

OCCASIONAL PAPER No. 286

**Records of the
Zoological Survey of India**

**Commercial and Medicinal Important
Molluscs of Sundarbans**

ANIRUDHA DEY

ZOOLOGICAL SURVEY OF INDIA

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**RECORDS
OF THE
ZOOLOGICAL SURVEY OF INDIA**

**Commercial and Medicinal Important
Molluscs of Sundarbans**

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सत्यमेव जयते

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INTRODUCTION

Sundarbans the well developed group of islands formed from sediments washed down from Himalayas, starting from the mouth of river Hughly on west to the river Meghna in the east, covering the four districts namely North and South 24-Paragonas (Hughly to Raimangal districts) of India and Khulna and Barishal districts of Bangladesh. The Bay of Bengal is the southern limits towards north the boundary can not be demarcated at any definite land mark.

The Indian Sundarbans lies 88°03'–89°07' E latitude and 21°13' to 22°40' N latitude located on the southern fringe of the state West Bengal covering the major portion of North and South 24-Paragonas districts. The area bordered by Bangladesh in the east, the river Hughly in the west, Damper-Hodges line in the north and Bay of Bengal in south. It has a considerable marine characteristics and the important morph type of the deltaic area are beaches, mud flats, coastal dunes, sand flats, estuaries, creeks, inlet and mangrove swamps. It also offer the freshwater ecosystems, like ponds, ditches, canals, paddy fields offers a variable ecosystems for harbouring of molluscs.

The mangrove attend their greatest diversity and luxuriance in the Sundarbans and covers 423, 803 hectares along the estuaries and coastlines both South and North 24 Parganas district of West Bengal. In this ecosystem the diversified habits like the tree, soil and water are occupied by different groups of organisms exposed to the different set of environmental conditions.

So, far the studies of molluscs of sundarbans are concerned the various workers worked in different times in different aspects. Stoliczka (1869) reported the molluscs of Lower Bengal and adjacent provinces. Nevill (1880) described the new species of brackish water molluscs from sundarbans. Annandale (1907) fauna of brackish water ponds at Port Canning. Jenkins (1912) on molluscs collected by Golden Crown vessel. Preston (1915) report on a collection of molluscs from outskirts of Calcutta. Annandale and Prashad (1919) some gastropods molluscs from Gangetic delta. Roonwal (1954) teredinid pest of living trees in Sundarbans. Rajagopal (1964) two new species of *Teredo* from West Bengal. Roonwal (1967) wood boring teredinid of the mangroves in the Sundarbans. Rajagopal (1970) field ecology of some marine borers from Sundarbans. Misra and Barua (1987) intertidal distribution of macro fauna on the muddy shore of Matla river, Canning. Subba Rao *et. al.* (1987) malacological notes of sagar islands. Das *et. al.* (1979) studies the molluscs collected by Golden Crown vessel. Subba Rao *et. al.* (1983) studies the molluscs of Muriganga estuary. Mandal and Nandi (1989) fauna of sundarbans mangroves ecosystems where they deals 92 species of molluscs. Mitra and

Dey (1992) studied the freshwater molluscs of West Bengal where they included the freshwater molluscs of Sundarbans. Subba Rao *et. al.* (1992) studies the estuarine and marine molluscs of West Bengal where they included the fauna of this area also. Subba Rao *et. al.* (1995) malacofauna of Hooghly estuary. Dey *et. al.* (2005) distribution of intertidal malacofauna at Sagar Islands. Dey (2006) published a handbook on mangrove associates molluscs of Sundarbans.

Majumder and Dey (2005) published an account of medicinal usages of arachnids and spiders among the tribal people of Sunderbans. Majumder and Dey (2007) reported 328 medicinal uses of 28 species of crustacea, fishes, reptiles, birds and mammals, which are commonly used as medicine by the tribal people from this area. This is the first comprehensive report regarding the commercial and medicinal important molluscs of Sundarbans. It deals 16 species of molluscs of which 6 species are from freshwater and 10 species of estuarine and marine molluscs. It deals the account of these molluscs along with the population, commercial as well as medicinal importance from the areas of Sundarbans.

SYSTEMATIC LIST OF MOLLUSCS RECORDED FROM SUNDARBANS

Land molluscs

Class GASTROPODA

Subclass GYMNOMORPHA

Order SOLEOLIFERA

Family VERONICELLIDAE

Genus *Filicaulis* Simroth, 1913

Subgenus *Eleutherocaulis* Simroth, 1913

1. *Filicaulis (Eleutherocaulis) alte* (Ferussac)

Order STYLOMMATOPHORA

Suborder ORTHURETHRA

Superfamily PUPILLOIDEA

Family PUPILLIDAE

Subfamily PUPILLINAE

Genus *Pupilla* Leach in Fleming, 1828

2. *Pupilla barrackporensis* Gude

Family VERTIGINIDAE

Subfamily NESOPUPINAE

Genus *Pupisoma* Stoliczka, 1873

3. *Pupisoma orcula* (Benson)

Superfamily MULIMINOIDEA

Family CERASTUIDAE

Genus *Rachis* Albers, 1850

4. *Rachis bengalensis* (Lamarck)

Suborder SIGMURETHRA

Superfamily ACHATINOIDEA

Family SUBULINIDAE

Subfamily SUBULININAE

Genus *Glessula* von Martens, 1860

5. *Glessula gemma* (Reeve)

Genus *Lamellaxis* Strebel and Pfeiffer, 1882

Subgenus *Allopeas* H.B. Baker, 1935

6. *Lamellaxis (Allopeas) gracile* (Hutton)

Family ACHATINIDAE

Genus *Achatina* Lamarck, 1799

7. *Achatina fulica fulica* (Bowdich)

Suborder ELASMOGNATHA

Superfamily SUCCINEOIDEA

Family SUCCINEIDAE

Subfamily SUCCINEINAE

Genus *Succinea* Draparnaud, 1801

8. *Succinea daucina* f. *hraswasikhara* Rao

9. *Succinea crassinuclea* Pfeiffer

10. *Succinea snigdha* Rao

11. *Succinea godivariana* f. *vangiya* Rao

Superfamily HELIXARIOMOIDEA

Family ARIOPHANTIDAE

Genus *Ariophanta* Desmoulins, 1829

- 12.
- Ariophanta interrupta*
- (Benson)

Genus *Cryptaustenia* Cockrell, 1981

- 13.
- Cryptaustenia bensoni*
- (Pfeiffer)

Subfamily MACROCHLAMYDINAE

Genus *Macrochlamys* Gray, 1827

- 14.
- Macrochlamys indica*
- Godwin-Austen

Freshwater Molluscs

Class GASTROPODA

Subclass PROSOBRANCHIA

Order ARCHAEOGASTROPODA

Superfamily NERITOIDEA

Family NERITIDAE

Subfamily NERITINAE

Genus *Theodoxus* Montfort, 1810Subgenus *Clithon* Montfort, 1810

- 15.
- Theodoxus (Clithon) reticularis*
- (Sowerby)

Family SEPTARIIDAE

Genus *Septaria* Ferrussac, 1807

- 16.
- Septaria lineata*
- (Lamarck)

Order MESOGASTROPODA

Superfamily VIVIPAROIDEA

Family VIVIPARIDAE

Subfamily BELLAMYINAE

Genus *Bellamya* Jousseume, 1886

- 17.
- Bellamya bengalensis*
- (Lamarck)

form *typica* (Lamarck)

form *annandalei* (Kobelt)

form *doliaris* (Gould)

form *eburnea* (Annandale)

race *gigantea* (Reeve)

form *mandiensis* (Kobelt)

18. *Bellamyia dissimilis* (Mueller)

Family AMPULLARIIDAE

Genus *Pila* (Bolten) Roeding, 1798

19. *Pila globosa* (Swainson)

Superfamily RISSOIDEA

Family BITHYNIIDAE

Genus *Bithynia* Leach, 1818

Subgenus *Digoniostoma* Annandale, 1920

20. *Bithynia (Digoniostoma) cerameopoma* (Benson)

21. *Bithynia (Digoniostoma) pulchella* (Benson)

Genus *Gabbia* Tryon, 1865

22. *Gabbia oracula* Frauenfeld

var. *producta* (Nevill)

Family IRAVADIIDAE

Genus *Iravadia* Blanford, 1887

23. *Iravadia ornata* Blanford

Family ASSIMINEIDAE

Subfamily ASSIMINEINAE

Genus *Assiminea* Fleming, 1828

24. *Assiminea francessi* (Wood)

Superfamily CERITHIOIDEA

Family THIARIDAE

Subfamily THIARINAE

Genus *Thiara* Roeding, 1798Subgenus *Thiara* s. st.

- 25.
- Thiara (Thiara) scabra*
- (Mueller)

Genus *Melanoides* Olivier, 1804

- 26.
- Melanoides tuberculata*
- (Mueller)

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

- 27.
- Tarebia granifera*
- (Lamarck)

- 28.
- Tarebia lineata*
- (Gray)

Family PLEUROCERIDAE

Subfamily MELANATRIINAE

Genus *Brotia* H. Adams, 1866Subgenus *Antimelania* Fischer and Crosse, 1892

- 29.
- Brotia (Antimelania) costula*
- (Rafinesque)

Subclass PULMONATA

Order BASOMMATOPHORA

Superfamily LYMNOIDEA

Family LYMNAEIDAE

Genus *Lymnaea* Lamarck, 1799Subgenus *Lymnaea* s. st.

- 30.
- Lymnaea stagnalis*
- (Linnaeus)

Subgenus *Pseudosuccinea* F. C. Baker, 1908

- 31.
- Lymnaea (Pseudosuccinea) acuminata*
- Lamarck

form *typica* Lamarckform *chlamys* Bensonform *gracilior* Martensform *rufescens* Gray

32. *Lymnaea (Pseudosuccinea) luteola* Lamarck

form *typica* Lamarck

form *australis* Annandale and Rao

form *ovalis* Gray

Family PLANORBIDAE

Subfamily PLANORBINAE

Tribe Planorbeae

Genus *Gyraulus* Agassiz in Charpentier, 1837

33. *Gyraulus convexiusculus* (Hutton)

34. *Gyraulus labiatus* (Benson)

Family BULLINIDAE

Subfamily BULLININAE

Genus *Indoplanorbis* Annandale and Prashad, 1920

35. *Indoplanorbis exutus* (Deshayes)

Class BIVALVIA

Subclass PTERIOMORPHIA

Order ARCOIDA

Superfamily ARCOIDEA

Family ARCIDAE

Subfamily ANADARINAE

Genus *Scaphula* Benson, 1834

36. *Scaphula deltae* Blanford

Subclass Paleoheterodonta

Order UNIONOIDA

Superfamily UNIONOIDEA

Family UNIONIDAE

Subfamily AMBLEMINEAE (Quadrulinae)

Tribe Amblemini

Genus *Lamellidens* Simpson, 1900

37. *Lamellidens corrianus* (Lea)

38. *Lamellidens marginalis* (Lamarck)

Genus *Parreysia* Conrad, 1853Subgenus *Parreysia* s.st.39. *Parreysia (Parreysia) corrugata* (Mueller)40. *Parreysia (Parreysia) favidens* (Benson)
var *deltae* (Benson)Subgenus *Radiatula* Simpson, 190041. *Parreysia (Radiatula) caerulea* (Lea)

Subclass HETERODONTA

Order VENEROIDA

Superfamily CORBICULOIDEA

Family CORBICULIDAE

Genus *Corbicula* Megerle, 181142. *Corbicula striatella* DeshayesGenus *Polymesoda* Rafinesque, 1820Subgenus *Geloina* Gray, 184243. *Polymesoda (Geloina) bengalensis* (Lamarck)

Family PISIDIIDAE (Sphaeriidae)

Genus *Pisidium* L. Pfeiffer, 1821Subgenus *Afropisidium* Kuiper, 196244. *Pisidium (Afropisidium) clarkeanum* G. and H. Nevill**Estuarine and Marine Molluscs**

Class GASTROPODA

Subclass PROSOBRANCHIA

Order ARCHAEOGASTROPODA

Superfamily PATELLOIDEA

Family LOTTIIDAE

Subfamily PATELLOIDINAE

Genus *Potamacmaea* Peile, 192245. *Potamacmaea fluviatilis* (Blanford)

Superfamily TROCHACEA

Family TROCHIDAE

Subfamily UMBONIINAE

Genus *Umbonium* Link, 1807

46. *Umbonium vestiarum* (Linnaeus)

Subfamily SOLARIELLINAE

Genus *Solariella* Wood, 1842

47. *Solariella sataparaensis* Preston

Family SKENEIDAE

Genus *Tubiola* A. Adams, 1863

48. *Tubiola microscopica* (Nevill)

Superfamily NERITOIDEA

Family NERITIDAE

Subfamily NERITINAE

Genus *Nerita* Linnaeus, 1758

49. *Nerita (Amphinerita) articulata* Gould

Genus *Neritina* Lamarck, 1816

50. *Neritina (Vittina) smithi* Wood

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

52. *Neritina (Pseudonerita) obtusa* (Benson)

53. *Neritina (Pseudonerita) sulculosa* (von Martens)

Genus *Theodoxus* Montfort, 1810

Subgenus *Clithon* Montfort, 1810

54. *Theodoxus (Clithon) reticularis* (Sowerby)

Order MESOGASTROPODA

Superfamily LITTORINOIDEA

Family LITTORINIDAE

Subfamily LITTORININAE

Genus *Littorina* Ferussac, 1822

Subgenus *Littorinopsis* Moerch, 1876

55. *Littorina (Littorinopsis) scabra scabra* (Linnaeus)

Genus *Littoraria* Griffith and Pidgeon, 1834Subgenus *Littoraria s.st.*56. *Littoraria (Littoraria) undulata* (Gray)Subgenus *Palustorina* Reid, 198657. *Littoraria (Palustorina) melanostoma* (Gray)Genus *Mainwaringia* Nevill, 188458. *Mainwaringia paludomidea* (Nevill)

Superfamily RISSOIDEA

Family STENOTHYRIDAE

Genus *Stenothyra* Benson, 185659. *Stenothyra blanfordiana* Nevill60. *Stenothyra deltae* (Benson)61. *Stenothyra soluta* Annandale and Prashad62. *Stenothyra woodmasoniana* NevillGenus *Gangetica* Ancey, 189063. *Gangetica miliacea* (Nevill)

Family ASSIMINEIDAE

Subfamily ASSIMINEINAE

Genus *Assiminea* Fleming, 182864. *Assiminea beddomeana* Nevill65. *Assiminea brevicula* (Pfeiffer)66. *Assiminea microsculpta* Nevill67. *Assiminea theoboldiana* Nevill68. *Assiminea woodmasoniana* Nevill

Superfamily CERITHIOIDEA

Family POTAMIDIDAE

Subfamily POTAMIDINAE

Genus *Cerithidea* Swainson, 184069. *Cerithidea alata* (Philippi)

70. *Cerithidea cingulata* (Gmelin)

71. *Cerithidea obtusa* Lamarck

Genus *Telescopium* Montfort, 1810

72. *Telescopium telescopium* Linnaeus

Superfamily XENOPHOROIDEA

Family XENOPHORIDAE

Genus *Xenophora* Fischer, 1807

73. *Xenophora solaris* (Linnaeus)

Superfamily NATICOIDEA

Family NATICIDAE

Subfamily POLINICINAE

Genus *Polinices* Montfort, 1810

74. *Polinices didyma* (Roeding)

75. *Polinices tumidus* (Swainson)

Subfamily NATICINAE

Genus *Natica* Scopoli, 1777

76. *Natica gualteriana* Recluz

77. *Natica lineata* (Roeding)

78. *Natica tigrina* (Roeding)

79. *Natica vitellus* (Linnaeus)

Subfamily SININAE

Genus *Sinum* Roeding, 1798

80. *Sinum neritoideum* (Linnaeus)

Superfamily TONNOIDEA

Family TONNIDAE

Genus *Tonna* Bruennich, 1771

81. *Tonna dolium* (Linnaeus)

82. *Tonna sulcosa* (Born)

Family FICIDAE

Genus *Ficus* Roeding, 179883. *Ficus gracilis* (Sowerby)84. *Ficus variegata* (Roeding)

Family CASSIDAE

Subfamily PHALIINAE

Genus *Phalium* Link, 180785. *Phalium bisulcatum* (Schubert and Wagner)

Family RANELLIDAE

Subfamily RANELLINAE

Genus *Gyrineum* Link, 180786. *Gyrineum natator* (Roeding)

Family BURSIDAE

Genus *Bursa* Roeding, 179887. *Bursa spinosa* (Lamarck)

Superfamily EPITONOIDEA

Family EPITONIIDAE

Subfamily EPITONINAE

Genus *Amaea* H. & A. Adams, 185388. *Amaea (Acrilla) acuminata* (Sowerby)

Order NEOGASTROPODA

Superfamily MURICOIDEA

Family MURICIDAE

Subfamily THAIDINAE

Genus *Thais* Roeding, 175889. *Thais lacera* (Born)90. *Thais blanfordi* (Melvill)

Family COLUMBELLIDAE

Subfamily PYRENINAE

Genus *Pseudanachis* Theile, 1924

91. *Pseudanachis duclosiana* (Sowerby)

Family NASSARIIDAE

Subfamily NASSARIINAE

Genus *Nassarius* Dumeril, 1806

92. *Nassarius foveolatus* (Reeve)

93. *Nassarius orissaensis* (Preston)

94. *Nassarius stolatus* (Gmelin)

Family MELONGENIDAE

Genus *Pugilina* Schumacher, 1817

95. *Pugilina cochlidium* (Linnaeus)

Family OLIVIDAE

Subfamily OLIVINAE

Genus *Olivancillaria* d'Orbigny, 1839

96. *Olivancillaria gibbosa* (Born)

Subfamily ANCILLINAE

Genus *Amalda* H. & A. Adams, 1858

97. *Amalda ampla* (Gmelin)

Superfamily CONOIDEA

Family TURRIDAE

Subfamily TURRICULINAE

Genus *Turricula* Schumacher, 1817

98. *Turricula javana* (Linnaeus)

Genus *Asthenotoma* Harris & Burrows, 1891

99. *Asthenotoma vertebrata* (Smith)

Subclass OPISTHOBRANCHIA

Order CEPHALASPIDEA

Superfamily PHILINOIDEA

Family AGLAJIDAE

Genus *Melanochlamys* Cheesman, 1881100. *Melanochlamys* sp.

Family HAMINEIDAE

Genus *Haminoea* Turton & Kingston in Carrington, 1830101. *Haminoea crocata* Pease

Subclass GYMNOMORPHA

Order SYSTELLOMMATOPHORA

Superfamily ONCHIDIOIDEA

Family ONCHIDIIDAE

Genus *Onchidium* Buchanan, 1800102. *Onchidium tenerum* Stoliczka103. *Onchidium tigrinum* Stoliczka104. *Onchidium typhae* Buchanan

Subclass PULMONATA

Order ARCHAEOPULMONATA

Superfamily ELLOBIOIDEA

Family ELLOBIIDAE

Subfamily ELLOBIINAE

Genus *Ellobium* Roeding, 1798105. *Ellobium aurisjudae* (Linnaeus)106. *Ellobium gangeticum* (Pfeiffer)Genus *Cassidula* Ferussac, 1821107. *Cassidula nucleus* (Gmelin)

Genus *Pythia* Roeding, 1798

108. *Pythia plicata* (Ferussac)

Subfamily MELAMPODINAE

Genus *Melampus* Montfort, 1810

109. *Melampus pulchella* Petit

Superfamily AMPHIBOLOIDEA

Family AMPHIBOLIDAE

Genus *Salinator* Hedley, 1900

110. *Salinator burmana* (Blanford)

Class CEPHALOPODA

Subclass COLEOIDEA

Order SEPIIDA

Suborder SEPIINA

Family SEPIIDAE

Genus *Sepia* Linnaeus, 1758

111. *Sepia aculeata* d' Orbigny

Genus *Sepiella* Gray, 1849

112. *Sepiella inermis* d' Orbigny

Order TEUTHIDA

Suborder MYOPSIDA

Family LOLIGINIDAE

Genus *Loligo* Schneider, 1784

113. *Loligo duvanceli* d' Orbigny

Subgenus *Doryteuthis* Neaf, 1912

114. *Loligo (Doryteuthis) singhalensis* Ortmann

Genus *Loliolus* Steenstrup, 1856

115. *Loliolus investigatoris* Goodrich

Order OCTOPODA
 Suborder INCIRRATA
 Superfamily OCTOPODIDEA
 Family OCTOPODIDAE
 Subfamily OCTOPODINAE
 Genus *Octopus* Lamarck, 1798

116. *Octopus macropus* Risso

117. *Octopus rugosus* (Bosc)

Class BIVALVIA
 Subclass PROTOBRANCHIA
 Order NUCULOIDA
 Superfamily NUCULOIDEA
 Family NUCULIDAE
 Genus *Nucula* Lamarck, 1799

118. *Nucula convexa* Hinds

119. *Nucula mitralis* Hinds

Superfamily NUCULANOIDEA
 Family NUCULANIDAE
 Genus *Nuculana* Link, 1807
 Subgenus *Jupiteria* Bellardi, 1875

120. *Nuculana (Jupiteria) fragilis* (Chemnitz)

Family YOLDIIDAE
 Subfamily YOLDIINAE
 Genus *Yoldia* Moller, 1842

121. *Yoldia nicobarica* (Bruguiere)

Order ARCOIDA
 Superfamily ARCOIDEA
 Family ARCIDAE
 Subfamily ANADARINAE
 Genus *Anadara* Gray, 1847

122. *Anadara granosa* (Linnaeus)

Subgenus *Scapharca* Gray, 1847

123. *Anadara (Scapharca) inequivalvis* (Bruguiere)

Family NOETIIDAE

Subfamily STRIARCINAE

Genus *Striarca* Conrad, 1862

124. *Striarca lactea* (Linnaeus)

Order MYTILOIDA

Superfamily MYTILOIDEA

Family MYTILIDAE

Subfamily MODIOLINAE

Genus *Modiolus* Lamarck, 1799

125. *Modiolus striatulus* (Hanley)

126. *Modiolus undulatus* (Dunker)

Order PTERIOIDA

Suborder PINNINA

Superfamily PINNOIDEA

Family PINNIDAE

Genus *Atrina* Gray, 1842

127. *Atrina pectinata pectinata* (Linnaeus)

Order OSTREOIDA

Suborder OSTREINA

Superfamily OSTREOIDEA

Family OSTREIDAE

Subfamily CRASSOSTREINAE

Genus *Crassostrea* Sacco, 1897

128. *Crassostrea cuttackensis* (Newton and Smith)

129. *Crassostrea gryphoides* (Schlotheim)

Genus *Saccostrea* Dollfus & Dautzenberg, 1920

130. *Saccostrea cucullata* (Born)

Suborder PECTININA

Superfamily ANOMIOIDEA

Family ANOMIIDAE

Genus *Enigmonia* Iredale, 1918

131. *Enigmonia aenigmatica* (Holten)

Family PLACUNIDAE

Genus *Placuna* Solander in Lightfoot, 1786

132. *Placuna placenta* (Linnaeus)

Subclass HETERODONTA

Order VENEROIDA

Superfamily LUCINOIDEA

Family LUCINIDAE

Subfamily MILTHINAE

Genus *Eamsiella* Chavan, 1951

133. *Eamsiella philippinarum* (Hanley)

Superfamily CARDIOIDEA

Family CARDIIDAE

Subfamily TRACHYCARDIINAE

Genus *Trachycardium* Moerch, 1853

134. *Trachycardium asiaticum* (Bruguiere)

Superfamily MACTROIDEA

Family MACTRIDAE

Genus *Mactra* Linnaeus, 1767

Subgenus *Mactra* s. st.

135. *Mactra (Mactra) luzonica* Deshayes

136. *Mactra (Mactra) mera* Deshayes

Subgenus *Coelomactra* Dall, 1895.

137. *Mactra (Coelomactra) turgida* Gmelin

138. *Mactra (Coelomactra) violacea* Gmelin

Subgenus *Mastrinula* Gray, 1853.

139. *Mastra (Mastrinula) plicataria* Linnaeus

Superfamily SOLENOIDEA

Family SOLENIDAE

Genus *Solen* Linnaeus, 1758

140. *Solen brevis* Gray

Family CULTELLIDAE

Genus *Cultellus* Schumacher, 1817

141. *Cultellus subelliptica* Dunker

Genus *Neosolen* Ghosh, 1920

142. *Neosolen aqua-dulcurio* Ghosh

Genus *Pharella* Gray, 1854

143. *Pharella javanicus* (Lamarck)

Genus *Siliqua* Megerele, 1811

144. *Siliqua albida* Dunker

Genus *Tanysiphon* Benson, 1858

145. *Tanysiphon rivalis* Benson

Superfamily TELLINOIDEA

Family TELLINIDAE

Subfamily TELLININAE

Genus *Tellina* Linnaeus, 1758

Subgenus *Pharonella* Lamy, 1918

146. *Tellina (Pharonella) iridescens* (Benson)

Subgenus *Tellinides* Lamarck, 1818

147. *Tellina (Tellinides) sinuata* Spengler

Genus *Strigilla* Turton, 1822

148. *Strigilla splendida* (Anton)

Subfamily MACOMINAE

Genus *Macoma* Leach, 1819149. *Macoma birmanica* (Philippi)

Family SEMELIDAE

Genus *Theora* H. & A. Adams, 1858150. *Theora opalina* (Hinds)

Family PSAMMOBIIDAE

Subfamily SANGUINOLARIINAE

Genus *Sanguinolaria* Lamarck, 1789Subgenus *Soletillina* Blainville, 1824151. *Sanguinolaria (Soletillina) acuminata* (Deshayes)

Subfamily NOVACULININAE

Genus *Novaculina* Benson, 1830152. *Novaculina gangetica* Benson

Superfamily ARCTICOIDEA

Family TRAPEZIIDAE

Genus *Trapezium* Megerle von Muehlfeld, 1811153. *Trapezium sublaevigatum* (Lamarck)

Superfamily CORBICULOIDEA

Family CORBICULIDAE

Genus *Polymesoda* Rafinesque, 1828Subgenus *Geloina* Gray, 1842154. *Polymesoda (Geloina) bengalensis* (Lamarck)

Superfamily VENEROIDEA

Family VENERIDAE

Subfamily CHIONINAE

Genus *Timoclea* Brown, 1827155. *Timoclea imbricata* (Sowerby)

Subfamily MERETRICINAE

Genus *Meretrix* Lamarck, 1799

156. *Meretrix meretrix* (Linnaeus)

Subfamily PITARINAE

Genus *Pitar* Roemer, 1857

157. *Pitar alabastrum* (Reeve)

Genus *Pelecypora* Dall, 1902

158. *Pelecypora trigona* (Reeve)

Subfamily TAPETINAE

Genus *Tapes* Megerle, 1811

159. *Tapes bruguiete* (Hanley)

Genus *Paphia* Roeding, 1798

160. *Paphia malabarica* (Schroeter)

161. *Paphia textile* (Gmelin)

Family GLAUCONOMIDAE

Genus *Glaucanome* Gray, 1828

162. *Glaucanome sculpta* (Sowerby)

Order MYOIDA

Suborder MYINA

Superfamily MYOIDEA

Family MYIDAE

Subfamily SPHENIINAE

Genus *Sphenia* Turton, 1822

163. *Sphenia perversa* Blanford

Family CORBULIDAE

Subfamily CORBULINAE

Genus *Corbula* Lamarck, 1799

164. *Corbula abbreviata* Preston

165. *Corbula calcarea* Preston

166. *Corbula gracilis* Preston

Suborder PHOLADINA

Superfamily PHOLADOIDEA

Family PHOLADIDAE

Subfamily PHOLADINAE

Genus *Barnea* Leach in Risso, 1828

167. *Barnea candida* (Linnaeus)

Subfamily MARTESIINAE

Genus *Martesia* Sowerby, 1824

168. *Martesia fragilis* Verrill and Bush

Family TEREDINIDAE

Subfamily TEREDININAE

Genus *Bactronophorus* Tapparone-Canefri, 1877

169. *Bactronophorus thoracites* (Gould)

Genus *Dicyathifer* Iredale, 1932

170. *Dicyathifer manni* (Wright)

Subfamily BANKIINAE

Genus *Bankia* Gray, 1842

171. *Bankia companellata* Moll and Roch

172. *Bankia nordi* Moll

173. *Bankia rochi* Moll

Genus *Nausitora* Wright, 1884

174. *Nausitora dunlopei* Wright

Subclass ANOMALODESMATA

Order PHOLADOMYOIDA

Superfamily PANDOROIDEA

Family LATERNULIDAE

Genus *Laternula* Roeding, 1798

175. *Laternula truncata* (Lamarck)

Superfamiy POROMYOIDEA

Family CUSPIDARIIDAE

Genus *Cuspidaria* Nardo, 1840

176. *Cuspidaria chilkaensis* (Preston)

Class SCAPHOPODA

Order DENTALIIDA

Family DENTALIIDAE

Genus *Dentalium* Linnaeus, 1758

177. *Dentalium octangulatum* Donovan

LIST OF COMMERCIAL AND MEDICINAL IMPORTANT MOLLUSCS OF SUNDARBANS

FRESHWATER

1. *Bellamya bengalensis* form *typica* (Lamarck)
phase *annandalei* (Kobelt)
race *doliaris* (Gould)
race *eburnea* (Annandale)
race *gigantea* (Reeve)
form *mandiensis* (Kobelt)
2. *Bellamya dissimilis* (Mueller)
3. *Pila globosa* (Swainson)
4. *Lamellidens corrianus* (Lea)
5. *Lamellidens marginalis* (Lamarck)
6. *Parreysia* (*Parreysia*) *favidens* (Benson)

ESTUARINE AND MARINE

7. *Telescopium telescopium* (Linnaeus)
8. *Cerithidea alata* (Philippi)
9. *Cerithidea cingulata* (Gmelin)
10. *Pugilinus cochlidium* (Linnaeus)

11. *Anadara granosa* (Linnaeus)
12. *Crassostrea cuttackensis* (Newton and Smith)
13. *Crassostrea gryphoides* (Schlotheim)
14. *Polymesoda (Geloina) bengalensis* (Lamarck)
15. *Meretrix meretrix* (Linnaeus)
16. *Pelecycora trigona* (Reeve)

SYSTEMATIC ACCOUNT

FRESHWATER

Family VIVIPARIDAE

Shell dextral, moderately large, perforate or imperforate; spire conical; whorls rounded with or without bands; aperture almost circular; operculum horny, concentric. The central tooth of radula is wide and lack of denticles. Females generally longer in size than the males.

Cosmopolitan. Found in freshwater throughout except South America.

The family very common in the freshwater in habiting streams, lakes, ponds, pools, marshes and rice field feeding on succulent vegetation. Respiration is strictly aquatic and by the bipectinate gill hanging into the right side of the mantle cavity. Dimorphic. Male with elongated right tentacle which serve as a copulatory organ. Fertilization internal. Pallial oviduct elongated and acts as uterus. Viviparous female carries developing young in the lower part of oviduct. All members are ovoviviparous, retaining 20 to 30 crawling young ones in the uterus. Young ones present in the uterus throughout the year but emit them into water only in summer.

Subfamily BELLAMYINAE

Shell medium to large, dextral, varying in shape convex to angular or carinate, obtusely or strongly keeled at the periphery. Apex of the embryonic shell pointed, with ridges on the earliest whorls, which bears spiral rows of short bristle of periostracum, unbanded. Aperture sub circular or broadly ovate; operculum corneous, concentric.

Respiration with monopectinate ctenidium or gill. Dimorphic, male with a big bean shaped complex testis on the right side of the roof of the mantle cavity and female with complex seminal receptacle.

Key to the species

1. Shell with dark colour bands..... *Bellamyia bengalensis* (Lamarck)
- Shell without any colour bands *Bellamyia dissimilis* (Mueller)

Bellamyia bengalensis (Lamarck, 1822)

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

2007. *Bellamyia bengalensis*: Ramakrishna and Dey, *Handbook on Indian Freshwater Molluscs*, p. 78

Diagnosis : Shell thin, more or less smooth, with three or more colour bands, embryonic shell delicate and thin, with three primary rows of chaetae, low ridges, the lower most well developed, sometimes developing into a keel, secondary ridges bearing chaetae may develop between the primary ones.

Distribution : India : Common throughout.

Elsewhere : Myanmar; Bangladesh; Sri Lanka.

form ***typica*** (Lamarck, 1822) [Pl.-I, figs. 1 & 2]

2007. *Bellamyia bengalensis* form *typica*: Ramakrishna and Dey, *Handbook on Indian Freshwater Molluscs*, p. 79, figs. 39A, & 39B.

Diagnosis : Shell thinner, spire and body whorl almost equal height, whorls gradually increasing, less rounded and with rather straight sides, sutures shallow; aperture sub circular with a narrow black margin. Bands are variable and irregular, alternating broad and narrow bands.

Distribution : India : Throughout.

Elsewhere : Myanmar.

Remarks : Although it is a common freshwater molluscs of India, it is not important intermediate host for parasites.

phase ***annandalei*** (Kobelt, 1908) [Pl.-I, figs. 7 & 8]

1908. *Vivipara annandalei* Kobelt, *Malak. Ges.*, 60 : 161, (Type locality: Visakhapatnam, Andhra Pradesh).

2007. *Bellamyia bengalensis* form *annandalei*: Ramakrishna and Dey, *Handbook on Indian Freshwater Molluscs*, p. 80, figs. 40A, & 40B.

Diagnosis : Shell thin, sutures shallow; whorls increasing gradually, less rounded with rather straight sides. Commonly found in different freshwater resources and very mild saline water resources of Sundarbans.

Distribution : India : Andhra Pradesh, Bihar, Jharkhand, Manipur, Meghalaya, Orissa, Rajasthan, Tamil Nadu, West Bengal.

race *doliaris* (Gould, 1843) [Pl.–I, figs. 3 & 4]

1843. *Paludina doliaris* Gould, *Proc. Boston Soc. nat. Hist.*, **1** : 144. (Type locality: Burma).

2007. *Bellamyia bengalensis* race *doliaris*: Ramakrishna and Dey, *Handbook on Indian Freshwater Molluscs*, p. 83, figs. 43A, & 43B.

Diagnosis : Shell thin, smaller and more conical, sutures shallow; whorls increasing gradually, less rounded with rather straight sides, last whorl distinctly biangulate.

Distribution : India : Andhra Pradesh, Bihar, Jharkhand, Madhya Pradesh, Maharashtra, Orissa, West Bengal.

Elsewhere : Myanmar.

It is also very common in all freshwater bodies as well mild saline water resources of the Sundarbans.

form *eburnea* (Annandale, 1921) [Pl.–1, figs. 9 & 10]

1921. *Viviparus bengalensis* race *eburnea* Annandale, *Rec. Indian Mus.*, **22** : 274, pl. 2, figs. 1-2. (Type locality: Kaligiri = Kanigiri) reservoir, Nellore, Andhra Pradesh.

2007. *Bellamyia bengalensis* form *eburnea*: Ramakrishna and Dey. *Handbook on Indian Freshwater Molluscs*, p. 84, figs. 44 A, & 44 B.

Diagnosis : Shell narrow with smaller aperture, without black rim, whorls much less inflated with distinct flattening below the sutures; body whorl showing a tendency to become biangulate.

Distribution : India : Andhra Pradesh, Jharkhand, Madhya Pradesh, Orissa, Tamil Nadu, West Bengal.

Not very common in freshwater bodies and mild saline water resources of the Sundarbans.

form *gigantea* (Reeve, 1862) [Pl.–1, figs. 5 & 6]

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

2007. *Bellamyia bengalensis* form *gigantea*: Ramakrishna and Dey, *Handbook on Indian Freshwater Molluscs*, p. 85, figs. 45 A, & 45 B.

Diagnosis : Shell large, aperture sub circular, sutures deep, umbilicus wide with prominent spiral bands.

Distribution : India : Bihar, Orissa, Rajasthan, West Bengal.

Elsewhere : Pakistan.

Remarks : Not very common in water freshwater bodies of Sundarbans.

form *mandiensis* (Kobelt, 1909) [Pl.–2, figs. 1 & 2]

1909. *Viviparus bengalensis* var. *mandiensis* Kobelt, in Martini Chemnitz, *Conch. Cab.*, 2 : 414, pl. 77, figs. 8–9. (Type locality: Mandi Kangra, Himachal Pradesh).

2007. *Bellamya bengalensis* form *mandiensis* : Ramakrishna and Dey, *Handbook on Indian Freshwater Molluscs*, p. 87, figs. 47 A, & 47 B.

Diagnosis : Shell narrower and conical than form *typica*, umbilicus broader; spiral bands well developed alternating broad and narrow bands.

Distribution : India: Bihar, Delhi, Gujarat, Himachal Pradesh, Jharkhand, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Uttar Pradesh, West Bengal.

Elsewhere : Myanmar, Bangladesh, Sri Lanka.

Remarks : It is very much resembles with form *anandalei*, but differs in being thinner, paler and more conical in shape with a proportionately broader last whorl.

Common in freshwater bodies and mild saline water resources of the Sundarbans.

Bellamya dissimilis (Mueller, 1774) [Pl.–1, figs. 11 & 12]

1774. *Nerita dissimilis* Mueller, *Hist. Verm. Test.*, pt. 2 : 184. Type locality: Not mentioned.

2007. *Bellamya dissimilis* : Ramakrishna and Dey, *Handbook on Indian Freshwater Molluscs*, p. 90, figs. 50 A, & 50 B.

Diagnosis : Shell small, high and narrow, broadly ovate, body whorl indistinctly angulated; spire swollen and suture deeply impressed, without dark spiral bands, body whorl with one slightly elevated ridge or broad and obscure, pale spiral band; sculpture with fine spiral striae; greenish with blackish peristome; rim of the aperture often black, operculum thicker and muscular scar better developed. Edge of the mantle smooth in the adult.

Distribution : Common throughout India.

Elsewhere : Bangladesh; Malaysia; Myanmar; Pakistan; Sri Lanka.

Common in freshwater bodies and mild saline water resources of the Sundarbans.

Economic importance : The *Bellamya* spp. is commonly used as food by the people of Sundarbans as well as the people of West Bengal and other parts of Country. In Sundarbans these are used as food by a section of people mainly the tribal and lower economic people. These are sold in the different markets of North and South 24 Paragonas, Kolkata, Howrah, Midnapore, Bankura, Puruliya and other parts of the country. Normally shell fish are sold with their shell, but sometimes soft fleshy part removed from the shell is also sold. It is a very prestigious food items in some places. The fleshy part is removed by breaking the shell with a piece of stone or hammer or shell

deep in boil water for some times and the flesh is taken out with a help of a needle or pin. The flesh after taken out from the shell cleaned with water and cooked with oil, spices and vegetables especially brinjal and potato and eaten.

Medicinal importance : (i) Soup prepared from the flesh used to cure Asthma, Arthritis, Joint swelling, Rheumatism and quick healing of wound. (ii) The snails cleaned and kept in water for few hours and then the water is used like an eye drop to cure conjunctivitis.

Family AMPULLARIIDAE

Shell medium to large, perforated or imperforated, dextral or sinistral; varying from depressed to ovate, with rounded angular or carinate whorls. Green or olive brown in colour. Operculum large, concentric calcareous or corneous and concentric with sub central nucleus.

In addition to a pair filiform tentacle the animals with the tentacle like process (pseudopodium) on each side of the snout. Near each is an epipodial lobe, the left one forming an inhalant siphon and the right one an exhalant siphon. The mantle cavity bears a long monopectinate gill on each side and modified into pulmonary sac on either side. Central tooth of radula with broad and lacking basal denticles. Sexes are separate. Oviparous. Copulatory organ in male on the right side, formed by modified part of the mantle border which encloses the penis. With the on set of rains snail goes to the banks of pond or stream, excavates a depression in where deposited a gelatinous mass of 200-300 eggs and protects this mass in folds of the mantle and foot until a calcareous shell has formed around each egg.

Amphibious. Inhabitants of freshwater ponds, tanks, streams and paddy fields. Some species lives in seasonal water bodies which dry out for a long period.

Distributed in tropical region of America, Asia and Africa.

Commonly known as apple snail and represented by a single genus, *Pila* distributed throughout India.

Genus *Pila* (Bolten) Roeding, 1798

1798. *Pila* (Bolten) Roeding, *Mus. Boltenianum*, pt. 2, p. 145 (in part). Type species: *Helix ampullacea*
Subsequent designation, Dall, 1904.

Medium to large dextral, globose, with convex non angular whorls; aperture large expanded, body whorl inflated, umbilicus open or closed; operculum with an inner calcareous layer. Lateral teeth of radula with 5 cusps, central one the largest and innermost reduced. Cluster of eggs with brittle calcareous shell are deposited on the bank above the water.

Found in Asia, Africa, Australia and Indo-Pacific Islands (Brandt, 1974).

Pila has unique respiratory provision, can enable to respire equally in water as well as in air. In the submerged condition the respiratory current enters on the left side by way of the large left nuchal lobe rolled into a funnel, by passes the closed pulmonary sac, continues obliquely to the posterior end of the mantle cavity.

***Pila globosa* (Swainson, 1822) [Pl.-2, figs. 3 & 4]**

1822. *Ampullaria globosa* Swainson, *Zool. Illustrations*, 2, pl. xix. (Type locality: Rivers of India).

2007. *Pila globosa*: Ramakrishna and Dey, *Handbook on Indian Freshwater Molluscs*, p. 98, figs. 56 A, & 56 B.

Diagnosis : Shell globose with inflated body whorl and depressed spire; suture shallow, coloured bands present inside the aperture. Shows remarkable variation in shape and elevation of the spire and body whorl.

Distribution : Throughout India except southern India and Punjab.

Remarks : Very common freshwater species inhabits all freshwater bodies including drains, canals, and wet fields. A number of trematodes like *Artyfechinostomum sufratyfex*, *Echinostoma cercaria*, *Cercaria andhraensis*, *C. pigmentata*, *Diplodiscus* sp., and *Xiphidocercaria* sp. reported from this species.

Economic importance : *Pila* commonly used as food by a section of people mainly the tribal and lower economic people of Sundarbans as well as the people of West Bengal and other parts of Country. They are also valuable resource of food for ducks and hybrid Magur (fishes) in Sundarban area.

Medicinal importance : (i) Soup prepared from the eggs used to cure the Rickets of children. (ii) Snails cleaned and kept in water for few hours and then the clean water used as eye drop to cure conjunctivitis.

Class BIVALVIA

Subclass PALEOHETERODONTA

Order UNIONOIDA

Family UNIONIDAE

Shell equivalve, nacreous; umbo generally sculptured and with remnant of larval shell; umbonal cavity deep; periostracum thick; ligament long, projecting; hinge with two cardinals and two posterior lamellar teeth in left valve and one cardinal and one lamellar tooth in right valve.

Gill with water tubes, all four gills or outer pair occupies by marsupium.

Geological range : Triassic to Recent.

Subfamily AMBLEMINEAE (Quadrulinae)

Shell heavy, high, squarish to triangular, shape varies with sexual dimorphism; beak ornamented with W or V-shaped folds, degenerating in some into row of tubercles; hinge angular, heavy. Marsupium occupying all four gills.

Geological Range : Lower Cretaceous to Recent.

Genus *Lamellidens* Simpson, 1900

1900. *Lamellidens* Simpson, *Proc. U.S. natn. Mus.*, **22** : 854. Type species: *Unio marginalis* Lamarck, 1819; original designation.

Shell moderately thick, elongate elliptical; anterior end narrow and curving regularly; posterior end broad with a post dorsal wing, a low, often biangulate posterior ridge and with two sharpe radiating lirae; umbo curved radiating ridges of zigzag shaped and concentric reaching about half way from beak and fading out gradually; periostracum smooth; brownish or dark, shiny and ray less; hinge with two elongated cardinals and two laterals in the left valve and right valve with two parallel lamellar cardinals and one laterals.

Exhalent aperture with a row of minute tubercles and its extreme lateral margins, inhalant aperture with a single row of stout and short tubercles.

Geological Range : Miocene to Recent. India, Bangladesh, Myanmar, Pakistan.

Key to the species

1. Umbo prominent, colour brown with a lighter band along the margin
..... *Lamellidens marginalis* (Lamarck)
- Umbo less prominent, colour uniformly dark..... *Lamellidens corrianus* (Lea)

Lamellidens corrianus (Lea, 1834) [Pl.-2, figs. 5 & 6]

1834. *Unio corrianus* Lea, *Trans. Amer. Philos. Soc.*, **6** (2) : 65, pl., 9, fig., 25. Type locality: India.

2007. *Lamellidens corrianus* : Ramakrishna and Dey, *Handbook on Indian Freshwater Molluscs*, p. 283, figs. 205A, 205B, 206 A, & 206 B.

Diagnosis : Shell elongate, elliptical; umbone slightly inflated; periostracum smooth and dark brown; dorsal margin almost straight and long; cardinals two in each valve.

Distribution : Common throughout India.

Elsewhere : Bangladesh and Myanmar.

Lamellidens marginalis (Lamarck, 1819) [Pl.-2, figs. 7 & 8]

1819. *Unio marginalis* Lamarck, *Hist. Nat. Anim. Sans. Vert.*, 4 : 79. Type locality: Bengal.

2007. *Lamellidens marginalis*: Ramakrishna and Dey, *Handbook on Indian Freshwater Molluscs*, p. 288, figs. 211 A, & 211 B.

Diagnosis : Shell oblong ovate, valves covered with periostracum of blackish brown with light brown border along ventral margin, umbo not elevated, posterior side broad, roundedly angular, margin produced, narrow wing, dorsal margin slightly curved, central margin slightly contracted in middle, hinge with two cardinals in right valve, interior nacreous.

Distribution : India : Widely distributed.

Elsewhere : Bangladesh; Myanmar and Sri Lanka.

Medicinal importance : (i) Soup prepared used to cure cardiac ailments and blood pressure. (ii) Curry and soup is used for faster growth and sound health. (iii) Shell ash after burning mixed with honey used for the remedy of giddiness, nervousness and dehydration during summer months. (iv) Shell lime water used for killing of intestinal parasites.

Commercial importance : They are commercially important because, they produced the precious item pearl. Due to the irritation caused by some foreign bodies the mantle layer of these mussels secrete the shelly nacreous around the foreign bodies which becomes pearl. Both these species *Lamellidens corrianus* (Lea) and *L. marginalis* (Lamarck) can produce the freshwater pearl in around two years of time. The price of these pearls varies Rs. 20/- to Rs. 100/- and the size 82 x 40 mm and above. Incident of occurrence of natural pearls were recorded from many places of Sundarbans. These pearls are various in size and shape and having good luster.

Genus *Parreysia* Conrad, 1853

1853. *Parreysia* Conrad, *Proc. Acad. Nat. Sci. Philad.*, 6 : 267. (Type species: *Unio multidentatus* Philippi, 1847; original designation).

Shell heavy, rounded to sub rhomboid, inflated, with distinct, radial zigzag ribs on umbonal region; periostracum smooth, bright rayed; hinge with strong cardinals, ragged or vertically striate, lateral teeth short, in some duplicated in right valve; cavity of beaks rather deep.

Animals with all four marsupial gills; supra and opening widely separated from the anal; inner lamina of the inner gill connected with the abdominal sac.

Geological Range : Miocene to Recent. India, Myanmar and other South-east Asia countries and central Africa.

***Parreysia (Parreysia) favidens* (Benson, 1862) [Pl.-2, figs. 9 & 10]**

1862. *Unio favidens* Benson, *Ann. Mag. Nat. Hist.*, (3) 10 : 188. Type locality: "Bhitoura on the Ganges between Cawnpore (Kanpur) and Allahabad."

2007. *Parreysia (Parreysia) favidens*: Ramakrishna and Dey, *Handbook on Indian Freshwater Molluscs*, p. 299, figs. 220 A, & 220 B.

Diagnosis : Shell thick and heavy, inflated, with strong zigzag ribs on beak, inequilateral and angulated both on anterior and posterior margins, cardinal teeth strong and broad.

Distribution : India : Andhra Pradesh, Assam, Bihar, Jharkhand, Maharashtra, Meghalaya, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere : Bangladesh, Pakistan.

Economical importance : This species used as food by a section of tribal and lower economic people. It is also used to feed the ducks.

Medicinal importance : (i) Soup prepared used to cure cardiac ailments and blood pressure. (ii) Shell lime water used for killing of intestinal parasites.

ESTUARINE AND MARINE SPECIES

Class GASTROPODA
Subclass PROSOBRANCHIA
Order MESOGASTROPODA
Superfamily CERITHIOIDEA
Family POTAMIDIDAE

Horn shells

Shell small to large upto 140 mm long, thick and turreted; spire high; whorls 10-16, aperture rounded or oval with a rudimentary anterior siphonal canal and posterior siphonal notch in some cases. Outer lip thickened grows beyond columellar base. Sculpture with spiral and axial ribs, often broken into nodules. Operculum horny, thin pauci to multispiral with basal nucleus.

Head broad, with a prominent snout, tentacle a pair projects from neck, eyes situated at the outer base. Foot massive, sub. circular anteriorly and obtuse posteriorly. Radula taenioglossate type. Digestive system with a large stomach. Mantle cavity deep, with osphradium and monopectinate ctenidium.

Sexes separate. Copulatory organ absent. A spermatophore is formed to store the sperm and to transfer them into the female, pallial gonoducts are open. Eggs lay in the form of mucus string as long coil.

Detritus feeders. Common in the estuaries, backwaters and mangroves. Found on mud banks and pools in the intertidal area, often seen moving on fluid slime, slowly creeping over low lying land and browsing on the tiny vegetative growths on the bases of the trunks and root of mangroves. They return to the slimy beds after feeding. They are capable to remain out of water for several days with the help of specialized breathing systems.

Key to the genera

1. Shell small, not exceeding 50 mm, elongate; whorls less than ten; aperture extending anteriorly with straight canal..... *Cerithidea* Swainson
- Shell large, more than 50 mm, conical; whorls more than ten; aperture not extending anteriorly..... *Telescopium* Montfort

Genus *Telescopium* Montfort, 1810

1810. *Telescopium* Montfort, *Conch. Syst.*, 2 : 438.

Telescopium telescopium (Linnaeus, 1758)

Telescope snail [Pl.-3, figs. 1 & 2]

1758. *Telescopium telescopium* Linnaeus, *Syst. Nat.*, ed. 10 : 760.

2006. *Telescopium telescopium*: Dey, *Handbook on Mangrove associates molluscs of Sundarbans*, p. 31, figs. 29-32.

Shell large, heavy, thick trochoid in shape, conically elevated with more or less 16 whorls; sculpture with 3 larger and, narrow spiral cordon whorls; columella twisted and channeled, labial lip acutely curved.

Feeds on organic detritus and surface algae.

Common species found on the mud of exposed areas of river banks, small ditches, and shallow pools and mainly concentrated on canals with a little flow of water during low tide or at extreme high tide mark in the soft mud or on pneumatophors of mangroves. Population varies (20 to 25/m²) in muddy areas and the mangroves regions; upto 100 to 140/m² on concentrated areas. They were observed to be concentrated at large numbers on the muddy banks at many places of Sundarbans. In many places (mainly near to the sea) it was observed the association with *Saccostrea cucullata* (Born) and often found associated with *Balanus sp.* Eggs are laid in gelatinous mass. Juveniles recorded during April–May.

Distribution : India : Andhra Pradesh, Gujarat, Kerala, Pondicherry, Orissa, Tamil Nadu, West Bengal.

Elsewhere : Australia (North), Indonesia, Malagasy, Myanmar, Philippines, Reunion, Sri Lanka.

Economic importance : Economically these shells are important. In many parts of India (Andhra Pradesh and Tamil Nadu) they are used for the preparation of quick lime. In Sundarbans (West Bengal) these shells are collected in huge quantities and brought to Canning where they are crushed into powdered and use as calcium resources in the poultry feed.



Fig. 1 : Telescopium shells crawling on the mud at Lothian Island, Sundarbans.

Genus *Cerithidea* Swainson, 1840

1840. *Cerithidea* Swainson, *Treat. Malac.*, p. 203.

Key to the species

1. Outer lip reflected over the sinus *C. alata* (Philippi)
 – Outer lip not reflected over the sinus *C. cingulata* (Gmelin)

Cerithidea alata (Philippi, 1847)

Horn shell or Cerithid snail [Pl. 3, figs. 3 & 4]

1847. *Cerithidea alata* Philippi, *Abbild. Bes. Conch.*, 3 : 17.

2006. *Cerithidea alata*: Dey, *Handbook on Mangrove associates molluscs of Sundarbans*, p. 33, figs. 33 & 34.

Shell upto 25mm in length, thick, with 12-13 whorls; suture distinct; aperture elongately ovate, outer lip and inner lip meet posteriorly at a point beyond the shell

plane; siphonal sinus hollow and short, outer lip reflects over the sinus; sculpture with rounded, somewhat rectangular, close set axial nodules, three on each whorl; greyish brown, inner white.



Fig. 2 : *Cerithidea* spp. crawling on the mud at Jharkhali.

This species closely resembles *C. cingulata* (Gmelin) in shell characters but can easily be differentiated by its typically detached aperture and sculpture.

Distribution : India : Andaman Islands, Andhra Pradesh, Tamil Nadu, West Bengal.

Elsewhere : Indian Ocean.

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

Cerithid snail [Pl.-3, figs. 5 & 6]

1791. *Murex cingulata* Gmelin, *Syst. Nat.*, ed. 13 : 3561

2006. *Cerithidea cingulata*: Dey, *Handbook on Mangrove associates molluscs of Sundarbans*, p. 34, figs. 36 & 37.

Elongate, thick, whorls 13-15, flattened; sculpture with tuberculate spiral ridges; aperture oblique, outer lip expanded broadly, anterior canal distinct; columella straight; dark brown, often with a whitish band above the suture, nodules dirty white interstices brown, interior of aperture white; operculum spherical with a central nucleus.

Distribution : India : Common in the estuaries and backwaters along East and West Coast.

Elsewhere : Indonesia, Japan, Myanmar, Pakistan, Sri Lanka.

Two species of cerithids *Cerithidea alata* and *C. cingulata* are found common in Sundarbans, crawling on the mud throughout Sundarbans. These are dominating species of mangrove areas and the population increased towards the sea mainly at Kishorimohanpur, Kalas, Saimari, Halliday, Gona, Chhotahardi and the population varies 1200 to 1500 nos/m². Youngones were found crawling on the mud toward the low water marks with adults gradually replacing them towards high water mark. Eggs lay in capsules in form of mass of gelatinous threads.

Economic importance : Economically very important and used for preparation of quick lime in many parts of India mainly Andhra Pradesh and Tamil Nadu. In Sundarbans these shells are collected in huge quantities and brought to Canning where they are crushed into powder and use as calcium resources in poultry feed.

Order NEOGASTROPODA

Superfamily MURICOIDEA

Family MELONGENIDAE

Crown Conchs or Whelks

Shell medium to large (upto 110 mm), thick, pyriform to fusiform, whorls few, flattened or elevated spire, bearing a sizable protoconch, covered with brown or opaque periostracum. Sculpture not very conspicuous, with a few spiral cords at the base and strong knobs or tentacles at shoulder. Aperture large and wide with a thickened and smooth outer lip. Columella smooth without any plaits. Operculum thick, horny and unguiculate, with lateral nucleus.

Head with a pair of tentacles. Foot large and powerful. Mantle cavity contains a large monopectinate ctenidium, bipectinate osphradium and large hypobranchial gland. Radula stenoglossate (1-1-1) or may be absent. Alimentary system consists of pair of salivary glands without accessories glands and a gland of Leiblein.

Sexes separate. Male with a large penis on the right side and female has a large capsule gland. Eggs laid in clusters or strings. Free swimming larval stage.

Carnivorous or scavenger in habit occurring on muddy sand substrates in shallow water.

Genus *Pugilina* Shumacher, 1817

1817. *Pugilina* Schumacher *Ess. Vers. Test.*, p. 65.

Subgenus *Hemifusus* Swainson, 1840

1840. *Hemifusus* Swainson, *Treat. Malacol.*, p. 91.

Pugilina (Hemifusus) cochlidium (Linnaeus)
Crown Conch [Pl.–3, figs. 9 & 10]

1758. *Pugilina cochlidium* Linnaeus, *Syst. Nat.*, ed. 10 : 753.

2006. *Pugilina cochlidium*: Dey, *Handbook on Mangrove associates molluscs of Sundarbans*, p. 48, figs. 59–61.

Shell variable, large, bursiform to pear shape with high acute spire; covered with brown periostracum; whorls angulated, body whorl large; shoulder with tubercles; aperture ovately oblong; columella smooth, without plaits; aperture large wide with thickened and smooth outer lip; sculpture not very conspicuous; colour reddish brown, interior of aperture brownish yellow.

Distribution : India : East and West coast of India. Common in Indian Ocean.

Carnivorous habit feeds on the bivalves. Radula or buccal mass absent. The proboscis modified to capture the prey and convert it into digestible form. Observed crawling on the mud throughout Sundarbans: Population up to 5 nos/ m². Copulating pairs observed from November to March. Egg capsules seen attached to the broken pieces of bricks, shell, mangroves plants etc. Capsules are yellowish green, broad at upper end and gradually narrow with an elongate stalk at the base; flattened and bounded by low longitudinal ridges at two ends and become pointed at the tip. Each cluster contains 10 to 30 capsules.

Medical uses : Operculum of *Pugilinus cochlidium* is used for the preparation of certain unani and ayurvedic medicines. The operculum burned into ashes and mixed with mustard oil used in ears for retention of pus. Sankha bhasma prepared from the shell burned powder is used against ailments ranging from skin diseases to rickets and asthma.

Class BIVALVIA

Subclass PTERIOMORPHIA

Order ARCOIDA

Superfamily ARCOIDEA

Family ARCIDAE

Ark Shells

Shell small to large, equivalve or inequivalve, elongate or elongate-ovate, usually thick; beak recurved, covered with a fibrous epidermis. Ligamental groove chevron shaped. Hinge line straight and with numerous equal sized teeth. The adductor scars are

equal or unequal, connected by pallial line. Pallial sinus absent. Byssal gape narrow side. Ligament external. Sculpture with smooth or granulose radial ribs.

Sedentary. Lives in intertidal region, a few of them live at the depth upto 300 fathoms, often in muddy sandy localities; attached by a byssus to the substrate. Buried in sand or mud; some frequent reefs and hard substratum.

Subfamily ANADARINAE

Genus *Anadara* Gray, 1847

Anadara granosa (Linnaeus, 1758)

Padma Jhinuk [Pl.-4, Figs. 1 & 2]

1758. *Arca granosa* Linnaeus, *Syst. Nat.*, ed. 10 : 694.

2006. *Anadara granosa*: Dey, *Handbook on Mangrove associates molluscs of Sundarbans*, p. 61, figs. 86 & 87.

Shell orbicularly-ovate, equivalve, side slightly angulated. Sculpture radiately ribbed; ribs upto 20, tuberculate and crenulated.

Commonly known as Ark shell, occurs on the muddy substratum of Sundarbans. Shell burrower, and lives partly buried in the sediment (semi-in fauna), and because of this is most frequently found in sheltered conditions, with the umbonal margin directed upwards. Population recorded 2-31 nos/m².

Distribution : India : East and West coast.

Elsewhere : Indo-Pacific.

Economic Importance : Commercially this shell very important. This species commonly known as Padma Jhinuk valuable resources of calcium for poultry feed. A huge amount of these shells are collected from the different parts of Sundarbans and brought to Canning shell factory where it is powdered by crusher and send to different parts of West Bengal to use as calcium resources for poultry feed. In Talseri (Digha) huge quantities (4-6 truck loads) of these shells are brought to the different places of West Bengal, where they grind into the powder and used as calcium resources for the preparation of poultry feed.

Order OSTREOIDA

Suborder OSTREINA

Superfamily OSTREOIDEA

Family OSTREIDAE

True Oysters

Shell shape varied, generally sub circular to elongate oval, more or less equilateral but in some inequivalve the cemented left valve being more inflated. Sculpture with

foliaceous lamellae, occasionally developed into hollow spines. Adductor muscle scar single situated off centre towards the posterior ventral edge. Hinge without teeth, but a variety of marginal ridges or pustules known as chomata present. Nodular chomata circular to oval, rounded denticle, pustulose chomata like pin head, multiple over the inner margin, Variable in colour. Pallets grooved ribbon type, longitudinally grooved and ridged, bi crescentic in section.

Mostly estuarine, euryhaline and stenohaline. Sedentary and remain confined to the spot where the spat (juvenile) settles. Shape and sculpture resulted according to the nature of substratum and salinity.

Dioecious or hermaphrodite. But even when dioecious a certain percentage of its members change their sexes. Dispersal occurs chiefly through a planktonic larval phase. Fertilization external and development occurs in the estuaries.

Subfamily CRASSOSTREINAE

Genus *Crassostrea* Sacco, 1897

Key to the species

1. Shell more elongate; adductor muscle scar broad, more or less oblong
..... *C. gryphoides* (Schlotheim)
- Shell sub circular to slightly elongate; adductor muscle scar semi lunar type
..... *C. cuttackensis* (Newton and Smith)

Crassostrea cuttackensis (Newton and Smith, 1912)

Kausturi Jhinuk [Pl.-3, Figs. 11 & 12]

1912. *Crassostrea cuttackensis* Newton and Smith, *Rec. Geol. Surv. India*, **42(1)** : 13, pl. 7 & 8, fig. A & B.

2006. *Crassostrea cuttackensis*: Dey, *Handbook on Mangrove associates molluscs of Sundarbans*, p. 64, figs. 91 & 92.

Shell very heavy, bulky, irregularly sub circular to elongate. Sculpture smooth or weakly lamellate, without pustules. Nodular chomata present near the hinge, pustulose chomata often present in right valve. Externally whitish, internally lustrous white.

Commonly occurs in Sundarbans, attached to lock gate, bricks and dykes, Pillars of jetties and also in the mud inside the river.

Distribution : India : Andhra Pradesh, Gujarat, Karnataka, Kerala, Maharashtra, Orissa, Tamil Nadu, West Bengal.

Elsewhere : Bangladesh, Malaysia, Indonesia, Myanmar, Philippines.



Fig. 3 : *Crassostra cutackensis* (Newton and Smith) attached on the concrete pillar of jetty at Lothian Island, Sundarbans.

***Crassostrea gryphoides* (Schlotheim, 1813)**

Kausturi Jhinuk [Pl.-3, Figs. 7 & 8]

1813. *Ostrea gryphoides* Schlotheim, *Beitr. Natur. Verstein geogn. Ilinscht*, 7 : 52.

2006. *Crassostrea gryphoides* : Dey, *Handbook on Mangrove associates molluscs of Sundarbans*, p. 64, figs. 93 & 94.

Shell irregular in shape, stout, bulky, elongate, inner margin pearly white; cavity beneath the hinge well marked; Muscle scars broad and more or less oblong striations present on the muscle scar.

Commonly occurs on the muddy substratum of the rivers and canals of Sundarbans.

Distribution : India : West Bengal.

Elsewhere : Myanmar.

Economic Importance : This is a commercially important species and huge numbers of dead and living shells are used as calcium resources in the poultry feed. At Canning a shell factory used about 100 to 150 tonnes/year of these shells, grind them into powder



Fig. 4 : Heap of oyster shells at Canning shell factory.



Fig. 5 : *Crassostrea* sp. attached on a pillar of jetty at Gosaba.

and send them to different places of West Bengal, where they used as calcium resources for preparation of poultry feed.

Subclass HETERODONTA
Order VENEROIDA
Super family CORBICULOIDEA
Family CORBICULIDAE

Shell rounded-trigonal to oval, thick, strong fibrous periostracum. Sculpture concentrically striated or ribbed. Hinge with three cardinal teeth in each valve and one or two laterals. Ligament strong, external. Pallial sinus absent or shallow if present. Colour yellow, green or brown, internally whitish.

Foot large, siphonal opening prolonged into small tubes, orifices with or without papillae, Gills two pairs, outer pair smaller than the inner, the later serving as brood pouch. Faecal pellet simplest being a plain rod rounded in section.

Inhabitant of freshwater extending to brackish water.

Genus *Polymesoda* Rafinesque, 1828

1828. *Polymesoda* Rafinesque, *Ann. Gen. Sci. Phys. (Bruxelles)*, 5 : 319.

Subgenus *Geloina* Gray, 1840

1840. *Geloina* Gray, *Syn. Cont. Brit. Mus.*, ed. 42 : 149.

Polymesoda (Geloina) bengalensis (Lamarck, 1818) [Pl.-4, Figs. 7 & 8]

1818. *Cyrena bengalensis* Lamarck, *Hist. nat. Anim. Sans. Vert.*, 5 : 564.

2006. *Polymesoda bengalensis*: Dey, *Handbook on Mangrove associates molluscs of Sundarbans*, p.74, figs. 113 & 114.

Shell large, solid, sub trigonal, tumid, thick, roughly striate; dorsal margin rather angulated; posterior margin abruptly sloping; anterior slope rather concave. Periostracum blackish brown. Umbo elevated and anterior. Cardinal and lateral teeth well developed. Muscle scars impressed, anterior adductor scar elongated; posterior adductor scar, broad, oval.

Found buried in stiff mud of the mangroves areas, well adapted to the habitat, being able to tolerate long periods of low tide, and has the ability to resume filter feeding rapidly when inundated.

Distribution : India : Andaman and Nicobar Islands, West Bengal (Gangetic delta).

Elsewhere : Indo-pacific.

Economic Importance : This species is also economically very important. A huge quantities of these shells are collected from the different parts of the Sundarbans and brought to the shell factories at Canning where they powdered by crushing them and used as calcium resources in poultry feed.

Superfamily VENEROIDEA

Family VENERIDAE

Venus clams

Shell small to large, orbicular to elongate, trigonal, tumid, solid and inequilateral. Sculpture with concentric or lamellate ridges and occasionally cancellating radial striae. Hinge with strong and well developed teeth, typically three cardinals in each valves with anterior lateral teeth, but laterals may be absent in many cases. Beak anterior. Ligament short and external placed in a prominent nymph. Adductor muscle scars are equal or sub equal. Pallial line with distinct sinus. Inner margin smooth or finely crenulated. Foot hatchet shaped. Siphons very short to moderately long. Intertidal. Inhabit wide variety of substrates but are most often an important part of the fauna of sand flat and the more consolidated sediments offshore.

Tropical species lives in clean coral sand and muddy sand localities. Found in all seas. Animal burrows but not deeply into the sand. Moves freely by means of flattened tongue shaped foot.

Key to the genera

1. Shell ovately trigonal; sculpture with concentric striae *Pelecypora* Dall
- Shell subovate to subcircular; sculpture with growth lines only.... *Meretrix* Lamarck

Subfamily MERETRICINAE

Genus *Meretrix* Lamarck, 1799

1799. *Meretrix* Lamarck, *Mem. Soc. H.N. Paris*, p. 85.

Meretrix meretrix (Linnaeus, 1758)

Jat Jhinuk [Pl.-4, Figs. 3 & 4]

1758. *Venus meretrix* Linnaeus, *Syst. Nat.*, ed 10, p. 686.

2006. *Meretrix meretrix*: Dey, *Handbook on Mangrove associates molluscs of Sundarbans*, p. 76, figs. 116 & 117.

Shell large, heavy, thick, ventricose; umbo pointed, elevated and slightly anterior in position; anterior margin rounded, ventral margin convex, posterior margin angulated; sculpture with concentric growth lines; anterior adductor scar elongately ovate, posterior

adductor scar broader posteriorly and pointed anteriorly; pallial sinus shallow; Posterior lateral teeth in the left valve and corresponding depression in the right valve are finely denticulate/striate. It is highly variable in colour and shape which leads to description of several varieties.

Distribution : India : Commonly occurs in river mouths and backwaters of east and west coast.

Elsewhere : Aden, Borneo, China, Japan, Java, Myanmar, Philippines, Red sea, Sri Lanka, Sumatra.

Found in the mud of river bed and highly populated on the river mouth. Population recorded 2320 to 2800 no/m² in port Canning, Parsemari and other places.



Fig. 6 : Heap of *Meretrix* shells at Chandipur collected for making poultry feed.

Economic importance : Commercially very important species of Sundarbans. Tonnes of shell of this species were collected from the mud of river mouth and brought to East Medinipur and 24 Paragonas (South) of West Bengal where use as calcium resources in poultry feed, after crushing them into powder. In West Bengal about 1200 tonnes of these shells were crushed annually for making poultry feed (Bojan, 1984).

Subfamily PITARINAE
Genus *Pelecypora* Dall, 1902

1902. *Pelecypora* Dall, *Proc. U.S. nat. Mus.*, 26 : 346.

Pelecypora trigona (Reeve, 1850) [Pl.-4, Figs. 5 & 6]

1850. *Artemis trigona* Reeve, *Conch. Icon.*, 6, pl. 7, fig. 42.

2006. *Pelecypora trigona*: Dey, *Handbook on Mangrove associates molluscs of Sundarbans*, p. 76, figs. 115.

Shell triangularly ovate, thick; umbone pointed and curved; sculpture with concentric striae, strong at the ventral margin. Ligament small. Lunule large, superficial, almost obsolete. White in colour or with some tinge of rust brown.

Commonly found in the muddy canals. Populations vary from 1-2 nos/m² to 106-108 nos/m² Maximum population recorded during the month of March.

Distribution India Kerala, Orissa, West Bengal.

Elsewhere Red Sea.



Fig. 7 : A view of *Meretrix* shells deposited at Canning Shell Factory, Canning, West Bengal.



Fig. 8 : A view of shell factory from where powdered shells are collected and used in poultry feed.



Fig. 9 : A view of oyster shells deposited at Canning Shell Factory, Canning, West Bengal.

Economic importance : This species also commercially used for making poultry feed. Huge quantities of these shells are collected from the river beds and canals of Sundarbans and brought to Canning/Contai where they powdered along with other molluscan shells and used as calcium resources in the poultry feed.

SUMMARY

A total of 177 species of molluscs recorded from the Sundarban area (North and South 24 Paragonas) of which 14 species of land, 30 species of freshwater and 133 species of estuarine and marine. Out of which 16 species are deals here are having commercial and medical importance.

Two species of land molluscs namely *Achatina fulica fulica* (Bowdich) and *Macrochlamys indica* Godwin-Austen are agri-horticultural pest and common in the vegetable gardens causing damage to the vegetable plants. Out of 30 recorded freshwater species 6 species very important as food for man as well as birds and fishes. They are nutritive as well as having medicinal value. There are some species like *Lymnaea (Pseudosuccinea) acuminata* form *typica* Lamarck, form *chlamys* Benson, form *gracilior* Martens, form *rufescens* Gray, *Lymnaea (Pseudosuccinea) luteola* Lamarck; form *typica* Lamarck; form *australis* Annandale and Rao; form *ovalis* Gray, *Indoplanorbis exustus* (Deshayes) are intermediate hosts for many important parasites of sheep, cattle and human like *Fasciola gigantica*, *F. hepatica*, *Schistosoma indicum*, *S. nasalis*, *S. spindalis* and others recorded from this area.

Out of 133 recorded estuarine and marine species from Sundarbans only 10 species (4 gastropods and 6 bivalves) are found commercial importance. They are important raw materials for calcium for calcium based industries. They content 33 to 40% calcium in the form of calcium carbonate, used in the preparation of stalked lime in many parts of the country but these are mainly used for poultry feed in Sundarbans. Clams, Cockles and Oysters having nutritive value and used as food in many coastal areas of India, not used as food by man from this area but they are the main resources of calcium in preparation of poultry feed. As the poultry industry play very vital role for supply of protein food to man, these species plays vital role for the growth of poultry industry.

Marine bio deterioration also caused by the molluscs. Bivalves are the most successful as fouler and borers. Several wood bores *Bactronophorus thoracites* (Gould), *Bankia companellata* Moll and Roch, *Bankia nordi* Moll, *Bankia rochi* Moll, *Dicyathifer manni* (Wright) and *Nausitora dunlopei* Wright common in these areas causes enormous damage to the man made structures like jetties, piles, fishing vessels, boats building yards and even the living mangrove plants. These animals cause serious damage in sundarbans areas and a problem to the fishing industry and the mangrove vegetation.

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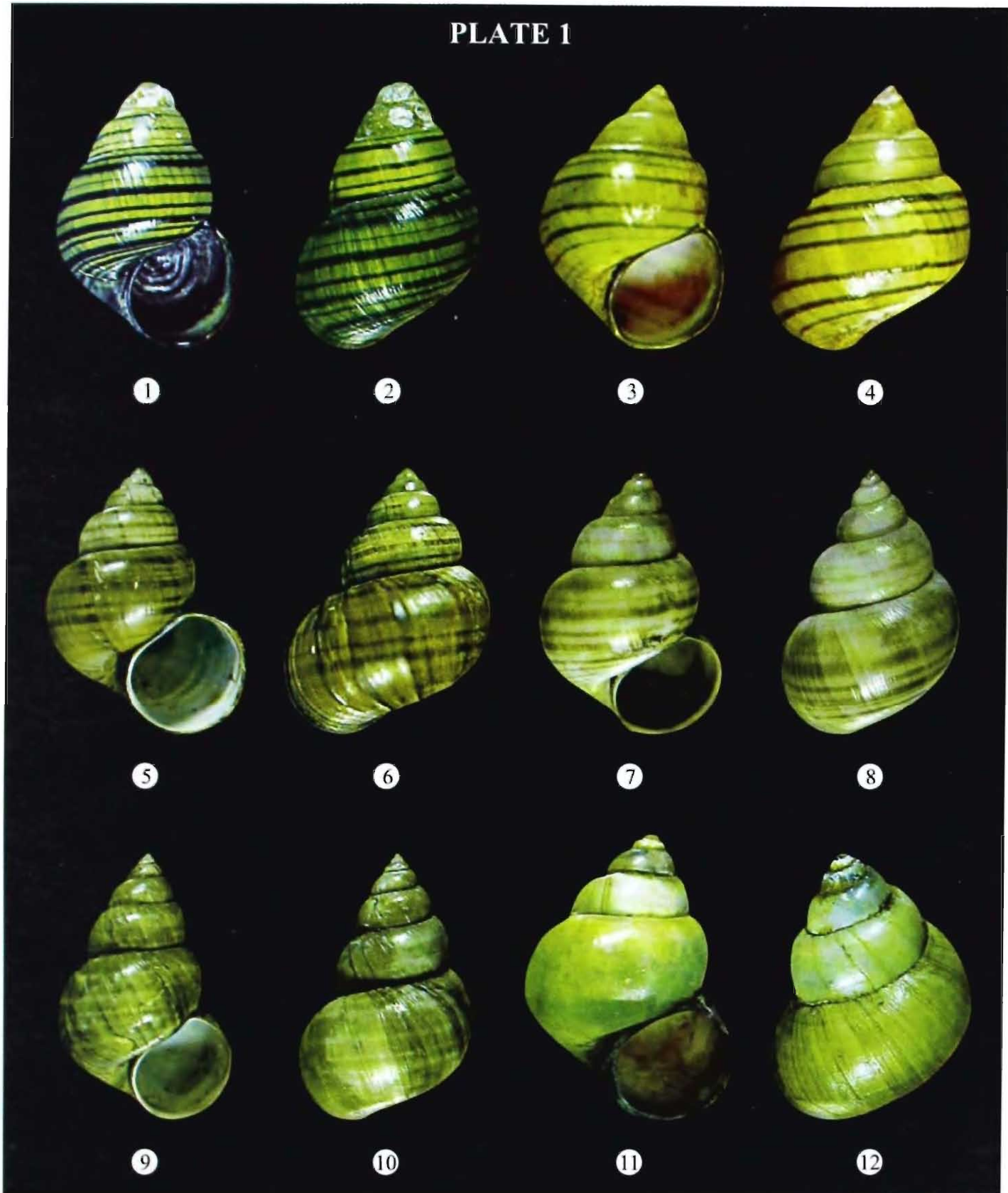


Fig. 1 & 2 : Ventral and Dorsal view of *Bellamya bengalensis* f. *typica* Lamarck
Fig. 3 & 4 : Ventral and Dorsal view of *Bellamya doliaris* (Gould)
Fig. 5 & 6 : Ventral and Dorsal view of *Bellamya bengalensis* f. *gigantea* (Reeve)
Fig. 7 & 8 : Ventral and Dorsal view of *Bellamya bengalensis* f. *annadalei* (Kobelt)
Fig. 9 & 10 : Ventral and Dorsal view of *Bellamya bengalensis* f. *eburnea* (Annandale)
Fig. 11 & 12 : Ventral and Dorsal view of *Bellamya dissimilis* (Mueller)



Fig. 1 & 2 : Ventral and Dorsal view of *Bellamya bengalensis f. mandiensis* (Kobelt)
 Fig. 3 & 4 : Ventral and Dorsal view of *Pila globosa* (Swainson)
 Fig. 5 & 6 : Exterior and Interior view of *Lamellidens corrianus* Lea
 Fig. 7 & 8 : Exterior and Interior view of *Lamellidens marginalis* (Lamarck)
 Fig. 9 & 10 : Exterior and Interior view of *Parreysia (Parreysia) flavidens* (Benson)



Fig. 1 & 2 : Ventral and Dorsal view of *Telescopium telescopium* (Linnaeus)
 Fig. 3 & 4 : Ventral and Dorsal view of *Cerithidea alata* (Philippi)
 Fig. 5 & 6 : Ventral and Dorsal view of *Cerithidea cingulata* (Gmelin)
 Fig. 7 & 8 : Exterior and Interior view of *Crassostrea gryphoides* (Schlotheim)
 Fig. 9 & 10 : Ventral and Dorsal view of *Pugilinus cochlidium* (Linnaeus)
 Fig. 11 & 12 : Exterior and Interior view of *Crassostrea cuttackensis* (Newton and Smith)



Fig. 1 & 2 : Exterior and Interior view of *Anadara granosa* (Linnaeus)
Fig. 3 & 4 : Exterior and Interior view of *Meretrix meretrix* (Linnaeus)
Fig. 5 & 6 : Exterior and Interior view of *Pelecycora trigona* (Reeve)
Fig. 7 & 8 : Exterior and Interior view of *Polymesoda (Geloina) bengalensis* (Lamarck)