umbonium* Link, 1807

4. *Umbonium vestiarum* (Linnaeus) (Pl. 1, figs. 4, 5 & 7)

1758. *Trochus vestiarum* Linnaeus, *Syst. Nat.* ed 10, p. 758.

1807. *Umbonium vestiarum* Link, *Besch. Nat. Samm. Rostock*, pt. 3, p.136.

1978. *Umbonium vestiarum* : Rajgopal & Mookherjee, *Rec. zool. Surv. India*, Occ. Paper 12; 29.

Material examined : i) 2 exs., Digha coast, 27.11.84, ii) 21 exs., Digha coast, 30.1.86, Coll. N.V. Subba Rao and A. Dey; iii) 85 exs., Digha, Coll. M. Mookherjee.

Measurements (in mm) : Length 8.400-4.70 ; Diameter 14.35 - 8.60; Maximum height of the aperture 4.30 3.40 (108 exs.).

Diagnosis : Shell smooth, brightly coloured, shiny, depressed; spire conical; umbilicus with large, subcircular callous pad.

Distribution : India : West Bengal : Medinipur; Andhra Pradesh, Goa, Maharastra, Tamil Nadu. Elsewhere : Japan, Java, New Zealand, Pakistan, Persian Gulf, Philippines, Indonesia, Sri Lanka.

Remarks : It is a common polymorphic, trochid. The shells, commonly known as button shells are collected in large quantities for the preparation of lime. The shell is also used in the preparation of garlands, toys, and other decoratives like flower vase, door hanging etc.

The snail is subtidal occurring in the surface layers of sandy mud often burrowing to a depth of 4 meter. At Digha it was observed crawling on the exposed beach during the low tide leaving behind a trail of a deep groove, and ultimately burying itself inside the sand. The population at Digha was very much scattered.

Ecology and the Polymorphism of the Snail have been studied by Rajagopal *et.al* (1981)

Family NERITIDAE

Key to the genera

1. Shell symmetrical, cuplike; without whorls; aperture very wide; operculum squarish, without apophyses *Septaria*

- Shell asymmetrical, with one or two spiral whorls; aperture not very wide; operculum semicircular with two apophyses 2
2. Shell thick or solid with spiral ribs; columellar callus large; outer lip dentate *Nerita*
- Shell thinner, less solid without spiral ribs, columellar callous small; outer lip smooth 3
3. Shell surface with more or less longitudinal and coarse striae or with fine spiral striae 4
- Shell surface smooth and shining, without spiral striae *Neritina*
4. Shell surface coarsely striated with growth lines; central expanded anteriorly *Clithon*
- Shell surface with fine spiral striae; central slightly longer than broad *Pseudonerita*

5. Genus *Nerita* Linnaeus, 1758

5. *Nerita articulata* Gould (Pl.1, figs. 8 & 9)

1847. *Nerita articulata* Gould, *Proc. Boston Soc. nat. Hist.*, 2 : 220.

Material examined: 1) ex., Matla river, Dec. 1916, Coll. S.W. Kemp; ii) 1 ex., Sunderban, 22.7.18, iii) 17 exs., Port Canning, Coll. N. Annadale; iv) 1 ex., Sajnakhali, 26.4.61, coll. A.S. Rajagopal; v) 1 ex., Namkhana, 13.3.80, Coll. K.V. Surya Rao and Party; iv) 6 exs. Arbesy block, Sunderban, 16.9.83, Coll. A.K. Hazra; vii) 1 ex., Gosaba, 16.9.83, coll. N.C. Gayen; viii) 22 exs., Chhota Hardi, 18.9.83, Coll. S.S. Saha; ix) 7 exs., Pargumti, 12.9.84, x) 1 ex., Gosaba, 17.9.84, Coll. B.P. Halder and party; xi) 2 exs., Pirkhali, 2.11.88, xii) 1 ex., Netidhopani, 8.11.88, xiii) 2 exs., Haldibari, 5.11.88, xiv) 2 exs., Jharkhali, 7.11.88, Coll. S. Barua.

Measurement (in mm): Length 29.80 - 13.10 ; Diameter 31.50 - 14.60; Maximum Height of the aperture 22.20 - 11.15

Diagnosis: Shell semigobular with numerous growth striae, semicircles and crossed by finer spiral lines; whorls one to one and half; spire represented by elevated portion of the body whorl, obliquely turned in words; aperture crescent shaped; columellar callous well developed, porcellaneous.

Distribution: India : West Bengal: North and South 24 Parganas; Andaman Islands and Tamil Nadu. Elsewhere : Sri Lanka, Indonesia, Malacca, Australia, New Caledonia, Philippines.

Remarks: These molluscs were mainly observed in Hugli-Matla estuary attached to the *Avicinnia* plant upto the height of 2 meters above the ground level. They were also found on the wooden pillars, in brick crevices of the dyke. They were either solitary or in clusters upto 9 individuals.

Key to the species

Shell with distinct, elevated spire *N. smithi* wood

Shell with the spire quite hidden by the body whorl *N. violacea* (Gmelin)

6. *Neritina violacea* (Gmelin, 171)
(Pl.1, fig. 11)

1791. *Nerita violacea* Gmelin, *Syst. Nat.* ed. 13, p. 3686
 1822. *Nertina crepidularia* Lamarck, *Hist. nat. Anim. Sans. Vert.*, 6(2) : 572.
 1836. *Neritina cornucopia* Benson, *J. Asiat. Soc. Beng.*, 5 : 748.
 1836. *Neritina depressa* Benson, *J. Asiat. Soc. Beng.*, 5 : 748.
 1978. *Neritina (Dostia) violacea* Rajagopal and Mookherjee, *Rec. zool. Surv. India*, Occ. paper, 12 : 44.

Material examined : i) 3 exs., Sagar Island, 1911, Coll. J. Muntyo; ii) 3 exs., Diamond harbour, 1.6.64, Coll. N.V. Subba Rao and H.P. Mookherjee; iii) 1 ex., Sagar Island, 21.5.80, Coll. K.V. Surya Rao and S.C. Mitra; iv) 3 exs., Jhigakhali, 11.9.83, Coll. S. Biswas; v) 1 ex., Pargumti, 9.9.84, vi) 16 exs., Diamond Harbour, 11.3.85, vii) 7 exs., Haldia, 18.3.85, viii) 2 exs., Falta, 25.3.85, Coll. B.P. Halder and Party; ix) 28 exs., Calcutta, x) 10 exs., Chingrighata, xi) 7 exs., River Hugli, xii) 8 exs., Digha, Coll. ?.

Measurements (in mm) : Length 15.00 - 5.45; Width 19.50 - 7.10; Maximum height of the aperture 16.00-7.00.

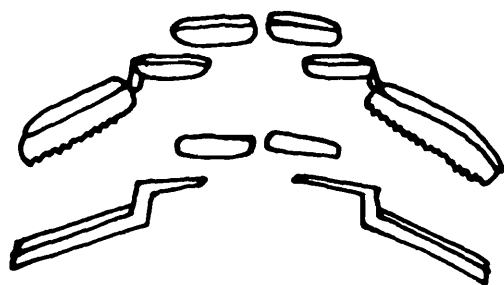
Diagnosis : Shell ovate, crepidula shaped; spire minute; periostracum yellowish-brown; columellar plate porcellaneous with 7-10 dentitions; radula with central having a little broader cusp, and strikingly than anterior end, the cusps of the V-lateral not very large.

Distribution : India West Bengal; Medinipur, North and South 24-parganas; Andaman Island, Andhra Pradesh, Goa, Kerala, Karnataka and Tamil Nadu. Elsewhere : Sri Lanka, Burma, Mergui Archipelago, Thailand, Bangkok, Cambodia, Siam, Vietnam, Touranne, Singapore, Indonesia, Sumatra, Java, Bali, Borneo, Celebes, Timor, New Caledonia, Samoa, Fiji, Australia : Queensland to South western Australia; Philippines : Island of Negros, Island of Siquijor; Japan : Yokohama.

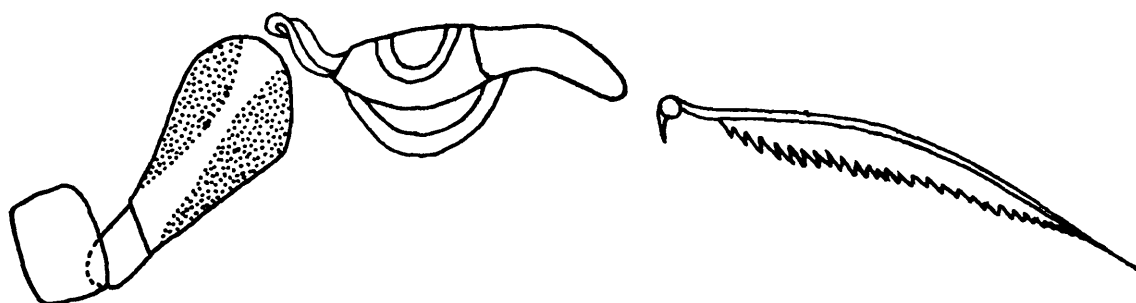
Remarks : The specimens were found mainly on the upper mud flat. Some were collected on the dyke remains attached to the pillars or in crevices of the bricks. This species seems to be euryhaline in nature and can tolerate a wide range of salinity.

7. *Neritina smithi* Wood
(Pl.1, fig. 10 Text fig. 2)

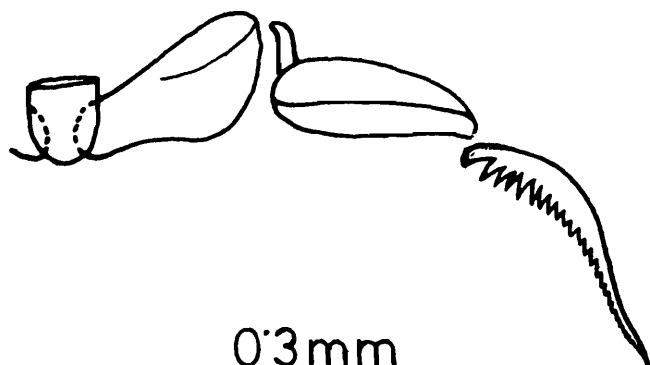
1828. *Neritina smithi* Wood, *Index Test.*, *Suppl.*, p.26, pl.8, fig. 11.
 1836. *Neritina tigrina* Benson *J. Asiat. Soc. Beng.*, 5 : 749 (non nud.).
 1837. *Neritina hamuligera* Troschel, *Arch. Naturgesch.*, p.3.



0.3mm



0.5mm



0.3mm

Text Figs.

1. Radula of *Potamocnuea fluviatilis* (Blanford)
2. Radula of *Neritina smithi* Wood
3. Radula of *Pseudonerita sulculosa* (Von Martens)

Material examined : 1 ex., Gona, Sunderban, 18.3.83, Coll. S. Bhuiya; ii) 1 ex., Pargumti, 10.9.84, iii) 1 ex., Falta, 27.3.85, Coll. B.P. Halder and Party; iv) 9 exs., Calcutta, Coll - ?.

Measurements (in mm) : Length 20.00 - 8.40 ; Diameter 17.40 - 7.15 ; Maximum height of the aperture 14.50 - 6.15

Diagnosis : Shell oval, higher than broad, solid, white or dull brown with strong, black, longitudinal, undulating and interrupted lines and bands, rarely with very fine, wavy and close set black lines; aperture broad, semilunar; columellar callus small and smooth; operculum semilunar.

Radula rhipidoglossate type, with a length of 13.70 mm in a specimen of 18.90 mm length, consist of 250 nos of rows. Each row consists of a typical median, central tooth and laterals and marginal teeth (Text Fig.2).

Distribution : India : West Bengal : Calcutta, North and South 24 parganas. Elsewhere : Burma (Irawaddy).

Remarks : It was observed in the crevices of mud or under surface of brick. In Falta it was observed in between mid tide mark to high tide mark, where the bank was grassy.

The species is restricted in its distribution to Gangetic and Irrawaddy deltas.

7. Genus *Pseudonerita* Baker, 1923

Key to the species

Shell with deep coarse spiral striae; inner columellar margin with strong teeth; outer lip broadly arched
..... *P. sulculosa* (von Martens)

Shell with fine spiral striae ; inner columellar margin with weak teeth; outer lip not broadly arched.....
..... *P. obtusa* (Benson)

8. *Pseudonerita obtusa* (Benson)

(Pl.1, fig. 12)

1836. *Neritina obtusa* Benson, *J. Asiat. Soc. Beng.*, 10 : 749.

1855. *Neritina spiralis* Reeve, *Conch. Icon.*, 9 : *Neritina* sp. no. 99, pl. 23, figs. 99a, b.

Material examined : 1) 13 exs., Calcutta, ii) 1 ex., River Hugli, Coll. ?.

Measurements (in mm) : Length 9.25-6.85 ; Diameter 13.78 - 8.60; Maximum height of the aperture 9.30 - 6.00 (14 exs.,).

Diagnosis : Transversely ovate, Olive green, lateral whorls three, decussately striated, spiral striae very fine, bodywhorl with a dark green or spiral band; aperture orbicularly ovate, columellar area excavated, columellar callus porcellaneous; operculum semilunar,

Distribution : India : West Bengal: Calcutta; Andaman Islands. Elsewhere : Burma.

9. *Pseudonerita sulculosa* (Von Martens)
(Pl.2, fig. 1 Text fig. 3)

1879. *Nertina sulculosa* Von Martens, in Chemnitz. *Syst. Conch. Cab.*, 2 (10) : 69, 136, 278, pl. 8, figs. 23-26.

Material examined : i) ex., Diamond Harbour, 17.6.64, Coll. N. V. Subba Rao and H. P. Mookherjee; ii) 11 exs., Diamond Harbour, 13.3.85, iii) 5 exs., Haldia, 16.3.85, iv) 2 exs., Geonkhali, 22.3.85, v) 4 exs., Falta, 26.3.85, Coll. B.P. Halder and party; vi) 5 exs., Port Canning, Coll.?

Measurements (in mm) : Length 9.50 - 5.60 ; Diameter 12.95 - 6.35; Maximum height of the aperture 9.45 - 5.45 (28 exs.).

Diagnosis : Obliquely oval, dark greenish grey; sculptured with numerous deep fine spiral striae crossed by longitudinal striae giving decussated appearance.

Radula rhipidoglossate type, with 6.60 mm length in a specimen of 9.35 mm length, consists of 80-85 rows of teeth. Each row having a median central tooth, laterals and marginal teeth (Text fig.3).

Distribution : India : West Bengal : South 24-Parganas, Medinipur ; Orissa. Elsewhere : Indonesia.

Remarks : It was found adhering to wood inside its barks and sometimes in the empty tunnels of shipworms, bricks, dyke crevices, concrete pillars which are not completely exposed during the low tide.

8. Genus *Clithon* Montfort, 1810

10. *Clithon reticularis* (Sowerby)
(Pl.2, fig.2)

1838 *Neritina reticularis* Sowerby, *Conch. Illust.*, no. 51, fig. 44.

1841. *Nerita michaudi* Recluz, *Revue zool. Soc. Cuvier*, p. 315.

1843. *Nerita michaudiana* Recluz. *Proc. zool. Soc. Lond.*, p. 72.

Material examined : i) 16 exs., Falta, 26.3.85, Coll. B.P. Halder and Party; ii) 28 exs., Calcutta, Coll.?

Measurements (in mm) : Length 9.40 - 4.05 ; Diameter 8.65 - 4.35; Maximum height of the aperture 6.65 - 3.85.

Diagnosis : Ovate or subglobose, yellowish or olive green, with oblique angulated red or black thin lines, sometimes forms a coarse network; whorls 3-4, concave round the upper part, sutures impressed; aperture semilunar; columellar callus narrow, with 5-6 small teeth at the centre; operculum semilunar, smooth.

Distribution : India : West Bengal : Calcutta, South 24 Parganas.

Remarks : Estuarine form, found attached to the underside of bricks in the Falta area which was slightly exposed during low tide.

9. Genus *Septaria* Ferussac, 1807

Key to the species

Shell narrow with compressed sides, lateral margins slightly arched..... *S. lineata* (Lamarck)

Shell broad, lateral margins somewhat straight.....*S. caerulea* (Sowerby)

11. *Septaria caerulea* (Sowerby)

1849. *Navicella caerulea* Sowerby, *Thes. Conch.*, 2 : 550, pl.118, fig. 129, pl.118, figs. 36-38.

1856. *Navicella orientalis* Reeve, *Conch. Icon.*, 9 : *Navicella* sp. no., 33, pl.8, figs. 33a, b.

Material examined : i) 20 exs., Zoological Garden, 20.7.72, Coll. N.V. Subba Rao; ii) 1ex., Falta, 26.3.85, Coll. B.P. Halder and Party, iii) 46 exs., Calcutta, Coll.?

Measurements (in mm) : Length 20.90 - 7.00 ; Diameter 14.40 - 4.35; Maximum height of the aperture 16.90 6.00

Diagnosis : Elongately oval, thin transparent, strongly arched, anterior and posterior margins equally rounded, lateral margins somewhat straight, apex rather beaked; aperture narrow; operculum rectangular, pale red, rib distinct from margin, small and pointed.

Distribution : India : West Bengal : Calcutta, South 24 Parganas.

Remarks : Brackishwater form but may occur in freshwater also. Restricted in its distribution to Hugli river and ponds fed by it.

12. *Septaria lineata* (Lamarck) (Pl.2, figs. 4 & 5)

1816. *Navicella lineata* Lamarck, *Encyl. Meth. Vers. Explic. Planches*, pl. 456, fig. 2.

Remarks : This species occurs in the river Hugli (from Scrampore to Diamond Harbour). Further details are given in the "Land and Freshwater Molluscs of West Bengal (Part I)" - Mitra and Dey, in Press.

Order MESOGASTROPODA Family LITTORINIDAE

10. Genus *Littorina* Ferussac, 1822

Key to the species

1. Columella black.....*L. melanostoma* Gray

- Columella not black..... (2)
2. Colour brown with undulating flammules or spots..... *L. undulata* Gray
- Colour mosaic brown with blotches arranged axially or zig-zag..... *L. scabra* (Linnaeus)

13. *Littorina (Littoraria) melanostoma* Gray
(Pl.3, fig. 1)

1839. *Littorina melanostoma* Gray, *Zool. Capt. Beechey's Voy. H.M.S. Blosson, Mollusks*, p. 140.
1970. *Littorina (Littorinopsis) melanostoma* Rosewater, *Indo-Pacific Mollusca*, 2 (11), pt. 1 : 462-46A, pl.325, figs. 28, 29, pl. 355, figs. 1-4.
1982. *Littorina (Littorinopsis) melanostoma* : Rajagopal & Mookherjee, *Rec. zool. Surv. India*, occ. paper 28 : 11.

Material examined : i) 3 exs., Port Canning, Coll. J. Woodmanson; ii) 1 ex., Port Canning, Coll. N. Annandale; iii) 38 exs., Sunderbans, Coll. N. Annandale and B. Prashad; iv) 1 ex., Gosaba, 25.4.61, Coll. A.S. Rajagopal; v) 2 exs., Dimond Harbour, 17.6.69, vi) 19 exs., Sunderbans, 23.4.69, vii) 6 exs., Kachuberia, 14.9.79, Coll. N.V. Subba Rao and Party; viii) 4 exs., Ganga Sagar, 2.9.79, ix) 4 exs., Narayanganj, 5.9.79, x) 8 exs., Madanganj, 6.9.79, xi) 5 exs., Kakdwip, 31.12.79, Coll. K.V. Surya Rao and S.C. Mitra; xii) 2 exs., Nadabhangachara, 25.10.79, xiii) 33 exs., Haribhagachara, 26.10.79, xiv) 1 ex., Narayanganj, 26.1.80, Coll. A. Dey and S. Barua; xv) 1 ex., Bidya river, 10.9.83, xvi) 1 ex., Matla Island, 12.9.83, xvii) 3 exs., Gosaba, 16.9.83, xviii) 8 exs., Gosaba, 18.9.83, Coll. N.C. Gayen; xix) 3 exs., Champia, 12.9.83, xx) 3 exs., Arbesy block (Sunderban), 14.9.83, Coll. A.K. Hazra; xxi) 2 exs., Gosaba, 12.9.83, xxii) 4 exs., Chhota Hardi, 18.9.83, Coll. S.S. Saha; xxiii) 5 exs., Gona, 12.9.83, Coll. S. Bhuiya; xxiv) 14 exs., Jhingakhali, 13.9.83, Coll. S. Biswas; xxv) 34 exs., Bagmarakhal, 14.9.83, xxvi) 3 exs., Pargumti, 10.9.84, xxvii) 1 ex., Bakkhali, 7.3.85, xxviii) 2 exs., Jharkhali, 21.5.85, xxix) 6 exs., Birajmanichar, Gosaba 27.5.85, Coll. B.P. Halder and Party; xxxii) 5 exs., Kaihali, 7.11.88, xxxiii) 2 exs., Parseymari, 9.11.88, xxiv) 4 exs., Baghbagan (Bagna), 13.11.88, Coll. A. Dey.

Measurement (mm): Length 26.25 - 7.30; Diameter 12.25 - 4.10; Maximum height of the aperture: 12.10 4.15

Diagnosis : Shell attenuated and conical, imperforate; yellowish white, with closely spaced zig-zag, punctate to elongate-rhomboidal brown markings located between the spiral striae; sculptured with shallow incised spiral striae and microscopic, wavy, spiral threads and fine, oblique axial lines of growth.

Distribution : India : West Bengal : North and South 24 Parganas; Andhra Pradesh, Orissa, Tamil Nadu. Elsewhere : Indo-Pacific, Sri Lanka to Philippines.

Remarks : Solitary, estuarine forms, found attached to stems and leaves of mangroves and grasses, generally at the height of 1.5 meters above the ground level. Population density varies with season and locality (Subba Rao *et. al.*, 1983).

14. *Littorina (Littoraria) undulata* Gray
(Pl.3, fig.2)

1839. *Littorina undulata* Gray, *Zool. Beechey's Voy.*, p. 140.
1885. *Littorina conica* var. *subintermedia* Nevill, *Hand list Mollusca Indian Museum*, pt. II, p. 150.
1982. *Littorina (Littoraria) undulata* : Rajagopal and Mookherjee, *Rec. zool. Surv. India*, Occ. paper 28 : 6.

Material examined : i) 1 ex., Sunderbans, 17.7.1998, Coll. N. Annadale, S.W. Kemp and B. Prasad; ii) 18 exs., Port Canning (Syntypes of *subintermedia*), iii) 29 exs., Sunderbans, Coll.?, iv) 105 exs., Sunderbans (Sajnakhali), 28.9.69, Coll. A.K. Mondal; vi) 3 exs., Gosaba block, Sept '88, Coll. S.S. Saha; vii) 2 exs., Gosaba, 17.9.84, Coll. B.P. Halder and Party; viii) 9 exs., Digha, 30.1.86, Coll. N.V. Subba Rao and A. Dey.

Measurement (in mm) : Length 12.20 - 4.65 ; Diameter 7.75 - 3.25; Maximum height of the aperture 5.80-2.50.

Diagnosis : Shell upto 25 mm length; yellowish or cream, ornamented with brown undulating axial marks or marbled with brown; columella violet-grey, sometimes white, with brown bands; sculptured thickened.

Distribution : India : West Bengal : Medinipur, North and South 24-Parganas; Andaman and Nicobar Islands, Goa, Kerala, Gujarat, Karnataka, Lakshadweep, Orissa and Tamil Nadu. Elsewhere : Indo-Pacific, Madagascar to Philippines.

15. *Littorina (Littorinopsis) scabra scabra* (Linnaeus)
(PL.3, fig.3)

1758. *Helix scabra* Linnaeus, *Syst. Nat.* ed. 10, 1 : 770.
1885. *Littorina conica* var. *delicatula* Nevill, *Hand list Mollusca Indian Museum*, pt. 11, p. 149.
1970. *Littorina (Littorinopsis) scabra scabra* Rosewater, *Indo-pacif. Mollusca*, 2(11), pt.1, 456 - 461, pl.352, figs.1-34.
1982. *Littorina (Littorinopsis) scabra scabra* : Rajagopal and Mookherjee, *Rec. zool. Surv. India*, Occ. paper, 28:9.

Material examined : i) 12 exs., Bakkhali, 23.8.78, Coll. G.C. Rao and party; ii) 41 exs., Kachuberia, 14.9.79, Coll. N.V. Subba Rao & Party; iii) 11 exs., Narayanganj, 5.9.79, iv) 6 exs., Ganga sagar, 3.9.79, Coll. K.V. Surya Rao and Party; v) 14 exs., Bakkhali, 29.10.79, Coll. A. Dey and S. Barua; vi) 4 exs., Bagmarikhal, 14.9.83, Coll. S. K. Chatterjee; vii) 3 exs., Gosaba, September '83, viii) 28 exs., Chhota Hardi, 18.9.83, Coll. S.S. Saha; ix) 2 exs., Gosaba, 18.9.93, Coll. N.C. Gayan; x) 8 exs., Pargumti, 9.9.84, xi) 6 exs., Gosaba, 19.8.84, Coll. B.P. Halder and Party; xii) 72 exs., Diamond Harbour, 17.6.64, Coll. N.V. Subba Rao and H.P. Mookherjee; xiii) 25 exs., Port Canning (type of *L. conica delicatula* Nevill), xiv) 9 exs., Port Canning, xv) 10 exs., Digha, Coll.?

Measurements (in mm) : Length 17.80 - 4.10 ; Diameter 10.10 - 2.82; Maximum height of the aperture 2.10 4.15

Diagnosis: Shell upto 43 mm length, solid, with variable colour pattern, generally dark, violet grey to reddish brown, nodules white, columella reddish brown; sculptured with spiral cords and a row of small nodules on the penultimate whorl and two rows on the last whorl; in addition there are spiral cords and axial growth lines; aperture with many fine lines and spotted with brown inside and outside.

Remarks: It occurs in the mangrove zone attached to trunks and branches of mangrove trees.

Distribution: India : West Bengal : Medinipur, North and South 24 parganas; Andaman Island, Goa, Karnataka, Kerala, Maharashtra, Tamil Nadu. Elsewhere : Widely distributed in the Indo pacific from South African coast to Philippines Islands.

Family IRAVADIIDAE

11. Genus *Iravadia* Blanford, 1867

16. *Iravadia ornata* Blanford

1867. *Iravadia ornata* Blanford, J. Asiat. Soc. Beng., 36 (1) : 56, pl. II, fig. 13,14.

Material examined: i) 30 exs., Port Canning, Coll. ?.

Measurements (in mm): Length 5.75 - 3.00 ; Diameter 3.35 - 2.10; Maximum height of the aperture 2.20 1.20 (30 exs.)

Diagnosis: Shell turreted, spirally ribbed; body whorl with six spiral ribs, some of them concealed.

Distribution: India : West Bengal : South 24 parganas; Orissa. Elsewhere : Burma.

Remarks: Occurs under the stones in creeks, It is also reported from the bark of wood in the jetties (Subba Rao and Mookherjee, 1975).

Family STENOTHYRIDAE

Key to the genera

Aperture very small, not prominent, separated from outer edge of the shell above by a well defined triangular area..... *Stenothyra*

Aperture larger and slightly prominent, less regular in outline, separated from the outer edge of shell above by a small and ill defined area..... *Gangetia*

12. Genus *Stenothyra* Benson, 1856

Key to the species

1. Aperture more than 1/3 of body whorl..... (2)

Aperture less than 1/3 of body whorl..... (3)

2. Bodywhorl not flattened on the ventral surface..... *S. soluta* Annandale and Prashad

Body whorl distinctly flattened on the ventral surface..... *S. blanfordiana* Nevill

3. Shell without spiral pitted sculpture..... *S. woodmasoniana* Nevill
 Shell with a definite spiral pitted sculpture..... *S. deltae* (Benson)

17. *Stenothyra blanfordiana* Nevill

1880. *Stenothyra blanfordiana* Nevill, *J. Asiat. Soc. Beng.*, 49 (2) : 160.
 1914. *Stenothyra chilkaensis* Preston, *Rec. Indian Mus.*, 10 : 300, fig.1.
 1915. *Stenothyra obesula* Preston, *Rec. Indian Mus.*, 11 : 293, fig. 4.

Material examined : i) 15 exs., Reg. No., M 3948/1, Port Canning, Coll. N. Annandale.

Measurements (in mm) : Length 1.75 1.00 ; Diameter 1.20 0.70; Maximum height of the aperture 1.00 0.50

Diagnosis : Subventricose, spire not much elongated, body whorl tumid, subangulate, operculum oval.

Distribution : India : West Bengal : South 24 Parganas; Orissa, Tamil Nadu.

18. *Stenothyra deltae* (Benson)
 (Pl.3, fig.4)

1836. *Nematura deltae* Benson, *J. Asiat. Soc. Beng.*, 5 : 782.
 1921. *Stenothyra deltae* : Annandale and Prashad, *Rec. Indian Mus.*, 22 : Text. fig. 2.

Material examined : i) 5 exs., Narayanganj, 5.9.79, ii) 2 exs., Ganga Sagar, 8.11.79, iii) 3 exs., Ganga Sagar, 19.5.80, iv) 12 exs., Costala (Sagar Island), 23.9.80, Coll. K.V. Surya Rao and S.C. Mitra; v) 31 exs., Manipara (Kakdwip), 16.4.80, vi) 20 exs., Pargumti, 9.9.84, vii) 2 exs., Jharkhali, 1.9.84, viii) 10 exs., Bakkhali, 7.3.85, ix) 10 exs., Kakdwip, 10.3.85, x) 13 exs., Dimond Harbour, 11.3.85, xi) 1 ex., Haldia, 15.3.85, xii) 8 exs., Falta, 26.3.85, Coll. B.P. Halder and party; xiii) 1 ex., Sunderbans, 20.8.18, xiv) 1 ex., Sunderbans, 22.7.18, Coll. N. Annandale, S.W. Kemp and B. Prashad; xv) 2 exs., Chandpal Ghat, xvi) 9 exs., Calcutta, xvii) 28 exs., Port Canning, Coll. ?; xix) 2 exs., Chandpal Ghat, Calcutta, Reg. No. M 11884/2.

Measurements (in mm.) : Length 6.5 - 3.5 ; Diameter 4.10 - 2.85 ; Maximum height of the aperture 2.25 1.25

Diagnosis : Shell with flattened bodywhorl, sculptured with spiral punctated lines; aperture small, subcircular, periostracum thick and often with spiral rows of spines (probably in the young).

Distribution : India : West Bengal : Calcutta, Medinipur, North and South 24 Parganas.

Remarks : This species occurs far above the area of tidal influence in pure freshwater as well as in brackishwater. In Sunderbans they were observed crawling on the small muddy patches, above the high water mark, which get inundated during the springtides.

19. *Stenothyra soluta* Annandale Prashad
(Pl.3, fig.5)

1919. *Stenothyra soluta* Annandale and Prashad, *Rec. Indian Mus.*, 16 : 247, pl. 20, fig. 6.

Material examined : i) 1 ex., Basanti (Holotype), Coll. N. Annandale, S.W. Kemp and B. Prashad.

Measurements (in mm) : Length 5.20 ; Diameter 2.85; Maximum height of the aperture 1.05

Diagnosis : Shell thick, and globose, spire flattened and concave at the apex, whorls distinct and swollen, body whorl proportionately short and stout.

Distribution : India : West Bengal : South 24 Parganas.

Remarks : Represented by the Holotype present in the National Zoological Collections of the Zoological Survey of India.

20. *Stenothyra woodmasoniana* Nevill
(Pl.3, fig.7)

1880. *Stenothyra woodmasoniana* Nevill, *J. Asiat. Soc. Beng.*, 49 (2) : 159.

Material examined : i) 24 exs., (Syntypes) Port Canning, Coll. J. Woodmason.

Measurements (in mm) : Length 3.50 - 3.00 ; Width 2.35 - 2.05; Maximum height of the aperture 1.50 - 1.05

Diagnosis : Ovately conical, spire very acute and concavely excavated; bodywhorl angulated, flattened rounded the umbilical region.

Distribution : India : West Bengal : South 24 Parganas.

Remarks : Represented by Syntypes present in the National Zoological Collection of the Zoological Survey of India.

13. Genus *Gangetia* Ancey, 1890

21. *Gangetia miliacea*, (Nevill)
(Pl.3, figs. 6 & 9)

1880. *Hydrobia* (*Belgrandia*) *miliacea* Nevill, *J. Asiat. Soc. Beng.*, 49 (2) : 161, pl. 8, fig. 7.

1880. *Hydrobia* (*Bythinella*) *miliacea* var. *minor* Nevill, *J. Asiat. Soc. Beng.*, 49 (2) : 52.

1989. *Gangetia miliacea* : Subba Rao, *Handbook Freshwater Molluscs of India*, p. 91, figs. 155, 156, 175-182.

Material examined : i) Many exs., Port Canning, Coll. F. Stoliczka; ii) 45 exs., Port Canning (Syntypes), Coll. G. Nevill; iii) 45 exs., Port Canning, Reg. No., M 11892/2, iv) 6 exs., Port Canning, Coll.

?; v) 2 exs., Port Canning, Coll. G. Nevill (Syntypes of var. *angulata*); vi) 4 exs., Port Canning, Coll. N. Annandale; vii) 1 ex., Port Canning (Holotype var. *gibbosula*); viii) 17 exs., Port Canning (Syntypes of var. *minor*), Coll. F. Stoliczka.

Measurements (in mm) : Length 2.50 ; Diameter 1.50; Maximum height of the aperture 0.8.

Diagnosis : Shell elongate, conical, somewhat turreted with a very long spire, body whorl smooth.

Distribution : India : West Bengal : South 24 Parganas, Orissa.

Remarks : Annandale and Prashad (1921) recognised three varieties viz. i) *typica*, with smooth body whorl and evenly rounded aperture ii) var. *subangulata* with smooth body whorl and subangulate aperture iii) *gibbosula* with distinctly keeled body whorl.

Common on the weeds in brackish water pools.

Family ASSIMINEIDAE
14. Genus *Assiminea* Fleming, 1828

22. *Assiminea beddomeana* Nevill
(Pl.3, fig.11)

1880. *Assiminea beddomeana* Nevill, *J. Asiat. Soc. Beng.*, 49 (2) : 163.

1919. *Assiminea beddomeana* : Annandale & Prashad, *Rec. Indian Mus.*, 16 : 250.

Material examined : i) 36 exs., Narayanganj, 5.9.79, Coll. K.V. Surya Rao and S.C. Mitra; ii) 10 exs., Nadabhangachara, 25.10.79, iii) 130 exs., Narayanganj, 28.1.80, Coll. A. Dey & S. Barua; iv) 7 exs., Pargumti, 9.9.84, v) 13 exs., Gosaba, 15.9.84, vi) 10 exs., Kakdwip, 10.3.85, Coll. B.P. Halder & party; vii) 41 exs., Port Canning (syntypes), viii) Many exs., Port Canning, Coll. J. Woodmason.

Measurements (in mm) : Length 6.25 1.75 ; Diameter 4.00 1.40; Maximum height of the aperture 3.35-0.70.

Diagnosis : Shell depressed, turbinata with quadrate foramen, spire obtuse, depressed with five whorls; aperture globose.

Distribution : India : West Bengal : North and South 24 Parganas. Elsewhere : Burma (Irrawady delta).

Remarks : This species was collected from the holes and crevices of the muddy substratum. Subba Rao *et.al.* (1983) recorded density of population from 2 to 544 m² in the Muriganga estuary. Juveniles were found during the month of January and grow to adult by April when the copulating pairs were frequently observed.

23. *Assiminea brevicula* (Pfeiffer)
(Pl.3, fig.11)

1854. *Ilydrocena bevicula* Pfeiffer, *Proc. zool. Soc. Lond.*, P. 306.
1867. *Assiminea rubella* Blanford, *J. Asiat. Soc. Beng.*, 36 (2) : 155, p. 3, fig. 78.
1919. *Assiminea brevicula* : Annandale & Prashad, *Rec. Indian Mus.*, 16 : 250.

Material examined : i) 50 exs., Kachuberia, 14.9.79, ii) 15 exs., Kakdwip, 16.8.79, iii) 163 exs., Silpara (Kakdwip), 18.8.79, Coll. N.V. Subba Rao & Party; iv) 14 exs., Nadabhangachara, 25.10.79, v) 52 exs., Namkhana, 27.10.79, Coll. A. Dey & S. Barua; vii) 52 exs., Costala (Sagar Island), 30.12.79; viii) 31 exs., Ganga Sagar, 21.9.80, ix) 42 exs., Namkhana, 5.9.79, Coll. K.V. Surya Rao & Party; x) 4 exs., Gosaba, Sept. 83, Coll. S.S. Saha; xi) 30 exs. Jhingakhali, 11.9.83, Coll. S. Biswas; xii) 26 exs., Bakkhali, 7.3.85, xiii) 14 exs. Kakdwip, 9.3.85, xiv) 20 exs, Haldia, 15.3.85, xv) 5 exs., Pargumti, 10.9.84, xvi) 2 exs., Soladanar Char, 5.9.84, xvii) 3 exs., Gosaba, 15.9.84, Coll. B.P. Halder & Party; xviii) 81 exs. Port Canning, Coll. ?.

Measurements (in mm) : Length 11.45 - 2.85 ; Diameter 4.65 - 1.95; Maximum height of the aperture 3.65 - 1.65

Diagnosis : Shell globose, thick with bright brick red or yellowish tan, 6-7 whorls, sutures sharp, smooth columellar pillar whitish; operculum corneous, thin, elongate with nucleus far off to one side.

Distribution : India : West Bengal : Medinipur, North and South 24 Parganas; Andaman and Nicobar Island, Andhra Pradesh, Tamil Nadu. Elsewhere : Borneo, Cebu, Malacca, Philippines , Singapore.

Remarks : Commonly found either crawling on the mud or remaining attached to grass in all muddy localities. Vertical distribution restricted to 10 meters downward from high water mark. Subba Rao *et. al.* (1983) recorded the population density in Namkhana-Kakdwip area.

24. *Assiminea francesiae* (Gray)
(Pl.3, figs. 12 & 13)

1828. *Turbo francesi* (Gray) Wood, *Ind. Test. Supp.*, pl. 6, fig. 28.

Material examined : i) 3 exs., Bakkhali, 7.3.85, ii) 22 exs., Soladanar Char, 5.9.84, iii) 20 exs. Taki, 6.9.84, iv) 17 exs. Dimond Harbour, 11.3.85, v) 32 exs. Haldia, 18.3.85, vi) 20 exs., Geonkhali, 21.3.85, vii) 42 exs., Falta, 25.3.85, Coll. B.P. Halder & Party; viii) 1 ex., Sagar Island, 23.9.80, Coll. K. V. Surya Roa & S.C. Mitra; ix) 18 exs., Calcutta, Coll. Mus. Staff; x) 19 exs., Barrackpore, Coll. N. Annandale; xi) 7 exs., Sunderbans, Coll. N. Annandale, S.W. Kemp and B. Prashad; xii) 61 exs., Tribeni (Hugli), 27.10.89, Coll. B.L. Chowdhury.

Measurements (in mm) : Length 4.10 - 9.55 ; Diameter 2.50 - 5.80; Maximum height of the aperture 1.0 - 4.95

Diagnosis : Shell elongately ovate, thin, with elongate spire; 6-8 whorls, body whorls with number of ridges or varices and reddish bands running across, aperture subcircular.

Distribution : India : West Bengal : Calcutta, Hugli, North and South 24 Parganas. Elsewhere : Bangladesh.

Remarks : It occurs in less saline waters. It was observed from Naihati to Sagar Island where the salinity was very low and almost nil during the rainy season.

26. *Assiminea theobaldiana* Nevill
(Pl.4, fig.2)

1880. *Assiminea theobaldiana* Nevill, *J. Asiat. Soc. Beng.* 49 (2) : 164, pl. 7, fig. 4.

Material examined : i) 1 ex., Portcanning (Holotype), Reg. No., M 17729/3, ii) 8 exs., Port Canning (Syntypes), Reg. No., M 17744/3, Coll. J. Woodmason; iii) Many exs., Port Canning, Coll. ?.

Measurements (in mm) : Length 4.45 3.00 ; Diameter 2.90 1.85; Maximum height of the aperture 1.95 0.70

Diagnosis : Shell conical, body whorl with oblique and decussating striae, except near the umbilicus and in the interstices of the spiral sulcations; the narrow smooth edge below the suture, on last 2-3 whorls formed by the abrupt cessation of the sculpture.

Distribution : India : West Bengal : South 24 Parganas.

Remarks : Only the type collections are present in National Collection of Zoological Survey of India.

25. *Assiminea microsculpta* Nevill
(Pl.4, fig.1)

1850. *Assiminea microsculpta* Nevill, *J. Asiat. Soc. Beng.* 49 (2) : 165, pl. 7, fig. 5.

Material examined : i) 1 ex., Port Canning, (Holotype), Reg. No., M 17727/3, Coll. J. Woodmason.

Measurements (in mm) : Length 2.78 - 1.70 ; Diameter 1.50 - 1.0 ; Maximum height of the aperture 0.6 - 0.5

Diagnosis : Shell conical, board, yellowish brown, apex dark; vertical ridges crossed by weak but conspicuous spiral ridges presenting a fine lattice work except the first whorl; whorls 5-6, sutures deep, basal and columellar margin slightly thickened and expanded.

Distribution : India : West Bengal : South 24 Parganas.

Remarks : Represented by the the holotype present in the National Zoological Collections of the Zoological Survey of India. No other collection recorded so far.

27. *Assimineia woodmasoniana* Nevill
(Pl.4, figs. 3 & 4)

1880. *Assimineia woodmasoniana* Nevill, *J. Asiat. Soc. Beng.* 49 (2) : 163.

Material examined : i) 2 exs., Port Canning (Syntypes), Reg.No., M 17730 /3, ii) Many exs., Port Canning, Coll. J. Woodmason.

Measurements (in mm) : Length 4.45 - 4.20 ; Diameter 2 .50 - 2.20; Maximum height of the aperture 1.75 1.65.

Diagnosis : Shell conical, smooth yellowish brown to chestnut; distinct raised spiral thread present half way between the suture and the periphery of each whorl; whorls 6-7; sutures deep.

Distribution : India : West Bengal : South 24 parganas.

Remarks : Represented by type collections in the National Zoological Collections of the Zoological Survey of India.

Family ARCHITECTONICIDAE

Key to the genera

Shell depressedly conical with sharply angulated margin; whorls with spiral ridges and grooves.....
.....*Architectonica*

Shell flatly disc shaped ; whorls with granular spiral sculpture showing radial lines above and below..
.....*Heliacus*

15. Genus *Architectonica* Roeding, 1798

28. *Architectonica perspectiva* (Linnaeus)
(Pl.4, figs. 5 & 6)

1755. *Trochus perspectiva* Linnaeus, *Syst. Nat.* ed 10, p. 757.

1952. *Architectonia perspectiva* : Satyamurti, *Bull. Madras Govt. Mus., new ser.* 1,2. pt. 6, p. 72.

1982. *Architectonica perspectiva* : Rajagopal and Mookherjee, *Rec. zool. Surv. India*, Occ. paper No. 28 : 19.

Material examined : i) 1 ex., Diamond Harbour, 17.6.64, Coll. N.V. Subba Rao & H.P. Mookherjee; ii) 1 exs., Sandhead, iii) 2 exs., Digha, Coll. ?; iv) 1 ex., Champta, 4.11.88, v) 1 ex., Ajmalmari-Kaikalmari junction, Sunderbans, 8.11.88, vi) 1 ex., Parseymari 9.11.88, Coll A. Dey

Measurements (in mm) : Length 13.15 - 11.10 ; Diameter 27.00 - 21.55 ; Maximum height of the aperture 9.50 - 6.50.

Diagnosis : Shell thick , broad, flattened base and depressedly conical spire; whorls inflated and perfectly straight; each whorl with distinct rib at the lower edge; bodywhorl sharply angular.

Distribution : India : West Bengal Medinipur, North and South 24 Parganas; Tamil Nadu.

16. Genus *Heliacus* d'Orbigny in Sagra, 1842

29. *Heliacus (Heliacus) stramineus* (Gmelin)
(Pl.4, figs. 7 & 9)

1791. *Trochus stramineus* Gmelin, *Syst. Nat.* ed 13, 1 (6) : 3575.

1971. *Heliacus (Heliacus) straminea* ; Garrard, *Rec. Aust. Mus.*, 31 (13) : 506.

Material examined : i) 3 exs., Sandhead, Coll. ?.

Measurements (in mm) : Length 14.10 - 9.90 ; Diameter 19.82- 18.40; Maximum height of the aperture 9.45 - 8.43.

Diagnosis : Body whorl consists of thick strong spiral ridges; sculptured with fine latticed consisting of strong, close set transpiral ribs decussated by weaker spiral ridges; aperture broad and rounded.

Distribution : India : West Bengal : South 24 Parganas; Tamil Nadu. Elsewhere : Australia, Japan, New Guinea and Philippines.

Remarks : Only the old collections are present in the National Zoological Collection of the Zoological Survey of India Found in shallow to deep water (Garrard, 1977).

Family TURRITELLIDAE

17. Genus *Turritella* Lamarck, 1799

30. *Turritella attenuata* Reeve
(Pl.4, fig. 10)

1869. *Turritella attenuata* Reeve, *Conch. Icon.*, 5, *Turritella* sp. no. 4, pl. 1, fig. 4.

1942. *Turritella attenuata* Gravely, *Bull. Madras Govt. Mus. new. ser.*, 5 (2) : 22.

1982. *Turritella attenuata* : Rajagopal & Mookherjee, *Rec. zool. Surv. India*, Occ. paper 28 : 16.

Material examined : i) 1 ex., Digha, 29.3.84, Coll. A Dey & Barua; ii) 2 exs., Digha, 20.12.65, Coll K. K. Ray; iii) 27 exs. Digha, 3.9.69, Coll. A.K. Dutta.

Measurements (in mm) : Length 83.00 - 35.75 ; Diameter 21.25 - 12- 15; Maximum height of the aperture 15.32.

Diagnosis : Shell elongate, attenuate; whorls with spirally raised striations. Whorls strongly single keeled bulged in the middle, upper part of whorls sloping, lower part of whorls curved and constricted.

Distribution : India : West Bengal, Medinipur; Orissa, Tamil Nadu. Elsewhere : Eastern sea.

Family THIARIDAE

Key to the genera

Shell elongate; whorls more than 5; operculum pear shaped. with an concentric nucleus at the narrow, basal end **Thiara**

Shell semiglobose; whorls less than 5; operculum ovate, with nucleus intermarginal near the middle of the inner edge **Larina**

18. Genus *Thiara* Roding, 1798

31. *Thiara (Mainwaringia) paludomidea* (Nevill) (Pl.4, fig.8)

1884. *Melania (Mainwaringia) paludomidea* Nevill, *Hand list Mollusca Indian Museum*, pl. 2, 286.

1919. *Melania (Mainwaringia) paludomidea* : Annandale & Prashad, *Rec. Indian Mus.* 16 : 252, pl. 20, fig. 8.

Material examined : i) 7 exs., Port Canning, 30.11.1893 (Syntypes), Coll. G.B. Mainwaring, J. Woodmason & F. Stoliczka; ii) 1 ex., Namkhana, 5.9.59, Coll. K.V. Surya Rao & Party.

Measurement (in mm) : Length 9.30- 5.90 ; Width 4.00 - 2.50; Maximum height of the aperture 3.00.

Diagnosis : Shell imperforate, conically produced, spire turretedly acuminate, suture distinct; spirally striated, below slightly subangulated, the striae prominent; whorls nine, the apical three minute, white and smooth next five slightly subangulated a little above middle, last whorl tumidly convex; aperture small, vertically ovate, peristome acute.

Distribution : India : West Bengal : South 24 Parganas.

Remarks : It is an uncommon species, which is found attached to the stem of mangrove plants submerged during the hightide (Preston, 1915).

19. Genus *Larina* A. Adamas, 1854

32. *Larina burmana* (Blanford) (Pl.4, fig.11)

1867. *Larina burmana* Blanford, *J. Asiat. Soc. Beng.*, 36 (2) : 61, pl. 11, fig. 1.

Material examined : i) 1 ex., Sagar Island, 14.6.76, Coll. A. Misra; ii) 6 exs., Digha, 12.4.84, Coll. A. Dey and S. Barua; iii) 4 exs., Haldia, 10.3.85, Coll. B.P. Halder and party; iv) 5 exs., Digha, Coll. A.K. Mondal & Party.

Measurements (in mm) : Length 18.30 - 4.95 ; Diameter 13.85 - 2.90 ; Maximum height of the aperture 12.00 - 2.35

Description : Shell ovately - globose, imperforate, thin, translucent, smooth and brownish in colour; spire conoidal, suture deep, whorls rounded, obsolete striated, five, regularly descending, the last tumid; aperture subelliptical, vertical and angulate above; columellar margin expanded.

Distribution : India: West Bengal : Medinipur, South 24 Parganas.

Remarks : It is restricted to Gangetic and Irawaddy deltas.

Family POTAMIDAE

Key to the genera

Shell conical, large; spiral ridges without tubercles, transpiral ridges absent.....*Telescopium*

Shell slender, medium; spiral ridges with tubercles from transpiral ridges *Cerithidea*

20. Genus *Telescopium* Montfort, 1810

33. *Telescopium (T) telescopium* (Linnaeus) (Pl.5, fig.1)

1758. *Trochus telescopium* Linnaeus, *Syst. Nat.* ed. 10, p. 760.

1865. *Telescopium fuscus* Reeve, *Conch. Icon.*, 15. *Telescopium* sp. no. 1, pl. 1, figs. 1a, b.

1972. *Telescopium telescopium* Cernohorsky, *Marine Shells of the Pacific*, 2 : 61, pl. 13, fig. 6.

1982. *Telescopium telescopium* : Rajagopal and Mookherjee, *Rec. zool. Surv. India*, Occ. Paper, 28 : 30.

Material examined : i) 8 exs., Port Canning, 25.9.23, ii) 2 exs., Port Canning, Oct. 24, Coll. R. Hoodgart; iii) 9 exs., mouth of Sela river (Bay of Bengal), 25. 3. 38, iv) 5 exs., Sajnakhali 23.3.58, Coll. H.C. Ray; v) 7 exs., Gomti river, , Sajnakhali, 26.4.61, vi) 8 exs., Sajnakhali, 2.5.61, Coll. A.S. Rajagopal; vii) 2 exs., Digha, 5.9.64, Coll. A.K. Dutta; ix) 23 exs., Junput, 28.11.66, Coll. P.K. Talwar & Party ; x) 4 exs., Arbesy, 11.9.83, xi) 1 ex., Arbesy, 16.3.83, Coll. A. K. Hazra; xii) 3 exs., Champta, 11.9.83, Coll. S. Bhuiya; xiii) 3 exs., Mayadcep, 13.9.84, Coll. C.K. Mishra; xiv) 5 exs., Digha, 27.3.84, Coll. A. Dey & S. Barua; xv) 1 exs., Port Canning, Coll. N. Annandale; xvii) 3 exs. Calcutta, Coll. ?.

Measurement (in mm) : Length 116.50- 69.40 ; Diameter 49.50 - 30.40; Maximum height of the aperture 33.20.

Diagnosis : Trochoid shape, elevated and conical with more or less 16 whorls and ill defined

sutures; sculptured with 3 larger and 1 narrow flat spiral cord on whorls; columella twisted and channelled; labial lip acutely curved.

Distribution : India : West Bengal : Calcutta, Medinipur, North and South 24 Parganas; Andhra Pradesh, Kerala, Tamil Nadu. Elsewhere : Madagascar, Reunion, Sri Lanka, Burma, Indonesia, Philippines, N. Australia.

Remarks : It is a common species found on mudflats, in small ditches or canals with a little flow of water. The animal stays partly burried in the mud. Subba Rao *et. al.* (1983) studied the population density of the species in Kakdwip-Namkhana area.

21. Genus *Cerithidea* Swainson, 1840

Key to the species

Shell narrow, slender; outer lip not so flattened; spiral ridge strongly tubercled....*C. cingulata* (Gmelin)

Shell more robust; outer lip flattened; spiral ridge not strongly tubercled *C. obtusa* (Lamarck)

34. *Cerithidea* (*Cerithideopsis*) *cingulata* (Gmelin) (Pl.5, fig.2)

1791. *Murex cingulata* Gmelin, *Syst. Nat.* ed. 13, 1 (6) : 3561.

1982. *Cerithidea* (*Cerithideopsis*) *cingulata* : Rajagopal & Mookherjee, *Rec. zool. Surv. India*, Occ. paper, 28 : 27.

Material examined : i) 1 ex., Port Canning, Reg. no., M 4793/1, Coll. N., Annandale; ii) 9 exs. Sunderbans, 1.5.61, iii) 105 exs., Sajnakhali, 2.5.61, Coll. A. S. Rajagopal; iv) 1 ex., Ganga Sagar, 25.8.78, Coll. G.C. Rao and Party; v) 1 ex., Ganga Sagar, 2.9.79, vi) 4 exs., Susnichara (Saptamkhi), 6.9.79, vii) 7 exs., Daknisagar, 5.11.79, viii) 1 ex., Kakdwip, 27.12.79, Coll. K. V. Surya Rao & S.C. Mitra; ix) 5 exs., Kakdwip, 17.4.80, Champta, 12.9.83, xii) 6 exs., Gona, 8.9.83, Coll. S. Bhuiya; xiii) 2 exs., Matla Island, 12.9.83, Coll. N.C. Gayen, xiv) 3 exs., Jharkhali, 24. 9. 84, Coll. B. P. Halder & Party.

Measurements (in mm) : Length 31.25 25.65 ; Diameter 8.35 - 8.15; Maximum height of the aperture 10.25 8.80

Diagnosis : Elongate, spire many whorls , flattened; sculptured with spiral ridges, tuberculated; aperture oblique, outer lip expanded broadly with distinct anterior canal.

Distribution : India : West Bengal , Medinipur, North and South 24 Parganas; Gujarat, Kerala, Maharastra, Orissa, Pondicherry, Tamil Nadu, Elsewhere : Pakistan, Sri Lanka, Burma, Indonesia, Japan.

Remarks : Found crawling on the mudflats and muddy areas of the Hugli Matla estuary.

35. *Cerithidea obtusa* (Lamarck)
(Pl.5, figs. 3 & 6)

1822. *Cerithidea obtusa* Lamarck, *Hist. nat. Anim. Sans. Vert.*, (Deshayed) 9 : 294.
1972. *Cerithidea obtusa* : Cernohorsky, *Marine shells of the Pacific*, 2 : 60, pl. 13, fig. 1.

Material examined : i) 7 exs., Sunderbans, Coll. Annandale, S.W. Kemp & B. Prashad; ii) 20 exs., Sunderbans, Coll. ? ; iii) 12 exs., Sandhead, Coll. N. Annandale; iv) 5 exs., Port Canning, 19.7.30, v) 1 exs., Port Canning, Coll. N. Annandale; vi) 5 exs., Sajnakhali, 22. 3. 58, Coll. H.C. Ray; vii) 2 exs., Digha, 5.9.64, Coll. A. K. Dutta; viii) 4 exs., Sajnakhali, 2.5.61, ix) 14 exs., Gosaba, 25. 4. 61, Coll. A.S. Rajagopal; x) 2 exs. Ganga Sagar 25. 8. 78, Coll. K.V. Surya Rao & G.C. Rao; xi) 22 exs., Kakdwip, 16.8.79, Coll. N.V. Subba Rao & Party; xii) 2 exs., Arbesy block, 11. 9. 83, xiii) 5 exs., Champta, 11.9.83, Coll. S. Bhuiya; xiv) 5 exs., Jhingakhali, 12.9.83, Coll. S. Biswas; xv) 1 ex., Bagmarakhal, 12.9.83, Coll. S.K. Chatterjee; xvi) ex., Matla Island 13.9.83, Coll. N.C. Gayen; xvii) 1 ex., Mayadeep, 13.9.83, Coll. C.K. Misra; xviii) 8 exs., Chhota Hardi, 18.9.83, Coll. S. S. Saha; xix) 7 exs., (young), Basirhat, 6.9.84, Coll. B.P. Halder & Party.

Measurement (in mm) : Length 43.00 - 30.22 ; Diameter 25.20 - 17.20; Maximum height of the aperture 10.50.

Diagnosis : Shell more robust; aperture broadly rounded; outer lip thick, flattened, interior smooth; sculpture with spiral threads crossed by prominent transpiral ridges.

Distribution : India : West Bengal ; Medinipur, North and South 24 Parganas; Andaman and Nicobar Islands, Orissa. Elsewhere : Indian Ocean to Western Pacific.

Remarks : Found crawling on the mud or on plants which were wet with spring tides. It was observed upto the height of 0.5 meters from the ground level. Subba Rao *et. al.* (1983) observed that it attached to plant with aperture facing down, with the help of mucus which on drying apperas like a thread.

Family EPITONIIDAE
22. Genus *Acrilla* H. Adams, 1860

Key to the species

- Shell with oblique varices; body whorl without keel*A. gracilis* (Sowerby)
Shell with straight varices; body whorl with keel*A. acuminata* (Sowerby)

36. *Acrilla acuminata* (Sowerby)

1844. *Scalaria acuminata* Sowerby, *Proc. zool. Soc. Lond*; p. 12.
1982. *Acrilla acuminata* : Rajagopal and Mookherjee, *Rec. zool. Surv. India. Occ. paper*, 28 : 47.

Material examined: i) 10 exs., Calcutta, Coll. ?; ii) 1 ex., Gosaba, 25.5.85, Coll B.P. Halder & Party; iii) 1 ex., Chhota Hardi, 25.8. 87, Coll. S. Barua.

Measurements (in mm) : Length 44.80 -11.80 ; Diameter 13.00 - 3.50; Maximum height of the aperture 9.30 -3.85

Diagnosis : Shell elongate, turreted, spire with ten whorls; bodywhorl with prominent keel at base; aperture obliquely ovate; sculptured with numerous fine vertical ribs.

Distribution : India : West Bengal ; Calcutta, North 24 Parganas; Maharashtra, Orissa, Tamil Nadu. Elsewhere : Sri Lanka, Malacca, Japan.

Remarks : A specimen along with the egg capsule was collected from Gosaba during May, 1985 from the mudflat where a little amount of water remained even during the low tide.

37. *Acrilla gracilis* (Sowerby) (Pl.5, fig.4)

1844. *Scalaria gracilis* Sowerby, *Proc. zool. Soc. Lond.*, p. 12.

1873. *Scalaria gracilis* : Reeve, *Conch. Icon.*, 19, sp. no. 53, pl.8, fig.53.

Material examined: i) 9 exs., Digha, Coll. ?; ii) 11 exs., Digha, Coll. F.M.J. Pinn.; iii) 52 exs., Digha, 8.12.82, Coll. N.V. Subba Rao and A. Dey; iv) 10 exs. Digha, 27.3.84, Coll. A. Dey & S. Barua.

Measurements (in mm) : Length 9.15 -6.10 ; Diameter 3.80 - 2.10; Maximum height of the aperture 1.40

Diagnosis : Shell small with attenuated spire, whorls eight, rounded; aperture ovate, acuminate at the base, outer lip margin thin, columella curved.

Distribution : India : West Bengal : Medinipur.

Remarks : This species found crawling on the Digha beach in plenty during the low tide leaving a very thin foot print. They burrow inside the sand as soon as the beach becomes dry on exposure to Sun.

Family EULIMIDAE

Key to the genera

Shell with umbilical perforation on the axis; posterior region of the aperture acuminate.....*Niso*

Shell without umbilical perforation ; posterior region of the aperture not acuminate*Eulima*

23. Genus *Niso* Risso, 182638. *Niso pyramidelloides* G. & H. Nevill1871. *Niso pyramidelloides* G. & H. Nevill, *J. Asiat. Soc. Beng.*, 40 (2) : 5, pl. 1, fig. 14.1968. *Niso pyramidelloides* ; Ray, *Bull. Indian Mus.* 3 (1 & 2) : 18, text fig. 6.*Material examined* : i) 1 ex., Digha, 26.2.86, ii) 3 exs., Digha, 9, 7, 86, Coll. A.K. Mondal & Party.*Measurements* (in mm) : Length 5.43 - 1.75 ; Width 1.95 - 0.85; Maximum height of the aperture 2.70 - 1.00*Diagnosis* : Shell small, elongate, spire more than the body whorl; smooth, with a chocolate brown band in the middle of the whorls; whorls 5-7; body whorl with a ridge in the middle; columellar with one twisted fold.*Distribution* : India : West Bengal : Medinipur; Orissa, Tamil Nadu. Elsewhere : Burma, Malacca, Malaysia.24. Genus *Eulima* Risso, 182639. *Eulima cuspidata* A. Adams
(Pl.5, fig. 5 & 8)1854. *Eulima cuspidata* A. Adams in Sowerby's *Thes. Conch.*, *Eulima* sp. no. 16, fig. 33.*Material examined* : i) 20 exs., Digha, 20.10.87, Coll. A.K. Mondal and Party.*Measurements* (in mm.) : Length 8.00-4.85 ; Diameter 1.65-1.00; Maximum height of the aperture 2.40 - 1.25.*Diagnosis* : Shell small (about 10 mm) in length, ventricose; whorls convex; body whorl oval; aperture ovate, outer lip nearly straight, thin; 8-10 whorls.*Distribution* : India : West Bengal : Medinipur.*Remarks* : Found on sand at low tide marks.

Family XENOPHORIDAE

25. Genus *Xenophora* Fischer von Waldheim, 180740. *Xenophora solaris* (Linnaeus)1767. *Trochus solaris* Linnaeus, *Syst., Nat.* ed. 12, 1229.1985. *Xenophora solaris* : Mookherjee, *Rec. zool. Surv. India*, Occ. paper 75 ; 24, pl. 3, fig. 13.

Material examined : i) 22 exs., Sandhead, June 1932, Coll. B. Prashad; ii) 1 ex., Sandhead, Coll. J. Barnett.

Measurements (in mm) : Length 19.08 - 7.37 ; Diameter 43.30 - 16.80 ; Maximum height of the aperture 25.80 - 7.48.

Diagnosis : Orbicular, depressedly conical, umbilicate; apex acute; sculptured with radiating wavy folds and fine obliquely waved granular threads; foreign particles accumulated in spiral fashion on the sutural line from little below the apex; whorls with radiating regular hollow tubes, following whorls excluding the periphery where they are free.

Distribution : India : West Bengal : South 24-Parganas; Maharashtra, Kerala, Tamil Nadu. Elsewhere : Burma, Maldives, Indo-Pacific.

Family NATICIDAE

26. Genus *Natica* Scopoli, 1777

Key to the species

1. Operculum with two marginal ribs..... (2)
 Operculum with one marginal rib..... (3)
2. Funicle ill developed..... *N. vitellus* (Linnaeus)
 Funicle well developed..... *N. lineata* (Roeding)
3. Sculpture with axial growth striae and radial ribs at the sutures; body whorl without rows of colour spots..... *N. gualteriana* Recluz
 Sculpture without axial growth striae and radial ribs at the sutures, body whorl with rows of chocolate brown spots..... *N. tigrina* (Roeding)

41. *Natica gualteriana* Recluz

1844. *Natica gualteriana* Recluz, *Proc. zool. Soc. Lond.*, pt.11 : 208.

1971. *Natica gualteriana* : Cernohorsky, *Rec. Auckland Inst. Mus.*, 8 : 180. figs. 21-25.

1885. *Natica marochiensis* : Mookherjee, *Rec. zool. Surv. India*, Occ. paper 75; 43 pl. 6, figs. 27a & 27b.

Material examined : i) 10 exs., Sagar Island, 24.5.81, Coll. K.V. Surya Rao & S. C. Mitra; ii) 5 exs., Digha, 15.1.83, iii) 2 exs., Digha, 15.3.83, iv) 4 exs., Digha, 27.11.84, v) 2 exs., Digha, 24.2.85, Coll. A. Dey & S. Barua; vi) 1 ex., Digha, 30.1.86, Coll. N.V. Subba Rao & A. Dey; vii) 1 ex., Port Canning, 5.3.86, Coll. S. Barua.

Measurements (in mm) : Length 21.70 - 6.50 ; Diameter 14.60 - 6.75 ; Maximum height of the aperture 10.80 - 4.20

Diagnosis : Shell ventrically gibbose, umbilicated, whorls smooth; columellar callus enters the umbilicus; aperture semicircular, internally brown; greyish brown to greenish brown encircled with brownish arched markings or almost obscured, base white.

Distribution : India : West Bengal : Medinipur, South 24-Parganas; Andaman & Nicobar Islands, Andhra Pradesh, Kerala, Maharashtra, Orissa, Tamil Nadu. Elsewhere : Sri Lanka, Singapore, Indo-China, Gulf of Siam, Java, Timor, N. Queensland, Australia, Philippines, Society Island.

Remarks : Common, intertidal to fairly deep-water.

42. *Natica lineata* (Roeding)
(Pl.5, fig.9)

1798. *Cochlic lineata* Roeding, *Mus. Bolten.*, p. 147.

1972. *Natica lineata* : Cernohorsky, *Marine shells of the Pacific*, 2 : 96, pl.25, fig.5.

1985. *Natica lineata* : Mookherjee, *Rec. zool. Surv. India*, Occ. paper 75 : 45, pl.6, fig. 29.

Material examined : i) 5 exs., Digba, 27.3.84, ii) 2 exs., Digba, 12.4.84, Coll. A. Dey & S. Barua; iii) 4 exs., Sandhead, Coll. P. V. Lady Fraser; iv) 7 exs., Sandhead, Coll. J. Barnett.

Measurements (in mm) : Length 28.90 - 21.50 ; Diameter 33.75 - 21.60 ; Maximum height of the aperture 24.00 - 16.40.

Diagnosis : Shell globose, umbilicate, spire a little elongated, whorls rounded, columella thin; spiral callus extends into umbilical groove; aperture semilunar; livid white marked with close set transpiral wavy deep yellow to orange lines; umbilical space white.

Distribution : India : West Bengal, Medinipur, South 24-Parganas; Maharashtra, Orissa, Tamil Nadu. Elsewhere : Pakistan, Australia, Malaya Archipelago, Philippines.

Remarks : Found in sand or mud upto 50 meters depth.

43. *Natica tigrina* (Roeding)
(Pl.6, figs. 1 & 2)

1798. *Cochlis tigrina* Roeding, *Mus. Bolten.*, p. 147.

1949. *Natica pellis tigrina* : Ray, *Rec. Indian Mus.*, 46 : 98.

1952. *Natica tigrina* : Satyamurti, *Bull. Madras Govt. Mus. new. ser.* 1 (2) pt.6 : 108, pl. 8, fig.2.

Material examined : i) 1 exs., Malta, Dec. 1916, Coll. S.W. Kemp; ii) 2 exs., Diamond Harbour, 17.6.64, iii) 3 exs., Digba, 27.11.84, Coll. N. V. Subba Rao & Party; iv) 1 ex., Ganga Sagar, 25.8.78, Coll.

G.C. Rao & K.V. Surya Rao; v) 6 exs., Ganga Sagar, 2.9.79, vi) 1 ex., Ganga Sagar, 5.9.79, vii) 3 exs., Sagar Island, 5.11.79, Coll. K.V. Surya Rao & S.C. Mitra; ix) 15 exs., Bakkhali, 21.10.79, x) 2 exs., Fraserganj, 27.1.80, xi) 21 exs., Digha, 15.1.83, xii) 3 exs., Digha, 15.3.83, xiii) 12 exs., Digha, 27.3.84, xiv) 9 exs., Digha, 12.7.84, xv) 1 ex., Digha, 24.2.85, Coll. A. Dey & S. Barua; xvi) 3 exs., Gosaba, 14.9.83, Coll. S.S. Saha; xvii) 12 exs., Port Canning, 26.9.84, Coll. B.P. Halder & Party; xviii) 1 ex., Port Canning, coll. A. Misra; xiv) 15 exs., Sandhead, Coll. P.V. Lady Fraser.

Measurements (in mm) : Length 31.65 - 5.60 ; Diameter 29.85 - 5.90 ; Maximum height of the aperture 24.25 - 3.85

Diagnosis : Shell globose, umbilicate, spire conically exerted whorls rounded; white to cream, with purple brown spots arranged in regular spiral line; aperture lunar ovate; columellar callus very thick especially at its base.

Distribution : India : West Bengal : Medinipur, North and South 24 Parganas; Andaman & Nicobar Islands, Andhra Pradesh, Orissa, Tamil Nadu.

Elsewhere : Australia, China, Fiji, Pakistan, Philippines, Viti.

Remarks : This species occurs in sandy mud in shallow areas.

44. *Natica vitellus* (Linnaeus) (Pl.5, fig.7)

1758. *Nerita vitellus* Linnaeus, *Syst. Nat.* ed. 10 : 776, sp.no. 625.

1780. *Nerita rufa* Born, *Test. Mus. Caes. Vindob.*, 389, pl. 17, figs. 3 & 4.

1798. *Cochlis albula* Roeding, *Mus. Bollen.*, 146, sp.no. 1829.

1985. *Natica vitellus* : Mookherjee, *Rec. zool. Surv. India*, Occ. paper 75 : 42, p. 16, figs. 26a & b.

Material examined : i) 1 ex., Sandhead, Coll. P.V. Lady Fraser; ii) 1 ex., Sandhead, Coll. J. Barnett.

Measurements (in mm) : Length 37.70 - 30.05; Diameter 38.85 - 30.82 ; Maximum height of the aperture 28.05 - 25.10.

Diagnosis : Globose, thick, excavately umbilicated with inflated body whorls; whorls rounded, spire short, columella with polished callus extending posteriorly and fused with the body whorl leaving anteriorly the umbilical opening; aperture lunar ovate; fulvous brown, pale band in the middle and whitish on the base and the sutures.

Distribution : India : West Bengal : South 24 Parganas; Andhra Pradesh, Lakshadweep, Maharashtra, Orissa, Tamil Nadu. Elsewhere : China, Malaya Peninsula, Mauritius, Pakistan.

Remarks : Common in shallow water.

27. Genus *Polinices* Montfort, 1810.*Key to the species*

Umbilicus wide and open; shell bluish grey; length and breadth almost equal.....*P. didyma* (Roeding)

Umbilicus closed by heavy callus ; shell white; length more than breadth..... *P. tumidus* (Swainson)

45. *Polinices didyma* (Roeding)

1798. *Albula didyma* Roeding, *Mus. Bolten.*, p. 20.

1976. *Polinices (Glossaulax) didyma* : Kilburn, *Ann. Natal Mus.* 22 (3) 860.

1985. *Polinices (Glossaulax) didyma* & *P. (G.) lamarckii* : Mookherjee, *Rec. zool. Surv. India*, Occ. paper 75 : 54, pl. 9, fig. 37a, b, 38a & 38b.

Material examined : i) 9 exs., Sandhead 17.11.1925, Coll. P.V. Lady Fraser, ii) 4 exs., Digha, 13.1.83, iii) 18 exs., Digha, 27.3.84, iv) 12 exs., Digha, 12.7.84, v) 2 exs., Digha, 27.11.84, vi) 1 ex., Digha, 12.7.84, vii) 1 ex., Digha, 19.3.85, Coll. A. Dey & S. Barua.

Measurements (in mm) : Length 53.40 - 22.50 ; Diameter 55.20 - 24.90 ; Maximum height of the aperture 43.70 - 18.75

Diagnosis : Large, globose, umbilicate, laterally slightly compressed, whorls rounded with oblique growth, striae and depressedly concave upper part; aperture semioval; columella callus terminated towards umbilical opening in a broad transverse extension, deeply grooved in the middle; umbilicus partly covered with the callus leaving wide excavated angular opening.

Distribution : India : West Bengal : Medinipur, South 24-Parganas; Maharashtra, Orissa, Tamil Nadu. Elsewhere : Hawaii and Japan to Natal, common in Fiji.

Remarks : Common in intertidal zone to 100 meter depth.

46. *Polinices tumidus* (Swainson)

1840. *Mamillaria tumidus* Swainson, *Treat. Malac.*, p. 345.

1971. *Polinices (Polinices) tumidus* : Cernohorsky, *Rec. Auckland Inst. Mus.*, 8 : 191, figs. 45, 47-50.

1985. *Polinices tumidus* : Mookherjee, *Rec. zool. Surv. India*, Occ. paper, 75 : 49, p. 7, figs. 32a, 32b.

Material examined : i) 2 exs., Digha, 15.3.83, ii) 7 exs., Digha, 27.6.84, iii) 8 exs., Digha, 12.7.84, iv) 2 exs., Digha, 27.11.84, Coll. A. Dey & S. Barua, v) 4 exs., Sandhead, Coll. P.V. Lady Fraser; vi) 5 exs., Sandhead, Coll. ?.

Measurement (in mm) : Length 32.50 - 10.90 ; Diameter 24.90 - 11.40 ; Maximum height of the aperture 23.40 - 8.45.

Diagnosis : Shell heavy, pyriformly ovate, glossy, spire short, ivorywhite, broad columellar callosity filling the umbilicus; aperture semicircular and obliquely inclined.

Distribution : India : West Bengal : Medinipur, South 24 Parganas; Andaman Island, Goa, Kerala, Lakshadweep, Maharashtra, Tamil Nadu. Elsewhere : Widely distributed in the Indo-Pacific from Persian Gulf to Polynesia and Hawaiian Islands.

Remarks : Common in shallow off shore water.

28. Genus *Sinum* Roeding, 1798

47. *Sinum neritoideum* (Linnaeus)

1767. *Helix neritoides* Linnaeus, *Syst. Nat.* ed. 12, 250.

1864. *Sigaretus neritoides* Reeve, *Conch. Icon.*, 15, *Sigaretus*, sp. no. 5.

1985. *Sinum neritoideum* : Mookherjee, *Rec. zool. Surv. India*, Occ. paper 75 : 60, pl. 10, fig. 42.

Material examined : i) 1 ex., Sandhead, June, 1932, B. Prashad; ii) 1 ex., Digha, 4.9.64, Coll. A.K. Dutta; iii) 1 ex., Sandhead, Coll. P.V. Lady Fraser.

Measurements (in mm) : Length 14.55 - 11.60; Diameter 21.08 - 18.65 ; Maximum height of the aperture 18.20 - 17.45

Diagnosis : Shell depressedly plano-convex like *Ilaliothis*, spire small and suffused; whorls spirally flat ridged, concentrically plicate, wrinkled; aperture elongate; ash white with pale livid brown bands; apex livid violet.

Distribution : India : West Bengal: Medinipur, South 24 Parganas; Orissa, Tamil Nadu. Elsewhere : Burma, China, Japan, Malacca, Indonesia, Malaysia, Pakistan coast, Philippines, Sri Lanka.

Remarks : Intertidal and off shore.

Family CASSIDAE

29. Genus *Phalium* Link, 1807

48. *Phalium bisulcatum* (Schubert & Wagner)
(Pl. 6, figs. 4 & 6)

1829. *Cassis bisulcata* Schubert and Wagner, *Conchyl. Cab. Nurnberg.* 12 : 68, figs. 3081-3082.

1968. *Phalium (Semicassis) bisulcatum* : Abobott, *Indo-Pacifi. Mollusca*, 1 (9) : 126, pl. 8, figs. 13-21, pls. 105-114.

1985. *Phalium (Semicassis) bisulcatum* : Mookherjee, *Rec. zool. Surv. Occ. paper* 75 : 66.

Material examined : i) 1 ex., Sandhead, Coll. ?.

Measurements (in mm) : Length 38.10 ; Diameter 27.00; Maximum Height of the aperture 27.40.

Diagnosis : Shell ovately globose, spire depressedly conical, spirally striated; last two whorls rounded; body whorl smooth with numerous close set incised lines; aperture anteriorly broad and posteriorly narrow; inner edge of outer lip with numerous teeth.

Distribution : India : West Bengal : South 24 Parganas; Andaman and Nicobar Island, Tamil Nadu. Elsewhere : East Africa, Madagascar, Persian Gulf, Gulf of Oman, Burma, Thailand, Malaya, Philippines and China.

Remarks : This species occurs on ridge below the low tide line.

Family CYMATIIDAE

30. Genus *Gyrineum* Link, 1807

49. *Gyrineum natator* (Roeding) (Pl.6, fig.5)

1798. *Tritonium natator* Roeding, *Mus. Bolten.*, p. 127.

1842. *Ranella tuberculata* Broderip, *Proc. zool. Soc. Lond.*, p. 179.

1985. *Gyrineum natator* : Mookherjee, *Rec. zool. Surv. India* Occ. Paper , 75 : 80, pl. 15, figs. 57a & b.

Material examined : i) 1 ex., Ganga Sagar, 3.9.79, Coll. K.V. Surya Rao & S.C. Mitra, ii) 2 exs., Ganga Sagar, 27.1.80, Coll. A. Dey and S. Barua.

Measurements (in mm) : Length 25.05 - 24.00 ; Diameter 14.55 - 13.85 ; Maximum height of the aperture 8.10 - 7.95

Diagnosis : Shell solid, slightly compressed laterally with an elevated spire, with dull brown colour, sculptured with spiral threads and spiral rows of granules; body whorl with spiral row of small nodules; aperture small, ovate, outer lip flattened and with 7 to 8 denticles, columella smooth upper half and lower half with denticles ; siphonal canal short.

Distribution : India : West Bengal : South 24 Parganas; Andaman and Nicobar Islands, Andhra Pradesh, Maharashtra and Tamil Nadu. Elsewhere : Persian Gulf, Red Sea, Pakistan coast, Sri Lanka, Burma, Singapore, Indonesia, Java, Sumatra, Amboina, New Guinea, Timor, Malacca, New Caledonia, Philippines, China and Japan.

Family BURSIDAE

31. Genus *Bursa* Roeding, 1798

50. *Bursa spinosa* (Lamarck) (Pl.6, fig.3)

1843. *Ranella spinosa* Lamarck, *Hist. nat. Anim. Sans, Vert.*, 9 (Deshayes ed) p. 545.

1985. *Bursa spinosa* : Mookherjee, *Rec. zool. Surv. India*, Occ. paper, 75 : 82, pl. 15, fig. 58.

Material examined : i) 6 exs., Sandhead, 20.6.24, Coll. P.V. Lady Fraser;; ii) 3 exs., Sandhead, 20.6.32, Coll. B. Prashad; iii) 3 exs., Sandhead, Coll ?.

Measurements (in mm) : Length 70.00 - 18.15 ; Diameter 38.45 - 14.25; Maximum height of the aperture 28.10 - 9.50

Diagnosis : Shell large, conical and elevated spire; varices not continuous but developed into outwardly directed strong spines at rather regular intervals; sculptured with close set spiral ridges and spinose nodes; bodywhorl with one or two spiral rows widely spaced spinose nodes; spire adjacent to posterior canal, directed backward; columella glazed, flesh colour; aperture, creamy and canaliculate on both the sides; siphonal canal fleshy white maculated and finely denticulate; outer lip filled with irregular denticulations, fleshbrown.

Distribution : India : West Bengal : South 24 Parganas; Andaman & Nicobar Island, Gujarat, Kerala, Maharashtra, Orissa, Tamil Nadu. Elsewhere : Burma, Java, Philippines.

Family TONNIDAE
32. Genus *Tonna* Brucnnich, 1771

Key to the species

Shell thick, outer lip flat, denticulate, sometimes with siphonal faciole.....*T. dolium* (Linnaeus)

Shell thin, outer lip without any denticulation, siphonal faciole absent..... *T. sulcosa* (Born)

51. *Tonna dolium* (Linnaeus)
(Pl.6, fig.7)

1758. *Tonna dolium* Linnaeus, *Syst. Nat.* ed. 10, p. 735.

1972. *Tonna dolium* : Cernohorsky, *Marine shells of the Pacific*, 2 : 109, pl. 32, figs. 2-2a.

1985. *Tonna dolium* : Mookherjee, *Rec. zool. Surv. India*, Occ. paper 75 : 68.

Material examined : i) 7 exs., Digha, 4.9.64, Coll. A.K. Duta; ii) 3 exs., Junput, 11.7.77, Coll. K.N. Reddy; iii) 1 ex., Digha, 22.9.79, Coll. N.V. subba Rao and Party; iv) 1 ex., Gona, 18.9.83, Coll. S. Bhuiya; v) 1 ex., Digha, 12.7.84, Coll. A. Dey & S. Barua; vi) 2 exs., Sandhead, Coll. H.A. Cooper; vii) 21 exs., Sandhead, Coll. ?.

Measurements (in mm) : Length 76.45 - 23.20 ; Diameter 67.90 - 16.90 ; Maximum height of the aperture 71.50 - 19.45

Diagnosis : Shell ovately ventricose, moderately thin with globular bodywhorl; spire conical, depressed; suture impressed, more or less canaliculate in large shells; sculptured with strong raised distant spiral ridges, 2-4 on the pneultimate whorl and 11 to 18 on the body whorl; intercostal spaces with much

finer ridges with the medium one stronger; columella oblique, straight, aperture wide; outer lip thin, fluted; white or cream with broad spiral rib marked with quadrate or rectangular reddish brown spots, nuclear whorl brown.

Distribution : India : West Bengal : Medinipur, North and South 24 Parganas; Tamil Nadu. Elsewhere : Australia, Fiji, Japan, Indonesia, New Zealand, Pakistan, Philippines.

52. *Tonna sulcosa* (Born)
(Pl.6, fig. 8)

1778. *Buccinum sulcosum* Born, *Index rerum naturalium musei Caesanei Vinobonensis*, p. 241.

1789. *Buccinum fasciatum* Bruguiere, *Encyl. Meth. Vers.*, 247.

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

1985. *Tonna sulcosa* : Mookherjee, *Rec. zool. Surv. India*, Occ. paper, 75 : 69, pl.12 fig. 48.

Material examined : i) 2 exs., Sandhead, Coll. ?.

Measurements (in mm) : Length 74.80 - 68.75 ; Diameter 56.22 - 55.35 ; Maximum height of the aperture 53.00 52.10

Diagnosis : Shell globosely ovate; moderately thin, umbilicate, with large ovately inflated bodywhorl; spire short, conical, suture canaliculate; sculptured with spiral thread and radiating striae in first post nuclear whorls; 5 spiral cords with intermediate thread on penultimate whorl, bodywhorl with 19-21 close set flattened spiral ribs and intercostal spaces with a fine intermediate thread; columella calloused, glossy and twisted to the anterior, aperture wide with flattened anterior lip, with a pair of denticles; white with 4 brown bands on the body whorl and purplish brown nuclear whorls.

Distribution : India : West Bengal : South 24 Parganas; Andaman & Nicobar Islands, Andhra Pradesh, Orissa, Tamil Nadu. Elsewhere : Sri Lanka, China, Philippines.

Family FICIDAE
33. Genus *Ficus* Roeding, 1798

Key to the species

Length width ratio more than 1/2, spiral striae less strong; body with brown red spots.....*F. variegata* Roeding

Length width ratio less than 1/2, spiral striae more strong; body without spots.....*F. gracilis* (Sowerby)

53. *Ficus gracilis* (Sowerby)
(Pl.7, fig.1)

1925. *Pyrula gracilis* Sowerby, *Cat. Shells Tank.*, 17 : 62.

Material examined : i) 6 exs., Sandhead, June 1932, Coll. B. Prashad; ii) 1 ex., Sandhead, Coll. P.V. Lady Fraser.

Measurements (in mm) : Length 74.15 - 48.82 ; Diameter 37.15 - 25.10 ; Maximum height of the aperture 67.45 - 44.80

Diagnosis : Shell elongate, pyriform with elevated spire, body whorl rounded; aperture elongate, outer lip margin crenulated; columella concave, siphonal canal wide, open, rounded; sculpture consist of transverse flat ridges interstices with longitudinal striae giving reticulate in appearance.

Distribution : India : West Bengal : South 24 Parganas; Andhra Pradesh, Orissa. Elsewhere : Persian Gulf, China, Madagascar, Scychelles.

54. *Ficus variegata* Roeding
(Pl.7, figs. 4 & 5)

1798. *Ficus variegata* Roeding, *Mus. Bolten.*, 148, sp.no. 1852.

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

Material examined : i) 1 ex., Sandhead, Coll. P.V. Lady Fraser.

Measurements (in mm) : Length 53.80 ; Diameter 31.75 ; Maximum height of the aperture 50.84

Diagnosis : Shell pyriformly ventricose, bulbous at the shoulder, spire depressed; sculptured with fine close set spiral thread and a finer intermediate thread and axial lirae in the intercoastal spaces; dark pink or brown, ornamented with 4 or 5 narrow white lines with brown spots within and maculated with irregular.

Distribution : India : West Bengal : South 24 Parganas; Andhra Pradesh, Gujarat, Kerala, Maharashtra, Orissa, Tamil Nadu. Elsewhere : Red Sea, Persian Gulf, Mauritius, Madagascar, Zanzibar, Gulf of Aden, Pakistan coast, Singapore, Thailand, Indonesia, China and Japan.

Remarks : No recent collection has been studied.

Order NEOGASTROPODA
Family MURICIDAE

Key to the genera

1. Shell with varices.....***Murex***
- Shell without varices..... (2)

2. Spire depressed; body whorls with three rows of spinose tubercles; umbilicus deep.....*Rapana*

Spire high; body whorls with less than three rows of spinose tubercles; umbilicus shallow.....
..... *Cymia*

34. Genus *Cymia* Mörch, 1861

55. *Cymia lacera* (Born)

1778. *Purpura lacera* Born, *Index rerum naturalium musei Caesanei Vindobonensis*, p. 308.

1872. *Cymia carinifera* Lamarck, *Hist. nat. Anim. Sans. Vert.* 7 : 241, sp. 19.

1975. *Cymia carinifera* : Subba Rao & Mookherjee, *Recent Researches in Estuarine Biology*, p. 170.

Material examined: i) 1 ex., Bulcherry (Sunderban), 14.2.25, Coll. B. Prasad; ii) 40 exs., Malta river (Port Canning), 10.3.65, Coll. N.V. Subba Rao; iii) 18 exs., Digha, 5.9.64, Coll. A.K. Dutta; iv) 3 exs., Bakkhali, 21.10.79, v) 1 ex., Digha, 12.7.84, vi) 6 exs., Digha, 6.9.84, Coll. A. Dey and S. Barua; vii) 6 exs., Gosaba, 17.9.84, viii) 2 exs., Jharkhali, 24.9.84, ix) 2 exs., Port Canning, 26.9.84, x) 1 ex., Bakkhali, 5.3.85, Coll. B.P. Halder & Party; xi) 1 ex., Netidhopani, 3.11.88, xii) 2 exs., Saimari, 5.11.88, xiii) 1 ex., Kishorimohanpur, 8.11.88, xiv) 2 exs., Parseymari, 9.11.88, xv) 1 ex., Khatuajhuri, 13.11.88, xvi) 2 exs., Baghbagan (Rangabelia), 13.11.88, Coll. A. Dey.

Measurements (in mm) : Length 51.50 - 21.50 ; Diameter 39.15 - 13.00 ; Maximum height of the aperture 22.15 - 19.65.

Diagnosis : Shell ovate, tuberculated, acute spire with four whorls; the body whorl large, ovate, tuberculate on shoulder; aperture large, ovate, outer lip finely crenulated; columella smooth; ashy brown; aperture light brown, margin white.

Distribution : India : Common in estuaries of India. Elsewhere : Sri Lanka, Pakistan, Persian Gulf, Burma, Israel.

Remarks : It is very common species in harbours, jetties, back water and river mouths attached to rocks, boulders and jetty's pillars.

35. Genus *Rapana* Schumacher, 1817

56. *Rapana rapiformis* (Born) (Pl.7, fig. 7)

1778. *Murex rapiformes* var. *a* Born, *Index rerum naturalium Musei Caesarei Vinodobonesis*, pt.1.

1817. *Buccinum bulbosum* (Solander MSS) Dillwyn, *Deseve Cat. Rec. Shells*, 2 : 631.

1972. *Rapana rapiformes* : Cernohorsky, *Marine Shells of the Pacific*, pt. 2 : 124, pl. 35, fig. 6.

Material examined : i) 3 exs., Digha, 27.11.84, Coll. A. Dey and S. Barua.

Measurements (in mm) : Length 29.90 - 22.90 ; Diameter 23.90 - 17.90 ; Maximum height of the aperture 12.10 - 9.60

Diagnosis : Shell pyriform, with 4.5 whorls, spire short, suture deep and canaliculate; outer lip denticulate; sculptured with three prominent rows of tubercles.

Distribution : India : West Bengal : Medinipur; Andhra Pradesh, Andaman & Nicobar Islands, Gujarat, Orissa, Pondicherry, Tamil Nadu.

Remarks : Mainly obtained from Fishermen's nets. Shells found attached with barnacles.

36. Genus *Murex* Linnacus, 1758

57. *Murex tribulus* Linnacus

1758. *Murex tribulus* Linnacus, *Syst. Nat.*, ed. 10 : 746

1976. *Murex tribulus* : Radwin & D'Attilio, *Murex Shells of the World* : 72, pl. 10, figs. 8-9, text. fig. 40-42.

1977. *Murex tribulus* : Ray, *Contribution to the knowledge of the molluscs of Maungmagan* : 46.

Material examined : i) 2 exs., Sandhead, Reg. No., 42.

Measurements (in mm) : Length 41.14 - 30.80 ; Diameter 16.15 - 12.20 ; Maximum height of the aperture 12.05 - 8.65

Diagnosis : Club shaped, spire acute, suture compressed; spire with 6-7 whorls; body whorl globose, aperture large; outer lip erect with limited crenulations.

Distribution : India : It is common on east and west coasts. Elsewhere : Red Sea to Philippines and Japan.

Remarks : It is highly variable in its colour. Radwin & D'Attilio (1976) described the polymorphism of the species.

Family PYRENIDAE

37. Genus *Columbella* Lamarck, 1799

58. *Columbella duclosiana* Sowerby (Pl.7, fig.6, Text fig.4)

1847. *Columbella duclosiana* Sowerby, *Thes. Conch.*, 1 : 113, pl. 36, figs. 15, 16.

1858. *Columbella duclosiana* : Reeve, *Conch. Icon.*, 11 : sp. no. 76, pl. 15, figs. 76a & b.

Material examined : i) 1 ex., Near Light House, Diamond Harbour, 17.6.64, Coll. N.V. Subba Rao; ii) 1 ex., Champita, Sunderban, 13.9.83, Coll. S. Rao & Party; iii) 2 exs., Laskarpur khal, 22.2.86, iv) 2 exs., Sajnatola, Hogol river, Basanti, 25.3.86, v) 3 exs., Laskarpur khal, 25.6.86, vi) 2 exs., Bakkhali, 3.4.87,

Coll. B.P. Halder & Party; vii) 5 exs., Haldibari, 22.8.87, viii) 2 exs., Saimari chara, 23.8.87, ix) 4 exs., Masjidbari, 26.8.87, x) 5 exs., Nowbankichar, Netidhopani, 30.8.87, xi) 1 ex., Halliday Island, 1.9.87, Coll. S. Barua.

Measurements (in mm) : Length 15.00 - 7.65 ; Diameter 8.25 - 3.85 ; Maximum height of the aperture 9.00 - 4.75

Diagnosis : Shell acuminate, ovate, dark brown in colour; fine longitudinal ribs; interstices of ribs finely striated; aperture broad; flexous, denticulate on both the sides; outer lip thickened; canal shortly acuminate, somewhat reflected.

Radula is of rachiglossate type and consists of more than 108 transverse rows of teeth. Each transverse row has one central flanked by one lateral on either side. The central tooth bears 12 strong denticulations and the lateral stronger denticulations. (Text fig. 4)

Distribution : India : West Bengal : North and South 24 Parganas; Andhra Pradesh, Orissa. Elsewhere : Malacca, Java.

Remarks : Gregarious and occurs near low water mark in the intertidal zone, attached to the undersurface of the bricks or rotten wood.

Family MELONGENIDAE

38. Genus *Pugilina* Schumacher, 1817

59. *Pugilina cochlidium* (Linnaeus) (Pl.8, fig.1)

1758. *Murex cochlidium* Linnaeus, *Syst. Nat.* ed. 10 : 753, sp. 482.

1778. *Murex pugilinus* Born, *Index rerum naturalium musei Caesanei Vinobonensis*, p. 314.

1972. *Volema (Pugilina) cochlidium* : Chernohorsky, *Marine Shells of the Pacific*, 2 : 163, pl. 47, fig. 8.

Material examined : i) 1 ex., Tura khal, Sunderban, 12.2.25, ii) 2 exs., Daltenganj, Sajnakhali, 27.3.58, Coll. H.C. Ray; iii) 5 exs., Gandhi river, Sajnakhali, 26.4.61, Coll. A.S. Rajagopal; iv) 1 ex., Digha, 5.9.1964, Coll. A.K. Dutta; v) 1 ex., Ganga Sagar, 25.8.78, Coll. G.C. Rao & K. V. Surya Rao; vi) 1 ex., Ganga Sagar, 2.9.79, Coll. K. V. Surya Rao & S. C. Mitra; vii) 1 ex., Bidya River, 10.9.83, Coll. N.C. Gayen; viii) 1 ex., Arbesy block, Sunderban, 11.9.83, ix) 1 ex., Arbesy block, Sunderban, 16.9.83, Coll. A.K. Hazra; x) 3 exs., Bagmara khal, Sunderban, 12.9.83, Coll. S.K. Chatterjee; xi) 13 exs., Saimari khal, Sunderban, 13.9.83, Coll. C.K. Misra; xii) 4 exs., Champta, 11.9.83, xiii) 1 ex., Gona, Sunderban, 18.9.83, Coll. S. Bhuiya; xiv) 4 exs., Chhota Hardi, 18.9.83, Coll. S.S. Saha; xv) 1 ex., Digha, 12.7.84, Coll. A. Dey & S. Barua; xvi) 2 exs., Gosaba, 17.9.84, xvii) 1 ex., Port Canning, 27.9.84, Coll. B.P. Halder & Party xviii) 4 exs., Netidophani, 3.11.88, xix) 1 ex., Ajmalari-Kaikalmari junction, 8.11.88, xx) 7 exs., Paresymari, 9.11.88; Coll. A. Dey.

Measurements (in mm) : Length 82.85 - 33.30 ; Diameter 48.60 - 16.00 ; Maximum height of the aperture 24.40 - 59.56

Diagnosis : Shell highly variable, pear shaped, large; spire high, acute; whorls angulated, bodywhorl large; shoulder with tubercles; aperture ovately elongate; columella smooth, colour light brown; shells covered with dark brown periostracum.

Distribution : India : West Bengal : Medinipur, North and South 24 Parganas; Andaman Islands, Andhra Pradesh, Gujarat, Maharashtra, Orissa, Tamil Nadu. Elsewhere : Persian Gulf, Sri Lanka, Penang, Burma, Australia.

Remarks : It is a carnivorous species generally feeding on bivalves. There is no radula or buccal mass. The proboscis may have been modified to capture the prey and convert it into a digestible form.

It occurs in muddy or sandy muddy areas but showing preference to the former in the Sunderbans. It is not gregarious and the population density varied from 3 to 5 nos./m². Copulating pairs were observed from May to November.

Family NASSARIIDAE
39. Genus *Nassarius* Dumeril, 1806

Key to the species

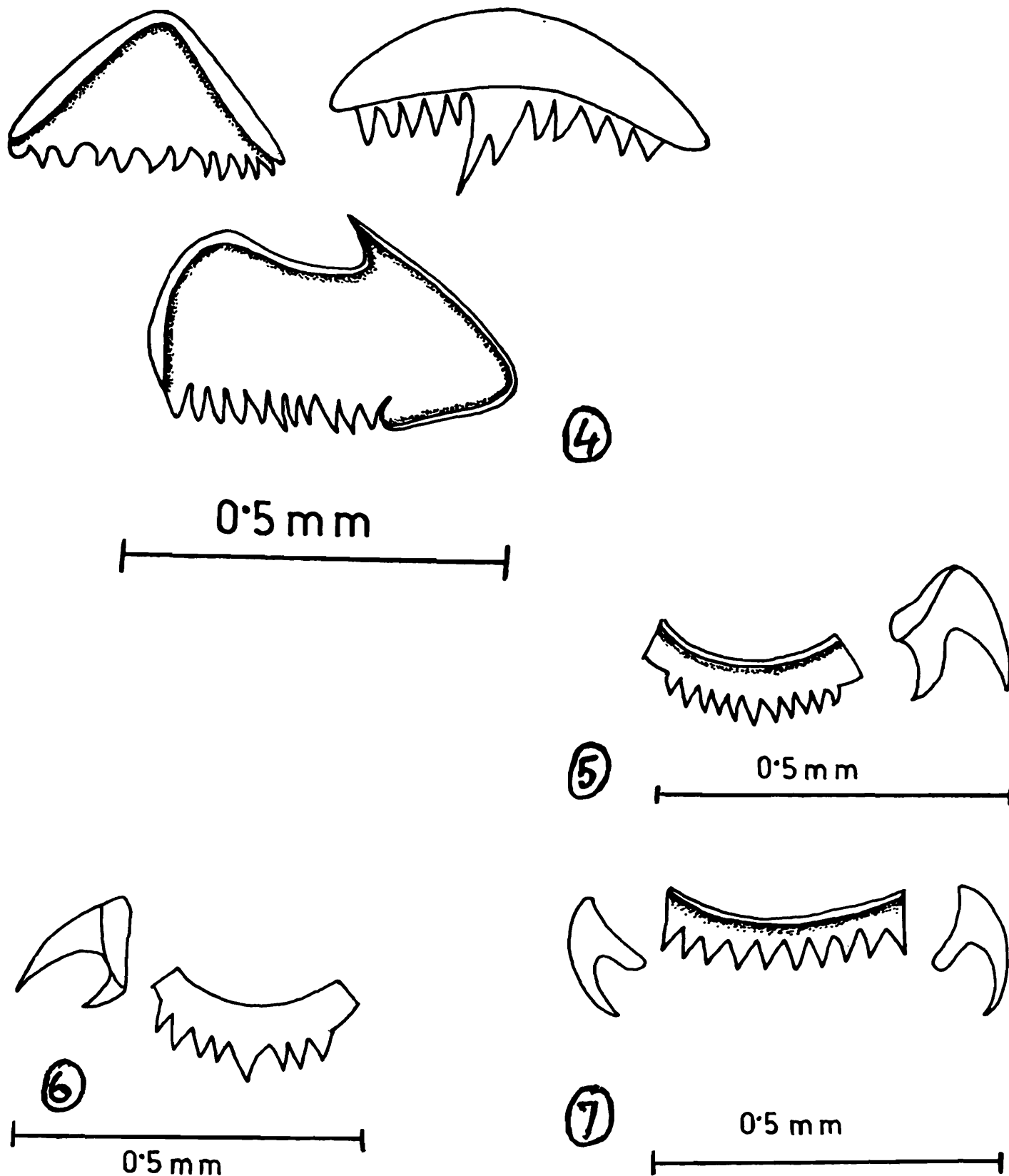
1. Shell small upto 10 mm; sculptured with prominent spiral striae..... *N. orissaensis* Preston
 Shell more than 10 mm; sculptured with fine or punctate spiral striae only at the lower part of body whorl..... 2
2. Shell ovately conical; chocolate or brown bands on the body whorls; sculptured with prominent axial ribs..... *N. stolatus* (Gmelin)
 Shell oblongely-ovate; without chocolate or brown bands on the body whorls; sculptured with fine axial ribs..... *N. foveolatus* (Reeve)

60. *Nassarius foveolatus* (Mss Dunker, Reeve)
(Pl.8, fig.2)

1853. *Nassa foveolatus* (Mss Dunker) Reeve, *Conch. Icon.*, 8 : sp.no. 83, pl. 13, figs. 83a & b.

Material examined : i) 26 exs., Susnichara (Saptamukhi), 2.9.79, ii) 3 exs., Sagar Island, 2.9.79, iii) 5 exs., Chemaguri, 4.11.79, Coll. K.V. Surya Rao & S.C. Mitra; iv) 2 exs., Digha, 27.3.84, Coll. A. Dey & S. Barua; v) 78 exs., Gosaba, 17.9.84, vi) 7 exs., Jharkhali 20.9.84, vii) 1 ex., Port Canning, 26.9.84, viii) 2 exs., Parbatipur, Jharkhali, 23.2.86, ix) 2 exs., Bhangankhali (Basanti), 1.3.86, x) 2 exs., Port Canning, 5.3.86, xi) 1 ex., Sonakhali, Sunderban, 21.6.86, xii) 3 exs., Laskarpur khal, Sunderban, 25.6.86, Coll. B.P. Halder & Party; xiii) 13 exs., Digha, Coll. F.M.J. Pinn.

Measurements (in mm) : Length 21.00 - 7.70 ; Diameter 8.65 - 3.50 ; Maximum height of the aperture 9.02 - 4.25.



Text Figs. 4. Radula of *Columbella duclosiana* Sowerby, 5. Radula of *Nassarius foveolatus* (Reeve)
6. Radula of *Nassarius orissaensis* Preston, 7. Radula of *Nassarius stolatus* (Gmelin)

Diagnosis : Shell oblongely ovate; spire sharp, elongated; sculptured with densely plicated fine longitudinal ribs; interstices cancellated; columella subrugose; outer lip varicose; shell dull white with steel bluish colour.

Radula rachiglossate with about 63-65 transverse rows of teeth. Central with 11 strong denticulations and lateral forked but different from that of the *N. stolatus*. (Fig.5)

Distribution : India : West Bengal : Medinipur, North and South 24 Parganas; Kerala, Maharashtra, Orissa, Tamil Nadu. Elsewhere : Sri Lanka, Burma, Mauritius, Singapore, Pennag.

Remarks : Found on the mud flats of low tidal region, crawling actively during the low tide. They also occur occasionally segregating (upto 75 individuals) in shole. Egg capsules were recorded from November to April attached with broken bricks, pitchers, shell or even the piece of mangrove.

61. *Nassarius orissaensis* (Preston)

1914. *Nassa orissaensis* Preston, *Rec. Indian Mus.*, **10** : 229, figs. 10 & 10a.

1919. *Nassa ennurensis* var. *depauperata* Annandale & Preston, *Rec. Indian Mus.*, **16** : 253, pl. 20, fig. 9.

Material examined : i) 14 exs., Malta river, Gangetic delta, Dec. 1916, Coll. S.W. Kemp; ii) 60 exs., Namkhana, 4.2.1918, Coll. D.N. Sen; iii) 3 exs., Chotamullahkhali, 22.9.84, iv) 6 exs., Tiger Project jetty, Gosaba, 20.6.86, v) 7 exs., Sonakhali, Basanti, 21.6.86, Coll. B.P. Halder & Party; vi) 1 ex., Kaikalmari (Holotype of *N. ennurensis depauperata*), Reg. No., M 114482, Coll ?.

Measurements (in mm) : Length 6.50 2.50 ; Diameter 3.55 1.30 ; Maximum height of the aperture 2.70 1.40

Diagnosis : Shell fusiform, small, spire high; whorls four, angulate, suture impressed; aperture ovate; columellar margin vertically descending, angulated above; sculptured with coarse transverse costulae crossed by fine spiral striae, somewhat cancellate in appearance.

Radula rachiglossate type with about 48-50 rows of teeth. The central with 8 strong teeth and laterals forked. (Text Fig.6)

Measurements (in mm) : Length 6.50 2.50 ; Diameter 3.55 1.30 ; Maximum height of the aperture 2.70 1.40

62. *Nassarius stolatus* (Gmelin)

1790. *Buccinum stolatus* Gmelin, *Syst. Nat.* ed. 13, p. 3496.

1948. *Nassarius (Hima) stolatus* : Ray, *Rec. Indian Mus.*, **46** : 105.

Material examined : i) 53 exs., Digha, 4.9.64, Coll. A.K. Dutta; ii) 1 ex., Bakkhali, 23.8.78, Coll. G.C. Rao & K.V. Surya Rao; iii) 2 exs., Ganga Sagar, 2.9.79, iv) 1 ex., Ganga Sagar, 30.9.80, Coll. K.V. Surya Rao & S.C. Mitra; v) 2 exs., Bakkhali, 27.1.80, vi) 3 exs., Digha, 13.1.83, Coll. A. Dey & S. Barua; vii) 13 exs., Port Canning, 26.9.84, viii) 1 ex., Bakkhali, 5.3.85, ix) 4 exs., Parbatipur, Jharkhali, 23.2.86, x) 5 exs., Port Canning, 5.3.86, xi) 3 exs., Bakkhali, 2.4.87, Coll. B.P. Halder & Party xii) 1 ex., Halliday Island 1.9.87, Coll. S. Barua.

Measurements (in mm) : Length 23.85 - 3.80 ; Diameter 12.95 - 2.15 ; Maximum height of the aperture 9.50 - 1.90

Diagnosis : Shell ovately conical, acuminate, rather smooth, with chocolate or brown bands on the body whorl; whorls convex, spire sharp, sculptured with slender axial ribs which become obsolete on the central area on the back of last whorl, interstices obscurely fine and cancellate; columella calloused, not expanded; outer lip thick and slightly varicose.

Radula rachiglossate type with about 55-60 transverse rows of teeth. Central teeth with 10 strong denticulations and lateral forked. (Fig.7)

Distribution : India : West Bengal : Medinipur, North and South 24 Parganas; Andhra Pradesh, Kerala, Maharashtra, Orissa, Tamil Nadu. Elsewhere : Persian Gulf, Gulf of Aden, Mauritius, Sri Lanka, Burma, Singapore, Java, Borneo, Gulf of Siam, Philippines.

Remarks : Prefers the sandy muddy areas and the population density was observed to be 3 to 5 nos./m² on an average. Cream coloured egg capsules attached to the pieces of bricks, pitchers, shell and mangrove pieces, were observed from April to November.

Family OLIVIDAE

Key to the genera

Shell thick ; spire short ; suture not canaliculated.....*Olivancillaria*

Shell thin; spire elongated; suture enamelled..... *Amalda*

40. Genus *Amalda* H. & A. Adams, 1858

63. *Amalda ampla* (Gmelin) (Pl.8, fig.7)

1791. *Voluta ampla* Gmelin, *Syst. Nat.*, ed. 13, p. 3467.
 1843. *Ancillaria candida* Kiener, *Coq. Viv.*, 1 : 25, pl. 5, fig. 4.
 1866. *Ancillaria cylindrica* Reeve, *Conch. Icon*, 15, *Ancillaria*, pl. 9, fig. 46.
 1982. *Amalda ampla* : Abbott & Dance, *Compendium of Sea Shells*, p. 195.

Material examined : i) 3 exs., Sandhead, Coll. J. Barnett; ii) 8 exs., Sandhead, Nov. 1923, Coll. P.V. Lady Fraser; iii) 1 ex., Digha, 10.3.66, Coll. K.V. Rama Rao & Party; iv) 2 exs., Bakkhali, 27.10.79, v) 1 ex. Digha, 27.3.84, vi) 12 exs., Digha, 30.1.85, Coll. A. Dey & S. Barua; vii) 2 exs., Digha, 27.11.84, viii) 2 exs., Digha, 30.1.86, Coll. N.V. Subba Rao & party.

Measurements (in mm) : Length 27.45 - 12.25 ; Diameter 10.05 - 4.75 ; Maximum height of the

aperture 18.45 - 8.21.

Diagnosis : Shell elongate, slender, smooth and highly polished, spire elevated; sutures densely covered with callous; columella slightly twisted; aperture narrow and elongated; colour almost white but sometimes orange brown or rusty brown.

Distribution : India : West Bengal; : Medinipur, South 24 Parganas; Andhra Pradesh, Andaman and Nicobar Islands, Orissa, Tamil Nadu. Elsewhere : Red Sea, Sri Lanka.

Remarks : It is very common on Digha beach specially in the winter season. It is collected by the local people for making curios.

Off shore to about 20 meters depth (Abbott & Dance, 1982).

41. Genus *Olivancillaria* d'Orbigny, 1839

64. *Olivancillaria gibbosa* (Born) (Pl.8, fig.3)

1778. *Voluta gibbosa* Born. *Index rerum naturalium musei Caesanei Vinobonensis*, p. 202.

1850. *Oliva gibbosa* : Reeve, *Conch. Icon.*, 6 : *Oliva* sp.no. 12, pl. 8, fig. 12.

1982. *Olivancillaria gibbosa* : Abbott & Dance, *Compendium of Sea Shells*, p. 193.

Material examined : i) 3 exs., Sandhead, Nov. 1923, Coll. P.V. Lady Fraser.

Measurements (in mm) : Length 35.28 - 34.15 ; Diameter 15.72 - 15.10 ; Maximum height of the aperture 25.20 - 24.85

Diagnosis : Shell thick, stout, fusiformly ovate, with highly polished surface; spire acuminate, columella callous, plaits almost buried; aperture narrow and elongated; with a small slit like posterior canal and broadly open anterior canal, semilunar notch. Colour blue or pale yellow, with black spotted yellow band at the base, spire and columella yellowish white; interior of aperture bluish white.

Distribution : India : West Bengal : South 24 Parganas; Andhra Pradesh, Maharashtra, Orissa, Tamil Nadu. Elsewhere : Sri Lanka.

Remarks : Common species of South Indian Coast.

Family CANCELLARIIDAE

42. Genus *Scalptia* Jousseaume, 1887

65. *Scalptia scalariformis* (Lamarck) (Pl.8, fig.8)

1822. *Cancellaria scalariformis* Lamarck, *Hist. nat. Anim., Sans, Vert.*, 7 : 113.

1982. *Scalptia scalariformis* : Abbott & Dance, *Compendium of Sea Shells*, p. 226.

Material examined : i) 10 exs., Digha, Coll. F.M.J. Pinn.

Measurements (in mm) : Length 23.70 - 18.34 ; Diameter 13.40 - 10.55 ; Maximum height of the aperture 12.40 - 9.72

Diagnosis : Shell pyramidal, scarcely umbilicated; spire acuminate; whorls flatly excavated at the suture and obliquely ribbed; ridges spirally crenate; aperture small, columella with 3 plaits; outer lip inflated; livid brown with white bands.

Distribution : India : West Bengal : Medinipur; Andhra Pradesh. Elsewhere : Australia (shallow water, locally common, Abbott & Dance, 1982).

It is recorded for the first time from Indian waters.

Family MARGINELLIDAE

43. Genus *Persicula* Schumacher, 1817

66. *Persicula ventricosa* (Fischer) (Pl. 8, figs. 4 & 5)

1807. *Marginella ventricosa* Fischer, *Mus. Demidoff.*, 3 : 172.

1822. *Marginella guineaplicata* Lamarck, *Hist. nat. Anim. Sans. Vert.*, 7 : 356.

1968. *Persicula (Gibberula) ventricosa* : Ray, *Bull. Indian Mus.*, 8 (1 & 2) : 24, Text fig. 18.

Material examined : i) 2 exs., Digha, 21.8.85, ii) 2 exs., Digha, 6.11.85, iii) 1 ex., Digha, 24.2.86, iv) 1 ex., Digha, 25.2.86, v) 1 ex., Digha, 26.2.86, vi) 47 exs., Digha, 9.7.86, Coll. A.K. Mondal & party.

Measurements (in mm) : Length 2.85 - 4.00 ; Diameter 1.50 - 2.15 ; Maximum height of the aperture 2.60 - 3.85

Diagnosis : Shell cone shaped, minute, white or wheat colour, glossy; shell with 2 whorls; sculpture smooth; aperture almost throughout the body, white and with 4 to 5 columellar folds.

Distribution : India : West Bengal : Medinipur; Orissa, Tamil Nadu. Elsewhere : Pakistan, Penang, Malacca, Singapore, Sumatra.

Family TURRIDAE

Key to the genera

1. Spire larger than body whorl; canal short..... (2)
 Spire equal or less than body whorl; canal long..... *Turricula*
2. Shell upto 20 mm; sinus shallow, outer lip not ascending..... (3)
 Shell more than 20 mm; sinus semicircular; outerlip ascending..... *Brachytoma*

3. Sculpture strongly keeled..... *Asthenostoma*
 Sculpture not strongly keeled..... *Turridrupa*

44. Genus *Brachytoma* Swainson, 1840

67. *Brachytoma crenularis* (Lamarck)

1822. *Pleurotoma crenularis* Lamarck, *Hist. nat. Anim. Sans. Vert.*, 7 : 92.
 1843. *Pleurotoma crenularis* : Reeve, *Conch. Icon.*, 1, *Pleurotoma* sp.no. 54, pl. 7, fig. 54.
 1952. *Brachytoma crenularis* : Satyamurti, *Bull. Madras Govt. Mus.*, (new ser.) nat Hist. 1,2 pt. 6 :p. 200, pl. 19, fig. 4.

Material examined : i) 2 exs., Digba, 30.1.86, Coll. N.V. Subba Rao & A. Dey.

Measurements (in mm) : Length 32.15 - 28.95 ; Diameter 12.80 - 11.05 ; Maximum height of the aperture 17.60 - 15.85.

Diagnosis : Shell sharply turreted, spindle shaped, brown; height of the spire more than the bodywhorl; surface bears strong, transpirally elongated, broadly rounded ribs and fine spiral ridges; interstices with finer spiral striae; suture margined; notch on outer lip is deep and rounded.

Distribution : India : West Bengal : Medinipur; Kerala, Orissa, Tamil Nadu. Elsewhere : Burma.

45. Genus *Turricula* Schumacher, 1817

68. *Turricula javana* (Linnaeus)
 (Pl. 9, figs. 1 & 2)

1767. *Murex javanus* Linnaeus, *Syst. nat.* ed. 12 : 1221, sp.no. 550.
 1811. *Pleurotoma contorta* Perry, *Conch. Lond.*, pl. 32, fig. 7.
 1822. *Pleurotoma nodifera* Lamarck, *Hist. nat. Anim. Sans. Vert.*, 7 : 96.
 1968. *Surcula javana* : Ray, *Bull. Indian Mus.*, 3 (1 & 2) : 25, fig. 21.
 1969. *Turricula javana* : Powell, *Indo-Pacif. Mollusca*, 2 (10) : 235, pl. 192, figs. 10 7 11; pl. 201.

Material examined : i) 1 ex., Sandhead, 6.1.28, Coll. P.V. Lady Fraser; ii) 1 ex., Digba, 10.3.66, Coll. K.V. Rama Rao & Party; iii) 1 ex., Digba, 27.3.84, Coll. A. Dey & S. Barua; iv) 7 exs., Sandhead, Reg. No., M 1623-29/1, Coll. ?.

Measurements (in mm) : Length 34.35 - 51.55 ; Diameter 12.10 - 19.00 ; Maximum height of the aperture 16.65 - 25.90

Diagnosis : Large, fusiform with turreted spire, creamy-buff to dull purplish brown, peripheral nodules paler. Anterior canal long; spire equal or slightly greater than the aperture and canal; post nuclear whorls strongly nodose, carinate; whorls 10-11; sculptured with numerous closely-spaced spiral cords

crossed on the peripheral carina by numerous strong, oblique nodules, 22-27 on the last whorls; spiral whorls with substructural collar of two strong cords, followed by a wide steeply descending concave shoulder area to the peripheral carina which is situated below the middle whorls; shoulder area with 6-9 fine spiral threads.

Distribution : India : West Bengal : Medinipur, South 24 Parganas; Andaman and Nicobar Islands, Goa, Gujarat, Kerala, Maharashtra, Orissa, Tamil Nadu. Elsewhere : Pakistan, Sri Lanka, Persian Gulf, Malacca, Penang, Thailand, China, Philippines.

46. Genus *Turridrupa* Hedley, 1922

69. *Turridrupa bijubata* (Reeve)
(Pl. 9, figs. 3 & 4)

1843. *Pleurotoma bijubata* Reeve, *Conch. Icon.*, 1, pl.10, fig. 87.

1967. *Turridrupa bijubata* : Powell, *Indo-Pacif., Mollusca*, 1 (7) : 418, pl. 303, figs. 1 & 2.

Material examined : i) 16 exs., Digba 20.10.87, Coll. A.K. Mandal & Party.

Measurements (in mm) : Length 7.10-4.70 ; Diameter 2.30 - 1.75 ; Maximum height of the aperture 2.38 - 1.80

Diagnosis : Shell small to medium (not more than 16 mm in length), cylindrical; sculptured with strong, raised spiral keels, three on the spiral whorl; whorls convex, aperture short; anterior canal very short; dark purple brown to light reddish brown.

Distribution : India : West Bengal : Medinipur. Elsewhere : Mauritius, Philippines, New Caledonia, Fiji, Queensland and Hawaiian Island.

Remarks : All are juveniles, and are obtained by sieving the sands from intertidal zone of the Digba beach.

47. Genus *Asthenotoma* Harris & Burrows, 1891

70. *Asthenotoma vertebrata* (Smith)
(Pl. 9, fig.6)

1875. *Pleurotoma vertebrata* Smith, *Ann. Mag. nat. Hist.*, (4) 15 : 416, No. 10.

1968. *Asthenotoma vertebrata* : Ray, *Bull. Indian Mus.*, 3 (1 & 2) : 26, Text fig. 22.

Material examined : i) 2 exs., Jharkhali, 26.6.86, Coll. B.P. Halder & Party.

Measurements (in mm) : Length 8.90 - 6.85 ; Diameter 3.10 - 2.60 ; Maximum height of the aperture 2.95 - 1.80

Diagnosis : Shell small, subfusiform, variable in size, upto 7 mm in length, pale brown to white. Sculptured with fine nodose lirations encircling the whorls just above the large central keel and other slender thread lines; whorls upto nine including the two nuclear whorls.

Distribution : India : West Bengal : North 24 Parganas; Maharashtra, Orissa, Tamil Nadu. Elsewhere : South African coast, Persian Gulf, Pakistan coast, Japan, New Zealand.

Family TEREBRIDAE

Key to the species

1. Whorls less than seven..... *T. tenera*
 Whorls more than seven..... (2)
2. Shell acuminate; sculptured with node like radial striae..... *T. trintica*
 Shell turreted; sculptured with longitudinal ribs..... *T. durgella*

48. Genus *Terebra* Bruguiere, 1792

71. *Terebra durgella* Ray

1968. *Terebra durgella* Ray, *Bull. Indian Mus.*, 3 (1 & 2) : 28, Text fig. 26.

Material examined : i) 4 exs., Digha, 20.10.87, Coll. A.K. Mondal & Party.

Measurements (in mm) : Length 7.85 - 4.00 ; Diameter 2.45 - 1.15 ; Maximum height of the aperture 2.00 - 1.00

Diagnosis : Shell small, short, elegant, stoutly subulate and turreted; dull whitish or pale cream colour; spire longer than the body whorl; whorls 9-10, tumid, separated from one another by very impressed and oblique sutures; sculptured with narrow, strong, regular longitudinal ribs and as broad as interspaces; aperture small and oblong; columella arched above; outer lip thin.

Distribution : India : West Bengal : Medinipur.

72. *Terebra tenera* Hinds

1843. *Terebra tenera* Hinds, *Proc. zool. Soc. Lond.*, p. 158.

Material examined : i) 14 exs., Digha, 21.10.87, Coll. A.K. Mondal & Party.

Measurements (in mm) : Length 7.85 - 2.65 ; Diameter 2.10 - 1.35 ; Maximum height of the aperture 2.00 - 1.10

Diagnosis : Shell cylindrically oblong; whorls flatly convex, undivided, strongly ventricosely ribbed, interstices concave; aperture oblong; columella little twisted; yellowish with reddish bands beneath the sutures.

Distribution : India : West Bengal : Medinipur. Elsewhere : Sri Lanka, Malacca.

73. *Terebra tricineta* Smith

1877. *Terebra tricineta* Smith, *Ann. Mag. nat. Hist.*, (4) 19 : 225.

1968. *Terebra (Strioterebrum) tricineta* : Ray, *Bull Indian Mus.*, 3 (1 & 2) 27, fig. 25.

Material examined : i) 3 exs., Digha, 20.10.87, Coll. A.K. Mondal and Party.

Measurements (in mm) : Length 6.10 - 4.80 ; Diameter 1.50 - 1.30 ; Maximum height of the aperture 0.9 - 0.8.

Diagnosis : Shell small, slender, acuminate with 9-12 whorls, arranged like a pyramid; whorls medially constricted deep; sculptured with node like radial striae, very prominent and strong throughout the whorls.

Distribution : India : West Bengal : Medinipur; Maharashtra, Orissa, Tamil Nadu. Elsewhere : Persian Gulf, Pakistan coast, Singapore, Indonesia.

Order ENTOMOTAENIATA
Family PYRAMIDELLIDAE

Key to the genera

1. Columella curved with columellar folds; shell turreted..... 2
Columella straight and without columellar folds; shell slender..... *Turbonilla*
2. Columella with single fold..... *Odostomia*
Columella with three or more folds..... *Pyramidella*

49. Genus *Pyramidella* Lamarck, 1799

74. *Pyramidella dolabrata terebellum* (Mueller) (Pl. 9, fig.3)

1774. *Helix terebella* Mueller, p. 123.

1982. *Pyramidella dolabrata* color form *terebellum* : Abbott & Dance, *Compendium of Sea Shells*, p.277.

Material examined : i) 2 exs., Digha, 30.1.86, Coll. N.V. Subba Rao & A. Dey.

Measurements (in mm) : Length 15.00 - 12.05 ; Diameter 5.60 - 4.30 ; Maximum height of the aperture 4.30 - 3.50

Diagnosis : Shell pyramidal, smooth, thin; whorls flat; aperture pyriform, columella recurved, expanded; outer lip thin; shell white with brown encircled bands.

Distribution : India : West Bengal : Medinipur. Elsewhere : Indo-pacific, uncommon (Abbott & Dance, 1982)

50. Genus *Turbonilla* Risso, 1826

75. *Turbonilla felicitia* Lascron (Pl. 9, fig.10)

1959. *Turbonilla felicitia* Lascron, *Austr. J. mar. Fresh Wat. Res.*, **10** : 235, fig. 152, 153.

Material examined : 8 exs., Digha, 30.1.84, Coll. N.V. Subba Rao & A. Dey; ii) 13 exs., Digha, 20.10.87, Coll. A.K. Mondal & party.

Measurements (in mm) : Length 8.10 - 4.50 ; Diameter 6.95 - 1.25 ; Maximum height of the aperture 1.50 - 1.15

Diagnosis : Shell large, attenuately subulate, pale yellow and shining; whorls 11-12 gradually increasing, constricted in the middle; sculptured with regular, strong, straight vertical ribs; aperture oval and distinctly angled at the upper, inner lip slightly thickened.

Distribution : India : West Bengal : Medinipur. Elsewhere : Australia.

51. Genus *Odostomia* Fleming, 1817

Key to the species

Shell upto four whorls; spiral liration not distinct..... *O. oxia* Watson

Shell more than four whorls (seven); spiral liration distinct.....*O. babylonica* Winckworth

76. *Odostomia oxia* Watson (Pl. 9, fig. 8 & 9)

1886. *Odostomia oxia* Watson, *Rep. Sci. Res. Challenger*, (zool.), No.15, p. 404, pl. 31, fig. 4.

1909. *Odostomia adipata* Hedley, *Proc. Linn. Soc. N.S.W.*, **34** (3) : 444, Pl. 42, fig. 73.

1959. *Odostomia oxia* : Lascron, *Austr., J. mar. Fresh Wat. Res.*, **10** : 202, fig. 52 & 53.

Material examined : i) 319 exs., Digha, 27.3.84, ii) 832 exs., Digha, 27.11.84, Coll. A. Dey & S. Barua; iii) 59 exs., Digha, 20.10.87, Coll. A.K. Mondal & Party.

Measurements (in mm) : Length 4.45 - 1.05 ; Diameter 1.75 - 0.95 ; Maximum height of the aperture 1.95 - 0.85

Diagnosis : Shell small, smooth, ovate with 3-4 whorls; suture deep; columella with single fold; outer lip depressed at the anterior forming a notch like structure.

Distribution : India : West Bengal : Medinipur. Elsewhere : Australia.

Remarks : Found attached to the posterior end of the shell of *Donax incarnatus* in Digba beach, as predator on the animals.

77. *Odostomia babylonica* Winckworth
(Pl. 10, figs. 3 & 4)

1940. *Odostomia babylonica* Winckworth, *Proc. malac. Soc. Lond.*, 24 (1) : 41, fig.2.

1968. *Odostomia babylonica* : Ray, *Bull. Indian Mus.*, 3 (1 & 2) : 19, text fig.7.

Material examined : i) 8 exs., Digba, 20.10.87, Coll. A.K. Mondal & Party.

Measurements (in mm) : Length 3.10 - 2.30 ; Diameter 1.05 - 0.85 ; Maximum height of the aperture 1.05 - 0.85

Diagnosis : Shell pyramidal, with seven gradate whorls; rudely angled at the upper end; spiral liration distinct within aperture; columella with single tooth; aperture ovately rounded; outer lip smooth.

Distribution : India : West Bengal : Medinipur; Orissa, Tamil Nadu.

Family RINGICULIDAE
52. Genus *Ringicula* Deshayes, 1838

Key to the species

Body whorl with regularly arranged, impressed spiral sulcations; outer lip serrated.....
..... *R. encarpofrens* de Folin

Body whorl with irregularly arranged striations; outer lip smooth..... *R. propinquans* Hinds

78. *Ringicula encarpofrens* de Folin
(Pl. 10, figs. 1 & 2)

1867. *Ringicula encarpofrens* de Folin, *Les fonds de lamer*, 1 (1) : 66, pl. 6, fig. 5.

1968. *Ringicula encarpofrens* : Ray, *Bull. Indian Mus.*, 3 (1 & 2) : 29, Text fig. 28.

Material examined : i) 1 ex., Digba, 20.10.87, Coll. A.K. Mondal & Party.

Measurements (in mm) : Length 3.95 ; Diameter 2.90 ; Maximum height of the aperture 2.85

Diagnosis : Shell small, thick, spire low; body whorl provided with regularly arranged impressed spiral sulcations on its surface; outer lip expanded and serrated.

Distribution : India : West Bengal : Medinipur; Orissa, Tamil Nadu. *Elsewhere* : Sri Lanka, Borneo, Sumatra, Batavia.

79. *Ringicula propinquans* Hinds
(Pl. 10, figs. 9 & 10)

1844. *Ringicula propinquans* Hinds, *Proc. zool. Soc. Lond.*, pt. 12 : 96.

1968. *Ringicula propinquans* : Ray, *Bull. Indian Mus.*, 3 (1 & 2) : 29, Text fig. 29.

Material examined : i) 8 exs., Bakkhali, 5.3.85, Coll. B.P. Halder & Party; ii) 9 exs., Digha, 20.10.87, Coll. A.K. Mondal & Party.

Measurements (in mm) : Length 3.95 - 3.25 ; Diameter 2.90 - 2.00 ; Maximum height of the aperture 2.85 - 1.75

Diagnosis : Shell minute, ovate, thick, spire conical and somewhat elevated; body whorl with fine transverse striations; outer lip smooth.

Distribution : India : West Bengal : Medinipur, South 24 Parganas; Andhra Pradesh, Kerala, Maharashtra, Orissa, Tamil Nadu. *Elsewhere* : Persian Gulf, Gulf of Aden, Gulf of Oman, Pakistan coast, Philippines, Japan.

Remarks : Found crawling on the sand near the river mouth at Bakkhali and Digha.

Family CYLICHNIDAE
53. Genus *Cylichna*, Loven, 1846

80. *Cylichna protracta* Gould

1859. *Cylichna protracta* Gould, *Proc. Boston Soc. nat. Hist.* 7 : 140

Material examined : i) 1 ex., Digha, 20.8.85, Coll. A.K. Mandal and Party.

Measurements (in mm) : Length 4.90 ; Diameter 1.60 ; Maximum height of the aperture 4.90

Diagnosis : Shell solid, cylindrical; apex obliquely truncated; aperture angular.

Distribution : India : West Bengal : Medinipur. *Elsewhere* : Coast of China.

Remarks : Collected from Digha by sieving the sand of the beach.

Family AGLAJIDAE

54. Genus *Melanochlamys* Cheeseman, 188181. *Melanochlamys* sp.

(Pl. 10, figs. 7 & 8, Text fig. 8)

Material examined: i) 8 exs., Digha, 30.10.84, ii) 5 exs., Digha, 24.2.85, Coll. A. Dey and S. Barua; iii) 3 exs., Bakkhali, 2.4.87, iv) 5 exs., Ganga Sagar, 21.12.87, Coll. B.P. Halder and Party; v) 4 exs., Digha, Coll. G.C. Rao and Party.

Measurements (in mm) : Length 9.05 - 8.85 ; Width 3.10 - 2.95

Diagnosis : Externally animals light brown with scattered brownish black maculations in fresh condition, but on preservation the specimens turned black; the head shield elongate and occupies almost half of the length of the body, anteriorly rounded and narrow posteriorly broad and truncate; posterior shield elongate, with short and rounded caudal lobes separated by a notch. (Text fig. 8)

Shell internal, calcified and occupies major portion of the posterior shield.

Buccal mass thick and devoid of jaws or radula.

Distribution : The genus is distributed from Japan to South Africa.

Remarks : The genus included ten species (Gosliner, 1986) which are distinguished on the basis of anatomical characters. We have provisionally retained it as *Melanochlamys* sp. as description of all known species are not available to us. However, it is the first record of the genus from Indian waters.

Live specimens were collected from fine sandy areas of Digha and Bakkhali. It lives buried in sand and during low tide when the beach was exposed animals with their sand-covered bodies, were seen crawling.

Family ATYIDAE

55. Genus *Haminea* (Leach) Gray, 184782. *Haminea crocata* Reeve

(Pl. 10, figs. 5 & 6)

1860. *Bulla (Haminea) crocata* Pease, *Proc. zool. Soc. Lond.*, p. 19.

1914. *Bulla (Haminea) crocata* : Preston, *Rec. Indian Mus.*, 10 : 303.

Material examined : i) 34 exs., Narayanganj, 5.9.79, ii) 1 ex., Ganga Sagar, 19.5.80, Coll. K.V. Surya Rao and S.C. Mitra; iii) 5 exs., Namkhana, 27.10.79; iv) 3 exs., Mainapara (Kakdwip), 16.4.80, v) 17 exs., Ghiapata (Kakdwip), 17.4.80, vi) 28 exs., Mainapara, 18.4.80, vii) 2 exs., Narayanganj, 19.4.80, Coll. A. Dey & S. Barua; viii) 9 exs., Bakkhali, 7.3.85, ix) 16 exs., Kakdwip, 10.3.85, Coll. B.P. Halder & Party.

Measurements (in mm) : Length 12.95 - 7.65 ; Diameter 8.25 - 5.00 ; Maximum height of the aperture 12.80 - 7.40

Diagnosis : Shell thin, fragile, oval shape with broad posterior end, semi transparent; light bluish in living but pale yellowish in preservation.

Distribution : India : West Bengal : South 24 Parganas; Orissa, Tamil Nadu. Elsewhere : Sri Lanka, New South Wales.

Remarks : Common on the muddy areas and in the small ditches on the bank of Hugli-Malta estuary; population density varies from 10 to 15 m².

Family RETUSIDAE

56. Genus *Retusa* T. Brown, 1927

83. *Retusa pyramidata* (A. Adams)
(Pl. 10, figs. 11 & 12)

1850. *Bulla (Cylichna) pyramidata* Adams in Sowerby's, *Thes. Conch.*, 2 : 595, pl. 125, fig. 149.

1968. *Retusa pyramidata* : Ray, *Bull. Indian Mus.*, 3 (1 & 2) : 30.

Material examined : 15 exs., Digha, 20.10.87, Coll. A.K. Mondal and Party.

Measurements (in mm) : Length 3.55 - 2.55 ; Diameter 2.00 - 1.30 ; Maximum height of the aperture 3.55 - 2.25

Diagnosis : Shell minute, pear shaped, fragile, dull white with sunken spire and slightly elevated upper end of the outer lip, columella concave, calloused.

Distribution : India : West Bengal : Medinipur; Orissa, Tamil Nadu.

Order BASOMMATOPHORA

Family ELLOBIIDAE

Key to the genera

1. Shell ovate..... *Ellobium*
 Shell oblong..... (2)
2. Outer lip denticulate..... (3)
 Outer lip non denticulate..... *Pythia*
3. Outer lip thick, denticulation upto three..... *Cassidula*
 Outer lip thin, denticulation more than three..... *Melampus*

57. Genus *Cassidula* Ferussac, 182184. *Cassidula nucleus* (Gmelin)
(Pl. 10, figs. 13 & 14)1791. *Auricula nucleus* Gmelin, *Syst. Nat.* ed. 13, p. 3651.1972. *Cassidula nucleus* : Cernohorsky, *Marine Shells of the Pacific*, 2 : 212, pl. 60, fig. 8.

Material examined : i) 1 ex., Kakdwip, 18.8.79, Coll. N.V. Subba Rao & Party; ii) 1 ex., Pargumti 9.9.84, Coll. B.P. Halder & Party; iii) 2 exs., Khatua jhuri, 13.11.88, iv) 6 exs., Marichjhapi, 13.11.88, Coll. A. Dey.

Measurements (in mm) : Length 24.00 - 16.10 ; Diameter 13.90 - 9.70 ; Maximum height of the aperture 15.50 - 11.30

Diagnosis : Shell small upto 20 mm, spire short, last whorl convex; sculptured with fine, sharp incised spiral striae on the body whorl; aperture narrow, outer lip varicose, obsolete denticulate and angulate, callousity on the inner margin of the lip; columella with a callous shield; cream or fawn, ornamented with brown bands, apex purplish brown.

Found attached to the stems of plants climbing upto the height of 150 cms from the ground and also crawling on the mud, prefers shady areas.

Distribution : India : West Bengal : North and South 24 Parganas; Maharashtra, Tamil Nadu, (Pitchavaram mangroves). Elsewhere : Burma.

58. Genus *Ellobium* Rodding, 1798*Key to the species*

Spire short (upto six whorls); columella with two plications..... *E. gangetica* (Benson)

Spire elongate (more than six whorls); columella with more than two plications.....
..... *E. aurisjudae* (Linnaeus)

85. *Ellobium aurisjudae* (Linnaeus)
(Pl. 11, fig. 1)1758. *Bulla aurisjudae* Linnaeus, *Syst. Nat.* ed. 10 : 728.1932. *Auricularia aurisjudae* : Sewell, *Rec. Indian Mus.*, 36 : 56.1972. *Ellobium aurisjudae* : Cernohorsky, *Marine Shells of the Pacific*, 2 : 221, pl. 60, fig. 3.

Material examined : i) 1 ex., Sunderban, Reg. No., M 11472, Coll. N. Annandale, S.W. Kemp and B. Prasad; ii) 4 exs., Chhota Hardi, 18.9.83, Coll. S.S. Saha; iii) 1 ex., Baghbagan (Rangabelia), 13.11.88, Coll. A. Dey.

Measurements (in mm) : Length 46.00 - 31.80 ; Diameter 20.20 - 12.25 ; Maximum height of the aperture 23.20 - 15.80

Diagnosis : Shell elongately ovate, moderate size; sculptured with numerous, close-set and wavy longitudinal striae and spiral rows of granules; outer lip calloused and flattened, columella calloused with 3 folds, centre fold large and angular.

Distribution : India : West Bengal : North 24 Parganas; Andaman & Nicobar Islands, Gujarat, Maharashtra and Orissa (Mahanadi Estuary). Elsewhere : Burma, Singapore, Queensland.

59. Genus *Ellobium* (Holten) Roeding, 1798

86. *Ellobium (Auricula) gangeticum* Pfeiffer

1855. *Auricula gangetica* Pfeiffer, *Malak. Blat.*, 2 : 7.

1934. *Auricularia gangetica* : Sewell, *Rec. Indian Mus.*, 36 : 56.

1975. *Ellobium (Auriculana) gangeticum*: Subba Rao and Mookherjee, *Recent Research in Estuarine Biology*: 172

Material examined : i) 87 exs., Port Canning, Coll. G. Nevill, J. Woodmason, F. Stoliczka & J. Baster; ii) 28 exs., Falta, 21.7.64, Coll. P. Roychowdhury; iii) 33 exs., Lakshikantapur, 10.8.65, iv) 3 exs., diamond Harbour, 17.7.64, Coll. N. V. Subba Rao & H. P. Mookherjee; v) 5 exs., Kakdwip, 18.8.79, Coll. N. V. Subba Rao & Party; vi) 8 exs., Jhingakhali, 12.9.83, Coll. S. Biswas; vii) 4 exs., Sajnakhali, 16.9.84, Coll. B. P. Halder & Party.

Measurements (in mm) : Length 30.25-4.55 ; Diameter 12.20 - 2.75 ; Maximum height of the aperture 18.30-4.00.

Diagnosis : Shell fusiformly ovate, rather thin, curved with straw coloured epidermis; spire short; whorls tumid; aperture slightly expanded below; columella with two plaits, peristome straight.

Distribution : West Bengal : North and South 24 Parganas; Andhra Pradesh, Maharashtra, Orissa (Mahanadi Estuary). Elsewhere : Sri Lanka, Burma.

60. Genus *Melampus* Montfort, 1810

87. *Melampus pulchella* Petit

1842. *Auricula pulchella* Petit, *Proc. zool. Soc. Lond.*, p. 202.

1857. *Melampus pulchella* : Pfeiffer, *Catalogue Auriculidae, British Mus. (nat. Hist.)*, p. 25.

Material examined : i) 44 exs., Port Canning, Coll. J. Woodmason; ii) 8 exs., Naranyanganj, 5.9.79, Coll. K.V. Surya Rao & S.C. Mitra; iii) 16 exs., Haldia, 14.4.87, Coll. B.P. Halder & Party.

Measurements (in mm) : Length 7.90 - 4.65 ; Diameter 4.15 - 2.30 ; Maximum height of the aperture 4.85 - 3.10

Diagnosis : Shell perforate, ovately fusiform, solid; spire convexly conoid, apex mucronate; suture linear; whorls 6 to 7; columellar plait strong; peristome thin; outerlip margin sharp; columellar margin short.

Individuals of this species congregate in the crevices of stones of the dyke constructed on the bank to prevent erosion.

Distribution : India : West Bengal : Medinipur, South 24 Parganas; Maharashtra. Elsewhere : Philippines.

61. Genus *Pythia* (Bolten) Roeding, 1798

88. *Pythia plicata* (Ferussac) Gray (Pl. 11, fig.4)

1825. *Scarabus plicatus* (Ferussac) Gray, *Ann. Phil.*, 25 : 415.

1921. *Pythia plicata* : Prashad, *Rec. Indian Mus.*, 22 : 467.

1975. *Pythia plicata* : Subba Rao & Mookherjee, *Recent Research in Estuarine Biology*, p. 171.

Material examined : i) 60 exs., Port Canning, Coll. G. Nevill, J. Woodmason, F. Stoliczka and J. Baxter; ii) 6 exs., Port Canning, Reg. No., M4795/1, Coll. N. Annandale; iii) 15 exs., Sunderban, Reg. No., M 11473/2, Coll. N. Annandale, S. W. Kemp and B. Prasad; iv) 82 exs., Falta, 21.7.64, v) 68 exs., Lakshikantipur, 10.8.85, Coll. P. Roychowdhury; vi) 9 exs., Diamond Harbour, 17.6.64, Coll. N.V. Subba Rao & H.P. Mookherjee; vii) 7 exs., Kakdwip, 18.8.79, Coll. N.V. Subba Rao & Party; viii) 1 ex., Bidya river, 10.9.83, ix) 1 ex., Malta Island, 12.9.83, x) 1 ex., Gosaba, 18.9.83, Coll. N.C. Gayen; xi) 1 ex., Champta, 11.9.83, xii) 8 exs., Gona, 18.9.83, Coll. S. Bhuiya; xiii) 1 ex., Basirhat, 5.9.84, xiv) 1 ex., Jharkhali, 20.9.84, Coll. B.P. Halder & Party.

Measurements (in mm) : Length 24.75 - 4.00 ; Diameter 17.60 - 2.40 ; Maximum height of the aperture 12.10 - 2.10

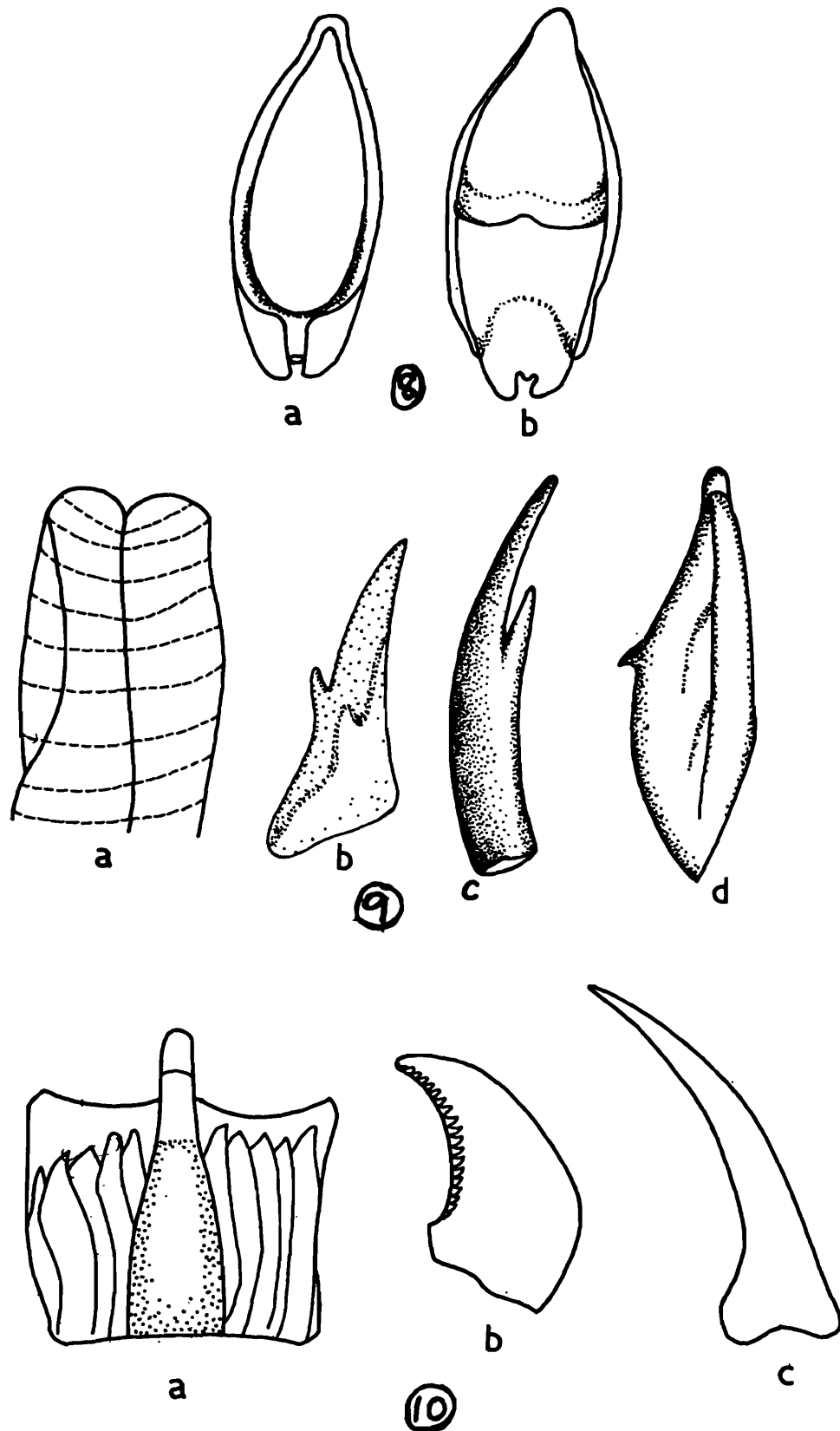
Diagnosis : Shell ovate, compressed; spire acute; body whorl large, ovate; suture impressed, aperture narrow; outer lip margin reflexed, dentate inside; columella strongly plicated; colour light purple with white band along the outer lip.

Distribution : India : West Bengal : North and South 24 Parganas; Pondicherry, Orissa, (Mahanadi Estuary), Tamil Nadu (Pitchavaram mangroves). Elsewhere : Sril Lanka, Burma, Borneo, Java, Siam, Hongkong.

Order NOTAPSIDEA Family PLEUROBRANCHAEIDAE 62. Genus *Pleurobranchaea* Laue

89. *Pleurobranchaea* sp. (Pl. 11, figs. 2 & 3 Text figs. 9a, b-d)

Material examined : i) 21 exs., Digba, 14.3.83, ii) 19 exs., Digba, 24.2.85, Coll. A. Dey and S. Barua.



Text figs. 8. *Melanochlamys* sp. (a) Dorsal view (b) Ventral view
 (9a) Radula of *Pleurobranchaea* sp. (b-d) Individual teeth of *Pleurobranchaea* sp.
 10. Radula of *Armina* sp. (a) Central (b) lateral (c) Marginal
 (Length 4.72 mm., Width- 3.76 mm., No. of rows - 50-52)

Measurements (in mm) : Length 62.30 - 35.35 ; Width 36.35 - 17.15.

Diagnosis : Body elongately ovate with protruded anterior buccal part, mantle ovate and covers the body; oral tentacles fused to form oral veil; foot broad anteriorly and tapering posteriorly which extends beyond the margin; ctenidium pectinate with 36/35 lamellae situated on the right side between foot and mantle; genital orifice situated anterior to the attachment of the gill rachis; anal opening hidden by upper row of the ctenidium; fleshy colour in fresh condition.

Radula flat, ribbon-like, measuring 21.82 mm long and 13.26 mm width in a specimen of 62.05 mm length; teeth uniform, large, sharp and with a denticle; there are 35 to 37 rows of teeth, each with 55 to 60 teeth on either side of a naked rachis. (Fig. 9)

Distribution : India : West Bengal : Medinipur; Tamil Nadu.

Order NUBIBRANCHIA
Sub-Order DORIDACEA
Family POLYCERIDAE
63. Genus *Kalinga* Alder and Hancock

90. *Kalinga ornata* Alder and Hancock
(Pl. 11, figs. 5 & 6)

1866. *Kalinga ornata* Alder and Hancock, *Trans. zool. Soc. Lond.*, 5 : 113, pl. 32, figs. 7-10.

Material examined : i) 2 exs., Digha, July 1985, Coll. A.K. Barua.

Measurements (in mm) : Length 56.05 ; Width 36.15 31.15

Diagnosis : Animal doris-like with broad foot and narrow back; foot flat, oval, pale yellowish-white; back tinted with shades of light green and pink; anterior margin bears 14 small, pale white, plumose tufts, shorter in the middle and longer on the sides; mouth slit-like, situated anterior between mantle and foot just below the oral veil, guarded by two fleshy labial folds; rhinophores two, conical, perfoliated structure with a short, stout pedicle; posterior dorsal margin with five pinnately branched branchiae with equal interspace; gills contractile, greyish-green, bespeckled with crimson, mantle beset with minute conical processes, very minutely papillated at the base and with crimson or yellow, contractile tuft at the centre; conical processes vary in size and diameter; genital vestibule situated on the right side of the body between mantle and foot.

Distribution : India : West Bengal : Medinipur; Andhra Pradesh, Tamilnadu. Elsewhere : East African Coast, Amboina, Malacca and Japan.

Remarks : Carnivorous, inhabits crevices of rocks submerged in shallow water in the sea (Eliot, 1910). The above specimens were collected from the fishing nets. Virabhadra Rao (1936) studied the anatomy in detail.

Sub-Order ARMINACEA
 Family ARMINIDAE
 64. Genus *Armina* Rafinesque

91. *Armina* sp.
 (Pl. 12, figs. 1 & 2 Text figs 10, a-c)

Material examined: i) 3 exs., Digha, 14.3.83, ii) 15 exs., Digha, 24.2.85, Coll. A. Dey and S. Barua.

Measurements (in mm) : Length 73.50 - 30.50 ; Width 33.50 - 18.60

Diagnosis : Dorsal surface almost plain without ridges or lines. An expanded oral velum; rhinophores withdrawn completely; foot broad anteriorly and pointed towards posterior end; mouth situated anteriorly on a round thickening in front of foot; labial armature consists of two oral jaw plates attached on both the sides; anteriorly on either side of the foot margin 15-16 gills followed by 37-38 lamellae; fleshy colour.

Radula 4.72 mm long and 3.76 mm broad in a specimen measuring 65-50 mm, 34 rows of teeth, each row with 50-52 serrations on either side of the rachidian tooth; rachidian tooth with a big central cusp and five denticles on either side. (Fig. 10).

Order SOLEOLIFERA
 Family ONCHIDIIDAE
 65. Genus *Onchidium* Buchannan

Key to the species

1. Pulmonary orifice is situated at the posterior end of mantle; body soft..... *O. tenerum* Stoliczka
 Pulmonary orifice is near to anus; body hard..... (2)
2. Foot broad; tip of the tubercle with one jet black dot..... *O. tigrinum* Stoliczka
 Foot narrow; tip of the tubercle with more than one jet black dot..... *O. typhae* Buchannan

92. *Onchidium tenerum* Stoliczka
 (Pl. 12, figs. 3 & 4)

1869. *Onchidium tenerum* Stoliczka, *J. Asiat. Soc. Beng.*, 38 : 107, pl. 15, fig. 3 (type locality : Matla river, Port Canning).

Material examined : i) 62 exs., Uttarbhag, 18.8.1931, Coll. Hodgart; ii) 203 exs., Pilai river, Uttarbhag, 13.3.33, iii) 423 exs., Pilai river, Uttarbhag, 4.3.34, Coll. S.L. Hora; iv) 4 exs., Chhota mullakhali, 13.9.84, v) 6 exs., Port Canning, 26.9.84, vi) 1 ex., Haldia, 15.3.85, vii) 11 exs., Diamond Harbour, 13.9.85, Coll. B.P. Halder and Party; viii) 5 exs., Sibganj (Hugli bank) 11.8.88, Coll. A. Misra and Party.

Measurements (in mm) : Length 35.40 - 5.85 ; Width 19.30 - 3.20

Diagnosis : Body oval, more or less elongated at the time of movement, soft, pulpy; mantle greenish-grey and with dark spots and finely granular; eyes black and centrally situated in transverse fold; eye pedicles stout at the base with distinct swollen, granular tips; pulmonary orifice is situated at the posterior end of the mantle.

Distribution : India : West Bengal : Haora, North and South 24 Parganas.

Remarks : It lives buried in mud upto 15 cms or more, found crawling on the dykes, and poles after the rain. It lies in perpendicular position with posterior end of the mantle directed upward.

93. *Onchidium tigrinum* Stoliczka
(Pl. 13, figs. 1 & 2)

1869. *Onchidium tigrinum* Stoliczka, *J. Asiat. Soc. Beng.*, 38 : 105, pl. 15, fig. 2 (type locality, Port Canning).

Material examined : i) 32 exs., Malta river, Port Canning, 10.8.85, Coll. N.V. Subba Rao and H.P. Mookherjee; ii) 1 ex., Haldibari, 11.9.83, Coll. S.S. Saha; iii) 2 exs., Jhingakhali, 12.9.83, Coll. S. Biswas; iv) 3 exs., Jhingakhali, 25.6.86, v) 6 exs., Diamond Harbour, 11.4.87, vi) 3 exs., Narayanganj (Namkhana) 16.12.87, vii) 2 exs., Sagar Island, 23.12.87, Coll. B.P. Halder and Party; viii) 2 exs., Netidhopani, 30.8.87, ix) 1 ex., Kcorasulti (Sunderban), 2.9.87, x) 1 ex., Bidya river, 21.8.87, xi) 3 exs., Haldibari, 22.8.87, Coll. S. Barua.

Measurements (in mm) : Length 17.00 - 6.70 ; Width 12.45 - 5.30

Diagnosis : Body large, ovate with strong coriaceous, hard mantle; upper surface with small granules enclosed between large tubercles each with a jet black dot at the tip; pale greenish with blackish irregular spots; foot broad and extended upto the mantle; head and pedicles dark green; the pedicle thick at the base, thin in the middle, and slightly thickened tip which bear black eyes at upper surface.

Distribution : India : West Bengal : North and South 24 Parganas.

Remarks : Occurs in shady places, inside holes, and on bricks, dykes, old wood and bushes on the bank of Hugli - Matla river.

94. *Onchidium typhae* Buchannan
(Pl. 13, figs. 3 & 4)

1800. *Onchidium typhae* Buchannan, *Trans Linn. Soc. Lond.*, 5 : 132.

Material examined : i) 1 ex., Calcutta, Reg. No., M 15745/2; Coll. H. S. Rao, ii) 3 exs., Haldibari, 11.9.83, Coll. S.S. Saha; iii) 1 ex., Jhingakhali, 12.9.83, Coll. S. Biswas; iv) 2 exs., Champta, 15.9.83, Coll. S. Bhuiya; v) 3 exs., Nurpur (Hugli river), 7.12.83; vi) 4 exs., Saibganj, 11.8.88, vii) 2 exs., Bally khal

(Hugli), 17.8.88, Coll. A. Misra and Party; viii) 1 ex., Chhotamullakhali, 13.9.84, ix) 1 ex., Diamond Harbour, 13.3.85, x) 1 ex., Haldia, 15.3.85, xi) 5 exs., Falta, 27.3.85, xii) 1 ex., Jharkhali, 25.6.86, xiii) 2 exs., Sultanpur, Diamond Harbour, 9.4.87, xiv) 4 exs., Patikhal (Haldia), 15.4.87, xv) 9 exs., Sultanpur, Diamond Harbour, 29.11.87, xvi) 5 exs., Gadiwra, 4.1.89, Coll. B.P. Halder and Party; xvii) 1 ex., Budge-Budge, 7.10.90, Coll. S. Chatterjee.

Measurements (in mm) : Length 43.25 13.45 ; Width 20.00 9.05

Diagnosis : Body narrow and elongated during motion; with obtuse anterior and posterior ends; mantle greenish with various shades upward, numerous smaller and larger tubercles distributed throughout the dorsal surface; the top of the tubercles provided with 2 to 4 jet black dots; foot narrow, greenish yellow and not as broad as mantle.

Distribution : India : West Bengal : Calcutta, Medinipur, North and South 24 Parganas.

Remarks : It is a common species and its range in the estuary extends upto Dakhineswar, about 120 kms. upward from Sand heads. Found crawling on bricks/dykes, ditches, and on the substratum the Hugli-Malta estuary.

Class SCAPHOPODA
Family SIPHONODONTALIIDAE
66. Genus *Cadulus* Philippi, 1844

95. *Cadulus clavatum* (Gould)
(Pl. 14, fig. 1)

1860. *Dentalium clavatum* Gould, *Proc. Boston Soc. nat. Hist.*, 7 : 166.

Material examined : i) 5 exs., Digha, Reg No., M 20527/4, Coll. F.M.J. Pinn; ii) 3 exs., Digha, 9.7.86, Coll. A.K. Mondal & Party.

Diagnosis : Shell small, white, somewhat solid, slightly curved and gradually tapering to the apex; surface smooth, polished; aperture ovate with dorsally more flattened than ventral.

Distribution : India : West Bengal : Medinipur. Elsewhere : China, Philippines, Japan.

Remarks : Washed shore collections, common in fine sandy bottom. It is perhaps the first record from Indian waters.

Family DENTALIIDAE
67. Genus *Dentalium* Linnacus, 1758

96. *Dentalium octangulatum* Donovan
(Pl. 14, fig. 2)

1804. *Dentalium octangulatum* Donovan, *Nat. Hist. Brit. Shells*, 5 : 162.

1859. *Dentalium hexagonum* Gould, *Proc. Boston Soc. nat. Hist.*, 7 : 166.

1872. *Dentalium sexocostatum* Sowerby, *Thes. Conch.*, 3 : 103, pl. 223, fig. 11.

1877. *Dentalium japonicum* Dunker, *Malak. Blatt.*, 24 : 68.
 1879. *Dentalium okohamense* Watson, *J. Linn. Soc. Lond.*, (zool), 14 : 517.
 1982. *Dentalium octangulatum* : Abbott & Dance, *Compendium of Sea Shells*, p. 283.

Material examined : i) 5 exs., Digha, Reg. No., M 20526/4, Coll. F.M.J. Pinn; ii) 7 exs., Saimari chara, Sunderbans, 23.8.87, Coll. S. Barua.

Diagnosis : shell large, moderately stout and well curved; sculpture consist of eight strong, raised, rounded longitudinal ribs, sharp and prominent at the narrow posterior end, separated by deep, wide, flattened and slightly concave intersectices, traversed by numerous longitudinal striae; growth lines inconspicuous; aperture slightly oblique, longer than broad and octogonal in shape; white or bluish white.

Distribution : India : West Bengal : Medinipur, North 24 Parganas; Orissa, Tamil Nadu. Elsewhere : China Sea, Korea, Japan.

Remarks : common in fine sandy and muddy bottoms, Indo-Pacific. Off shore to 100 meters (Abbott & Dance, 1982).

Class BIVALVIA
 Order NUCULOIDA
 Family NUCULIDAE

68. Genus *Nucula* Lamarck, 1799

Key to the species

Inner ventral margin, smooth..... *N. convexa* Hinds
 Inner ventral margin denticulate..... *N. mitralis* Hinds

97. *Nucula (Leionucula) convexa* Hinds
 (Pl. 14, figs. 3 & 5)

1833. *Nucula convexa* Sowerby, *Conch. Illustr.*, *Nucula*, 50 : 5, fig. 22.
 1933. *Nucula convexa* : Prashad, *Arch. Naturges.*, 2 : 127, pl. 1, fig. 3.

Material examined : i) 19 exs., Sandhead, 1884, Coll. J. Barnett.

Measurements (in mm) : Length 10.35 - 5.40 ; Width 7.85 - 4.40 ; Height 6.10 - 3.60.

Diagnosis : Shell obliquely ovate, infalted, inequilateral; anterior end long, somewhat tapering; posterior end short less than half of anterior side; umbone prominent and recurved backward; sculptured with fine concentric striae, almost absent on the umbonal region; inner side nacreous; ventral inner margin smooth; teeth bigger in the mid region, with gradually reduced in size on either side, anterior with 18-22 and posterior with 7 teeth.

Distribution : India : West Bengal : South 24 Parganas; Orissa. Elsewhere : Sri Lanka, Burma, Singapore, China, Malacca.

98. *Nucula (Nucula) mitralis* Hinds
(Pl. 14, figs. 8 & 10)

1843. *Nucula mitralis* Hinds *Proc. zool. Soc. Lond.*, 9 : 97.

1933 *Nucula mitralis* : Prashad, *Arch. Naturges.*, 2 : 130, pl. 1, figs. 8,9.

Material examined : i) 13 exs., Sandhead, 1884, Reg. No., M3027/1 ii) 3 exs., Sandhead, 17.6.1885, Coll. J. Barnett.

Measurements (in mm) : Length 7.60 - 4.43 ; Width 5.60 - 3.80 ; Height 4.45 - 2.60

Diagnosis : Shell wedge shaped, longer than broad, inequilateral, nacreous; umbone acute; lunule lozenge shaped; anterior margin rounded; posterior side short and less than half of anterior side; sculptured with fine concentric striae; teeth plate like, anterior end with 25-28 and posterior with 8-9 teeth; ventral margin denticulate on the inner side.

Distribution : India : West Bengal : South 24 Parganas; Andamans, Orissa. Elsewhere : Malacca, Australia.

Family NUCULANIDAE

Key to the genera

Shell closing tightly; pallial sinus shallow..... *Nuculana*

Shell gaping posteriorly; pallial sinus deep..... *Yoldia*

69. Genus *Nuculana* Link, 1807

99. *Nuculana (Secella) fragilis* Chemnitz
(Pl. 14, figs. 4 & 6)

1784. *Arca fragilis* Chemnitz, *Syst. Cab. Conch.*, 7 : 165, fig. 546.

Material examined : i) 110 exs., Off Sandhead, 1884, Coll. J. Barnett.

Measurements (in mm) : Length 12.15 - 6.00 ; Width 7.85 - 3.65 ; Height 6.15 - 2.70

Diagnosis : Shell medium, inflated, semipellucid, posterior end pointed beak like; anterior dorsal margin straight; posterior dorsal margin and ventral margin concave; sculptured with fine concentric ridges fom like riblet; anterior with 14 teeth and posterior with 16 teeth.

Distribution : India : West Bengal : South 24 Parganas; Andaman & Nicobar Islands.

Remarks : These shell were collected in the year of 1984 by J. Barnett from Sandhead. After that no collections were recorded.

70. Genus *Yoldia* Mueller, 1842

100. *Yoldia nicobarica* (Bruguier)
(Pl. 14, figs. 7 & 9)

1860. *Leda nicobarica* Bruguier (MS) Hanley in Sowerby's *Thes. Conch.*, 3 : 136, pl. 223, fig. 7.

Material examined : i) 1 ex., Sandhead, 7.6.1885, Coll. J. Barnatt; ii) 1 ex., Off Gangetic deltae, (200 meters), Reg. No., 406/1.

Measurements (in mm) : Length : 29.65 ; Width 16.00 ; Height 10.50

Diagnosis : Shell ovate, subequilateral; posterior side attenuated, acuminate above; sculptured with fine concentric groove; posterior side larger than the anterior; anterior with 18 teeth and posterior with 20 teeth.

Distribution : India : West Bengal : South 24 Parganas; Andaman & Nicobar Islands.

Remarks : No recent collections were made.

Order ARCOIDA
Family ARCIDAE

Key to the genera

Shell equivalve, heavy; sculptured with strong costae..... *Anadara*

Shell inequivalve the left valve larger than the right; relatively thin; sculptured with radial ribs.....
..... *Scapharca*

71. Genus *Scaphula* Benson, 1834

101. *Scaphula deltae* Blanford
(Pl. 15, figs. 1 & 2)

1876. *Scaphula deltae* Blanford, *J. Asiat. Soc. Beng.*, 36 (2) : 71, pl. 14, figs. 7-10.

Additional materials : 3 exs., Palta (Barrackpore), 17.2.88, Coll. A. Dey.

Remarks : This species occurs in the river Hugli and the ponds feeds by the Hugli. Further details are given in the "Land and Freshwater Mollusca of West Bengal (Part I)" - Mitra and Dey, in Press.

72. Genus *Anadara* Gray, 1847102. *Anadara granosa* (Linnaeus)
(Pl. 15, fig. 3)1758. *Arca granosa* Linnaeus, *Syst. Nat.* ed. 10, p. 694.1790. *Arca corbicula* Gmelin, *Syst. Nat.* ed. 13, p. 3310.

Material examined : i) 1 ex., Sandhead, 17.6.1888; ii) 2 valves Ganga Sagar, 25.8.78, Coll. G.C. Rao and K.V. Surya Rao; iii) 1 valve, Ganga Sagar, 3.9.79, Coll. K.V. Surya Rao & S.C. Mitra ; iv) 17 valves, Saimari khal, 13.9.83, Coll. C.K. Misra; v) 1 ex., Champta, 11.9.83, Coll. S. Bhuiya; vi) 9 exs., Jharkhali, Sunderban, 23.9.84, vii) 3 exs., Jumbudeep, 7.12.87, Coll. B.P. Halder & Party ; viii) 1 ex., Digha, 27.3.83, Coll. A. Dey & S. Barua; ix) 1 ex., Naubankichara, mouth of Netidhopani, 30.8.87 Coll. S. Barua; x) 1 ex., Port Canning, Coll. A. Misra; xi) 2 exs., Champta, 4.11.88, xii) 3 exs., Kishorimohanpur, 5.11.88, Coll. A. Dey.

Measurements (in mm) : Length 56.50 - 21.60 ; Width 45.40 - 16.70 ; Height 46.40 - 15.15

Diagnosis : Shell orbicularly - ovate, equivalve, side slightly angulated; sculpture radiately ribbed, ribs upto 20, tuberculately crenulated.

Distribution : India : West Bengal : Medinipur, North and South 24 Parganas; Andhra Pradesh, Gujarat, Kerala, Maharashtra, Orissa, Tamil Nadu. Elsewhere : Widely distributed in the Indo-pacific region.

Remarks : Commonly known as 'Ark Shell', occurs in muddy substratums of Sunderbans. The maximum population 2-31 nos./m² observed at Kishorimohanpur. It is commercially an important species.

73. Genus *Scapharca* Gray, 1847*Key to the species*

Shell rhomboidal; umbo more elevated; cardinal area not so narrow..... *S. inequivalvis* (Bruguiere)

Shell inequilateral; umbo less elevated; cardinal area narrow..... *S. deyrollei* Joussacume

103. *Scapharca deyrollei* Joussacume
(Pl. 15, figs. 4 & 5)1983. *Scapharca deyrollei* Joussacume, *Le Natura liste*, 15 lanne, p. 191.1948. *Acra deyrollei* : Ray, *Rec. Indian Mus.*, 46 : 110.

Material examined : i) 1 ex., Digha khal, 22.9.79, Coll. N.V. Subbba Rao & Party.

Measurements (in mm) : Length 35.30 ; Width 22.00 ; Height 18.25

Diagnosis : Shell elongated, inequivalve, angulated at the dorsal region ; surface radiately ribbed, ribs 33 to 35 numbers ; ligamental area narrow, umbone not elevated.

Distribution : India : West Bengal : Medinipur, Tamil Nadu. Elsewhere : Burma

104. *Scapharca inequivalvis* (Bruguier)
(Pl. 15, figs. 6 & 7)

1789. *Arca inequivalvis* Bruguier, *Ency. Meth. Vers.*, 1(1) : 106, pl. 305 fig. 3c.

1956. *Arca inaequivalvis* : Satyamurti, *Bull. Madras Govt. Mus. new. Ser.* 2 (7) : 24, pt. II, figs. 7a & 7b.

Material examined : 1) 1 ex., Sandhead, 17.6.1885, Coll. J. Barnett; iii) 1 valve, Digba, 17.5.83, Coll. A. Dey & S. Barua.

Measurements (in mm) : Length 18.80 12.85 ; Width 15.40 - 11.10 ; Height 14.30

Diagnosis : Shell elongately ovate, inequivalve, side angulated at the dorsal margin, posterior side extended; surface radiately ribbed; ribs 32 to 35 in numbers; unbones elevated.

Distribution : India : West Bengal : Medinipur, South 24 Parganas ; Gujarat, Kerala, Maharastra, Orissa, Tamil Nadu.

Remarks : Widely distributed in the Indo-pacific region, on fine sandy bottom to 20 meter depth.

Family NOETIIDAE

74. Genus *Striarca* Conard, 1862

105. *Striarca lactea* (Linnaeus)
(Pl. 15, figs. 8 & 9)

1858. *Arca lactea* Linnaeus, *Syst. Nat.* ed. 10, p. 649, no. 143.

1915. *Arca (Fossularca) lactea* : Preston, *Rec. Indian Mus.*, 11., 11 : 298.

Material examined : i) 2 valves, Sajnakhali, 19.9.84, ii) 1 valve, Jharkhali, 29.9.84, iii) 1 ex., Pirkhali, 29.5.85, iv) 2 valves, Bakkhali, 3.4.87, Coll. B.P. Halder & Party; v) 3 exs., Nikarikhal, 24.8.87, Coll. S. Barua.

Measurements (in mm) : Length 16.80-10.55 ; Width 12.87 8.38 ; Height 9.95 5.90

Diagnosis : Shell squarely oval, sides angulated at the dorsal region, anterior obtusely rounded, posterior angularly rounded; sculptured with radiate and finely crenulated striae.

Distribution : India : West Bengal : North and South 24 Parganas; Orissa.

Remarks : It occurs in the crevices of mud covered rocks and oyster beds.

Order MYTILOIDA
Family MYTILIDAE

Key to the genera

Umbo situated on the anterior end..... *Perna*

Umbo situated behind anterior end..... *Modiolus*

75. Genus *Perna* Retzius, 1877

106. *Perna viridis* Linnaeus
(Pl. 16, fig. 1)

1758. *Mytilus viridis* Linnaeus, *Syst. nat.* ed. 10, p. 706, sp.no.220.

1785. *Mytilus smaragdinus* Chemnitz, *Conch. Cab.*, 8., pl. 83, fig. 745.

Material examined : 1) 2 exs., Digha, 28.3.84, Coll, A. Dey & S. Barua.

Measurements (in mm) : Length 7.65; Width : 5.50; Height : 2.85

Diagnosis : Shell large, thick, elongately triangular with pointed posterior end, umbo terminal; ligament long, strong; sculptured with strongly decussate striae; periostracum greenish black, bright greenish towards the margin.

Distribution : India : West Bengal : Medinipur; Andhra Pradesh, Goa, Gujarat. Elsewhere : Hongkong to Arabian Sea.

Remarks : It generally occurs in clusters, but only 2 juvenile specimens attached to a wooden pole were collected from Digha.

76. Genus *Modiolus* Lamarck, 1799

Key to the species

1. Shell with radiating ridges on the posterior end..... (2)

Shell without radiating ridges on the posterior end..... *M. tulipa* (Lamarck)

2. Shell deep colour; ventral margin more depressed in the middle; radiating ridges prominent and present half of the body..... *M. striatulus* (Hanley)

Shell light colour; ventral margin almost straight; not so prominent and only a few radiating ridges *M. undulatus* (Dunker)

107. *Modiolus striatulus* (Hanley)
(Pl. 16, figs. 2 & 4)

1844. *Modiolus striatula* Hanley, *Proc. zool. Soc. Lond.*, pt. 7 : 14.
1910. *Modiola jenkinsi* Preston, *Rec. Indian Mus.*, 5 : 36, fig. 5.
1911. *Modiola annandalei* Preston, *Rec. Indian Mus.*, 6 : 46, fig. 4.
1911. *Modiola celator* Preston, *Rec. Indian Mus.*, 6 : 41, fig. 5.
1914. *Modiola emarginata* Preston, *Rec. Indian Mus.*, 10 : 304.
1915. *Modiola taprobanensis* Preston, *Ann. Mag. nat. Hist.*, (8) 16 : 84.

Material examined : i) 62 exs., Uttarbhag Lockgate, 18.3.34, Coll. S.L. Hora; ii) 204 exs., Pulta, from 27.2.35 to 15.9.38, Coll. Pulta Survey; iii) 3 valves, Zoological garden, 25.2.63, Coll. P. Raychowdhury & A. Biswas; iv) 15 exs., Botanical garden, Haora, Coll. P. Raychowdhury; v) 5 exs., Botanical garden, Haora, Coll. K. K. Tiwari; vi) 6 exs., Dakhsineswar ghat, 25.2.71, Coll. P.K. Das; vii) Many exs., King George's Dock, Calcutta, Reg. no., M15628/2, Coll. B. Prashad.

Measurements (in mm) : Length 24.80 - 7.50; Width : 10.35-3.35 ; Height : 8.35 - 2.40.

Diagnosis : Shell elongately trapezoid and gibbous in the middle; sculptured with radiating ridges which are wider and rather more distinct on the anterior margin.

Distribution : India : West Bengal : Calcutta, Haora, North and South 24 Parganas; Andaman and Nicobar Islands, Kerala, Maharastra, Orissa, Tamil Nadu. Elsewhere : Sri Lanka, Burma, Singapore, Gulf of Thailand; Philippines, China and Japan.

Remarks : It is a highly variable species. Annadale and Kemp (1916) studied the variation of this species and clarified its identity. It is usually found attached to rocks, stones, wooden jetties in submerged water. It causes major nuisance in Pulta water works, Calcutta (Krishnamurti & Rajagoalan, 1968).

108. *Modioulis tulipa* (Lamarck)
(Pl. 16, figs. 3 & 6)

1836. *Modiola tulipa* Lamarck, *Hist. nat. Anim. Sans. Vert.*, 7 : 18.

Material examined : i) 1 valve, Digba, 17.5.83, ii) 19 exs., Digba, 27.3.84, Coll. A. Dey & S. Barua.

Measurements (in mm) : Length 45.15 - 26.45; Width : 22.90 - 12.60; Height : 18.40 - 10.00

Diagnosis : Shell thick, glossy, brown, moderately large, lower margin concave in the middle and upper margin convex; sculptured with fine concentric striae, a prominent oblique keel extending from umbo along the middle, inner side with distinct bluish-white outer part and purplish inner part, dorsal half above the keel with hairy surface.

Distribution : India : West Bengal : Medinipur; Andaman & Nicobar Islands, Tamil Nadu. Elsewhere : Mauritius.

109. *Modiolus undulatus* (Dunker)
(Pl. 16, figs. 5 & 7)

1856. *Valsella undulata* Dunker, *Proc. zool. Soc. Lond.*, 26 : 363.
1911. *Modiola chilkaensis* Preston, *Rec. Indian Mus.*, 6 : 41, fig. 6.
1914. *Modiola undulata* var. *crassicosta* Preston, *Rec. Indian Mus.*, 10 : 304, fig. 15.

Material examined: i) 4 exs., Mainapara (Kakdwip), 1.2.81, Coll. A. Dey & S. Barua; ii) 6 exs., Port Canning, 26.9.84, coll. B.P. Halder & Party; iii) 2 exs., Port Canning, Coll. A. Misra; iv) 18 exs., Port Canning, Coll. ?.

Measurements (in mm) : Length 34.35 - 27.25; Width 14.30 - 13.00; Height 12.65 - 9.35

Diagnosis : Shell gibbous, oblong, thin, rather inequivalve; umbo not so prominent, anteriorly situated; yellowish brown.

Distribution : India : West Bengal : South 24 Parganas; Orissa, Tamil Nadu. Elsewhere : Indonesia, Malacca.

Remarks : It very much resembles *M. striatulus* but differs from it in having thin and fragile shell with reddish undulating markings on its surface, radiating striae towards anterior and posterior parts.

Family PINNIDAE

77. Genus *Pinna* Linnaeus, 1758

110. *Pinna (Atrina) pectinata pectinata* Linnaeus
(Pl. 17, fig. 2)

1767. *Pinna pectinata* Linnaeus, *Syst. nat.*, ed. 12, p. 1160.
1891. *Pinna serra* Smith, *Proc. zool. Soc. Lond.*, p. 233.

Material examined : i) 1 valve, Sandhead, 20.6.24, ii) 1 ex., Sandhead, May 1928, Coll. P.V. Lady Fraser; iii) 1 ex., Sandhead, July 1927, Coll. C. Park.

Measurements (in mm) : Length 104.60+ - 99.50+ ; Height 39.40-35.60 ; Width 16.50 - 15.50

Diagnosis : Shell wedge shaped, triangular, outline inflated; heavy; sculptured with radiating ribs, bears short upright spines which open posteriorly; radiating sculpture consists of 15 to 30 radiating ribs on the posterior slope. Nacreous layer iridescent, occupying two-thirds of the valve; posterior adductor scar large, subcircular, located within the posterior border of the nacreous area; anterior adductor scar small, located at the tip of nacreous area.

Distribution : India : West Bengal : South 24 Parganas; Andaman and Nicobar Islands. Elsewhere : Sri Lanka, Thailand, Malaya, Korea, Japan, Philippines and Australia.

Remarks : No collections were made after 1928.

Order PTERIOIDA
Family ANOMIIDAE

Key to the genera

Shell irregular, orbicular or saddle shape; compressed.....*Placuna*

Shell irregular, not orbicular extremely compressed*Enigmonia*

78. Genus *Placuna* Lightfoot, 1786

111. *Placuna (P) placenta* (Linnaeus)
(Pl. 17, figs. 1 & 3)

1758. *Anomia placenta* Linnaeus, *Syst. Nat.*, ed. 10, p. 703.

1788. *Placenta orbicularis* Retzius, *Diss. Sist. nova testaceorum genera* London, p. 15.

Material examined : i) 1 ex., Palta, 1938, Palta Survey; ii) 4 exs., Jharkhali, 24.9.84, iii) 3 exs., Jambu Island, 17.12.87, Coll. B.P. Halder & Party.

Measurements (in mm) : Length 95.30-92.10; Width 92.25-89.80; Height 6.19-6.00

Diagnosis : Shell large, thin, flat, rounded and translucent, rather fragile, inner surface smooth, glossy and brilliant pearly appearance; outer surface with prominent growth lines and radial striae; adductor scar at the centre of the valve; umbo small, inconspicuous; cardinal teeth two, ridge-like, diverging from the umbo at a narrow angle; unequal and the posterior larger.

Distribution : India : West Bengal : North and South 24 Parganas; Andaman and Nicobar Islands Andhra Pradesh, Tamil Nadu. Elsewhere : Gulf of Aden, Malaya, China, Borneo, Philippines.

Remarks : It is seen lying on its right valve below the subsurface soil of mud flat from mid tidal zone to about 20 metres down. At the time of low tide it can be easily located by the slightly raised surface soil.

79. Genus *Anomia* Linnaeus, 1758

112. *Anomia achaeus* Gray
(Pl. 17, figs. 4 & 5)

1849. *Anomia achaeus* Gray, *Proc. zool. Soc. Lond.*, p. 116.

1859. *Anomia achaeus* Reeve, *Conch. Icon.*, 11 : *Anomia*, Pl. 3, figs. 12a - c

Material examined : i) 2 valves, Digba, Reg. no., M 20350/4, Coll. ?.

Measurements (in mm) : Length 25.10 - 16.40; Width 28.15- 21.50; Height -

Diagnosis : Shell broadly ovate, golden yellow; left valve convex, tumid and hooked towards the umbo; right valve radially striated

Distribution : India : West Bengal : Medinipur; Andhra Pradesh, Gujarat, Kerala, Maharashtra. Elsewhere : Persian Gulf, Gulf of Aden, Pakistan coast, Kawa Bay, West coast of Ceram.

80. Genus *Enigmonia* Iredale, 1918

113. *Enigmonia aenigmatica* Holten
(Pl. 18, figs. 1 & 2)

1795. *Tellina aenigmatica* Chemnitz, *Conch. Cab.*, 11, pl. 199, fig. 199, fig. 1949 (nom. nud.).

1918. *Enigmonia aenigmatica* Iredale, *Proc. malac. Soc. Lond.*, 13 : 28.

1975. *Anomia aenigmatica* : Subba Rao and Mookherjee, *Recent Researches in Estuarine Biology*, p. 173.

Material examined: i) 3 exs., Narayanganj, 12.3.80, Coll. K. V. Surya Rao & S.C. Mitra; ii) 1 valve, Sajnatala (Basanti), 25.2.86, iii) 1 ex., Narayanganj, 16.12.87, Coll. B.P. Halder & Party; iv) 10 exs., Baghbagan, 13.11.89, Coll. A. Dey.

Measurements (in mm) : Length 45.50- 13.63; Width 40.40-11.50; Height 8.70-3.60.

Diagnosis : Shell thin, fragile, inequivalve, almost rounded, purple colour; right valve bigger than the left; muscle scars well developed; adductor muscle scar single and smaller than the byssal retractor scars, muscle scars three in the left valve, crurum oblique.

Distribution : India : West Bengal : North and South 24 Parganas; Orissa, Maharashtra. Elsewhere : Bangladesh, Burma, Singapore, Philippines.

Remarks : Abundant throughout Sunderbans, attached to the trunk of mangrove plants. It attaches with its right valve and the umbo pointing downward to the exposed part of the trunk which receives the tidal splash. Our observations agree with those of Morton (1986).

Family OSTREIDAE

81. Genus *Crassostrea* Sacco, 1897

114. *Crassostrea cuttackensis* (Newton & Smith)

1912. *Ostrea gryphoides* var. *cuttackensis* Newton & Smith, *Rec. geol. Surv. India*, 42 (1) : 13, pls. 7,8, figs. A.B.

1916. *Ostrea madrasensis* Preston, *Rec. Indian Mus.*, 12 : 33, fig. 11.

1916. *Ostrea virginiana* : Annandale & Kemp, *Mem. Indian Mus.*, 5 : 348.

1967. *Crassostrea lugubris* : Ramson, *Rev. Tran. Inst. Peches marit.*, 31 (2) : 166, fig. 14.

1967. *Crassostrea belcheri* : Ramson, *Rev. Tran. Inst. Peches marit.*, 31 (2) : 171, fig. 17.

Material examined : i) 2 exs., Champia, 12.9.83, Coll. S. Bhuiya; ii) 2 exs., Jharkhali, 29.9.84, Coll. B.P. Halder & Party.

Diagnosis : Shell very heavy and bulky, variable shape. The shape, size and even the impression of muscle scars change due to the environmental conditions and that creates a lot of problem in the identification.

Distribution : India : West Bengal : North 24 Parganas; Andhra Pradesh, Gujarat, Karanatak, Kerala, Maharastra, Orissa, Tamil Nadu. Elsewhere : Bangladesh, Burma, Malaysia, Indonesia, Philip-pines.

Measurements (in mm) : Length 290.00-130.40; Width 145.00-56.00; Height 83.75-24.25

Remarks : This species was observed in Sunderban, attached to the lock gate, bricks and dykes and also inside the river.

115. *Crassostrea gryphoides* (Schlotheim)
(Pl. 18, figs. 3 & 4)

1813. *Oystrea gryphoides* Schlotheim, *Beitr. Natur. Verstein geogn. Hinsicht.*, 7 : 52.

1971. *Crassostrea gryphoides* : Ahmed, *Pakist. J. zool.*, 3 (2) : 232 pl. II, Figs. 10-12, 16.

Material examined : i) 2 exs., Baghbagan (Bagna), 13.11.89, Coll. A. Dey.

Measurements (in mm) : 280-250.00; Width 130-.00-105.00; Height 91.20-52.70

Diagnosis : Shell stout, bulky, elongated and irregular shape; inner margin pearly white; cavity beneath the hinge well marked; muscle scar broad and more or less oblong striations on the muscle scar.

Distribution : India : West Bengal : North 24 Parganas. Elsewhere : Burma.

Remarks : This species was considered as fossil species by many authors. Newton and Smith (1912) collected this species and concluded that *C. gryphoides* was a Miocene species and it was supported by Brown (1924). But Awati and Rai (1931) and Ahmed (1971) considered it as a living species.

During our recent survey to Sunderban area we observed beds of living oysters in the muddy substratum of canals in the Bagna block. A few samples were collected and preserved. From our studies we are of the opinion that the *C. gryphoides* (Schlotheim) is different from that of *C. cuttackensis* Newton and Smith and it is a living species.

82. Genus *Saccostrea* Dellfus and Dautzenberg, 1920

116. *Saccostrea cucullata* (Born)
(Pl. 19, fig. 1)

1778. *Ostrea cucullata* Born, *Index rerum naturalium musei Cassarei Vindobensis*, p.100.

1916. *Ostrea cucullata* : Annandale and Kemp, *Mem. Indian Mus.*, 5 : 349.

1956. *Ostrea forskalii* : Satyamurti, *Bull. Madras Govt. Mus. new. Ser.*, 1 (2) pt. 7 : 67, pl. 10, fig. 4.

Material examined : i) 5 exs., Chulkati, 9.11.88, ii) 7 exs., Matla-Chhota Hardi junction, 10.11.88, iii) 3 exs., Sajnakhali jetty, 11.11.88, Coll. A. Dey.

Measurements (in mm) : Length 29.80-20.60; Width 56.80-44.70; Height : 18.40-14.40

Diagnosis : Shell variable in shape, inequivalve, left more thick and larger than the right valve; some times flat, some times shallow cup like; outer margin with a series of folds which interlock with each other; shell whitish or geryish white, marked with deep purple towards the margin.

Distribution : India : West Bengal : North and South 24 Parganas, Andhra Pradesh, Andaman and Nicobar Islands, Gujarat, Kerala, Maharashtra, Orissa, Tamil Nadu. Elsewhere : Widely distributed in Indo-Pacific area.

Remarks : This species is highly variable, growing in clusters on rocks, bricks, wooden piles or jetties throughout Sunderbans. Sometimes they were also observed attached to the mangrove plants and also to molluscan shells, when no other suitable habitat was available. At Chulkati, about 70% of the total population of *Telescopium* were seen encrusted with oysters.

Order VENEROIDA
Family LUCINIDAE
83. Genus *Eamesiella* Chavan, 1951

117. *Eamesiella philippinarum* (Hanley)
(Pl. 19, figs. 2 & 3)

1850. *Lucina philippinarum* : Reeve, *Conch. Icon.* 6 : sp. no. 18, pl. 4, figs. 18a, 18b.

Material examined : i) 12 valves, Halliday Island, 1.9.87, Coll. S. Barua; ii) 9 valves, Port Canning, Reg. no., M 4746.

Measurements (in mm) : Length : 32.30-16.00; Width : 32.55-15.57; Height : 21.25-8.40

Diagnosis : Shell orbicular, inequilateral; posterior excavately angled; umbo central, elevated; sculptured with irregular, corrugate raised striae; hinge with indistinct cardinal teeth; lateral teeth calloused; white, outer side covered with dark brown epidermis; anterior adductor scar elongated, posterior adductor scar oval shaped.

Distribution : India : West Bengal : South 24 Parganas. Elsewhere : Burma, Singapore, Philippines.

Family CARDIIDAE

84. Genus *Trachycardium* Moerch, 1853118. *Trachycardium asiaticum* (Bruguiere)
(Pl. 19, figs. 4 & 5)1792. *Cardium asiaticum* Bruguiere, *Encly. Meth. Vers.*, 1, p. 224, no. 19, pl. 293, fig. 2.

Material examined: i) 4 exs., Sandhead, 12.9.1884, Coll. J. Barnett; ii) 3 exs., Sandhead, 17.6.1885, iii) 1 exs., Sandhead, 17.6.1885, iv) 1 ex., Sandhead, 27.4.1887, Coll. G. Lash; v) 2 exs., Sandhead, 18.10.1889 vi) 24 exs., Sandhead, 17.6. 1865, Coll. A. Milner.

Measurements (in mm) : Length : 36.05-31.55; Width 35.45-34.05; Height : 31.45-29.50

Diagnosis : Shell globose, white or pale cream colour; sculptured with radial ribs, smooth around umbo but lamelliferous towards the posterior margin.

Distribution : India : West Bengal : South 24 Parganas, Tamil Nadu.

Family MACTRIDAE

85. Genus *Macra* Linnacus, 1767*Key to the species*

1. Shell with concentric plications; posterior slope with a ridge..... *M. (Macrinula) plicataria*
Shell without concentric plications; posterior slope without ridge..... (2)
2. Shell violet colour..... *M. (Coelmactra) violacea*
Shell without violet colour or if any present only a part (3)
3. Concentric striae grooved at the anterior margin *M. (M) luzonica*
Concentric striae smooth and not grooved at anterior margin (4)
4. Shell inequilateral; triangular..... *M. (M) mera*
Shell equilateral; ovately triangular *M. (C) turgida*

119. *Macra (Macra) luzonica* Deshayes
(Pl. 19, figs. 7 & 8)

1854. *Macra luzonica* Deshayes, *Proc. zool. Soc. Lond.*, p. 64, no. 12.
1977. *Macra (M) luzonica* : Ray, *Contribution to the knowledge on Molluscan fauna of Maungmagan, Lower Burma*, p. 135.

Material examined: i) 8 valves, Digha, 20.12.65, Coll. K.K. Ray; ii) 28 exs., Digha, 10.3.66, Coll. K.V. Rama Rao; iii) 5 valves, Fraserganj, 9.12.68, Coll. K.V. Surya Rao & S. Ahmed; iv) 3 valves, Bakkhali, 23.8.78, Coll. G.C. Rao & K.V. Surya Rao; v) 3 valves, Ganga Sagar, 25.8.78, vi) 3 exs., Digha, 12.1.83, vii) 1 valve, Digha, 1983, viii) 2 valves, Digha, 17.5.83, ix) 2 exs., Digha, 21.9.83, x) 1 ex., Digha, 19.3.85, Coll. A. Dey & S. Barua.

Measurements (in mm) : Length 40.55 - 9.50 ; Width 39.15 - 6.85 ; Height 19.85 - 3.65.

Diagnosis : Shell triangulate, equilateral; almost equal on both the sides; umbo small, elevated; anterior end rounded; posterior slightly pointed; sculptured with fine concentric striae grooved at the anterior end; shining pale brown with violet at umbonal region but internally deep violet.

Distribution : India : West Bengal : Medinipur, South 24 Parganas; Andaman & Nicobar islands, Goa, Maharashtra, Orissa, Tamil Nadu. Elsewhere : Sri Lanka, Burma, Philippines, Japan, Australia.

120. *M. (M) mera* Deshayes
(Pl. 20, figs. 5 & 6)

1853. *Macra mera* Deshayes, *Proc. zool. Soc. Lond.*, p. 16
1854. *Macra mera* Deshayes in Reeve *Conch. Icon.* 8., *Macra* pl. 16, fig. 82.
1854. *Macra antiquata* Reeve (non Spengler), *Conch. Icon.* 8, *Macra* pl. 6, fig. 22.

Material examined: i) 1 ex., Junput, 8.3.66, Coll. K.V. Rama Rao & Party; ii) 1 valve, Ganga Sagar, 3.9.79, Coll. K.V. Surya Rao; iii) 1 ex., Digha, Reg. no., M 20344/3, Coll. F.M.J. Pinn.

Measurements (in mm) : Length 68.40 - 41.70 ; Width 58.70 - 29.55 ; Height 44.35 - 23.55

Diagnosis : Shell ovately triangular, inequilateral; umbo elevated; shining light yellowish with violet umbonal region; sculptured with fine concentric striae, lunule ovate.

Distribution : India : West Bengal : Medinipur, South 24 Parganas; Maharashtra, Orissa, Tamil Nadu. Elsewhere : Singapore, Borneo, China sea, Australia, Indonesia.

121. *Macra (Macrinula) plicataria* Linnaeus
(Pl. 20, figs. 7 & 8)

1767. *Macra plicataria* Linnaeus, *Syst. Nat.*, ed. 12 : 1125.
1977. *Macra (Macrinula) plicataria* : Subba Rao, *Newsl. zool. Surv. India*, 3 (5) : 300.

Material examined : i) 10 valves, Sandhead, 17.5.1885, Coll. J. Barnett; ii) 2 exs., Sandhead, 17.6.1885, iii) 1 ex., Sandhead, 18.10.1889, Coll. Capt. Milner; iv) 1 ex., Digha, 4.9.64, Coll. K.K. Dutta; v) 1 valve, Digha, 20.12.65, Coll. K.K. Ray; vi) 3 exs., 2 valves, Digha, 19.5.83, vii) 1 ex., Digha, 27.3.83, Coll. A. Dey & S. Barua; viii) 1 ex., Digha, Reg. no., M 20343/3, Coll. F.M.J. Pinn.

Measurements (in mm) : Length 41.00 - 26.00 ; Width 28.50 - 19.50 ; Height 16.15 - 9.85

Diagnosis : Shell triangular, inequilateral; umbo small, elevated, anterior side rounded; posterior side angulated, plicately keeled; lunule lanceolately ovate; sculptured with broad, concentric ribs, white, transparent.

Distribution : India : West Bengal : Medinipur, South 24 Parganas; Andaman & Nicobar Islands, Goa, Maharashtra, Orissa, Tamil Nadu. Elsewhere : Burma, Indonesia, Sumatra.

122. *Mactra (Coelomactra) turgida* Gmelin
(Pl. 20, figs. 2 & 4)

1791. *Mactra turgida* Gmelin, *Syst. Nat.*, ed. 13 : 3260.

Material examined : i) 18 valves, Junput, 8.3.66, Coll. K.V. Rama Rao & Party; ii) 3 valves, Digha, 27.3.83, Coll. A. Dey & S. Barua; iii) 2 valves, Saimari khal, 13.9.83, Coll. C.K. Misra.

Measurements (in mm) : Length 80.50 - 47.35 ; Width 61.50 - 29.85 ; Height 37.85 - 17.50

Diagnosis : Shell large, strong, ovately triangulate; umbo elevated; sculptured with very fine concentric striae more prominent in the umbonal region; smooth, white, often with pinkish violet tint at the umbonal region.

Distribution : India : West Bengal : Medinipur, North 24 Parganas; Orissa, Tamil Nadu. Elsewhere : Sri Lanka, Burma. Indian Ocean (Abbott & Dance, 1982).

123. *Mactra (C) violacea* Gmelin
(Pl. 20, fig. 1 & 3)

1782. *Mactra violacea* Chemnitz, *Conch. Cab.*, 6 : 208, 220, figs. 213 & 214.

1790. *Mactra violacea* Gmelin, *Syst. Nat.*, ed. 13, p. 3260.

Material examined : i) 1 ex., Bay of Bengal, 29.2.24, ii) 9 exs., Sandhead, 20.6.24, Coll. P.V. Lady Fraser; iii) 1 ex., Digha, 4.9.64 Coll. A.K. Dutta; iv) 1 valve, Digha, 20.12.65, Coll. K.K. Ray; v) 2 exs., Digha, 29.9.79, Coll. N.V. Subba Rao & Party ; vi) 2 valves, Digha, 27.3.83, vii) 1 ex., Digha, 17.5.85, viii) 1 ex., Digha, 19.3.85, Coll. A. Dey & S. Barua.

Measurements (in mm) : Length : 79.85 - 69.35 ; Width 60.95 - 31.25 ; Height 36.85 - 18.75

Diagnosis : Shell large, inequilateral; inflated; umbo prominent, elevated; anterior part longer than the posterior part; anterior and posterior margin broad and rounded; sculptured with fine concentric striae and conspicuous growth lines, violet in colour.

Distribution : India : West Bengal : Medinipur, South 24 Parganas; Andaman & Nicobar Islands, Orissa, Tamil Nadu. Elsewhere : Indian Ocean to Philippines (Abbott and Dance, 1982).

Remarks : This species closely resembles *M. turgida*, but differs in having low umbo, more transversely ovate shape, thin and violet colour. Generally occurs in fine muddy sands in the intertidal region.

Family SOLENIDAE
86. Genus *Solen* Linnaeus, 1758

124. *Solen brevis* Gray
(Pl. 21, figs. 1 & 2)

1842-56. *Solen brevis* Gray, in *Hanley's Recent Bivalves*, p. 12, pl. 13, fig. 42.

Material examined : i) 3 valves, Digha, 10.3.66, Coll. K.V. Rama Rao & Party; ii) 2 exs., Bakkhali, 15.3.80, iii) 14 exs., Ghiapata (Kakdwip), 16.4.80, iv) 5 valves, Digha, 1983, v) 1 ex., Digha, 15.3.83, vi) 5 valves, Digha, 1983, v) 1 ex., Digha, 15.3.83, vi) 1 ex., Digha, 28.3.84, Coll. A. Dey & S. Barua; vii) 1 ex., Basirhat, 6.9.84, viii) 1 ex., Pargumti, 10.9.84, ix) 5 exs., Gosaba, 17.9.84, x) 2 exs., Jharkhali, 21.9.84, xi) 1 ex., Port Canning, 26.9.84, Coll. B.P. Halder & Party ; xii) 1 ex., Digha, Coll. F.M.J. Pinn, Reg. no., M 20351/3; xiii) 1 ex., Port Canning, Coll. A. Misra.

Measurements (in mm) : Length 73.05 - 36.25 ; Width 14.00 - 5.50 ; Height 8.80 - 4.50

Diagnosis : Shell almost straight with flattened tapering posterior end; posterior margin narrow; anterior margin broad abruptly truncated; sculptured with prominent growth lines.

Distribution : India : West Bengal : Medinipur, North and South 24 Parganas; Orissa, Tamil Nadu.

Family CULTELLIDAE

Key to the genera

1. Shell with internal ribs.....*Siliqua*
 Shell without internal ribs..... (2)
2. Right valve with one cardinal..... *Cultellus*
 Right valve with more than one cardinals..... (3)

3. Shell thick, subcylindrical.....*Pharella*

Shell thin; Glauconomon shaped.....*Tanysiphon*

87. Genus *Cultellus* Schumacher, 1817

125. *Cultellus subelliptica* Dunker
(Pl. 21, figs. 3 & 4)

1861. *Cultellus subelliptica* Dunker, *Proc. zool. Soc. Lond.*, : 421.

Material examined : 1 ex., Port Canning, Reg. no., 4626.

Measurements (in mm) : Length 27.45 ; Width 12.50 ; Height 4.90

Diagnosis: Shell white, thin, depressed, ovate with a short anterior and broad posterior end; anterior dorsal short, convex; posterior dorsal elongated and slightly convex; ventral margin convex.

Distribution : India : West Bengal : South 24 Parganas; Orissa, Tamil Nadu. Elsewhere : Malacca, Indonesia.

88. Genus *Pharella* Gray, 1854

126. *Pharella javanicus* (Lamarck)
(Pl. 21, figs. 6 & 7)

1818. *Solen javanicus* Lamarck, *Hist. nat. Anim. Sans. Vert.*, 5 : 454.

1977. *Pharella javanicus* : Subba Rao, *News. zool. Surv. India*, 3 (5) : 299.

Material examined : i) 2 valves, Narainganj, 19.4.80, Coll. A. Dey & S. Barua; ii) 1 ex., Pargumti, 10.9.84, iii) 4 exs., 1 valves, Jharkhali, 23.9.84, iv) 4 exs., Port Canning, 26.9.84, v) 5 exs., Port Canning, 27.9.84, Coll. A. Misra; vi) 2 exs., Gosaba Tiger Project jetty, 25.5.85; vii) 8 exs., Pirkhali, 29.5.85, Coll. B.P. Halder & Party; viii) 1 ex., Digba, Reg. no., M 20348/3, Coll. F.M.J. Pinn; ix) 2 exs., Halliday island, 6.11.88, Coll. A. Dey.

Measurements (in mm) : Length : 66.50 31.85 ; Width 16.20 - 7.60 ; Height 9.60 - 4.55.

Diagnosis : Shell comparatively thick, compressed, attenuated, covered with a thin, pale olive epidermis; anterior side narrow, short, with more gape and evenly rounded; posterior side oblique, broad curved, slightly produced ventrally; ventral margin contracted in the middle.

Distribution : India : West Bengal : Medinipur, North and South 24 Parganas; Orissa. Elsewhere : Malaysia, Penang, Singapore, Indonesia, Java, Philippines.

Remarks : Burrowing forms, found upto the depth of 2-3 times of body length in upper mud flats where the substratum is hard. They can easily be recognised by their specific slit-shaped holes. The maximum population was observed at Tiger Project jetty of Gosaba and at upper mud flats of Port Canning where the *Sonneratia* plants were very common.

89. Genus *Siliqua* Megerle von Muehfeld, 1811

Key to the species

Shell white; inflated; without white radiating bands..... *S. albida* Dunker

Shell violet; compressed; with white radiating bands..... *S. radiata* (Linnaeus)

127. *Siliqua albida* Dunker

1861. *Siliqua albida* Dunker, *Proc. zool. Soc. Lond.*, p.

1874. *Cultellus albidus* : Sowerby, in Reeve, *Conch. Icon.*, 19, *Cultellus* sp.no. 16, pl. 5, fig. 16.

Material examined : i) 8 valves, Sandhead, 17.6.1885, Coll. J. Barnett; ii) 1 valve, Bakkhali, 13.8.78, Coll. G.C. Rao & K.V. Surya Rao; iii) 5 valves, Bakkhali, 28.10.79, iv) 25 exs., Mainapara (Kakdwip), 24.1.80, v) 1 ex., Mainapara (Kakdwip), 16.4.80, vi) 21 exs., Ghiapata (Kakdwip), 17.4.80, vii) 1 ex., Digha, 17.4.83, Coll. A. Dey & S. Barua; viii) 10 exs., Kakdwip, 10.3.85, Coll. B.P. Halder & Party.

Measurements (in mm) : Length 24.40 - 6.60 ; Width 11.85 - 3.00 ; Height 6.65 - 1.15

Diagnosis : Shell small, subelliptical, semipellucid, anterior margin short; posterior side oblong; dorsal margin convex; ventral margin scarcely contracted at the middle; sculptured with very fine concentric striae; white.

Distribution : India : West Bengal : Medinipur, South 24 Parganas; Maharashtra, Orissa. Elsewhere: Bangladesh, Philippines.

Remarks : Found in the canals where small amount of water remain even during the low tide. Juveniles were recorded from January to April at densities of 2 to 9 on an average.

128. *Siliqua radiata* (Linnaeus)
(Pl. 21, figs. 8 & 9)

1758. *Solen radiata* Linnaeus, *Syst. Nat.*, ed. 10, p. 673, no. 28.

1980. *Siliqua radiata* : Rajagopal, Mookherjee & Mitra, *Bull. zool. Surv. India*, 2 (2 & 3) : 227, pl. 5, fig. A & B.

Material examined : i) 2 exs., Digha, 10.3.66, Coll. K.V. Rama Rao and Party; ii) 1 ex., Digha, Reg. no.. M 20352/3. Coll. F.M.J. Pinn.

Measurements (in mm) : Length 39.85 - 30.05 ; Width 14.10 - 11.00 ; Height 5.15 - 4.10

Diagnosis : Shell elongately compressed, thin; anterior side short, excavated near the umbones; posterior side elongated; dorsal margin rather straight; ventral margin convex, arched, sloping upward towards the end of each side, surface white-rayed and concentrically banded with purple.

Commonly known as sunset shells.

Distribution : India : West Bengal : Medinipur; Andhra Pradesh, Goa, Gujarat, Kerala, Maharashtra, Orissa, Tamil Nadu. Elsewhere : Siam, Java, Celebes, Malacca, Burma, South Africa, Sri Lanka.

90. Genus *Tanysiphon* Benson, 1858

129. *Tanysiphon rivalis* Benson

1858. *Tanysiphon rivalis* Benson, *Ann. Mag. nat. Hist. Lond.*, (3) 1 : 407 pl. 12b, figs. 1-3.

1915. *Anatina induta* Preston, *Rec. Indian Mus.*, 11 : 482, fig.4 (Type locality, Chingrighatta).

Material examined : i) 30 valves, Costala (Sagar Island), 25.5.81, Coll. K.V. Surya Rao & S.C. Mitra; ii) 147 valves, Geonkhali, 22.3.85, Coll. B.P. Halder & Party.

Measurements (in mm) : Length : 23.20 - 16.65 ; Width 13.35 - 9.50 ; Height 6.70 - 5.85.

Diagnosis : Shell thin, small, transversely elongate; pallial sinus large.

Distribution : India : West Bengal : Medinipur, South 24 Parganas.

Remarks : This species was observed at Ganga Sagar and Geonkhali on the muddy substratum. It prefers less salinity and the population density was 80-90 nos./m²

Family TELLINIDAE

Key to the genera

1. Lateral teeth present at least in one of the valves..... (2)
 - Lateral teeth not present in either of the valves..... (3)
2. Sculptured concentric or with fine radial striae..... *Tellina*
 - Sculptured with oblique scissulation in both the valves..... *Strigilla*
3. Pallial sinus discrepant in both the valves..... *Macoma*
 - Pallial sinus not discrepant in both the valves..... *Apolymetis*

91. Genus *Tellina* Linnaeus, 1758

Key to the species

1. Lateral teeth two in the right valve..... *T. irridescens* (Benson)
 Lateral teeth one in right valve..... (2)
2. Shell elongate to sub-rectangular..... *T. sinuata* Spengler
 Shell ovate to elliptical *T. corbuloides* Hanley

130. *Tellina corbuloides* Hanley

1844. *Tellina corbuloides* Hanley, *Proc. zool. Soc. Lond.*, p. 70.

Material examined : 14 exs., Bakkhali, 29.10.79, Coll. A. Dey and S. Barua

Measurements (in mm) : Length 15.20 - 12.00 ; Width 10.05 - 8.50 ; Height 6.00 - 1.85

Diagnosis : Shell corbuloid, solid, inequivalve, white and rosy colour specially on the umbonal region and ventral side; umbo pointed, elevated and almost middle, anterior margin rounded; ventral margin convex; anterior dorsal margin and posterior dorsal margin straight and gradually sloping; sculpture fine closed concentric striae; cardinal complex consist of an equally bilobed anterior tooth and a thin posterior tooth on left valve and small anterior tooth and a bilobed posterior tooth on the right valve; muscle scar well developed, pallial sinus equal on both the valves; sinus ascending posteriorly and descending anteriorly with arcuated anterior end touching the anterior adductor scars and falls obliquely to the pallial line and confluent with it.

Distribution : India : West Bengal : South 24 Parganas; Andaman & Nicobar Islands. Elsewhere Philippines Island.

131. *Tellina (Pharaonella) irridescens* (Benson)

1842. *Sanguinolaria irridescens* Benson, *Ann. Mag. nat. Hist. Lond.*, (1) 9 : 490.

1913. *Tellina chilkaensis* Preston, *Rec. Indian Mus.*, 11 : 306, fig. 20, 20 a-b.

Material examined : i) 105 exs., Ghiapata (Kakdwip), 25.1.80, ii) 8 exs., Ghiapata (Kakdwip), 17.4.80, Coll. A. Dey & S. Barua; iii) 3 exs., Mainapara (Kakdwip), 18.4.84; iv) 1 ex., Port Canning, 17.5.85; v) 2 exs., Namkhana, 16.12.87, Coll. B. P. Halder & Party.

Measurements (in mm) : Length 11.40 - 6.85 ; Width 7.21 - 4.00 ; Height 3.75 - 2.20.

Diagnosis : Shell small, oval, equivalve and glossy in appearance; umbo pointed, elevated, white or pink in colour; cardinal complex with subequal bilobed anterior tooth and a thin laminate posterior tooth

in the left valve; and a deltoid, globular anterior tooth and a smaller posterior tooth in the right valve; laterals present and formed by thickening on the hinge line on the left valve and two in the right valve. Pallial sinus equal in both the valves; sinus rises abruptly posteriorly and descending anteriorly, close to anterior adductor scar, touches and form arcuation, confluent with the pallial line.

Distribution : India : West Bengal : South 24 Parganas; Andhra Pradesh. Gujarat, Orissa. Elsewhere : Secyelles, Philippines, China.

132. *Tellina (Tellinides) sinuata* Spengler

1798. *Tellina sinuata* Spengler, *Nat. Selsk. Skrivt.*, 4 : 109

1815. *Tellina nivea* Wood, *Gen. Conch.* 1 : 144, no. 62, p. 46.

1818. *Tellina timorensis* Lamarck, *Hist. nat. Anim. Sans. Vert.*, 5 : 526

Material examined : i) 1 valve, Bakkhali, 23.8.78, Coll. G.C. Rao & K.V. Surya Rao; ii) 9 valves, Digha, 27.3.84, iii) 2 exs., Digha, 28.3.84, Coll. A. Dey & S. Barua.

Measurements (in mm) : Length 32.54 25.92 ; Width 20.78 - 14.80 ; height 6.00 - 4.95

Diagnosis : Shell oblong, subquadrate, compressed; cardinal complex with strong bifid anterior and a posterior in the left valve and a laminate anterior and a bifid posterior in the right valve; sinus equal; rises posteriorly and after a short distance it descends anteriorly with adductor scar and ventral margin confluent with pallial sinus.

Distribution : India : West Bengal : Medinipur, South 24 Parganas; Andaman & Nicobar Island, Goa, Gujarat, Maharashtra, Orissa, Tamil Nadu. Elsewhere : Madagascar, Sri Lanka, Indonesia, Philippines.

92. Genus *Strigilla* Anton, 1822

133. *Strigilla splendida* (Anton) (Pl. 22, figs. 1 & 3)

1833. *Tellina splendida* Anton, *Verz., Conch.*, p. 5.

1908. *Strigilla denestriata* Preston, *Rec. Indian Mus.*, 2 : 210.

Material examined : i) 12 exs., Bakkhali, 28.10.79, ii) 38 exs., Mainapara (Kakdwip), 16.4.80, iii) 2 exs., Digha, March '85, Coll. A. Dey and S. Barua; iv) 9 exs., Bakkhali, 6.9.85, Coll. B.P. Halder & Party; v) 7 exs., Port Canning, Coll. A. Misra.

Diagnosis : Shell orbicular; sculptured with oblique scissulations on the posterior part of both the valve but the anterior end with fine close concentric striae; variable in colour, rosy, yellowish or white.

It is an estuarine species which extends from far interior of the estuary to river mouth near the confluence of the sea.

Measurements (in mm) : Length 17.90 10.34 ; Width 16.42 - 6.28 ; Height 8.05 - 3.85

Distribution : India : West Bengal : Medinipur, South 24 Parganas; Andaman & Nicobar Islands. Elsewhere : Indonesia, Philippines.

93. Genus *Macoma* Lcach, 1819

Key to the species

Pallial sinus developed almost whole length of the shell..... *M. birmanica* (Philippi)

Pallial sinus developed slightly more than half length of the shell..... *M. truncata* (Jonas)

134. *Macoma birmanica* (Philippi)
(Pl. 22, figs. 6 & 7)

1849. *Tellina birmanica* Philippi, *Abbil. Reschr.*, 3 : 27, 55, No.1

Material examined : i) 2 exs., Digha, Nov. '66, Coll. F.M.J. Pinn, ii) 102 exs., Chemaguri, 1981, Coll. K.V. Surya Rao & S.C. Mitra; iii) 5 exs., Prentice Island, Oct., 1981, Coll. S. Chakravorty; iv) 2 exs., Digha, 27.3.84, Coll. A. Dey & Barua; v) 28 exs., Pargumti, 10.9.84, vi) 20 exs., Chhotamullakhali, 13.9.84; vii) 5 exs., Gosaba, 18.9.84, viii) 8 exs., Jharkhali, 24.9.84, Coll. B.P. Halder & Party; ix) 2 exs., Port Canning, Coll. A. Misra; x) 5 exs., Champia, 4.11.88, xi) 2 exs., Kishorimohanpur, 8.11.88, Coll. A. Dey.

Measurements (in mm) : Length 60.10 - 22.54 ; Width 37.54 - 12.50 ; Height 16.75 - 5.80

Diagnosis : Shell oblong, subovate, inequivalve, the left more heavy and convex than the right; umbo posterior; sculptured with spaced growth lines and minuate concentric striae; hinge with only cardinal teeth.

Distribution : India : West Bengal : Medinipur, North and South 24 Parganas; Andhra Pradesh. Elsewhere : Burma.

Remarks : It occurs buried in the muddy substratum of Hugli-Matla estuary, generally at depths twice that of its shell length, but often burrows deeper than that. Siphons are very long and the inhalent siphon extends out of the burrow moving in all directions. The population density varied from 2 to 5 m².

135. *Macoma (Psammacoma) truncata* (Jonas)
(Pl. 22, figs. 2 & 4)

1844. *Tellina truncata* Jonas in Philippi, *Abbil. Besch.*, 1 (3). p. 1, fig. 2.

Material examined : i) 1 ex., Digha, 15.3.83, ii) 2 valves, Digha, 27.3.84, Coll. A. Dey & S. Barua.

Measurements (in mm) : Length : 49.10 - 32.00 ; Width 27.00 - 23.00 ; Height 12.20 - 9.20

Diagnosis : Shell trigonal, donaciformes; pallial sinus equal, developed upto half of the length; sinus rises sharply posterior, descending anteriorly with arcuated anterior end, falls obliquely to the pallial line and confluent with ventral margin only posterior half.

Distribution : India : West Bengal : Medinipur; Andaman & Nicobar Islands, Goa, Gujarat, Maharashtra, Orissa, Tamil Nadu. Elsewhere : Red Sea, Persian Gulf, Pakistan, Indonesia, Philippines.

94. Genus *Apolymetis* Salisbury, 1929

136. *Apolymetis edentula* Spengler (Pl. 22, fig. 5, Pl. 23, fig. 1)

1782. *Tellina angulata* Chemnitz, *Conch. Cab.*, 6 : 89, pl. 9, figs. 74-75.

1794. *Tellina edentula* Spengler, *Nat. Selsk. Ser.*, 4 : 96.

Material examined : i) 1 ex., Sandhead 17.6.1885, Coll. A. Milner; ii) 3 exs., Digha, 19.5.83, iii) 2 exs., Digha, 27.3.84, iv) 2 exs., Digha, 28.3.84, v) 1 ex., Digha, March '85, Coll. A. Dey & S. Barua.

Measurements (in mm) : Length 72.64 - 43.93 ; Width 52.18 - 34.10 ; Height 24.15 - 12.50

Diagnosis : Shell large to medium, somewhat oval, strong, inequivalve, the right one large and convex than the left; cardinal complex consists of bilobed anterior and inflated posterior in the left valve, and laminated anterior and bilobed posterior in the right valve; sculptured with concentric striae.

Distribution : India : West Bengal : Medinipur, South 24 Parganas; Goa, Gujarat, Karnataka, Kerala, Maharashtra, Orissa, Tamil Nadu. Elsewhere : Red Sea, Madagascar, Sri Lanka, Thailand, Indonesia, Philippines, New Caledonia, Fiji.

Family DONACIDAE

95. Genus *Donax* Linnaeus, 1758

Key to the species

Sculpture smooth or fine except the posterior slope; dorsal margin without groove; posterior carination not conspicuous..... *D. incarnatus* Gmelin

Sculpture prominent; dorsal margin with sharp groove; posterior carination conspicuous.....
..... *D. scortum* Linnaeus

137. *Donax (Hecuba) scortum* Linnaeus (Pl. 23, fig. 3 & 5)

1758. *Venus scortum* Linnaeus, *Syst. Nat.*, ed. 10, p. 686, no. 103.

1758. *Donax pubescens* Linnaeus, *Syst. Nat.* (ed. 10), p. 682, no. 83.

1986. *Donax (Hecuba) scortum* : Subba Rao and Dey, *Rec. zool. Surv. India*, Occ. Paper, 91 : 7, figs. 4, 20-21.

Material examined : i) 1 valve, Digha, 10.3.66, Coll. K.V. Surya Rao & Party; ii) 1 ex., Digha, 21.9.83, iii) 2 exs., Digha, 27.3.84, iv) 20 exs., Digha, 12.7.84, Coll. A. Dey & S. Barua.

Measurements (in mm) : Length 79.40 - 23.25 ; Width 46.35 - 15.95 ; Height 34.15 - 11.00

Diagnosis : Shell trigonately oblong; gibbous, dirty white, violet in the posterior region; sculptured with prominent concentric striae, lamellae-like on the anterior end, thinner on the posterior; radial striae prominent and divergent from umbo; ligament short, dark brown colour.

Distribution : India : West Bengal : Medinipur; Andhra Pradesh, Goa, Gujarat, Karnataka, Kerala, Maharashtra, Orissa, Pondicherry, Tamil Nadu. Elsewhere : South Africa, Persian Gulf, Pakistan, Sri Lanka, Burma, Indonesia, China.

138. *Donax (Latona) incarnatus* Gmelin
(Pl. 23, figs. 6 & 7)

1788. *Donax incarnatus* Schroeter, *Nimen. Reg. Conch. Cab.*, p. 30.
1791. *Donax incarnatus* Gmelin, *Syst. Nat.* ed. 13, p. 3265.
1854. *Donax dysoni* Deshayes, *Proc. zool. Soc. Lond.*, 22 : 353.
1908. *Donax trigonalis* Preston, *Rec. Indian Mus.*, 2 : 208, pl. 16, fig. 57.
1986. *Donax (Latona) incarnatus* : Subba Rao and Dey, *Rec. zool. Surv. Occ. paper*, 91; p. 4, figs. 8,9,34,35.

Material examined : i) 3 valves, Digha, 10.3.66, Coll. K.V. Rama Rao & Party; ii) 25 exs., Ganga Sagar beach, 3.9.79, Coll. K.V. Surya Rao & S.C. Mitra; iii) 10 exs., Bakkhali, 19.4.80, 1982-84, vi) Several (more than a few thousands), Digha, Coll. A. Dey & S. Barua.

Measurements (in mm) : Length : 18.30 - 7.25 ; Width 14.40 - 5.50 ; Height 9.10 - 2.60

Diagnosis : Shell triangular, compressed, posterior margin short and serrated; sculptured with fine thread like concentric and radial striae, the posterior portion concentric striae rugose and crossed by prominent radial striae giving a punctate appearance; ligament short and brown, lunule small and present in both the valves.

Distribution : India : West Bengal : Medinipur, South 24 Parganas; Gujarat, Maharashtra, Orissa, Pondicherry, Tamil Nadu. Elsewhere : Madagascar, Burma, Indonesia, Japan, Malacca.

Remarks : It is abundantly available at Digha Beach, The population recorded upto 2.48 m². It is a polymorphic species.

Family PSAMMOBIIDAE

96. Genus *Sanguinolaria* Lamarck, 1789139. *Sanguinolaria (Soletellina) acuminata* (Deshayes)

(Pl. 23, figs. 2 & 4)

1857. *Soletellina acuminata* Nurital in Reeve's, *Conch. Icon.*, 10 : *Soletellina sp.no. 12, pl.3, fig. 12.*1977. *Sanguinolaria (Soletellina) acuminata* : Subba Rao, *Newsl. zool. Surv. India*, 3 (5) : 300.

Material examined : i) 1 ex. Ganga Sagar, 27.5.81, Coll. K.V. Surya Rao & S.C. Mitra; ii) exs., Digba, 27.3.83, Coll. A. Dey & S. Barua; iii) 1 ex., Gosaba, 14.9.83, Coll. S.S. Saha; iv) 5 exs., Saimari, 5.11.88, v) 1 ex., Kalas, 10.11.88, Coll. A. Dey.

Measurements (in mm) : Length 73.40 - 57.10 ; Width 32.00 - 25.80 ; Height 14.90 - 10.80

Diagnosis : Shell elongately transverse, inequilateral; bluish purple, covered with a blackish olive epidermis; umbo anterior, eroded; anterior-end rounded, posterior acuminate with obtuse angle; muscle scars well developed, anterior elongate and posterior almost oval; pallial sinus equal on both the valves extending upto the 3/4 length of the shell.

Distribution : India : West Bengal : Medinipur, North and South 24 Parganas; Kerala, Maharashtra, Orissa, Tamil Nadu. Elsewhere : Pakisthan, Bangladesh, Sri Lanka, Malacca, Burma, Philippines, China and Japan.

Remarks : Their presence can be noticed by the characteristic circular holes through which water is ejected by their siphons on disturbed. The depth at which the animal burrows varies from 1/2 meter to more depending on the size of the animal.

Hiatula diphos (Linnaeus) as per Abbott & Dance (1982) occurs from low water level to sea ward upto 30m, but our collections were made between high tide mark to low tide mark in the estuarine region. Although it has superficial resemblance to *H. diphos* we prefer to retain *S. acuminata* since its ecology is different and the shell is also very acuminate and the pallial sinus rounded anteriorly and confluent with the pallial line.

Family SEMELIDAE

97. Genus *Theora* H. & A. Adams, 1856140. *Theora opalina* (Hinds)

(Pl. 24, figs. 1 & 3)

1843. *Neaera opalina* Hinds, *Proc. zool. Soc. Lond.*, p. 781914. *Theora opalina* : Preston, *Rec. Indian Mus.*, 10 : 310.

Material examined : i) 3 exs., Matla river, Dec. 1916, Coll. S.W. Kemp; ii) 25 exs., Ghiapata (Kakdwip), 17.4.80, Coll. A. Dey and S. Barua; iii) 2 exs., Chhotamullakhali, 12.9.84, iv) 2 exs., Kakdwip, 10.3.85, Coll. B.P. Halder & Party.

Measurements (in mm) : Length 15.75 - 4.25 ; Width 8.92 - 2.36 ; Height 3.20 - 1.10

Diagnosis : Shell thin, fragile, creamy white; umbo acuminate and anterior in position; anterior dorsal straight and gradually sloped; posterior dorsal straight; ventral margin convex; sculpture smooth or with fine concentric striae; muscle scars well impressed.

Distribution : India : West Bengal : North and South 24 Parganas; Kerala, Maharashtra, Orissa, Tamil Nadu. Elsewhere : Indonesia, Malacca, Philippines.

Remarks : Annandale and Kemp (1916) gave some interesting observations. It is an abundant bivalve found in the central part of the canal where water remains even during the low tide.

It was observed that this bivalve prefers shallow side canals rather than the main canals. Juveniles were observed from January to April. Population density was 1.6 to 10 nos./m² on average.

Family SOLECURTIDAE

98. Genus *Novaculina* Benson, 1830

141. *Novaculina gangetica* Benson
(Pl. 24, figs. 5 & 7)

1830. *Novaculina gangetica* Benson, *Gleaning in Science*, p. 263.

Additional materials : i) 2 exs., Geonkhali, 21.3.85, ii) 3 exs., Geonkhali, 22.3.85, iii) 1 ex., Purandar, 26.2.86, Coll. B.P. Halder and Party.

Remarks : Occurs in the river Ganges from Uttar Pradesh to estuarine mouth of Hugli-Matla. Further details are given in the land and freshwater molluscs of West Bengal (Mitra and Dey, in press).

Family CORBICULIDAE

99. Genus *Polymesoda* Rafinesque, 1828

142. *Polymesoda (Geloina) bengalensis* (Lamarck)
(Pl. 24, figs. 2 & 4)

1818. *Cyrena bengalensis* Lamarck, *Hist. nat. Anim. Sans. Vert.*, 5 : 564

1834. *Cyrena turgida* Lea, *Trans. Ame. phil., Soc.*, 5 : 109, pl. 3, fig. 53.

Material examined : i) 1 valve, Junput, 8.12.65, Coll. K.V. Surya Rao and S. Ahmed; ii) 1 valve, Digha, 20.12.65, Coll. K.K. Ray; iii) 1 valve, Bakkhali, 28.4.78, Coll. G.C. Rao and K.V. Surya Rao; iv) 3 exs., Jharkhali, 23.9.84, v) 1 ex., Haldia, 15.3.85, Coll. B.P. Halder & Party

Measurements (in mm) : Length 53.35 - 38.35 ; Width 46.00 - 33.20 ; Height 31.60 - 27.45

Diagnosis : Shell large, solid, subtrigonal, roughly straight; dorsal margin rather angulate; posterior margin abruptly sloping; anterior rather concave.

Distribution : India : West Bengal : Medinipur, North and South 24 Parganas; Andaman and Nicobar Islands.

Remarks : Infaunal, buried in mud at the back of mangroves, inhabitant of banks of small streams and drains.

Family TRAPEZIIDAE

100. Genus *Trapezium* Megerle von Muchfeld, 1811

143. *Trapezium sublevigatum* (Lamarck)
(Pl. 24, figs. 6 & 8)

1819. *Cardita sublaevigata* Lamarck, *Hist. nat. Anim. Sans. Vert.*, 6 : 26.

1843. *Cypricardia vellicata* Reeve, *Proc. zool. Soc. Lond.*, pl. 2, p. 195.

1915. *Petricola esculpturata* Preston, *Rec. Indian Mus.*, 11 : 301, fig. 13.

Material examined : i) 2 exs., Champta, 12.9.83, Coll. S. Bhuiya; ii) 3 exs., Nikarikhal, 24.8.87, Coll. S. Barua.

Measurements (in mm) : Length 18.60 - 10.80 ; Width 10.25 - 5.85 ; Height 7.05 - 3.00

Diagnosis : Shell oblong, solid with greenish brown periostracum; umbo small, anteriorly situated; dorsal margin sloping towards the posterior; ventral margin nearly straight; anterior rapidly sloped; posterior produced; obtusely rounded.

Distribution : India : West Bengal : North and South 24 Parganas, Andhra Pradesh, Andaman and Nicobar Islands, Gujarat, Maharashtra, Orissa, Tamil Nadu. Elsewhere : Red Sea, Persian Gulf, Pakistan, Burma, Singapore, Philippines, Japan.

Remarks : This species was observed in the empty holes of pneumatophores of *Avicennia* plants, attached with byssus threads.

Family VENERIDAE

Key to the genera

1. Lateral teeth present..... (4)
- Lateral teeth absent..... (2)
2. Shell ovately trigonal..... *Pelecypora*
- Shell not ovately trigonal..... (3)

3. Shell elongate, compressed..... *Paphia*
 Shell oblong, rhomboidal..... *Tapes*
4. Posterior lateral tooth finely striate..... *Meretrix*
 Posterior lateral tooth smooth..... (5)
5. Sculptured with concentric and radial ribs..... (6)
 Sculptured with concentric striae..... *Pitar*
6. Ribs nodose, dichotomous medially,..... *Gafrarium*
 Ribs nodose, radial predominant..... *Timoclea*

101. Genus *Gafrarium* (Bolton) Roeding, 1798

144. *Gafrarium pectinatum* (Linnaeus)

1758. *Venus pectinatum* Linnaeus, *Syst. Nat.*, ed. 10, p. 689.

1948. *Gafrarium divaricatum* : Ray, *Rec. Indian Mus.*, 46 : 118.

1976. *Gafrarium pectinatum* : Fischer Picette, *Rec. zool. Surv. India*, 70 : 236.

Material examined : i) 1 ex., Palta, 19.3.1937, Coll. Palta Survey.

Measurements (in mm) : Length : 15.45; Width : 11.95; Height : 9.75

Diagnosis : Shell thick, oblong-oval, posterior end somewhat squarose; sculpture with nodose radial ribs, bifurcate middle; pallial sinus shallow.

Common, found in shallow sandy areas upto 20 meters depth (Abbott & Dance, 1982).

Distribution : India : West Bengal : North 24 Parganas; Andaman & Nicobar Islands, Andhra Pradesh, Gujarat, Orissa, Tamil Nadu. Elsewhere : Persian Gulf, Red sea, Zanzibar, South Africa, Sri Lanka, Burma, Philippines.

102. Genus *Meretrix* Lamarck, 1799

145. *Meretrix meretrix* (Linnaeus)
 (Pl. 25, figs. 1 & 2)

1758. *Venus meretrix* Linnaeus, *Syst. Nat.*, ed. 10, p. 686.

1916. *Meretrix meretrix* : Annandale & Kemp, *Mem. Indian Mus.*, 5 : 333, 351.

1917. *Meretrix meretrix* : Hornell, *Rec. Indian Mus.*, 13 : 155, fig. 13

Material examined : i) 11 valves, Diamond Harbour, 17.6.64, ii) 13 exs., Port Canning, 10.3.65, Coll. N.V. Subba Rao; iii) 2 exs., Digha, 4.6.64, Coll. A.K. Dutta; iv) 6 valves, Ganga Sagar, 27.5.84, Coll. K.V. Surya Rao & S.C. Mitra; v) 1 ex., Gosaba, 14.9.83, Coll. S.S. Saha; vi) 5 exs., Digha, 28.3.84, vii) 6 exs., Talseri (Digha), 28.11.84, Coll. A. Dey & S. Barua; viii) 41 exs., Port Canning, 27.9.84, Coll. B.P. Halder & Party; ix) 45 exs., Port Canning, Coll. A. Misra; x) 1 ex., Ajmalmari Kaikalmari junction, 8.11.88, Coll. A. Dey.

Measurements (in mm) : Length : 70.70 - 9.65; Width : 62.00 - 8.10 Height : 41.20 - 4.15

Diagnosis : Shell ventricose, hinge narrow; anterior cardinal on left valve; highly variable in shape and colour, a number of varieties e.g. *morphina*, *impudica*, *zonaria*, *castanea* and *aurora*.

Commonly occurs in the river mouth and backwaters on both coasts of India. Tonnes of shells of this species are collected from Subarnarekha river mouth, near Digha and transported to different parts of West Bengal for preparation of poultry feed.

Distribution : India : West Bengal : Medinipur, North and South 24 Paganas; Andaman & Nicobar Islands, Gujarat, Goa, Kerala, Maharashtra, Orissa, Pondicherry, Tamil Nadu. Elsewhere : Red Sea, Aden, Sri Lanka, Siam, Java, Sumatra, Borneo, Philippines, China, Japan, Burma.

103. Genus *Pitar* Roemer, 1857

146. *Pitar alabastrum* (Reeve) (Pl. 25, figs. 3 & 4)

1863. *Dione alabastrum* Reeve, *Conch. Icon.*, 14., *Dione*, sp.no. 42, pl. 10, fig. 42.

1894. *Cytherea (Caryatis) pudicissima* Smith, *Ann. Mag. nat. Hist.*, (6) 14 : 169, pl.5, figs. 3 - 4.

1967. *Pitar alabasturm* : Fischer-piette, *Rec. zool. Surv. India*, 70 : 243.

Material examined : i) 3 exs., Sandhead, 17.6.1885, ii) 1 ex., Sandhead, Coll.?

Measurements (in mm) : Length : 16.25-13.15; Width : 12.35-10.40; Height : 8.85 - 7.35

Diagnosis : Shell ovately cordate, thin, inflated; anterior end short; posterior elongate; umbo impressed; sculpture with concentric, irregular, wrinkle striae; white, scarcely tinged with rust.

Distribution : India : West Bengal : South 24 Parganas; Arabian Sea, Orissa, Tamil Nadu.
Elsewhere : Gulf of Oman, Burma, Singapore.

Remarks : Represented by very old collections (1885.)

104. Genus *Pelecyora* Dall, 1902147. *Pelecyora trigona* (Reeve)
(Pl. 25, figs. 5 & 6)1850. *Artemis trigona* Reeve, *Conch. Icon.*, 6 pl. 7, fig. 42.1916. *Dosinia trigona* : Satyamurti, *Bull. Madras. Govt. Mus. (nat Hist.)*, 1(2), pl.7, 118, pl.17, figs. 6a-b.

Material examined : i) 4exs., Sandhead, 17.6.1885, Coll. J. Barnett; ii) 1 ex., Sandhead, 9.2.1887, Coll. R.M. Daly; iii) 1 ex., Sandhead, 18.10.1889, Coll. Capt. A. Milner; iv) 1 ex., Digha, 1.9.64, Coll. A.K. Dutta; v) 12 exs., Mainapara (Kakdwip), 31.8.79, vi) 35 exs., Mainapara (Kakdwip), 16.4.90, Coll. A. Dey & S. Barua; vii) 35 valve, Ganga Sagar, 27.5.81, Coll. K.V. Surya Rao and S.C. Mitra; viii) 1 ex., Gosaba, 18.9.84; ix) 21 exs., Port Canning, 29.9.84; x) 12 exs., Kakdwip, 10.3.85, Coll. B.P. Halder & Party; xi) 4 exs., Port Canning, Coll. A. Misra.

Measurements (in mm) : Length 32.70-12.60; Width : 30.90 - 12.00; Height : 18.40-8.05.

Diagnosis : Shell triangularly ovate, rather thick; umbone pointed and curved; sculptured with concentric striae, strong at the ventral margin; lunule very large, superficial, almost obsolete; ligament rather small; white, or with some tinge of rust brown.

Distribution : West Bengal : Medinipur, North and South 24 Parganas; Kerala, Orissa. Elsewhere: Red Sea.

Remarks : Found commonly in the muddy canals. Young ones were noticed during April. Population varies from 1-2 nos. m² to 106-108 nos/m² maximum being during the month of March.

105. Genus *Tapes* Mergerle von Muchfeld, 1811148. *Tapes bruguieri* (Hanley)
(Pl. 25, figs. 7 & 8)1845. *Venus bruguieri* Hanley, *Proc. zool. Soc. Lond.*, p. 21.1864. *Tapes bruguieri* & *T. violascens* Reeve. *Conch. Icon.*, 14, *Tapes*, pl. 13, figs. 68,73.

Material examined : 1) 1 ex., Lakhikantapur, 10.8.65, Coll. P. Ray Chowdhury.

Measurements (in mm) : Length 35.20; Width 23.14; Height 14.25.

Diagnosis : Shell oblong-ovate, not so thick, posterior end short and attenuated; sculptured with flat radial ridges and concentrically ridged giving decussate in appearance; white with broadly rayed reddish-fulvous.

Only one example of eroded shell collected from Lakhikantapur. It might have been brought from some other place.

Distribution : India : West Bengal; South 24 Parganas; Andhra Pradesh. Elsewhere : Sri Lanka.

106. Genus *Paphia* Roeding, 1798*Key to the species*

Strong concentric, obtusely ridged..... *P. malabarica* (Schroeter)

Sculpture smooth with reticulations, waved violet gray lines..... *P. textile* (Gmelin)

149. *Paphia malabarica* (Schroeter)

(Pl. 26, fig. 1)

1782. *Venus malabarica* Chemnitz, *Conch. Cab.*, 6 : 323, pl. 31, figs. 324 & 325.

1843. *Venus rhombifera* Hanley, *Cat. Recent Biv. Shells*, p. 120, pl. 13, figs. 45.

1758. *Venus malabarica* Schaoter in Martini-Chemnitz, *Conch. Cab. Nomen. Register.*, 10 : 112.

1975. *Paphia malabarica* : Fisher-Peitte, *Rec. zool. Surv. India*, 70 : 247.

Material examined : i) 1 valve, Ganga Sagar, 27.5.81, Coll. K.V. Surya Rao & S.C. Mitra.

Measurements (in mm) : Length 22.75 ; Width 17.54 ; Height

Diagnosis : Shell cordately-ovate, arched; sculpture concentrically and obtusely ridged and rather flexous on the posterior side; fulvus cream colour, with ash grey lines.

This species occurs in estuaries and backwaters of India, used as food by local fisherman.

Distribution : India : West Bengal : South 24 Parganas; Andaman & Nicobar Islands, Andhra Pradesh, Gujarat, Kerala, Maharashtra, Orissa, Tamil Nadu. Elsewhere : Persian Gulf, Gulf of Aden, Pakistan, Sri Lanka, Burma, Malaysia, Indonesia, Philippines, China.

150. *Paphia textile* (Gmelin)

(Pl. 26, figs. 2 & 4)

1791. *Venus textile* Gmelin, *Syst. Nat.* ed. 13, p. 3280.

1932. *Paphia (Paratapes) textile* : Prashad, *Siboga Exped.*, 53C : 239.

Material examined : i) 1 ex., Sandhead, 18.10.1889, Coll. Capt. Milner; ii) 2 exs., Sandhead, 20.6.24, Coll. P.V. Lady Fraser; iii) 1 ex., Sandhead, July 1927, Coll. Capt. C. Park; iv) 1 ex., Digba, 4.9.64, Coll. A.K. Dutta.

Measurements (in mm) : Length 42.95 - 30.60 ; Width 26.40 - 18.05 ; Height 20.15 - 16.30

Diagnosis : Shell oblong-ovate, posterior end attenuated; surface smooth, except for very faint concentric lines, pale fulvous with reticulated wavy violet gray lines.

No recent collections are observed.

Distribution : India : West Bengal : Medinipur, South 24 Parganas; Goa. Elsewhere : Red Sea, Siboga.

Genus *Timoclea* Brown, 1827151. *Timoclea imbricata* (Sowerby)
(Pl. 26, figs. 3 & 6)1853. *Venus imbricata* Sowerby, *Thes., Conch.*, pt. 2 : 715, pl. 156.1853. *Venus cochinensis* Sowerby, *Thes. Conch.*, pt. 2 : 716, pl. 156, figs. 79-80.*Material examined* : i) 106 exs., Digba, 21.1.88, Coll. A.K. Mondal & party.*Measurements* (in mm) : Length 10.30 - 7.85 ; Width 9.50 - 7.55 ; Height 5.65 - 4.60*Diagnosis* : Shell ovately subordate, posteriorly angulate; sculptured with radial ribs, ribs crenately imbricated, interstices neatly excavate; shell whitish, tinged with rust brown and violet at the umbonal region.*Distribution* : India : West Bengal : Medinipur; Goa, Karanataka, Kerala, Maharashtra, Orissa, Tamil Nadu. Elsewhere : Sri Lanka, China, Pakistan.*Remarks* : Occurs abundantly (10-12 nos/m²) on Digba beach buried in sand at 2-3 cms depth.

Family GLAUCONOMIDAE

108. Genus *Glaucanome* Gray, 1828152. *Glaucanome sculpta* (Sowerby)1894. *Glaucanome sculpta* Sowerby, *Rec. malac. Soc. Lond.*, 1 : 40.1977. *Glaucanome sculpta* : Subba Rao, *Newsl. zool. Surv. India*, 3 (5) : 301.*Material examined* : i) 4 valves, Ganga Sagar, 25.8.78, Coll. G.C. Rao & K.V. Surya Rao; ii) 2 exs., Ganga Sagar, 3.11.79, iii) 10 exs., Bakkhali, 15.3.80, Coll. K.V. Surya Rao & S.C. Mitra; iii) 63 exs., Bakkhali, 27.1.80 Coll. A. Dey & S. Barua; iv) 5 exs., Bakkhali, 5.3.85, v) 13 exs., Geonkhali, 22.3.85, Coll. B.P. Halder & Party.*Measurements* (in mm) : Length 27.35 - 12.75 ; Width 12.55 - 6.50 Height 8.60 - 4.40*Diagnosis* : Shell elongately-oblong, anterior end short and angularly attenuated posterior end; sculptured with fine concentric striae and growth lines but eroded at the umbonal region; shell light greenish straw colour.*Distribution* : India : West Bengal : Medinipur, South 24 Parganas; Orissa.*Remarks* : Lives buried in hard mud from mid tide zone to the low tide mark at 2 to 4 cms depth but can be easily made out by its honey comb like markings on the surface of the mud. The population varies from place to place; at Netidophani it was 10-12 nos./m² and maximum of 300-350 nos./m² at Bakkhali.

Order MYOIDA

Family MYIDAE

109. Genus *Sphenia* Turton, 1822153. *Sphenia perversa* Blanford
(Pl. 26, figs. 5 & 7)1867. *Sphenia perversa* Blanford, *J. Asiat. Soc. Beng.*, 36 (2) : 68, pl. 3, figs. 4 & 6.

Material examined : i) 8 exs., Port Canning, 9.1.58, ii) 1 ex., Matla river, Port Canning, 14.1.58, Coll. A.S. Rajagopal.

Measurements (in mm) : Length 13.60 - 8.30 ; Width 5.50 - 3.40 ; Height 5.10 - 3.35

Diagnosis : Shell thin, inequivalve, oblong with broadest umbonal region and acuminate posterior region; dorsal margin nearly straight, the ventral rounded and slightly concave.

Distribution : India : West Bengal : South 24 Parganas.
Elsewhere : Burma.

Family CORBULIDAE

110. Genus *Corbula* Lamarck, 1799154. *Corbula abbreviata* Preston
(Pl. 27, figs. 1-4)1907. *Corbula abbreviata* Preston, *Ann. Mag. nat. Hist. Lond.*, (7) 19 : 215, fig. 1.1907. *Corbula alcocki* Preston, *Ann. Mag. nat. Hist. Lond.*, (7) 19 : 215, fig. 2.1907. *Corbula pfeifferi* Preston, *Ann. Mag. nat. Hist. Lond.*, (7) 19 : 216, fig. 5.

Material examined : i) 1 ex., Port Canning, Reg. No., M 3945/1, ii) 1 ex., Port Canning, Reg. No., M 3942/1, iii) 1 ex., Port Canning, Reg. No., M 3946/1, Coll. N. Annandale.

Measurements (in mm) : Length 4.80 - 4.40 ; Width 3.42 - 2.80 ; Height 2.60 - 2.55

Diagnosis : Shell small, roundly ovate, thin, anterior margin round, posterior margin with a more or less beak like projection, umbo slightly posterior; sculptured with fine concentric striae.

Distribution : India : West Bengal : South 24 Parganas.

Remarks : Preston (1907) described three species, viz. *Corbula abbreviata*, *C. alcocki* and *C. pfeifferi* from Port Canning. All the three species are from one and the same lot collected by N. Annandale. After examining the holotypes of the three species we are convinced that these were distinguished based on very minor differences. We examined the teeth characters of *C. abbreviata* and found that the valve is without reselifer, a distinctive character of the genus *Corbula*. All these types are in very fragile condition. As *C. abbreviata* gets the page priority we have preferred that name over the other two namely *C. alcocki* and *C. pfeifferi*, which should be treated as synonymus of the former.

155. *Corbula calcarea* Preston
(Pl. 27, figs. 5 & 7)

1907. *Corbula calcarea* Preston, *Ann. Mag. nat. Hist., Lond.*, (7) 19 : 216, fig. 3.

Material examined : i) 1 ex., Port Canning, Reg. No., M 3040/1, Coll. N. Annandale.

Measurements (in mm) : Length 4.75 ; Width 2.90 ; Height -

Diagnosis : Shell small, thin, and ovate; umbo anterior in position; anterior end rounded and the posterior end beak like; Sculptured with fine concentric striae.

Distribution : India : West Bengal : South 24 Parganas.

Remarks : Since the specimen is not in a good condition for study we have provisionally retained it as a valid species.

156. *Corbula gracilis* Preston
(Pl. 27, fig. 6)

1907. *Corbula gracilis* Preston, *Ann. Mag. nat. Hist. Lond.*, (7) 19 : 216, fig. 4.

Material examined : i) 3 exs., Port Canning, Reg. No., M 3944/1 & M 3951/1, Coll. N. Annandale.

Measurements (in mm) : Length 5.25 - 4.60 ; Width 3.40 - 3.35 ; Height 2.20

Diagnosis : Shell small, thin, roundly ovate, with a rounded anterior and a long beak like posterior ends; sculptured with very fine concentric striae.

Distribution : India : West Bengal : South 24 Parganas.

Remarks : This and the immediately preceding species, as seen from their diagnostic characters agree with *C. abbreviata*. However we have provisionally retained them as distinct species.

Family PHOLADIDAE

Key to the genera

1. Pedal gape not closed by callum; protoplax present..... (2)
 Pedal gape completely closed by callum; protoplax absent..... (3)
2. Protoplax thin, divided longitudinally; umbonal reflection septate..... *Pholas*
 Protoplax lanceolate; umbonal reflection simple..... *Barnea*

3. Posterior slope elongate, with series of fringed, overlapping periostracal lamellae; metaplastax and hypoplastax absent..... *Lignopholas*

Posterior slope not elongate, without series of fringed periostracal lamellae; metaplastax and hypoplastax present *Martesia*

111. Genus *Martesia* Sowerby, 1824.

157. *Martesia fragilis* Verrill and Bush
(Pl. 28, figs. 1 & 3)

1873. *Pholas teredinaeformis* Sowerby in Reeves, *Conch. Icon.*, 18, pl.9, fig. 36.

Material examined : i) 1 ex., Khidirpur Dock, Reg. No., M 17294/3, Coll. A. Daniel & A.S. Rajagopal; ii) 16 valves, Port Canning, Reg. No., 4984, iii) 30 valves, Khidirpur Dock, Reg. No., M 12112/2, iv) 5 valves, Khidirpur Dock, v) 1 ex., Port Canning, Coll. ?.

Measurements (in mm) : Length 29.00 - 5.92 ; Width 17.10 - 2.65 ; Height 17.15 - 1.75

Diagnosis : Shell obliquely divided in the middle, with angular, longitudinally ribbed anterior half; ribs serrated; anterior ventral margin smooth; posterior concentrically striated towards the margin, extremity produced and attenuated; one elongate ventral shield and two dorsal shields upon the umbo and one posterior elongated and narrow shield.

Distribution : India : West Bengal : Calcutta, South 24 Parganas; Andhra Pradesh, Andaman & Nicobar Islands, Gujarat, Karnataka, Kerala, Maharashtra, Orissa, Tamil Nadu. Elsewhere : Eastern Pacific, Indo-Pacific, West Atlantic.

112. Genus *Lignopholas* Turner, 1955

158. *Lignopholas fluminalis* (Blanford)

1867. *Martesia fluminalis* Blanford, *J. Asiat. Soc. Beng.*, 36 (2) : 67. pl. 3, figs. 1-3.

Material examined : i) 26 valves, Khidirpur dock, Calcutta, Reg. No. M 12112/2, ii) 1 ex., Port Canning, Coll.?

Diagnosis : Shell cuneiform, closed, transversely divided by a canal, anterior part striated and partly smooth and ventricose towards the ventral margin; posterior part elongated, ornamented with fringed cutaneous layer.

Measurements (in mm) : Length 22.40 - 11.45 ; Width 12.40 - 7.05 ; Height 12.60 - 6.90

Distribution : India : West Bengal : Calcutta, South 24 Parganas. Elsewhere : Borneo.

113. Genus *Barnea* Risso, 1876159. *Barnea candida* (Linnaeus)
(Pl. 28, figs. 2 & 4)1758. *Pholas candida* Linnaeus, *Syst. Nat.*, : 669.1949. *Pholas backeri* Subrahmanyam *et. al.*, *J. Univ. Bombay*, 17 (5) : 74.1982. *Barnea candida* : Abbott and Dance, *Compendium of Sea shells*, p. 371.

Material examined : i) 1 valve, Digha, 20.12.65, Coll. K.K. Ray; ii) 1 valve, Junput, 8.3.66, coll. K.V. Rama Rao & Party; iii) 2 exs., Bakkhali, 27.1.88, iv) 9 valves, Digha, 19.5.83, v) 9 exs., Digha, 28.3.84, Coll. A. Dey and S. Barua; vi) 3 valves, Digha, Reg. No., M 20350/3, Coll. F.M.J. Pinn.

Measurements (in mm) : Length 74.55 32.85 ; Width 26.60 - 12.61 ; Height 25.40 - 13.58

Diagnosis : Shell thin, subventricose, rounded in front, ventricose in the middle; posteriorly attenuated, acuminate, narrow, simple; sculptured with strong concentric ridges but less prominent on the anterior part, radial ribs almost throughout the body except a small portion of anterior end.

Distribution : India : West Bengal : Medinipur, South 24 Parganas; Maharashtra, Orissa. Elsewhere: Atlantic and Indo-Pacific.

Remarks : Animals are found in soft mud banks at the depth of 15 to 20 cm. below the surface.

114. Genus *Pholas* Linnaeus 1758160. *Pholas orientalis* Gmelin
(Pl. 28, fig. 5)1791. *Pholas orientalis* Gmelin, *Syst. Nat.*, p. 3216, no.7.

Material examined : i) 1 valve, Junput, 8.3.66, Coll. K.V. Rama Rao & Party; ii) 3 valves, Digha, 19.5.83, Coll. A. Dey & S. Barua.

Measurements (in mm) : Length 105.36 102.30 ; Width 31.00 - 29.75 ; Height -

Diagnosis : Shell large, white with a narrow posterior end; gradually wider towards umbo and again narrow down rapidly; sculptured with strong, nodular radial ribs crossed by concentric ridge from anterior to middle region but almost smooth posterior part.

Distribution : India : West Bengal : Medinipur; Kerala, Orissa, Tamil Nadu. Elsewhere : Indo-

Pacific.

Family TEREDINIDAE

Key to the genera

1. Pallets nonsegmental, consist of calcareous base covered by periostracum..... (2)
 Pallets with numerous closely-packed, segments distinct but fused, wide shape or cone-like..... (4)
2. Pallet oval to rectangular..... *Uperotus*
 Pallet triangular (3)
3. Pallets assymetrical, basal portion of blades triangular with shallow cup from which issue postulose, dagger-like extensions; siphons united except the tip.....*Bactronophorus*
 Pallets simple, blade triangular in outline, stalk long and heavy; siphons separate.....*Dicyathifer*
4. Cones fused or closely-packed; periostracal covering extended as arms.....*Nausitora*
 Cones not fused, easily separated; periostracal covering extended as border, varies in width and sculpture.....*Bankia*

115. Genus *Bactronophorus* Tapparone-Canefri, 1877

161. *Bactronophorus thoracties* (Gould)

1856. *Teredo thoracties* Gould, *Proc. Boston Soc. nat. Hist.*, 6 : 15.

1970. *Bactronophorus thoracites* : Rajagopal, *Rec. zool. Surv. India*, 62 (1 & 2) : 25.

Material examined : i) 1 ex., Sajnakhali, Reg. No., M 16740/2, Coll. H. C. Ray; ii) 1 ex., (Pallet) Haldia, 13.4.87, Coll. B.P. Halder & Party.

Diagnosis : The dorsal portion of anterior slope of adult with the disc and the posterior lobe appear eroded; internally the auricles form a shelf where the disc overlaps; apophyses arising from shelf at the junction of lobe and disc.

Distribution : India : West Bengal : Medinipur, North 24 Parganas; Andhra Pradesh, Maharashtra. Elsewhere : Burma, Singapore, Indonesia, Borneo, Malacca, New Guinea, Philippines, Australia.

116. Genus *Dicyathifer* Iredale, 1932

162. *Dicyathifer manni* (Wright)

1866. *Kuphus manni* Wright, *Trans. Linn., Soc. Lond.*, 25 (3) : 565, pl. 65, figs. 1-8.

1970. *Teredo (Kuphus) manni* : Rajagopal, *Rec. zool. Surv. India*, 62 (1 & 2) : 23

Material examined : i) 6 exs., Budge-Budge, 13.1.36, Coll. E.W.E. Macfarlans; ii) 1 ex., Port Canning, 16.1.58, iii) 55 exs., Matla river, Port Canning, 1.9.58 - 16.9.58, iv) 26 exs., Sajnakhali, 28.3.61 - 29.3.61, v) 11 exs., Banentolla Bharani, Sajnakhali, 29.4.61, vi) 2 exs., Gomdi river, Sajnakhali, 30.4.61, vii) 9 exs., Sudhnyakhali, 30.4.61 - 3.5.61, viii) 10 exs., Pichkhali, Sunderbans, 1.5.61, Coll. A.S. Rajagopal; ix) 7 exs., Tatubaria camp, Sajnakhali, 21.3.58, x) 2 exs., Sajnakhali, 21.3.58, xi) 33 exs., Sajnakhali, 22.3.58 - 28.3.58, Coll. H.C. Ray; xii) 3 exs., Jhingakhali, 18.9.83, Coll. S. Biswas & Party; xiii) 1 ex., Haldibari, Sunderban, 24.8.87, xiv) 4 exs., Naubanki chara, Netidhopani, 30.8.87, Coll. S. Barua.

Diagnosis : Shell triangular with a broad dorsal margin; anterior lobe varies in size and in ridges; anterior portion of the disc well developed with a narrow median and posterior portion. Pallets large, heavy, calcareous and almost triangular in shape. The blade has flat inner face with convex outer face, outer margin of the blade u-shaped, inner margin straight as slightly curved.

Distribution : India : West Bengal : North and South 24 Parganas; Andhra Pradesh, Andaman & Nicobar Island, Kerala, Karnataka, Maharashtra. *Elsewhere* : East African coast, Madagascar Archipelago, Reunion, Malaya, Indonesia, New Guinea, Philippines, Australia, Vitenam.

117. Genus *Bankia* Gray, 1842

Key to the species

1. Margin of the cups on pallet dentate..... (2)
 Margin of the cups on pallets not dentate..... *B. campenellata* Moll and Roch
2. Cups compactly arranged; awns not extended on its sides..... *B. nordi* Moll
 Cups not so compact; awns extended on its side..... *B. rochi* Moll

163. *Bankia campenellata* Moll and Roch

1931. *Bankia campenellata* Moll and Roch. *Proc. malac. Soc. Lond.*, 19 (4) : 215.

1954. *Bankia bengalensis* Nair, *Rec. Indian Mus.*, 52 : 388.

Material examined : i) 16 exs., Matla river, Port Canning, 12.1.58 - 16.1.58, ii) 5 exs., Sajnakhali, 1.3.61, iii) 7 exs., Sajnakhali, 26.4.61 - 27.4.61, iv) 4 exs., (Pallets), Gomdi river, Sunderban, 30.4.61, v) 6 exs., Sajnakhali, 25.3.58, vi) 1 ex., Sajnakhali, 25.3.58, vii) 2 exs., Sajnakhali, 28.3.58, Coll. H.C. Ray; viii) 6 exs., Diamond Harbour, 17.6.64, Reg. No., 17714/3, Coll. ?, ix) 4 exs., Tiger Project Jetty, Gosaba, 25.5.85, Coll. B.P. Halder & Party.

Diagnosis : Shell with ridge from umbo to ventral margin and also a ridge from anterior disc; auricle well developed; apophysis blade like, curved; pallets with a series of spaced cones, calcareous portion of the cone funnel shaped, periostracal margin wide, flattened and bell shaped with a central notch on the

margin of outer surface.

Distribution : India : West Bengal : North and South 24 Parganas; Andhra Pradesh, Kerala, Maharashtra, Tamil Nadu. Elsewhere : Reunion, Malaya Archipelago, Indonesia, East coast of South America.

164. *Bankia nordi* Moll

1935. *Bankia nordi* Moll, *Sitzungber Awad. Wiss. Wien.*, 144 : 272, text fig. 8.

1964. *Nausitora sajnakhaliensis* Rajagopalainger, *J. Bombay nat. Hist. Soc.*, 61 (1) : 113, figs. 4-6 (type locality, Sajnakhali, types national Zoological Collection, ZSI).

Material examined : i) 4 exs., Khidirpur Dock, 10.1.36, ii) 7 exs., Budge-Budge, 13.1.36, Coll. E.W.E. Macfarlane; iii) 1 ex., Sajnakhali, 28.3.58, Coll. H.C. Ray; iv) 1 ex., Haldibari, Sunderban, 28.4.87, Coll. S. Barua; v) 1 ex., Sudhanyakhali, Sajnakhali, Reg. No., M 16846/2 (Holotype of *N. sajnakhaliensis*); vi) 1 ex. Sudhyanakhali, Sanjanakhali, Reg. No., M 16847/2 (Paratype of *N. sajnakhaliensis*), Coll. A.S. Rajagopal.

Diagnosis : Shell globular and translucent; auricle fairly large, pallets elongate, solid with a short cylindrical stalk and a long blade, with a series of transverse, v-shaped imbrications covered by golden brown periostracum; lateral margin of cones more or less fused.

165. *Bankia rochi* Moll

1931. *Bankia rochi* Moll, *Proc. malac. Soc. Lond.*, 19 : 215, pl. 25.

1961. *Bankia roonwali* Rajagopalainger, *Sci. Cult.*, 27 : 550 (type locality, Sajnakhali, Sunderban; types, National Zoological Collection, ZSI).

Material examined : i) 2 exs., Matla, Port Canning, 13.1.58-15.1.58, ii) 1 ex., Banentolla Bharani, Sunderban, 26.4.61 & 27.4.61, iii) 3 exs. Gomdi river, Sajnekhal, 28.3.61-1.5.61, Reg. No., M. 17637/3, iv) 21 exs., Sajnakhali, 29.4.61, v) 1 ex., Sudhyanakhali, 3.5.61, Reg. No., M 17610/3, Coll. A.S. Rajagopal; vi) 3 exs., Tataulbaria camp, Sajnakhali, 25.3.58, vii) 3 exs., Sajnakhali, 28.3.58 Reg. No., M 17634/3, Coll. H.C. Ray; viii) 1 ex., Gomdi river, Sajnakhali, 30.4.61, (Holotype of *B. roonwali* Rajagopal), ix) 3 exs., Gomdi river, Sajnakhali, Coll. A.S. Rajagopal (Paratypes of *B. roonwali* Rajagopal)

Diagnosis : Shell small, median disc well marked, ribs on anterior lobe close with coarse sculpture; pallets with a series of cones aranged on a central disc; calcareous portior u-shaped and covered by periostracum and the margin with comb like serration in both the faces; stalk long and cylindrical.

Distribution : India : West Bengal : North and South 24 Parganas; Andhra Pradesh, Karnataka, Maharashtra. Elsewhere : East coast of Africa, Madagascar, Red Sea, Persian Gulf, Indian and Pacific Ocean Islands, Japan.

Remarks : Very important borer causing a considerable damage to timber structures.

118. Genus *Nausitora* Wright, 1864166. *Nausitora dunlopei* Wright

1864. *Nausitora dunlopei* Wright, *Trans. Linn. Soc. Lond.*, 24 : 453.
 1954. *Bankia (Nausitora) madrasensis* Nair, *Rec. Indian Mus.*, 52 : 399.
 1964. *Nausitora lanceolata* Rajagopal, *J. Bombay nat. Hist. Soc.* 61 (1) : 109.

Material examined : i) 1 ex., Tatulbaria camp, 25.3.58, ii) 1 ex., Sajnakhali, 28.3.58, Coll. H.C. Ray; iii) 10 exs., Baentolla Bharani, 27.4.61, Reg. No., M 17676/3, iv) 5 exs., Gomdi river, Sajnakhali, v) 5 exs., Pichkhali, Sajnakhali, 1.5.61, Reg. No., M 17608/3, vi) 18 exs., Sajnakhali, 2 & 3.5.61, Reg. No., 17667/3, Coll. A.S. Rajagopal; vii) 1 ex., Haldia, 13.4.87, Coll. B.P. Halder & Party; viii) 2 exs., Nikarikhali, Haldi, Sunderban, 24.8.87, ix) 1 ex., Naubankichara, 30.8.87, Coll. S. Barua; x) 1 ex., Sajnakhali, Sunderban, 2.5.61, Reg. No., M 16841/2 (Holotype of *N. lanceolata* Rajagopal) xi) 4 exs., Sajnakhali, Sunderban, 2.5.61, Reg. No., M 16842-45/2 (Paratype of *N. lanceolata* Rajagopal).

Diagnosis : Shell large; anterior slope extend upto half of ventral margin; broad anterior disc; sculptured with coarsely denticulate ridges; median and posterior disc narrow; auricle greatly reduced; apophysis flattened, umbonal area broad, condyles well developed; Pallets asymmetric with broad, smooth basal portion; blades often covered with periostracum; upper portion of the blade composed of fused, close set, crooked cones; tips of the pallets pustulate; inner face of the cones distally marked; upper cones more or less fused.

Distribution : India : West Bengal : Medinipur, North and South 24 Parganas; Andhra Pradesh, Tamil Nadu. Elsewhere : East coast of Africa, Madagascar, Red Sea, Persian Gulf, Malaya Archipelago, Indian Ocean islands, Philippines.

119. Genus *Uperotus* Guettard, 1770167. *Uperotus clavus* (Gmelin)

1791. *Teredo clava* Gmelin, *Syst. Nat.* ed 13, p. 3748.
 1966. *Uperotus clavus* : Turner, *Cat. Teredinidae*, p. 94, pl. 23, fig. C.

Material examined : Some broken shells and pallets

Diagnosis : Pallet oval to rectangular with short and heavy stalk; periostracum absent. The basal portion of blade almost smooth, distal portion with pronounced radiating ribs. Shells of anterior and posterior slopes greatly reduced with high posterior slope.

Distribution : India : West Bengal, Tamil Nadu. Elsewhere : Indo-Pacific.

Remarks : We have not examined complete specimens as we have only the broken pieces of pallets. The characters given are from Turner (1966)

This species is usually found living in the fruits of *Xylocarpus* (Turner, 1966).

Order PHOLADOMYOIDA
Family PANDORIDAE
120. Genus *Pandora* Bruguiere, 1829

168. *Pandora ceylonica* Sowerby
(Pl. 28, figs. 6 & 7)

1835. *Pandora ceylonica* Sowerby, *Proc. zool. Soc. Lond.*, p.

1874. *Pandora ceylonica* : Reeve, *Conch. Icon.* 19, sp. no. 19, pl. 3, figs. 19 a & b.

Material examined : i) 5 exs., Digha, Coll. F.M.J. Pinn; ii) 9 exs., Digha, Coll. ?.

Measurements (in mm) : Length 34.50 - 30.95 ; Width 19.85 - 19.25 ; Height 2.70 - 2.15

Diagnosis : Shell elevated, compressed, equilateral and hatchet shaped; anterior side sloped; posterior side produced at the ventral; dorsal margin deeply arched; beak narrow, produced and with two strong rostral ribs; valve almost flat.

Distribution : India : West Bengal : Medinipur. Elsewhere : Sri Lanka.
It is recorded for the first time from India.

Family LATERNULIDAE
121. Genus *Laternula* Roeding, 1798

169. *Laternula truncata* (Lamarck)
(Pl. 29, figs. 1 & 2)

1818. *Anatina truncata* Lamarck (or parte) *Hist. nat. Anim. Sans. Vert.* 5 : 463.

1977. *Laternula subrostrata* : Subba Rao, *Newsl. zool. Surv. India*, 3 (5) : 301.

Material examined : i) 6 exs., Digha, 27.3.83, Coll. A. Dey and S. Barua; ii) 4 exs., Port Canning, 26.9.84, Coll. B.P. Halder and Party; iii) 3 exs., Port Canning, Coll. A. Misra.

Measurements (in mm) : Length 61.75 - 37.30 ; Width 28.80 - 19.35 ; Height 21.30 - 15.15

Diagnosis : Shell elongately oblong, thin, white with reddish brown outline; umbo anterior in position; anterior dorsal straight posterior dorsal concave; ventral margin almost straight; anterior end rounded with straight square, posterior end with large gape.

Distribution : India : West Bengal : Medinipur, South 24 Parganas; Orissa. Elsewhere : Indian ocean islands, Philippines, Japan.

Remarks : Deep mud burrower, found in the estuaries.

Family CUSPIDARIIDAE
122. Genus *Cuspidaria* Nardo, 1840

170. *Cuspidaria chilkaensis* (Preston)

1912. *Corbula chilkaensis* Preston, *Rec. Indian Mus.*, 6 : 39, fig. 2.

Material examined : i) 47 exs., Port Canning, 6.12.09, Reg. No. ,M 6395-99/1, Coll. C. A. Paiva; ii) 2 exs., Mainapara, Kakdwip, 10.3.50, Coll. B.P. Halder and Party.

Measurements (in mm) : Length 11.80 - 3.40 ; Width 6.80 - 2.35 ; Height 4.90 - 1.55.

Diagnosis : Shell thin, white with broad rounded anterior end and elongated beak like posterior end; sculptured with fine concentric striae; umbo acuminate, elevated and mid dorsal in position.

Distribution : India : West Bengal : South 24 Parganas; Kerala, Orissa, Tamil Nadu.

Remarks : We have examined the types of *C. annandalei* and *C. chilkaensis* and have gone through the original descriptions. We are of the opinion that both the species bear the same characters. Since *C. chilkaensis* has priority over *C. annandalei* we prefer to retain the former name for the present species.

Class CEPHALOPODA
Order SEPIOIDEA
Family SEPIIDAE

Key to the genera

Posterior end of mantle without glandular pore; cuttle bone with prominent spire at posterior end
.....*Sepia*

Posterior end of mantle with distinct glandular pore; cuttle bone without spine at posterior end
..... *Sepiella*

123. Genus *Sepia* Linnaeus, 1758

171. *Sepia aculeata* d'Orbigny
(Pl. 29, figs. 3 & 4)

1848. *Sepia aculeata* d'Orbigny, *Hist. Nat. Gen. Part. Paris*, p. 287.

1987. *Sepia aculeata* : Jothinayagam, *Tech. Mon. zool. Surv. India*, 15 : 14, fig. 5.

Material examined : i) 1 exs., Sandhead, 728, Coll. A. Milner; ii) 3 exs., Sandhead, Reg. No., M 15316/2, Coll. P. V. Lady Fraser; iii) 2 exs., Sandhead Reg. No., M 2505/6/1, Coll. Capt. J.H. Row; iv) 1 ex., Malta River, Reg. No., 3651/1, Coll. Gilles; v) 2 exs., Mouth of Hugli, Reg. No., M 8280-81/1, Coll. Golden Crown.

Measurements (in mm) : Total length 190.00 - 142.00 ; Mantle length 140.00 - 112.00 ; Head length 26.10 - 21.00 ; Tentacle length 50.00 - 30.00.

Diagnosis : Tentacular sucker small, subequal and arranged in 12 longitudinal rows; proximal end of left ventral arm hectocotylised, with 3 series of normal suckers and 5-6 series of minute suckers.

Distribution : India: West Bengal : South 24 Parganas; Andhra Pradesh, Karnataka, Kerala, Orissa, Tamil Nadu. Elsewhere : Indo-Pacific.

124. Genus *Sepiella* Gray, 1849

172. *Sepiella inermis* d'Orbigny
(Pl. 30, figs. 1 & 2)

1848. *Sepiella inermis* d'Orbigny, *Hist. nat. Gen. Part. Paris*, p. 286, pl. 20, figs. 1-9.

1987. *Sepiella inermis* : Jothinayagam, *Tech. Mon. zool. Surv. India*, 19 : 29, fig. 10.

Material examined : i) 4 exs., Sandhead, Reg. Nos., M 329/1, 331/1, 12085-86/2, Coll. ?; ii) 1 ex., Sandhead, Reg. No., 727, Coll. F. Stoliczka; iii) 3 exs., Digha, 27.11.84, Coll. N.V. Subba Rao and Party; iv) 1 ex., Basanti, 27.2.86, Coll. B. P. Halder and Party.

Measurements (in mm) : Total length 84.70 - 35.40 ; Mantle length 62.20 - 22.40 ; Head length 28.20 - 9.10 ; Tentacle length 11.00 - 7.90.

Diagnosis : Cuttle bone flat and laminate; tentacular suckers minute and irregular; dorsal side of mantle dark coloured but ventral pale white; fins pale with faint white.

Distribution : India : West Bengal : Medinipur, North and South 24 Parganas; Andhra Pradesh, Maharashtra, Pondicherry, Tamil Nadu. Elsewhere : Red sea, Malaya Archipelago, Indonesia, Vietnam, China Sea.

Order TEUTHOIDEA
Family LOLIGINIDAE

Key to the genera

1. Fin length less than 70% of mantle length..... *Loligo*
 Fin length nearly 70% or more of mantle length..... (2)
2. Mantle long and narrow; posterior end sharp.....*Doryteuthis*
 Mantle short, stout; posterior end broadly rounded..... *Loliolus*

125. Genus *Loligo* Schneider, 1784

173. *Loligo duvauceli* d'Orbigny

1848. *Loligo duvauceli* d'Orbigny *Hist. nat. Gen. Part. Paris*, p. 318, pls. 14 & 20, figs. 6-16.

1987. *Loligo duvauceli* : Jothinayagam, *Tech. Mon. zool. Surv. India*, 19 : 43, fig. 15.

Material examined : i) 2 exs., Sandhead, Reg. No., M 15303/2, Coll. P. V. Lady Fraser.

Measurements (in mm) : Total length 155.00 - 150.00 ; Mantle Length 108.00 - 100.00 ; Head length 37.60 - 30.00 ; Tentacular length 40.00 - 37.00

Diagnosis : Mantle long, slender, tubular, tapering from middle and blunt posterior end; fins rhomboidal ; left ventral arm hectocotylised, distal half possessing pedicle flattened into conical papillae present colour reddish brown chromatophores with pale white back grow, which dark and the head region.

Distribution : India : West Bengal : South 24 Parganas; Andaman & Nicobar Islands, Andhra Pradesh, Tamil Nadu. Elsewhere : Indo-Pacific.

126. Genus *Doryteuthis* Neaf, 1912174. *Doryteuthis singhalensis* Ortmann

1891. *Doryteuthis singhalensis* Ortmann, *Zool. Jb. Syst.*, 5 : 676, pl. 46, fig. 3.

1987. *Doryteuthis singhalensis* : Jothinayagam, *Tech. Mon. zool. Surv. India*, 19 : 5, fig. 18.

Material examined : i) 2 exs., Male, Sandhead, Reg. No., M 15301-2/2, Coll. P.V. Lady Fraser.

Measurements (in mm) : Total length 226.00 - 210.00 ; Mantle length 171.00 - 141.00 ; Head length 27.00 - 20.00 ; Tentacular length 44.00 - 38.00

Diagnosis : Mantle long, slender; fin length nearly 2/3rd of the mantle length; tentacles short; chitinous rings of tentacular club with 20-22 sharp teeth; arm suckers with 7-9 blunt teeth; left arm heterocotyle, distal half of arm with slender papillae with minute suckers; pale white with chromatophores on the dorsal surface.

Distribution : India : West Bengal : South 24 Parganas, Tamil Nadu. Elsewhere : Indo-Pacific.

127. Genus *Loliolus* Steen Strup, 1856175. *Loliolus investigatoris* Goodrich
(Pl. 30, fig. 3)

1856. *Loliolus investigatoris* Goodrich, *Trans. Linn. Soc. Lond.*, 7 : 8, pl. 2, figs. 24-37.

1987. *Loliolus investigatoris* : Jothinayagam, *Tech. Mon. zool. Surv. India*, 15 : 57, fig. 20.

Material examined : i) 4 exs., Barakara, Sunderbans, 14.3.18, Coll. B. Prashad; ii) 1 exs., Digha, 27.11.84, Coll. N.V. Subba Rao & Party ; iii) 1 ex., Jharkhali, 20.5.85, Coll. B.P. Halder and Party; iv) 1 ex., Sandhead, Reg No., M 15307/2, Coll. P.V. Lady Fraser.

Measurements (in mm) : Total length 77.00 - 42.40 ; Mantle length 44.00 - 24.45 ; Head length 13.00 - 6.30 ; Tentacle length 27.00 - 13.00

Diagnosis : Mantle short and stout, fin broad, fin length about 70% of the mantle length; left ventral arm hectocotylised.

Distribution : India : West Bengal : Medinipur, North and South 24 Parganas; Andhra Pradesh, Orissa, Tamil Nadu. Elsewhere : Bangladesh, Burma, Malayasia, Indonesia.

Order OCTOPODA
Family OCTOPODIDAE
128. Genus *Octopus* Lamarck, 1796

Key to the species

Web shallow between arm I..... *O. rugosus* (Bosc)

Web highest between arm I..... *O. macropus* Risso

176. *Octopus macropus* Risso
(Pl. 30, fig. 4)

1826. *Octopus macropus* Risso, *Hist. nat. Europe Meridum*, 4 : 3.

1987. *Octopus macropus* : Jothinayagam, *Tech. Mon. zool. Surv. India*, 15 : 64, fig. 23.

Material examined : i) 1 ex., Digha, 1.5.87, Coll. A. Dey and S. Barua.

Measurements (in mm) : Total length 245.00 ; Mantle length 60.00 ; Head length 30.00 ; Tentacle length 162.00

Diagnosis : Mantle short and round; Funnel long reaching above the level of the eyes; head short; eyes less prominent; dorsal pair of arm long and stout; 12 lamellae present in the outer demibranch of each gill; colour of the body buff with minute chromatophores on the dorsal side, ventral side pale.

Distribution : India : West Bengal : Medinipur; Tamil Nadu. Elsewhere : Cosmopolitan, in tropical and warm temperate seas.

177. *Octopus rugosus* (Bosc)

1792. *Sepia rugosa* Bosc, *Act. Soc. Hist. nat. Paris*, 1 : 24, pl. 5, figs 1 & 2.

1987. *Octopus rugosus* : Jothinayagam, *Tech. Mon. zool. Surv. India*, 15 : 62, fig. 22.

Material examined : 1 ex., Sandhead, Reg. No. ,M 15312/2, ii) 1 ex., Sandhead, Aug. - Sept. Reg. No., M 20839/4, Coll. ?.

Measurements (in mm) : Total length 28.00 ; Mantle length 72.00 ; Head length 31.00 ; Tentacle length 180.00

Diagnosis : Mantle round with a distinct ventral furrow; skin grey with tubercles and faint dark reticulation on the dorsal side and paler on the ventral side; Funnel with broader posterior and reaching above the level of eyes; arm length 2-1/2 to 3 times more than the mantle length; prominent multifid cirrus on head above each eye.

Distribution : India : Common on east and west coast. Elsewhere : Cosmopolitan, in tropical and warm temperate waters.

GENERAL SUMMARY AND REMARKS

A consolidated list of estuarine and marine molluscs of West Bengal includes a total of 226 species, belonging to 145 genera and 77 families. Of these, 49 species are included on the basis of literature records.

From the present data it is seen that the class Polyplacophora is not represented in the area studied. Poor representation of the classes Cephalopoda and Scaphopoda is more a reflection of the intensity and techniques of collection rather than an indication of their abundance. The two classes, Gastropoda and Bivalvia are well represented, the former by 118 species and the latter by 98 species.

Collections were made from different habitats, but majority of these species (about 66 nos.) were collected from mud flats, occurring either as infauna or epifauna in the estuarine region (Appendix - I). Around 18 species are associated with mangrove plants. The intertidal coastal sandy areas have yielded 63 species, of which gastropod(33) form a major constituent. Only 29 species were collected from the fishing nets operated in the off shore region. The number of species of the littoral region may be more than what is actually reported here.

Among mangrove associated gastropods, *Littorina melancstoma* Gray, *Littorina scabra scabra* (Linnaeus), *Nerita articulata* Gould, *Cerithidea obtusa* Lamarck and *Telescopium telescopium* Linnaeus were found associated with mangrove plants and in areas where the mangrove vegetation is not available they cling to crevices in the substratum. *Columbella duclosiana* Sowerby was found attached to pneumatophores, and also crawling on the muddy substratum. Important epifaunal elements are mangrove bivalves, namely *Saccostrea cucullata* (Born) and *Enigmonia aenigmatica* (Bolten). The former is very common on the jetties and on molluscan shells. Saddle oyster is found attached to stems of mangroves, particularly *Avicennia* sp. and *Rhizophora* sp. Two other important families of bivalves, namely Teredinidae and Pholadidae have their representatives boring into wooden structures and even living trees. *Martesia fragilis* Verrill and Bush, *Bactronophorus thoracites* (Gould), *Dicyathifer manni* (Wright),

Bankia companellata Moll and Roch, *B. nordi* Moll, *B. rochi* Moll and *Nausitora dunlopei* Wright are some of the mangrove borers, which occur throughout Sunderbans, experiencing tidal influence.

Mud dwellers include those that crawl on the substratum. Among Gastropods, *Assiminea*, *Telescopium*, *Cerithidea* *Stenothyra*, *Larina*, *Pugilina*, *Auricula*, *Pythia* and *Haminea* are common. Among bivalves, *Anadara*, *Modiolus*, and *Placuna* occur on the mud as epifauna and others e.g. *Macra*, *Solen*, *Pharella*, *Siliqua*, *Tanysiphon*, *Tellina*, *Strigilla*, *Macoma*, *Theora*, *Meretrix*, *Pelecypora*, *Glaucanome*, *Barnea* and *Laternula* live buried in the substratum at various depths.

Gastropod species in order of relative abundance are *Assiminea brevicula*, *A. beddomeana*, *Cerithidea cingulata*, *Telescopium telescopium* and *Pugilina cochlidium*, Bivalve species in order of relative abundance are *Saccostrea cucullata*, *Pelecypora trigona*, *Macoma birmanica*, *Glaucanome sculpta* and *Pharella javanicus*. But on the Digha coast *Donax incarnatus* and *Meretrix meretrix* are the two dominant species, which occur in the intertidal region.

When we compare malacofauna of West Bengal with that of neighbouring state of Orissa we find that the latter has more number of species (108 nos.) than that of the former and 106 species are common to both. Orissa has more coastal habitats offering varied ecological niches than West Bengal and hence more number of species were recorded.

However West Bengal fauna has some uniqueness in that it includes some important estuarine species, three of which occur only in Irawaddy delta. The species, namely *Clithon reticularis* (Sowerby), *Septaria caerulea* (Sowerby), *Stenothyra deltae* (Benson), *S. soluta* Annandale and Prashad, *S. woodmasoniana* Nevill, *Assiminea francesiae* (Gray), *A. theobaldiana* Nevill, *A. microsculpta* Nevill, *Thiara (Mainwaringia) paludomidea* Nevill, *Larina burmana* (Blanford), *Acrilla gracilis* (Sowerby), *Onchidium tenerum* Stoliczka, *O. tigrinum* Stoliczka, *O. typhae* Buchannan, *Tanysiphon rivalis* Benson and *Novaculina gangetica* Benson are 'restricted endemic' to Gangetic delta.

Of the 226 species given in the list 44 species are recorded for the first time from West Bengal. These include 24 species of gastropods, one species of scaphopod and 19 species of bivalves. In fact the scaphopod *Cadulus clavatum* (Gould) and bivalve *Pandora ceylonica* Sowerby are recorded for the first time from India

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Appendix - I
Habitat-wise distribution of Molluscs

A. Mangrove associated species

1. *Potamacmaea fluviatilis* (Blanford)
2. *Nerita articulata* Gould
3. *Littorina (Littoraria) melanostoma* Gray
4. *Littorina (Littorinopsis) scabra scabra* (Linnaeus)
5. *Telescopium (T) telescopium* Linnaeus
6. *Cerithidea (Cerithidea) obtusa* Lamarck
7. *Columbella duclosiana* Sowerby
8. *Cassidula nucleus* (Gmelin)
9. *Enigmonia aenigmatica* (Holten)
10. *Saccostrea cucullata* (Born)
11. *Trapezium sublevigatum* Reeve
12. *Martesia fragilis* Verrill and Bush
13. *Bactronophorus thoracites* (Gould)
14. *Dicyathifer manni* (Wright)
15. *Bankia compenellata* Moll and Roch
16. *B. nordi* Moll
17. *B. rochi* Moll
18. *Nausitora dunlopei* Wright

B. Species occurring on mud flats.

Epifauna : Gastropoda

1. *Tubiola microscopica* (Nevill)
2. *Solariella satparaensis* Preston
3. *Neritina smithi* Wood
4. *Neritina violacea* (Gmelin)
5. *Clithon reticularis* (Sowerby)
7. *Septaria lineata* (Lamarck)
8. *Stenothyra blanfordiana* Nevill
9. *S. deltae* (Benson)

10. *S. soluta* Annandale and Prashad
11. *S. woodmasoniana* Nevill
12. *Gangetia miliacea* (Nevill)
13. *Assiminea beddomeana* Nevill
14. *A. brevicula* (Pfeiffer)
15. *A. francesiae* (Wood)
16. *A. microsculpta* Nevill
17. *A. theobaldiana* Nevill
18. *A. woodmasoniana* Nevill
19. *Architectonica perspectiva* (Linnaeus)
20. *Telescopium* (T.) *telescopium* Linnaeus
21. *Cerithidea* (*Cerithideopsis*) *cingulata* (Gmelin)
22. *C. (Cerithidea) obtusa* Lamarck
23. *Acrilla acuminata* (Sowerby)
24. *Columbella duclosiana* Sowerby
25. *Pugilina cochlidium* (Linnaeus)
26. *Nassarius foveolatus* (Reeve)
27. *N. orissanensis* Preston
28. *N. stolatus* (Gmelin)
29. *Asthenotoma vertebrata* (Smith)
30. *Iaminea corcata* Reeve
31. *Cassidula nucleus* (Gmelin)
32. *Ellobium aurisjudae* (Linnaeus)
33. *Melampus pulchella* Petit

Bivalvia

34. *Scaphula deltae* Blanford
35. *Scapharca deyrollei* Joussacume
36. *Modiolus striatulus* (Hanley)
37. *M. tulipa* (Lamarck)
38. *M. undulatus* (Dunker)
39. *Placuna* (P.) *placenta* (Linnaeus)
40. *Crassostrea cuttackensis* Newton and Smith
41. *C. gryphoides* (Schlotheim)

Infauna : Gastropoda

42. *Onchidium tenerum* Stoliczka
43. *O. tigrinum* Stoliczka
44. *O. typhae* Buchannan

: Bivalvia

45. *Eamesiella philippinarum* (Hanley)
46. *Solen brevis* Gray
47. *Pharella javanicus* (Lamarck)
48. *Siliqua albida* Dunker
49. *Tanysiphon rivalis* Benson
50. *Tellina corbuloides* (Hanley)
51. *T. irridescens* (Benson)
52. *Macoma birmanica* (Philippi)
53. *M. truncata* Jonas
54. *Theora opalina* (Hinds)
55. *Novaculina gangetica* Benson
56. *Polymesoda (Geloia) bengalensis* (Lamarck)
57. *Meretrix meretrix* (Linnaeus)
58. *Glaucanome sculpta* (Sowerby)
59. *Sphenia perversa* Blanford
60. *Corbula abbreviata* Preston
61. *C. calcarea* Preston
62. *C. gracilis* Preston
63. *Barnea candida* (Linnaeus)
64. *Pandora ceylonica* Sowerby
65. *Laternula truncata* (Lamarck)
66. *Cuspidaria chilkaensis* (Preston)

C. Species occurring in Intertidal Zone

Gastropoda

1. *Umbonium vestiarius* (Linnaeus)
2. *Littorina (Littoraria) undulata* Gray
3. *Iravadia ornata* Blanford

4. *Turritella attenuata* Reeve
5. *Acrilla gracilis* (Sowerby)
6. *Niso pyramidelloides* G. & H. Nevill
7. *Eulima cuspidata* A. Admas
8. *Natica gualteriana* Recluz
9. *N. lineata* (Roeding)
10. *N. tigrina* (Reding)
11. *N. vitellus* (Linnaeus)
12. *Polinices didyma* (Roeding)
13. *P. tumidus* (Swainson)
14. *Cymia lacera* (Lamarck)
15. *Rapana rapiformis* (Born)
16. *Nassarius foveolatus* (Reeve)
17. *N. stolatus* (Gmelin)
18. *Amalda ampla* (Gmelin)
19. *Olivancillaria gibbosa* (Born)
20. *Persicula ventricosa* (Fischer)
21. *Turridrupa bijubata* (Reeve)
22. *Terebra durgella* Ray
23. *T. tenera* A. Adams
24. *T. tricineta* Smith
25. *Pyramidella dolabrata terebellum* (Mueller)
26. *Turbonilla felicitas* Laseyron
27. *Odostomia babylonica* Winckworth
28. *O. oxia* Watson
29. *Ringicula encarpiferens* de Folin
30. *R. propinquans* Hinds
31. *Cylichna protracta* Gould
32. *Retusa pyramidata* (A. Adams)

Scaphopoda

33. *Dentalium octangulatum* Donovan

Bivalvia

34. *Anadara granosa* (Linnaeus)
35. *Striarca lactea* (Linnaeus)
36. *Anomia achaeus* (Gray)

37. *Saccostrea cucullata* (born)
38. *M. (Mactra) luzonica* Deshayes
39. *M. (M.) mera* Reeve
40. *M. (Mactrinula) plicataria* Linnacus
41. *M. (Coelomactra) turgida* Gmelin
42. *M. violacea* Gmelin
43. *Solen brevis* Gray
44. *Siliqua albida* Dunker
45. *S. radiata* (Linnacus)
46. *Tellina corbuloides* (Hanley)
47. *T. sinuata* Spengler
48. *Strigilla splendida* (Anton)
49. *Apolymetis edentula* Spengler
50. *Donax incarnatus* Gmelin
51. *D. scortum* Linnacus
52. *Sanguinolaria (Soletellina) acuminata* (Deshayes)
53. *Gafrarium pectinatum* (Linnacus)
54. *Pitar alabastrum* (Reeve)
55. *Pelecypora trigona* Reeve)
56. *Paphia malabaricus* (Schoerter)
57. *P. textile* (Gmelin)
58. *Tapes bruguieri* (Hanley)
59. *Timoclea imbricata* (Sowerby)
60. *Glaucanome sculpta* (Sowerby)
61. *Barnea candida* (Linnaeus)
62. *Pholas orientalis* Gmelin
63. *Laternula truncata* (Lamarck)

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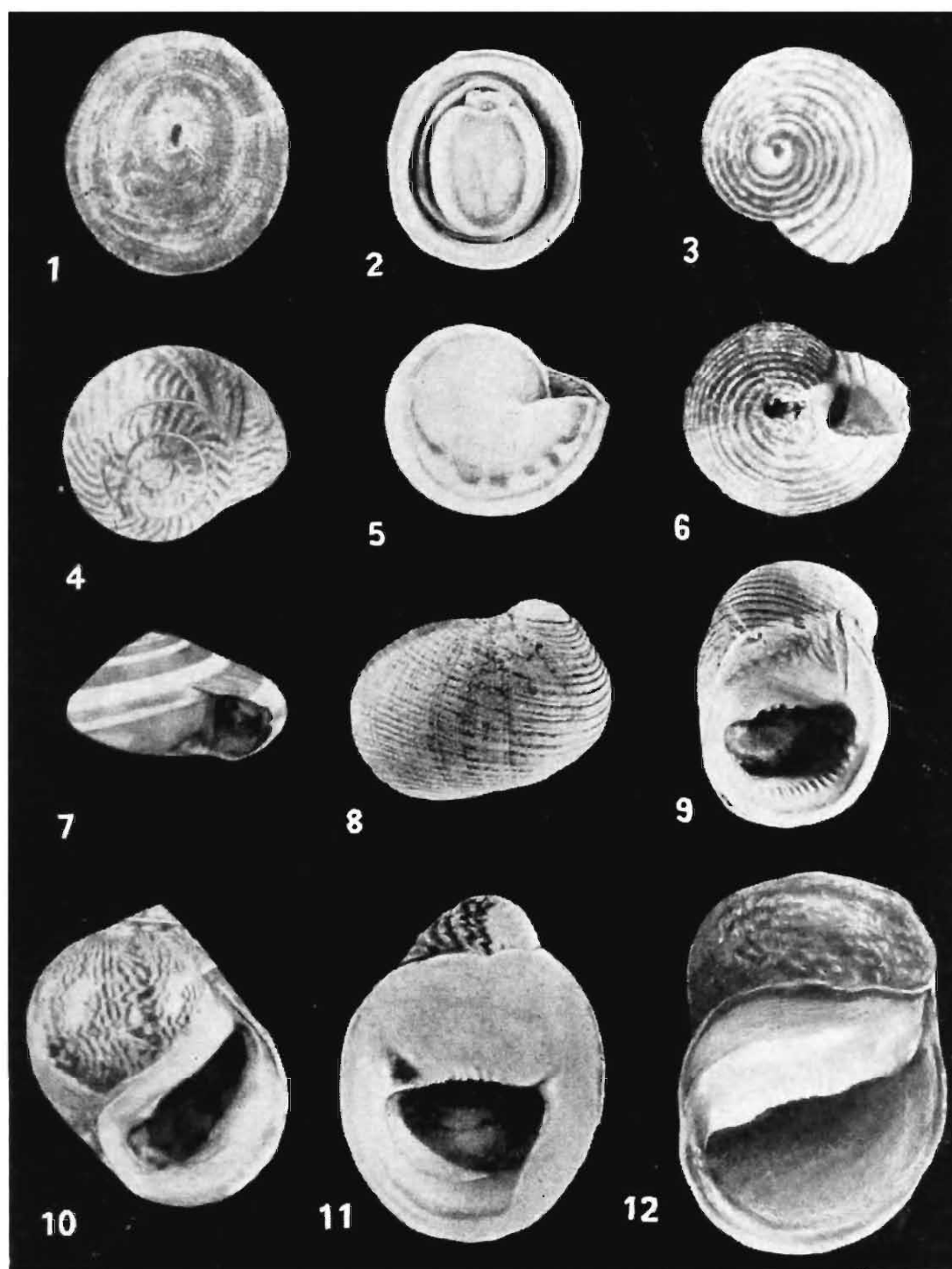


Fig 1 & 2. *Potamacmaea fluviatilis* (Blanford) 17.16x15.76 mm. 3 & 6. *Tubirola microscopica* (Nevill) 1.30x2.70 mm. 4, 5 & 7. *Umbonium vestiarium* (Linnaeus) 7.40x13.00 mm. 8 & 9. *Nerita articulata* Gould 29.34x31.75 mm. 10. *Neritina smithi* Wood 16.50x16.77 mm. 11. *Neritina violacea* (Gmalin) 19.00x10.85 mm. 12. *Pseudonerita obtusa* (Benson) 11.60x13.60.

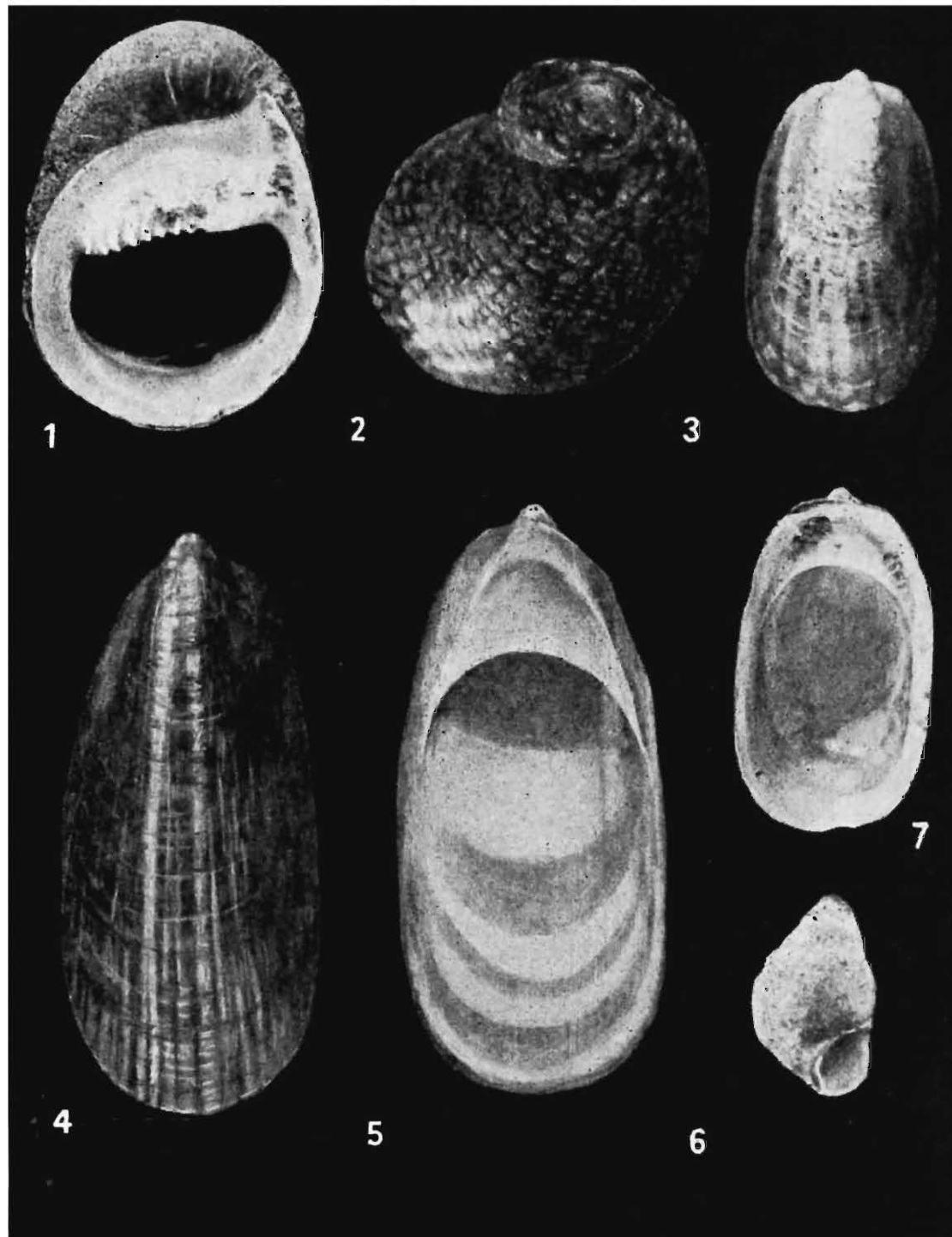


Fig. 1. *Pseudonerita sculculosa* (von. Martens) K 40x6.10 mm. 2. *Clithon reticularis* (Sowerby) 12.90x10.40 mm. 3 & 7. *Septaria caerulescens* (Towerby) 11.25x6.80 mm. 4 & 5. *Septaria lineata* (Lamarck) 23.30x10.00. 6. *Stenothyra blanfordiana* Nevill 3.24x1.60 mm.

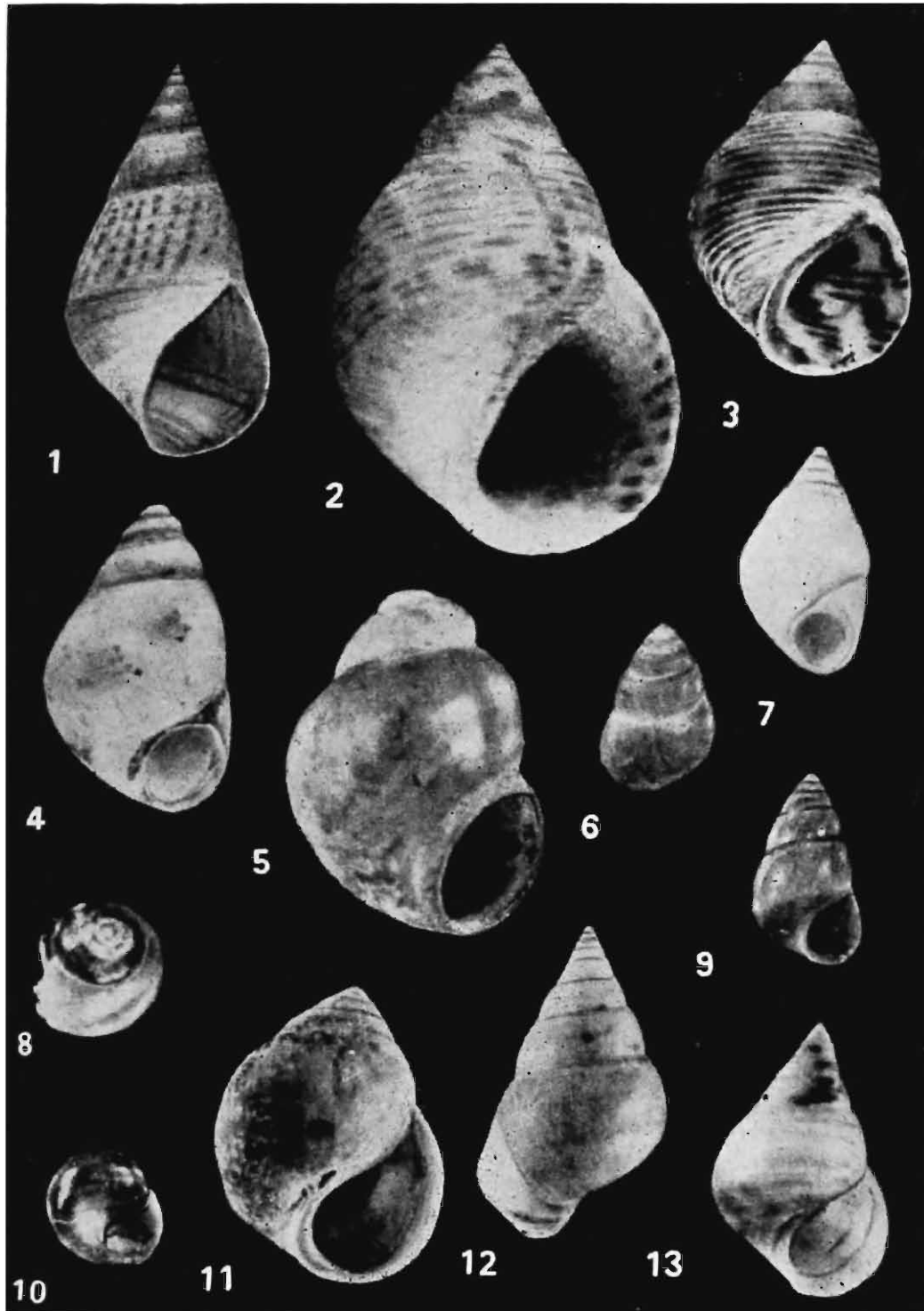


Fig. 1 *Littorina (Littoraria) melanostoma* Gray 21.40x11.95 mm. 2. *Littorina (L.) undulata* Gray 8.82x5.32 mm. 3. *Littorina (Littorinopsis) scabra scabra* (Linnaeus) 9.40x6.43 mm. 4. *Stenothyra beltae* (Benson) 5.30x3.55 mm. 5. *Stenothyra soluta* Annandale & Prashad 2.75x1.0 mm. 6 & 9. *Gangatia miliacea* (Nevill) 2.55x1.80 mm. 7. *Stenothyra woodmasoniana* Nevil 2.88x3.60mm. 8 & 10. *Assiminea beddomeana* Nevill 2.00x2.50 mm. 11 *Assiminea brevicula* (Pleiffer) 6.00x4.60 mm. 12 & 13. *Assiminea francesiae* (Wood) 9.30x5.45 mm.

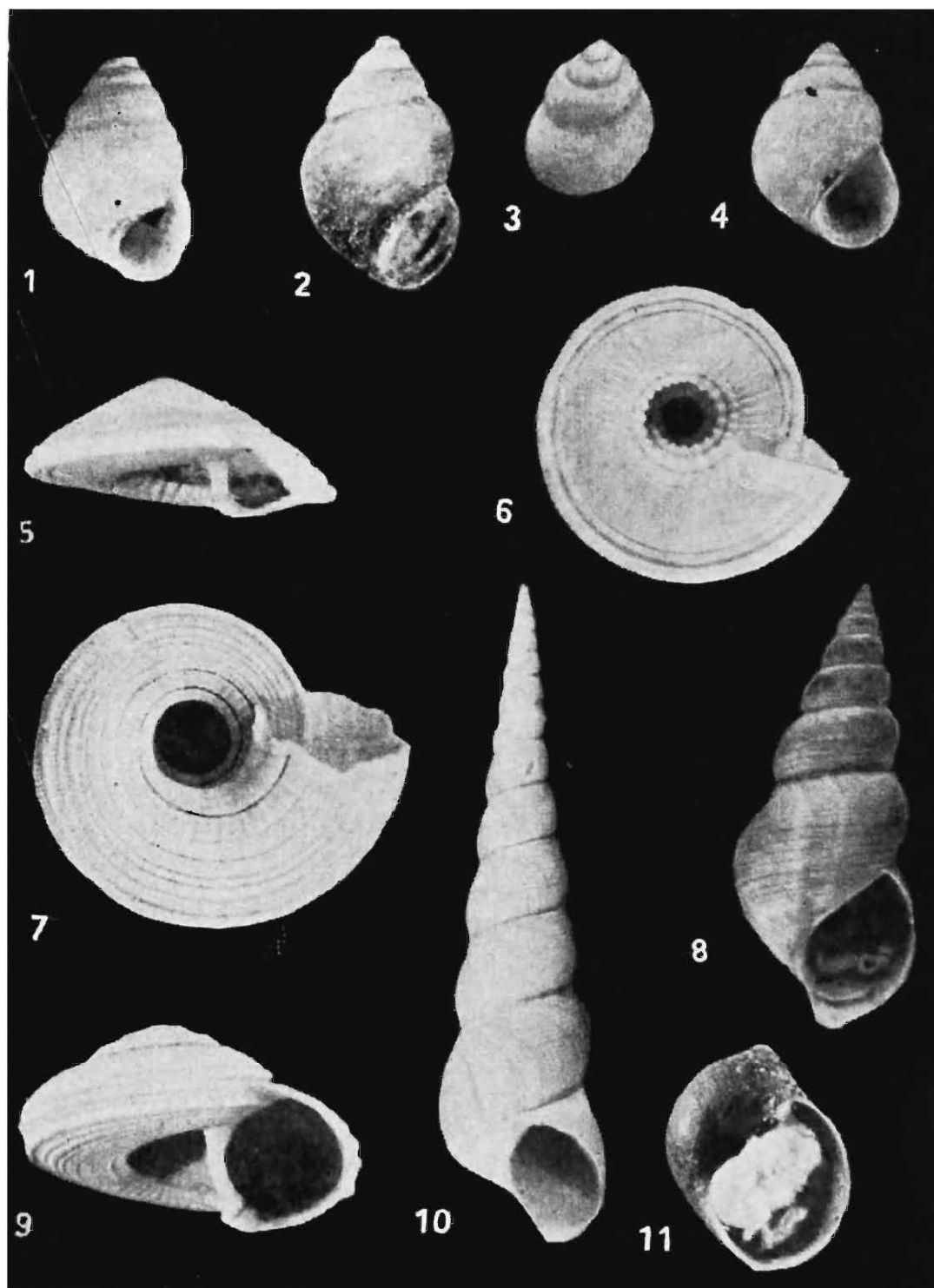


Fig. 1. *Assiminea microsculpta* Nevill 3.25x2.15 mm. 2. *Assiminea theobaldiana* Nevill 3.65x2.40 mm. 3 & 4. *Assiminea woodmasoniana* Nevill 4.22x2.35 mm. 5 & 6. *Architectonica perspectiva* (Linnaeus) 9.90x19.00 mm 7 & 9. *Heliacus* (*Heliacus*) *stramineus* (Gmelin) 14.10x19.82. 8. *Thiara* (*Mainwaringa*) *paludomidea* Nevill. 10. *Turritella attenuata* Reeve 74.50x18.50 mm. 11. *Larina burmana* Blanford 9.60x7.80.

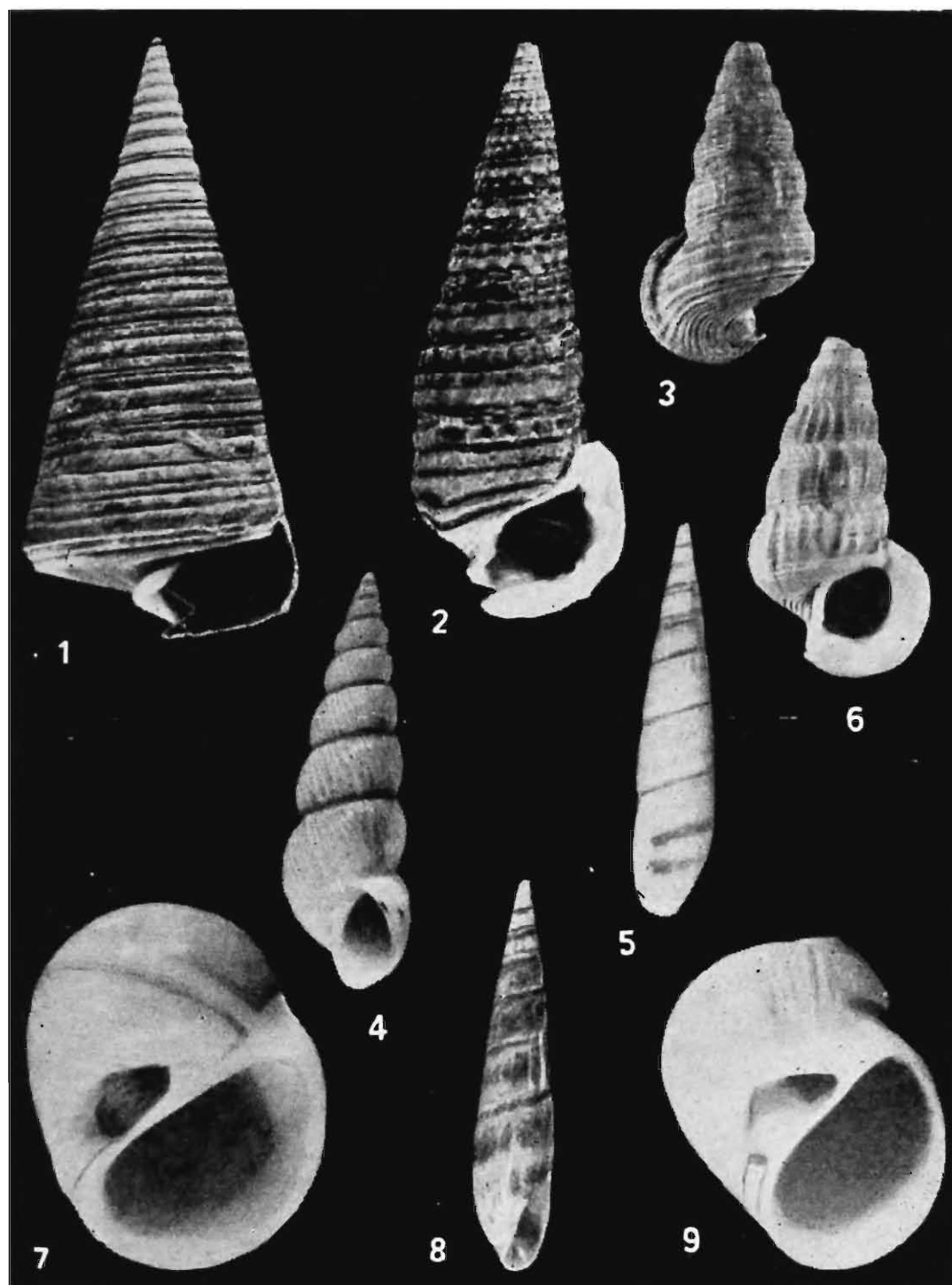


Fig. 1. *Telescopium* (*T.*) *telescopium* Linnaeus 73.45x33.85 mm. 2. *Cerithidea* (*Cerithideopsis*) *cingulata* (Gmelin) 25.00x9.20 mm. 3 & 6. *Cerithidea* (*Cerithidea*) *obtusata* Lamarck 42.20x22.65 mm. 4. *Acrilla gracilis* (Sowerby) 9.45x2.55 mm. 5 & 8. *Eulima cuspidata* A. Adams 8.50 x 1.65 mm. 7. *Natica vitellus* (Linnaeus) 45.90x46.80 mm. 9. *Natica lineata* (Roeding) 25.00x26.55 mm.

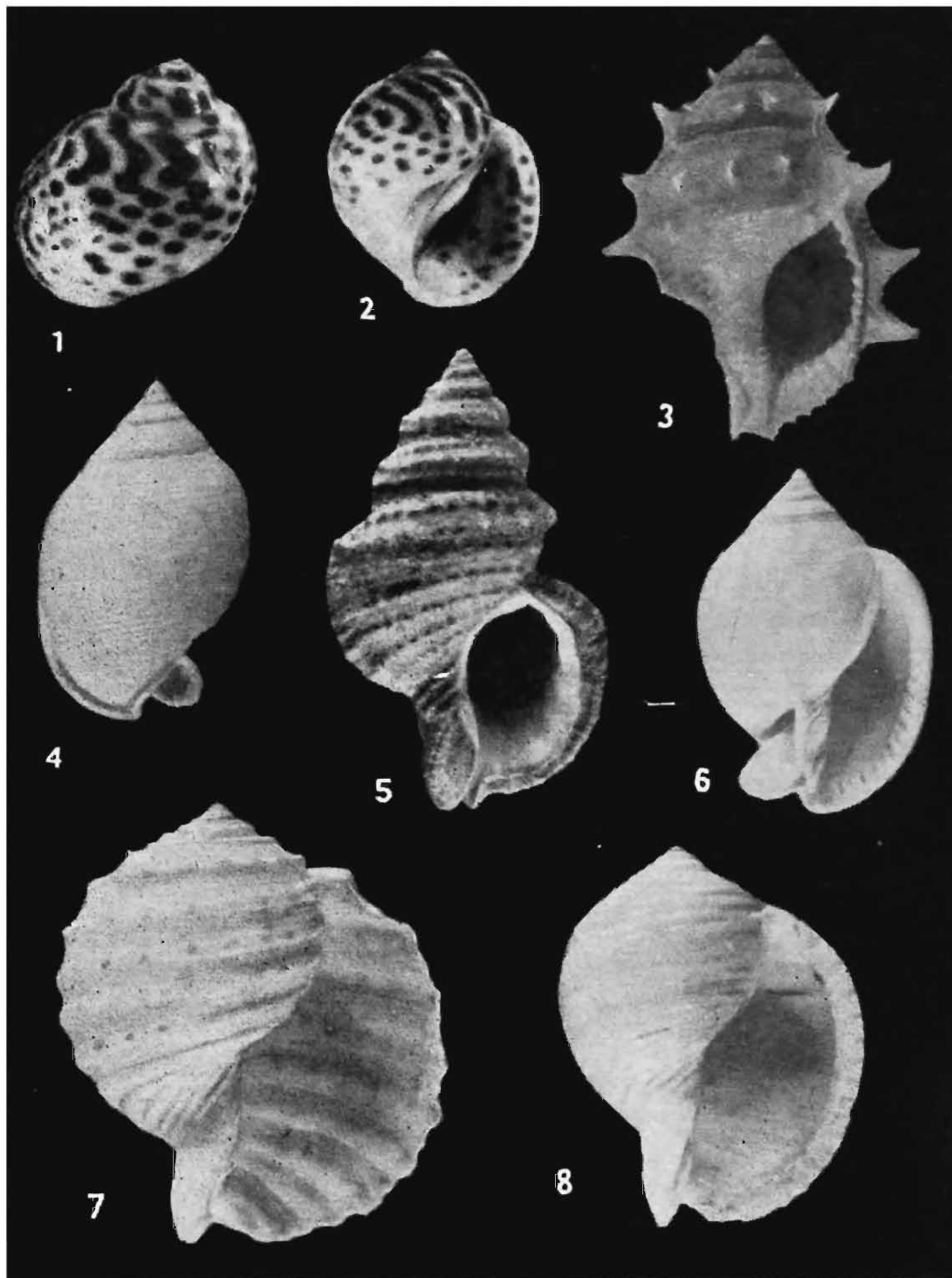


Fig. 1 & 2. *Natica tigrina* (Roeding) 12.45x10.80 mm. 3. *Bursa spinosa* (Lamarck) 50.90x31.75 mm. 4 & 6. *Phalium bisulcatum* (Schuber & Wagner) 44.00x29.60 mm. 5. *Gyrineum natator* (Roeding) 40.90x25.00 mm. 7. *Tonna dolium* (Linnaeus) 74.15x64.15 mm. 8. *Tonna sulcosa* (Born) 67.60x56.00 mm.

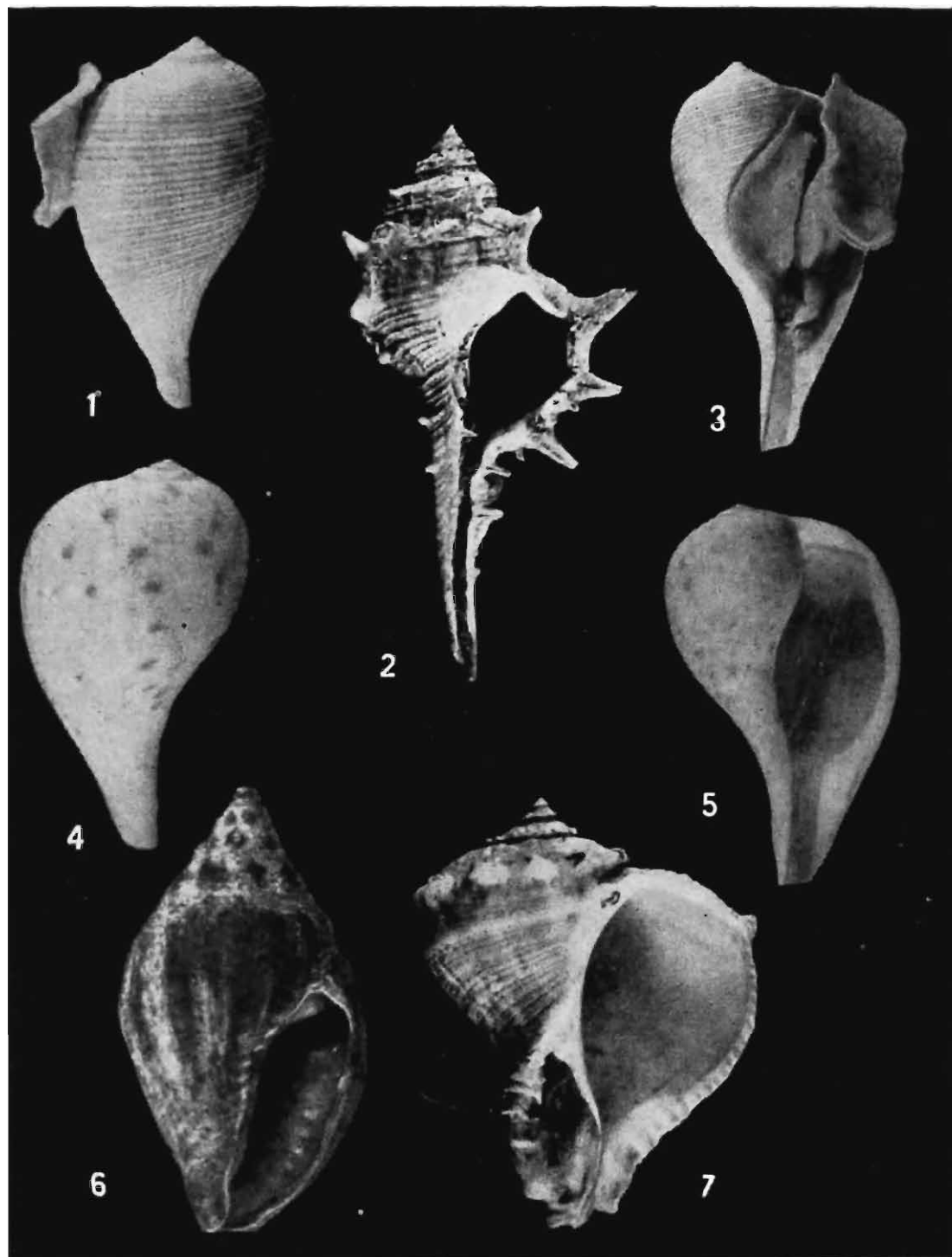


Fig. 1 & 3, *Ficus gracilis* (Sowerby) 73.80x37.25 mm. 2. *Murex tribulus* Linnaeus 63.20x25.75 mm. 4 & 5. *Ficus variogata* Roeding 53.60x31.00 mm. 6. *Columbella duclosiana* Sowerby 14.88x7.75 mm 7. *Rapana rapiformis* (Born) 48.20x37.10 mm.

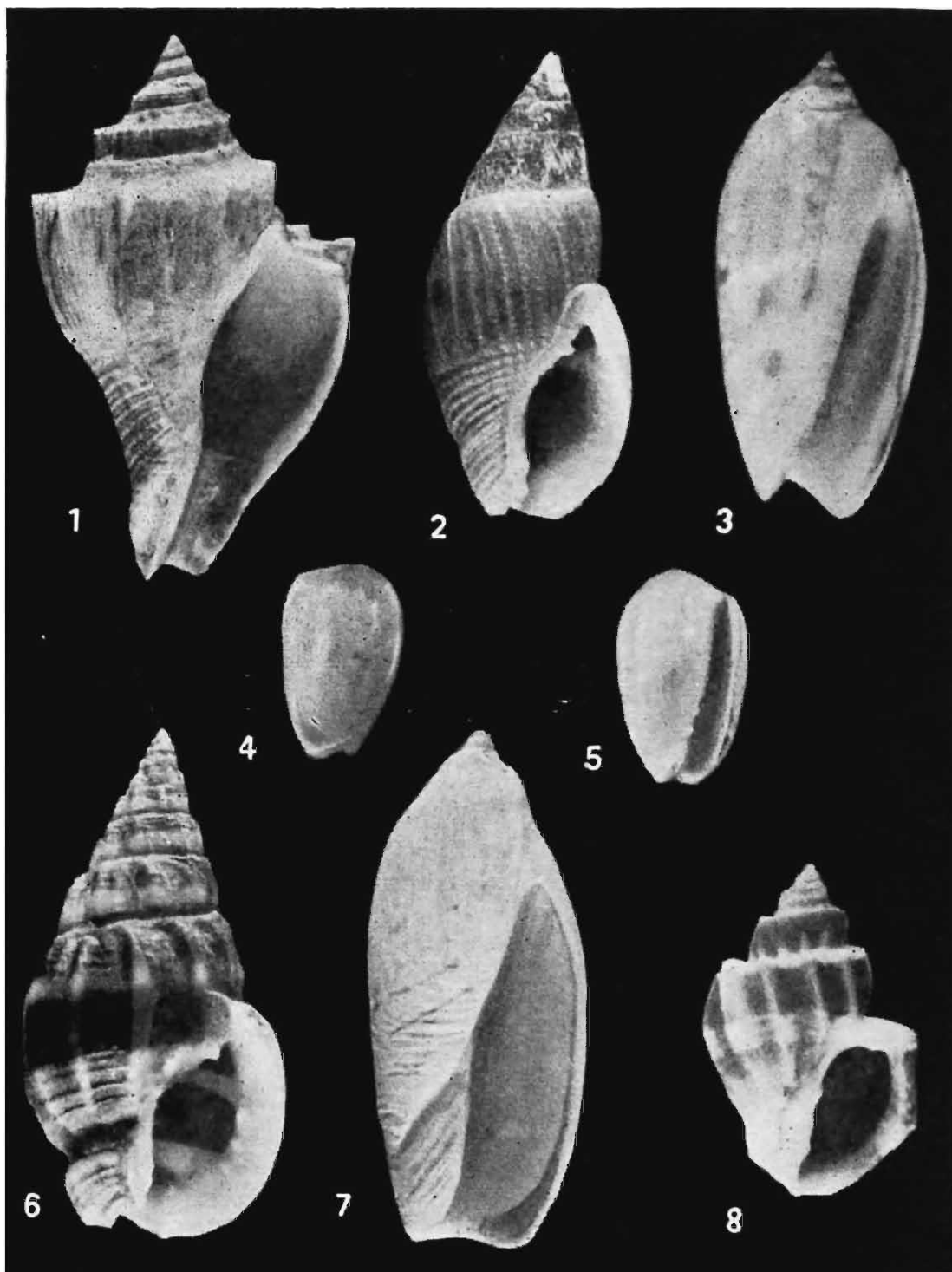


Fig. 1. *Pugilina cochlidium* (Linnaeus) 86.40x48.40 mm. 2. *Nassarius foveolatus* (Reeve) 18.85x8.50 mm. 3. *Olivancillaria gibbosa* (Born) 37.00x17.90 mm. 4 & 5. *Pereicola ventricosa* (Fischer) 4.40x2.58 mm. 6. *Nassarius stolatus* (Gmalin) 23.15x12.40 mm. 7. *Amalda ampla* (Gmalin) 21.55x9.85 mm. 8. *Scalptia scalariformis* (Lamarck) 19.38x10.70 mm.

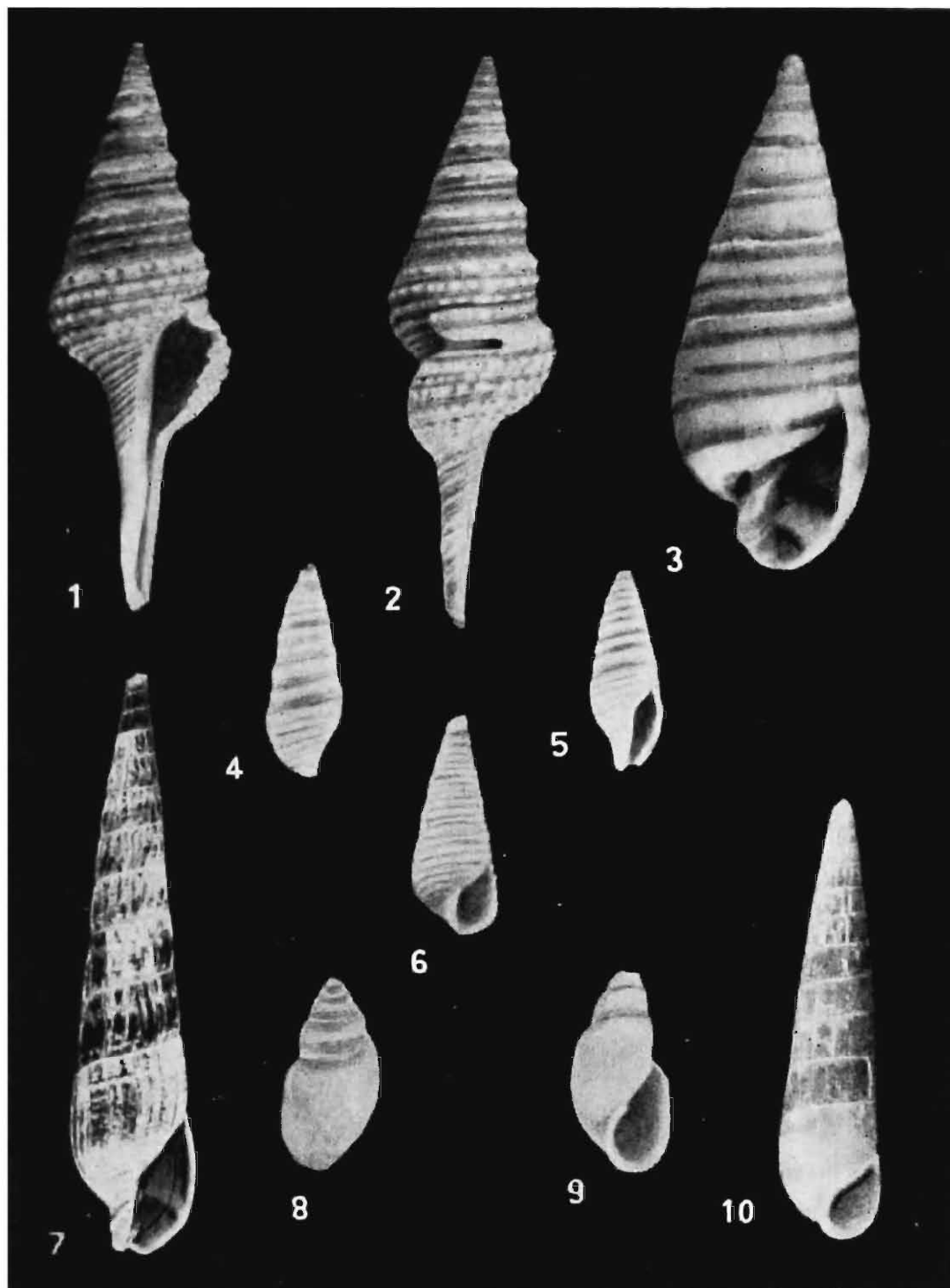


Fig. 1 & 2. *Turricola javana* (Linnaeus) 56.95x19.15 mm. 3. *Pyramidella dolabrata terrebellum* (Mueiler) 15.40x6.50 mm. 4 & 5, *Turridrupa bijubata* (Reeve) 6.75x2.50 mm. 6. *Asthenostoma vertebrata* (Smith) 2.45x1.05 mm. 7. *Duplicaria duplicata* (Linnaeus) 22.45x5.90 mm. 8 & 9. *Odostomia oxia* Watson 3.60x1.35 mm. 10. *Turbinella felicitia* Laseron 11.00x2.45 mm.

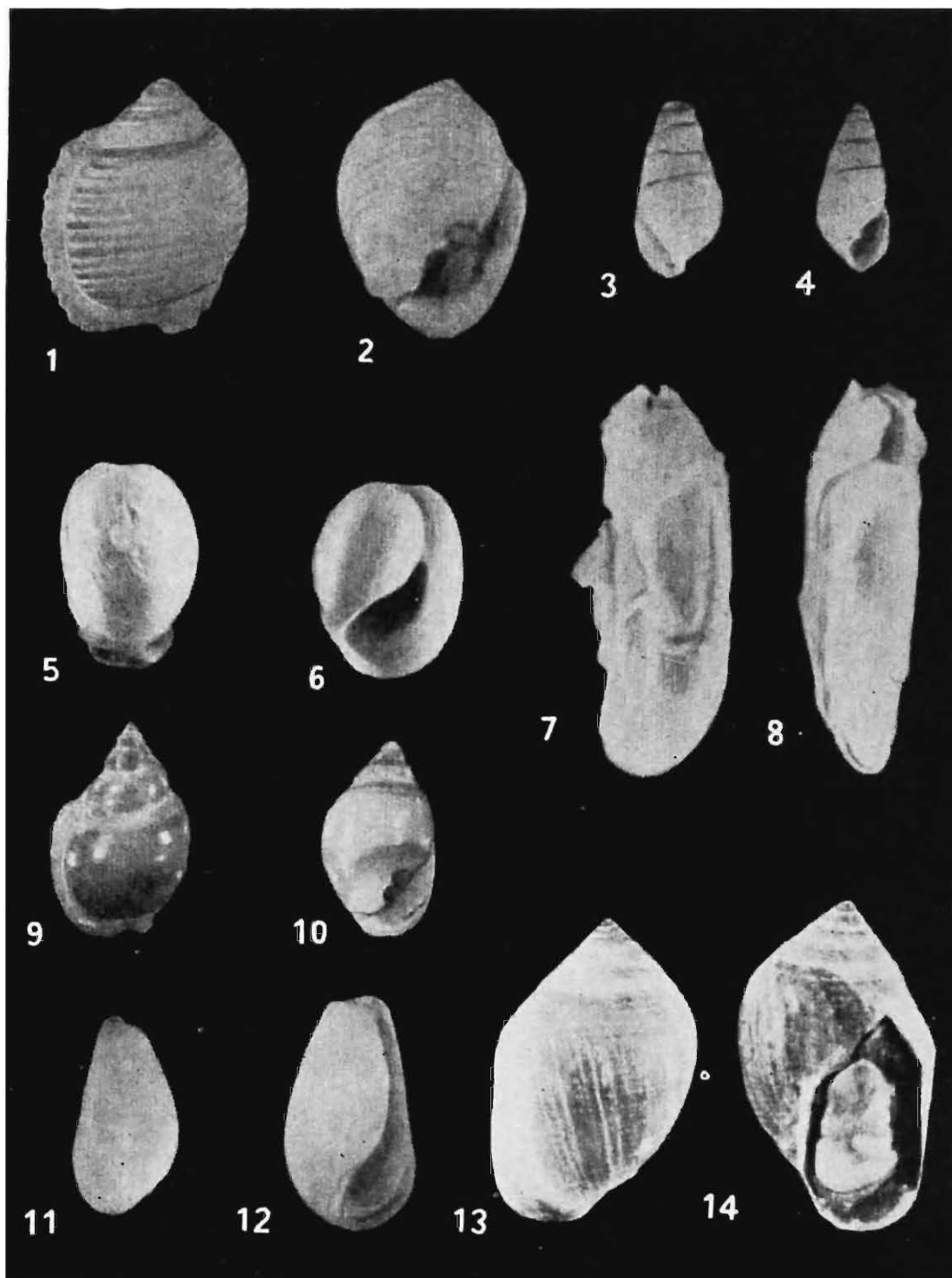


Fig. 1 & 2. *Ringicula encarpofereana* de folin 3.68x2.60 mm 3 & 4. *Odostomia babylonica* Winckworth 3.50x1.25 mm 5 & 6. *Haminea crocata* Reeve 8.00x5.95 mm 7 & 8. *Melanoclamys* sp. 8.10x5.95 mm 9 & 10. *Ringicula propinquans* Hinds 4.74x3.00 mm 11 & 12. *Retusa pyramidata* (A. Adams) 3.60x2.55 mm 13 & 14. *Cassidula nucleus* (Gmelin) 18.20x11.15 mm

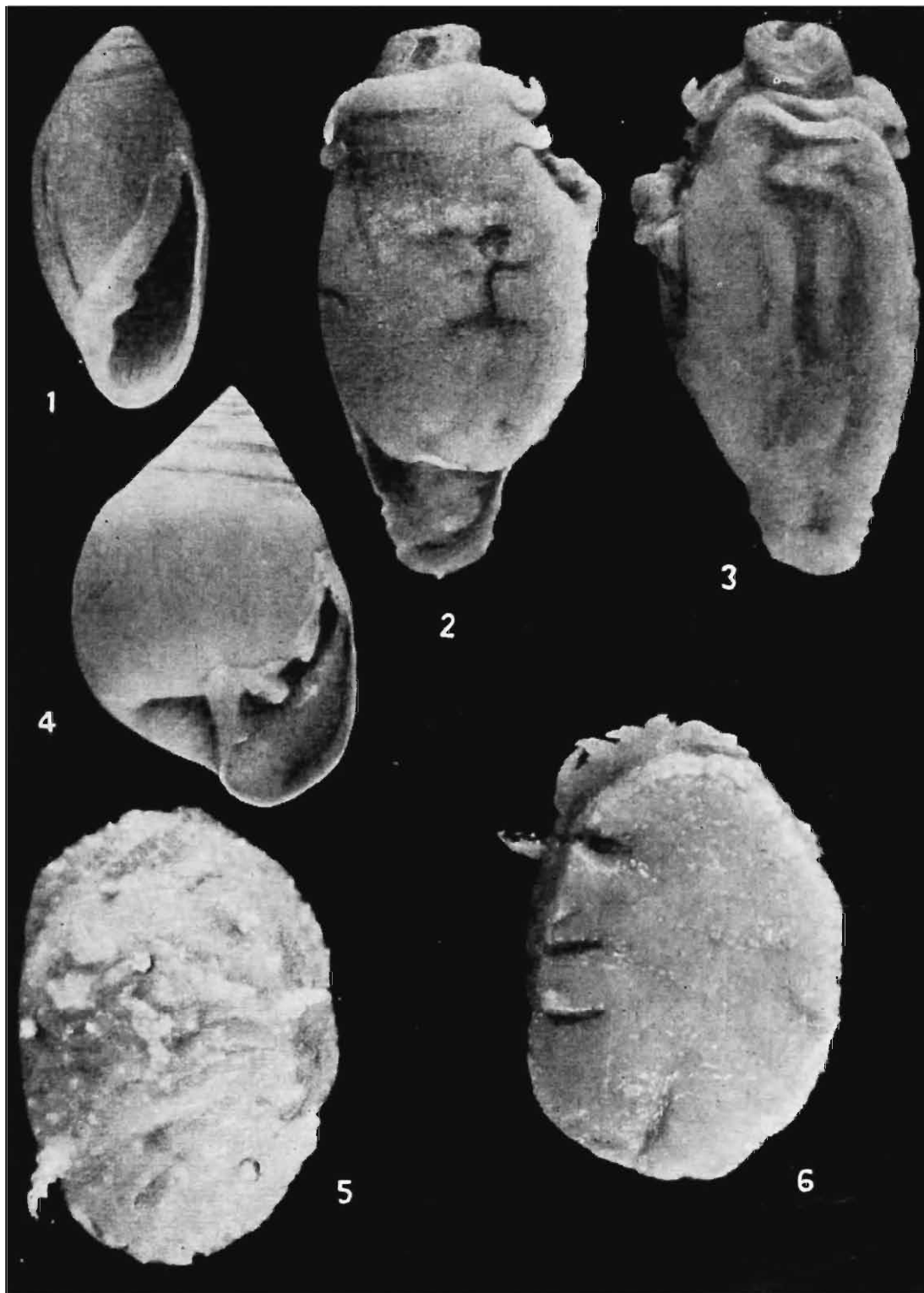


Fig. 1. *Ellobium aurisjudae* (Linnaeus). 2 & 3. *Plurobranchus* sp.
4. *Pythia plicata* (Ferussac) 19.45x13.10 mm.
5 & 6, *Kalinga ornata* Alder & Hancock 47.40x31.20 mm.

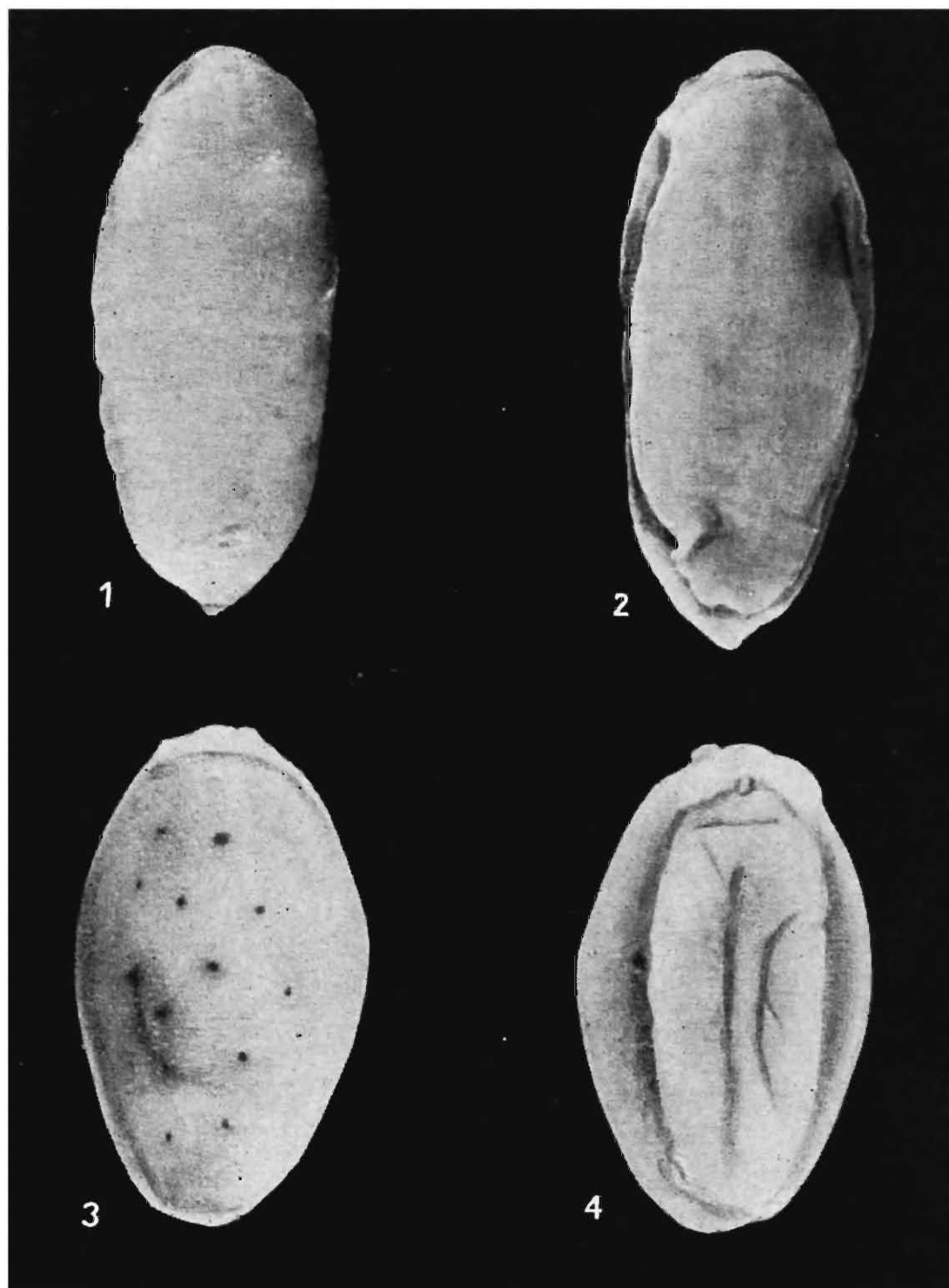


Fig. 1 & 2. *Armina* sp.

72.15x32.75 mm.

3 & 4. *Onchidium tenerum* Stoliczka

25.75x16.60 mm.

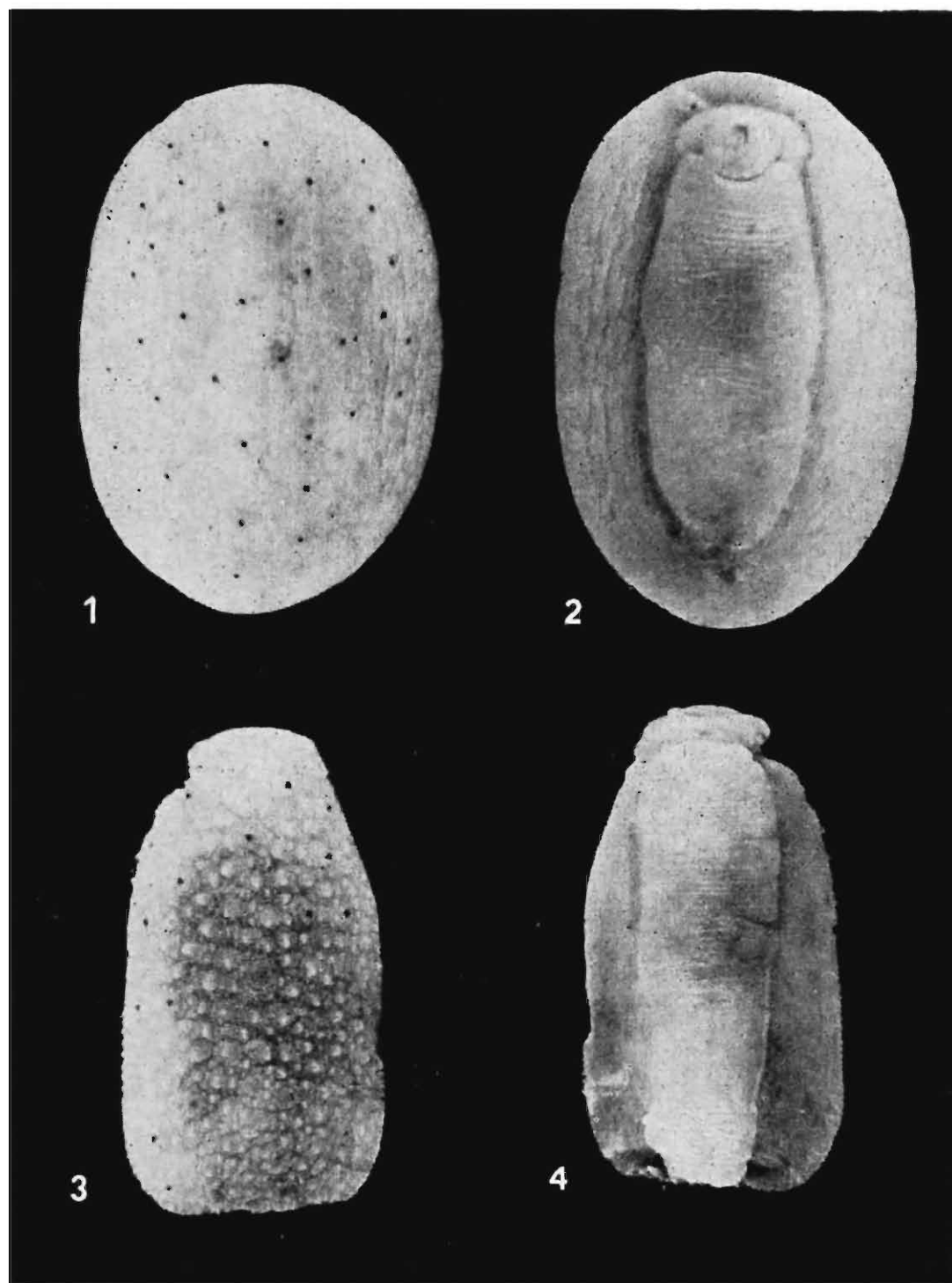


Fig. 1 & 2. *Onchidium tigrinum* Stoliczka 18.00x11.95 mm.
3 & 4. *Onchidium typhae* Buchannan 26.80x16.30 mm.

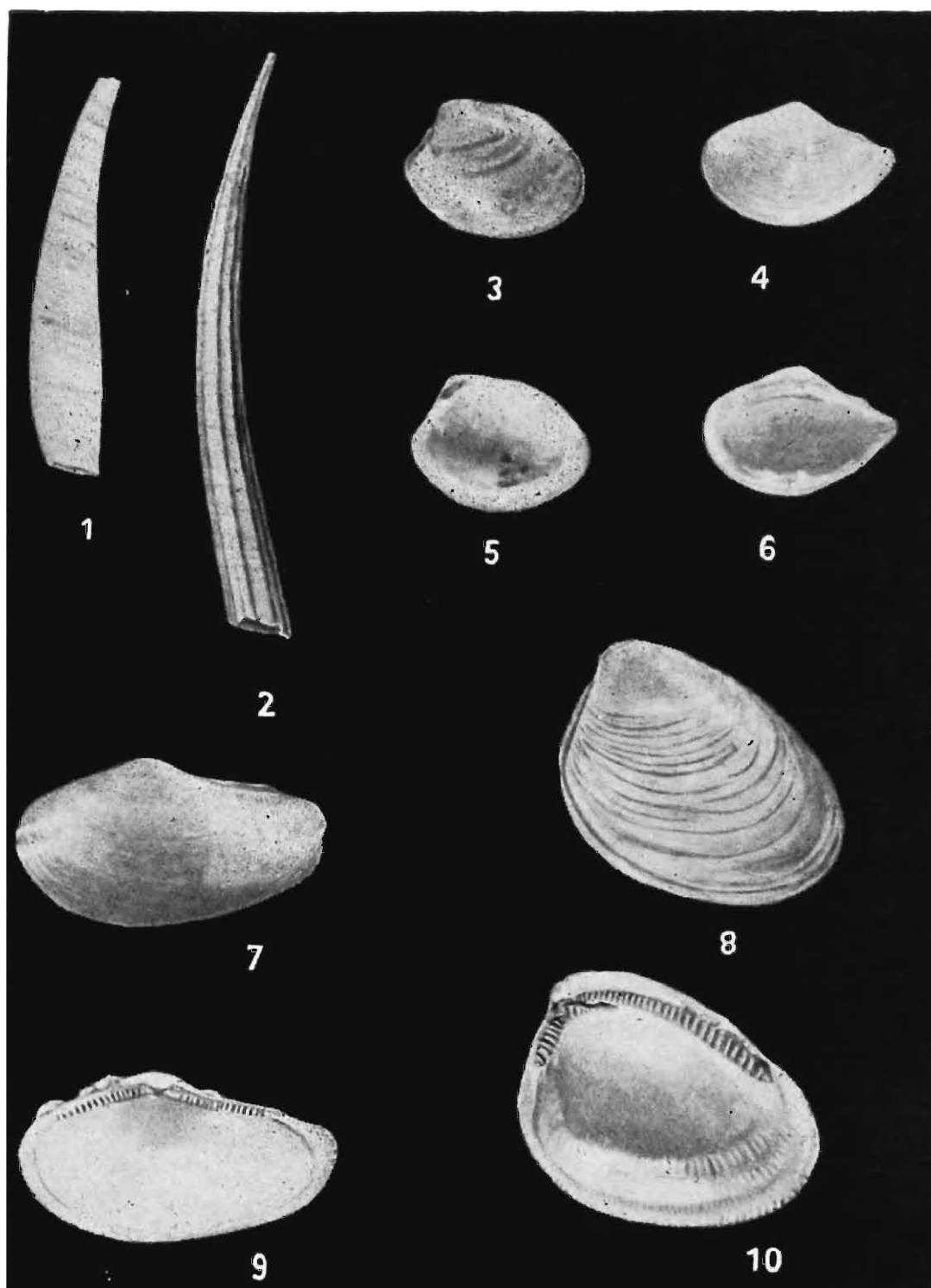


Fig. 1. *Cadulus clavatum* Gould 8.20x1.25 mm. 2. *Dentalium octangulatum* Denovan 20.05x2.05 mm. 3 & 5. *Nucula (Leionucula) convexa* Hinds 10.35x7.64 mm. 4 & 6. *Nuculana (Sacella) fragilis* Chemnitz 11.00x1.20 mm. 7 & 9. *Yoldia nicobarcea* (Bruguiera) 29.60x16.00 mm. 8 & 10. *Nucula (Nucula) mitralis* Hinds 9.25x7.40 mm.

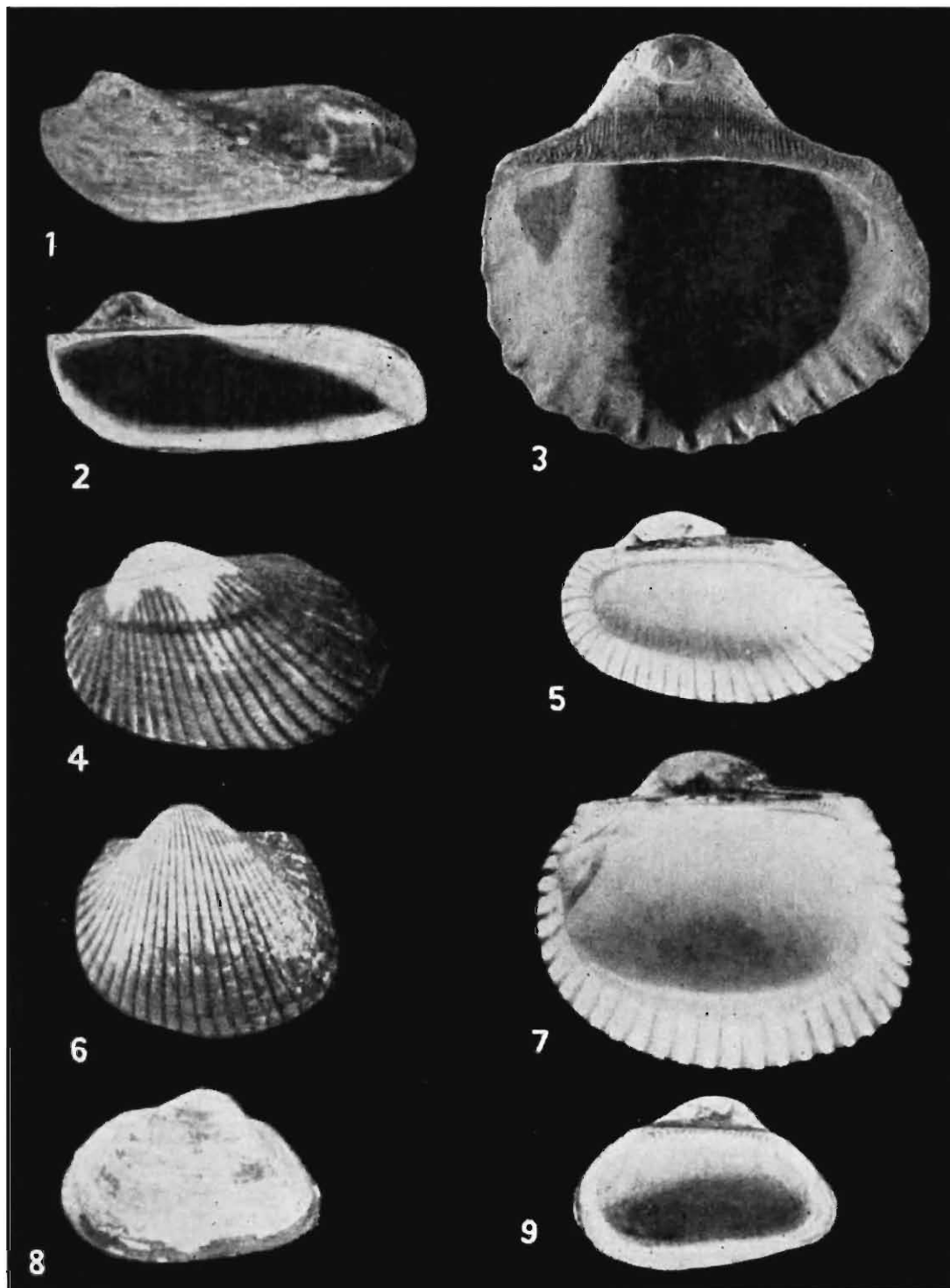


Fig. 1 & 2. *Scaphula deltae* Blanford 12.70x5.05 mm. 3. *Anadara granosa* (Linnaeus) 64.84x63.18 mm. 4 & 5. *Scapharca deyrollei* Jausseume 23.00x14.40 mm. 6 & 7. *Scapharca inequivalvis* (Bruguiere) 43.80x37.70 mm. 8 & 9. *Striarca lactea* (Linnaeus) 17.50x12.45 mm.

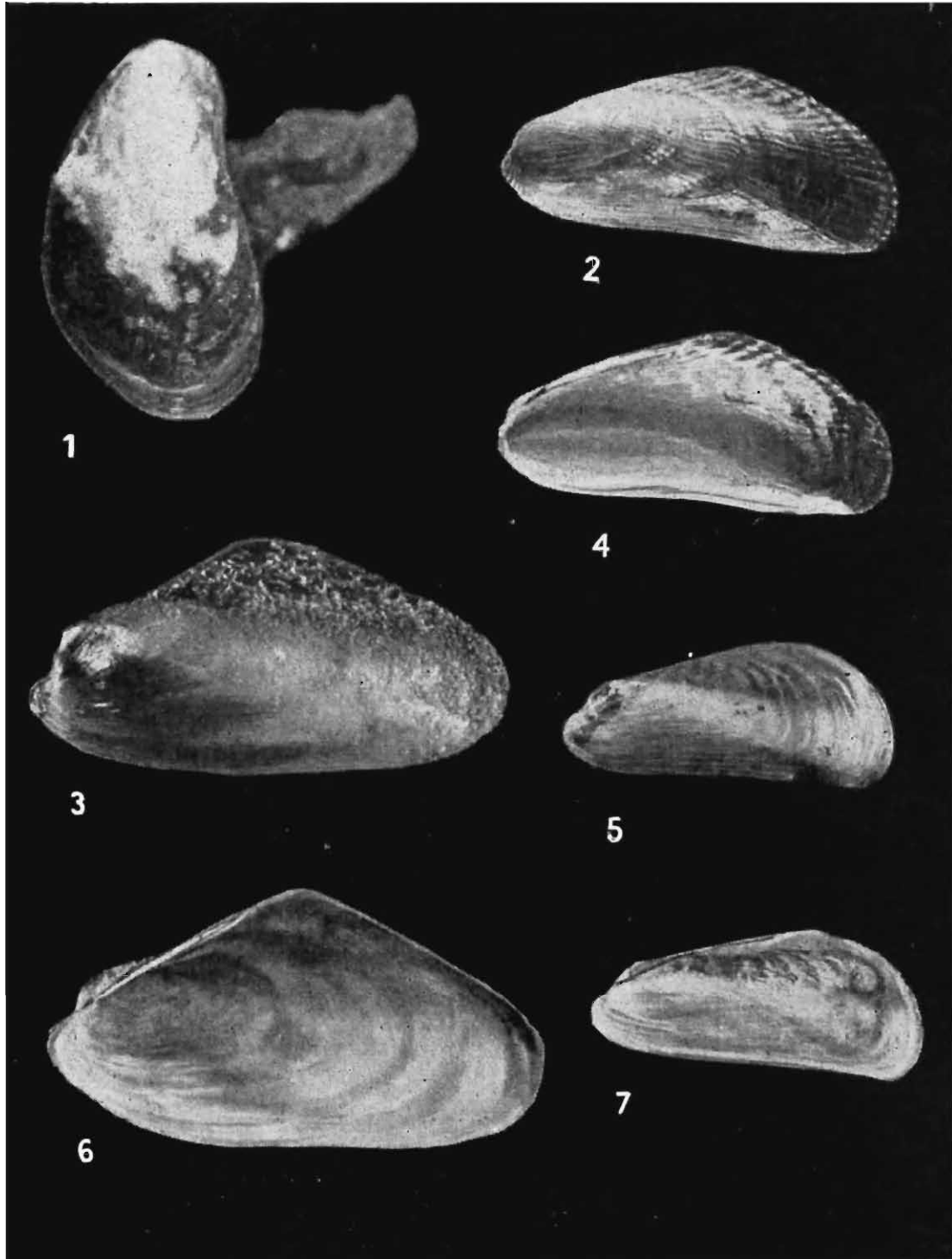


Fig. 1. *Perna viridis* (Linnaeus) 7.70x4.20 mm. 2 & 4. *Modiolus striatulus* (Hanley) 16.46x6.84 mm. 3 & 6. *Modiolus tulipa* (Lamarck) 45.45x23.15 mm. 5 & 7. *Modiolus undulatus* (Dunker) 34.65x15.15 mm.

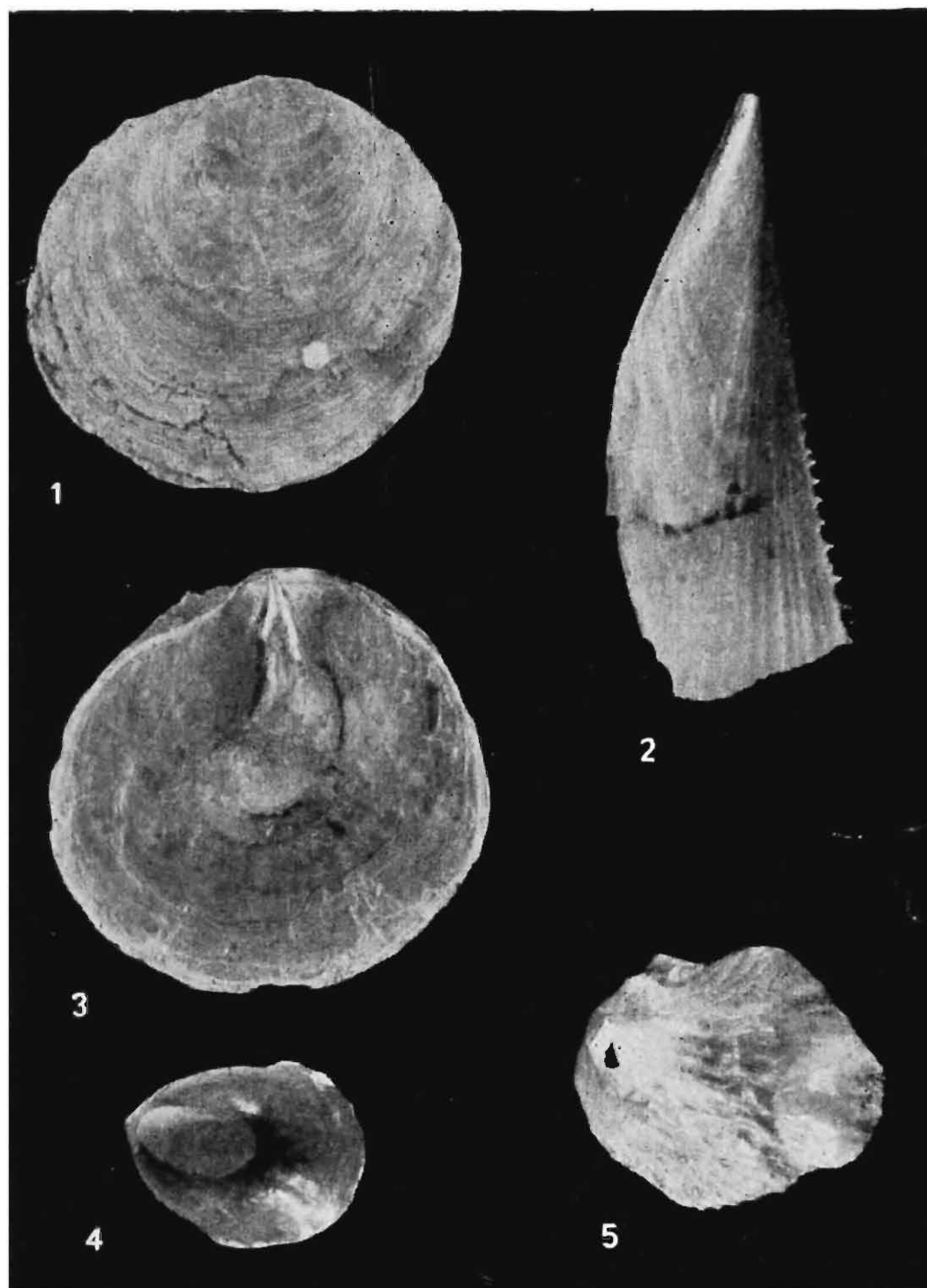


Fig. 1 & 3. *Placuna (Placuna) placenta* (Linnaeus) 92.90x95.90 mm.
2. *Pinna (Atrina) pectinata pectinata* Linnaeus 101.15x33.60 mm.
4 & 5. *Anomia achaeus* (Gray) 28.00x25.20 mm.

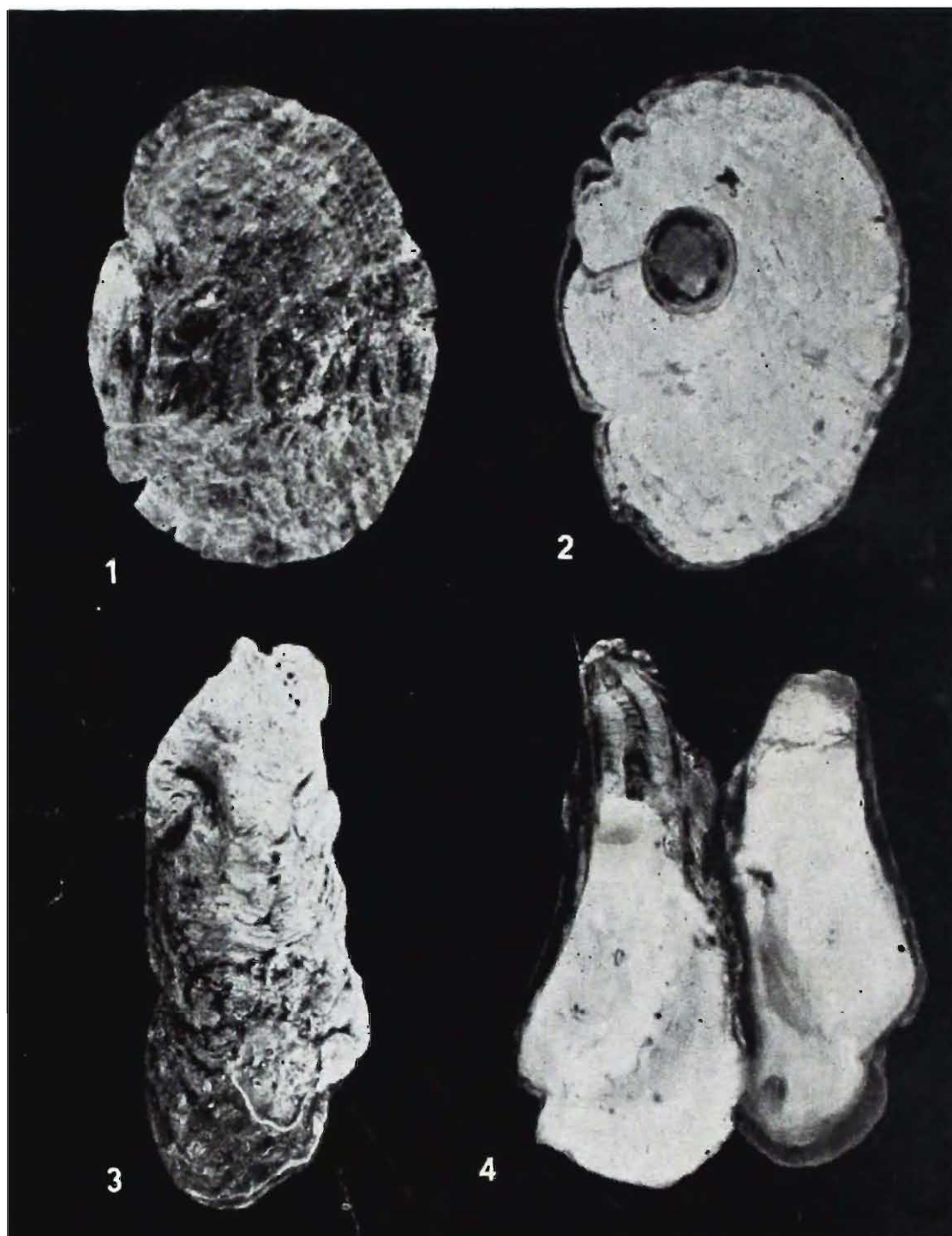


Fig. 1 & 2. *Enigmonia aenigmatetica* (Holten) 40.25x29.95 mm.
3 & 4, *Crassostrea gryphoides* (Schlotheim) 270.00x103.00 mm.

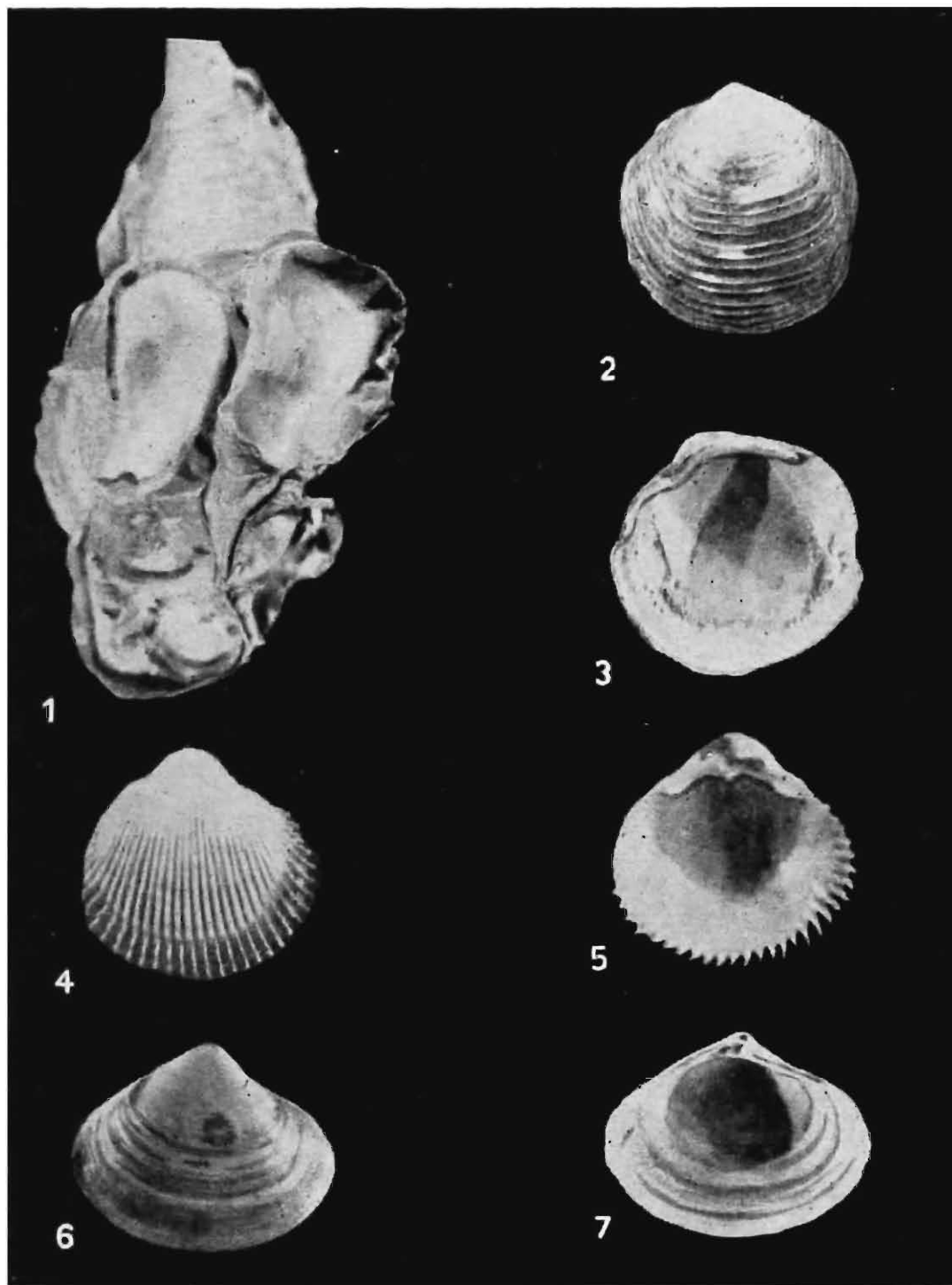


Fig. 1. *Saccostrea cucullata* (Born) 52.80x21.00 mm.
2 & 3. *Eamesiella philippinarum* (Henley) 30.18x33.43 mm.
4 & 5. *Trachycardium asiaticum* Bruguiere 28.30x27.47 mm.
6 & 7. *Nactra* (*Mactra*) *luzonica* Deshayes 31.55x21.56 mm.

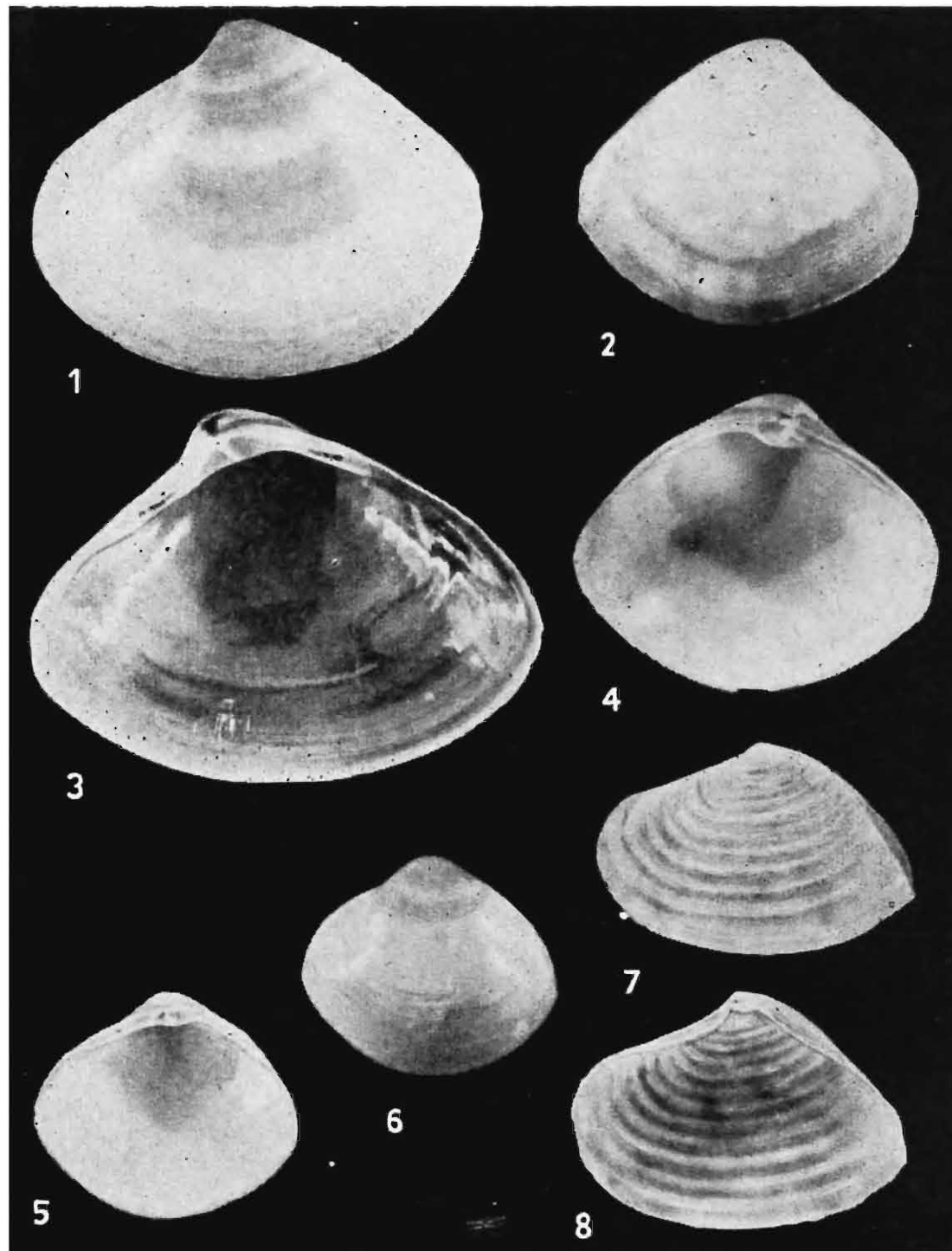


Fig. 1 & 3. *Mactra violacea* Gmelin 68.00x53.55 mm.
2 & 4. *Mactra (Coslomactra) turgida* Gmelin 73.65x62.10 mm.
5 & 6. *Mactra (Mactra) mera* Reeve 41.14x35.25 mm.
7 & 8. *Mactra (Mactrinula) plicataria* Linnaeus 37.85x26.90 mm.

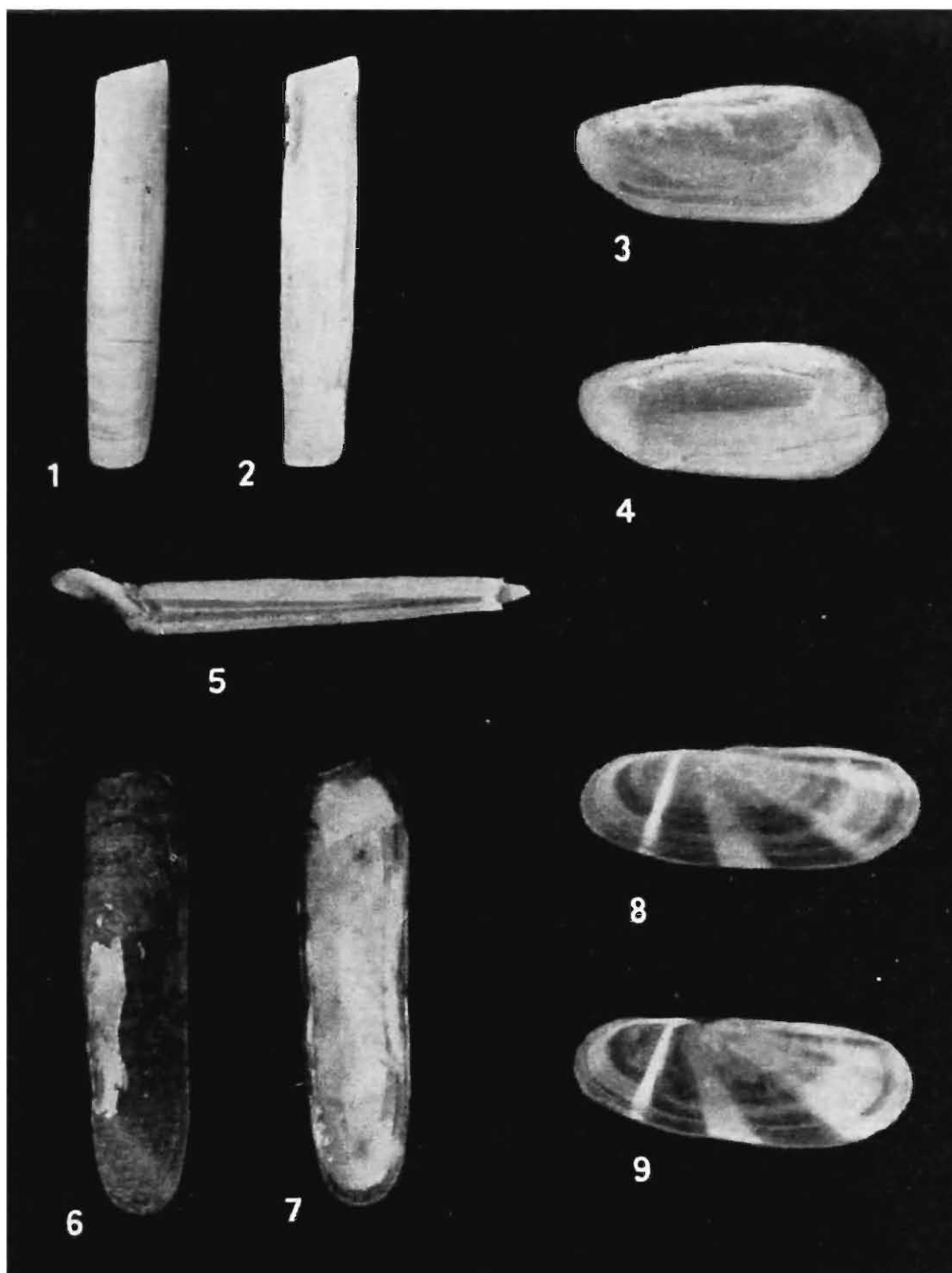


Fig. 1 & 2. *Solen brevis* Gray 68.55x12.12 mm. 3 & 4. *Cultellus subelliptica* Dunker 27.15x12.60 mm. 5. *Solen brevis* Gray with animals 13.05x2.65 mm. 6 & 7. *Pharilla gavanicus* (Lamarck) 54.75x13.76 mm: 8 & 9. *Siliqua radiata* (Linnaeus) 38.20x14.50 mm.

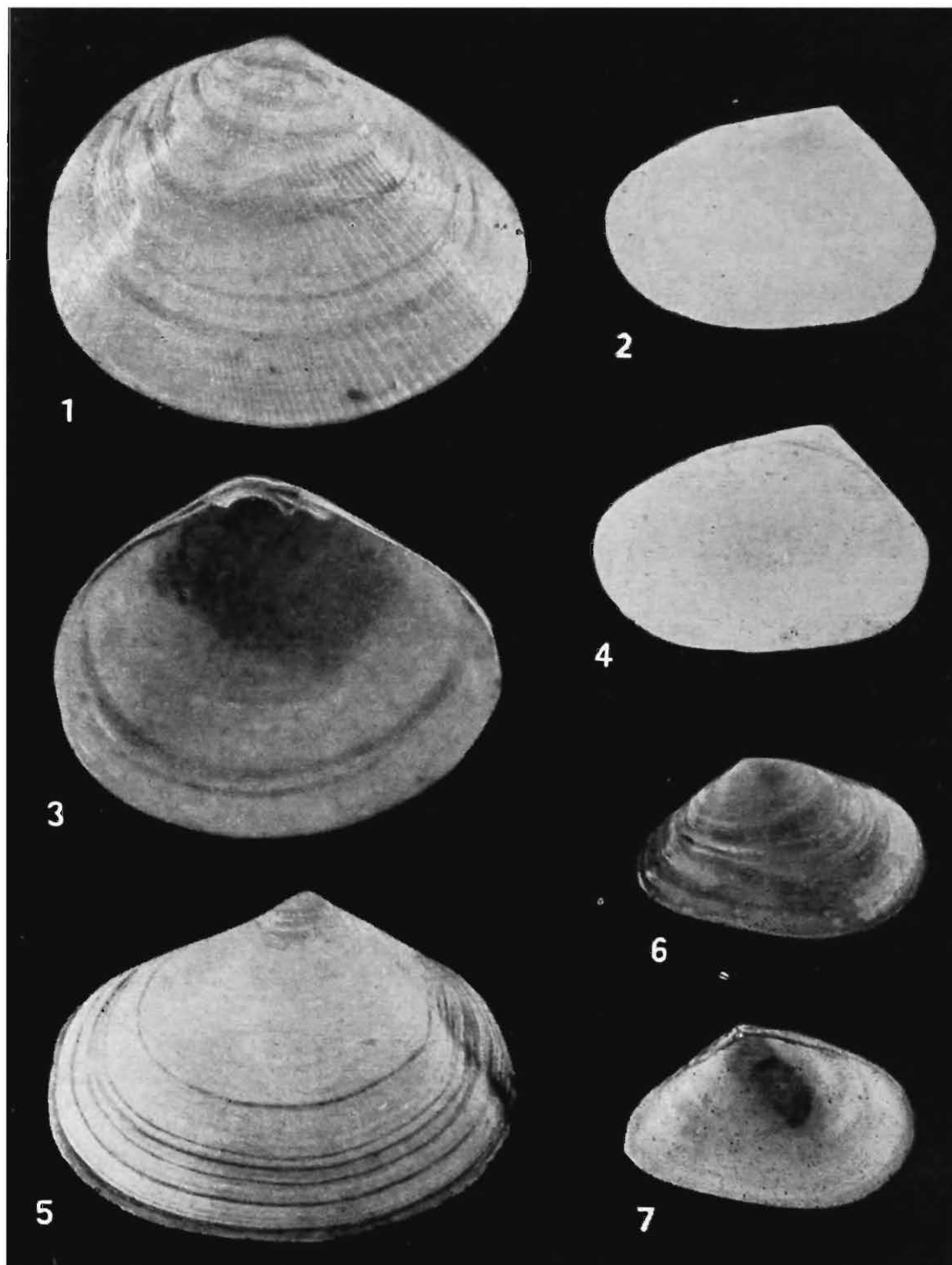


Fig. 1 & 3. *Strigilla splendida* (Anton) 10.35x7.75 mm,
2 & 4. *Macoma truncata* Jonas 25.85x17.50 mm.
5. *Apolymetis edentula* Spengler 55.45x41.25 mm.
6 & 7. *Macoma birmanica* Philippi 50.35x30.70 mm.

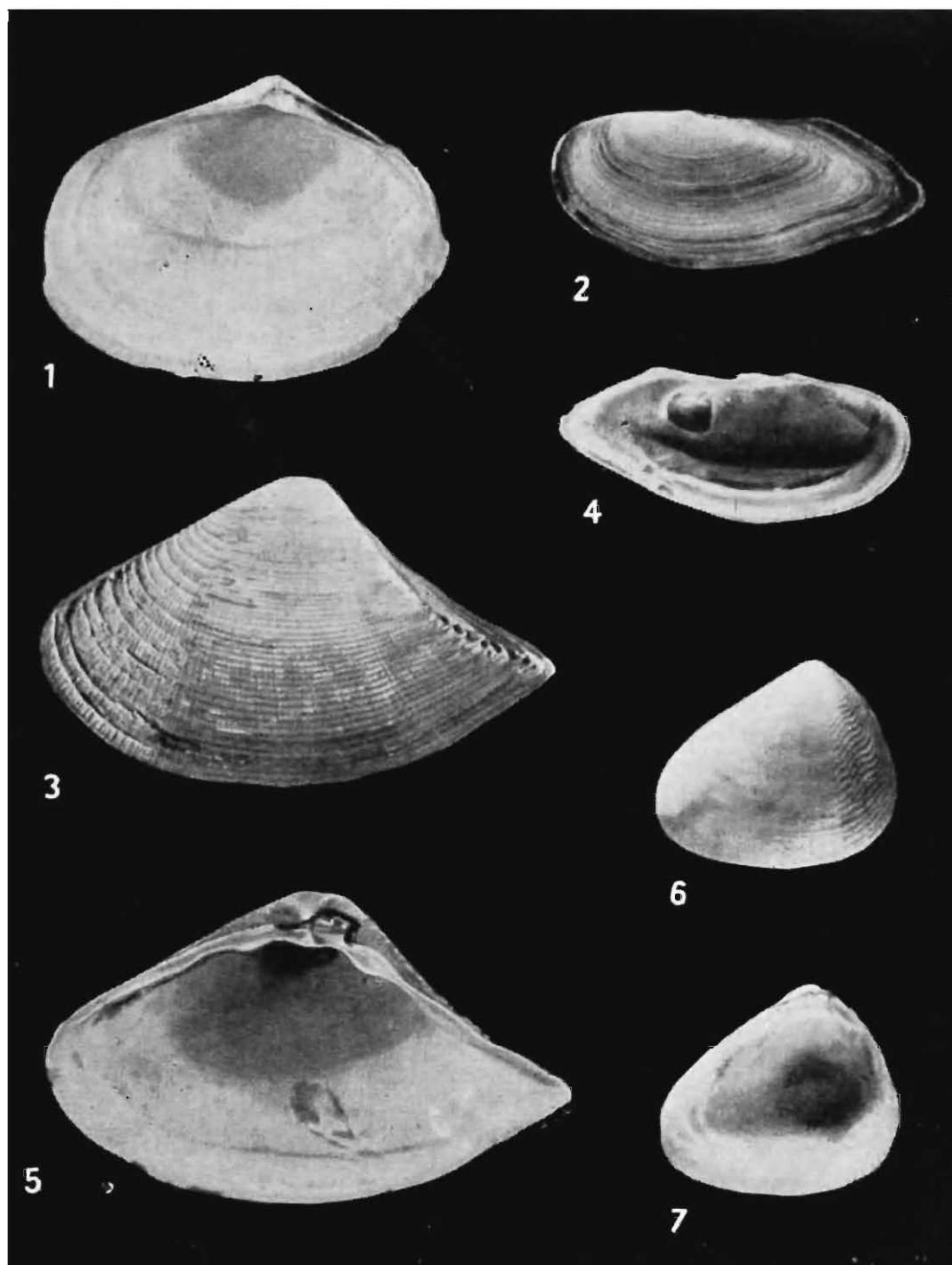


Fig. 1. *Apolymetis edantula* Spengler 53.45x41.25 mm.

2 & 4. *Sanguinolaria (Soletellina) acuminata* (Deshayes) 72.75x31.64 mm.

3 & 5. *Donax scortum* Linnaeus 62.90x37.50 mm,

6 & 7. *Donax incarnatus* Gmelin 11.10x10.05 mm.

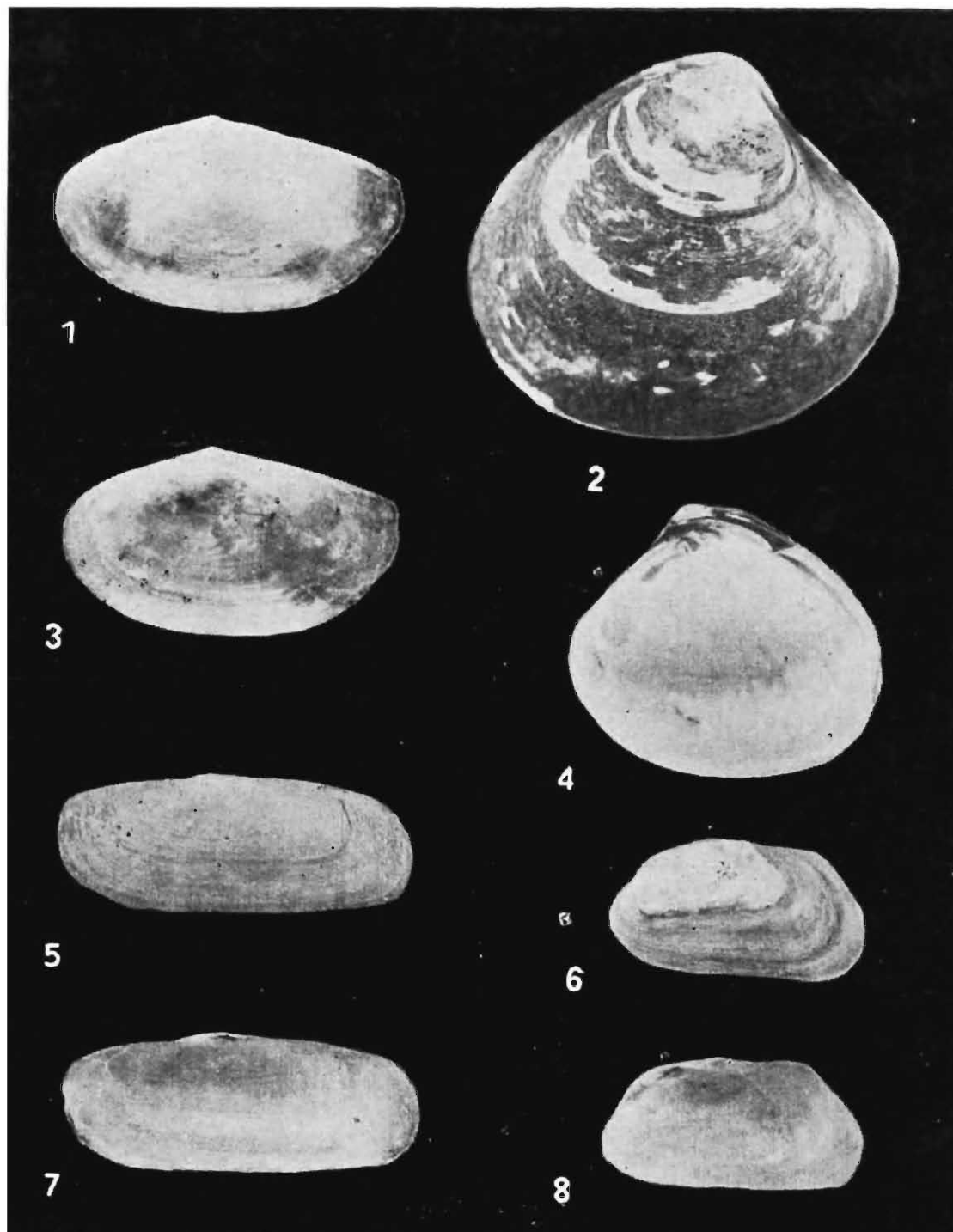


Fig. 1 & 3. *Theora opalina* (Hinda) 11.65x9.94 mm,
2 & 4, *Polymesoda* (*Geloina*) *bengalensis* Lamarck 60.50x53.30 mm.
5 & 7. *Novaculina gangetica* Benson 37.90x14.90 mm.
6 & 8. *Trapezium sublevigatum* (Lamarck) 18.00x9.50 mm.

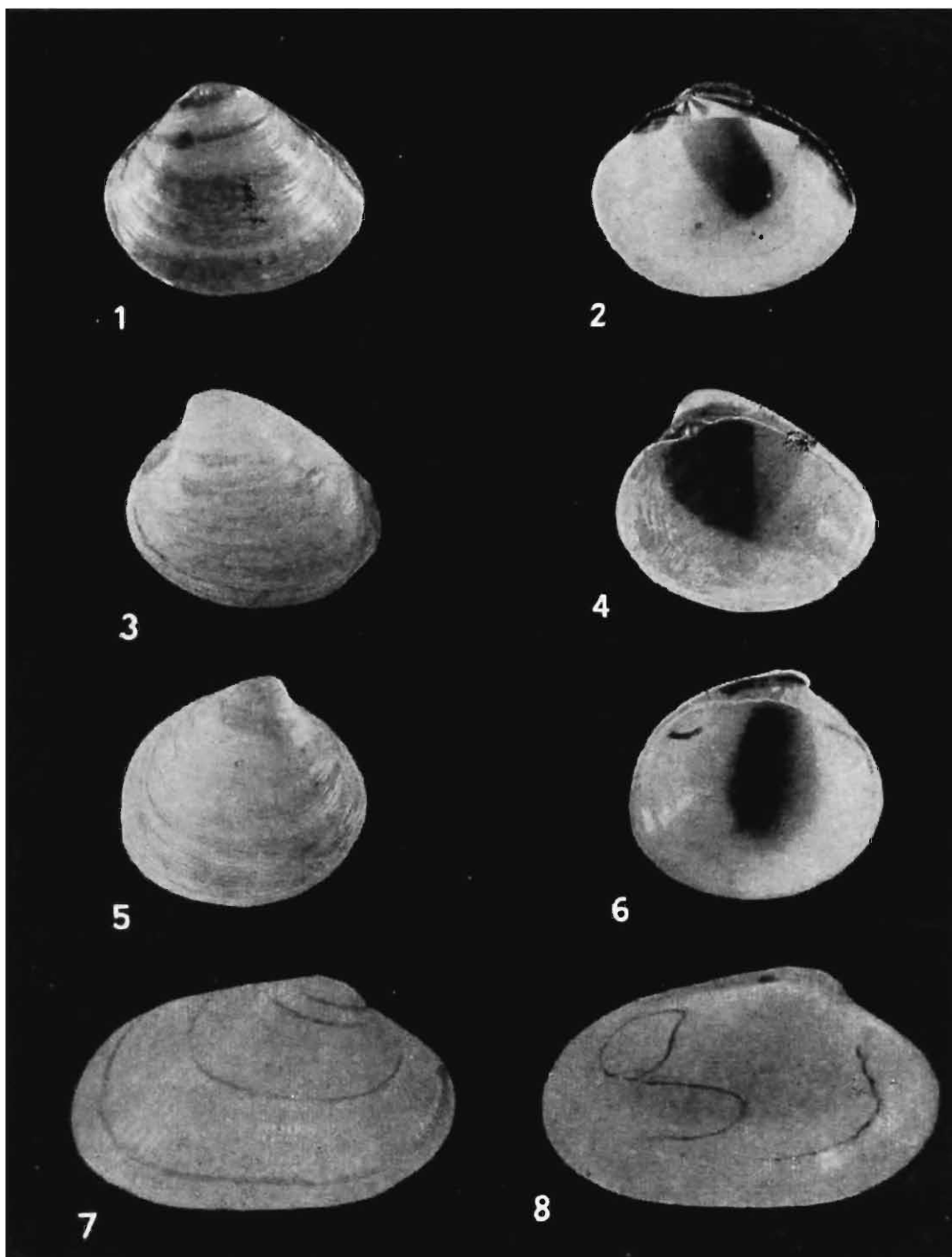


Fig. 1 & 2. *Metriexrmeretrix* (Linnaeus) 50.26x41.82 mm.
3 & 4. *Pitar alabastrum* (Reeve) 19.90x15.90 mm.
5 & 6. *Pelecypora trigona* Reeve 12.85x12.02 mm.
7 & 8. *Tapes bruguieri* (Hanley) 34.35x21.20 mm.

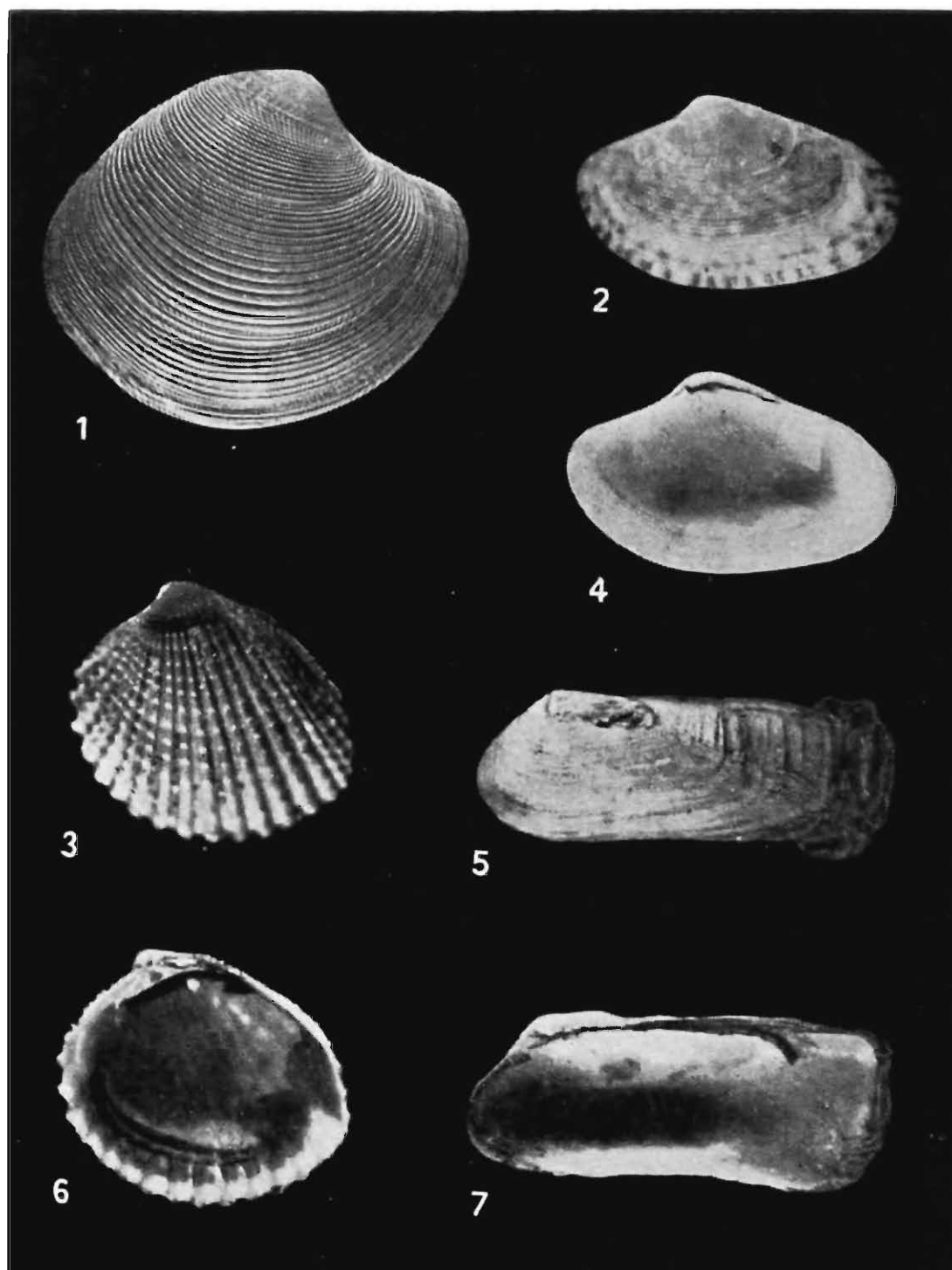


Fig. 1. *Paphia malabaricus* (Schoerter) 51.20x41.85 mm.
2 & 4. *Paphia textile* (Gmelin) 35.21x21.65 mm.
3 & 6. *Timoclea imbricata* (Sowerby) 10.68x9.20 mm.
5 & 7. *Sphenia perversa* Blanford 10.45x4.28 mm.

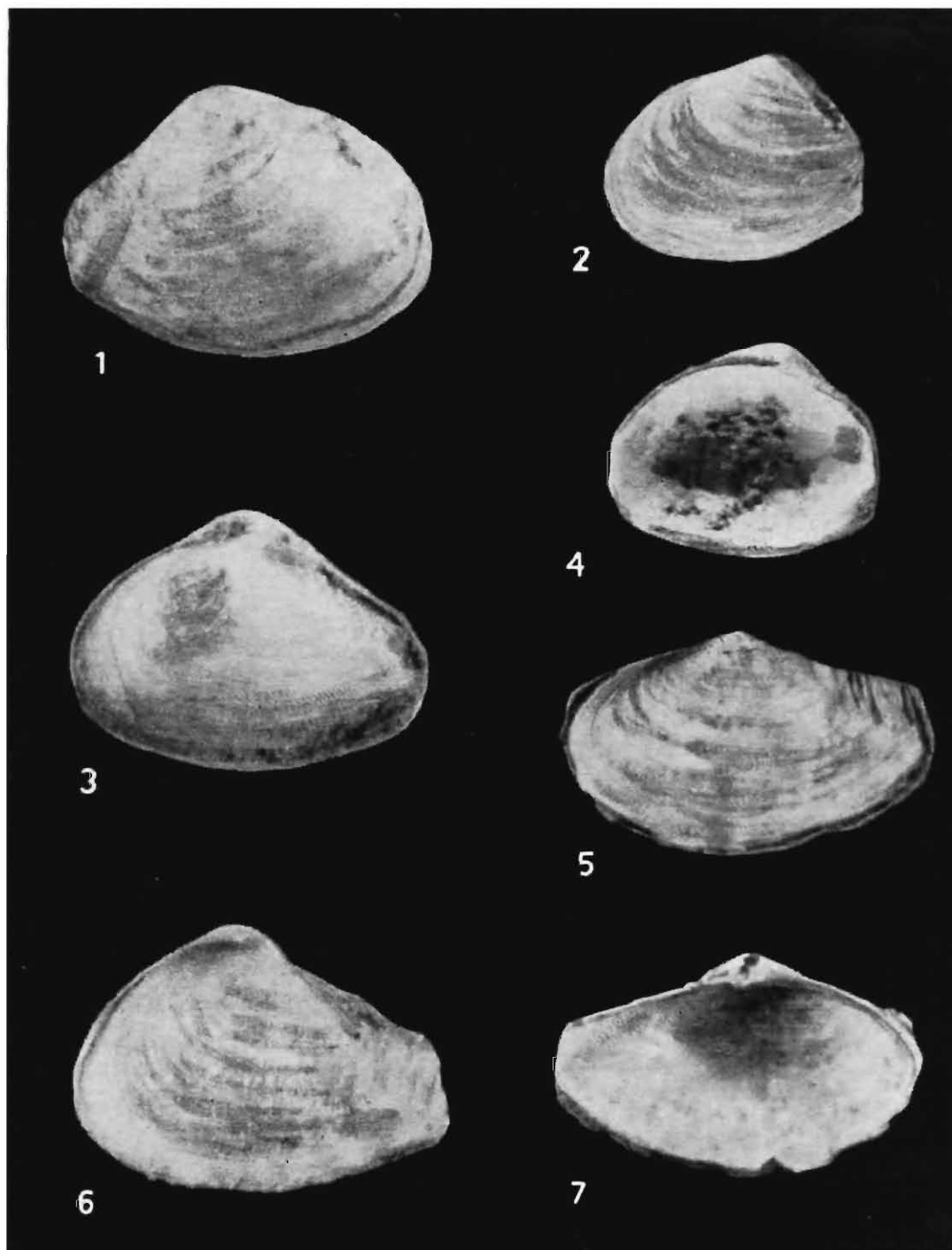


Fig. 1 & 3, *Corbula abbreviata* Preston 29.65x14.15 mm,
2 & 4. *Corbula alcocki* Preston (type).
5 & 7. *Corbula calcarea* Preston 4.75x2.90 mm.
6. *Corbula gracilis* Preston 5.25x3.40 mm.

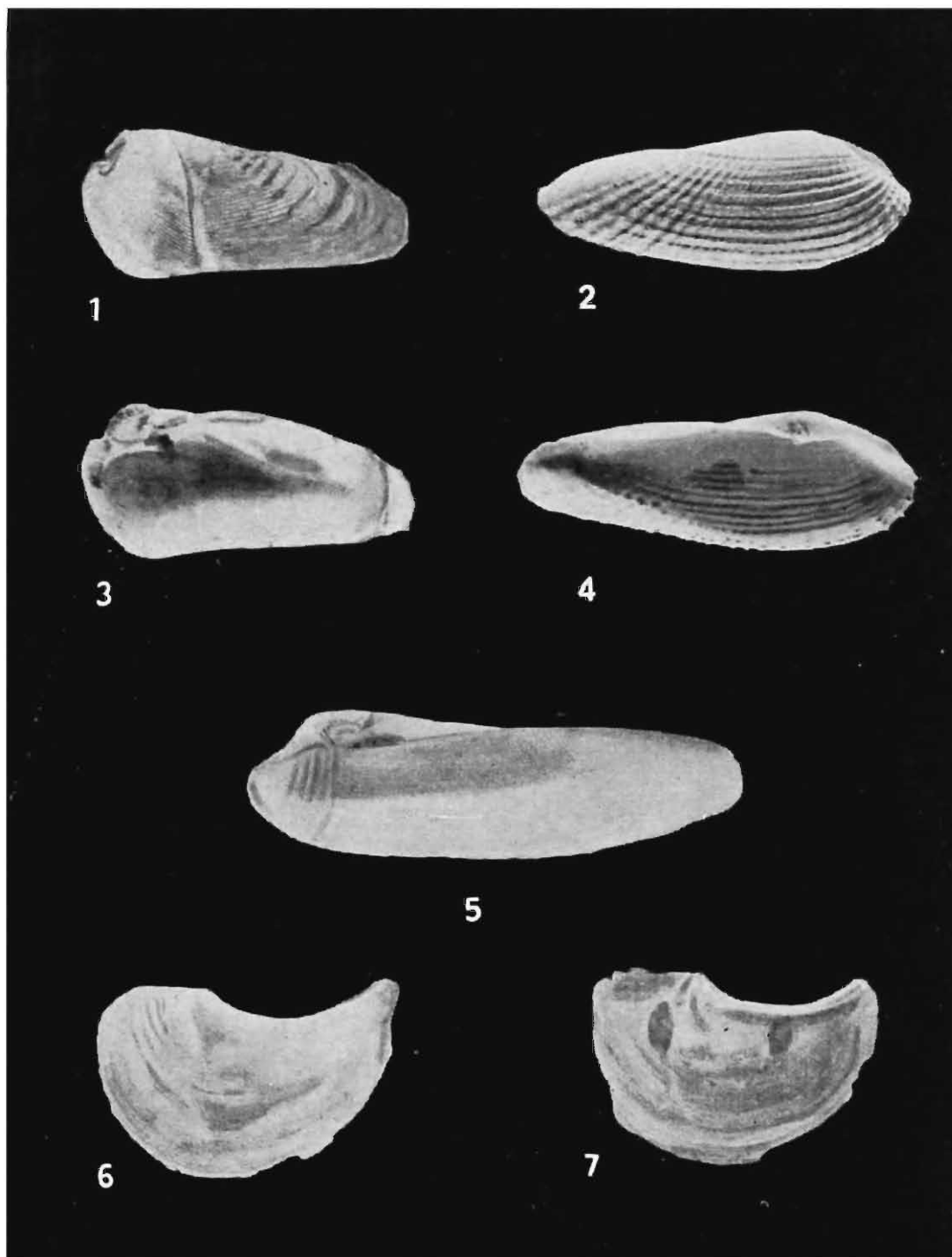


Fig. 1 & 3. *Martesia fragilis* Verrill & Bush
2 & 4. *Barnia candida* (Linnaeus) 74.48x26.32 mm,
5. *Phols orientalis* Gmelin 105.00x30.50 mm.
6 & 7. *Pandora ceylonica* Sowerby 31.45x12.00 mm.

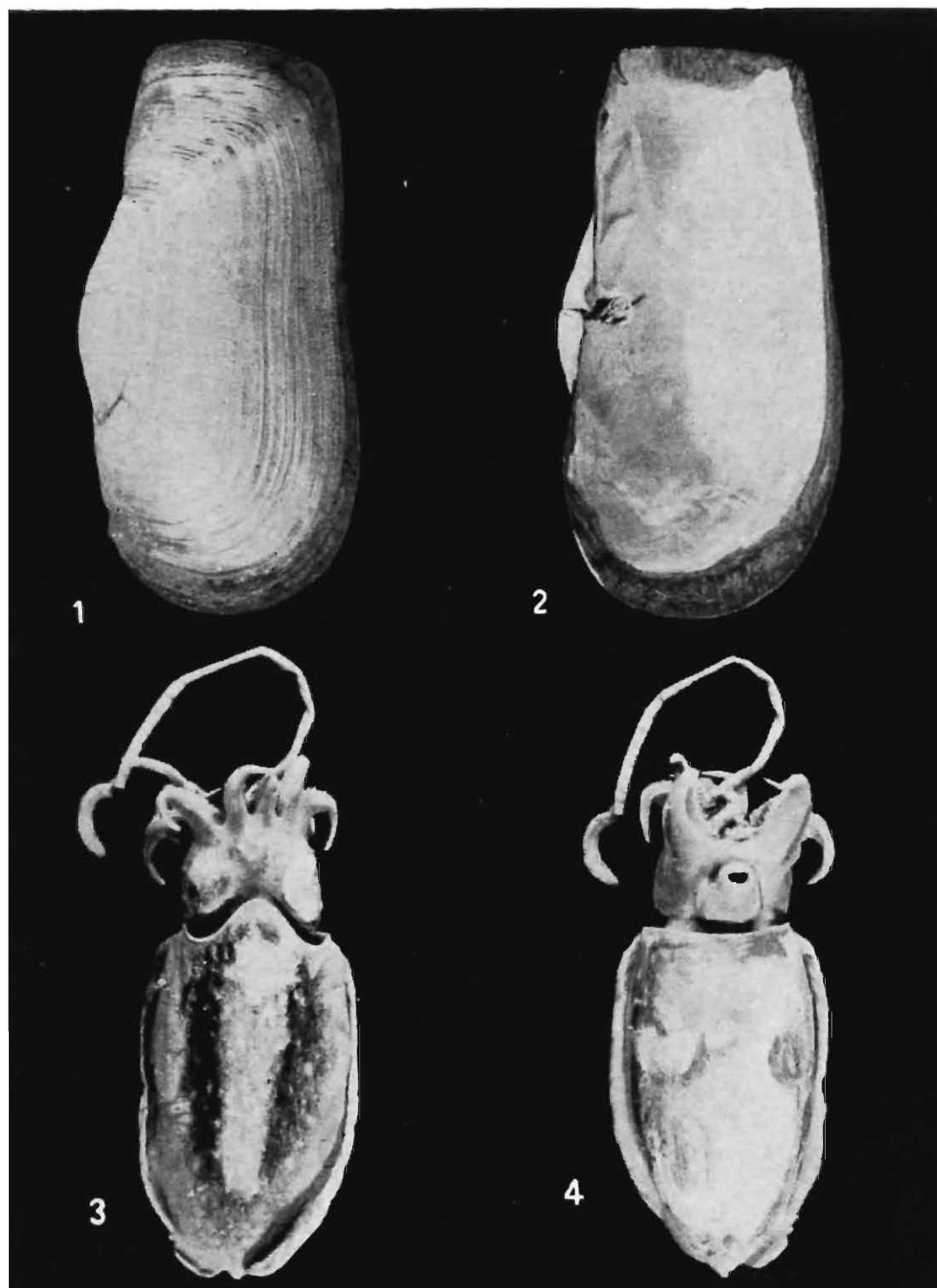


Fig. 1 & 2. *Laternula truncata* (Lamarck) 58.60x29.10 mm.
3 & 4, *Sepia aculeata* d' Orbigny 160.00 mm.

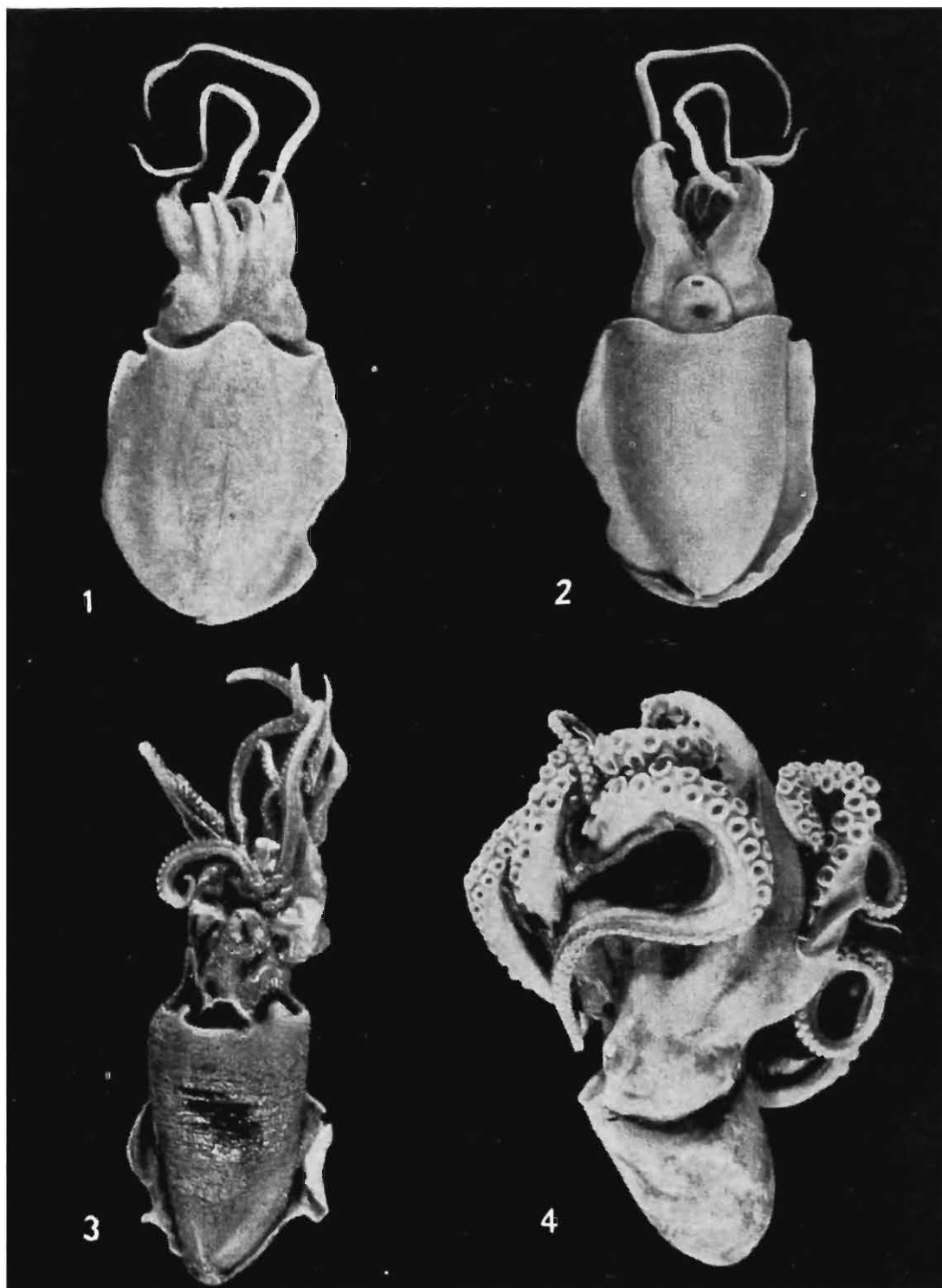


Fig. 1 & 2. *Sepiella inermis* (d' Orbigny) 102.45 mm.
3. *Loliolus investigatoris* Goodrioh 68.60 mm.
4. *Octopus macropus* Riss 245.00 mm.

