

STATE FAUNA SERIES 3

FAUNA OF WEST BENGAL

PART 2

ZOOLOGICAL SURVEY OF INDIA



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FAUNA OF WEST BENGAL

PART 2

(Reptilia, Amphibia, Fishes, Hemichordata and
Archaeozoology)

Edited by
The Director, Zoological Survey of India



ZOOLOGICAL SURVEY OF INDIA

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State Fauna Series 3 : Fauna of West Bengal

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REPTILIA

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Zoological Survey of India, Calcutta

INTRODUCTION

The present work on the reptile fauna of West Bengal is based on the entire material currently deposited in the Zoological Survey of India which also includes the material collected by the senior author from the different areas of the State from time to time.

West Bengal has an area of 89,900 sq. km. and extends from the foot of the Himalayas in the north to the Bay of Bengal in the south between the latitudes of 28°30'N and 21°48'S and from Bangladesh in the east to Bihar in the west between the longitudes of 89°54'E and 85°56'W. The State embraces, diverse ecosystems such as snowclad alpine zone in the north, hot and dry zone in the west, mangrove forest with deltaic estuaries in the south.

The overall climate is hot and moist but it varies with altitude and latitude. The tropical rain forests are found in the northern region which receives maximum rain fall of 500 cm per annum. The western region experience extremes of climate and receives very little rainfall, viz. 100-130 cm per annum. The eastern and southern regions are plains of alluvial soil. The Sunderbans which are famous for the wildlife like the Royal Bengal Tiger are located in the southern zone.

The physiography of this area has undergone drastic changes on account of the urbanisation and industrialisation resulting in a drastic imbalance in the various ecosystems.

Since the publication of Smith's Volumes in the FBI series, (1931, 1935, 1943), our knowledge of the herpetology of West Bengal has considerably increased necessitating a review of the reptile fauna of the State. Some work on the reptiles of the State has been carried out by workers like Barker (1936), Miller (1903), Spillet (1967), Acharjee (1966), Annandale (1907, 1910), Shaw (1952), Wall (1909, 1910, 1913), Ahmed (1975) and Biswas (1982). The present study is based on 139 species belonging to 70 genera referable to 19 families. An exhaustive list of the species so far reported from the State is provided. Of these six species are new records.

Of the 139 species, 103 species are treated in the systematic account.

As regards the current distribution of reptiles of West Bengal, see table I, (CROCODYLIA & TESTUDINES) (pp. 24-25) table II, (SAURIA) (pp. 47-48) and table III, (SERPENTES) pp. 99-104).

SYSTEMATICS AND MORPHOLOGY

The Reptiles are coldblooded, lungbreathing vertebrates usually with two pairs of limbs; each limb bears five fingers or toes armed with claws. The skull is joined to the Vertebral column by a single condyle; the pelvic girdle is connected to two or more vertebrate. The body is covered by horny scales and plates. The outer skin is almost devoid of glands.

LIST OF HERPETOLOGICAL SURVEYS UNDERTAKEN IN THE STATE OF WEST BENGAL

Name of survey	Year	Leader of survey party of collector	Districts surveyed
Palta survey	1936	Dr. B. Biswas	Dist. 24-Parganas
24-Parganas Dist. survey	1955	Dr. A. K. Mukherjee	Dist-24 Parganas
Midnapore coastal survey	1964	Dr. A. K. Dutta	Dist. Midnapore
Nadia district survey	1969	Shri P. K. Das	Dist. Nadia
Darjeeling district survey	1979	Shri S. S. Saha	Dist. Darjeeling
Bankura district survey	1980	Shri S. Ahmed	Dist. Bankura
Bankura district survey	1981	Miss. M. Deb	Dist. Bankura
Purulia district survey	1981	Shri S. Ahmed	Dist. Purulia
Malda & Murshidabad districts survey	1982	Shri S. Ahmed	Dist. Malda & Murshidabad
Sunderbans Tiger Reserve survey	1983	Shri S. M. Ali	Dist. 24-Parganas
Birbhum & Burdwan district survey	1983	Shri S. Ahmed	Dist. Birbhum & Burdwan Dist.
Jalpaiguri & Coochbehar districts survey	1984	Shri S. Ahmed	Jalpaiguri & Coochbehar
Malda & West Dinajpur districts survey	1984	Shri A. K. Sarkar	Dist. Malda & West Dinajpur

There are different opinions about the origin of reptiles in the world. Reptiles first appeared in the upper Carboniferous period (about 260 million years ago). Most diversified development occurred in reptiles during Mesozoic period. There were 19 ancient orders into which the group was divided. Reptiles belonging to 4 order only survive today; the Testudines (Chelonians : Turtles, Tortoises, and Terrapins); the Rhyncocephalia represented to-day by a single species, the Tuatera (*Sphenodon punctatus* of New Zealand); the Crocodylia (Gharials, Crocodiles, Alligators, and Caimans); the Squamata (Lizards and Snakes).

The reptiles of today's world now consists of about 6,000 species which are distributed in Oceans, rivers, land and even on high snow clad mountains. The reptiles are mainly concentrated in the tropics and their number sharply falls in the colder regions. No reptiles are found in Greenland, Iceland and Antarctic continent (K. Klemmer, 1975).

The longest reptile is the reticulate python of tropical Asia (*Python reticulatus*) which attains a length of about 10 m. and the smallest are the geckos of the genera *Saurodactylus*, from north western Africa, and *Sphaerodactylus* from north America; these geckos measure 4 cm in length as adults and weigh nearly 2 gm.

The reptiles are now represented by about 2750 species of lizards, 2125 species of snakes, about 220 species of turtles, 21 species of crocodiles and only one species of Rhyncocephalian, the Tuatara (K. Klemmer op. cit.).

Order CROCODYLIA

The crocodylia (Crocodiles, alligators, and gavialis) includes the largest modern reptiles. The order Crocodylia is divided into three families; 1. Alligatoridae (Alligators, in which the fourth tooth of the lower jaw fits into a laterally closed pit in the upper jaw. This family consists of seven species distributed into four genera. 2. Crocodylidae (Crocodiles), in which the fourth tooth of the lower jaw is laid into a notch in the upper jaw, open at the side, so that it is visible when the mouth is closed. 3. Gavialidae (Gavials), only one genus with a single species now remains, the INDIAN GAVIAL (*Gavialis gangeticus*) in which the snout is very elongated and the teeth are all of the same size and shape.

Crocodylians are characterized by a lizard like shape. The back is covered by thick, rectangular horny plates, partially ossified on the underside. Ventral plates are smaller. The skin on the head is firmly fused to the skull; on the neck there are groups of large, sharply ridged bosses which are of great taxonomic importance. The tail is compressed. The nostrils are provided with valves and are placed on the upper surface of the snout. The eyes have an upper and a lower lid, as well as a nictitating membrane. The pupil is vertical. Among the reptiles only the Crocodylians have external ear. The tongue which is entirely attached to the floor of the mouth, can barely be moved. The teeth are situated in deep hollows in the jaws and meant for seizing and holding the prey, not for chewing. These are shed at intervals throughout life. The forelegs end in five fingers. The four toes of the hind legs are webbed.

Crocodylians are oviparous. Their eggs are oval in shape and have a hard white shell. They have two pairs of sexual or scent glands.

Crocodylians are extremely keen of hearing and are very sharp sighted. They make a loud hissing sound when they are angry.

All the species are strictly carnivorous. Apart from one species found only in brackish and seawater, crocodylians live near fresh-water shores into the Warmer regions.

Order TESTUDINEA

The Turtles and Tortoises

The testudines first appeared on earth about 200 million years ago. They are found in deserts, lakes, rivers and the oceans. There are about 220 species of turtles in the world (K. Klemmer op. cit.). India is represented by 32 species of Turtles and Tortoises and 3 species of Crocodiles. Two species of Crocodylia and thirteen species of Turtles and Tortoises occur in West Bengal.

The body of a turtle is covered by a bony shell (sometimes with a leathery skin instead) which is part of skeleton. It protects both the back and the underside. The turtle is capable of retracting completely the head, neck, legs and tail under the shell. The jaws are toothless but provided with sharp horny edges. The dorsal portion of the shell is called the 'Carapace' and the ventral portion is known as 'plastron', these two parts are connected laterally by small pieces of shell known as "marginals" A carapace consists of a right and lateral series of 'costal' plates. The first plate of the

medium series is the large 'nuchal plate' and the rest are known as the 'neurals' The dorsal surface of carapace is sometimes covered with large scutes of horn.

The plastron is composed of nine plates in a Asiatic species a pair each of 'epiplastron', 'hyoplastron', 'hypoplastron' and 'xiphiplastral' plates and single median 'entoplastron'.

All turtles lay hard-shelled, oval, round or elliptical eggs.

Order SQUAMATA : SAURIA

The lizards

The order Squamata is divided into two suborders : 1. Sauria (Lizards), and Serpentes (Snakes). The Saurians are characterised by a short body with four limbs, a short flat tongue and an external ear opening. The body of the lizards is covered with epidermal scales with the exception of a few degenerate forms which have rings instead. Some lizards have lost their limbs. They look like a snake but they can easily be distinguished from snakes by the following characters. In lizards, the mandibular rami are joined by sutures but in snakes these are joined by elastic ligament. Sternum which is absent in snakes, is present in lizards.

About 3000 species of lizards are known in today's world. Lizards are found all over the world but their number decreases rapidly in the temperate or colder zones. Marine lizards – the iguanids and skinks of the genus *Cryptolepharis* are found in the Galapagos Islands.

Majority of lizards are land dwellers but some are arboreal forms such as the flying lizards (*Draco*) are also known as, also, some burrowing forms, the *Dibamus*. The Geckos developed adhesive pads to their digits which enable them to climb trees, rocks and walls of a house.

Lizards usually prey upon insects and small ones may feed on vegetable matter.

Lizards are famous for changing colour. Majority of lizards are oviparous and some are ovoviviparous.

Only two poisonous species of lizards (*Heloderma horridum*), Gila monster (*H. suspectum*) are found in Mexico only, rest of the lizards are non-poisonous.

Among 3000 species of lizard in the world (K. Klemmer, 1975) 150 species distributed in 8 families are found in India. Of these, 29 are found in West Bengal. The largest lizard of India is the Water Monitor, *Varanus salvator* which attains a length of about 2.5 meters and is the second largest living lizard in the world, next only to the Komodo Dragon of Indonesia.

Islanders and tribal people prefer to eat the eggs of all monitor lizards. People in the desert area eat the flesh of the spiny-tailed Lizard (*Uromastix hardwikeri*).

The skin of monitor lizard is also of great commercial value.

Order SQUAMATA : SERPENTES

The Snakes

The snakes are most fearful animals to man because some species of the group have venom but most snakes are harmless.

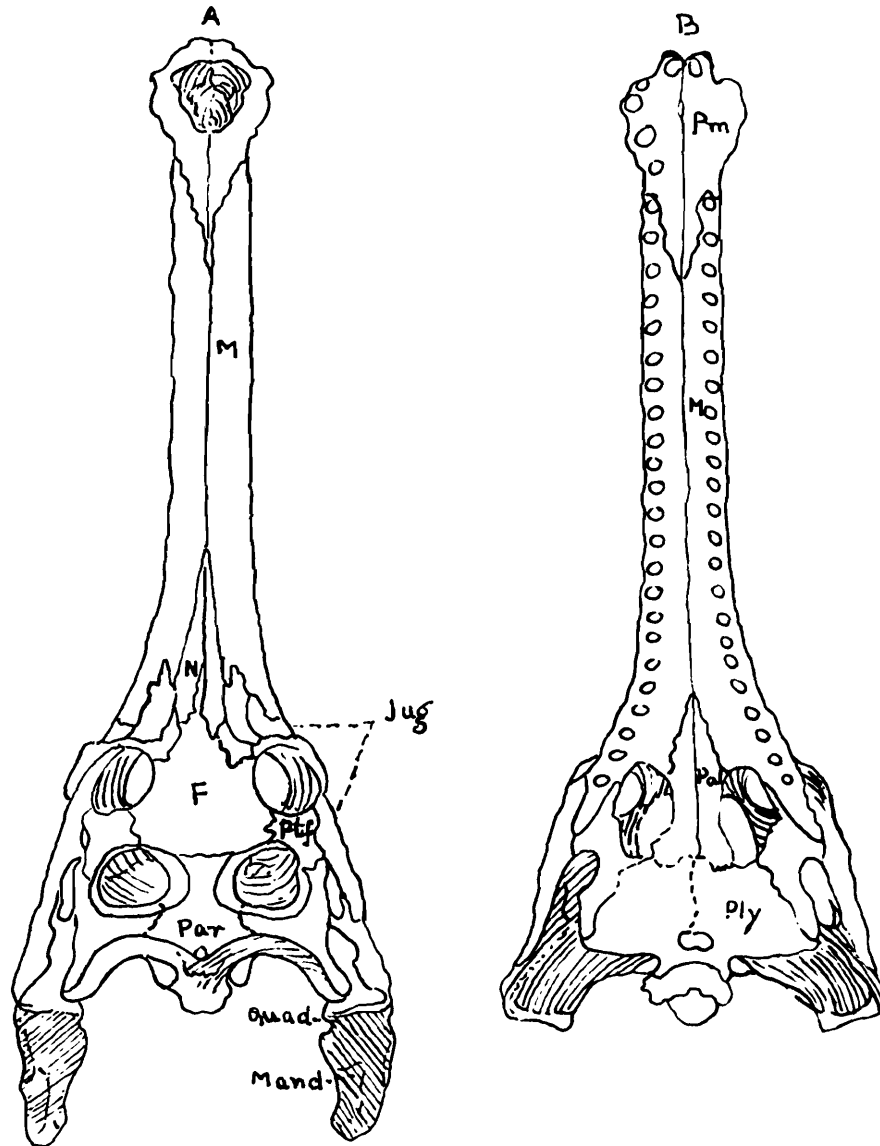


Fig. 1. Skull of *Gavialis gangeticus*. A. Upper view. B. Lower view.

pm. – Preamaxillary; m. – Maxillary; n. – Nasal; l. – Lachrymal; prf. – Prefrontal; pfl. – Postfrontal; f. – Frontal; par. – Parietal; jug. – Jugal; q.j. – Quadrato-jugal; quad. – Quadrate; mand. – Mandible; pal. – Palatine; pty. – Pterygoid.

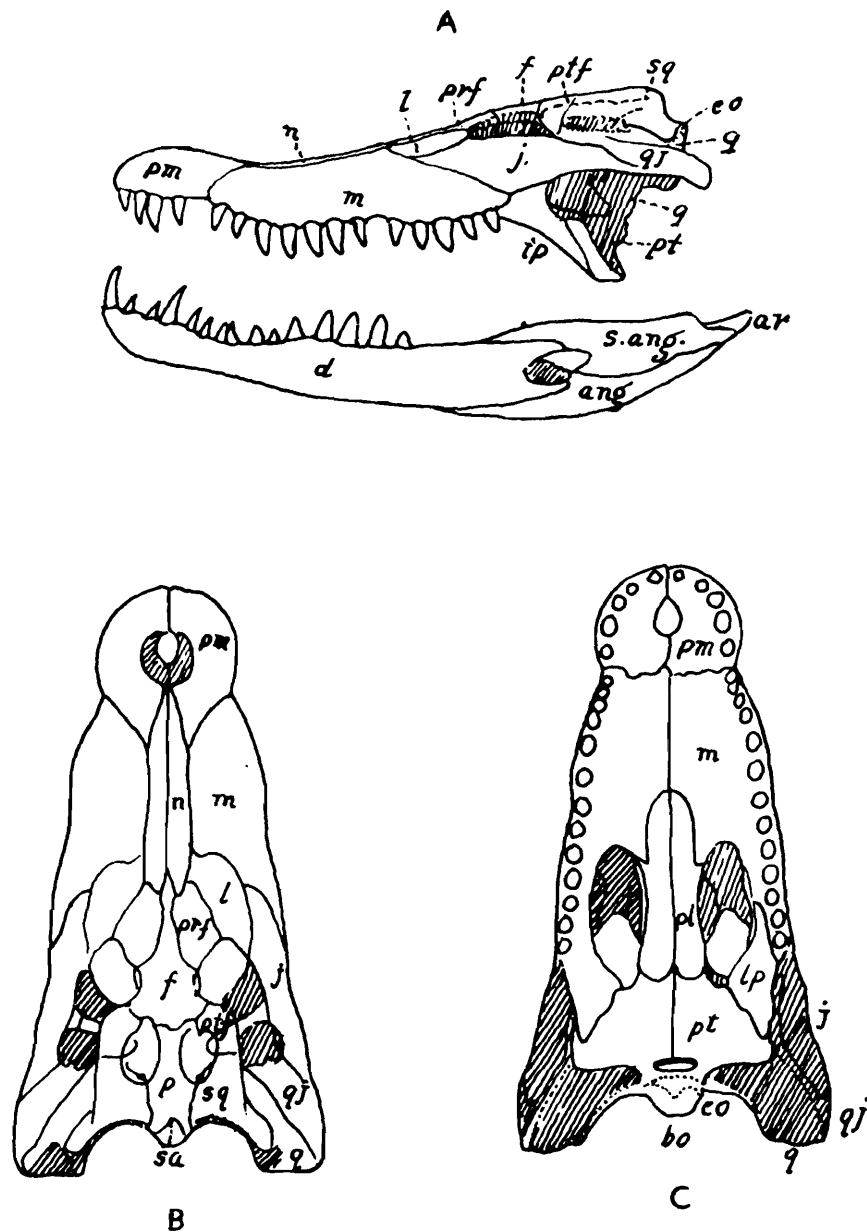


Fig. 2. Skull of *Crocodilus palustris* (after Boulenger). A. Side view. B. Upper view. C. Lower view. ang. - Angular; ar. - Articular; bo. - Basisphenoid; d. - Dentary; eo. - Exocephal; f. - Frontal; j. - Jugal; l. - Lachrymal; m. - Maxillary; n. - Nasal; p. - Parietal; pl. - Palatine; pm. - Premaxillary; prf. - Prefrontal; pt. - Pterygoid; ptf. - Postfrontal; q. - Quadrate; qj. - Quadrato-jugal; s. ang. - Supra-angular; so. - Supraorbital; sq. - Squamosal; tp. - Transpalatine.

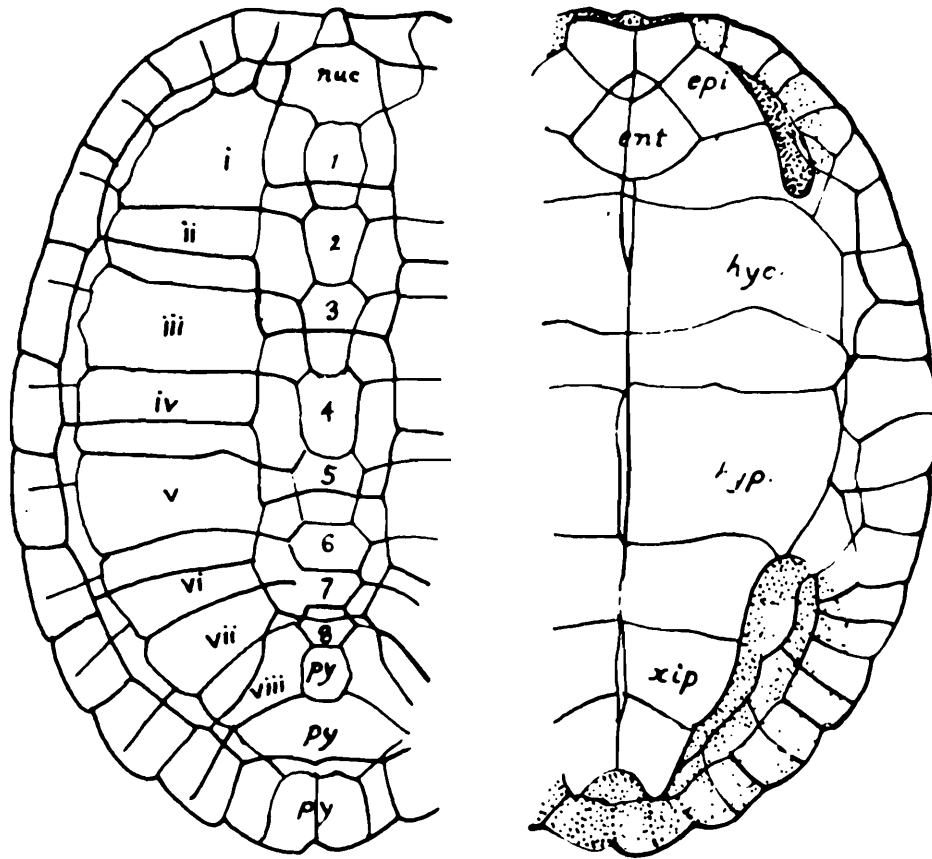


Fig. 3. Shell of *Hardella thurgi*.

nuc. – Nuchal; 1-8. – Neural plates; py. – Pygal; i-viii. – Costal plates; epi. – Epiplastron; hyo. – Hyoplastron; hyp. – Hypoplastron; xip. – Xiphoplastron; ent. – Entoplastron.

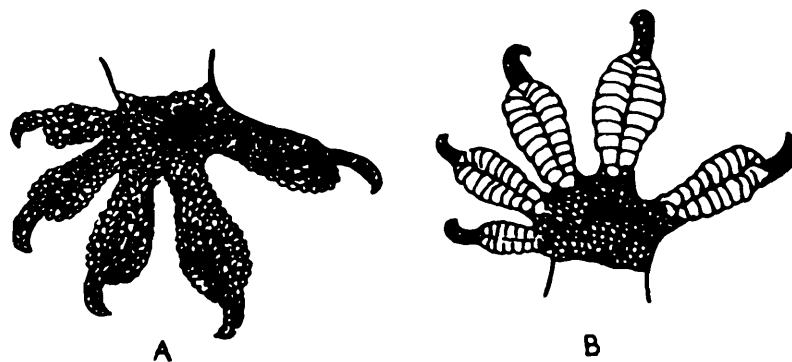


Fig. 4. Foot of *Hemidactylus leschenaulti*. (After Boulenger). A. Upper surface; B. Lower surface.

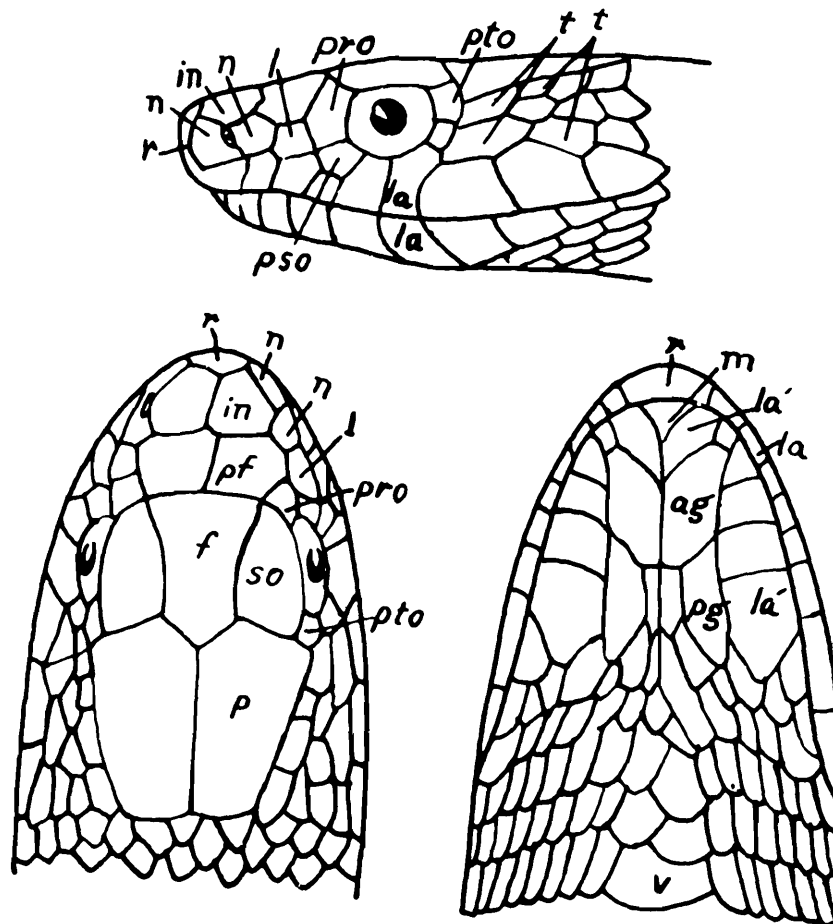


Fig. 5. Three views of the head of *Coluber ventromaculatus* to explain the terminology of the head shields.

ag. – anterior genials (or chin shields); f. – frontal; in. – internasal; l. – loreal; la. – infralabial; m. – mental (or symphyisial); n. – nasal; p. – parietal; pf. – prefrontal; pg. – posterior genials (or chin shields); pro. – preocular; ps. – presubocular; pto. – postocular; r. – rostral; so. – supraocular; t. – anterior and posterior temporals; v. – first ventral.

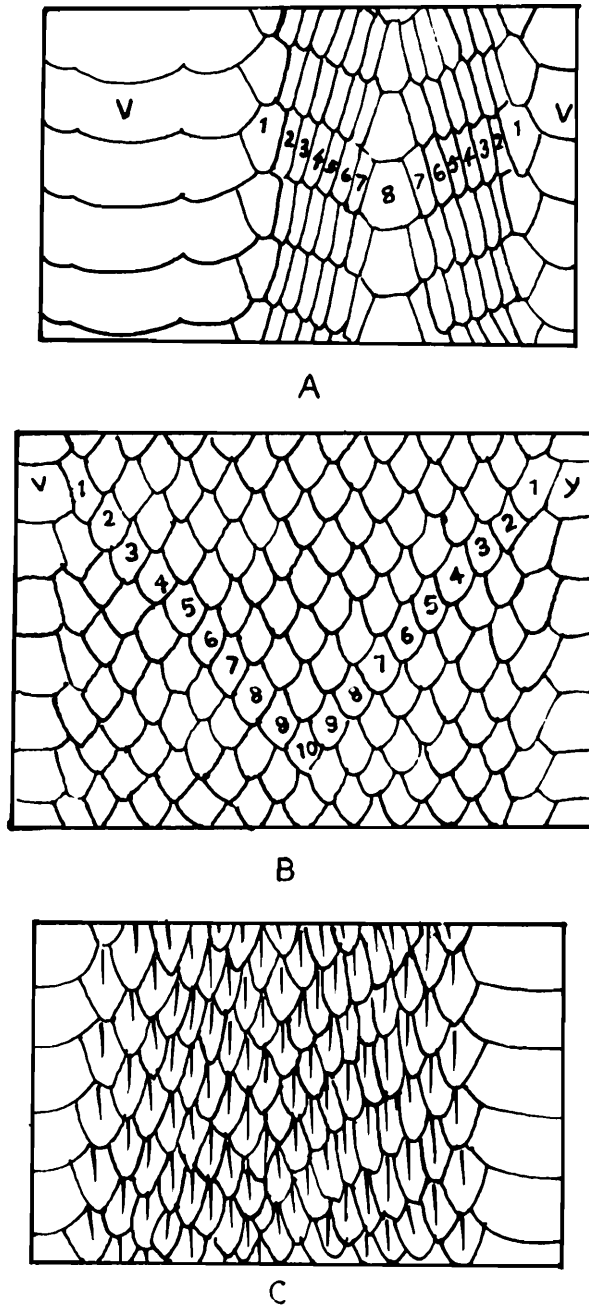


Fig. 6. (A–C). Scaling of the body of : A. *Ahaetulla ahaetulla* showing enlarged vertebral scales (8), the apical pits on the oblique dorsal scales, and the lateral keel of the ventral shields (v). B. *Elaphe radiata*, showing normal scales. C. *Pseudoxenodon macrops*, showing oblique scales.

The snakes belong to a suborder Serpentes of the Order Squamata.

The body of a snake is elongated and is covered with scales which are usually imbricate and form longitudinal and oblique transverse series. Vestiges of pelvis are noticed in some species of snake.

The snakes can be distinguished from lizards by various characters. Snakes lack a pectoral girdle and sternum; the upper and lower jaws, palatine bones and sphenoid bone are loosely joined.

Snakes are found throughout the world and occur in desert, in the ocean and in jungles. They are found in, on and above the ground, to the highest palm tree tops. Snakes are both diurnal and nocturnal in habit. They can swim, dive, climb and burrow in the ground. They are oviparous and ovoviviparous.

Only about one-third of the 2700 species of snakes in the world is poisonous. The smallest snake is the *Typhlop* 73 mm long; and the longest one is the reticulate python of tropical Asia attaining a length of 10 metres.

All snakes are toothed. Snakes are carnivorous and prey upon living animals such as fish, frogs, rats, lizards, birds, insects and other snakes and small animals which they can easily overpower.

The sensory organs in snakes are highly developed though they lack external ear, a tympanic cavity, and Eustachian tubes. They have touch receptors and heat receptors scattered over the surface of their skin.

Snakes render some beneficial service to man by destroying the agricultural pests like rodents and various kinds of insects.

The world fauna is represented by 2700 species of snake (Shaw, 1974). Of these, 220 species are found in India and 95 species of snakes occur in West Bengal.

SYSTEMATIC LIST OF REPTILES REPORTED FROM WEST BENGAL

Order I. CROCODYLIA

Family 1. GAVIALIDAE

1. *Gavialis gangeticus* (Gmelin)

Family 2. CROCODYLIDAE

2. *Crocodylus porosus* Schneider

Order II. TESTUDINES

Family 3. CHELONIDAE

3. *Lepidochelys olivacea* (Eschscholtz)

Family 4. EMYDIDAE

4. *Batagur baska* (Gray)
5. *Melanochelys tricarinata* (Blyth)
6. *Geoclemys hamiltoni* (Gray)
7. *Melanochelys trijuga indopeninsularis* (Annandale)

8. *Hardella thurgi* (Gray)
9. *Kachuga tecta* (Gray)
- Family 5. TESTUDINIDAE
10. *Geochelone elongate* (Blyth)
- Family 6. TRIONYCHIDAE
11. *Chitra indica* (Gray)
12. *Lissemys punctata* (Bonnaterre)
13. *L. punctata granosa* (Schoepff)
14. *Trionyx gangeticus* Cuvier
15. *T. hurum* Gray
- Order III. SQUAMATA
- Sub-order (i). SAURIA
- Family 7. GEKKONIDAE
16. *Gekko gekko* Linnaeus
17. *Cyrtodactylus gubernatoris* (Annandale)
18. *C. khasiensis* (Jerdon)
19. *Hemidactylus bowringi* (Gray)
20. *H. brooki* Gray
21. *H. flaviviridis* Ruppell
22. *H. frenatus* Schlegel
23. *H. garnoti* Dumeril & Bibron
24. *H. leschenaulti* (Dumeril & Bibron)
25. *Cosymbotus platyurus* (Schneider)
- Family 8. AGAMIDAE
26. *Calotes rouxi* Dumeril & Bibron
27. *C. versicolor* (Daudin)
28. *Japalura tricarinata* (Blyth)
29. *J. variegata* Gray
30. *Psammophilus blanfordanus* (Stoliczka)
31. *Sitana ponticeriana* Cuvier
- Family 9. CHAMAELEONIDAE
32. *Chamaeleon zeylanicus* Laurenti
- Family 10. SCINCIDAE
33. *Scincella sikkimense* (Blyth)
34. *Sphenomorphus indicum indicum* (Gray)
35. *S. maculatum* (Blyth)

36. *Mabuya carinata* (Schneider)
 37. *M. macularia* (Blyth)
 38. *M. multifasciata multifasciata* (Kuhl)
 39. *Riopa albopunctata* Gray
 40. *R. punctata* (Linnaeus)
 Family 11. ANGUIDAE
 41. *Ophisaurus gracilis* (Gray)
 Family 12. VARANIDAE
 42. *Varanus bengalensis* (Daudin)
 43. *V. flavescens* (Gray)
 44. *V. salvator* (Laurenti)
 Sub-Order (ii) SERPENTES
 Family 13. TYPHLOPIDAE
 45. *Ramphotyphlops braminus* (Daudin)
 46. *Typhlops acutus* (Dumeril & Bibron)
 47. *T. diardi* Schlegel
 48. *T. oligolepis* Wall
 49. *T. porrectus* (Stoliczka)
 50. *T. jerdoni* Boulenger
 Family 14. BOIDAE
 51. *Python molurus* (Linnaeus)
 52. *Eryx conicus* (Schneider)
 Family 15. COLUBRIDAE
 53. *Acrochersydrus granulatus* (Schneider)
 54. *Ahaetulla mycterizans* (Linnaeus)
 55. *A. nasutus* (Lacepede)
 56. *A. prasinus* (Boie)
 57. *A. fronticinctus* (Gunther)
 58. *Amphiesma stolata* (Linnaeus)
 59. *A. platyceps* (Blyth)
 60. *A. parallela* (Boulenger)
 61. *Atretium schistosum* (Daudin)
 62. *Boiga cyanea* (Dumeril & Bibron)
 63. *B. cynodon* (Boie)
 64. *B. gokool* (Gray)
 65. *B. multifasciata* (Blyth)

66. *B. ochracea* (Gunther)
67. *B. trigonata* (Schneider)
68. *Cerberus rhynchops* (Schneider)
69. *Chrysopelea ornata* (Shaw)
70. *Argyrogea fasciolatus* (Shaw)
71. *Dendrelaphis ahaetulla* (Linnaeus)
72. *D. cyanochloris* (Wall)
73. *D. gorei* (Wall)
74. *D. tristis* (Boulenger)
75. *Dinodon gammiei* (Blanford)
76. *D. septentrionalis* (Gunther)
77. *Elaphae cantoris* (Boulenger)
78. *E. helena* (Daudin)
79. *E. porphyracea* (Cantor)
80. *E. radiata* (Schlegel)
81. *E. prasina* (Blyth)
82. *E. taeniura* (Cope)
83. *Enhydris enhydris* (Schneider)
84. *Fordonia leucobalia* (Schneider)
85. *Gerardia prevostiana* (Eydoux & Gervais)
86. *Liopeltis rappi* (Gunther)
87. *L. stoliczkae* (Sclater)
88. *Lycodon aulicus* (Linnaeus)
89. *L. jara* (Whaw)
90. *Natrix khasiensis* (Boulenger)
91. *Oligodon albocinctus* (Cantor)
92. *O. cyclurus* (Cantor)
94. *O. erythrogaster* Boulenger
95. *O. juglandifer* (Wall)
96. *O. taeniolatu* (Gunther)
97. *Pareas macularius* Theobald
98. *P. monticola* (Cantor)
99. *Psammodynastes pulverulentus* (Boie)
100. *Psammophis condanarus* (Merrem)
101. *Pseudoxenodon macrops* (Linnaeus)
102. *Ptyas korros* (Schlegel)

- 103. *P. mucosus* (Linnaeus)
- 104. *Rhabdophis himalayana* (Gunther)
- 105. *R. subminiata* (Schlegel)
- 106. *Sibynophis sagittarius* (Cantor)
- 107. *Trachischium fuscum* (Blyth)
- 108. *T guentheri* Boulenger
- 109. *T monticola* (Cantor)
- 110. *T tenuiceps* (Blyth)
- 111. *Xenochrophis piscator* (Schneider)
- 112. *Zaocys nigromarginatus* (Blyth)

Family 16. DASYPELTIDAE

- 113. *Elachistodon westermanni* Reinhardt

Family 17. ELAPIDAE

- 114. *Bungarus bungaroides* (Cantor)
- 115. *B. caeruleus* (Schneider)
- 116. *B. fasciatus* (Schneider)
- 117. *B. niger* Wall
- 118. *B. lividus* Cantor
- 119. *B. walli* Wall
- 120. *Calliophis maccelellandi* (Reinhardt)
- 121. *Naja naja kaouthia*, (Linn)
- 122. *Ophiophagus hannah* (Cantor)

Family 18. HYDROPHIIDAE

- 123. *Enhydrina schistosa* (Daudin)
- 124. *Laticauda laticaudata* (Linnaeus)
- 125. *Hydrophis caeruleus* (Shaw)
- 126. *H. cyanocinctu* Daudin
- 127. *H. fasciatus* (Schneider)
- 128. *H. mamillaris* (Daudin)
- 129. *H. nigrocinctus* (Daudin)
- 130. *H. obscurus* (Daudin)
- 131. *M. gracilis gracilis* (Shaw)
- 133. *Praescutata viperina* (Schmidt)

Family 19. VIPERIDAE

- 134. *Trimeresurus erythrurus* (Cantor)
- 135. *T gramineus* Shaw

136. *T. monticola* Gunther
 137. *T. popeurum* (Gray)
 138. *T. stejnegeri* Schmidt
 139. *Vipera russelli* (Shaw)

SYSTEMATIC ACCOUNT

Order 1. CROCODYLIA

Family 1. GAVIALIDAE

1. *Gavialis gangeticus* (Gmelin) Gavial/Gharial

1798. *Lacerta gangetica* Gmelin, *Syst. Nat.*, 1 : 1057

Material : 1 ex., Ranagha, dist. Nadia, 29.xii., 1926., A. Rahim (Reg. No. 19895).

Measurements : Total length 775 mm., length of snout 110 mm., breadth 15 mm.

Distribution : India : The Ganges, Mahanadi and the Brahmaputra Rivers and their tributaries. Elsewhere : The Indus, the Kaladan Rivers; Upper Burma.

Remarks : This is a juvenile specimen; the snout is more than 7 times as long as broad; dorsal surface dark olive, ventral surface yellowish.

Family 2. CROCODYLIDAE

2. *Crocodylus porosus* Schneider Estuarine/Saltwater Crocodile

1801. *Crocodylus porosus* Schneider, *Hist. Amphib.*, 2 : 159.

Material : 1 ex., Bhagabatpur, dist. 24, Parganas, 21.xi.1981, Bhagabatpur Crocodile project team (Reg. No. 23860).

Measurements : Length of body 155 mm.; tail 195 mm.

Distribution : India : The east coast and west coast as far north as Cochin. Elsewhere : Sri Lanka, the coasts of Indo-China; the Malay Peninsula and Archipelago; the north coast of Australia; the Solomon and Fiji Islands.

Remarks : This is juvenile specimen (1 Month old); 6 longitudinal and 16 transverse series of scutes on dorsal surface; upper teeth 17. This is a endangered species and so the centre has taken steps to protect this species from extinction by opening rearing centres of crocodile in different parts of the country.

Order II. TESTUDINES

Family 3. CHELONIDAE

3. *Lepidochelys olivacea* (Eschscholtz) Pacific Ridley Turtle

1929. *Chelonia olivacea* Eschscholtz, *Zool. Atlas* : 3.

Material : 1 ex., Digha, dist. Midnapore, 16.v.1983. Zoological Survey of India team (Reg. No. 24134).

Measurements : Length of Carapace 660 mm., breadth 600 mm., depth 210 mm.

Distribution : India : Digha, Orissa, Tamil Nadu and Andaman Islands Coasts. Elsewhere : Coast of Sri Lanka; the Pacific and South Atlantic Oceans.

Remarks : Head and Carapace olive in colour, plastron yellowish; the ridley is the smallest of the sea turtles, according to Pritchard (1969) the average weight of 14 turtles is 37 kg. This marine turtle is largely exploited for food.

Family 4. EMYDIDAE

4. *Melanochelys tricarinata* (Blyth)

1856. *Geomyda tricarinata* Blyth, *J. Asiat. Soc. Beng.*, 24 : 714.

Material : 1 ex., Baradighi Tea Estate, dist. Jalpaiguri, ? W. L. Travers (Reg. No. 20448).

Measurements : Length of Carapace 1540 mm., breadth 920 mm., depth 64 mm.

Distribution : Bihar (Chaibasa dist.), West Bengal (Jalpaiguri dist.); Assam (Daflas Hills and Bisnath plain).

Remarks : Carapace elongate, more or less rectangular in shape, arched above, the sides descend deeply. This species is common in the hilly regions.

5. *Kachuga tecta* (Gray)

Indian Sawback Turtle

1831. *Emys tecta* Gray *Syn. Rept.* : 23, pl. 5.

Material : 2 exs., Calcutta 26.x.1967. H. N. Mitra, (Reg. No. 22003); 1 ex., Palta, dist. 24-Parganas, 21.v.1936, B. Biswas, (Reg. No. 22964); 1 ex., Botanical Garden, dist. Howrah, 1872. J. Anderson (Reg. No. 109); 1 ex., Baradighi Tea Estate, dist. Jalpaiguri, 1916, W. L. Travers (Reg. No. 18015)

Measurements : Length of shell ranges from 28 mm. (Juvenile) to 173 mm. (Adult); breadth 23 mm. (Juvenile) to 72 mm. (adult) depth 17 mm. – 72 mm. (Adult).

Distribution : The Ganges, Brahmaputra and the Indus Rivers.

Remarks : This aquatic turtle is widely distributed in India and is common in rivers, channels, and ponds. Vertebral keel distinct, hinder margin of carapace feebly serrated; nuchal shield broad behind; plastron shorter than carapace.

Family 5. TESTUDINIDAE

6. *Geochelone elongata* (Blyth)

1853. *Testudo elongata* Blyth, *J. Asiat. Soc. Beng.*, 22 : 639.

Material : 1 ex., Baradighi, Jalpaiguri dist., 1916, W. L. Travers (Reg. No. 17992).

Measurements : Length of shell 116 mm. breadth 80 mm., depth 63 mm.

TABLE I
Crocodylians & testudines
Distribution of turtles in West Bengal

Sl. No.	Name of species	Calcutta	24 Parganas	Midnapore	Howrah	Hooghly	Burdwan	Birbhum	Bankura	Purulia	Nadia	Murshidabad	Malda	W. Dinajpur	Coochbehar	Jalpaiguri	Darjeeling
Family GAVIALIDAE																	
1.	<i>Gavialis gangeticus</i> (Gmelin)	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
Family CROCODYLIDAE																	
2.	<i>Crocodylus porosus</i> Schneider	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Family CHELONIDAE																	
3.	<i>Lepidochelys olivacea</i> (Eschscholtz)	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
Family EMYDIDAE																	
4.	<i>Batagur baska</i> (Gray)	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5.	<i>Geoclemys hamiltoni</i> (Gray)	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.	<i>Melanochelys tricarinata</i> (Blyth)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
7.	<i>Melanochelys trijuga indopeninsularis</i> (Annandale)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
8.	<i>Hardella thurgi</i> (Gray)	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.	<i>Kachuga tecta</i> (Gray)	+	+	-	+	-	-	-	-	-	-	-	-	-	-	+	-
Family TESTUDINIDAE																	
10.	<i>Geochelone elongate</i> (Blyth)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
Family TRIONYCHIDAE																	
11.	<i>Chitra indica</i> (Gray)	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
12.	<i>Lissemys punctata</i> (Bonnaterre)	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
13.	<i>L. punctata granosa</i> (Schoepff)	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
14.	<i>Trionyx gangeticus</i> Cuvier	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15.	<i>T. hurum</i> (Gray)	+	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-

Distribution : North-Eastern India; Tonkin, Malay Peninsula.

Remarks : This land tortoise is common in hilly regions of low altitude; carapace convex, the margin of carapace strongly serrated, plastron with deep posterior notch; dorsal surface of carapace greenish yellow, plastron yellow; black blotch on each shield. This species is reported so far from Jalpaiguri district only in West Bengal.

Family 6. TRIONYCHIDAE

7. *Trionyx hurum* Gray Peacock Soft-Shell Turtle

1831. *Trionyx hurum* Gray, *Syn. Rept.* : 47, pl. 10.

Material : 1 ex., Uttapara, Howrah dist., 7.viii.1960, H. N. Mitter (Reg. No. 20818).

Measurements : Length of shell 17.4 cm.; breadth 15.1 cm.; depth 4.6 cm.

Distribution : The Ganges and Brahmaputra Rivers (lower reaches).

Remarks : This is a beautifully coloured juvenile. Carapace slightly convex with no vertebral keel, coarsely reticulated with four distinct eye-spots; carapace olive green with darker patches throughout the disc; angle of mouth and chin reddish brown; plastron greyish brown.

Revised key for the identification of Lizards of West Bengal

Key to the Families of Sauria

1. Limbs present.....2
Limbs absent or rudimentary..... ANGUIDAE
2. Limbs modified as clasping organs.....CHAMAELEONIDAE
Limbs not modified so.....3
3. Head shields symmetrical4
Head shields asymmetrical5
4. Eye lids movable.....SCINCIDAE
Eye lids usually not movable.....GEKKONIDAE
5. Dorsal crest present.....AGAMIDAE
Dorsal crest absent.....VARANIDAE

Key to the Genera of GEKKONIDAE

1. Digits straight.....2
Digits bent, composed of a base and a terminal part.....*Cyrtodactylus*
2. Outer four terminal phalanges united at base*Gekko*
Terminal phalanges not united.....3

3. A cutaneous expansion along the side of the body present.....*Cosymbotus*
 A cutaneous expansion along the side of the body absent.....*Hemidactylus*

Key to the Species of *Cyrtodactylus*

1. 33 scales across the belly, male with femoral pores.....*C. gubernatoris* Annandale
 34-40 scales across the belly, male without femoral pores*C. khasiensis* (Jerdon)

Key to the Species of *Hemidactylus*

1. Dorsal surface with minute granules mixed with round, larger tubercles or not.....2
 Dorsal surface with trihedral tubercles.....*H. brooki* Gray
 2. Male with a continuous series of preanal and femoral pores..... *H. frenatus* Schlegel
 Male with femoral pores only3
 3. Tail swollen at base4
 Tail not swollen at base.....5
 4. Male with 10-17 femoral pores on each side, separated by a few scales.....
*H. leschenaulti* (Dumeril & Bibron)
 Male with 5-7 femoral pores on each side*H. flaviviridis* Ruppell
 5. 9-11 upper labials.....*H. bowringi* (Gray)
 . 11-13 upper labials*H. garnoti* Dumeril & Bibron

Key to the Genera of AGAMIDAE

1. Four toes only*Sitana*
 Five toes.....2
 2. Postorbital spine present.....3
 Postorbital spine absent.....*Japalura*
 3. Gular sac usually present; dorsal crest developed*Calotes*
 Gular sac absent, dorsal crest undeveloped.....*Psammophilus*

Key to the Species of *Japalura*

1. Tympanum naked; a crest of 6-8 conical scales on the back of the head*J. tricarinata* (Blyth)
 Tympanum concealed, a crest on the back of the head not prominent*J. variegata* Gray

Key to the Species of *Calotes*

1. Presence of long fold in front of the shoulder, no whorl of compressed spines below the tympanum*C. rouxi* Dumeril & Bibron

No fold in front of the shoulder present. A whorl of spines below the tympanum.....
*C. versicolor* (Daudin)

Key to the Genera of SCINDIDAE

1. Pterygoid bones separated from one another, the palatal notch extending forwards to the level of the centre of the eyes.....*Mabuya*
 Pterygoid bones usually in contact anteriorly, the palatal notch not reaching to the level of the centres of eyes2
2. Limbs usually well developed, tympanum sunk.....3
 Limbs undeveloped, tympanum exposed.....*Riopa*
3. Lower eye lid scaly *Sphenomorphus*
 Lower eye lid with a transparent disc *Scincella*

Key to the Species of *Mabuya*

1. 28-30 scales round the body, 12-17 lamellae under the fourth toe *M. macularia* (Blyth)
 30-34 scales round the body2
2. 14-18 lamellae under the fourth toe *M. carinata* (Schneider)
 17-23 lamellae under the fourth toe *M. multifasciata multifasciata* (Kuhl)

Key to the Species of *Riopa*

1. Two fronto-parietals; lower eye lid scaly *R. albopunctata* Grey
 Single fronto-parietal, lower eye lid with an undivided transparent disc ... *R. punctata* (Linnaeus)

Key to the Species of *Sphenomorphus*

1. Rostral convex, 30-38 scales round the body *S. indicum indicum* (Boulenger)
 Rostral flat or concave, 38-42 scales round the body *S. maculatum* (Blyth)

Key to the Species of *Varanus*

1. Distance between the orbit and nostril is less than twice the distance between nostril and snout....
 *V. bengalensis* (Daudin)
 Distance between the orbit and nostril is twice the distance between nostril and snout.....2
2. Nostril an oblique slit, snout convex *V. flavescens* (Gray)
 Nostril round or oval, snout depressed..... *V. salvator* (Laurenti)

Order II. SQUAMATA

Suborder (i) SAURIA

Family 7. GEKKONIDAE

8. *Gekko gekko* (Linnaeus)

Tokay

1758. *Lacerta gekko* Linnaeus, *Syst. Nat. ed.* 10 : 205.

Material : 2 exs., Behala, Calcutta, 13.vi.1956, R. C. Sharma (Reg. No. 22845).

Measurements : Snout to vent 114 mm. - 151 mm.; tail 67 mm. - 118 mm.

Distribution : India : West Bengal; Bihar; Tripura; the Andamans. Elsewhere : Indo-China; Southern China; the Malay Peninsula and East Indian Archipelago.

Remarks : This is a large sized house gecko. It hides in holes or crevices of the house during day and ventures out after sunset to capture its prey, chiefly consisting of insects, but it prepared to devour anything that it can master; longitudinal rows of tubercles on the body 13-14 instead of 12 as cited by Smith (1935).

9. *Cyrtodactylus khasiensis* (Jerdon)

1870. *Pentadactylus khasiensis* Jerdon, *P. Asiat. Soc. Beng.* : 75.

Material : 1 ex., Gopaldhara, Dist. Darjeeling, 24.iv.1926, H. Stevens (Reg. No. 19546).

Measurements and Scale counts : Snout to vent 69 mm, tail 6 mm, (major part missing); upper labials 10, lower labials 8, lamellae under 4th toe 26.

Distribution : India : West Bengal (Darjeeling district). Assam, Abor Country. Elsewhere : Upper Burma.

10. *Hemidactylus bowringi* (Gray)

1845. *Doryura bowringii* Gray, *Cat. Liz. Brit. Mus.* : 156.

Material : 2 exs., Teesta P.W.D. Bungalow, dist. Jalpaiguri; 26.v.1930; S. L. Hora (Reg. No. 20278); 1 ex., Jarkhoala, dist. Darjeeling, 14.vii.1958, H. Khajuria (Reg. No. 21033).

Measurements : Snout to vent 42 mm - 48 mm, tail 38 mm - 53 mm.

Distribution : India : Darjeeling; Godavari valley; Sikkim. Elsewhere : Burma; Hongkong; S. China.

Remarks : This specis is usually found in houses in Rangoon and Pegu according to Theobold. It is not widely distributed in India. Back with small granules intermixed with large round tubercles; round tubercles were not seen in te specimen from Jalpaiguri.

11. *Hemidactylus brooki* Gray

House-Gecko

1845. *Hemidactylus brookii* Gray, *Cat. Liz. Brit. Mus.* : 153.

Material : 2 exs., Zoological Garden Calcutta, 22.i.1957, H. Trapido (Reg. No. 23920); 3 exs., Balurghat, dist. West Dinajpur; 25.vii.1984, A. K. Sarkar & Party (Reg. No. 24164); 2 exs., Bagdabra forest area, dist. Murshidabad 15.iv.1983, S. Ahmed & Party (Reg. No. 24011) 1 ex.,

Chitidih vill. dist. Purulia, 7.xi.1981, S. Ahmed & party (Reg. No. 23888); 2 exs., Bolesunda, Dist. Birbhum, 23.iii.1984, S. Ahmed & party (Reg. No. 24120); 1 ex., Kalaneshwar vill. dist. Burdwan, 16.xi.1984, B. Nath (Reg. No. 24217).

Measurements & Scale counts :

Reg.No.	Upper labials	lower labials	Number of lamellae under 1st toe	Number of lamellae under 4th toe	Femoral pores	Snout to vent mm	Tail mm
23920	11/11	9,9	5,5	10,10	—	54	29
23888	8/9	8,7	5,5	9,9	—	46	25
24217	10/10	8,8	5,6	9,8	—	38	25
24120	10/10	9,9	5,6	9,10	12,10	45	45
24011	11,11	9,7	5,5	10, dam.	11,11	50	36
24164	9,9	7,7	6,6	12,11	—	37	35
23795	10,9	8,8	5,5	9,9	—	60	damaged

12. *Hemidactylus flaviviridis* Ruppell
Yellow-Bellied House Gecko

1835. *Hemidactylus flaviviridis* Ruppell, *Neue Wibr. Faun. Abyss* :.18

Material : 1 ex., Gobindapur vill., dist. 24 parganas, 17.ix.1975, S.K. Talukdar (Reg. No. 23153) 1 ex., Calcutta, 18.vii.1950, Paras Nath Singh (Reg. No. 23919); 2 exs., P.W.D., I. B. Bungalow at Bishnupur, dist. Bankura, 26.x.1980, S. Ahmed & Party (Reg. No. 23794), 2 exs., Bhatkara forest area dist. Birbhum, 31.iii.1984, S. Ahmed & party (Reg. No. 24118); 1 ex., Gour, dist. Malda, 8.viii.1984, A. K. Sarkar & party (Reg. No. 24165); 3 exs., Chandur vill. dist. Murshidabad, 13.iv.1983, S. Ahmed & party, (Reg. No. 23986); 6 exs., Dhopaghat, near Purulia Rly. station, dist. Purulia, 11.xi.1981, S. Ahmed & party (Reg. No. 23866).

Measurements & Scale counts :

Reg.No.	Upper labials Left/ Right	Lower labials Left/ Right	Number of lamellae under 1st toe L/R	Number of lamellae under 4th toe L/R	Femoral pores	Snout to vent mm	Tail mm
23153	15,15	12,12	10,10	14,14	—	40	32
23919	15,16	12,13	10,10	14,13	—	58	46
23794	15,15	12,13	9,9	14,13	6	64	74
24118	13,14	11,11	9,9	10,12	—	82	55
24165	16,16	13,13	9,9	12,12	—	90	61
23986	12,14	10,10	8,8	10,10	7	44	49
23866	15,13	11,11	8,9	11,11	—	65	62

Distribution : India : North India from Punjab to West Bengal. Elsewhere : Persia, Arabia, Shores of Red Sea.

13. *Hemidactylus frenatus* Schlegel
South Asian Waif Gecko

1836. *Hemidactylus frenatus* Schlegel *Erp. Gen.* 3 : 366.

Material : 1 ex., Sundarbans, dist. 24 Parganas, 5.xi.1981, S. S. Saha (Reg. No. 23921); 3 exs., Ballavpur reserve forest area, dist. Birbhum, 3.iv.1984, S Ahmed & Party (Reg. No. 24115); 3 exs., Bhagirathir Char, dist. Murshidabad, 6.iv.1983, S. Ahmed & party (Reg. No. 24062); 1 ex., Balurghar, dist. West Dinajpur; 25.vii.1984, A. K. Sarkar & party (Reg. No. 24163); 3 exs., Coochbehar station area, dist. Coochbehar, 4.xii.1984, S. Ahmed & party (Reg. No. 24199); 2 exs. Sukna forest area, dist. Darjeeling, 8.12.1984, S. Ahmed & party (Reg. No. 24200); 2 exs., Jagulia, dist. Nadia, 12.ix.1983, Kapileshwar Ghosh (Reg. No. 24129).

Measurement & Scale counts :

Reg.No.	Upper labials	Lower labials	Number of lamellae under 1st toe	Number of lamellae under 4th tow	Femoral pores	Snout to vent mm	Tail mm
23921	11,10	8,9	5,5	10	–	41	25
24115	10,11	9,9	5,5	10	33	42	28
24062	12,11	9,9	5,5	11	31	44	39
24129	12,12	9,9	5,5	11	–	53	50
24163	12,11	8,9	4,4	9	–	47	50
24199	11,12	8,9	5,5	10	32	60	36
24200	11,11	9,9	5,5	11,10	28	50	53

Distribution : Southern India; West Bengal; Sri Lanka, Indo-China, Hainan, Yunnan, Hongkong, Southern China, the Malay Peninsula, Australia, East Africa, St. Helena.

Remarks : A widely distributed species; common in southern India.

14. *Hemidactylus leschenaulti* Dumeril & Bibron
Bark Gecko

1836. *Hemidactylus leschenaulti* Dumeril & Bibron, *Erp. Gen.*, 3 : 364.

Material : 3 exs., Lalbag, dist. Murshidabad, 8.iv.1983, S. Ahmed & party (Reg. No. 23992); 5 exs., Muchia vill., dist. Malda, 27.iii.1984, S. Ahmed & party (Reg. No. 24013); 1 ex., Gosaba, dist. 24-Parganas, 10.ix.1983, S. M. Ali & party (Reg. No. 24074).

Measurements : Snout to vent 35 mm - 50 mm; tail 31 mm - 43 mm.

Distribution : India : West Bengal; Gujarat; Rajasthan; Maharashtra; Madhya Pradesh; Kerala. Elsewhere : Sri Lanka.

Remarks : 3rd pair of mentals present in one specimen only out of nine specimens examined;

barring one, the dorsal surface of the rest is covered with small granules intermixed with larger tubercles.

Family 8. AGAMIDAE

15. *Calotes rouxi* Dumeril & Bibron
Forest Blood Sucker

1837. *Calotes rouxi* Dumeril & Bibron, *Erp. Gen.*, 4 : 407.

Material : 1 ex., Kalimpong, dist. Darjeeling (Reg. No. 17928).

Measurements : Snout to vent 70 mm, tail 61 mm (partly damaged).

Distribution : West Bengal : As above (first record from the area). Maharashtra & Kerala.

Remarks : The Oblique curved fold in front of the shoulder does not extend across the throat; spines on nuchal crest broken; tail highly swollen at the base and almost as long as the body.

16. *Calotes versicolor* (Daudin)
Blood Sucker

1802. *Agama versicolor* Daudin, *Hist. Nat. Rept.*, 3 : 395.

Material : 1 ex., Calcutta, ? N. Annandale (Reg. No. 15471); 1 ex., Fragergaunge, dist. 24-Parganas, 22.ix.1975, S. K. Talukder (Reg. No. 23094); 1 ex., Ganganagar, dist. West Dinajpur, 20.vii.1984, A. K. Sarkar and party (Reg. No. 24161); 3 exs., Deogori vill. dist. Birbhum, 21.iii.1984, S. Ahmed & party (Reg. No. 24112).

Measurements : Snout to vent 35 mm to 50 mm, tail 31 mm to 43 mm.

Distribution : The whole of India; Indo-Chinese subregions; Afghanistan; Sri Lanka; Hainan; Hongkong; South China; Malay Peninsula; Sumatra.

Remarks : This species is common in high mountain and plains. This lizard ventures out to capture its prey in the morning when the temperature is not high.

17. *Japalura tricarinata* (Blyth)

1854. *Calotes tricarinatus* Blyth, *J. Asiat. Soc. Beng.*, 22 : 650.

Material : 1 ex., Shrubbonny Park, dist. Darjeeling, 12.ix.1972, S. S. Saha (Reg. No. 23964).

Measurements : Snout to vent 32 mm, tail 91 mm.

Distribution : India : Sikkim; Darjeeling. Elsewhere : Eastern Nepal.

Remarks : Upper labials 5, Lower labials 6; two brown cross bars on head; body pale brown with 6 angular darker stripes, belly yellowish; one ridge of large scales beginning just behind the nuchal extends behind to each side of the body.

18. *Japalura variegata* Gray

1853. *Japalura variegata* Gray *Ann. Mag. nat. Hist.* (2) 12 : 388.

Material : 1 ex., Shrubbonny Park, dist. Darjeeling, 12.ix.1979. S. S. Saha (Reg. No. 23967).

Measurements : Snout to vent 32 mm; tail 58 mm.

Distribution : India : Sikkim; West Bengal.

Remarks : Upper labials 9-10; lower labials 9; hind limb reaches to the eye, 3 conical tubercles near nuchal crest. This species is not widely distributed in India.

19. *Psammophilus blanfordanus* (Stoliczka)
Dwarf Rock Lizard

1871. *Charasia blanfordana* Stoliczka, *Proc. Asiat. Soc. Beng.* : 194.

Material : 1 ex., Madanpur, dist. Nadia, 18.vii.1969, P. K. Das (Reg. No. 24169); 2 exs., Joychandi Hill, dist. Purulia, 15.xi.1981, S. Ahmed (Reg. No. 23901); 2 exs., Mukutmanipur, dist. Bankura, 3.xi.1980, S. Ahmed (Reg. No. 23862).

Measurements : Snout to vent 59 mm - 108 mm, tail 119 mm - 138 mm.

Distribution : West Bengal; Madhya Pradesh; Bihar; Orissa; Tamil Nadu; Kerala. First record from West Bengal.

Remarks : Body much depressed, dorsal crest a mere denticulation; 5 dark lozenge-shaped spots on the body and some spots on tail. Though this species is common in hilly regions, strangely enough not a single specimen has been obtained from hilly areas of north Bengal.

20. *Sitana ponticeriana* Cuvier
Fan-Throated Lizard

1844. *Sitana ponticeriana* Cuvier, *Guerin. Icon. Reg. Anim. Rept.* pl. 10, fig. 2.

Material : 1 ex., Dhankora, dist. Bankura, 10.i.1981, M. Deb. (Reg. No. 23820); 3 exs., Bhatkara forest, dist. Birbhum, 31.iii.1984, S. Ahmed & party (Reg. No. 24117); 1 ex., Kalaneswari vill. dist. Burdwan, 16.xi.1984, Sinha (Reg. No. 24216).

Measurements : Snout to Vent 26 mm - 46 mm, tail 33 mm - 108 mm.

Distribution : The whole of India.

Remarks : Four toes in the hind limb; 5 dark brown rhomboidal spots on mid-dorsal surface; 2 light brown stripes one on each side of the body, extending from behind the neck to hind limbs.

Family 9. CHAMAELEONIDAE

21. *Chamaeleon zeylanicus* (Laurenti)
Indian Chameleon

1768. *Chamaeleon zeylanicus* Laurenti, *Syn. Rept.* : 46.

Material : 1 ex., Paddapukur, dist. Midnapore, 4.ix.1964, A. K. Dutta (Reg. No. 22911).

Measurements : Snout to Vent 164 mm, tail 175 mm.

Distribution : The hilly districts of India south of the Gangetic plain.

Remarks : Canthal and supraorbital crest prominent; dorsal extends from thorax to vent; tail prehensile, with 21 wide black bands; hands and feet modified as clasping organs.

Family 10. SCINCIDAE

22. *Scincella sikkimense* (Blyth)

1854. *Mococa sikkimensis* Blyth, *J. Asiat. Soc. Beng.*, 22 : 652.

Material : 1 ex., Jalapahar, Darjeeling dist., 19.v.1984, S. K. Dey (Reg. No. 24185).

Measurements : Snout to Vent 46 mm.; tail 64 mm.

Distribution : West Bengal; Bihar; Sikkim.

Remarks : This skink is not a cosmopolitan species. According to Smith (1935) it is usually found between 912 m - 3040 m. altitude. Its occurrence is so far confined to Darjeeling district in West Bengal. Scales round the body 24; dorsal surface brown with darker spots; flank spotted white; ventral part pale bluish.

23. *Sphenomorphus indicum indicum* (Gray)

1853. *Hinulia indica* Gray, *Ann. Mag. Nat. Hist.*, (2) 12 : 388.

Material : 1 ex., Pashoke, dist. Darjeeling, ? T. D. La Touche (Reg. No. 16408).

Measurements : Snout to Vent, 90 mm.; tail 140 mm.

Distribution : West Bengal (Darjeeling); Sikkim; S. E. Tibet; Indo-China; Hainan; S. China; the Malay Peninsula.

Remarks : This species is not widely distributed in India; scales round the body 36; upper labials 7, lower labials 6; lamellae under 4th toe 18.

24. *Sphenomorphus maculatum* (Blyth)

1853. *Lissonota maculata* Bluth, *J. Asiat. Soc. Beng.*, 22 : 653.

Material : 1 ex., Kalimpong, dist. Darjeeling, ? F. H. Gravely (Reg. No. 18160).

Measurements : Snout to Vent 62 mm; tail 94 mm.

Distribution : Sikkim; West Bengal; Assam and the Andaman & Nicobar Islands.

Remarks : This lizard is found both in the plains and hills; scales round the body 39, spuraoculars, 5 (1st longest, 5th smallest); upper labials 7, lower labials 6; lamellae under 4th toe 16.

25. *Mabuya carinata* (Schneider)

Bhraminy/Common Skink

1801. *Scincus carinatus* Schneider, *Hist. Amphib.*, 2 : 183.

Length of the body from Snout to Vent, tail length and variation in lepidosis

Reg.No.	Upper labials L/R	lower labials L/R	Dorsal Scales 1st toe	Scales round the body	Lamellae under 1st toe	Lamellae under 4th toe	Length Snout to vent mm	Tail mm
23806	7,6	6,6	5 (3) (larger)	30	5,5	15,15	70	65
23906	7,7	8,6	5 (3)	30	7,7	15,13	122	80
24138	6,6	6,6	5 (3)	32	6,6	17,16	96	125
24031	7,7	6,6	5 (3)	33	7,7	16,16	91	156

Material : 1 ex., Bashi vill. dist. Bankura, 30.x.1981, S. Ahmed (Reg. No. 23806); 1 ex., Chandan Hill, dist. Purulia, 6.xi.1981, S. Ahmed (Reg. No. 23906); 1 ex., Goadihi vill. dist.

Birbhum, 30.iii.1984, S. Ahmed & party (Reg. No. 24138) 1 ex., Hariharpara vill., dist. Murshidabad, 9.iv.1983, S. Ahmed (Reg. No. 24031).

Distribution : Indian Peninsula; Sri Lanka.

26. *Mabuya macularia* (Blyth)
Bronze Grass Skink

1853. *Euprepes macularius* Blyth, *J. Asiat. Soc. Beng.*, 22 : 652.

Material : 1 ex., Narayantala, Sunderbans Tiger Reserve, dist. 24-Parganas, 19.ix.1983, C. K. Misra, (Reg. No. 24077); 1 ex., Botanical Garden, dist. Howrah, (Reg. No. 20332); 1 ex., Gop forest, dist. Midnapore 10.iv.1977. S. K. Talukder (Reg. No. 23525).

Measurements : Snout to Vent 44 mm - 67 mm; tail 14 mm - 33 mm.

Distribution : India : Uttar Pradesh, Bihar, West Bengal, Assam. Elsewhere : Gulf of Siam, Burma, Cambodia, Southern Annam; Malay Peninsula.

Remarks : this lizard is common in the grassland and cultivated fields and is diurnal in habits. It may be seen at night in hot weather. Upper and lower labials, 6-7; lamellae under 4th toe 14-15.

27. *Mabuya multifasciata multifasciata* (Kuhl)

1820. *Scincus multifasciatus* Kuhl, *Birt. Zool. Vergl. Anat* : 126.

Material : 1 ex., Bango Range, Sunderbans, dist. 24-Parganas, 16.ix.1983, S. M. Ali & party (Reg. No. 24078).

Measurements : Snout to Vent 50 mm, tail 66 mm.

Distribution : India : West Bengal; Assam; Nicobar Islands. Elsewhere : Yunnan, Tonking, Hainan, Malay Peninsula, East Indies.

Remarks : This species is not widely distributed in India. Lamellae under 1st toe 8, 7; under 4th toe 20,17; scales round the body 30. Recorded for the first time from the area under report.

28. *Riopa albopunctata* Gray

1846. *Riopa albopunctata* Gray, *Ann. Mag. nat. Hist.* 18 : 430.

Measurements and scale counts :

Reg.No.	Dorsal scales down the flanks	Dorsal scales round the body	Upper labials L/R	Lower labials L/R	Lamellae under 4th toe	Length Snout to vent mm	Tail mm
23918	62	28	7,7	7,7	15,15	60	31
24091	61	26	6,6	5,5	11,11	42	21
24090	67	27	7,7	6,6	15,13	52	24
23988	61	26	7,8	6,6	14,14	53	18
23933	66	28	7,7	6,6	14,14	50	30
24125	65	26	7,7	6,6	13,13	47	40
2396	67	26	7,7	6,6	11,13	21	26

Material : 1 ex., Belgachia, Calcutta, 14.v.1951, B. Biswas (Reg. No. 23918); 1 ex., Digha, dist. Midnapore, 14.ix.1982, Indranil Das (Reg. No. 24091); 1 ex., Bethuadahari, dist. Nadia, 3.ix.1983, Indranil Das (Reg. No. 24090); 1 ex., Bulbul Chandi vill. dist. Malda, 31.i.1970, K. C. Jayaram (Reg. No. 23933); 3 exs., Bagdabra, dist. Murshidabad, 14.iv.1983. S. Ahmed (Reg. No. 23988); 1 ex., Raichandrapur vill., dist. Birbhum, 25.iii.1984, S. Ahmed & party (Reg. No. 24125); 1 ex., Botanical Garden, dist. Howrah ? J. Anderson (Reg. No. 2396).

Distribution : India : Maharashtra; Madhya Pradesh; Uttar Pradesh, Bihar; West Bengal; Orissa; Kerala. Elsewhere : Nepal.

29. *Riopa punctata* (Linnaeus)
Dotted Garden Skink

1766. *Lacerta punctata* Linnaeus : 369 (Type locality : Asia).

Material : 1 ex., Kakdwip, dist. 24-Parganas, 16.ix.1975, S. K. Talukder (Reg. No. 23137); 1 ex., Danton, dist. Midnapore, 13.iv.1977. S. K. Talukder (Reg. No. 23547); 1 ex., Kalimpong, dist. Darjeeling, 10.v.1975, F. H. Gravely (Reg. No. 17926-7).

Measurements : Snout to Vent 39 mm - 62 mm., tail 50 mm - 52 mm.

Distribution : India : Uttar Pradesh; Madhya Pradesh; Himachal Pradesh; Bihar; Orissa; Karnataka; Tamil Nadu; Andhra Pradesh. Elsewhere : Sri Lanka.

Remarks : This species is widely distributed in India. It lives in damp soil and under fallen leaves or logs. Scales round the body, 26-28; Lamellae under 4th toe 12-16; snout to fore-limb 13 mm - 15 mm; axilla to groin 25 mm - 30 mm.

Family 11. ANGUIDAE

30. *Ophisaurus gracilis* (Gray)
Burmese Glass Snake

1845. *Pseudopus gracilis* Gray, *Cat. Liz. Brit. Mus.* : 56.

Material : 1 ex., Darjeeling, ? G. Gammie (Reg. No. 2254).

Measurements : Snout to Vent 144 mm.; tail 181 mm.

Distribution : Eastern Himalayas (Darjeeling district); Assam; Upper Burma.

Remarks : Dorsal scales keeled, in 14 longitudinal series, ventral rows of scales 10; 11 transverse rows of blue black spots on anterior dorsal surface. This limbless lizards is nocturnal reptile and is sluggish in habits.

Family 12. VARANIDAE

31. *Varanus bengalensis* (Daudin)
Indian Monitor

1802. *Tupinambis bengalensis* Daudin, *Hist. nat. Rept.*, 3 : 67.

Material : 1 ex., Calcutta, 22.iv.1871, D. Waldic (Reg. No. 2107); 1 ex., Barrackpore, dist. 24-Parganas, May, 1916, Matley (Reg. No. 18369); 1 ex., Krishnagar, dist. Nadia, ? R. D. Dombel (Reg. No. 4673); 1 ex., Darjeeling, ? G. Gammie (Reg. No. 4620); 1 ex., Jalpaiguri, dist. Jalpaiguri, ? G. W. Shillingford (Reg. No. 12876). 1 ex., Chapra, W. Dinajpur 30.vii.84, A. K. Sarkar & party (Reg. No. 24167).

TABLE II
Distribution of Saurians (lizards) in West Bengal

Sl. No.	Name of species	Calcutta	24 Parganas	Midnapore	Howrah	Hooghly	Burdwan	Birbhum	Bankura	Purulia	Nadia	Murshidabad	Malda	W. Dinajpur	Coochbehar	Jalpaiguri	Darjeeling
Family GEKKONIDAE																	
1.	<i>Gekko gekko</i> Linnaeus	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.	<i>Cyrtodactylus gubernatoris</i> (Amandale)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
3.	<i>C. khasiensis</i> (Jerdon)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
4.	<i>Hemidactylus bowringi</i> (Gray)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
5.	<i>H. brooki</i> (Gray)	+	+	+	-	-	+	+	+	+	-	+	+	+	-	-	-
6.	<i>H. Flaviviridis</i> Ruppell	+	+	+	-	-	-	+	+	+	-	+	+	-	-	-	+
7.	<i>H. frenatus</i> Schlegel	-	+	+	-	-	-	+	+	-	+	+	+	+	+	-	+
8.	<i>H. Garnoti</i> (Dumeril & Bibron)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
9.	<i>H. Leschenaulti</i> (Dumeril & Bibron)	-	+	-	-	-	-	-	-	-	-	+	+	-	-	-	-
10.	<i>Cosymbotus platyurus</i> (Schneider)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
Family AGAMIDAE																	
11.	<i>Calotes rowxi</i> (Dumeril & Bibron)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
12.	<i>C. versicolor</i> (Daudin)	+	+	+	+	+	+	+	+	+	-	+	+	-	-	-	+
13.	<i>Japalura tricarinata</i> (Blyth)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
14.	<i>J. variegata</i> (Gray)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
15.	<i>Psammophilus blanforodanus</i> (Stoliczka)	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-
16.	<i>Sitana ponticeriana</i> Cuvier	-	-	+	-	-	+	+	+	-	-	-	-	-	-	-	-
Family CHAMAELEONIDAE																	
17.	<i>Chamaeleon zeylanicus</i> Laurenti	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Family SCINCIDAE																	
18.	<i>Scincella sikkimense</i> (Blyth)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+

Sl. No.	Name of species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
19.	<i>Sphenomorphus indicum indicum</i> (Gray)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
20.	<i>S. maculatum</i> (Blyth)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
21.	<i>Mabuya carinata</i> (Schneider)	+	+	+	+	-	-	+	+	+	-	+	-	-	-	-	-
22.	<i>M. macularia</i> (Blyth)	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-
23.	<i>M. multifasciata multifasciata</i> (Kuhl)	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24.	<i>Riopa albopunctata</i> (Gray)	+	+	+	+	-	-	+	-	-	+	+	+	-	-	-	-
25.	<i>R. punctata</i> (Linnaeus)	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	+
	Family ANGUIDAE																
26.	<i>Ophisaurus gracilis</i> (Gray)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
	Family VARANIDAE																
27.	<i>Varanus bengalensis</i> (Daudin)	+	+	-	-	-	-	-	-	-	+	-	-	+	-	+	+
28.	<i>V. flavescens</i> (Gray)	+	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-
29.	<i>V. salvator</i> (Laurenti)	+	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-

Measurements : Snout to Vent 280 mm 420 mm; tail 160 mm - 289 mm.

Distribution : The whole of India. Nepal; Burma; Sri Lanka; Pakistan; southeast Persia.

Remarks : Most of the specimens examined are juveniles; abdominal scale rows, 69-93; dorsal surface olive with yellow spots transversely arranged, ventral aspect yellowish. The population of this species is dwindling due to random killing for commercial use.

32. *Varanus flavescens* (Gray)
Yellow Monitor

1827. *Monitor flavescens* Gray, *Zool. Journ*, 3 : 226.

Material : 1 ex., Calcutta, Feb. 1870, J. Anderson (Reg. No. 2170), 1 ex., Pathar Pratima, dist. 24-Parganas, 12.ii.1972, A. K. Mukherjee (Reg. No. 23528); 1 ex., Botanical Garden, dist. Howrah, ? J. Anderson (Reg. No. 2149).

Measurements : Snout to Vent 161 mm - 701 mm; tail 76 mm - 368 mm.

Distribution : From Punjab to West Bengal.

Remarks : Abdominal scale rows 65-85, snout depressed, nostril oblique; dorsal surface dark brown with yellow crossbars, ventral surface brown.

33. *Varanus salvator* Laurenti
Water Monitor

1768. *Stellio salvator* Laurenti, *Syn. Rept.*, (based on seba's *Illustr.* ii, pl. 88, fig. 2).

Material : 1 ex., Ballygaunge, Calcutta, ? O. L. Fraser (Reg. No. 4669); 1 ex., Bisalakhipur, dist. 24-Parganas, 19.ix.1975, S. K. Talukder (Reg. No. 23062); 1 ex., Botanical Garden dist. Howrah, Sept. 1872, King (Reg. No. 2190).

Measurements : Snout to Vent 90 mm - 383 mm; tail 80 mm 205 mm.

Distribution : Eastern India; the Andaman and Nicobar Islands. Bangladesh; Sri Lanka; Indo-China; Southern China; East Indian Archipelago; Northern Australia.

Remarks : Nostril oval, nearer to the snout than to the orbit; median supraocular transversely enlarged; top of head brown, dorsal surface brown with cross bars of yellow dots; tail alternately banded with brown and yellow. This species is common in canals, rivers, estuaries and on the sea coast.

Revised key for the identification of Serpentes (Snakes) of West Bengal

Key to the Families

1. Eyes vestigial, body worm like, teeth only in the upper jawTYPHLOPIDAE
Eyes not vestigial, teeth in both jaws.....2
2. Vestiges of hind limbs present BOIDAE
Vestives of hind limbs absent3
3. Maxillary bone with teeth4
Maxillary bone toothless except for a few minute teeth.....DASYPELIDAE

4. Poison fangs present5
 Poison fangs absent COLUBRIDAE
5. Tail cylindrical, ventrals broad.....6
 Tail vertically compressed, ventrals narrow.....HYDROPHIIDAE
6. Teeth present behind poison fangs, pupil round ELAPIDAE
 Teeth absent behind poison fangs, pupil vertical..... VIPERIDAE

Key to the Species of Typhlopidae

1. Nasal not in contact with one another behind the rostral.....2
 Nasal is contact with one another behind the rostral.....5
2. 18-20 scales round the body3
 22-26 scales round the body4
3. 18 scales round the body*T. porrectus* (Stoliczka)
 20 scales round the body*Ramphotyphlops braminus* (Daudin)
4. 22 scales round the body, nasals completely divided.....*T. jerdoni* (Boulenger)
 24-26 scales round the body, nasals in completely divided.....*T. diadri* Schlegel
5. Snout round, 16 scales round the body*T. oligolepis* Wall
 Snout pointed, 26-28 scales round the body *T. acutus* (Dumeril & Bibron)

Key to the Species of Colubridae

1. Mental groove present2
 Mental groove absent*Pareas monticola* (Cantor)
2. Ventral shields enlarged3
 Ventral shields not enlarged *Chersydrus granulatus* (Schneider)
3. Maxilla with teeth4
 Maxilla toothless except for a few minute teeth.....*Elachistodon westermanni* (Reinhardt)
4. Nostrils valvular.....5
 Nostrils not valvular8
5. Nasal shields in contact with one another6
 Nasal shields separated by an inter nasal7
6. Parietals well developed*Enhydris enhydris* (Schneider)
 Parietals broken up *Cerberus rhynchops* (Schneider)

7. Scales in 17 rows *Gerardia prevostiana* (Eydoux & Gervais)
 Scales in 25-29 rows *Fordonia leucobalia* (Schlegal)
8. Hypapophyses absent on the posterior dorsal vertebrae9
 Hypapophyses present throughout the vertebral column34
9. Longitudinal series of scales in odd numbers 10
 Longitudinal series of scales in even numbers 17
10. Head distinct from neck..... 11
 Head not or rarely distinct from neck 12
11. Scales in 22-23 rows round the body *Argyrogena fasciolatus* (Shaw)
 Scales in 15 or 17 rows round the body..... *Pyras mucosus* (Linnaeus)
12. 15 scales round the body *Oligodon taeniolatus* (Gunther)
 17-21 scales round the body 13
13. 17-rows of scales round the body 16
 19-21 rows of scales round the body 14
14. Seven supralabials 15
 Eight supralabials..... *O. cyclurus* (Cantor)
15. Hemipenis deeply formed *O. juglandifer* (Wall)
 Hemipenis not formed *O. albocinctus* (Cantor)
16. Hemipenis spinose throughout..... *O. arnensis* (Shaw)
 Hemipenis not spinose *O. erythogaster* (Boulenger)
17. Pupil round 21
 Pupil elliptic 18
18. Maxillary bone strongly arched..... 19
 Maxillary bone not arched 20
19. Ventrals angulate laterally *Lycodon aulicus* (Linnaeus)
 Ventral not angulate laterally *L. jara* (Shaw)
20. Body with alternating black and greenish yellow rings *Dinodon gammiei* (Blanford)
 Body with white transverse bars..... *D. septentrionalis* (Gunther)
21. Apical pits present..... 22
 Apical pits absent..... 33
22. Single apical pit..... 23
 Paired apical pits 26

23. Scales in 13 rows round the body..... *Dendrelaphis gorei* (Wall)
Scales in 15 rows round the body.....24
24. Snout rounded.....25
Snout squarish*D. cyanochloris* (Wall)
25. Maxillary teeth 17-22.....*D. tristis* (Boulenger)
Maxillary teeth 23-28..... *D. ahaetulla* (Linnaeus)
26. 14 or 16 scales round the body*Zaocys nigromarginatus* (Blyth)
19-29 or 29 scales round the body27
27. 19 scales round the body28
20-27 or 29 scales round the body30
28. 8 supralabials.....*Elaphe porphyracea* (Cantor)
9 supralabials.....29
29. Hemipenis extending to 9th caudal plate.....*E. prasina* (Blyth)
Hemipenis extending to 10th caudal plate.....*E. radiata* (Schlegel)
30. 21-23 scales round the body31
25 or 27 rarely 29 scales round the body.....*E. helena* (Daudin)
31. 21 rows of scales round the body*E. cantoris* (Boulenger)
23 rows of scales round the body*E. taeniura* (Cope)
32. Nasal divided.....*Liopeltis rappi* (Gunther)
Nasal undivided *L. stoliczkae* (Sclater)
33. Scales in 13-15 rows round the body34
Scales in 17-27 rows round the body42
34. 6 supralabials.....35
7-9 supralabials.....39
35. Scales in 13 rows round the body.....36
Scales in 15 rows round the body.....*Trachischium monticola* (Cantor)
36. Ventral 125-140*T tenuiceps* (Blyth)
Ventral 132-16537
37. Ventral 132-54*T. guentheri* Boulenger
Ventrols 150-165..... *T. fuscum* (Blyth)
38. Presence of dermal appendage on the snout which is pointed*Ahetulla nasutus* (Lacpede)
Dermal appendage absent, snout hot pointed39

39. Anal scale single *A. mycterizans* (Linnaeus)
 Anal scales two4
40. Nasals in contact with labials.....*A. prasinus* (Boie)
 Nasals separated from labials.....*A. fronticinctus* (Gunther)
47. Scales in 17 rows round the body.....42
 Scales in 19-27 rows round the body46
42. Pupil round43
 Pupil vertical.....*Psammodynastes pulverulentus* (Boie)
43. 12-13 maxillary teeth *Psammophis condanarus* (Merrem)
 20-50 maxillary teeth44
44. 7-8 supralabials.....45
 9 supralabials.....*Chrysopelea ornata* (Shaw)
45. Teeth equal in size *Sibynophis sagittarius* (Cantor)
 Teeth unequal in size..... *Pseudozenodon macrops* (Linnaeus)
46. Pupil of eye round54
 Pupil of eye vertical.....47
47. Preocular reaches to the upper surface of head48
 Preocular does not reach to the upper surface of head.....
48. Scales in 21 rows round the body.....49
 Scales in 23 rarely 25 rows round the body*Boiga cynodon* (Boie)
49. Posterior genials about as long as the anterior.....*B. cyanea* (Dumeril & Bibron)
 Posterior genital as long as the anterior.....*B. multifasciata* (Blyth)
50. Ventral feebly enlarged.....*B. trigonata* (Schneider)
 Ventrals strongly enlarged51
51. Hemipenis extending to 10th caudal plate*B. gokool* (Gray)
 Hemipenis extending to the 10th-12th caudal plate.....*B. ochracea* (Gunther)
52. 17 scales round the body53
 19 scales rows round the body54
53. Two black oblique stripes below the eye*Xenochrophis piscator* (Schneider)
 Black oblique stripes absent below the eye.....*Atretium schistosum* (Daudin)
54. Hemipenis forked.....*Rhabdophis subminiata* (Schlegel)
 Hemipenis not forked *R. himalayana* (Gunther)

Key to the Species of Elapidae

1. Maxillary bone extends forwards beyond palatine2
Maxillary bone does not extend beyond palatine.....4
2. Scales arranged obliquely on the body3
Scales arranged not obliquely on the body..... *Calliophis macclellandi* (Reinhardt)
3. Scales in 19-25 rows on the body *Naja naja kaouthia* (Linn.)
Scales in 15 rows on the body..... *Ophiophagus hannah* (Cantor)
4. Paired white crossbars on the back *Bungarus caeruleus* (Schneider)
No paired white crossbars on the back.....5
5. Tails ends obtusely6
Tails ends in a point.....7
6. Scales in 15 rows on the body..... *B. fasciatus* (Schneider)
Scales in 17 or 19th rows on the body..... *B. walli* wall
7. Uniform black or bluish black above with no crossbars on body *B. niger* wall
Black or darkbrown above with crossbars..... *B. bungaroides* (Cantor)

Key to the Species of Hydrophiidae

1. Maxillary bone extends forwards beyond palatine *Laticauda laticaudata* (Linnaeus)
Maxillary bone does not extend beyond palatine.....2
2. Ventral divided by a longitudinal fissure.....3
Ventrals not divided by any longitudinal fissure.....4
3. Prefrontal touching third supralabial *Microcephalophis cantoris* (Günther)
Prefrontal does not touch third supralabial *M. gracilis* (Shaw)
4. Mental elongate, partly hidden in a groove..... *Enhydrina schistosa* (Daudin)
Mental not elongate5
5. Ventrals uniform in size.....6
Ventral not uniform in size..... *Praescutata viperina* (Schmidt)
6. Round or bluntly pointed scales on the thickest part of the body7
Quadrangular or hexagonal scales on the thickest part of the body9
7. Head small, body slender *Hydrophis obscurus* Daudin
Head moderate, body elongate.....8
8. 1 or 2 maxillary teeth behind poison fangs *H. nigrocinctus* Daudin
5 or 6 maxillary teeth behind poison fangs *H. cyanocinctus* Daudin

9. 5-6 maxillary teeth behind poison fangs.....*H. fasciatus* Schneider
 8-18 maxillary teeth behind poison fangs 10
10. 8-10 maxillary teeth behind poison fangs *H. mamillaris* (Daudin)
 14-18 maxillary teeth behind poison fangs.....*H. caeruleus* (Shaw)

Key to the Species of Viperidae

1. Nostril very large and absence of pit.....*Vipera russelli* (Shaw)
 Nostril small and presence of pit.....2
2. First labial completely separated from the nasal.....3
 First labial completely or partly united with the nasal.....*Trimeresurus erythrurus* (Cantor)
3. Hemipenis extending to 12th caudal plate4
 Hemipenis extending to the 20th-25th caudal plate.....*T. popeorum* (Gray)
4. Supraoculars large.....*T. monticola* Gunther
 Supraoculars narrow5
5. Dorsal scales smooth or feebly keeled.....*T. gramineus* (Shaw)
 Dorsal scales strongly keeled.....*T. stejnegeri* Schmidt

Sub-Order (ii). SERPENTES (OPHIDIA)

Family 13. TYPHLOPIDAE

34. *Typhlops acutus* (Dumeril & Bibron)

Beaked Blind Snake

1844. *Onychocephalus acutus* Dumeril & Bibron, *Erp. Gen.*, 6 : 333.

Material : 1 ex., Calcutta, 4.vi.1866, P. Chandra (Reg. No. 6938); 1 ex., Krishnagar, Nadia dist.
 ? R. D. Dombel (Reg. No. 6935).

Measurements : Total length 445 mm - 500 mm.

Distribution : Gurajat & West Bengal.

Remarks : This species is the largest of all blind snakes found in the oriental region. Snout hooked, rostral large.

35. *Ramphotyphlops braminus* (Daudin)

Brahminy Blind Snake

1803. *Eryx braminus* Daudin, *Hist. Nat. Rep.*, 7 : 279.

Material : 1 ex., Calcutta 12.vii.1970, A. K. Mukherjee (Reg. No. 22220); 1 ex., Sampa Mirzanagar, 24-Paranas dist., 23.vi.1980, T. K. Chakraborty (Reg. No. 23956); 2 exs., Contai, Midnapore dist. 20.v.1975, Arabinda Maji (Reg. No. 23469); 1 ex., Bally, Howrah dist., 12.vii.1970, A. K. Sarkar (Reg. No. 22219); 1 ex., Serampore, Hooghly dist. 30.v.1982, H. P. Mukherjee (Reg.

No. 23955); 1 ex., Haldibari, Jalpaiguri dist.? (Reg. No. 10990); 2 exs., Sevok, Darjeeling dist, 18.iii.1945, H. A. Hafiz (Reg. No. 23256).

Measurements : Total length 60 mm - 152 mm.

Distribution : Throughout India. Sri Lanka; Indo.China; Hainan; Southen China; the Malay Peninsula; Persia, Arabia, Mexico.

Remarks : This is a cosmopolitan species, and is common in moist and shady places.

36. *Typhlops diadri* Schlegel
Diard's Blind Snake

1839. *Typhlops diadri* Schlegel, Abbid. Amphib. : 39.

Material : 1 ex., Botanical Garden, Howrah dist. July, 1871, J. Anderson (Reg. No. 6860).

Measurements : Total length 252 mm.

Distribution : Bengal; Assam. Burma; French Indo-China; Siam; the Malay Peninsula and Archipelago.

Remarks : This snake is not as common as the preceding species.

37. *Typhlops porrectus* Stoliczka
Slender Blind Snake

1871. *Typhlops porrectus* Stoliczka, *J. Asiat. Soc. Beng.*, 11 : 426.

Material : 1 ex., Calcutta, 27.viii.1914, Alex J. Brown (Reg. No. 19066); 1 ex., Darjeeling; June, 1912, Lord Carmichael (Reg. No. 18435); 2 exs. Kanchrapara, dist. 24-Parganas, ? D. L. Mc Pharson (Reg. No. 17577-78).

Measurements : Total length of a specimen from Calcutta 185 mm.; (other specimens damaged).

Distribution : India : the Himalayas, Punjab, United Province, Bihar, Orissa, West Bengal, Maharastra, Karnataka, Kerala; Elsewhere : Sri Lanka; Upper Burma.

Family 14. BOIDAE

38. *Eryx conicus* (Schneider)
Russell's Sand Boa

1801. *Boa conica* schneider, *Hist. Amphib.*, 2 : 268.

Material : 1 ex., Garia, Calcutta, 30.iv.1956. ? (Reg. No. 20681).

Measurements : Total length 665 mm, tail 45 mm.

Distribution : India : Rajasthan, Uttar Pradesh, Bihar, Orisa and West Bengal.

Remarks : Scales round the body 48; ventrals 171; caudals 24; tail poined; dorsal surface yellowish wiwh brown zigzag spots; ventral surface pale yellow.

Family 15. COLUBRIDAE

39. *Ptyas mucosus* (Linnaeus)
Dhaman or Rat Snake

1758. *Coluber mucosus* Linnaeus, *syst. Nat.* ed. 10 : 226.

Material : 1 ex., Behala, 30.x.1980, Sankar Das (Reg. No. 23794); 1 ex., Kakdwip, 24 Parganas dist., 20.x.1973, A. K. Mukherjee (Reg. No. 22902).

Measurements : Total length 1674 mm - 2062 mm, tail 452 mm - 481 mm.

Distribution : The whole of India.

Remarks : This is one of the most widely distributed non-poisonous snakes of India; the median and one lateral row of scales on each side are less distinctly keeled; the scales on the body are more or less of the same size.

Dorsum is olivebrown with black cross bars on one third of posterior region of the body; ventral surface is yellowish brown.

40. *Chersydrus granulatus* (Schneider) Indian Wart Snake

1799. *Hydrus granulatus* Schneider, *Hist. Amph.*, 1 : 243.

Material : 1 ex., Sunderban Sea Coast, 24-Parganas dist. A. Rahim (Reg. No. 18651); 1 ex., Hidgilli, Midnapore dist. ? H. L. Houghton (Reg. No. 8091).

Measurements : Total length 128 mm - 732 mm, tail 62 mm - 67 mm.

Distribution : The coasts of India, Ceylon and Indo-China; the Nicobar Islands; Indo-Australian Archipelago to the North Coast of Australia and the Solomon Islands.

Remarks : The arrangement of scales on the head is quite different from other colubrid snakes. Small scales on top of the head; 100 small scales round the body.

41. *Fordonia leucobalia* (Schlegel)

1837. *Homalopsis leucobalia* Schlegel, *Phys. Serp.*, 2 : 345.

Material : 1 ex., Sunderbans, 24-Parganas dist., H. J. Harrison (Reg. No. 8441).

Measurements : Total length 432 mm, tail 47 mm.

Distribution : Rivers and coast of Bengal; the Nicobar Islands. Elsewhere : Burma and Cochin-China; the Indo-Australian Archipelago to N. Australia.

Remarks : This is a water snake, usually found in rivers and coasts of sea; ventrals 154, caudals 30; dorsal surface brown, ventral part yellow. According to Kopstin (1931) it feeds on snake.

42. *Ahaetulla mycterizans* (Linnaeus)

1758. *Coluber mycterizans* Linnaeus, *Syst. Nat.*, ed. 10 : 223.

Material : 1 ex., Calcutta, 21.iv.1870, J. Fayrer (Reg. No. 8863); 1 ex., Mutlah, 24-Parganas dist. 27.xi.1866, W. Swinhoe (Reg. No.8866); 1 ex., Botanical Garden, Howrah dist., R. G. King (Reg. No. 13735).

Measurements : Total length 1002 mm - 1142 mm., tail 365 mm - 456 mm.

Distribution : India : Rajasthan; Bihar; West Bengal and Assam.

Remarks : This is one of the tree snakes geneally known as Whip or Vine snakes. It preys upon

insects and other small animals; one lizard was found in the stomach of a snake from Calcutta. The ventral scale count in a specimen of Calcutta is 177 as against 186-195 (Smith 1943). A species representing the Malayan element in the Indian snake fauna.

43. *Ahaetulla nasuta* (Lacepede)
Common Green Whip Snake

1789. *Coluber nasutus* Lacepede, *Hist. Nat. Serp.*, 1 : 100.

Material : 1 ex., Zoogarden, Calcutta, 30.iv.1935; (Reg. No. 22968); 2 exs., 24-Parganas dist., 22.ix.1972, Lalji Srivastava. (Reg. No. 22539); 1 ex., Ilambazar, Birbhum dist., 21.iii.1984, S. Ahmed & party (Reg. No. 25113).

Measurements : Total length 996 mm - 2227 mm; tail 355 mm - 571 mm.

Distribution : Rajasthan; Bihar (East of Patna); West Bengal and Assam. Elsewhere : Sri Lanka; the Indo-Chinese region as Siam; Cambodia; Cochin-China.

Remarks : This common green whip snake is usually found on trees; and is widely distributed throughout the country. Dorsal surface green with a white line along the ventro-lateral surface on each side of the body.

44. *Ahaetulla prasina* (Boie)

1827. *Dryophis prasinus* Boie, *Iris* : 545.

Material : 1 ex., Darjeeling, Darjeeling dist.; ? N. De Niceville (Reg. No. 14497).

Measurements : Total length 1280 mm, tail 472 mm.

Distribution : Eastern Himalayas (Sikkim); West Bengal. Elsewhere : Indo-Chinese region; Indo-Australian Archipelago.

Remarks : This is one of the rare snakes of India. This snake is not aggressive in nature. Green above and greenish below; a white line along the outer margin of the ventrals; rostral not pointed like other species of *Ahaetulla*.

45. *Amphiesma stolata* (Linnaeus)
Striped Keel Back

1758. *Coluber stolatus* Linnaeus, *Syst. Nat.* 10th E.D. : 219.

Material : 2 exs., Calcutta, 12.v.1980, Manager, Caver factory (Reg. No. 23950); 1 ex. Chitidih vill., Purulia dist., 7.xi.1981. S. Ahmed & party (Reg. No. 23889), 1 ex., Karjadanaga vill., Murshidabad dist., 4.iv.1985, S. Ahmed & party (Reg. No. 24061); 1 ex., Roy Chandrapur vill., Birbhum dist., 26.iii.1984, S. Ahmed & party (Reg. No. 24122); 1 ex., Chapra, West Dinajpur dist., 29.vi.1984, A. K. Sarkar & party (Reg. No. 24159), 1 ex. Patra vill. Bankura dist., 31.x.1980, S. Ahmed & party (Reg. No. 23786); 3 exs., Bakkhali, 24-Parganas dist., 21.ix.1975, S. K. Talukder (Reg. No. 23141); 1 ex., Kantalipara, dist. Jalpaiguri, 1984, S. Ahmed & party (Reg. No. 24218).

Measurements : Total length 335 mm - 609 mm; tail 83 mm - 145 mm.

Distribution : The whole of India; Sri Lanka; Pakistan; Southern China; Hainan; Indo-China; Andaman Is.

Remarks : This is one of the most widely distributed snakes and is chiefly found in both plains and hills. This snake is diurnal in habits.

46. *Atretium schistosum* (Daudin)
Olivaceous Keelback

1803. *Coluber schistosus* Daudin, *Hist. Nat. Rept.*, 7 : 132.

Material : 1 ex., Arapach vill. 24-Parganas dist., 30.x.1968, R. C. Sharma & party (Reg. No. 21938).

Measurements : Total length 8770 mm, tail 2690 mm.

Distribution : India : West Bengal, Orissa, Tamil Nadu, Karnataka, Uttar Pradesh. Elsewhere : Sri Lanka.

Remarks : Broad snouted, terrestrial snake but sometimes it captures frogs in water; upper labials 8, lower labials 7; scales round the body 19.

47. *Boiga gokool* (Gray)
Eastern Gamma Snake

1834. *Dipsas gokool* Gray, *Ill. Ind. Zool.*, 2, pl. 83 fig. 1.

Material : 1 ex., Calcutta, ? G. Nevile (Reg. No. 7841); (Reg. No. 17111), 1 ex., Jalpaiguri dist. ? W. L. Travers (Reg. No. 17111).

Measurements : Total length 2420 mm - 7850 mm; tail 470 mm - 1630 mm.

Distribution : The Eastern Himalayas; Assam; Bangladesh (Chittagong.).

Remarks : This snake is very commonly seen in Duars; an arrow shaped brown mark on the head; series of dorsal 'Y' shaped markings on the body; dorsals 21, ventrals 230-260, caudals 88-89.

48. *Boiga multifasciata* (Blyth)
Himalayan Cat Snake

1861. *Dipsas multifasciata* Blyth, *J. Asiat. Soc. Beng.*, 29 : 114.

Material : 1 ex., Darjeeling, North Bengal, ? J. Gammie (Reg. No. 7860).

Measurements : Total length 8130 mm; tail 1850 mm.

Distribution : Western Himalayas (Uttar Pradesh); Nepal; North Bengal.

Remarks : Head large, eye large, pale greyish brown on dorsal surface with inverted 'Λ' black bars, two black stripes on the head; one on the nape.

49. *Boiga ochracea* (Gunther)

1868. *Dipsas ochraceus* Gunther, *Ann. Mag. nat. Hist.*, (4) 1 : 425.

Material : 1 ex., Nagasuri, Jalpaiguri dist., ? G. W. Shillingford (Reg. No. 12879); 1 ex., Darjeeling, North Bengal, ? T. C. Jerdon.

Measurements : Total length 896 mm - 1021 mm; tail 214 mm - 231 mm.

Distribution : Sikkim; West Bengal; Assam; the Andaman & Nicobar Islands. Burma; Tenasserim.

Remarks : Smith (loc. cit) recognises two forms on the basis of the scale count viz. *Boiga ochracea ochracea* and *Boiga ochracea walli*. Scales round the body 21, ventrals 237 - 241, caudals 115 - 116.

50. *Boiga trigonata* (Schneider)

Indian Gamma; Common Cat Snake

1802. *Coluber trigonatus* Schneider, Bechst. *Transl. Lincee.*, 4 : 256. pl. 11, fig. 1.

Material : 1 ex., Salt Lake, Calcutta, 24.vii.1978, B. Bhattacharjee (Reg. No. 23753); 1 ex. Botanical Garden, Howrah dist. ? (Reg. No. 8961).

Measurements : Total length 2520 mm - 2800 mm, tail 470 mm - 550 mm.

Distribution : The whole of India. Ceylon & Pakistan.

Remarks : Upper labials 8, lower labials 9, scales round the body 21, ventral 215-223. caudals 82; dorsal surface brownish grey, ventral surface whitish. According to Wall (1908 & 1921) the head and body are raised well off the ground, the later thrown into loops prior to striking when the snake is disturbed.

51. *Cerberus rhynchops* (Schneider)

Dog-Faced Water Snake

1799. *Hydrus rhynchops* Schneider, *Hist. Amph.*, 1 : 246.

Material : 1 ex., Calcutta, ? Schwindler (Reg. No. 8419); 1 ex., Luxbagan, 24-Parganas dist., 5.vii.1955, A. K. Mukherjee (Reg. No. 26673); 1 ex., Haldia, Midnapore dist. 5.iv.1977, S. K. Talukder (Reg. No. 23474) 1 ex., Botanical Garden, Howrah dist. 1.viii.1867, J. Anderson (Reg. No. 8112); 1 ex., Barakar, Burdwan dist., G. Nevile (Reg. No. 8107).

Measurements : Total length 731 mm - 1315 mm; tail 244 mm - 402 mm.

Distribution : Coasts and estuaries of India, the Andaman and Nicobar Islands. Elsewhere : Sri Lanka; the Malay Peninsular and Archipelago.

Remarks : This is a quite inoffensive estuarine snake and can easily be distinguished from marine snakes by its round body and tail pattern; both upper and lower labials 7-8; scales round the body 23; ventrals 143-150; caudals 57-71.

52. *Argyrogena fasciolatus* (Shaw)

Banded Racer

1802. *Coluber fasciolatus* Shaw, *Gen. Zool.*, 3 : 528.

Material : 1 ex., Calcutta, 27.vii.1870, J. Fayer (Reg. No. 7332).

Measurements : Total length 385 mm; tail 70 mm.

Distribution : India : Maharashtra; Karnataka; Madhya Pradesh and West Bengal. Elsewhere : northern Sri Lanka.

Remarks : Light brown above with narrow cross bars on the anterior half of the body, lower surface yellowish, it raises its body like a Cobra if it is disturbed.

53. *Dendrelaphis ahaetulla* (Linnaeus)
Painted Bronze - Back

1758. *Coluber ahaetulla* Linnaeus, *Syst. Nat. Ed.*, 10 : 225.

Material : 4 exs., Calcutta, 12.xii.1975, G. P. Sharma (Reg. No. 23289); 1 ex., Dum Dum, Calcutta, 7.x.1965, M. L. Biswas (Reg. No. 23848); 1 ex., Sukchar, 24-Parganas dist., 2.vii.1964, B. Biswas (Reg. No. 23103); 1 ex., Saraswatipur, Jalpaiguri dist., 9.xii.1984, S. Ahmed & party (Reg. No. 24202).

Measurements : Total length 771 mm; tail 269 mm.

Distribution : India : West Bengal; Southern India; the Andaman Islands. Elsewhere : Southern China.

Remarks : This is an arboreal snake with a vertebral row of larger scales; 5th upper labial of a specimen from Calcutta, touches the eye instead of 4th labial as commented upon by Smith (1943), bronze brown above, bluish below, pale yellowish on the flanks.

54. *Dendrelaphis cyanochloris* (Wall)

1921. *Dendrophis pictus* var. *cyanochloris* Wall. *Rec. Ind. Mus.*, 22 : 155.

Material : 1 ex., Darjeeling, North Bengal, Oct., 1872, J. A. Gammie (Reg. No. 7735).

Measurements : Total length 6860 mm., tail 2020 mm.

Distribution : India : West Bengal; Assam; the Andaman & Nicobar Islands. Elsewhere : upper Burma; Tenasserim; Siam.

Remarks : Scales round the body 15; ventrals 204; caudals 126; dorsal surface bronzy olive; ventrals and outer scales rows pale-greenish.

55. *Dendrelaphis gorei* (Wall)
Gore's Bronze Back

1910. *Dendrophis gorei* Wall, *J. Bombay nat. Hist. Soc.*, 19 : 829.

Material : 1 ex., Darjeeling, North Bengal, Oct., 1872, J. A. Gammie (Reg. No. 7705).

Measurements : Total length 4140 mm; tail 190 mm.

Distribution : India : West Bengal; Assam. Elsewhere : Burma Tong-King.

Remarks : This is an arboreal snake but it descends to the ground to capture its prey. This species is somewhat rare in India.

56. *Dendrelaphis tristis* (Daudin)
Common Indian Bronze-Back

1803. *Coluber tristis* Daudin, *Hist. Nat. Rept.*, 6 : 430.

Material : 1 ex., Krishnagar, dist. Nadia, ? R. De Dombel (Reg. no. 7720); 1 ex., Bhatkara Forest area, dist. Birbhum, 31.iii.1984, S. Ahmed & party (Reg. No. 24114); 1 ex., Baradighi tea estate, dist. Jalpaiguri, ? W. L. Travers (Reg. No. 17107); 1 ex., Belgachia, Calcutta, Dec., 1913, A. Smith (Reg. No. 17407); 1 ex., Salkia, dist. Howrah, ? Baron B. A. Duff (Reg. No. 17562).

Measurements : Total length 786 mm 877 mm, tail 249 - 402 mm. Body length, tail length, and variation in scale counts :

Reg. No.	Upper labial L/R	Lower labial L/R	Pre Ocular	Post Ocular	Temporal	Scales round the body	Ventral	Caudal	Total length	Tail length	Anal
17407	9	9/8	1	2	2+2	15	189	133	73.6	24.9	2
17562	9	8	1	2	1+2	15					dam.
7720	9	9	1	2	1+2	15					dam.
17107	9	7/8	1	2	1+2	15	192	126	87.7	26.9	1
24114	9	8/8	1	2	2+2 1+2	15	191	132	122.5	40.2	

Distribution : India : West Bengal; Tamil Nadu.

57. *Dinodom gammiei* (Blanford)

1878. *Ophites gammiei* Blanford, *J. Asiat. Soc. Beng.*, 47 : 130.

Material : 1 ex., Darjeeling, North Bengal, ? Lord Carmichael (Reg. No. 17129); 1 ex., Darjeeling, North Bengal, ? K. K. Tiwari (Reg. No. 23431).

Measurements : Total length 913 mm 1185 mm; tail 197 mm - 285 mm.

Distribution : Sikkim and West Bengal.

Remarks : This is a rare snake in India; scales round the body 17; ventrals 207-222; Caudals 94-104; dorsum with alternating black and light greenish yellow bands.

58. *Elaphe cantoris* (Boulenger)

Ring-Tailed Dhaman/Ring-Tailed Trinket Snake

1894. *Coluber cantoris* Boulenger, *Cat. Sn. Brit. Mus.*, II : 35.

Material : 1 ex., Kurseong, Darjeeling dist, ? J. S. Gamble. (Reg. No. 12019).

Measurements : Total length 425 mm; tail 85 mm.

Distribution : Sikkim; West Bengal; Assam. Upper Burma.

Remarks : Though this snake is common in the hills, it has so far been not reported further beyond Sikkim.

59. *Elaphe helena* (Doudin)

Trinket Snake

1803. *Coluber helena* Daudin, *Hist. Nat. Rept.*, 6 : 277.

Material : 1 ex., Jalpaiguri, West Bengal, ? W. Lancelot Travers (Reg. No. 17108); 1 ex., Mutlah, 24-Parganas dist. June, 1867, W. Swinhoe (Reg. No. 7035).

Measurements : Total length 358 mm 429 mm; tail 58 mm 82 mm.

Distribution : Assam; West Bengal & Uttar Pradesh.

Remarks : This beautifully coloured snake is common only in the Jalpaiguri dist. of West Bengal; scales round the body 25; ventrals 235-246 caudals 78-89; upper and lower labials 8-9.

60. *Elaphe porphyracea* (Cantor)1839. *Coluber porphyraceous* Cantor, *Proc. zool. Soc.*, : 51.*Material* : 1 ex., Gopaldhara, Darjeeling dist. ? H. Stevens (Reg. No. 18643).*Measurements* : Total length 253 mm; tail 38 mm.*Distribution* : Sikkim; West Bengal; Assam. Burma; Yunnan; Western China; North Siam; the Malay Peninsula; Sumatra.*Remarks* : According to Smith (1935) two forms of this species are recognisable depending on the number of cross-bar on the body. This snake having 19 cross bars on dorsal surface belongs to the form *Elaphe porphyracea porphyracea* in which the rings range from 14-20.61. *Elaphe prasina* (Blyth)

Green Tree Racer

1845. *Coluber prasinus* Blyth, *J. Asiat. Soc. Beng.*, 23 : 291.*Material* : 1 ex., Darjeeling, West Bengal, ? J. Gammie (Reg. No. 7733).*Measurements* : Total length 8197 mm; tail 287 mm.*Distribution* : West Bengal; Assam. Upper Burma; Yuman; Teng-King; Malay Peninsula.*Remarks* : It has not been reported so far from West Bengal (Darjeeling district) and Assam.62. *Enhydris enhydris* (Schneider)

Schneiders Water-Snake/Smooth Water Snake

1799. *Hydrus enhydris* Schneider, *Hist. Amph.* 1 : 245.*Material* : 1 ex., Ballygaunge, Calcutta, ? S. C. Law (Reg. no. 23936); 1 ex., Diamond Harbour, 24-Parganas dist. 9.xi.1963, Dr. Walter (Reg. No. 22916); 1 ex., Ullberia, Howrah dist., ? J. Anderson (Reg. No. 8176); 1 ex., Uttarpara, Hooghly dist., 3 vii.1956, Hindusthan Motor Works employee (Reg. No. 2067); 1 ex., Burdwan, West Bengal, ? C. K. Sinha (Reg. No. 23731); 1 ex., Vaisalnagar, Maldah dist., 21.iii.1980, D. N. Tiwari (Reg. No. 23784) 1 ex., Berhampur, Murshidabad dist. 30.v.1973, B. Roy (Reg. No. 23937).*Measurements* : Total length of the body 457 mm - 606 mm; tail 105 mm - 113 mm.*Distribution* : Uttar Pradesh; Bihar; Andhra Pradesh; Orissa; West Bengal; Assam. Burma; Siam; French Indo-China; S. Shina; the Malay Peninsula and Archipelago.

Total length of body, tail length and variation in scale counts

Reg. No.	Upper labial L/R	Lower labial L/R	Temp-oral	Scales round the body	Ventral	Caudal	Total length mm	Tail length mm
23939	8	9	1+2	21	151	59	584	104
22916	7	6	1+2	21	161	68	463	107
8176	8,7	dam.	1+2	22	157	57	612	106
2067	8,7	7	1+2	21	dam.	59	606	105
23731	8	7	1+2	21	162	56	457	113
23784	8	8	1+2	21	154	32	435	46
23937	8	10	1+2	21	157	72	727	147

63. *Gerardia prevostiana* (Eydoux & Gervais)

1832-37. *Coluber (Homalopsis) prevostianus* Eydoux & Gervais, *Cuer. Mag. Zool.*, Cl. 3 : 5.

Material : 1 ex., Howrah, West Bengal, ? Smith (Reg. No. 13659); 1 ex., Kakdwip, 24-Parganas dist. ? N. Nandy (Reg. No. 24212), 1 ex., Digha beach, Midnapore, 4.ix.1964, A. K. Das (Reg. No. 22653).

Measurements : Total length 413 mm - 57 mm; tail 46 mm - 63 mm.

Distribution : India : Coasts & rivers of West Bengal; Maharashtra; Kerala. Elsewhere : Sri Lanka; Burma & Malay Peninsula.

Remarks : This snake can easily be distinguished by the shape of its head scales from other water snakes; internasal scale elongated and pentagonal in shape; frontal is hexagonal, dorsals 17; ventrals 150-152; caudals 32-34. This species is reported for the first time from West Bengal.

64. *Lycodon aulicus* (Linnaeus)

Common Wolf Snake

1754. *Coluber aulicus* Linnaeus, *Mus. Adolph. Trider*, 1 : 29.

Material : 1 ex., Salt Lake, Calcutta, 26.xi.1968, B. Biswas (Reg. No. 22450); 1 ex., Bakkhali, 24-Parganas dist., 21.ix.1975, S. K. Talukder (Reg. No. 23173); 1 ex., railway station campus at Midnapore, 10.iv.1977, S. K. Talukder (Reg. No. 23475); 1 ex., Botanical Garden, dist. Howrah, ? Fraser (Reg. No. 8148); 1 ex., Bankura, West Bengal, 28.xii.1896, J. R. Green (Reg. No. 14246); 1 ex., Chanchal dist. Maldah, 23.iii.1980, D. N. Tiwari (Reg. No. 23957).

Total length of body, tail length and variation in scale counts

Reg. No.	Upper labial L/R	Lower labial L/R	Temp-oral	Scales round the body	Ventral	Caudal	Total length mm	Tail length mm
22450	9,9	9/9	2+3	17	207	68	192	32
23173	8,9	9/9	2+2	17	195		274	40
8148	9,9	9/9	3+2	16	213	71	472	77
23475	8,9	8/8	2+2 2+2	17	199	71	180	33
14246	8,9	9/9	2+2 2+3	17	Damaged	64	410	68
23957	9,9	10,9	2+3	17	Damaged	29	175	29

Distribution : The whole of India. Nepal; Burma; Sri Lanka; French Indo-China; Southern China; Hongkong; the Maldives Island; the Malay Peninsula and Archipelago; Celebes and the Philippines.

Remarks : According to Smith (1943) there are two colour forms of this species i.e. *Lycodon aulicus aulicus* and *Lycodon aulicus capucinus*. The specimens under report agree with the former; 21-31 white bifurcated bands on dorsal surface; the bands speckled with brown; ventral surface pale brown; the common wolf snake is usually seen around human habitations.

65. *Lycodon jara* (Shaw)
Twin-Spotted Wolf-Snake

1802. *Coluber jara* Shaw, *Gen. Zool.*, 3 : 525.

Material : 1 ex., Ballygaunge, Calcutta, ? O. Moses (Reg. No. 19473). 1 ex., Botanical Garden, Howrah dist., Feb. 1867 J. Anderson, (Reg. No. 8015); 1 ex., Sherpur, 24-Parganas dist., 20.v.1981, S. Ahmed (Reg. No. 23823).

Measurements : Total length 340 mm - 357 mm, tail 65 mm - 70 mm.

Distribution : Tamil Nadu; Orissa; West Bengal & Assam.

Remarks : Dorsal surface brownish with white stripes all over the body; ventral surface yellow; this is a rare snake.

66. *Natrix khasiensis* (Boulenger)

1890. *Tropidonotus khasiensis* (Boulenger), *Faun. Brit. India.*, : 344.

Material : 1 ex., Sureil, Darjeeling dist., ? A. Alcock (Reg. No. 15260).

Measurements : Total length 584 mm, Tail 104 mm.

Distribution : West Bengal; Assam. Upper Burma; Nam Tamail Valley; Tong King.

Remarks : This snake has been recorded from Eastern India. The specimen under study is the first documented record from West Bengal.

67. *Amphiesma parallela* (Boulenger)

1890. *Tropidonotus parallelus* Boulenger, *Faun. Brit. India.*, : 345.

Material : 1 ex., Darjeeling, W. Bengal, March 1867, J. Anderson (Reg. No. 7490).

Measurements : Total length 257 mm, Tail damaged.

Distribution : West Bengal, Sikkim; Assam. Upper Burma; Yunnan; Tonk King.

Remarks : This species is not widely distributed and is reported for the first time from this area. Dorsals 19, ventrals 167; dorsal surface greenish; a black streak extends from the eye to the angle of the mouth.

68. *Amphiesma platyceps* (Blyth)

1854. *Tropidonotus platyceps* Blyth, *J. Asiat. Soc. Beng.* 23 : 297.

Material : 1 ex., Takdah, Darjeeling dist., 17.vi.1958, H. Khajuria. (Reg. No. 21019).

Measurements : Total length 835 mm, tail 185 mm.

Distribution : Kashmir to Assam.

Remarks : This species is widely distributed and is very common in the district of Darjeeling; dorsal surface olive brown; ventral surface yellowish.

69. *Rhabdophis subminiata* (Schlegel)
Red-Necked Keelback

1837. *Tropidonotus subminiatus* Schlegel, *phys. Serp.*, 2 : 313.

Material : 1 ex., Gopaldhara, Darjeeling dist. ? H. Stevens (Reg. No. 18630); 1 ex., Jalpaiguri, West Bengal, ? Shillingford (Reg. No. 12667).

Measurements : Total length 616 mm, tail 167 mm.

Distribution : Indo-Chinese subregion; southern China; Hainan; Hong Kong; the Malay Peninsula and Archipelago.

Remarks : This species is not so widely distributed in India as preceding species.

70. *Trachischium fuscum* (Blyth)

Black-Bellied Roughside

1854. *Calamaria fusca* Blyth, *J. Asiat. Soc. Beng.*, 23 : 288.

Material : 1 ex., Kurseong, Darjeeling dist., 11.iii.1926, Sharif (Reg. No. 23960).

Measurements : Total length 81 mm, tail 17 mm.

Distribution : Kashmir; Uttar Pradesh; West Bengal; Assam.

Remarks : This snake is distinguished from other members of the family Colubridae by the presence of a single almost rectangular prefroital scale; scales round the body 13; it lives under stones; three dark brown longitudinal stripes on the dorsal-lateral surface on each side of the body.

71. *Oligodon albocinctus* (Cantor)

Ladder Back Kukri Snake

1839. *Coronella albocincta* Cantor, *Proc. Zool. Soc.*, : 50.

Material : 1 ex., Darjeeling, West Bengal, ? J. A. Gammie (Reg. No. 7743).

Measurements : Total length 710 mm, tail 115 mm.

Distribution : Sikkim; West Bengal; Assam. Bangladesh; Burma.

Remarks : This snake is rare in the plains. Brown above with 29 black-edged cross bars; black squarish spots on the outer margin of ventrals.

72. *Oligodon juglandifer* Wall

Large-Spotted Kukri Snake

1911. *Simotes juglandifer* Wall, *J. Bombay nat. Hist. Soc.*, 29 : 1162.

Material : 1 ex., Gopaldhara, Darjeeling dist. ? H. Stevens (Reg. No. 18633).

Measurements : Total length 614 mm, tail 102 mm.

Distribution : West Bengal (Darjeeling dist.).

Remarks : This species is very rare in India and its distribution is so far confined to Darjeeling district. According to Shaw & Shebbeare (1939-40), this snake seldom comes to plains below 2000 ft.

73. *Oligodon arnensis* (Shaw)

Common Kukri Snake

1802. *Coluber arnensis* Shaw, *Gen. Zool.*, 3 : 526.

Material : 1 ex., Calcutta, Nov. 1870, J. Fayer (Reg. No. 7118); 1 ex., Serampore, Hooghly Dist. ? G. B. Mainwaring (Reg. No. 12634); 1 ex., Kakdwip, 24-Parganas, 17.ix.1975, S. K. Talukder (Reg. No. 23098).

Measurements : Total length 392 mm - 413 mm, tail 68 mm - 80 mm.

Distribution : India : West Bengal. Uttar Pradesh. Elsewhere : Nepal; Pakistan.

Remarks : This species is common both in the hills and plains. Black crossbars on the body range from 35-46; 3 distinct triangular marks on head; ventrals 189-199; Upper labials 7 in all specimens except one from Calcutta; lower labials 6.

74. *Oligodon cyclurus* (Cantor)

1839. *Coronella cyclura* Cantor, *Proc. Zool. Soc.*, : 50.

Material : 1 ex., Atimachar, Coochbehar dist., 3.ix.1983, A. K. Mondal (Reg. No. 24087); 1 ex., Alipore, Calcutta, Aug. 1919. Mrs. B. M. Smith (Reg. No. 19144); 1 ex., Darjeeling, W. Bengal. ? G. King (Reg. No. 8613); 1 ex., Jalpaiguri, West Bengal, ? W. Lancelot Travers (Reg. No. 17105).

Measurements : Total length 333 mm - 557 mm, tail 330 mm - 620 mm.

Distribution : India : West Bengal; Assam. Elsewhere : Bangladesh; Cochin China; Burma; Siam; Indo-China.

Remarks : According to Smith (1943) there are 5 colour forms of this snake. Here the specimens having dark brown reticulations on the body belong to first form; 7 upper and 7 lower in all specimens except one from Jalpaiguri district in which the upper labials are 8.

75. *Pareas monticola* (Cantor)

1839. *Dipsas monticola* Cantor, *Proc. Zool. Soc.*, : 53.

Material : 1 ex., Takdah, Darjeeling dist., 10.viii.1958, H. Mukherjee (Reg. No. 21021).

Measurements & Scale counts : Body damaged, tail 22 mm, dorsals 15; ventrals 181; caudals 72.

Distribution : Sikkim; West Bengal; Assam.

76. *Psammodynastes pulverulentus* (Boie)

Mock Viper

1827. *Psammophis pulverulenta* Boie, *Isis* : 547.

Material : 1 ex., Darjeeling, West Bengal, 29.ix.1870, J. Gammie (Reg. No. 7650).

Measurements : Total length 575 mm, tail 75 mm.

Distribution : The whole of Indo-China.

Remarks : This snake is rare in India. It has so far been recorded only from North Bengal in India. It strikes vigorously at its offenders if disturbed.

77. *Psammophis condanarus* (Merrem)

1820. *Coluber condanarus* Merrem, *Tent. Syst. Amph.*, : 107.

Material : 1 ex., Lower Bengal, ? Russell (Reg. No. 7594).

Measurements : Total length 667 mm (tail damaged).

Distribution : India : Haryana; Maharashtra; Uttar Pradesh; Bihar; Orissa; West Bengal. Elsewhere : Pegu; Lopburi; Bangkok, Phan-rang in Annam.

Remarks : According to Smith (1943) there are two colour formes of this snake viz. *Psammophis condanarus condanarus*, and *Psammophis condanarus indochinensis* based mainly on the number of stripes on the body and other morphological characters. The snake under study has 5 dark brown stripes and belongs to the former. Scales round the body 17; Upper labials 7-8; lower labials 8.

78. *Pseudoxenodon macrops* (Blyth)

1854. *Tropidonotus macrops* Blyth, *J. Asiat. Soc. Beng.*, 23 : 296.

Material : 1 ex., Darjeeling, West Bengal, 24.vi.1870, J. Gammie (Reg. No. 7781).

Measurements : Total length 812 mm, tail 182 mm.

Distribution : India : West Bengal; Assam. Elsewhere : Nepal; Burma; Siam; Annam and Malay Peninsula.

Remarks : The ornamentation on the head and body of this snake is variable. Both upper and lower labials 8; dorsals 19; ventrals 173; caudals 61.

79. *Chrysopelea ornata* (Shaw)

Golden Tree Snake; Flying Snake

Material : 1 ex., Calcutta, ? D. D. Cunningham (Reg. No. 7776).

Distribution : Bihar, Orissa and West Bengal.

Remarks : Dorsals 19, ventrals 215, caudals 111; colour variable : pale greenish yellow above, lower surface marked alternately with black and yellow spots.

80. *Sibynophis sagittarius* (Cantor)

1839. *Calamaria sagittaria* Cantor, *Proc. Zool. Soc.*, : 49.

Material : 1 ex., New Barackpur, dist. 24-Parganas; 30.iii.1977, G. K. Samanta (Reg. No. 23756); 1 ex., Calcutta 12.x.1874, O. L. Franger (Reg. No. 8722); 1 ex., Botanical Garden, 1868, J. Anderson (Reg. No. 7067); 1 ex., Hooghly dist. ? Woodmason (Reg. No. 8739).

Measurements : Total length 219 mm - 280 mm, tail 28 mm - 58 mm.

Distribution : Uttar Pradesh; Madhya Pradesh; West Bengal.

Remarks : Upper labials 8; lower labials 7-8, dorsal 17, ventrals 229-275; caudals 32-64; dorsal surface pale brown with vertebral series of black dots; ventral surface pale yellow; elongate yellowish patch on either side of the head.

81. *Xenochrophis piscator* (Schneider)

Checked Heelback

1799. *Hydrus piscator* Schneider, *Hist. Amph.*, : 247.

Material : 2 exs., Salt Lake, Calcutta, 8.xi.1964. B. Biswas (Reg. No. 22901); 1 ex., Dhankoda, Susunia, Bankura dist., 10.i.1981, S. Banerjee & Party (Reg. No. 23903); 1 ex., Patharpratima, 24-Parganas dist., May, 1972. S. Dinda (Reg. No. 22513); 1 ex., Haldia, Midnapore dist., 5.iv.1977, S. K. Talukder (Reg. No. 23473).

Measurements : Total length 714 mm - 1154 mm; tail 194 mm - 299 mm.

Distribution : The whole of India. Pakistan; Indo-China region.

Remarks : Upper labials 9 except in one juvenile which has 8; lower labials 9-10; dorsals 19; caudals 65-75; Smith (1943) differentiated four colour forms of this species depending on their geographical range; this snake agrees with in which dorsal spots are arranged in five rows; this is an (*X. piscator piscator*) aquatic snake and is common throughout West Bengal.

82. *Zaocys nigromarginatus* (Blyth)

1854. *Coluber nigromarginatus* Blyth, *J. Asiat. Soc. Beng.*, 23 : 29.

Material : 1 ex., Darjeeling, Oct., 1872, J. Gammie (Reg. No. 8807).

Measurements : Total length 1670 mm, tail 600 mm.

Distribution : Sikkim; West Bengal; Assam. Burma; Tonk-King; Yunnan & Western China.

Remarks : This is a hill snake; dorsal surface green with four broad stripes confined to the posterior one third of the body; dorsal 16; ventrals 188; caudals 123.

Family 15. HYDROPHIDAE

83. *Enhydrina schistosa* (Daudin) Beaked Seasnake

1803. *Hydrophis schistosus* Daudin, *Hist. Nat. Rept.*, 7 : 386 (based on Russell).

Material : 1 ex., Diamond Harbour, 1.xi.1972, 24-Parganas dist. Research Scholar, Z.S.I. (Reg. No. 22546).
1 ex., Midnapore dist., 12.vii.1970, ? (Reg. No. 22546).

Measurements : Total length 282 mm - 772 mm, tail 87 mm - 108 mm.

Distribution : From the Persian Gulf to the coast of Cochin China and the North Coast of Australia.

Remarks : This snake is distinguished by its high rostral from other members of the family; dorsals 60-63; this species is common along the east and west coasts of India.

84. *Laticauda laticaudata* (Linnaeus)

1758. *Coluber laticaudatus* Linnaeus, *Syst. Nat.* 10th ed. : 222.

Material : 1 ex., Tolly's nullah, Calcutta, ? J. Fayrer (Reg. No. 8289).

Measurements & Scale counts : Total length 1275 mm, tail 36 mm, dorsals 19, ventrals 240.

Distribution : Bay of Bengal, the Seas South of Japan to the Coast of Australia and Islands of Ocenia.

Remarks : Though this speies is usually found in river mouths it has so far been reported from Calcutta and Little Nicobar Harbour in the Nicobar Islands only; body with broad black bands.

85. *Hydrophis caeruleus* (Shaw)
Many-Toothed Seasnake

1802. *Hydrus caeruleus* Shaw, *Gen. Zool.*, 3 : 561.

Material : 1 ex., Sandhead, mouth of Hooghly river, 24-Parganas dist., ? C. J. Scott (Reg. No. 8413).

Measurements & Scale counts : Total length 1235 mm, tail 63 mm, dorsals 38, ventrals 304.

Distribution : Bombay to China and the Malay Archipelago; recorded between Bombay and Karwar on the west coast and from Andhra Pradesh, Orissa, and West Bengal on the east coast.

86. *Hydrophis cyanocinctus* Daudin
Annulated Seasnake

1803. *Hydrophis cyanocinctus* Daudin, *Hist. Nat. Rept.*, 7 : 383.

Material : 1 ex., Sunderbans sea coast, 24-Parganas dist. ? A. Rahim (Reg. No. 18653); 1 ex., Hooghly river below Calcutta, 1867, J. Anderson (Reg. No. 8272).

Measurements & Scale counts : Total length 959 mm - 1485 mm; tail 41 mm - 71 mm, dorsals 38 - 40; ventrals 300 - 320.

Distribution : Persian Gulf to Japan and the Indo-Australian Archipelago.

Remarks : This species is very common on the west coast of India and Sri Lanka and rare on the east coast of India; 71-80 wide bluish bands on the body.

87. *Hydrophis fasciatus* (Schneider)

1799. *Hydrus fasciatus* Schneider, *Hist. Amphib.* 1 : 240.

Material : 1 ex., Sandheads, mouth of river Hooghly, 24-Parganas dist. ? P. V. Fraser (Reg. No. 19505), 1 ex., Digha beach, Midnapore dist. 3.ix.1964, A. K. Dutta (Reg. No. 22652).

Measurements & Scale counts : Total length 700 mm - 784 mm; dorsals 50-53; ventrals 400-475.

Distribution : East coast of India. Indo-Chinese coast.

Remarks : This species includes two races. The race *fasciatus* is common on the east coast of India but is rare on the west coast.

88. *Hydrophis mamillaris* (Daudin)
Bombay Sea Snake

1803. *Anguilla mamillaris* Daudin, *Hist. Nat. Rept.*, 7 : 340.

Material : 1 ex., Digha beach, Midnapore dist., 4.ix.1964, A. K. Dutta (Reg. No. 22671).

Measurements & Scale counts : Total length 628 mm, tail 74 mm, dorsals 43, ventrals 385.

Distribution : Gulf of Cambay; coasts of West Bengal; Maharashtra and Andhra Pradesh.

89. *Hydrophis nigrocinctus* Daudin

1803. *Hydrophis nigrocinctus* Daudin, *Hist. Nat. Rept.*, 7 : 380.

Material : 1 ex., Vidyariver, 24-Parganas dist., 20.ix.1983, S. M. Ali & party (Reg. no. 24084).

Measurements and Scale counts : Total length 520 mm, tail 45 mm; dorsals 40; ventral surface dissected.

Distribution : Coasts of Bay of Bengal (Sunderbans). Burma.

Remarks : Juvenile specimen with a dark blue patch on head, dark blue streaks on the upper lip, 60 dark blue bands of uniform width on the body.

90. *Hydrophis obscurus* (Daudin)
Estuarine Sea Snake

1803. *Hydrophis obscura* Daudin, *Hist. Nat. Rept.*, 7 : 375.

Material : 1 ex., Sunderbans, 24-Parganas dist. ? H. Butcher (Reg. No. 8522); 1 ex., Hidgili, Midnapore dist. ? H. L. Hanghton (Reg. No. 8253).

Measurements & Scale counts : Total length 930 mm - 1603 mm, tail 105 mm - 108 mm, dorsals 30-32, ventrals 300-320.

Distribution : From coast of India to the coasts of Burma.

Remarks : Head small, with a curved yellow mark on it, body moderately slender and compressed posteriorly, reddish brown dorsal bands 55-64 on the body.

91. *Microcephalophis cantoris* (Gunther)
Cantor's Small-Headed Sea Snake

1864. *Hydrophis cantoris* Gunther, *Rept. Brit. Ind.*, : 374.

Material : 1 ex., Digha shore, Midnapore dist., 27.iii.1975, T. K. Sen (Reg. No. 23149); 1 ex., Sandhead, mouth of river Hooghly, 24-Parganas dist., W. Earl (Reg. No. 8231).

Measurements & Scale count : Total length 1306 mm - 1368 mm; tail 92 mm - 97 mm, dorsals 43-46; ventrals 405-450.

Distribution : West coast of India (Cannanore); east coast of India (Orissa, Sunderbans). Karachi; Chittagong coasts.

92. *Microcephalophis gracilis* (Shaw)
Common Small-Headed Seasnake

1802. *Hydrus gracilis* Shaw, *Gen. Zool.*, 3 : 560.

Material : 1 ex., Sandhead, Hooghly river, 24-Parganas dist., 1924, P. V. Lady Fraser (Reg. No. 22522); 1 ex., Digha beach, Midnapore dist., 3.ix.1964, A. K. Dutta (Reg. No. 22673).

Measurements & Scale counts : Total length 311 mm - 637 mm, tail 41 mm - 75 mm; dorsals 33-35; ventrals 230-240.

Distribution : Persian Gulf to Southern China, the coasts of Australia, east coast of India.

Remarks : Head very small with slender body; snout projecting beyond lower jaw; ventrals divided by a longitudinal fissure.

93. *Praescutata viperina* (Schmidt)

1852. *Thalassophis viperina* Schmidt, *Abh. Nat. Ver. Hamburg*, 2 : 79.

Material : 1 ex., Digha beach, Midnapore dist., 3.ix.1964, A. K. Dutta (Reg. No. 22650).

Measurements & Scale counts : Total length 496 mm, tail 77 mm, dorsals 43, Upper labials 8 (4-5 touching the eye), lower labials 9.

Distribution : From Persian Gulf to Southern China and the Malay Archipelago.

Remarks : According to Smith (1943) there are three colour forms of this species i.e. Form 1. Complete gray above, white below, Form 2. dorsum grey with dark rhomboidal spots, and Form 3. Completely banded. The specimen examined agrees with the first form. This species is widely distributed in Indian waters.

Family 16. ELAPIDAE

94. *Elaps bungaroides* Cantor

1839. *Elaps bungaroides* Cantor, *Proc. zool. Soc.*, : 33.

Material : 1 ex., Labdah, near Kurseong, Darjeeling dist. ? J. L. Lister (Reg. No. 8692).

Measurements : Total length 543 mm, tail 61 mm.

Distribution : Sikkim; West Bengal; Assam. Upper Burma.

Remarks : This is a rare snake in West Bengal; dorsals 15, ventrals 239, 62 brown bands on the body, ventral surface whitish.

95. *Bungarus caeruleus* (Schneider)

Common Indian Krait/Blue Krait

1801. *Pseudoboa caerulea* Schneider, *Hist. Amphib*, 2 : 284 (based on Russell).

Material : 1 ex., Calcutta, ? R. Hodgart (Reg. No. 16688); 1 ex., Ranigaunge, Burdwan dist.? purchased (Reg. No. 2904), 1 ex., Patharpratima, 24-Parganas dist., May 1972 (Reg. No. 23516); 1 ex., Korondi vill., Purulia dist., S. Ahmed & party (Reg. No. 23916).

Measurements & Scale counts :

Reg. No.	Scales round the body	Ventral	Caudal	Total length mm	Tail mm
23516	15	204	49	572	86
16688	15	201	49	714	116
2904	15	206	50	786	117
23916	15	216	47	1200	160

Distribution : India : Rajasthan; Uttar Pradesh; Madhya Pradesh; Bihar; West Bengal; Orissa; Andhra Pradesh and Andaman Islands. Elsewhere : Sri Lanka.

Remarks : Body with narrow white bands. This snake is highly poisonous and is nocturnal in habits.

96. *Bungarus fasciatus* (Schneider)

Banded Krait

1801. *Pseudoboa fasciata* Schneider, *Hist. Amph.* 2 : 283 (based on Russell's disc fig.).

Material : 1 ex., Ballygaunge, Calcutta, 12.viii.1973, Manager, Aligarh Dairy Farm (Reg. No. 20086); 1 ex., Krishnanagar, Nadia dist.? Maharaj Bahadur of Nadia (Reg.No. 19084); 1 ex., Botanical Garden, Howrah dist.,? J. Anderson (Reg. No. 1867); 1 ex., Ranigunge, Burdwan dist.,? (Reg. No. 2923).

Measurements & Scale counts :

Reg. no.	Scales round the body	Ventral	Caudal	Total length mm	Tail mm
20086	15	222	37	587	60
1867	15	226	34	1459	137
2923	15	224	37	998	98
19084	15	225	34	1474	1260

Distribution : India : Uttar Pradesh; Bihar; Orissa and Andhra Pradesh. Elsewhere : Malay Peninsula; Archipelago; Southern China.

Remarks : Alternately banded with black bands wider than inter spaces; this snake is usually found in plains and open areas; According to Wall (1911) this snake is not as venomous as the Cobra.

97. *Bungarus lividus* Cantor

Lesser Black Krait

1839. *Bungarus lividus* Cantor, *Proc. zool. Soc.*, 32.

Material : 1 ex., Jalpaiguri, West Bengal, ? Major Wall (Reg. No. 16685).

Measurements : Total length 472 mm; tail 56 mm.

Distribution : India : West Bengal; Assam. Elsewhere: Bangladesh.

Remarks : This snake is not widely distributed in India. Scales round the body 15; ventrals 215; caudals 41.

98. *Naja naja kaoutchia* (Linnaeus)

Indian Corba

1758. *Coluber naja* Linnaeus, *Syst. Nat.* 10th ed, : 221.

Measurement & Scale counts :

Reg. no.	Labials L/R	Dorsal	Ventral	Caudal	Total length	Tail mm	Pre ocular	Post ocular	Temp
22950	7	21	177	58	407	78	1	1	2+2
22949	7/8	21	178	58	67	9	1	3	2+1
	8/8								
8781	7	21	180	52	393	65	1	2	2+1
18172	7	21	181	49	382	54	1	2	2+1
8329	7	21	183	50	319	52	1	3	2+1

Material : 1 ex., Palta, 24-Parganas dist., 19.vii.1975, N. Maghi (Reg. No. 22949); 1 ex., Dumdum, Calcutta, 7.iv.1968, ? (Reg. No. 22950); 1 ex., Botanical Garden Howrah dist. ? J. Anderson (Reg. No. 8781); 1 ex., Krishnanagar, Nadia dist. ? R. De Dombel (Reg. No. 8329). 1 ex., Burdwan, dist. Burdwan, 11.x.1916, E. B. White (Reg. No. 18172).

Distribution : India : Bihar; Uttar Pradesh; West Bengal; Assam; Andaman & Nicobar Islands. Elsewhere : Nepal; Upper Burma; Southern China.

99. *Ophiophagus hannah* (Cantor)
King Cobra

1836. *Hamadryas hannah* Cantor, *Asiat. Research*, 19 : 187.

Material : 1 ex., Botanical Garden, Howrah dist., 16.ix.1880, J. Anderson (Reg. No. 8292); 1 ex., Darjeeling, 16.ix.1880, J. Gammie (Reg. No. 8294).

Measurements : Total length 2364 mm - 2557 mm; tail 434 mm - 465 mm.

Distribution : India : West Bengal; Bihar; Orissa; Western Ghats (some segments); Andaman Isladns. Elsewhere : Upper Burma; Southern China; the Malay Peninsula and Archipelago; the Philippine Islands; Siam and Frech Indo-China.

Remarks : This snake is highly poisonous and is found both in hills and plains. This is diurnal snake and is aggressive in nature; 33 yellow cross bars on the dorsum and the tail. The cross bars are confined to posterior part of the body and tail in the specimen from Howrah.

Family 17. VIPERIDAE

100. *Vipera russelli* (Shaw)
Russell's Viper

1779. *Coluber russelli* Shaw, *Nat. Misc*; viii 291.

Material : 1 ex., Gokarni; 24-Parganas dist., 9.xi.1971, S. K. Roy (Reg. No. 22456); 1 ex., Nischindapur, Howrah dist., 22.vii.1977, D. K. Biswas (Reg. No. 23566); 1 ex., Uttarpara, Hooghy dist., 31.i.1967. Mrs. N. Pal' (Reg. No. 23092).

Measurements : Total length 620 mm - 1030 mm, tail 110 mm - 140 mm.

Distribution : The whole of India. Sri Lanka; Pakistan; Burma; Siam; China; Formosa.

Remarks : This snake can be found both in the plains and hills; dorsal 31, ventrals 169, caudals 46. This snake is nocturnal in its habits.

101. *Trimeresurus gramineus* (Shaw)
Bamboo Pit Viper

1802. *Coluber gramineus* Shaw, *Gen. zool.* 3 : 420.

Material : 1 ex., Nagasuri, Jalpaiguri dist., 30.xii.1884, G. W. Shillingford (Reg. No. 12665).

Measurements : Total length 375 mm, tail 65 mm.

Distribution : Peninsular India south of lat. 22°.

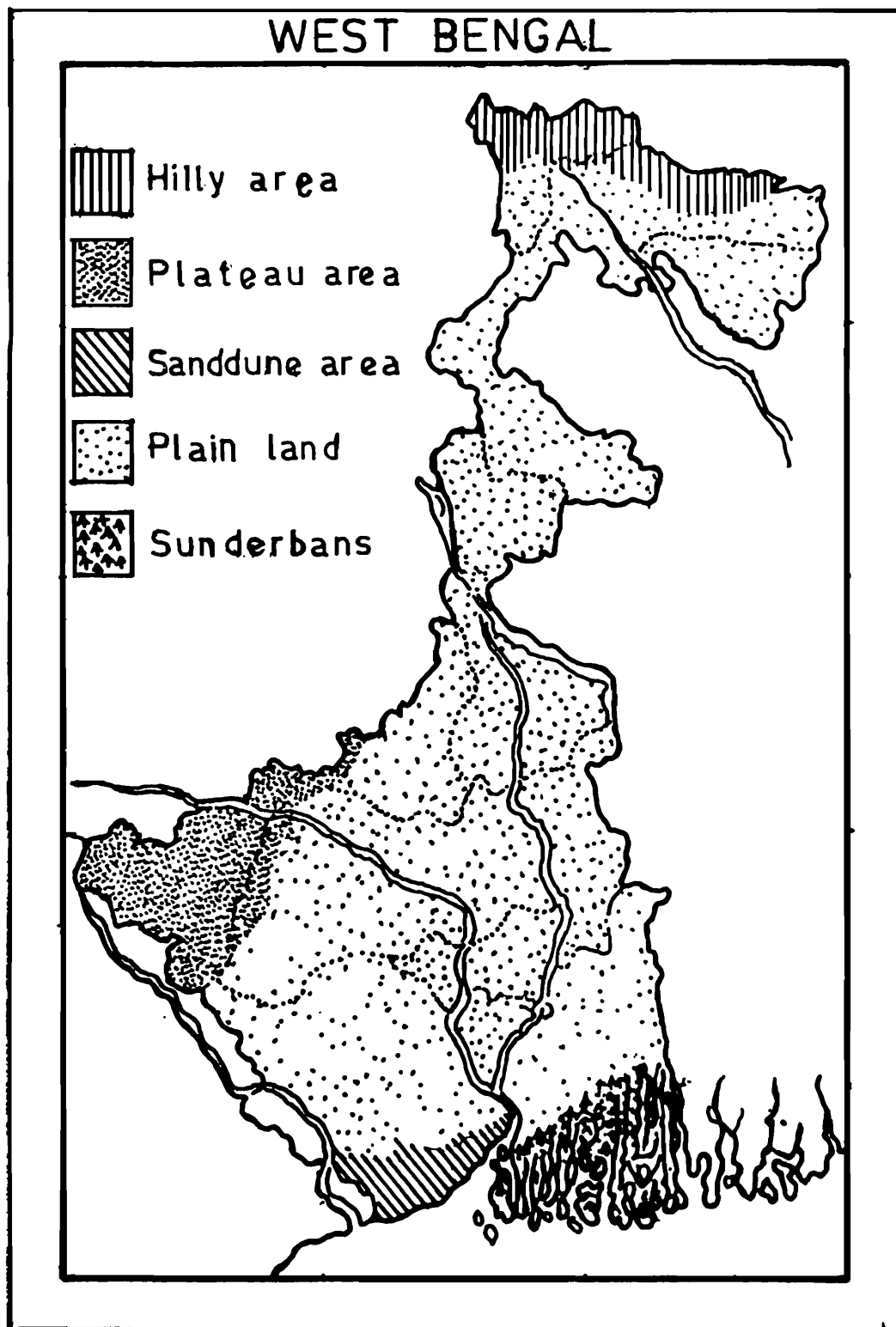
Remarks : This poisonous snake is green in colour and is common in North Bengal districts, ventrals 162; caudals 46. This viper wraps the tail and hinder part of the body round a branch when it strikes a victim.

TABLE III
Distribution of Serpentes (snakes) in West Bengal

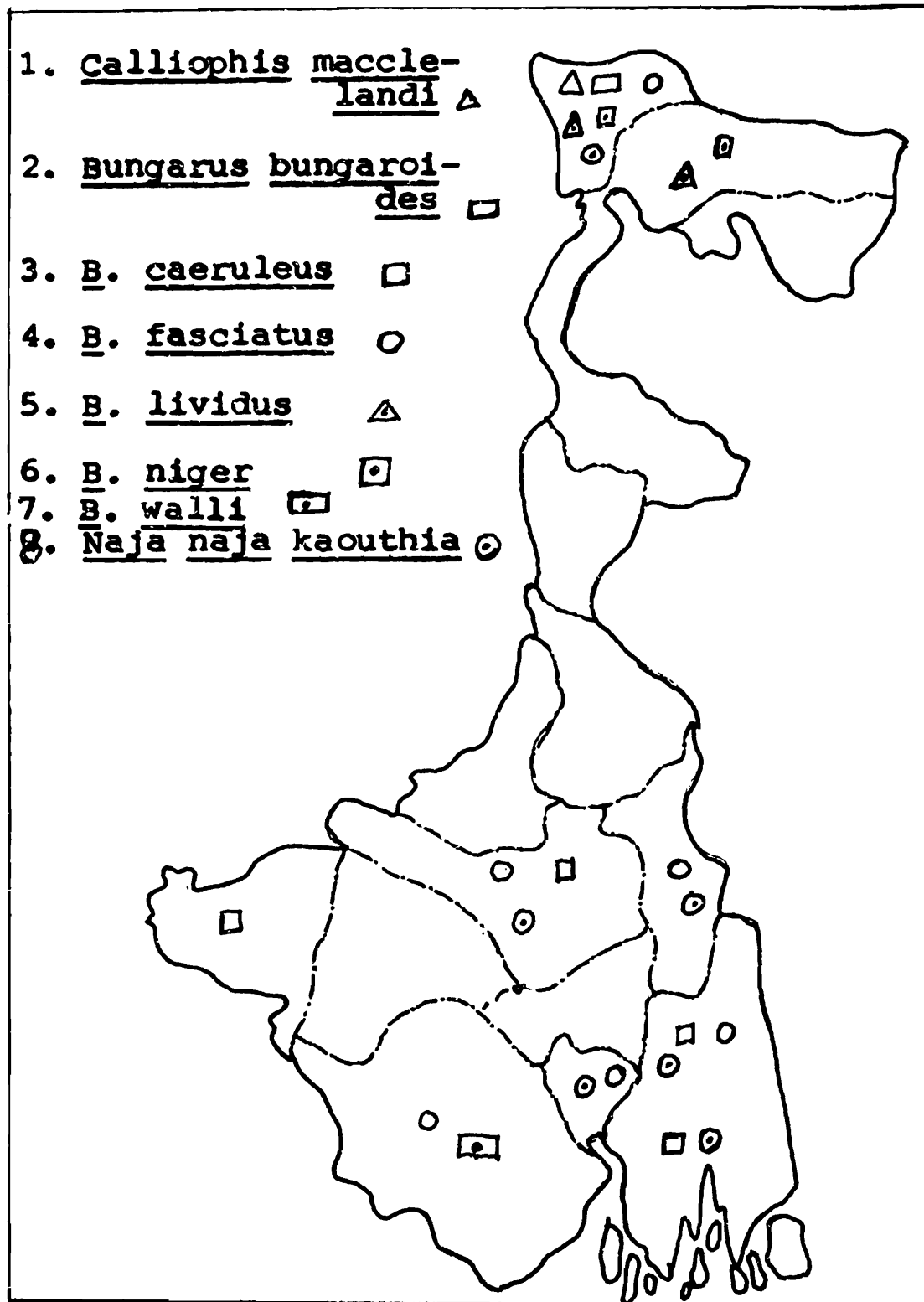
Sl. No.	Name of species	Calcutta	24 Parganas	Midnapore	Howrah	Hooghly	Burdwan	Birbhum	Bankura	Purulia	Nadia	Murshidabad	Malda	W. Dinajpur	Coochbehar	Jalpaiguri	Darjeeling
Family TYPHLOPIDAE																	
1.	<i>Typhlops acutus</i> (Dumeril & Bibron)	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
2.	<i>T. diard</i> Schlegel	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+
3.	<i>T. oligolepis</i> Wall	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
4.	<i>T. porrectus</i> (Stoliczka)	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+
5.	<i>T. jerdoni</i> Boulenger	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
6.	<i>Ramphotyphlops braminus</i> (Daudin)	+	+	+	+	+	-	-	-	-	-	-	-	-	-	+	+
Family BOIDAE																	
7.	<i>Python molurus</i> (Linnaeus)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
8.	<i>Eryx conicus</i> (Schneider)	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Family COLUBRIDAE																	
9.	<i>Chersydrus granulatus</i> (Schneider)	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
10.	<i>Ahaetulla mycterizans</i> (Linnaeus)	+	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-
11.	<i>A. nasutus</i> (Lacepede)	+	+	-	+	-	-	+	-	-	-	-	-	-	-	-	-
12.	<i>A. prasinus</i> (Boie)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
13.	<i>A. fronticinctus</i> (Gunther)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
14.	<i>Amphiesma stolata</i> (Linnaeus)	+	+	+	+	+	+	+	+	+	-	+	+	+	-	+	+
15.	<i>A. platyceps</i> (Blyth)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
16.	<i>A. parallela</i> (Boulenger)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
17.	<i>Atretium schistosum</i> (Daudin)	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18.	<i>Boiga cyanea</i> (Dumeril & Bubron)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
19.	<i>B. cynodon</i> (Boie)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+

Sl. No.	Name of species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
20.	<i>B. gokool</i> (Gray)	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
21.	<i>B. multifasciata</i> (Blyth)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
22.	<i>B. ochracea</i> (Gunther)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
23.	<i>B. trigonata</i> (Schneider)	+	-	+	-	-	-	-	-	-	-	-	-	-	-	+	+
24.	<i>Cerberus rhynchops</i> (Schneider)	+	+	+	+	-	+	-	-	-	-	-	-	-	-	-	-
25.	<i>Chrysopelea ornata</i> (Shaw)																+
26.	<i>Argyrogena fasciolatus</i> (Shaw)	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27.	<i>Dendrelaphis ahaetulla</i> (Linnaeus)	+	+	-	-	-	-	-	-	-	-	-	-	-	-	+	+
28.	<i>D. cyanochloris</i> (Wall)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
29.	<i>D. gorei</i> (Wall)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
30.	<i>D. tristis</i> (Boulenger)	+	-	-	+	-	-	+	-	+	+	-	-	-	-	+	-
31.	<i>Dinodon gammiei</i> (Blanford)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
32.	<i>D. septentrionalis</i> (Gunther)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
33.	<i>Elaphe cantoris</i> (Boulenger)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
34.	<i>E. helena</i> (Daudin)	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-
35.	<i>E. porphyracea</i> (Cantor)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
36.	<i>E. radiata</i> (Schlegel)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
37.	<i>E. prasina</i> (Blyth)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
38.	<i>E. taeniura</i> (Cope)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
39.	<i>Enhydris enhydris</i> (Schneider)	+	+	-	+	+	+	-	-	-	-	+	+	-	-	-	-
40.	<i>Fordonia leucobalia</i> (Schneider)	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41.	<i>Gerardia prevostiana</i> (Eydoux & Gervais)	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-
42.	<i>Liopeltis rappi</i> (Gunther)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
43.	<i>L. stoliczkae</i> (Sclater)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
44.	<i>Lycodon aulicus</i> (Linnaeus)	+	+	+	+	-	-	-	+	-	-	-	+	-	-	-	+
45.	<i>L. jara</i> (Shaw)	+	+	-	+	-	-	-	-	-	-	-	-	-	-	-	+
46.	<i>Natrix khasiensis</i> (Boulenger)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+

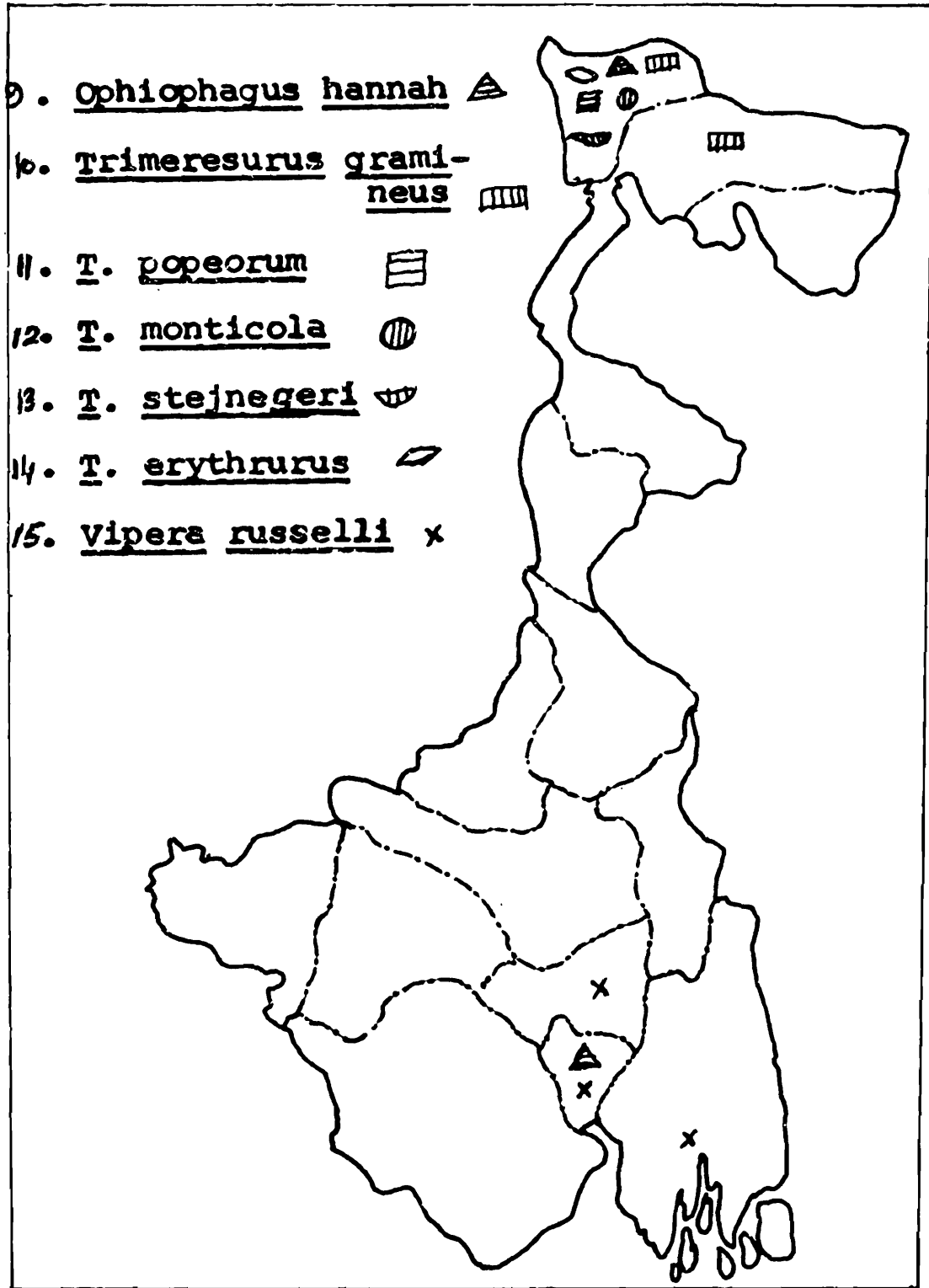
Sl. No.	Name of species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
47.	<i>Oligodon albocinctus</i> (Cantor)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
48.	<i>O. arnensis</i> (Shaw)	+	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-
49.	<i>O. cyclurus</i> (Cantor)	+	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+
50.	<i>O. erythrogaster</i> Boulenger	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
51.	<i>O. juglandifer</i> (Wall)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
52.	<i>O. teaniolatus</i> (Gunther)	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
53.	<i>Pareas macularius</i> Theobald	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
54.	<i>P. monticola</i> (Cantor)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
55.	<i>Psammodynastes pulverulentus</i> (Boie)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
56.	<i>Psammophis condanarus</i> (Merrem)	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+
57.	<i>Pseudoxenodun macrops</i> (Linnaeus)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
58.	<i>Ptyas korros</i> (Schlegel)	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	+
59.	<i>P. mucosus</i> (Linnaeus)	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60.	<i>Rhadophis himalayana</i> (Gunther)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
61.	<i>R. subminiata</i> (Schlegel)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
62.	<i>Sibynophis sagittarius</i> (Cantor)	+	+	-	+	+	-	-	-	-	-	-	-	-	-	-	-
63.	<i>Trachischium fuscum</i> (Blyth)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
64.	<i>T. guentheri</i> Boulenger	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
65.	<i>T. monticola</i> (Cantor)	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
66.	<i>T. tenuiceps</i> (Blyth)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
67.	<i>Xenochrophis piscator</i> (Schneider)	+	+	+	-	-	-	-	+	-	-	-	-	-	-	-	-
68.	<i>Zaocys nigromarginatus</i> (Blyth)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
Family DASYPELTIDAE																	
69.	<i>Elachistodon westermanni</i> Reinhardt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
70.	<i>Bungarus bungaroides</i> (Cantor)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
71.	<i>B. caeruleus</i> (Schneider)	+	+	-	-	-	+	-	-	+	-	-	-	-	-	-	-
72.	<i>B. fasciatus</i> (Schneider)	+	-	-	+	-	+	-	-	-	+	-	-	-	-	-	+



Map 1. Showing physiographic regions of West Bengal



Map 2. Showing distribution of poisonous terrestrial snakes in West Bengal



Map 3. Showing distribution of poisonous terrestrial snakes in West Bengal

102. *Trimeresurus monticola* Gunther

1864. *Trimeresurus monticola* Gunther, *Rept. Brit. Ind.*, : 388.

Material : 1 ex., Palmajua, Darjeeling dist., 1.vii.1958, H. Khajuria (Reg. no. 21022).

Measurements : Total length 575 mm, tail 95 mm.

Distribution : The Eastern Himalayas, West up to Nepal. Indo-Chinese region, Malay peninsula, Yunnan, S. E. Tibet, China, Formosa, Tenasserim, S. Annam, Peninsular Siam.

Remarks : This is a widely distributed viper. Body stout with a short tail; ventrals 146, caudals 48; dorsal surface pale brown with irregular dark brown spots; ventral surface greyish white.

103. *Trimeresurus popeorum* (Gray)

1853. *Trimeresurus elegans* Gray, *Ann. Mag. nat. Hist.*, (2) 12 : 39.

Material : 1 ex., Darjeeling, 23.viii.1978. Gammie (Reg. No. 3026).

Measurements & Scale counts : Total length 785 mm, tail 122 mm. ventrals 171; caudals 67.

Distribution : India : West Bengal; Assam. Elsewhere : Burma; Siam; Malay Peninsula; Borneo; Sumatra.

SUMMARY

An exhaustive account of reptiles from West Bengal based on the material available in the ZSI has been presented here. In all 139 species referable to 70 genera have been recorded, of which six are first records from West Bengal.

ACKNOWLEDGEMENTS

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AMPHIBIA

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INTRODUCTION

Amphibian wealth of West Bengal is very rich in number and varieties. Representatives of all the three orders of Class Amphibia namely, Anura, Caudata and Gymnophiona are available here. Altogether 39 species of amphibia, out of 196 species so far recorded from India, and 4014 species from the World (Frost, 1985), are occurring in West Bengal. Apart from some scattered publication and records by Ahl (1931), Anderson (1871), Annandale (1909), Annandale and Rao (1918), Bhaduri (1945 & 1947), Boulenger (1890 & 1920), Chanda (1986), Daniel (1962), Gunther (1875), Inger and Dutta (1986), Mansukhani and Sarkar (1977), Sarkar (1984) and Parker (1934), no other consolidated faunal account on the amphibians from the State as a whole is available.

So, this will be first detailed account on the amphibians of West Bengal, which comprises 2959 examples belonging to 39 species, 14 genera, 7 families and 3 orders. Darjeeling, the hill - district of the State, provides habitats for maximum number of species (30 species). Fourteen species viz., *Bufo abatus*, *Amolops afghanus*, *A. formosus*, *A. monticola*, *Occidozyga lima*, *Rana annandalii*, *R. blanfordii*, *R. gerbillus*, *R. mawphlongensis*, *R. senchalensis*, *R. sikkimensis*, *Philautus jerdonii*, *Rhacophorus jerdonii*, and *Rh. reinwardtii* recorded by earlier authors have also been included in this paper for a complete account of amphibians of West Bengal. Faunal account in details from the districts of 24-Parganas, Haora, Hugli and part of Nadia has not been included under 'Material examined', as the same has been studied and published earlier (Sarkar, 1984). Data on field observations are included in the 'Remarks' of the species. Where the collections are large, only localities of collections are given under 'Material examined'

MATERIAL AND METHOD

Amphibians are either aquatic, terrestrial or arboreal. Aquatic form has been collected by the help of water-net, a net fitted with a metal ring fixed at the end of a long bamboo-pole, cast-net and fishing hook. Both terrestrial and arboreal forms have been collected by hand or long forceps. The amphibians reported in this paper have mainly been collected by the survey parties of Zoological Survey of India from several ecological niches of West Bengal. As amphibians hibernate during winter, collections have mainly been made during pre-monsoon and monsoon months, the breeding season of amphibians. In the field, notes have been taken regarding the habits and habitats of the frogs, toads and salamanders. For collection, aquatic vegetations, bushes grown on moist soil, heaps of rotten leaves or straw, burrows made on elevated banks of ponds and canals, dark corners of village huts, undersurface of barks of trees, soil under stones etc. are explored. Nocturnal fauna has been explored by the help of lamps. The collected material are first chloroformed and then put into 5% formalin solution at least for 24 hours for fixation. Before putting in the formalin, an incision on the abdomen for the smaller specimens, and injection of 10% formalin solution inside the abdomen for larger specimens are given for the fixation of viscera. The fixed material along with labels containing the data of locality, altitude, habitat, date of collection and name of collector, are packed properly and kept in 5% formalin. After returning from the tour the material are unpacked, washed properly in fresh water, and preserved in 90% alcohol for studies. Then the material have been studied and identified with the help of literature in the laboratory.

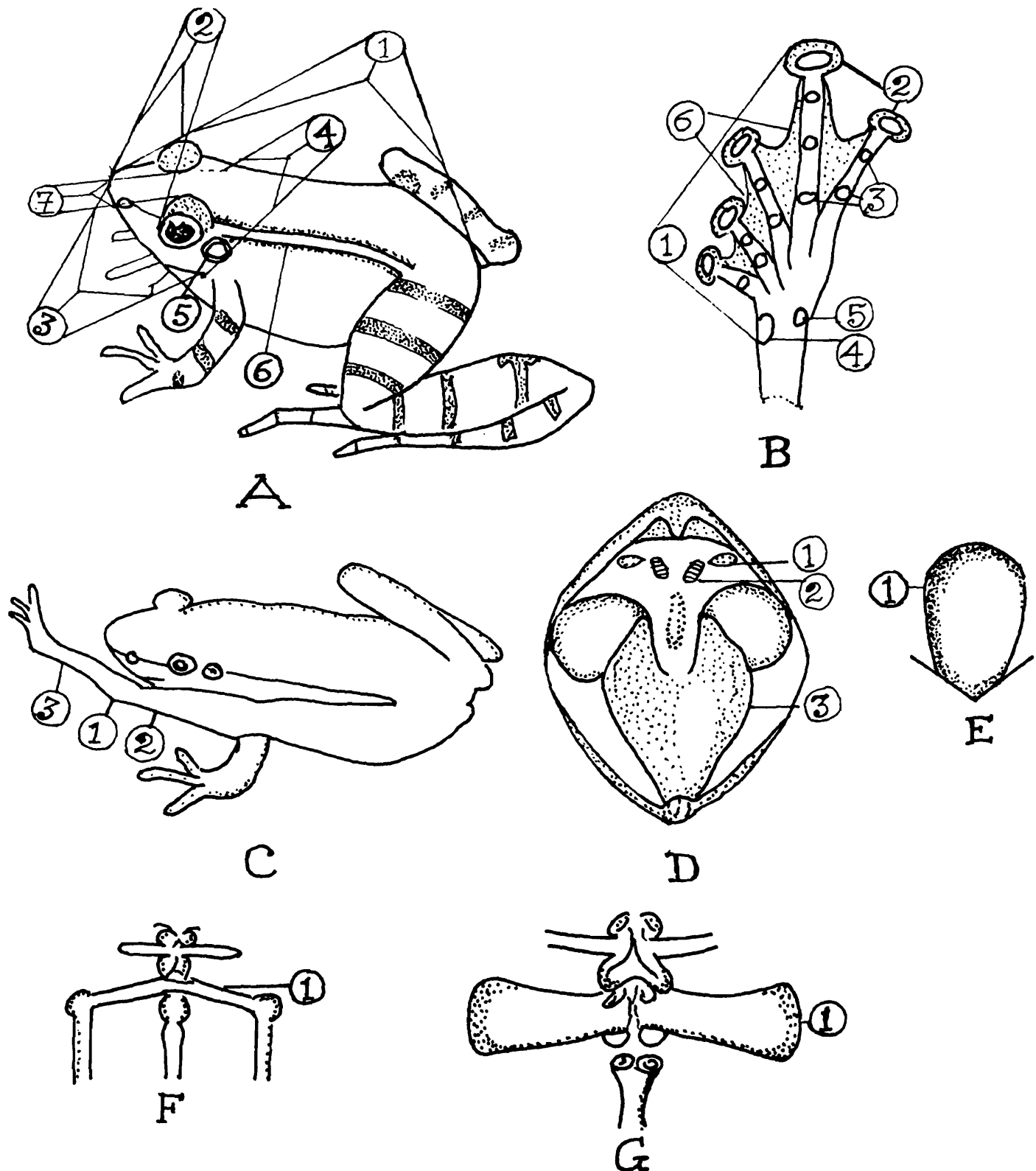


Fig. 1. Illustrations of measurements and essential morphological characters used in the paper.

A 1 : Snout to vent length, A 2 : Snout length, A 3 : Head length, A 4 : Head width, A 5 : Tympanum, A 6 : Glandular dorso-lateral fold, A 7 : Width of interorbital space. B 1 : Foot length, B 2 : Suctorial disc, B 3 : Subarticular tubercles, B 4 : Inner metatarsal tubercle, B 5 : Outer metatarsal tubercle, B 6 : Webs of toes. C 1 : Position of tibiotarsal articulation when hind limb is kept parallel to body, C 2 : Tibia, C 3 : Tarsus. D 1 : Position of Choanae, D 2 : Position of vomerine teeth, D 3 : Tongue (bifid). E 1 : Tongue (entire). F 1 : Cylindrical sacral vertebra. G. 1 : Dilated sacral vertebra.

SYSTEMATIC ACCOUNT

Class AMPHIBIA
Order ANURA

Key to the Families

1. Jaws toothless.....2
Upper jaw toothed3
2. Skin rough with welldeveloped warts, parotoids presentBUFONIDAE
Skin more or less smooth, parotoids absentMICROHYLIDAE
3. Diapophyses of sacral vertebra cylindrical or very slightly dilated4
Diapophyses of sacral vertebra strongly dilated.....ELOBATIDAE
4. No. intercalary ossification (extra cartilaginous bone) between the distal and penultimate phalangesRANIDAE
An intercalary ossification between the distal and penultimate phalanges ..RHACOPHORIDAE

Family I. BUFONIDAE

Genus 1. *Bufo* Laurenti

1768. *Bufo* Laurenti, *Synops. Rept.*, : 25

Family Bufonidae is represented in West Bengal by four species of the genus *Bufo*.

Key to the Species of the Genus *Bufo*

1. Head with bony ridges 2
Head without bony ridges*stomaticus*
2. Tympanum large, 2/3 diameter of the eye*melanostictus*
Tympanum small, about 1/3 diameter of the eye3
3. Subarticular tubercles on toes single.....*himalayana*
Subarticular tubercles on toes double*abatus*

1. *Bufo stomaticus* Lutken
(Marbled Toad)

1863. *Bufo stomaticus* Lutken, *Vidensk. Meddr dansk naturh-Foren*, 14 : 305.

1923. *Bufo stomaticus* : Nieden, *Das Tierreich*, Anura I : 85.

1984. *Bufo stomaticus* : Sarkar, *Rec. Zool. Surv. India*, 81 (3 & 4) : 217.

Material examined : Koch Behar dist. : 1 ex., Koch Behar town, 16.vii.1986; 1 ex., Tufanganj, 19.vii.1986; 1 ex., Dinhat, 22.vii.1986; 2 ex., Mathabhanga, 28.vii.1986. All coll. M. L. Biswas. Maldah dist. : 1 ex., Gour (inside heap of straw). 8.viii.1984, A. K. Sarkar. Birbhum dist. : 2 ex., Bakreswar, 1984,

S. Ahmed. 1 ex., Rampurhat, 22.xi.1984, M. L. Biswas. Bankura dist. : 1 ex., Bishnupur, 26.vi.1977, R. Ray. 1 ex., Mukutmanipur, 3.xi.1980; 5 ex., Bishnupur, 31.x.1980. All coll. S. Ahmed. 1 ex., Sareswar, 10.ix.1985; 2 ex., Jayrambati, 11.ix.1985; 3 ex., Bishnupur, 12.ix.1985; 1 ex., Simlapal, 15.ix.1985; 1 ex., Beliatare, 19.ix.1985. All coll. A. K. Sarkar. Purulya dist. : 1 ex., Purulya town, 7.vii.1977, R. Ray. 4 ex., Kenda 26.ix.1985; 1 ex., Hariharpur (Kenda), 28.ix.1985. All coll. A. K. Sarkar. Medinipur dist. : 1 ex., Mandalphushkarini, 15.vii.1985; 1 ex., Garbeta, 18.vii.1985; 2 ex., Arabari, 21.vii.1985; 2 ex., Jhargram, 26.vii.1985; 2 ex., Belpahari, 29.vii.1985; 1 ex., Tamluk, 5.xii.1985; 1 ex., Kantai, 8.xii.1985; 1 ex., Digha, 11.xii.1985; 1 ex., Hijli, 19.xii.1985. All coll. M. L. Biswas.

Measurements : Snout to vent length 8 86 mm.

Diagnostic character : Head broader than long, without bony ridge; snout rounded, nearly once the diameter of the eye; nostril nearer the tip of snout than the eye; interorbital width broader than that of upper eyelid; tympanum very distinct, nearly once the diameter of the eye. Fingers free, first a little longer than second, tips of fingers and toes swollen. Toes more than half webbed, two phalanges of fourth toe free; two oval (inner and outer) metatarsal tubercles present. Tarsometatarsal articulation reaches in between tympanum and eye. Dorsum brownish, rough with several non-spiny warts, parotoids large, flat, not kidney shaped. Venter dull-whitish with numerous small, non-spiny warts.

Distribution : India : West Bengal : Bankura, Birbhum, Koch Behar, Maldah, Medinipur, Nadia, Purulya and 24 Pargonas districts. New records from the districts of Bankura, Birbhum, Koch Behar, Maldah, Medinipur and Purulya. *Elsewhere* : Plains of India from Jammu and Kashmir to Karnataka, and Assam in the east. Also Nepal, Burma, Sri Lanka, Pakistan and Arabia.

Remarks : Common in Bankura, Medinipur and Purulya districts of West Bengal, and occasionally found in other parts of the State. It is terrestrial, nocturnal in habit, and found in and near water during breeding. It moves together with *B. melanostictus* during night and spends day in the same habitat. Adults are used in College laboratories for dissection study.

2. *Bufo melanostictus* Schneider (Common Indian Toad)

1799. *Bufo melanostictus* Schneider, *Hist. Amph.* 1 : 216.

1890. *Bufo melanostictus* : Boulenger, *Fauna Br. India, Rept. & Batr.* : 505 - 507.

1923. *Bufo melanostictus* : Nieden, *Das Tierreich, Anura*, 1 : 116.

1984. *Bufo melanostictus* : Sarkar, *Rec. Zool. Surv. India*, 81 (3 & 4) : 216-217.

Material examined : 180 toads and 85 tadpoles collected from, - Darjeeling dist. : Panighata (Balason river side), Mahanadi (Goomti Tea Estate), Bamanpokhri, Simulbari Tea Garden, Sukna. Jalpaiguri dist. : Jainti, Rydak. Koch Behar dist. : Koch Behar town. West Dinajpur dist. : Kumarganj, Gangarampur, Buniadpur, Hilli, Balurghat, Raiganj, Kaliaganj, Chopra and Islampur, Maldah dist. : Ratua (Kalindi river), Adampur (Mahananda river), Baishnabnagar, Maldah town, Kaliachak, Gazole, Chanchal and Gour. Murshidabad dist. : Jalangi, Kandi, Baharampur, Lalgola, Dhulian, Swarupganj, Bhabta and Jiaganj. Nadia dist. : Karimpur and Bethuadahari. Birbhum dist. : Sainthia, Bakreswar, Suri, Bolpur, Ahmedpur and Rampurhat. Bardhaman dist. : Kajoria, Kulti. Bankura dist. : Bishnupur, Simlapal and Beliatare. Purulya dist. : Arsa, Manbazar and Kenda. Medinipur dist. : Digha, Arabari and Jhargram.

24-Parganas dist. : Namkhana, Sagar Island (Kachuberia and Bamankhali), Canning, Gosaba, Kakdwip, Parmadn, Bongaon, Helencha and Duttaphulia. Collections have been made by the staff of our department. Apart from the months of January and February collections are available throughout the year.

Measurements : Snout to vent length 11-129 mm.

Diagnostic character : Head broader than long, with cornified bony ridges; snout rounded, nearly equal the diameter of the eye; nostril a little nearer to the tip of snout than to the eye; interorbital width broader than that of upper eyelid; tympanum very distinct, two third the diameter of the eye. Fingers free, first a little longer than second, tips of fingers and toes swollen. Toes nearly half webbed, more than three phalanges of fourth toe free; two oval (inner and outer) metatarsal tubercles present. Tarsometatarsal articulation reaches in between tympanum and eye. Dorsum dark brownish, rough with several spiny warts, parotoid large, kidney-shaped. Venter dull whitish with numerous small spiny warts.

Distribution : India : West Bengal : All the districts. Common throughout the plains of India. Also Nepal, Sri Lanka, Burma, South China, Malaya Peninsula and Archipelago.

Remarks : Common throughout the plains of West Bengal; Collected from an altitude of about 1400 m. in the Darjeeling Himalayas. Boulenger (1890) records its distributional range upto 10,000 feet in the Sikkim Himalayas. Terrestrial and nocturnal in habit, found in and near water during breeding season.

3. *Bufo Himalayana* Gunther (The Himalayan Toad)

1864. *Bufo melanostictus* Var. *himalayanus* Gunther, *Rept. Br. India* : 422.

1890. *Bufo himalayanus* : Boulenger, *Fauna Br. India, Rept. & Batr.* : 505.

1962. *Bufo himalayanus* : Daniel, *J. Bombay nat. Hist. Soc.*, 59 (2) : 667.

Material examined : Darjeeling dist. : 5 ex., Darjeeling Botanical Garden, 1.i.1971, J. M. Julka. 2 ex., Kurseong, 30.iv.1971; 346 ex., (tadpoles), Sonada, 7.v.1971. All coll. A.R. Bhowmik and A. K. Sarkar. 1 ex., Mirik, 5.x.1982; 2 ex., Ghoombanjan, 22.v.1983. All coll. A. K. Sarkar.

Measurements : Snout to vent length 15-115 mm.

Diagnostic character : Head broader than long, with blunt supraorbital ridges; snout short, blunt, nearly once the diameter of the eye; nostril a little nearer the tip of the snout than the eye; interorbital width broader than upper eyelid; tympanum very small, rather indistinct. Fingers free, first equals the second, tips of fingers and toes blunt. Toes half webbed, three phalanges of the fourth toe free; two oval (inner and outer) metatarsal tubercles present. Subarticular tubercles on toes single. Tarsometatarsal articulation reaches in between anterior border of eye and tip of snout. Dorsum brownish, rough with porous warts. Parotoids large, elliptical. Venter dull whitish with numerous small warts.

Distribution : India : West Bengal : Darjeeling district. *Elsewhere* : Sikkim, Meghalaya and Arunachal Pradesh, Nepal.

Remarks : Common in and around Darjeeling, Kurseong and Mirik Hills.

4. *Bufo abatus* Ahl

1925. *Bufo abatus* Ahl, *Zool. Anz.*, 63 : 110-111.

1986. *Bufo abatus* : Inger and Dutta, *J. Bombay nat. Hist. Soc.*, 83 : 136.

Material examined : Nil; record from published literature.

Diagnostic character : Nostril nearer to tip of snout than eye; interorbital width broader than that of upper eyelid; tympanum small, not one-third the diameter of the eye. First finger as long as second; subarticular tubercles on fingers and toes double. Toes three-fourth webbed. Tarsometatarsal articulation reaches the eye. Dorsum rough with spiny warts. Venter rough, granular.

Distribution : India : West Bengal : Darjeeling.

Remarks : Specimens could not be collected since Ahl (1925)'s report.

Family II. MICROHYLIDAE

Key to the Genera of Family MICROHYLIDAE

1. Two normal metatarsal tubercles present *Microhyla*
Two large, shovel-shaped metatarsal tubercles (inner larger) present 2
2. Tips of fingers with triangular dilatations *Kaloula*
Tips of fingers without dilatations *Uperodon*

Genus 2. *Microhyla* Tschudi

1838. *Microhyla* Tschudi, *classif. Batr.* : 71

5. *Microhyla ornata* (Dumeril and Bibron)
(Ornata Microhylid)

1841. *Engystoma ornatum* Dumeril and Bibron, *Erpet. Gen.*, 8 : 745.

1890. *Microhyla ornata* : Boulenger, *Fauna Br. India Rept. & Batr.* : 491-492.

1934. *Microhyla ornata* : Parker, *Monogr. Microhylidae*, : 139-141.

1984. *Microhyla ornata* : Sarkar, *Rec. Zool. Surv. India*, 81 (3 & 4) : 220-221.

Material examined : Jalpaiguri dist. : 22 ex. (Moist grassy soil), Jainti, 16-19.x.1982; 8 ex. (2 adults and 6 tadpoles), Jainti, 31.v.1983. All coll. A. K. Sarkar. Koch Behar dist. : 5 ex., Koch Behar town, 17.vii.1986; 3 ex., Toofanganj, 19.vii.1986; 3 ex., Dinahata, 24.vii.1986; 4 ex., Mekliganj, 27.vii.1986; 2 ex., Mathabhanga, 30.vii.1986. All coll. M. L. Biswas. West Dinajpur dist. : 4 ex., Hilli, 23.iii.1980. D. N. Tiwari. 2 ex., Chopra, 29.vii.1984, A. K. Sarkar. Maldah dist. : 9 ex., Chanchal, 2.viii.1984; 35 ex. (tadpoles), Gabgachhiya (Maldah town), 3.viii.1984; 21 ex. (1 adult and 20 tadpoles), Maldah town, 5.viii.1984; 10 ex., Kaliachak, 7.viii.1984; 8 ex., Gour, 8.viii.1984. All coll. A. K. Sarkar. Murshidabad dist. : 3 ex., Baharampur, 13.xii.1983; 1 ex., Lalgola, 16.ii.1984; 1 ex., Dhulian, 19.ii.1984; 2 ex., Kandi, 22.ii.1984; 2 ex., Swarupganj, 24.vi.1984; 2 ex., Bhabta, 29.vi.1984; 2 ex., Jiyaganj, 1.vii.1984. All coll. M. L. Biswas. Nadia dist. : 4 ex., Bethuadahari, 27.ix.1983; 2 ex., Karimpur, 17.xii.1983. All coll. M. L. Biswas. Birbhum dist. : 4 ex., Sainthia, 6.vii.1984; 2 ex., Suri, 13.ix.1984; 4 ex., Bolpur, 18.ix.1984;

5 ex., Ahmedpur, 21.ix.1984; 3 ex., Rampurhat, 24.ix.1984. All coll. M. L. Biswas. Bardhaman dist. : 10 ex., Bardhaman town, S. Chakraborty. Bankura dist. : 1 ex., Bishnupur, 28.vi.1977, S. Ray. 2 ex., Bishnupur, 12.ix.1985, A. K. Sarkar. Purulya dist. : 10 ex., Arsa, 22-24.ix.1985; 1 ex., Manbazar, 27.ix.1985; 12 ex., Kenda, 28.ix.1985. All coll. A. K. Sarkar. Medinipur dist. : 2 ex., Mandalpushkarini, 17.vii.1985; 2 ex., Arabari; 23.vii.1985; 1 ex., Digha, 13.xii.1985. All coll. M. L. Biswas. 24-Parganas dist. : 1 ex., Kakdwip, 5.ix.1974; 3 ex., Parmadan, 19.xii.1983; 2 ex., Bangaon, 6.vii.1983; 2 ex., Helencha, 9.viii.1983; 4 ex., Duttaphulia, 11.viii.1983. All coll. M. L. Biswas.

Measurements : Snout to vent length 9-25 mm.

Diagnostic character : Head broader than long; snout obtusely pointed, a little longer than the diameter of the eye; nostril nearer to the tip of snout than the eye; interorbital width a little broader than that of upper eyelid; tympanum not so distinct. Fingers free, first shorter than second, tips flattened. Toes with a rudiment of web, tips blunt; two small but distinct oval (inner and outer) metatarsal tubercles present. Tibiotarsal articulation reaches near to eye. Dorsum smooth, brownish with broad darker markings. Venter smooth, dull whitish, little darker on throat.

Distribution : India : West Bengal : All the districts.

Remarks : Common in the plains of West Bengal. Found inside grass grown on moist soil. One example of frog collected in May from Jainti, Jalpaiguri district possesses darker gular skin, and lateral sides of belly spotted with dark-chocolate.

Genus 3. *Kaloula* Gray

1831. *Kaloula* Gray, *Zool. Misc.*, 1 : 38

6. *Kaloula pulchra* Gray (Painted Frog)

1831. *Kaloula pulchra* Gray, *Zool. Misc.*, 1 : 38

1934. *Kaloula pulchra taprobanica* : Parker, *Monogr. Microhylidae*, pp. 86-87.

1984. *Kaloula pulchra taprobanica* : Sarkar, *Rec. Zool. Surv. India*, 81 (3 & 4) : 221-222.

1986. *Kaloula pulchra* : Inger, F & Dutta, S. K. *J. Bombay nat. Hist. Soc.*, 83 (Supplement) : 136.

Material examined : Koch Behar dist. : 1 ex. (hole on tree-trunk), Dinhat, 22.vii.1986, M. L. Biswas. West Dinajpur dist.: 2 ex. (hole on tree-trunk), Raiganj, 26.vii.1984; 1 ex., Chopra, 29.vii.1984. All coll. A. K. Sarkar. Nadia dist.: 1 ex., Bethuadahari, 27.ix.1983, M. L. Biswas. Birbhum dist.: 1 ex., Bolpur, 18.ix.1984, M. L. Biswas. Hugli dist.: 1 ex., Chandan Nagar, 19.v.1977, A. K. Ray. Bankura dist.: 1 ex., Bishnupur, 28.vi.1977, Rupendu Ray. 2 ex., Bishnupur, 10.ix.1985, A. K. Sarkar. Purulya dist.: 1 ex., Santaldi, 5.vii.1977, Rupendu Ray. 24-Parganas dist.: 1 ex., Bongaon, 6.viii.1983, M. L. Biswas.

Measurements : Snout to vent length 13-58 mm.

Diagnostic character : Head broader than long; snout rounded, as long as the diameter of the eye; nostril nearer to the tip of snout than the eye; interorbital width much broader than that of upper eyelid; tympanum hidden. Fingers free, first shorter than second, tips bearing well-developed truncate discs;

subarticular tubercles of fingers and toes distinct. Toes one third webbed, tips obtusely swollen; inner metatarsal tubercle well developed, large, shovel-shaped, outer metatarsal tubercle small, shovel-shaped. Tibiotarsal articulation reaches the axil. Dorsum rough with scattered warts, and greyish with reddish brown patches margined with black. Venter wrinkled on belly, granular on throat and under surface of thighs, and light brownish.

Distribution : India : West Bengal : Bankura, Birbhum, Haora, Hugli, Koch Behar, Medinipur, Nādia, Purulya, West Dinajpur and 24-Pargonas districts ; Madhya Pradesh; Karnataka and Tamil Nadu. New records from the districts of Bankura, Birbhum, Hugli, Nadia, Purulya and West Dinajpur. Also Sri Lanka.

Remarks : Terrestrial and nocturnal in habit. Sarkar (1984) gives a detailed account of its habit. In two different instances collections have been made from holes on tree trunks. The frog can climb trees more or less faster. In July, 1984 night two frogs have been found sitting at the edge of a big hole on an old vertical tree-trunk in the Forest Rest House Campus, Raigunj. The height of the hole is about 1.5 m. from the ground. The tree-trunk has been found infested by termites. The frogs are found busy eating termites and other insects (ants). Both the frogs escape inside the hole after a little disturbance, and come out again after two and a half hours.

Genus 4. *Uperodon* Dumeril and Bibron

1841. *Uperodon* Dumeril and Bibron, *Erp. Gen.*, 8 : 746.

7. *Uperodon globulosus* (Gunther) (Balloon Frog)

1864. *Cacopus globulosus* Gunther, *Rept. Br. India*, p.416.

1934. *Uperodon globulosum* : Parker, *Monogr. Microhylidae*, : 76.

1984. *Uperodon globulosum* : Sarkar, *Rec. Zool. Surv. India*, 81 (3 & 4) : 219-220.

1986. *Uperodon globulosus* : Inger and Dutta, *J. Bombay nat. Hist. Soc.*, 83 (Supplement) : 137.

Material examined : Jalpaiguri dist. : 1 ex., Dhupguri, 19.iii.1979, D. N. Tiwari; 1 ex. (under ground), Sulkapara, 24.v.1983, A. K. Sarkar. Medinipur dist. : 1 ex., Mandalpuskarini, 16.vii.1985, M. L. Biswas.

Measurements : Snout to vent length 66-81 mm.

Diagnostic character : Head broader than long; snout rounded, about twice as long as the diameter of the eye; nostril equidistant from the tip of snout and the eye; interorbital width about thrice the width of upper eyelid; tympanum hidden. Fingers free, first shorter than second, tips not bearing discs; subarticular tubercles of fingers and toes not very distinct. Toes with a rudiment of web; both inner and outer shovel-shaped metatarsal tubercles present, inner very large. Tibiotarsal articulation not reaching shoulder. Dorsum smooth or slightly tuberculated, and reddish brown. Venter wrinkled and dull whitish.

Distribution : India : West Bengal : Hugli, Haora, Jalpaiguri, Medinipur and 24-Pargonas districts, Assam, Orissa, Madhyapradesh, Maharastra, Gujarat and Karnataka.

Remarks : Rare species. Mostly found under ground. One example of frog collected from Sulkapara, Jalpaiguri district has been found at a depth of half a metre under ground at the time of digging soil.

Family III. PELOBATIDAE

Genus 5. *Megophrys* Kuhl and Van Hasselt

1822. *Megophrys* Kuhl and Van Hasselt, *Algemeene Konst-en Letter-Bode*, 7 : 102.

Key to the species of the genus *Megophrys*

Tympanum distinct, about Half diameter of eye; diameter of eye equals the distance between the eye and tympanum*robusta*

Tympanum more or less distinct, about 3/5 to 2/3 diameter of eye; diameter of eye is greater than the distance between the eye and tympanum*parva*

8. *Megophrys robusta* Boulenger

1908. *Megalophrys robusta* Boulenger, *Proc. Zool. Soc.*, London : 418.

1923. *Megalophrys robusta* : Nieden, *Das Tierreich*, Anura I, 46 : 57

Material examined : Darjeeling district : 1 ex., Sureil, N. Annandale. 1 ex., Kalimpong, May, 1915, F. H. Gravely.

Measurements : Snout to vent length 41-90 mm.

Diagnostic character : Head broader than long; snout obliquely truncate, as long as eye; nostril equidistant from the tip of snout and eye; interorbital width broader than that of the upper eyelid; tympanum distinct, about half the diameter of the eye. Fingers free, first as long as or a little longer than second, tips feebly swollen; subarticular tubercles of fingers and toes absent. Toes with rudiment of web, tips swollen feebly; inner and outer metatarsal tubercles indistinct. Tibiotarsal articulation reaching in between posterior end of the eye and nostril. Dorsum brown, smooth or finely granular with a fine glandular ridge on each side of the back. Venter white, spotted with brown on throat and breast.

Distribution : India : West Bengal : Darjeeling district.

Remarks : It is a rare anuran which has so far been recorded from Darjeeling district only.

9. *Megophrys parva* (Boulenger)

1893. *Leptobrachium parvum* Boulenger, *Ann. Mus. Genova*, (2) xiii : 344.

1908. *Megalophrys parva* Boulenger, *Proc. Zool. Sec.*, London : 419

Material examined : Darjeeling dist. : 2 ex. (tadpoles), Kurseong, 26.xii.1970, J. M. Julka. 1 ex., Ghum Bhanjan, 27.v.1971, A. R. Bhowmik and A. K. Sarkar.

Measurements : Snout to vent length 37 mm.

Diagnostic character : Head a little broader than long; snout obliquely truncate, nearly as long as eye; nostril equidistant from the tip of snout and the eye; interorbital width equals to that of the upper eyelid; tympanum more or less distinct, about two-third the diameter of the eye. Fingers free, first as long as or a little shorter than second, tips feebly swollen; subarticular tubercles of fingers and toes absent. Toes with rudiment of web, tips swollen feebly; inner and outer metatarsal tubercles indistinct. Tibiotarsal articulation reaching maximum to the eye. Dorsum brown, smooth or granular with some small glandular warts. Venter white, smooth with brown spots on throat and breast.

Distribution : India : West Bengal : Darjeeling district; Sikim; Assam and Meghalaya. Also Burma, Borneo, Java and Malaya Peninsula.

Remarks : Medium sized frog. One frog collected from Ghum Bhanjan in May, 1971 have been found under stone near a small fall (Hima Fall).

Family IV. RANIDAE

Family Ranidae possesses four genera in West Bengal, of which genus *Amolops* Cope, 1865 is distinguished by their tadpoles possessing "large adhesive belly disc" just below the mouth (Inger, 1966). Keys for the other three genera are as follows,

1. Tongue entire, vomerine teeth absent*Occidozyga*
Tongue bifid behind, Vomerine teeth present2
2. Outer metatarsal separated by web, at least in the distal half*Rana*
Outer metatarsal united or separated only in their distal extremity*Tomopterna*

Genus 6. *Amolops* Cope

1865. *Amolops* Cope, *Nat. Hist. Rev.*, N. S., 5 : 117.

Key to the Species of the Genus *Amolops*

1. Glandular dorsolateral fold along the back present*monticola*
Glandular dorsolateral fold absent2
2. Web of toes deeply notched, only the fringe of web reaches the base of the disc on fourth toe....
.....*formosus*
Web of toes feebly notched, web (not fringe of web) reaches laterally the middle of the disc on fourth toe*afghanus*

10. *Amolops monticola* Anderson

1871. *Hylorana monticola* Anderson, *J. Asiat. Soc. Bengal*, 11 : 25

1920. *Rana monticola* : Boulenger, *Rec. Indian Mus.*, 20 : 206

1985. *Amolops monticola* : Frost, *Amphibian species of the World* : 455.

Material examined : Nil; record from published literature.

Diagnostic character : Head as long as broad or a little longer than broad; snout round, as long as the eye; nostril equidistant from the tip of snout and the eye; interorbital width a little shorter than that of the upper eyelid; tympanum distinct, about half the diameter of the eye. Fingers free, first more or less equal to second, tips with distinct discs; subarticular tubercles of fingers and toes distinct. Toes almost entirely webbed, the web deeply notched, web does not reach the disc of the fourth toe. Only fringe of web reaches the base of the fourth toe, tips with distinct discs; inner metatarsal tubercle long, oval, compressed, outer metatarsal tubercle absent. Tibiotarsal articulation reaching beyond the tip of the snout. Dorsum brown, smooth, an indistinct fold above the tympanum feebly prominent. A glandular dorsolateral fold present. Venter dull white and smooth.

Distribution : India : West Bengal : Darjeeling district. China; Tibet.

11. *Amolops formosus* (Gunther)

1875. *Polypedates formosus* Gunther, *Proc. Zool. Soc.*, London : 570.

1974. *Amolops formosus* : Dubois, *Bull. Mus. Natl. Hist. Nat.*, 143 (213) : 357 - 362.

Material examined : Nil; record from published literature.

Diagnostic character : Head as long as broad or a little broader than long; snout round, as long as or a little shorter than the eye; interorbital width almost equal to that of the upper eyelid; tympanum more or less distinct, less than half the diameter of the eye. Fingers free, first shorter than second, tips with well-developed discs; subarticular tubercles of fingers and toes distinct. Toes almost entirely webbed, the web deeply notched, web does not reach the disc of the fourth toe, only fringe of web reaches the base of the fourth toe, tips with distinct discs; inner metatarsal tubercle oval, compressed, outer metatarsal tubercle absent. Tibiotarsal articulation reaching beyond the tip of the snout. Dorsum brown (in spirit) and smooth, a very distinct glandular fold above the tympanum, glandular dorsolateral fold absent. Venter dull white and smooth

Distribution : India : West Bengal : Darjeeling district; Sikkim; Meghalaya : Khasi Hills; Uttar Pradesh : Mussoorie. Also Nepal.

12. *Amolops afghanus* (Gunther)

1858. *Polypedates afghana* Gunther, *Cat. Batr. Sal. Coll. Br. Mus.*, : 81.

1974. *Amolops afghanus* : Dubois, *Bull. Mus. Natl. Hist. Nat.*, 143 (213) : 356 - 357.

Material examined : Nil; record from published literature.

Diagnostic character : Head as long as broad or a little broader than long; snout round, equals the diameter of the eye; nostril equidistant from the tip of the snout and the eye; interorbital width nearly equal to that of the upper eyelid; tympanum almost indistinct, covered by granules, less than half diameter of the eye. Fingers free, first generally a little shorter than second, tips with well developed large discs; subarticular tubercles of fingers and toes distinct. Toes fully webbed, web feebly notched, web reaches middle of the disc of the fourth toe, tips with distinct and large discs; inner metatarsal tubercle elliptical, outer metatarsal tubercle absent. Tibiotarsal articulation reaching beyond the tip of the snout. Dorsum olive green and granular, a distinct glandular fold above the tympanum, glandular dorsolateral fold absent. Venter light yellowish, granular on belly and posterior part of thighs.

Distribution : India : West Bengal : Darjeeling district; Sikkim; Punjab : Kangra district; Meghalaya : Khasi Hills and Garo Hills. Elsewhere : Nepal, Burma, Thailand, Yunnan and Tibet.

Genus 7. *Occidozyga* Kuhl and van Hasselt.

1822. *Occidozyga* Kuhl and van Hasselt, *Algemeene Konst-en Letter-Bode*, 7 : 103.

13. *Occidozyga lima* (Gravenhorst)

1829. *Rana lima* Gravenhorst, *Dilic. Mus. Zool. Vratisl.*, 1 : 41.
 1890. *Oxyglossus lima*, Boulenger, *Fauna Br. India*, : 436-437
 1985. *Occidozyga lima* : Frost, *Amphibian species of the World* : 465.

Material examined : Nil; record from published literature.

Diagnostic character : Head broader than long; snout pointed, as long as eye; nostril equidistant from the tip of snout and the eye; interorbital width shorter than that of upper eyelid; tympanum rather indistinct, as long as eye. Fingers free, first as long as second, tips pointed; subarticular tubercles very small. Toes fully webbed, tips swollen; inner metatarsal tubercle well developed, rather shovel-shaped, outer metatarsal tubercle subconical; a small tarsal tubercle just below the tibiotarsal articulation which reaches mid-eye to tip of snout. Dorsum brown, a bit warty. Venter white, belly rather wrinkled.

Distribution : India : West Bengal : Boulenger (1890) reports it from 'Lower Bengal' Burma, Southern China, Vietnam. Malaya and Java.

Genus 8. *Rana* Linnaeus

1758. *Rana* Linnaeus, *Syst. Nat. Ed.* 10, 1 : 210

Key to the Species of the Genus *Rana*

- | | |
|--|-----------------------|
| 1. Tips of toes with discs | 2 |
| Tips of toes without discs..... | 11 |
| 2. Toes entirely webbed | 3 |
| Toes not entirely webbed | 7 |
| 3. Tips of fingers with discs | 4 |
| Tips of fingers without discs..... | <i>liebigii</i> |
| 4. Dorso-lateral glandular fold present | 5 |
| Dorso-lateral glandular fold absent | 6 |
| 5. A glandular fold from eye to shoulder present | <i>sikimensis</i> |
| A glandular fold from eye to shoulder absent | <i>gerbillus</i> |
| 6. Dorsal skin entirely smooth | <i>livida</i> |
| Dorsal skin on sacral region tuberculated | <i>mawphlongensis</i> |
| 7. Tips of fingers with discs | 8 |
| Tips of fingers without discs | 10 |
| 8. First finger shorter than second | <i>senchalensis</i> |
| First finger longer than second | 9 |
| 9. Tibia as long as or shorter than the foot | <i>erythraea</i> |
| Tibia usually longer than foot, never shorter | <i>nicobariensis</i> |

10. Tympanum one fourth diameter of the eye.....*annandalii*
 Tympanum half diameter of the eye*blanfordii*
11. Toes webbed upto the tips12
 Toes webbed not upto the tips15
12. Inner metatarsal tubercle digitiform (toe-like).....13
 Inner metatarsal tubercle not digitiform14
13. Ventral surface smooth with no porous warts, tips of toes swollen*cyanophlyctis*
 Ventral surface more or less granulated with porous warts on throat, under surface of thighs and sides of belly; tips of toes pointed*hexadactyla*
14. Inner metatarsal tubercle blunt, not shovel-shaped*tigerina*
 Inner metatarsal tubercle sharp, shovel-shaped*crassa*
15. Two phalanges of the fourth toe free from webbing, male with internal vocal sacs ...*keralensis*
 Three phalanges of the fourth toe free from webbing, male with external vocal sacs.....
*limnocharis*

14. *Rana liebigii* Gunther

1860. *Rana liebigii* Gunther, *Proc. Zool. Soc.*, London : 157

1920. *Rana liebigii* : Boulenger, *Rec. Indian Mus.*, 20 : 78-80

Material examined : Darjeeling dist. : 1 ex., Palmajua, 7.vii.1958, H. Khajuria; 42 ex. (tadpoles), Mahanadi (stream), 26.iv.1971; 14 ex. (tadpoles), Kurseong, 1.v.1971. All. Coll. A. R. Bhowmik and A. K. Sarkar.

Measurements : Snout to vent length 50 mm.

Diagnostic character : Head much broader than long; snout rounded, as long as or a little shorter than the eye; nostril a little nearer to the eye than the tip of the snout; interorbital width almost equal to that of the upper eyelid; tympanum indistinct. Fingers free, first shorter than second, tips blunt; subarticular tubercles of fingers and toes large, prominent. Toes entirely webbed, tips with small discs; inner metatarsal tubercle long, outer metatarsal tubercle absent. Tibiotarsal articulation reaching beyond the tip of the snout. Dorsum brown, smooth with round warts and dorsolateral folds. Venter light brownish, smooth. Males develop black spines on breast, inner side of the arm and on upper side of three inner fingers.

Distribution : India : West Bengal : Darjeeling district; Sikkim; Himachal Pradesh : Simla. Also Nepal.

Remarks : The tadpoles have been collected under stones inside fast-flowing stream.

15. *Rana sikimensis* Jerdon

1870. *Rana sikimensis* Jerdon, *Proc. Asiat. Soc. Bengal* : 83.

1985. *Rana sikimensis* : Frost, *Amphibian species of the World* : 514.

Material examined : Nil; record from published literature.

Diagnostic character : Head a little broader than long; snout rounded, slightly longer than the eye; nostril equidistant from the tip of the snout and the eye; interorbital width shorter than that of upper eyelid;

tympanum distinct, half the diameter of the eye. Fingers with rudimentary web, first equals second, tips with small discs; subarticular tubercles of fingers and toes feebly distinct. Toes almost entirely webbed, tips with small discs; inner metatarsal tubercle long, compressed, outer metatarsal tubercle absent. Tibiotarsal articulation reaching beyond the tip of snout. Dorsum reddish brown (in spirit), smooth with a few warts and dorso-lateral glandular folds. Venter dull white, smooth, a cutaneous almost circular flap surrounded by papillae around the vent.

Distribution : India : West Bengal : Darjeeling district; Meghalaya : Khasi Hills. Elsewhere : Nepal.

Remarks : Boulenger (1920) reports three examples of frogs (two are present in the collection of Z.S.I., Calcutta) as *R. assamensis* from Darjeeling district. Annandale in Boulenger (1920) reports that the frog is very common inside the dense herbage at the edge of shady jungle streams in the Eastern Himalayas.

16. *Rana gerbillus* Annandale

1912. *Rana gerbillus* Annandale, *Rec. Indian Mus.*, 8 : 10

1920. *Rana gerbillus* : Boulenger, *Rec. Indian Mus.*, 20 : 207-208.

1986. *Rana gerbillus* : Chanda, *J. Bengal nat. Hist. Soc. (N.E.)* 5 (2) : 143.

Material examined : Nil; record from published literature.

Diagnostic character : Head as long as broad; snout round, as long as or a little longer than eye; nostril a little nearer the tip of the snout than the eye; interorbital width equals to that of the upper eyelid; tympanum distinct, about half diameter of the eye. Fingers free, first equals second, tips with large discs; subarticular tubercles of fingers and toes not so distinct. Toes almost completely webbed, tips with distinct discs; a flat oval inner metatarsal tubercle present, outer metatarsal tubercle absent. Tibiotarsal articulation reaching beyond the tip of snout. Dorsum dark-gray, smooth, with a distinct glandular dorso-lateral fold. Venter greenish yellow with brown spots on throat and breast.

Distribution : India : West Bengal : Darjeeling district; Arunachal Pradesh : Abor foot-hills.

Remarks : Chanda (1986) reports it from Darjeeling.

17. *Rana livida* (Blyth)

1855. *Polypedates lividus* Blyth, *J. Asiat. Soc. Bengal*, 24 : 718.

1920. *Rana livida* : Boulenger, *Rec. Indian Mus.*, 20 : 214-216.

Material examined : 2 ex., Darjeeling, -x.1872, J. Gammie.

Measurements : Snout to vent length 45-60 mm.

Diagnostic character : Head mostly as long as broad; snout rounded, generally longer than the eye; nostril nearer to the tip of the snout than the eye; interorbital width longer than of upper eyelid; tympanum distinct, more than half diameter of the eye. Fingers with rudiment of that web, first equals second, tips with large discs containing groove separating the upper from the lower surface; subarticular tubercles of fingers and toes large, distinct. Toes entirely webbed, tips with discs similar to those of fingers, but smaller; inner metatarsal tubercle long, compressed, outer metatarsal tubercle absent. Tibiotarsal articulation reaching beyond the tip of snout. Dorsum dark brown (in spirit), smooth. Venter dull whitish, smooth, granules on under surface of thighs.

Distribution : Indian : West Bengal : Darjeeling district; Meghalaya; Assam and Manipur. Elsewhere : Burma.

18. *Rana mawphlongensis* Pillai & Chanda

1977. *Rana mawphlongensis* Pillai and Chanda, *J. Bombay nat. Hist. Soc.*, 74 : 138.

1986. *Rana mawphlongensis* : Chanda, *J. Bengal nat. Hist. Soc.*, (N.S.) 5 (2) : 146.

Material examined : Nil; record from published literature.

Diagnostic character : Head as long as broad; snout pointed, a little longer than eye; nostril equidistant from the tip of snout and the eye; tympanum distinct, more than half diameter of the eye. Fingers free, first slightly longer than second, tips with small discs; subarticular tubercles of fingers and toes well developed. Toes nearly fully webbed, tips with distinct discs; inner metatarsal tubercle moderately prominent, outer metatarsal tubercle absent. Tibiotarsal articulation reaching tip of snout. Dorsum bluish black, smooth upto sacral region, rest glandular. Venter white, smooth.

Distribution : India : West Bengal : Darjeeling district; Meghalaya.

Remarks : Chanda (1986) reports it from Darjeeling.

19. *Rana senchalensis* Chanda

1986. *Rana senchalensis* Chanda, *J. Bengal nat. Hist. Soc.*, (N.S.) 5 (2) : 146-147.

Material examined : Nil; record from published literature.

Diagnostic character : Head broader than long; snout rounded; nostril nearer to eye than the tip of the snout, tympanum distinct, about two-third diameter of eye. Fingers free, first shorter than second, tips swollen into small discs; subarticular tubercles of fingers and toes distinct, well developed. Toes nearly entirely webbed, two penultimate phalanges of fourth toe free, tips dilated into small discs; inner metatarsal tubercle small, oval, outer metatarsal tubercle absent. Tibiotarsal articulation reaching beyond the tip of snout. Dorsum dark brown with black spots. Venter spotted with brown on throat and limbs.

Distribution : West Bengal : Darjeeling district (Chanda, 1986).

20. *Rana erythraea* (Schlegel)

1837. *Hyla erythraea* Schlegel, *Abbild.* : 27

1920. *Rana erythraea* : Boulenger, *Rec. Indian Mus.*, 20 : 152-155.

1984. *Rana erythraea* : Sarkar, *Rec. Zool. Surv. India*, 81 (3 & 4) : 223-224.

Material examined : Bardhaman dist. : 1 ex., Bardhaman town, 1983, S. Chakrabarty. Bankura dist. : 1 ex., Kotalpur, 25.vi.1977, S. Ray. Mednipur dist. : 1 ex., Khirai, July, 1986, A Mitra. 24-Parganas dist. : 1 ex., Haridevpur (Calcutta), 13.v.1986, R. L. Chowdhury.

Measurements : Snout to vent length 38-46 mm.

Diagnostic character : Head longer than broad; snout more or less pointed, projecting beyond the mouth, longer than the diameter of the eye; nostril nearer the tip of the snout than the eye; interorbital width equal/little broader than that of upper eyelid; tympanum very distinct, nearly once the diameter of the eye. Fingers slender with rudimentary web, first a little longer than second, tips with distinct discs; subarticular tubercles of fingers and toes well developed. Toes three-fourth webbed, two phalanges of fourth toe free,

tips with distinct discs; an oval inner metatarsal tubercle present, outer metatarsal tubercle mostly absent. Tibiotarsal articulation reaching in between posterior end of eye to tip of snout. Dorsum smooth with distinct dorso-lateral glandular folds running from above the tympanum to the hip on both the sides of the back. Venter smooth.

Distribution : West Bengal : Bardhaman, Bankura, Haora, Medinipur and 24-Pargonas districts. It is recorded for the first time from Bardhaman and Bankura districts of West Bengal. *Elsewhere* : Assam in India and South-east Asia.

Remarks : The frogs are not common in West Bengal. They are found inside the aquatic vegetation. Inger and Dutta (1986) kept the Indian form under *Rana taipehensis* Van Deburgh, which differ from *Rana erythraea* by possessing three phalanges of the fourth toe free. We regard it as *Rana erythraea*, as the specimens in our disposal tally more with *Rana erythraea* by possessing two phalanges of the fourth toe free, and the third phalange of the same is covered partly or fully with web.

21. *Rana nicobariensis* (Stoliczka)

1870. *Hylorana nicobariensis* Stoliczka, *J. Asiat. Soc. Bengal*, 39 : 150.

1920. *Rana nicobariensis* : Boulenger, *Rec. Indian Mus.*, 20 : 162-165.

Material examined : Darjeeling dist. : 1 ex. (under log), Sukna, 4.x.1982. Jalpaiguri dist. : 13 ex. (2 adults and 11 juv.), Khutimari, 8.x.1982; 3 ex. (under log), Rydak, 6.vi.1983. All coll. A. K. Sarkar.

Measurements : Snout to vent length 34-65 mm. (adult); 9-18 mm. (juveniles).

Diagnostic character : Head longer than broad; snout more or less pointed, longer than the eye; nostril nearer the tip of the snout than the eye; interorbital width equals to that of the upper eyelid; tympanum very distinct, three-fourth the diameter of the eye. Fingers free, first longer than second, tips with small discs; subarticular tubercles of finger and toes distinct. Toes half webbed, three phalanges of fourth toe free, tips with small discs; inner metatarsal tubercle oval, outer metatarsal tubercle small, round, situated at the base of fourth toe. Tibiotarsal articulation reaching in between nostril and tip of snout. Dorsum dark reddish brown with darker spots, granular, with glandular dorsolateral fold running from above the tympanum to the hip. Venter dull white, spotted with chocolate, smooth.

Distribution : West Bengal : Darjeeling and Jalpaiguri districts. First record from main land of India; Nicobars Islands, Sumatra, Malaysia, Borneo and Java.

Remarks : Medium sized frog. Largest one measuring 65 mm. from snout to vent, 'as against 55 mm. (Boulenger, 1920)' is from Sukna forest. The frogs prefer deep forest with thick canopy of lofty trees where sunlight can not penetrate properly. The frogs are not very active. They are found sitting near big trees, and escape inside the crevices under the tree-trunk when disturbed.

22. *Rana annandalii* Boulenger (Annandale's Frog)

1920. *Rana annandalii* Boulenger, *Rec. Indian Mus.*, 20 : 77-78.

1962. *Rana annandalii* : Daniel, *J. Bombay nat. Hist. Soc.*, 59 (2) : 667-668.

Material examined : Nil; record from published literature.

Diagnostic character : Head a little broader than long; snout rounded, nearly once the diameter of the eye; nostril equidistant from the tip of the snout and the eye; interorbital width shorter than that of upper eyelid; tympanum feebly distinct or hidden, one-fourth the diameter of the eye. Fingers free, first equals second, tips blunt; subarticular tubercles of fingers and toes small, weak. Toes three-fourth webbed, two phalanges of fourth toe free, tips with small discs; inner metatarsal tubercle absent. Tibiotarsal articulation reaches nostril. Dorsum olive-green, smooth or with few small warts. Venter whitish, smooth.

Distribution : West Bengal : Darjeeling district.

Remarks : Daniel (1962) reports that tadpoles are common in the streams around Darjeeling during monsoon.

23. *Rana blandfordii* Boulenger (Blanford's Frog)

1882. *Rana blandfordii* Boulenger, *Cat. Batr. Ecaud.* : 23.

1944. *Rana blanfordii* : Bhaduri, *J. Asiat. Soc. Bengal*, 10 : 53-57.

Material examined : Nil; record from published literature.

Diagnostic character : Head a little broader than long; snout rounded, as long as the eye; nostril nearer the eye than the tip of snout; interorbital width equals nearly to that of the upper eyelid; tympanum distinct or indistinct, about half the diameter of the eye. Fingers free, first shorter than second, tips blunt; subarticular tubercles of fingers and toes large, prominent. Toes three-fourth webbed, tips with small discs; inner metatarsal tubercle feebly prominent, outer metatarsal tubercle absent. Tibiotarsal articulation reaching in between the nostril and the tip of snout. Dorsum olive green, and smooth with or without granules and flat glands. Venter whitish, smooth.

Distribution : India : West Bengal : Darjeeling district; Uttar Pradesh : Nainital, Garhwal district; Himachal Pradesh : Simla, Kangra and Dharmasala.

Remarks : Very common in the Western Himalayas.

24. *Rana cyanophlyctis* Schneider (Skipping Frog)

1799. *Rana cyanophlyctis* Schneider, *Hist. Amph.*, 1 : 137.

1920. *Rana cyanophlyctis* : Boulenger, *Rec. Indian Mus.*, 20 : 12.

1984. *Rana cyanophlyctis* : Sarkar, *Rec. Zool. Surv. India*, 81 (3 & 4) : 224.

Material examined : 777 Frogs and 35 tadpoles collected from, - Darjeeling dist. : Siliguri (Phuleswari and Jorapani stream), Sukna, Chalsa, Bamanpokhri, Kurseong and Panighat (Balasan river). Jalpaiguri dist. : New Jalpaiguri, Jalpaiguri town, Khutumari (Paddy-field), Gaikata, Rajabhatkhawa, Jainti, Sulkaipara, Sevok road-side, Lataguri and Chelpata. Koch Behar dist. : Koch Behar town, Tufanganj, Dinahata, Mckliganj and Mathabhanga. West Dinajpur dist. : Hoseinpur, Balurghat, Gangarampur, Hilli, Raiganj, Kaliaganj, Islampur and Chopra. Maldah dist. : Maldah town, Kaliachak, Tulsihata and Chanchal. Murshidabad dist. : Baharampur, Lalgola, Dhulian, Kandi, Swarupganj, Bhabta and Jiaganj. Nadia dist. : Bethuadahari and Karimpur. Birbhum dist. : Sainthia, Suri, Bolpur, Ahmedpur and Rampurhat. Bardhaman dist. : Ranigunje, Ukhra, Kojoria and Salanpur. Bankura dist. : Bishnupur, Bankura town, Rajagram, Gandeshwari, Sareswar, Kotalpur, Simlapal, Panchmura, Raipur and Sonakukhi.

Purulya dist. : Purulya town, kenda and Balarampur. Medinipur dist. : Digha, Mandalpuskarini, Garbeta, Arabari, Jhargram, Belpahari, Tamruk, Kantai, Datan, Hizli and Khirai. 24-Pargonas dist. : Jharkhali, Sajnakhali, Namkhana, Frazerganj, Sagar Island (Kachuberia, Bamunkhali, Rudranagar), Gosaba, Kakdwip, Bangaon, Helencha, Duttaphulia and Parmadan. All Coll. Staff of Z.S.I. Collections are available throughout the year.

Measurements : Snout to vent length 19-69 mm.

Diagnostic character : Head broader than long; snout generally rounded equal or a little longer than the diameter of the eye; nostril equidistant from the tip of the snout and the eye; interorbital width much smaller than that of the upper eyelid; tympanum distinct, nearly once the diameter of the eye. Fingers free, first equals second, tips pointed; subarticular tubercles of fingers and toes feebly prominent. Toes fully webbed, tips swollen; a pointed digit-like inner metatarsal tubercle present, outer metatarsal tubercle absent. Tibiotarsal articulation reaches in between posterior end of tympanum and nostril. Dorsum darker with small warts. Venter whitish and smooth.

Distribution : India : West Bengal : All the districts. Throughout the plains of India, and up 1846 m. in the Himalayas. Also Pakistan, Afghanistan, Beluchistan, Iran, South Arabia, Nepal, Thailand and Sri Lanka.

Remarks : It is one of the commonest species of frogs, which is found floating in ponds, ditches and other water bodies in the plains of India almost throughout the year. Boulenger (1920) records its distributional range upto 6,000 ft. in the Quetta hills. The frogs can tolerate hazards and manage to live in dirty habitat. These frogs have been found living in the slums of open drains in the suburbs of Calcutta, and feeding on insect-larvae and mosquitoes grown in the slums. Two examples of frog measuring 57 mm. and 60 mm. respectively from snout to vent collected at night from an open drain of N.V.F. Training Centre, Kurseong (alt. 1459 m.), Darjeeling district, possess thickly tuberculated skin on dorsum, and chain of warts running laterally from below the tympanum to the ventral joint of thighs. There is no record of collection of *Rana cyanophlyctis* from such an altitude in West Bengal. Another example of frog collected from Jainti, Jalpaiguri district possesses thickly tuberculated skin on dorsum. Adults can be used in College laboratories for dissecting purpose.

25. *Rana hexadactyla* Lesson (Pond Frog)

1834. *Rana hexadactyla* Lesson, in Balang, *Voy. Indian. or.*, : 331.

1920. *Rana hexadactyla* : Boulenger, *Rec. Indian Mus.* 20 : 10-11.

1984. *Rana hexadactyla* : Sarkar, *Rec. Zool. Surv. India*, 81 (3 & 4) : 225-227.

Material examined : 24-Pargonas dist. : 4 ex., Sajnakhali, 17.iii.1975; 3 ex., Jharkhali, 23.iii.1975; 1 ex., Canning, 14.i.1976. All coll. M. L. Biswas.

Measurements : Snout to vent length 22-144 mm.

Diagnostic character : Head as long as broad or a little broader than long; snout rounded or very slightly pointed, hardly projecting beyond the mouth, longer than the diameter of the eye; nostril nearer the tip of the snout than the eye; interorbital width much smaller than that of upper eyelid; tympanum distinct, nearly once the diameter of the eye. Fingers free, first longer than second, tips pointed; subarticular tubercles of fingers and toes feebly prominent. Toes fully webbed, tips pointed digit-like inner metatarsal

tubercle present, outer metatarsal tubercle absent. Tibiotarsal articulation reaching in between posterior end of tympanum and anterior end of the eye. Dorsum leaf-green or darker with porous warts. Venter dull whitish, granular with large porous warts on the throat, lateral sides of belly, and under the thighs.

Distribution : India : West Bengal : Haora, Hugli and 24-Parganas districts; South India; Punjab; Rajasthan; Maharastra and Goa. Elsewhere : Sri Lanka.

Remarks : A giant edible frog generally found floating in ponds with rich green aquatic vegetation.

26. *Rana tigerina* Daudin (Indian Bull Frog)

1803. *Rana tigerina* Daudin, *Hist. Rain. Gren. Crap.*, p.64.

1920. *Rana tigrina* : Boulenger, *Rec. Indian Mus.*, 20 : 17-20.

1984. *Rana tigerina* : Sarkar, *Rec. Zool. Surv. India*, 81 (3 & 4) : 227.

Material examined : Jalpaiguri dist. : 1 ex., Khutumari, 7.x.1982; 2 ex. (Bush), Sulkapara, 24.v.1983; 1 ex., Sulkapara (Sulkhani River), 25.v.1983; 2 ex. (1 frog and 1 tadpole), Rydak, 4.vi.1983. All coll. A. K. Sarkar. Koch Behar dist. : 1 ex., Koch Behar town, 16.vii.1986; 1 ex., Tufangunj, 19.vii.1986; 4 ex., Dinahata, 22.vii.1986; 3 ex., Mekliganj, 25.vii.1986; 1 ex., Mathabhanga, 28.vii.1986. All coll. M. L. Biswas. West Dinajpur dist. : 3 ex., Balurghat, 22.vii.1984; 1 ex., Hilli, 25.vii.1984; 1 ex., Raiganj, 26.vii.1984; 1 ex., Kaliaganj, 27.vii.1984; 1 ex., Islampur, 29.vii.1984; 5 ex., Chopra, 29.vii.1984. All coll. A. K. Sarkar. Maldah dist. : 1 ex., Tulsihata, 1.viii.1984; 1 ex., Chanchal, 2.viii.1984; 2 ex., Gazole, 4.viii.1984; 1 ex., Maldah town, 5.viii.1984. All coll. A. K. Sarkar. Murshidabad dist. : 1 ex., Kandi, 20.ii.1984, M. L. Biswas. Nadia dist. : 1 ex., Bethuadahari, 26.ix.1983; 1 ex., Karimpur, 15.xii.1983. All coll. M. L. Biswas. Birbhum dist. : 1 ex., Suri, 11.ix.1984. M. L. Biswas. Bankura dist. : 1 ex. Jaipur, 26.vi.1977, R. Ray. 1 ex., Bankura town, 30.x.1980, S. Ahmed. Purulya dist. : 3 ex., Arsa, 24.ix.1985, A. K. Sarkar. Medinipur dist. : 1 ex., Mandalpuskarini, 15.vii.1985; 1 ex., Jhargram, 24.vii.1985; 4 ex., Tamluk, 5.xii.1985; 10 ex., Kantai, 8.xii.1985; 21 ex., Digha, 13-19.vii.1974; 7 ex., Digha, 11.xii.1985; 10 ex., Dantan, 14.xii.1985; 5 ex., Hijli, 17.xii.1985. All coll. M. L. Biswas. 1 ex., Khirai, July-Aug., 1986, A. Mitra. 24-Parganas dist. : 13 ex., Kakdwip, 3-12.ix.1974; 1 ex., Jharkhali, 22.iii.1975; 1 ex., Parmadan, 18.xii.1983. All coll. M. L. Biswas.

Measurements : Snout to vent length 17-154 mm.

Diagnostic character : Head as long as broad or a little broader than long; snout rounded or pointed, projecting beyond the mouth, longer than the diameter of the eye; nostril generally equidistant from the tip of snout and the eye; interorbital width much smaller than that of the upper eyelid; tympanum distinct, nearly equal to the diameter of the eye. Finger free, first longer than second, tips not sharply pointed; subarticular tubercles of fingers and toes not very distinct. Toes entirely webbed, tips not pointed; a blunt, not shovel-shaped inner metatarsal tubercle present, outer metatarsal tubercle absent. Tibiotarsal articulation reaches in between posterior end of eye to nostril. Dorsum olive green with darker spots, distinct warts and long glandular folds. Venter whitish and smooth.

Distribution : India : West Bengal : All the districts. The species is common throughout India from the base of the Himalaya to Southern part of the country. Elsewhere : Nepal, Sri Lanka, Burma, Thailand, South China and Taiwan.

Remarks : Commonest species of edible frogs found throughout the plains of West Bengal and India. It frequents inside the bushes grown on the banks of ditches, ponds, canals and lakes. Sarkar (1984) gives an account of its habits, habitats and diminishing in population in the environs of Calcutta. Abdulali (1985) has stated its utility in the control of agricultural pests. In recent years during the course of field surveys in different parts of West Bengal our scientists have noticed and also come to know from the villagers that population of *Rana tigerina* and also of *Rana bexadactyla*, another edible species, have gradually been depleted from the nature owing to severe commercial exploitation. They also feel that these beneficial creatures can not be protected by framing Wild Life Protection Act only, but also creation of public awareness is required for the same.

27. *Rana crassa* Jerdon (Jerdon's Bull Frog)

1853. *Rana crassa* Jerdon, *J. Asiat. Soc. Beng.*, 22 : 531.

1974. *Rana crassa* : Bhaduri, *J. Bombay nat. Hist. Soc.*, 44 (3 & 4) : 481-484.

1984. *Rana crassa* : Sarkar, *Rec. Zool. Surv. India*, 81 (3 & 4) : 228.

Material examined : Koch Behar dist. : 1 ex., Koch Behar town, 16.vii.1986; 1 ex., Mathabhanga, 28.vii.1986. All coll. M. L. Biswas. West Dinajpur dist. : 4 ex., Balurghat, 22.vii.1984; 1 ex., Islampur, 29.vii.1984. All coll. A. K. Sarkar. Maldah dist. : 3 ex., Tulsihata, 1.viii.1984; 2 ex., Chanchal, 2.viii.1984; 9 ex., Gazole, 4.viii.1984; 5 ex. (tadpoles), Telipokhri (Maldah town), 5.viii.1984. All coll. A. K. Sarkar. Murshidabad dist. : 1 ex., Baharampur, 14.xii.1983; 1 ex., Lalgola, 15.ii.1984; 2 ex., Dhulian, 19.ii.1984; 2 ex., Kandi, 22.ii.1984; 1 ex., Swarupganj, 22.vi.1984; 1 ex., Bhabta, 26.vi.1984; 1 ex., Jiyaganj, 30.vi.1984. All coll. M. L. Biswas. Nadia dist. : 1 ex., Bethuadahari, 26.ix.1983; 1 ex., Karimpur, 15.xii.1983. All coll. M. L. Biswas. Birbhum dist. : 1 ex., Sainthia, 3.vii.1984; 1 ex., Bolpur, 15.ix.1984; 1 ex., Ahmadpur, 21.ix.1984; 1 ex., Rampurhat, 25.ix.1984. All coll. M. L. Biswas. Bankura dist. : 1 ex., Panchmura, 15.ix.1985; 3 ex., Simlapal, 15.ix.1985; 1 ex., Raipur, 16.ix.1985; 1 ex., Beliatore, 19.ix.1985. All coll. A. K. Sarkar. Purulya dist. : 4 ex., Arsa 22-24.ix.1985; 4 ex., Shirkabad, 23.ix.1985; 6 ex., Kenda, 26-28.ix.1985; 1 ex., Manbazar, 27.ix.1985; 1 ex., Purulya town, 2.ix.1985. All coll. A. K. Sarkar. Medinipur dist. : 1 ex., Mandalpushkarini, 17.xii.1985; 1 ex., Garbeta, 20.vii.1985; 2 ex., Dantan, 16.xii.1985. All coll. M. L. Biswas. 19 ex., Khirai, July-Aug., 1986, A. Mitra. 24-Pargonas dist. : 1 ex., Bangaon, 5.viii.1983; 2 ex., Halencha, 9.viii.1983; 1 ex., Duttaphulia, 11.viii.1983; 1 ex., Parmadan, 19.xii.1983. All coll. M. L. Biswas.

Measurements : Snout to vent length 20-100 mm.

Diagnostic character : Head a little broader than long; snout generally pointed, projecting beyond the mouth, longer than the diameter of the eye; nostril generally equidistant from the tip of snout and the eye; interorbital width much smaller than that of upper eyelid; tympanum distinct, nearly equal to the diameter of the eye. Fingers free, first longer than second; subarticular tubercles of fingers and toes feebly distinct. Toes entirely webbed, penultimate phalange of fourth toe free, tips not pointed; a highly developed, shovel-shaped inner metatarsal tubercle present, outer metatarsal tubercle absent. Tibiotarsal articulation reaches the tympanum or the eye. Dorsum light grayish with interrupted long warts. Venter dull whitish with darker spots on throat, and smooth.

Distribution : India : West Bengal : Birbhum, Bankura, Koch Behar, Maldah, Medinipur, Nadia, Puruliya, 24-Parganas and West Dinajpur districts; Northern and Peninsular India. Elsewhere : Sri Lanka.

Remarks: Fairly common in the districts of Purulya, Bankura, Birbhum, Murshidabad and Medinipur, and scattered in other districts of West Bengal. The frogs are nocturnal in habit. Spend day inside the crevices on the elevated walls of ditches, ponds and canals. It has strong cannibalism and consumes all the consumable sizes of frogs kept together in a container. One example of frog collected from Balurghat in July possesses smooth skin on the dorsum. Four examples from Kenda, Purulya district, and one example from Simlapal, Bankura district are with white mid-dorsal line running from snout to vent.

28. *Rana keralensis* Dubois (Gunther's Warty-Frog)

1875. *Rana verrucosa* Gunther, *Proc. Zool. Soc.*, London, p. 567.

1920. *Rana verrucosa* : Boulenger, *Rec. Indian Mus.*, 20 : 26-27.

1980. *Rana keralensis* Dubois, *Bull Mus., natn. Hist. nat. Paris*, (94) 2, Sec. A : 928 (replacement name).

Material examined : Jalpaiguri dist. : 1 ex., Sulkapara, 25.v.1983; 2 ex., Jainti, 1.vi.1983; 5 ex., Rydak, 6.vi.1983. All coll. A. K. Sarkar.

Measurements : Snout to vent length 54-72 mm.

Diagnostic character : Head a little broader than long; snout bluntly pointed, equals the diameter of the eye; nostril equidistant from the tip of the snout and the eye; interorbital width shorter than that of upper eyelid; tympanum distinct, about two-third the diameter of the eye; fingers free, first longer than second, tips more or less pointed; subarticular tubercles of fingers and toes large and distinct. Toes three-fourth webbed, two phalanges of fourth toe free; inner metatarsal tubercle elliptical, outer metatarsal tubercle small, oval. Tibiotarsal articulation reaching in between nostril and tip of snout. Dorsum greyish and warty. Venter whitish, smooth.

Distribution : India : West Bengal : Jalpaiguri district. New record from West Bengal; Kerala and Tamil Nadu.

Remarks : Rare species. Found inside bushes grown at the edge of large streams. One example of frog collected from Sulkapara has been found inside thick grass grown at the edge of a fast flowing stream (Sukhni Nadi), and five examples from Rydak are also from the similar habitat inside dense forest. The frogs collected from Jainti and Rydak are very stout with rough warty skin on dorsum, smooth ventrum and granular skin on hinder side and under-surface of thighs. The frogs are darker in colour. These frogs have been collected in the evening while males are busy in making mating-calls. It is very difficult to trace the frogs during the day.

29. *Rana limnocharis* Boie (Cricket Frog)

1835. *Rana limnocharis* (Boie), Wiegmann, *N. Acta. Ac. Leop.-Carol.* 17 (i) : 255.

1920. *Rana limnocharis* : Boulenger, *Rec. Indian Mus.*, 20 : 28.

1984. *Rana limnochari limnocharis* : Sarkar, *Rec. Zool. Surv. India*, 81 (3 & 4) : 229.

Material examined : 648 frogs and 45 tadpoles collected from,- Darjeeling dist. : Kalimpong, Miric, Bamanpokhri, Sukna. Jalpaiguri dist. : Khutumari, Gairkata, Rajabhatkhawa, Jainti, Sulkapara, Rydak and Jalpaiguri town. Koch Behar dist. : Koch Behar town, Tufanganj, Dinhat, Mekhliganj and Mathabhanga.

West Dinajpur dist. : Balurghat, Gangarampur, Hilli, Kaliaganj, Raiganj, Islampur and Chopra. Malda dist. : Tulsihata, Chanchal, Gazole, Malda town, Kaliachak and Gour. Murshidabad dist. : Baharampur, Lalgola, Dhulian, Kandi, Bhabta, Jiyaganj and Jalangi. Nadia dist. : Karimpur, Bethuadahari and Swarupganj. Birbhum dist. : Suri, Bolpur, Ahmedpur, Rampurhat and Sainthia. Bardhaman dist. : Bardhaman town and Ukhra. Bankura dist. : Bankura town, Sareswar, Bishnupur, Panchmura, Raipur, Beliatore and Sonamukhi. Purulya dist. : Santaldi, Purulya town, Sarabhum, Kharbari, Arsa, Manbazar, Hariharpur, Balarampur and Kenda. Midnipur dist. : Khirai, Mamdalpuskarini, Garbeta, Arabari, Jhargram, Belpahari, Tamluk, Kantai, Digha, Dantan and Hizli. 24-Pargonas dist. : Sajnakhali, Jharkhali, Namkhana, Kachuberia (Sagar Island), Kakdwip, Gosaba, Bangaon, Halencha, Duttaphulia and Parmadan. All coll. staff of Z.S.I. Collections are available throughout the year except winter.

Measurements : Snout to vent length 9-82 mm.

Diagnostic character : Head generally as long as broad; snout generally pointed, projecting beyond the mouth, as long as or a little longer than the diameter of the eye, nostril nearer to the tip of snout than the eye; interorbital width much smaller than that of the upper eyelid; tympanum distinct, nearly two-third the diameter of the eye. Fingers free, first longer than second, tips swollen; subarticular tubercles of fingers and toes distinct. Toes half-webbed, normally three phalanges of fourth toe free; a distinct oval inner metatarsal tubercle, and a feebly distinct outer metatarsal tubercle present. Tibiotarsal articulation reaches in between tympanum and nostril. Dorsum greyish and warty. Venter whitish and smooth.

Distribution : India : West Bengal : All the districts. It is a broadly distributed species in India and found in almost all the biotopes of the country. Also eastern Asia from Pakistan, Nepal, Sri Lanka and China to Japan.

Remarks : Common in all the districts of West Bengal. Frogs are found inside the bush grown on the demarcation lines of cultivated land, banks of ditches, ponds and canals, and on moist forest-bed covered with thick canopy of trees. One example of frog collected from kenda, Purulya district possesses a little broader head, strongly overlapping heels (when the limbs are folded at right angle to the body) and tibiotarsal articulation reaching near the nostril.

Genus 9. *Tomopterna* Dumeril and Bibron

1841. *Tomopterna* Dumeril and Bibron, *Erp. Gen.*, 8 : 443.

30. *Tomopterna breviceps* (Schneider) (Burrowing Frog)

1799. *Rana breviceps* Schneider, *Hist. Amph.* 1 : 140.

1920. *Rana breviceps* : Boulenger, *Rec. Indian Mus.*, 20 : 103-105.

1984. *Rana breviceps* : Sarkar, *Rec. Zool. Surv. India*, 81 (3 & 4) : 230-232.

1986. *Tomopterna breviceps* : Inger and Dutta, *J. Bombay nat. Hist. Soc.*, 83 : 138.

Material examined : Jalpaiguri dist. : 1 ex., Sulkapara, 24.v.1983; 1 ex., Jainti, 2.vi.1983. All coll. A. K. Sarkar. West Dinajpur dist. : 3 ex., Chopra, Islampur, 29.vii.1984, A. K. Sarkar. Murshidabad dist. : 1 ex., Dhulian, 17.ii.1984; 1 ex., Bhabta, 26.vi.1984. All coll. M. L. Biswas. Nadia dist. : 1 ex.,

Bethuadahari, 27.ix.1983; 1 ex., Karimpur, 16.xii.1983. All coll. M. L. Biswas. Birbhum dist. : 1 ex., Sainthia, 4.vii.1984; 2 ex., Bolpur, 15.ix.1984; 1 ex., Rampurhat, 22.ix.1984. All coll. M. L. Biswas. Bankura dist. : 2 ex., Simlapal, 14.ix.1985; 1 ex., Punchmura, 15.ix.1985. All coll. A. K. Sarkar. Purulya dist. : 2 ex., Kenda, 28.ix.1985, A. K. Sarkar. Medinipur dist. : 9 ex., Digha, July, 1974; 1 ex., Garbeta, 18.vii.1985; 1 ex., Arabari, 23.vii.1985. All coll. M. L. Biswas. 24-Pargonas dist. : 1 ex., Bangaon, 5.viii.1983; 1 ex., Duttaphulia, 10.viii.1983; 1 ex., Parmadan, 18.xii.1983. All coll. M. L. Biswas.

Measurements : Snout to vent length 13-52 mm.

Diagnostic character : Head broader than long; snout rounded, not projecting beyond the mouth, shorter than the diameter of the eye; nostril equidistant from the tip of the snout and the eye; interorbital width is smaller than that of the upper eyelid; tympanum distinct, more or less half diameter of the eye. Fingers free, first much longer than second, tips swollen, subarticular tubercles of fingers and toes well-developed. Toes minutely webbed, more than three phalanges of the fourth toe free; a highly developed, large, shovel-shaped inner metatarsal tubercle present, outer metatarsal tubercle absent. Tibiotarsal articulation reaches axil or shoulder. Dorsum greyish and warty. Venter whitish and granular.

Distribution : India : West Bengal : Bankura, Birbhum, Jalpaiguri, Medinipur, Murshidabad, Nadia, Purulya, 24-Pargonas and West Dinajpur districts. New record from the districts of Bankura, Birbhum, Jalpaiguri, Medinipur, Murshidabad, Purulya and West Dinajpur of West Bengal. The species is available all over the plains of India. Elsewhere : Sri Lanka, Nepal and Burma.

Remarks : It is an uncommon species of anuran found in West Bengal. It is nocturnal in habit, and found to roam with toad. Once example (♂) collected from Jainti, Jalpaiguri district, possesses tubercles on the hinder and lateral sides of dorsum.

Family V. RHACOPHORIDAE

Key to the Genera of Family RHACOPHORIDAE

1. Vomerine teeth present2
 Vomerine teeth absent*Philautus*
2. Toes not completely webbed, interspace between vomerine processes narrow*Polypedates*
 Toes completely webbed, interspace between vomerine processes wide.....*Rhacophorus*

Genus 10. *Philautus* Gistel

1848. *Philalutus* Gistel, *Naturgesch. Thierr.* : 10.

Key to the species of the genus *Philautus*

- Fingers free from web; toes half webbed; nostril equidistant from the eye and the tip of the snout*annandalii*
- Fingers webbed at the base; toes nearly two third webbed; nostril nearer to the tip of the snout than the eye.....*jerdonii*

31. *Philautus annandalii* Boulenger (Bush Frog)

1906. *Ixalus annandalii* Boulenger, *J. Asiat. Soc. Bengal*, 2 : 385.
 1931. *Philautus annandalii* : Ahl, *Das Tierreich*, Anura III : 71.
 1962. *Philautus annandalii* : Daniel, *J. Bombay nat. Hist. Soc.*, 59 (2) : 668.
 1986. *Philautus annandalii* : Chanda, *J. Bengal nat. Hist. Soc.*, 5 (2) : 148.

Material examined : Darjeeling dist. : 1 ex. (road side bush), Kalimpong, 9.i.1971, J. M. Julka. 10 ex. (forest bed), Goomti, Mahanadi, 30.iv.1971; 1 ex., Ghum Bhanjan, 28.v.1971. All coll. A. R. Bhowmik and A. K. Sarkar. 2 ex., Birch Hill, i.vii. 1979, S. S. Saha.

Measurements : Snout to vent length 11-20 mm.

Diagnostic character : Head broader than long; tongue without conical papilla in the middle; snout sub-accuminate, longer than the diameter of the eye; nostril in between the eye and the tip of the snout; interorbital width much broader than that of upper eyelid; tympanum not very distinct, smaller than eye. Fingers free, first shorter than second, tips with distinct discs; subarticular tubercles of fingers and toes not distinct. Toes half webbed, tips with distinct discs; inner metatarsal tubercle feebly distinct, outer metatarsal tubercle absent. Tibiotarsal articulation reaching between eye and tip of snout. Dorsum dark-brown, smooth with few tubercles and darker bands. Venter dull white, granular.

Distribution : India : West Bengal : Darjeeling district; Assam.

Remarks : Fairly common inside bushes in Darjeeling hills. Nocturnal in habit. Daniel (1962) has given a good account of its habits and habitats. Specimens have been collected under rotten leaves on forest bed near Kurseong during April, 1971.

32. *Philautus jerdonii* (Gunther)

1875. *Ixalus Jerdonii* Gunther, *Proc. Zool. Soc.*, London : 575.
 1882. *Rhacophorus dubius* Boulenger, *Cal. Batr. Sal.* : 81.
 1931. *Rhacophorus (Philautus) dubius* Ahl. *Das Tierreich* Anura III : 93-94.

Material examined : Nil; record from published literature.

Diagnostic character : Snout rounded, not larger than the diameter of the eye; nostril nearer the tip of the snout than the eye; interorbital width broader than that of the upper-eyelid; tympanum distinct, one third the diameter of the eye. Fingers with rudimentary web, tips with distinct discs which are larger than those of toes; subarticular tubercles well-developed. Toes nearly two third webbed, tips with distinct discs. Tibiotarsal articulation reaches the eye. Dorsum reddish-brown and smooth. Venter granular. Snout to vent length 3.8 mm.

Distribution : India : West Bengal : Darjeeling district.

Remarks : Gunther (1875) described the species as *Ixalus jerdonii* basing on a single specimen collected from Darjeeling. He kept it under the genus *Ixalus* (now *Philautus*) basing on main generic character, 'absence of vomerine teeth' Boulenger (1882) reviewed the species and kept it under the genus *Rhacophorus* with the remark that absence of vomerine teeth in the specimen was accidental, and he gave

a new name of the species as *dubius*, as *jerdonii* was pre-occupied under the genus *Rhacophorus*. Ahl (1931) kept it under *Philautus* ignoring Gunther's description of the species as *I. jerdonii*. I like to honour Dr. Gunther's decision as 'absence of vomerine teeth' is one of the main morphological characters for determining the genus *Philautus*.

Genus 11. *Polypedates* Tschudi

1838. *Polypedates* Tschudi, *classif. Batr.* : 34.

Key to the Species of the Genus *Polypedates*

Parieto-squamosal arch absent; skin on head ossified *leucomystax*
 A more or less distinct parieto-squamosal arch present; skin on head mostly free *maculatus*

33. *Polypedates leucomystax* Gravenhorst (Tree Frog)

1829. *Hyla leucomystax* Gravenhorst, *Delic. Mus. Vralislay.*, 1 : 26.

1889. *Rhacophorus leucomystax* : Boulenger, *Proc. Zool. Soc. London* : 29.

1931. *Rhacophorus leucomystax* : Ahl, *Das Tierreich Anura III* : 134-137.

1986. *Polypedates leucomystax* : Inger and Dutta, *J. Bombay nat. Hist. Soc.*, 83 : 139.

Material examined : Darjeeling dist. : 3 ex. (aquatic vegetation), Tibetan Naya Basti (Sonada), 8.v.1971; 21 ex. (aquatic vegetation), Pochang (Sonada), 9.v.1971. All coll. A. R. Bhowmik and A. K. Sarkar. 11 ex. (bush), Kurseong, 18.v.1983, A. K. Sarkar. Jalpaiguri dist. : 1 ex. (bush), Jainti, 31.v.1983; 1 ex., Rydak, 4.vi.1983. All coll. A. K. Sarkar.

Measurements : Snout to vent length 48-85 mm.

Diagnostic characters : Head broader than long, skin on head rugose; snout not pointed, projecting a little beyond the mouth, greater than the diameter of the eye; nostril nearer to the tip of the snout than the eye; interorbital width much broader than that of the upper eyelid; tympanum distinct, about three fourth diameter of the eye. Fingers free, first equals the second, tips of fingers and toes bears horse-shoe shaped distinct discs; subarticular tubercles of fingers and toes distinct. Toes three fourth webbed, one phalange of fourth toe free; a distinct oval inner metatarsal tubercle present, outer metatarsal tubercle absent. Tibiotarsal articulation reaches in between eye and tip of snout. Dorsum light chocolate and smooth. Venter dull whitish and granular.

Distribution : India : West Bengal; Darjeeling and Jalpaiguri districts; Eastern Himalayas. Elsewhere : South China to Malaysia.

Remarks : More or less common in Darjeeling Himalayas, and Foot-hills of West Bengal. A good population of these frogs have been found inside aquatic vegetation of a large pond at Pochang, Darjeeling district during May, 1971. Several frogs have also been found trapped inside their dried up foam-nests made on the dry soil on the bank of the pond. After a little shower during evening in May the frogs are coming out in large number from the dense thorny bushes inside forest at Jainti, Jalpaiguri district, and sit very closer on the logs fallen on the forest bed. The frogs are nocturnal in habit. All the specimens collected from Pochang, Sonad have got rugose skull, and skin adheres to nasal and frontal ridges. A few

examples have got clear parieto-squamosal bony arch, and as such they are intermediate between *P. leucomystax* and *P. maculatus*. But they have been kept under this species as those are possessing more affinities to *R. leucomystax*.

34. *Polypedates maculatus* (Gray) (Tree Frog)

1832. *Hyla maculata* Gray, *Ill. Indian Zool.* 1, pl. 82, fig. 1.

1890. *Rhacophorus maculatus* : Boulenger, *Fauna Br. India Rept. & Batr.* : 475 - 476.

1931. *Rhacophorus maculatus* : Ahl, *Das Tierreich*, Anura III : 133 - 134.

1984. *Rhacophorus maculatus* : Sarkar, *Rec. Zool. Surv. India*, 81 (3 & 4) : 232 - 234.

1986. *Polypedates maculatus* : Inger and Dutta *J. Bombay nat. Hist. Soc.*, 83 : 139.

Material examined : Koch behar dist. : 2 ex., Mathabhanga, 29. vii. 1986, M. L. Biswas. Murshidabad dist. : 1 ex., Swarupgang, 25. vi. 1984; 1 ex., Bhabta, 29. vi. 1984. All coll. M. L. Biswas. Nadia dist. : 1 ex., Bethuadahari, 27. ix. 1983, M. L. Biswas. Birbhum dist. : 1 ex., Sainthia, 6. vii. 1984; 1 ex., Bolpur, 18. ix. 1984. All coll. M. L. Biswas. Bardhaman dist. : 1 ex., Assansol, 3. iv. 1985, S. K. Chanda. Bankura dist. : 1 ex., Bishnupur, 28. vi. 1977, S. Ray. 6 ex. (bush) Simlipal, 15. ix. 1985, A. K. Sarkar. Purulya dist. : 2 ex., Arsa, 4 & 5. xi. 1981, S. Ahmed. 24 Parganas dist. : 1 ex., Parmadan, 18. xii. 1983, M. L. Biswas.

Measurements : Snout to vent length 30-61 mm.

Diagnostic character : Head broader than long, skin on head free, pointed, projecting a little beyond the mouth, generally longer than the diameter of the eye; nostril nearer the tip of the snout than the eye; interorbital width broader than that of the upper eyelid; tympanum distinct, about three fourth diameter of the eye. Fingers with rudimentary web, first equals the second, tips of fingers and toes bear horse-shoe shaped distinct discs; subarticular tubercles of fingers and toes distinct. Toes nearly three fourth webbed, two phalanges of fourth toe free; a distinct oval inner metatarsal tubercle present, outer metatarsal tubercle absent. Tibiotarsal articulation reaches in between posterior end of eye and tip of snout. Dorsum brownish with light darker spots, and smooth. venter dull whitish and granular; skin on head free.

Distribution : India : West Bengal : Bardhaman, Birbhum, Bankura, Darjeeling, Haora, Hugli, Koch Behar, Murshidabad, Nadia, Purulya and 24 Parganas districts. Plains of India in general. Elsewhere : Sri Lanka.

Remarks : More or less common throughout the plains of West Bengal. Nocturnal in habit, generally found inside thick bushes. Sarkar (1984) gives a detailed account regarding its habit and habitat.

Genus 12. *Rhacophorus* Kuhl and van Hasselt

1822. *Rhacophorus* Kuhl and van Hasselt, *Algemeene Konst-en-Letter- Bode* , 7 : 104.

Key to the Species of the Genus *Rhacophorus*

1. Fingers more than half webbed2
Fingers not half webbed.....*Jerdonii*
2. Heel with a triangular dermal appendage; one or two black spots behind the arm present.....
.....*reinwardtii*
Heel without triangular dermal appendage; black spots behind the arm absent.....*maximus*

35. *Rhacophorus jerdonii* (Gunther)

1875. *Polypedates jerdonii* Gunther, *Proc. Zool. Soc. London*, : 571.

1831. *Rhacophorus* (*Rhacophorus*) *Jerdonii* : Ahl. *Das Tierreich* 55, Anura III : 114.

Material examined : Nil; record from published literature.

Diagnostic character : Head a little broader than long; snout rounded, a little shorter than the diameter of the eye; nostril equidistant from the tip of the snout and the eye; interorbital width broader than the upper eyelid; tympanum distinct, one third the diameter of the eye. Fingers with distinct web at the base, tips with distinct discs; subarticular tubercles of fingers and toes moderate. Toes two third webbed, tips with distinct discs. Tibiotarsal articulation reaches the eye. Dorsum greyish, smooth. Venter dull white, spotted brown on throat, granular on the belly.

Distribution : India : West Bengal : Darjeeling district ; Arunachal Pradesh; Assam.

36. *Rhacophorus reinwardtii* (Schlegel)

1840. *Hyla reinwardtii* Schlegel, *Abbild. Amph.*, : 105.

1986. *Rhacophorus reinwardtii*, Chanda, *J. Bengal. nat. Hist. soc.*, (N.S.) 5 (2) : 149.

Material examined : nil; record from published literature.

Diagnostic character : Head broader than long; snout pointed or rounded, as long as the diameter of the eye; nostril equidistant from the tip of snout and the eye; interorbital width much broader than upper eyelid; tympanum more than half diameter of the eye. Fingers entirely webbed, first shorter than second, tips with large discs; subarticular tubercles of fingers and toes well developed. Toes fully webbed to the discs; an oval, more or less distinct inner metatarsal tubercle present, outer metatarsal tubercle absent. Tibiotarsal articulation reaching in between the eye and the nostril. Dorsum darker, smooth, heel with a triangular dermal appendage, one or two black spots on each side behind the arm. Venter dull white, granular.

Distribution : India : West Bengal : Darjeeling district; Meghalaya ; Assam; Arunachal Pradesh. Sumatra.

Elsewhere : Java and Borneo.

Remarks : Chanda (1986) reports it from Darjeeling

37. *Rhacophorus maximus* Gunther

1858. *Rhacophorus maximus* Gunther, *cat. Batr. Sal. Br. Mus.* : 83.

1985. *Rhacophorus maximus* : Sarkar and Sanyal, *Rec. Zool. Survey. India*, 82 (1-4) : 290.

Material examined : Darjeeling distinct : 1 ex., Darjeeling, 17. i. 1916, L. C. Hartess; 1 ex., Darjeeling, 14. v. 1917, S. W. Kemp.

Measurements : Snout to vent length 78 - 110 mm.

Diagnostic character : Head a little broader than long; snout rounded, as long as the diameter of the eye; nostril equidistant from the tip of snout and the eye; interorbital width much broader than that of upper eyelid; tympanum distinct, more than half diameter of the eye. Fingers entirely webbed, web reaches the

base of discs at the tips of fingers, first shorter than second; subarticular tubercles of fingers and toes well - developed. Toes fully webbed to the discs ; an oval, distinct inner metatarsal tubercle present, outer metatarsal tubercle absent. Tibiotarsal articulation reaching in between the eye and the nostril. Dorsum greenish and smooth. Venter white, granular.

Distribution : India : West Bengal : Darjeeling district; Assam; Meghalaya ; Arunachal Pradesh. Elsewhere : Nepal, Southern China and Thailand.

Order CAUDATA
Family SALAMANDRIDAE

Genus 13. *Tylototriton* Anderson

1871. *Tylototriton* Anderson, *Proc. Zool. Soc London* : 423.

38. *Tylototriton verrucosus* Anderson
(The Himalayan Newt)

1871. *Tylototriton verrucosus* Anderson, *Proc. Zool. Soc London* : 423.

1890. *Tylototriton verrucosus* : Boulenger, *Fauna Br. India, Rept. & Batr.* : 514.

1962. *Tylototriton verrucosus* : Daniel, *J. Bombay nat. Hist. Soc.*, 59 (2) : 666.

1983. *Tylototriton verrucosus* : Tikader, *Threatened Animals of India* : 252.

Material examined : Darjeeling dist . 8 ex : (tadpoles) , Sonada, 31. xii. 1970, J.M. Julka. 20 ex. (17 adults and 3 tadpoles) , Sonada, 7. v.1971; 98 ex. (adults), Pochang, Sonada, 9.v.1971. All coll. A. R. Bhowmik and A. K. sarkar. 12 ex. (adults), Jorppkhri, 15. v. 1972, M. R. Mansukhani.

Measurements :

Adults :

Largest : Snout to vent length 81mm., and vent to tip of tail length 85 mm.

Smallest : Snout to vent length 63mm. and vent to tip of tail length 65 mm.

Tadpoles :

Largest : Snout to vent length 26 mm. and vent to tip of tail length 20 mm.

Smallest : Snout to vent length 21 mm. and vent to tip of tail length 16 mm.

Diagnostic character : Head broader than long; surrounded by hard porous ridge; snout short, blunt tipped, larger than the diameter of the eye; nostril nearer the tip of the snout than the eye; tympanum indistinct. Fingers and toes moderate and free, tips blunt. Body 3 to 3 1/2 times the length of the head. Tail flat, as long as or a little longer than the head and body. A broad and distinct porous vertebral ridge ; a series of 15 to 16 knob- like porous glands along each side of dorsum, the last three behind the leg. Anal opening a longitudinal slit. Dorsum tubercular, dark brown, parotoids large and distinct; wrinkled on belly, granular on throat and under-surface of limbs, a distinct gular fold.

Distribution : India : West Bengal : Darjeeling district; Sikkim; Arunachal Pradesh : Lohit district ; Monipur. Elsewhere : Nepal, Burma, Thailand and Western China

Remarks : The species is quite rare. It is found in pools in the eastern Himalayas. on altitude between 1260 and 2220 m. Daniel (1962) and Tikader (1983) give a detailed account on its habit and habitat. Senior

author visited Darjeeling district during December, 1970, May, 1971 and May, 1983 respectively, and made some observation on the Himalayan Newts in a natural pond near "Naya Bastee" at Sonada during may, 1971. when the pond was partly full of rain -water, bottom of which was partially visible. The bottom was covered with small boulders and decomposed leaves of trees. A good number of newts were found crawling on the bottom. They were found swimming by the help of tail when limbs are kept motionless and parallel to the body. The newts swim when they are disturbed, and when come to surface for breathing. Frequency of breathing increases during courtship when both male and female clasp each other ventrally by the help of hind limbs. Eggs are laid on aquatic vegetation, and are normally found attached to water weeds. The pond suffers from desiccation in December, and only a few examples of lately-hatched tadpoles of newts with gills, four limbs and finned- tails could be traced under stone- boulders partly submerged in ice-cold water. During the visit in the month of May, 1971 another spot of Himalayan Newts was located at Pochang, a village C. 2 km. down from Sonada proper. A large number of newts` had been traced there in a big tank with submerged aquatic vegetation.

The author visited the same pond at "Naya Bastee" Sonada During May, 1983, and found a meagre population of newts there. Decrease in population of newts in Darjeeling area occurs owing to severe commercial exploitation during seventies.

In Darjeeling the newts are locally known as 'Gohro ' and frogs and toads as 'Vagota'

Order GYMNOPIHIONA
Family ICHTHYOPHIIDAE
Ssub family ICHTHYOPHIINAE
Genus 14. *Ichthyophis* Fitzinger

1826. *Ichthyophis* Fitzinger, *Neue classif. Rept.* : 36.

39. *Ichthyophis sikkimensis* Taylor

1960. *Ichthyophis sikkimensis* Taylor, *Univ., Kansas Sci. Bull.*, 40 : 91 - 92.

1986. *Ichthyophis sikkimensis* : Pillai and Murthy, *Wild Life Wealth of India, Amphibia* : 190

Material examined : Darjeeling dist. : 2 ex., Kurseong and Sureil, 1917, N. Annandale.

Measurements : Snout to vent length 237 mm. and tail length 3 mm.

Diagnostic character : Tentacle closer to eye than to nostril (tip of snout) or equal; tentacle near the edge of lip, below the level of a line between eye and nostril. Anal opening longitudinal ; tail present. Lateral stripe of cream or yellow on side of body absent; usually 9 or 10 splenial teeth on each side present. Number of folds on tail less than ten ; body fold less than 300.

Distribution : India : West Bengal : Darjeeling district; Sikkim.

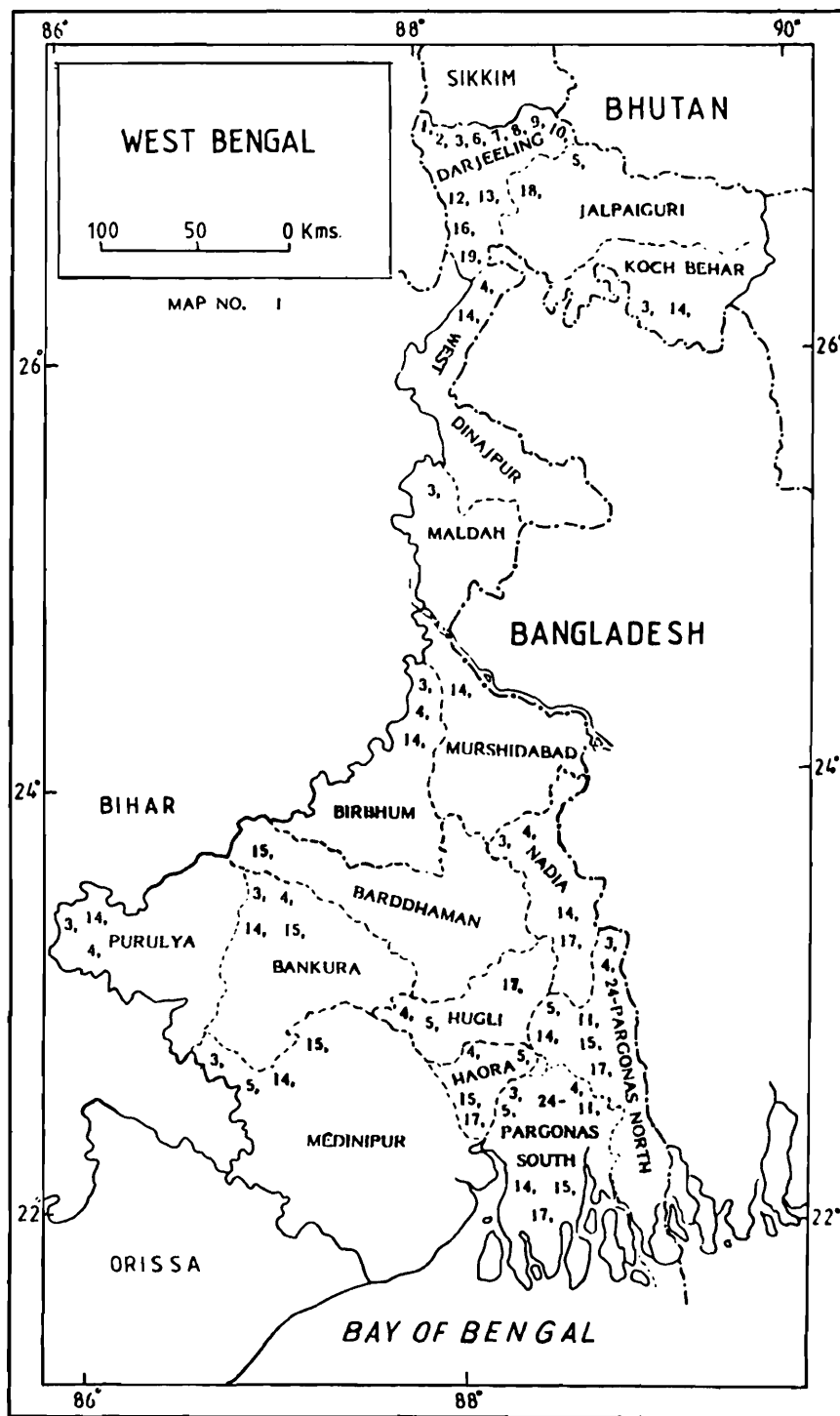
Remarks : The species is not common in Darjeeling.

DISTRIBUTION OF AMPHIBRAN SPECIES IN WEST BENGAL AT A GLANCE

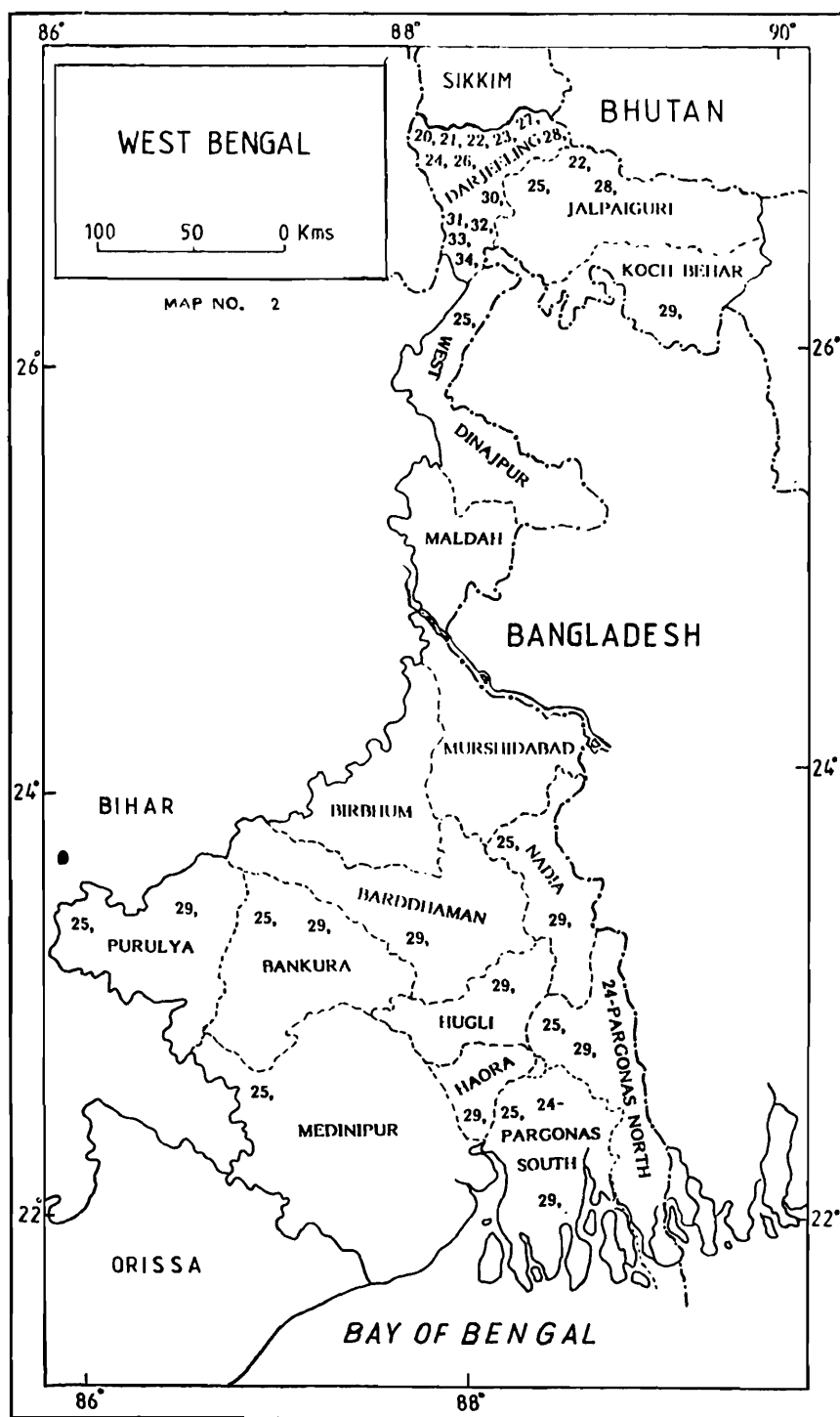
Found + ; Not found

State Fauna Series 3 : Fauna of West Bengal

Name of species	Name of districts														
	Bardhaman	Birbhum	Bankura	Darjeeling	Haora	Hugli	Jalpaiguri	Kochbehar	Maldah	Medinipur	Murshidabad	Nadia	Purulya	24 Parganas	West Dinajpur
1. <i>B. abatus</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
2. <i>B. stomaticus</i>	-	+	+	-	-	-	-	+	+	-	-	+	+	+	+
3. <i>B. melanostictus</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
4. <i>B. Himalayana</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
5. <i>M. ornata</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
6. <i>K. pulchra</i>	-	+	+	-	+	-	-	+	+	+	-	-	+	+	+
7. <i>U. globulosus</i>	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
8. <i>M. robusta</i>	-	-	-	+	-	+	+	-	-	+	-	-	+	+	-
9. <i>M. parva</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
10. <i>A. monticola</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
11. <i>A. formosus</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
12. <i>A. afghanus</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
13. <i>O. lima</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
14. <i>R. liebigii</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
15. <i>R. sikimensis</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
16. <i>R. gerbillus</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
17. <i>R. livida</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
18. <i>R. mawphlongensis</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
19. <i>R. senchalensis</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
20. <i>R. erythraea</i>	+	-	+	-	+	-	-	-	-	+	-	-	-	+	-
21. <i>R. nicobariensis</i>	-	-	-	+	-	-	-	+	-	-	-	-	-	-	-
22. <i>R. annandalii</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
23. <i>R. balanfordii</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
24. <i>R. cyanophlyctis</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
25. <i>R. hexadactyla</i>	-	-	-	-	+	+	-	-	-	-	-	-	-	+	+
26. <i>R. tigerina</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
27. <i>R. crassa</i>	-	+	+	-	-	-	-	+	+	+	+	+	+	+	+
28. <i>R. keralensis</i>	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
29. <i>R. limnocharis</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
30. <i>T. breviceps</i>	-	+	+	-	-	-	+	-	-	+	+	+	+	+	+
31. <i>Ph. annandalii</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
32. <i>Ph. jerdonii</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+
33. <i>Poly. leucomystax</i>	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-
34. <i>Poly. maculatus</i>	+	+	+	+	+	+	-	+	-	-	+	+	+	+	-
35. <i>Rh. jerdonii</i>	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-
36. <i>Rh. reinwardtii</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
37. <i>Rh. maximus</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
38. <i>Tylo. verrucosus</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
39. <i>Ich. sikkimensis</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-



Map No. 1 (Showing district- wise distribution of species) Species 1,=*Bufo abatus*; 2,=*Bufo himalayanus*; 3,=*Bufo stomaticus*; 4,=*Kaloula pulchra*; 5,=*Uperodon globulosus*; 6,=*Megophrys parva*; 7,=*Megophrys robusta*; 8,=*Amolops afghanus*; 9,=*Amolops formosus*; 10,=*Amolops monticola*; 11,=*Occidozyga lima*; 12,=*Rana annandalii*; 13,=*Rana blanfordii*; 14,=*Rana crassa*; 15,=*Rana erythraea*; 16,=*Rana gerbillus*; 17,=*Rana hexadactyla*; 18,=*Rana keralensis*; 19,=*Rana liebigii*.



Map No.2 (Showing district- wise distribution of species) Species 20,- *Rana livida*; 21,- *Rana mawphlongensis*; 22,- *Rananicobariensis*; 23,- *Rana senchalensis*; 24,- *Rana sikkimensis*; 25,- *Tomopterna breviceps*; 26,- *Philautus annandalii*; 27,- *Philautus jerdonii*; 28,- *Polypedates leucomystax*; 29,- *Polypedates maculatus*; 30,- *Rhacophorus jerdonii*; 31,- *Rhacophorus maximus*; 32,- *Rhacophorus reinwardtii*; 33,- *Tylototriton verrucosus*; 34,- *Ichthyophis sikkimensis*.

SUMMARY

The paper deals with 39 species under 14 genera, 7 families, 3 orders representing the Amphibian fauna of West Bengal based on the collections mainly made by the surveys undertaken by the Scientists of Zoological Survey of India during December, 1970 to July, 1986. A few examples collected prior to that, and available with the registered National Zoological Collections have also been utilized. The paper reports on 2959 examples of amphibians belonging to seven families, fourteen genera, and thirty nine species, of which *Rana keralensis* and *Rana nicobariensis* are recorded for the first time from West Bengal, and the latter for the first time from the mainland of India too. Many other species are recorded for the first time from different districts of the state. Keys, illustrations of essential morphological characters to follow the key and short diagnostic characters of the species have been added in the paper for determination of the species. Maps showing distribution of species, and a list containing district - wise distribution of species at a glance have also been provided.

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Species found in all the districts of West Bengal : *Bufo melanostictus*; *Microhyla ornata*; *Rana cyanophlyctis*; *Rana limnocharis*; *Rana tigerina*.

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FRESHWATER FISH

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INTRODUCTION

Ichthyologically West Bengal is the most fascinating and interesting state in India owing to its diverse incthyofauna occurring in the varied habitats. Ecologically the habitats can be classified into the following zones viz., (a) *Freshwater zone* comprising rivers and its tributaries, tanks, lakes, ponds and canals (b) *Marshy zone* comprising road-side canals, beels, ditches, sewage-fed bheries, brackish water fed bheries and submerged paddy fields (c) *Marine zone* comprising sea shores adjoining Bay of Bengal (d) *Estuarine zone* comprising southernmost islands adjoining Bay of Bengal and the Sunderban-complex-cum-estuarine waters (e) *Hill stream-cum-torrential zone* comprising water falls, hill-streams, torrential rivers and its tributaries and rockpools (f) *Reservoirs and barrages* comprising confined waters.

West Bengal is also renowned for being the largest fish consuming state in India (annual demand is estimated to be around 570 thousand tonnes; annual production is estimated as 402 thousand tonnes, out of which 370 thousand tonnes are derived from inland sources and rest from marine sources). It owes its rich fish fauna to the vast area of water, the riverine areas being 2.53 lac hectares, tank 240, 000 hectares, seasonal tanks 20,000 hectares, beels 80, 000 hectares, brackish water 3,500 hectares approximately, reservoirs 19,058 hectares, coast line 64 km., continental shelf area 17,094 sq.km. and off-shore area 1, 813 sq.km. (10-40 fathoms).

A perusal of literature shows that since Days time (1878-1889) work on freshwater fishes of Bengal has been extremely fragmental. The most important contributors on West Bengal freshwater fish fauna are Hamilton (1822), Shaw and Shebbeare (1937), Hora (1929, 1930, 1932, 1935, 1944, 1947, 1949, 1951, 1953, 1955), Hora and Gupta (1941), Hora and Nair (1944), Hora and Menon (1952), David (1953), Sen et al (1970), Sen (1975), Ramaiyan (1975), Raj Tilak (1975), Datta and Sen (1977).

Day (1878-1889), Misra (1962), Menon (1974), Jayaram (1981), Sen and Jayaram (1982) and Talwar and Kacker (1984) have also made valuable contributions on West Bengal fishes.

The present work includes a large number of fresh water fish collections made by the Z.S.I. survey parties; freshwater fishes collected from various districts of West Bengal by the local Universities and Institutions which were received by Z.S.I. for identification; varieties of freshwater fishes that appear regularly in the Calcutta fish markets, and lastly the up-to-date available literature.

The present systematic list of the fishes of West Bengal includes 10 orders, 38 families, 92 genera and 172 species of which 30 genera comprising 64 species are riverine. 14 genera comprising 39 species are hill-stream fishes, 10 genera comprising 13 species are torrential fishes, 22 genera comprising 40 species are freshwater-cum-marshy fishes, 12 genera comprising 12 species are freshwater-cum-estuarine fishes and 4 genera comprising 4 species are exotic but found all over West Bengal.

All the 172 species have been described in detail with their keys, up-to-date scientific names, references, local names, fin-formulae, diagnostic characters, colour-patterns, sizes, distributions, critical scientific remarks together with their 101 figures drawn by the author in the popular format of the famous work of Shaw and Shebbeare¹.

Only freshwater and a few freshwater-cum-estuarine fishes have been dealt with in this paper. A map showing drainage systems and ecological distributions of different groups of fishes of West Bengal has been added to further reveal its diverse ecological patterns. Original old popular spellings of the names of a few districts of West Bengal have been retained to avoid confusions with reference to the very recently changed spellings. The classification of fishes adopted in this paper is after Greenwood *et al.*

PHYSIOGRAPHY

The State of West Bengal came into existence on the 15th August, 1947, with the historic partition of India and the consequent birth of Pakistan. As a result of this partition the new State of West Bengal, which was carved out of the old Bengal, could only have 40 per cent of the original area, the rest merged with East Pakistan (now Bangladesh).

The State of West Bengal consists of 17 districts (7 districts viz, Burdwan, Bankura, Hooghly, Howrah, Midnapore, and Purulia under Burdwan Division and 10 districts viz, N. 24-Parganas, S.24-Parganas, Calcutta, Nadia, Murshidabad, Malda, West Dinajpur, Cooch Behar, Jalpaiguri and Darjeeling under Presidency Division) covering an area of 88, 752 sq. kilometres (1981) and with a population of 54, 580, 647 number (1981) lies approximately between 21°31' and 27°14' N. latitude, 86°35' and 89°53' E. longitude with Tropic of Cancer running across it. It forms around 9 per cent of the national total. It has common boundaries with Nepal, Bangladesh and the two states that have special treaty relations with this country - Sikkim and Bhutan. The sharp wedge of Tibbet region of China which reaches the Chumbi valley at the junction of Sikkim and Bhutan slopes just a few miles to the north of West Bengal's boundary.

The special strategic importance of this state is that the narrow neck which connects its northernmost region with the main body of West Bengal provides the only land corridor between the N.E. Zone comprising Assam, Nagaland, Manipur, Tripura and Arunachal Pradesh (N. E. F. A) on the one hand and the rest of the country, on the other. The state represents the western part of the great Brahmaputra-Gangetic delta situated at the culminating point of the three well known geological regions of India viz, the Peninsular (S. India), Extra Peninsular (the Himalayas) and the Indo-Gangetic plains.

The state of West Bengal may be divided into three broad physiographic zones - (1) the extensions of the Chotonagpur plateau in the western bulge of the state which comprises the district of Purulia and the continuous parts of Midnapore, Burdwan and Birbhum districts; (2) consists of the northern mountain ranges and low hills of the Himalayas with impenetrable evergreen forests and hill streams in the valley comprising parts of the Darjeeling, Jalpaiguri and Cooch Behar districts, and (3) consists of the rest of the state lying in the Gangetic plains with rich alluvial soils.

¹ Shaw and Shebbeare, E.O. 1937. The Fishes of Northern Bengal. *J. Asiat. Soc. Bengal.* (Science), p.1-137, 6 pls.

The first division is formed of peneplain old rocks, most of which are below the 500 ft. (152.43mt.) contour. But there are some which rise a 1000ft.(304.86mt.) and stand out as majestic monadrocks. These rocky plains gradually descend eastward to merge with the higher slopes of alluvial lands.

The second division-the Himalayan zone rises abruptly from the plains of N.Bengal to attain great heights within a short distance of the foot hills.

High terrain, steep gradients, heavy rains from 80 to 160 inches in places and torrential streams make this region extremely susceptible to soil erosion and landslides. The foot-hills of Darjeeling slowly descend into tarai of Siliguri subdivision which is a narrow strip of the North Bengal plain, criss-crossed by many fast flowing streams.

The third physiographic region of this state comprises the flat alluvial plains and delta of the Gangetic system. The southern part consists of plains and the moribund delta. This latter area includes Nadia district. The swampy area at the back lying between the natural levees is poorly drained. In the matured delta, which covers north 24-Parganas, the rivers are enough vigorous to overflow and deposit some silt, although their salinity is an indication of their gradual deterioration. The south 24-Parganas is occupied by an active delta system reaching 60 to 80 miles inland from the head of the Bay of Bengal.

West Bengal is criss-crossed by a large number of rivers. The Ganga passes through the centre and its distributary the Hooghly, runs through the full length of the southern part of the state. Other large rivers in the south are the Damodar, the Ajay, the Rupnarayan and the Kasai. In the north, the Teesta, the Torsa and the Mahananda rivers drain the Himalayan area. The Gangetic delta comprising the districts to the east of the Bhagirathi and Hooghly (Murshidabad, Nadia, Calcutta and N. and S. 24-Parganas). Of this tract, Murshidabad and Nadia form the '*moribund delta*'. The N. 24-Parganas including Calcutta down to a rough transverse line through Basirhat, Canning and Diamond Harbour constitutes the '*mature delta*'. The territory, south of this transverse line is the '*active delta*'.

As the Bhagirathi enters the state beyond the Rajmahal hills it bisects the districts of Murshidabad. On the right bank of the Bhagirathi are the 'Rarh' old alluvium and red soil. The western tract of the district is dissected by streams which descend from the uplands-the more important ones being the Mayurakshi and Dwarka. The eastern tract is criss-crossed by the meanders of Jalangi. Calcutta is an enclave of N. and S. 24-Parganas whose low level and salt lakes cause great run off during early monsoon storms. The northern and eastern parts of N. and S. 24-Parganas are '*mature delta*', but in the Sunderbans the delta is still very much active. The Damodar delta consists of the Hooghly and Midnapore districts. This tract has been formed by the hydraulic interactions of the Damodar and the Hooghly. The south-eastern margins of Howrah and the mouth of Rupnarayan are still '*active*' delta, which constitutes along the coast line of Midnapore.

East of the Sunderbans, the plateau gradually sinks into the deltaic alluvium. In the Rarh proper, Burdwan is drained mainly by the Ajay and Damodar. Bankura is drained west-east mainly by the Dalkishore and Kasai. The Dalkishore is joined by the Silai at Ghatal in Midnapore from which point downward it is called the Rupnarayan. The Kassi joins the Kalighai in Tamluk sub-division of Midnapore to form the Haldi river. The Subarnarekha enters at Gopiballavpur in the same district and

passes through Nayagram out to Orissa. The Gunammani, Bansloi, Pagla, Brahmani, Dwarika and Mayurakshi drain the Birbhum district before they fall into the Bhagirathi.

The Himalayas have influenced the climatic of the state from temperate to tropical, excessively humid to semi arid conditions. Rainfall as a whole in the state is fairly high. The average is about 70 inches, of which over 50 inches falls in the monsoon months from June to September. There are wide regional fluctuations from more than 200 inches in parts of the Himalayan region to less than 50 inches in parts of the Bankura districts. The heavy seasonal concentration of rainfall results in both droughts and floods.

There are four main types of soils in the state which are the brown podzolic soils of the hill regions, chiefly in Darjeeling and Jalpaiguri districts; the red acidic lateric soils of the western parts of the Midnapore and Burdwan districts; the deltaic and saline soils of the mangrove areas of the southernmost parts of 24-Parganas districts; and the alluvial soils in the rest of the state including the Gangetic delta lands in the south and the Gangetic plain in the north covering over 75 per cent of the total land surface of the state.

Total forest coverage of the state is 4, 535 sq.miles or merely 13 per cent of the total area of the state comprising three main areas-(1) the hills of the tarai regions in the north; (2) the forest area in the extension of the Chotanagpur hills in the western part of the state and (3) the mangrove areas on the sea shores in the extreme south.

GEOMORPHOLOGY

The sharp contrast in the variation of topographical features within the limits of the state is remarkable. The eastern low lands, which are only a few metres above the level rise gradually to the rocky undulating elevations to the west. The most characteristic of these uneven westerly tracts are Panchet (643m), the Biharinath hill (452m), the Susunia hill (442m) and the Gorangi (291m) and Baghmudi hills (677m). A considerable region of the western part of the state (3, 100 sq.km) is covered by the Archaeans which form the eastward extension of the Peninsular shield. These regions were subjected to great diastrophic movements and erosion through a considerable period. On the deeply denuded edges of the contorted Archaeans, the sedimentary formations of Purana age were deposited. Only a few isolated representatives of the Purana are noted in the state.

The post-Purana period witnessed large scale crustal movements and deformation that brought about revolutionary changes in the physiography of India and affected the state of West Bengal as well. During this period of the earth's history, the great Tethys or the ancient Mediterranean ocean encircled almost the whole of earth and covered vast tracts of India which are now the site of the northern zone of the Himalayas.

During the Upper Gondwana period, the Gondwana was subjected to marked vulcanicity, which manifested itself into outpouring of Rajmahal lava flows and dykes of basic and ultrabasic rocks. These intrusions are abundant in the lower Gondwana rocks, found in the state and have often damaged the coal seams near the contacts (Banerjee, 1953). The end of the Mesozoic and the commencement of the Tertiary era witnessed tremendous physiographic vulcanism and conspicuous revolution in the distribution of land and sea. These culminated (1) in the obliteration of the Tethys sediments into mighty Himalayan ranges followed by (3) serving of the Indian peninsula from the Indo-African

Gondwana continent, and (4) outpouring of vast amount of lava flow as the Deccan Traps in the Peninsular India.

The uplift of the Himalayas continued by stages throughout the whole of Tertiary. The rocks lying on the southern flanks of the Darjeeling-Himalayas which are extensions of similar formations of the Peninsular India were also affected and folded during the Himalayan orogenic movements. The Bay of Bengal began to have its present shape from the upper Jurassic times when it had a gulf extending into Assam and Burma. During the upper Cretaceous or early Eocene times, the eastern portion of the Bay of Bengal was separated into an Assam gulf and a Burma gulf with the rise of the great north-south oriented Arakan mountains, which continued both to the upper Assam and into the Andamans, Nicobars, Sumatra, Java etc. (Krishnan, 1956).

Later, the geodetic observations revealed that the floor of the superficially 'even strength' of the Indo-Ganga alluvium is corrugated by inequalities and buried ridges. Two such submerged ridges, one between Delhi and Hardwar on the upwarp of the Archaean rocks in structural continuation with the Aravalli and the other extending from Delhi to the Salt Range with a strike in the N.W.S.E. direction have been suggested by the data of gravity anomalies. Recent work has also established the existence of another upwarp in the form of a great arc slightly convex to the south between Allahabad and Benaras extending to Shillong and two minor upwarps, one having strike along north-south through Jalpaiguri ($28^{\circ}32' : 88^{\circ}44'$) and the other under the Madhupur jungle in Bangladesh extending to Garo Hills.

Intervening these two minor upwarps, there is a zone of relative depression extending S.S.W and roughly 80 km. west of Dhulian ($24^{\circ}42' : 87^{\circ}58'$).

The Ganga trough does not extend below the delta into the Bay of Bengal. Though locally closed in the Jalpaiguri area, the trough recommences further east and almost certainly bends south following the curve of the Arakan Yoma Range and of the Andaman and Nicobar Islands. Thus, it appears that there was undoubtedly a land barrier between Calcutta and the ancient Siwalik rivers at the time of deposition of the Siwalik sediments during the upper Miocene to Pleistocene times, otherwise, these instead of flowing into the Arabian sea would have discharged into already existing Bay of Bengal since Upper Jurassic time. The depression of this land barrier which brought about reversal of drainage, must have taken place in the late Pleistocene to Recent times. Recent operations have confirmed the existence of a buried ridge to north of the Bengal basin. Thus, the Lower Cretaceous vulcanicity marked the initiation of a prolonged period of Tertiary basin movements in the Bengal delta. Formation of the trapwash rocks under continental, freshwater, lacustrine and lagoonal conditions continued in the late Lower Cretaceous period, until downwarp movements resulted in marine onlap in the early Upper Cretaceous times in parts of the Bengal area. There was a periodic marine regression until a strong marine activity was initiated all over the Bengal area in the early Middle Eocene time, which lasted till the end of the upper Eocene. There was again a wide spread marine regression when another fresh marine activity took place in the late Oligocene or early Miocene time which lasted until the end of the Miocene. The present configuration of the Bay of Bengal is apparently a late Pleistocene to Recent feature. The beds are practically horizontal, and are low-dipping towards east and south-east. Predominant structural deformations affecting the sediments are faults, presumably of many generations.

With the formation and upheaval of the laterites and the fitting up of the Indo-Gangetic trough by the alluvium in sub-Recent and Recent times, the configuration of the state of West Bengal has been completed (Krishnan, 1961).

The topography, thus formed, was modified to present day surface reliefs through subsequent secular changes by wind, water and snow.

ZOOGEOGRAPHY

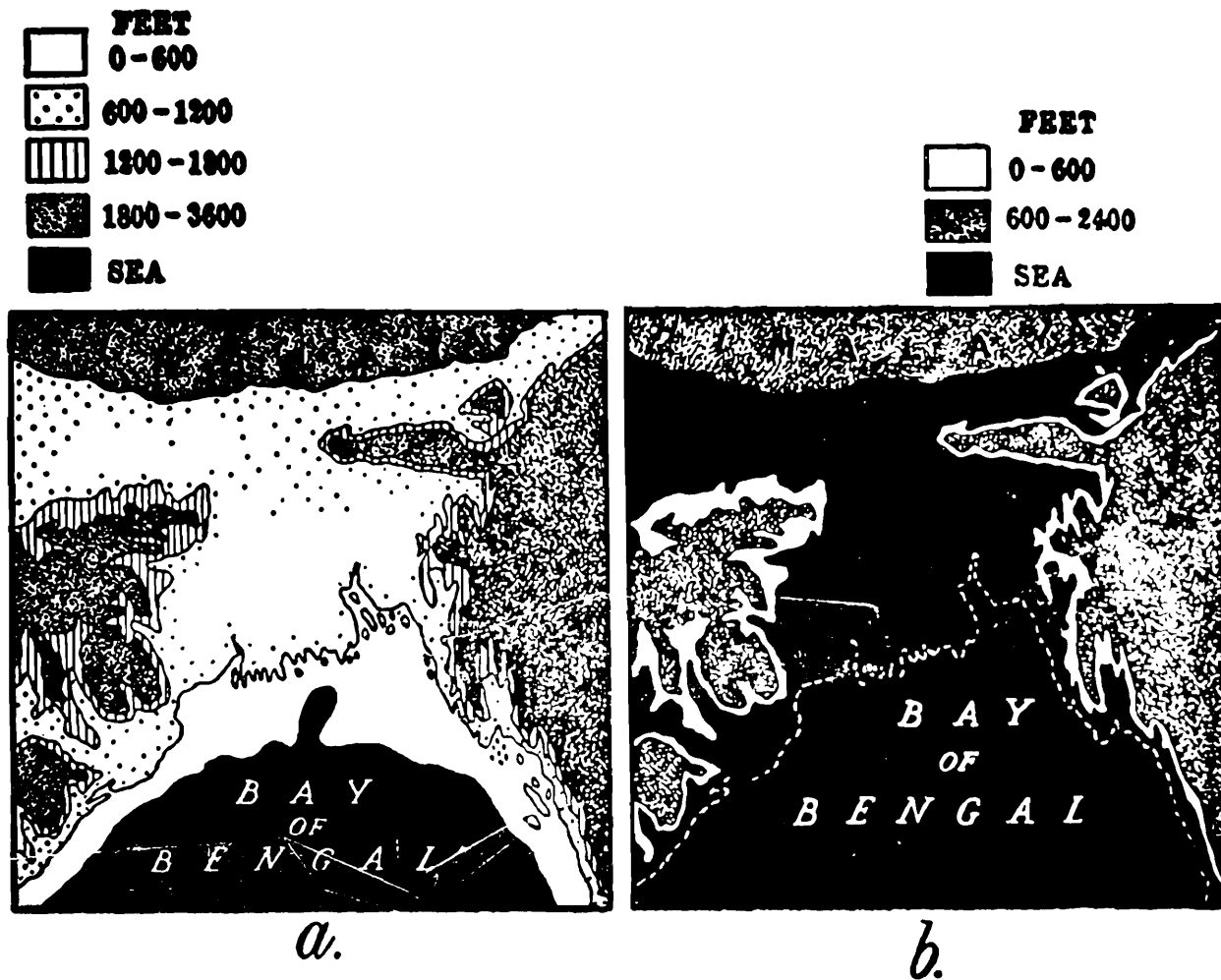
It is a well known fact that the fish fauna along the Himalayas becomes poorer as we proceed towards the west and a large assemblage of the so called Malayan forms are found in Assam and the Eastern Himalayas and reappear again in the Peninsular India but not extending to the Western Himalayas. This Malayan element in the fish fauna of India entered India along the Assam Hills and the Eastern Himalayas on the one hand and the Garo-Rajmahal and the Vindhya-Satpura mountain ranges on the other during the glacial periods of the Pleistocene (Hora, 1951).

During the major upheaval of the Himalayas during the Miocene and early Pliocene, the arm of the sea in the Assam region becomes shallow and had cut into shallow lagoons and freshwater lakes (Menon, 1951). This shallow area, with the further gradual rise of the Himalayas, turned to a marshy land enabling the marsh-loving fishes like *Clarias*, *Channa*, *Heterobagrus*, *Mystus*, *Rita*, *Bagarius* and *Silurus* to cross over India (Hora and Menon, 1952). This fauna, however, did not spread to the Peninsular India then, the Garo-Rajmahal area was under the sea during the whole of Pliocene.

In the present day West Bengal all the marsh-loving fishes are present. The typical freshwater-cum-estuarine fishes of West Bengal are closely related to those of the Mahanadi drainage (Orissa-hills). The spread of the fish fauna to West Bengal should have taken place during the Pleistocene Glacial periods. The ecological conditions during the Glacial periods brought into India the migrants from the east and the Indo-Brahm helped to carry them to the extreme west of India. The dismemberment of the Indo-Brahm occurred in the late Pleistocene and the two mighty rivers, the Indus flowing westwards and the Ganges eastwards were born. The fish fauna especially the marshy and estuarine fishes of the present day West Bengal which is common to the rivers of the plains of the Brahmaputra, the Ganges and the Mahanadi must have spread to West Bengal during the eustatic movements of the sea during the height of the Glacial period. The sea bed fell by about 100 to 200 metres and vast structures of the coastal shallow areas of the present day sea became dryland and the Ganges, the Brahmaputra and the Mahanadi may have formed a common delta thus enclosing fauna of the Ganges to colonise the whole of West Bengal.

According to the distribution table of the known genera of Indian freshwater fishes (Menon, 1951 and 1973), it has been found that out of the total 89 genera listed, 60 genera are found in West Bengal. Of these 60 genera, 14 genera viz, *Notopterus*, *Barilius*, *Cirrhinus*, *Garra*, *Labeo*, *Laubuca*, *Puntius*, *Rasbora*, *Tor*, *Noemacheilus*, *Clarias*, *Channa*, *Anabas*, *Chanda* found in West Bengal, are common to India (including West Bengal), S. E. Asia, W. Asia and Africa; 35 genera viz, *Acrossocheilus*, *Aspidoparia*, *Amblypharyngodon*, *Catla*, *Crossocheilus*, *Danio*, *Esomus*, *Osteobrama*, *Semiplotus*, *Psilorhynchus*, *Acanthopthalmus*, *Botia*, *Lepidocephalichthys*, *Wallago*, *Ompok*, *Batasio*, *Rita*, *Bagarius*, *Euchiloglanis*, *Gagata*, *Pseudecheneis*, *Clupisoma*, *Eutropiichthys*, *Pangasius*, *Pseudeutropius*, *Chaca*, *Olyra*, *Heteropneustes*, *Colisa*, *Badis*, *Mystus*, *Macrogathus*, *Schizothorax* and

Silurus are common to India (including West Bengal) and S.E.Asia; 11 genera viz., *Aborichthys*, *Somileptes*, *Sisor* (also found westwards as far as Delhi), *Balitora*, *Conta*, *Erethistes*, *Erethistoides*, *Ailia*, *Silonia*, *Ctenops* and *Amphipnous* are endemic to Eastern Himalayas including West Bengal.



Map showing orographic features of the Garo-Rajmahal gap.

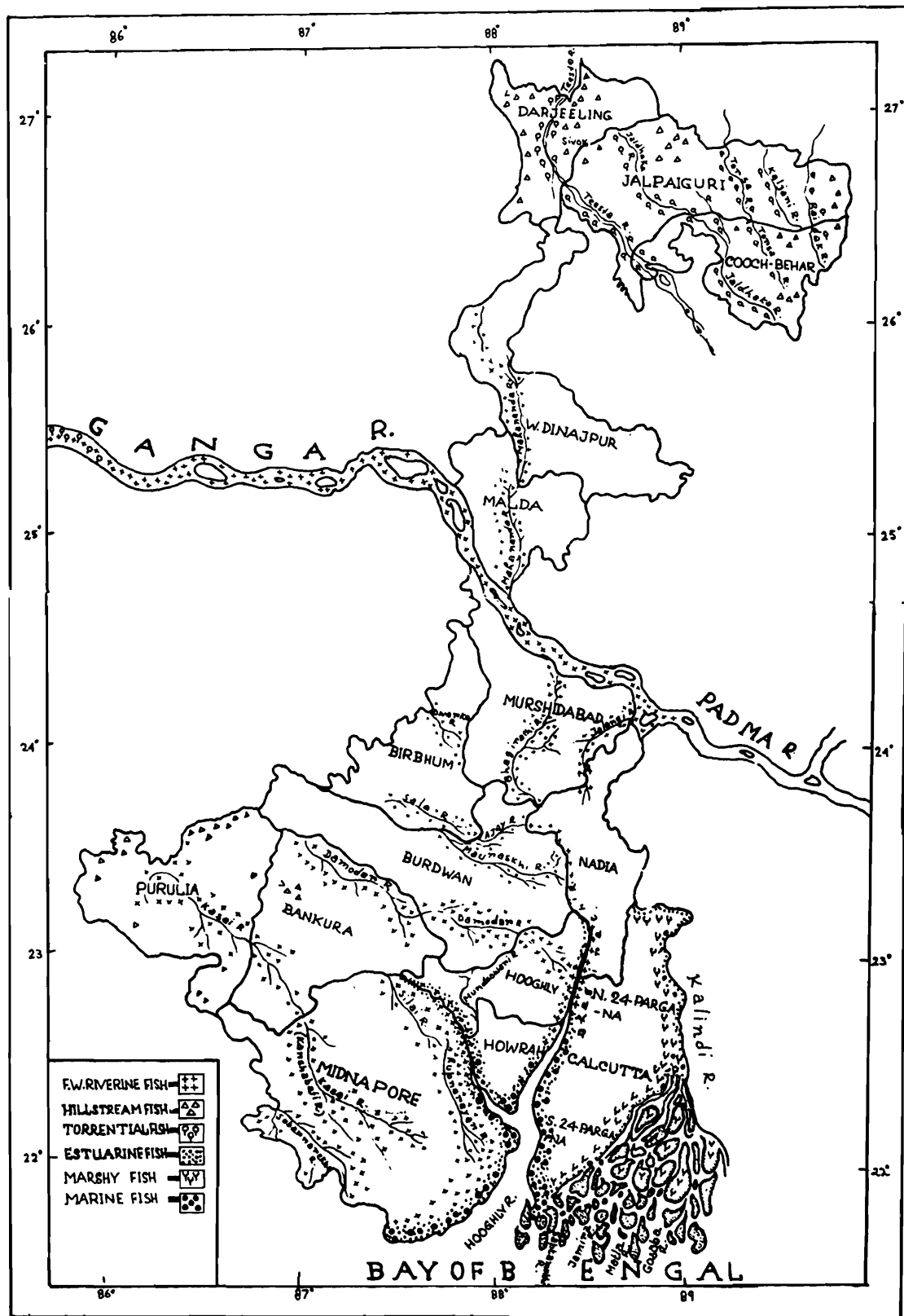
a. Condition during a glacial period.

b. Condition during an inter glacial period. (After Hora-*Proc.Nat.Inst.Sci.*, 17, 1951).

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Map showing drainage systems and different ecological distributions of different groups of fishes of West Bengal.

SYSTEMATIC LIST OF FRESHWATER FISHES OF WEST BENGAL

- Super Class PISCES
- Class OSTEICHTHYES (Bony fishes)
- Order ANGUILLIFORMES
- Family ANGUILLIDAE
1. *Anguilla bengalensis bengalensis* (Gray & Hardw.)¹
- Family MORINGUIDAE
2. *Moringua raitaborua* (Ham.)¹
- Family OPHICHTHIDAE
3. *Pisodonophis boro* (Ham.)¹
- Order CLUPEIFORMES
- Family CLUPEIDAE
4. *Hilsa ilisha* (Ham.)¹
5. *Gudusia chapra* (Ham.)¹
6. *Goniolosa manmina* Ham.¹
7. *Corica soborna* Ham.¹
- Order OSTEOGLOSSIFORMES
- Family NOTOPTERIDAE
8. *Notopterus notopterus* (Pallas)
9. *Notopterus chitala* (Ham.)
- Order CYPRINIFORMES
- Family CYPRINIDAE
- Sub family CULTRINAE
10. *Chela (Chela) cachi* (Ham.)
11. *Chela (Chela) Laubuca* (Ham.)
12. *Securicula gora* (Ham.)
13. *Salmostoma bacaila* (Ham.)
14. *Salmostoma phulo phulo* (Ham.)
15. *Salmostoma sardinella* (Val.)
- Subfamily HYPOPHTHALMICHTHYINAE
16. *Hypophthalmichthys molitrix* (Val.)
- Subfamily RASBORINAE
17. *Aspidoparia morar* (Ham.)
18. *Aspidoparia jaya* (Ham.)
19. *Amblypharyngodon mola* (Ham.)
20. *Barilius barila* (Ham.)
21. *Barilius bendelisis* (Ham.)
22. *Barilius bola* (Ham.)
23. *Barilius vagra vagra* (Ham.)
24. *Barilius tileo* (Ham.)
25. *Danio (Danio) aequipinnatus* McCl.
26. *Danio (Danio) devario* (Ham.)
27. *Danio (Danio) dangila* (Ham.)
28. *Danio (Brachydanio) rerio* (Ham.)
29. *Esomus danricus* (Ham.)
30. *Rasbora daniconius daniconius* (Ham.)
31. *Rasbora rasbora* (Ham.)
32. *Rasbora elanga* (Ham.)
- Subfamily CYPRININAE
33. *Acrossocheilus hexagonolepis* (McCL.)
34. *Chagunius chagunio* (Ham.)
35. *Catla catla* (Ham.)
36. *Cirrhinus mrigala* (Ham.)
37. *Cirrhinus reba* (Ham.)
38. *Cyprinus carpio carpio* (L.)²
39. *Ctenopharyngodon idella* (Val.)³
40. *Labeo rohita* (Ham.)
41. *Labeo bata* (Ham.)
42. *Labeo boga* (Ham.)
43. *Labeo calbasu* (Ham.)
44. *Labeo dero* (Ham.)
45. *Labeo gonius* (Ham.)
46. *Labeo pangusia* (Ham.)
47. *Labeo fimbriatus* (Blotch)
48. *Labeo nandina* (Ham.)
49. *Osteobrama cotio cotio* (Ham.)
50. *Puntius conchonus* (Ham.)
51. *Puntius chola* (Ham.)
52. *Puntius dukai* (Day)

53. *Puntius gelius* (Ham.)
 54. *Puntius guganio* (Ham.)
 55. *Puntius phutunio* (Ham.)
 56. *Puntius sophore* (Ham.)
 57. *Puntius sarana sarana* (Ham.)
 58. *Puntius terio* (Ham.)
 59. *Puntius ticto ticto* (Ham.)
 60. *Tor tor* (Ham.)
 61. *Tor putitora* (Ham.)
 Subfamily GARRINAE
 62. *Crossocheilus latius latius* (Ham.)
 63. *Garra annadalei* (Ham.)
 64. *Garra gotyla gotyla* (Gray)
 65. *Garra lamta* (Ham.)
 66. *Garra mullya* (Sykes)
 67. *Garra satyendranathi* Ganguly & Dutta
 Family PSILORHYNCHIDAE
 68. *Psilorhynchus balitora* (Ham.)
 69. *Psilorhynchus sucatio* (Ham.)
 Family HOMALOPTERIDAE
 Subfamily NOEMACHEILINAE⁴
 70. *Noemacheilus bevani* Gunther
 71. *Noemacheilus botia botia* (Ham.)
 72. *Noemacheilus corica* (Ham.)
 73. *Noemacheilus devdevi* Hora
 74. *Noemacheilus multifasciatus* Day
 75. *Noemacheilus rupicola rupicola* (McCl.)
 76. *Noemacheilus rupicola inglisi* Hora
 77. *Noemacheilus savona* (Ham.)
 78. *Noemacheilus scaturigina* (McCl.)
 79. *Noemacheilus shebbeari* Hora
 80. *Noemacheilus zonatus* (McCl.)
 81. *Aborichthys elongatus* Hora
 82. *Aborichthys kempfi* Chaudhuri⁵
 Subfamily HOMALOPTERINAE
 83. *Balitora maculata* Gray
 84. *Balitora brucei* Gray
 Family COBITIDAE
 Subfamily COBITINAE
 85. *Acanthopthalmus pangia* (Ham.)
 86. *Lepidocephalus (L) quntea* (Ham.)
 87. *Lepidocephalus (L) annandalei* Chaudhuri
 88. *Somileptes gongota* (Ham.)
 Subfamily BOTIINAE
 89. *Botia (Botia) dario* (Ham.)
 90. *Botia (Botia) rostrata* Gunther
 Order SILURIFORMES
 Family BAGRIDAE
 91. *Aorichthys seenghala* (Sykes)
 92. *Aorichthys aor* (Ham.)
 93. *Batasio batasio* (Ham.)
 94. *Batasio tengana* (Ham.)
 95. *Chandramara chandramara* (Ham.)
 96. *Mystus bleekeri* (Day)
 97. *Mystus cavasius* (Day)
 98. *Mystus gulio* (Ham.)
 99. *Mystus vittatus* (Bl.)
 100. *Mystus tengara* (Ham.)
 101. *Mystus menoda menoda* (Ham.)
 102. *Rita rita* (Ham.)
 Family SILURIDAE
 103. *Ompok bimaculatus* (Blotch)
 104. *Ompok pabda* (Ham.)
 105. *Ompok pabo* (Ham.)
 106. *Wallago attu* (Schn.)
 Family SCHILBEIDAE
 107. *Ailia coila* (Ham.)
 108. *Clupisoma prateri* Hora
 109. *Clupisoma garua* (Ham.)
 110. *Eutropiichthys murius* (Ham.)
 111. *Eutropiichthys vacha* (Ham.)
 112. *Pseudeutropius atherinoides* (Bloch)

113. *Silonia silondia* (Ham.)
Family PANGASIIDAE
114. *Pangasius pangasius panangasius* (Ham.)
Family AMBLYCIPITIDAE
115. *Amblyceps mangois* (Ham.)
Family SISORIDAE
116. *Bagarius bagarius* (Ham.)
117. *Conta conta* (Ham.)
118. *Conta elongata* (Day)
119. *Erethistes pussilus* Muller & Troschel
120. *Erethistoides montana montana* Hora
121. *Euchiloglanis hodgarti* (Hora)
122. *Gagata cenia* (Ham.)
123. *Gagata gagata* (ham.)
124. *Glyptothorax cavia* (Ham.)
125. *Glyptothorax conirostrae conirostrae* (Stend.)
126. *Glyptothorax telchitta telchitta* (Ham.)
127. *Glyptothorax telchitta telchitta* (Ham.)
128. *Hara hara* (Ham.)
129. *Hara horai* Misra
130. *Hara jerdoni* (Day)
131. *Pseudecheneis sulcatus* (McCl.)
132. *Sisor rhabdophorus* Ham.
Family CLARIIDAE
133. *Clarius batrachus* (L.)
Family HETEROPNEUSTIDAE
134. *Heteropneustes fossilis* (Blotch)
135. *Chaca chaca* (Ham.)
Family OLYRIDAE
136. *Olyra longicaudata* McCl.
137. *Olyra kempfi* Chaudhuri
Family ARIIDAE
138. *Arius arius* (Ham.)
139. *Arius gagora* (Ham.)
Family PLOTOSIDAE
140. *Plotosus canius* Ham.
- Order ATHERINIFORMES
Family BELONIDAE
141. *Xenentodon cancila* Ham.
Family CYPRINODONTIDAE
142. *Aplocheilus panchax* (Ham.)
143. *Oryzias melanostigma* (McCl.)
144. *Gambusia affinis patruelis* (Baird & Girad)
Super Order Acanthopterygii
Order Gasterosteiformes
Family Syngnathidae
145. *Dorichthys deocata* (Ham.)
Order CHANNIFORMES
Family CHANNIDAE
146. *Channa barca* (Ham.)
147. *Channa marulius* (Ham.)
148. *Channa striatus* (Blotch)
149. *Channa stewartii* (Playfair)
150. *Channa orientalis* (Sch.)
151. *Channa punctatus* (Blotch)
Order SYMBRANCHIFORMES
Family SYMBRANCHIDAE
152. *Monopterusuchia* (Ham.)⁷
153. *Ophisternon bengalensis* Mc Cl.
Order PERCIFORMES
Family CENTROPOMIDAE
154. *Lates calcarifer* (Blotch)⁶
Family CHANDIDAE
155. *Chanda nama* Ham.
156. *Chanda ranga* Ham.
Family NANDIDAE
157. *Badis badis* (Ham.)
158. *Nandus nandus* (Ham.)
Family CICHLIDAE
159. *Oreochromis mossambica* (Peters)⁸
Family MUGILIDAE
160. *Rhinomugil corsula* (ham.)
161. *Liza parsia* (Ham.)⁹

162. *Sicamugil cascasia* (Ham.)¹⁰

Family POLYNEMIDAE

163. *Polynemus paradiseus* L.¹¹

Family GOBIIDAE

164. *Glossogobius giuris giuris* (Ham)¹²

Family ANABANTIDAE

165. *Anabas testudineus* (Bloch)

Family BELONTIDAE

166. *Ctenops nobilis* Mc Clelland

167. *Colisa fasciata* (Schn.)

168. *Colisa lalius* (Ham.)

Order MASTACEMBELIFORMES

Family MASTACEMBELIDAE

169. *Macrogathus aculeatus* (Bloch)

170. *Mastacembelus pancalus* (Ham.)

171. *Mastacembelus armatus armatus* Lac.

Order TETRAODONTIFORMES

Family TETRAODONTIDAE

172. *Tetraodon cutcutia* Ham.

¹ Species commonly found in the freshwaters, estuaries and tidal rivers.

² Three 'varieties' are popularly known as (1) *Cyprinus carpio communis* (Scale Carp) (2) *Cyprinus carpio specularis* (Mirrior Carp) and *Cyprinus Carpio nudus* (Leather Carp).

³ Exotic species introduced in Indian waters.

⁴ Placed under the family Homalopteridae according to the latest revisionary work 'Fauna of India-Cobitoidea : Homalopteridae by Dr. A. G. K. Menon (1987).

⁵ Not found in West Bengal but included here for the sake of comparative studies.

⁶ Though marine but also found in the backwards, estuaries and tidal rivers.

⁷ Amphipnous cuchia is a synonym of *Monopterus cuchia* (Ham.) (Jayaram, 1981, p. 310).

⁸ *Tilapia mossambica* is a synonym of *Oreochromis massambica* (Trewavas, 1983).

⁹ Though marine but found in plenty in backwaters, tidal rivers and estuaries.

¹⁰ The only small sized Mullet found typically in freshwaters of India; the other species *S.hamiltonii* (Day) is a Burmese form found in Sittang river system.

¹¹ Marine but commonly found in tidal rivers, backwaters and estuaries.

¹² *G.g.giuris* is synonymised with *G.gutum* (Menon, 1974, p. 96); retained the old name to avoid confusion.

SYSTEMATIC ACCOUNT

Order ANGUILLIFORMES

Family ANGUILLIDAE

Genus *Anguilla* Shaw, 1803

1803. *Anguilla* Shaw, *General Zool.* 4 p. 15 (Type-*A.vulgaris* Shaw).

1. *Anguilla bengalensis bengalensis* (Gray & Hardw.)

(Fig. 1)

1833-34. *Muraena bengalensis* Gray & Hardwicke, *Ill. Ind. Zool.* Hardwicke. 2. pl.95, fig.5 (Type locality-the Ganges).

1984. *Anguilla bengalensis bengalensis*, Talwar & Kacker, *Commercial sea fishes of India*, Handbook (4), *zool.Surv.India*, p.216.

Common english name : Freshwater eel.

D.250-305; P.220-250; C.10-12.

Diagnostic characters : Length of head 3 to 3.1 in the distance between snout and vent, head rather broader than body, snout not broad, dorsal situated about mid way between gill-opening and origin of anal fin, lower jaw prominent, lips well developed, length of cleft of mouth equals the head.

Colour : Brownish above and yellowish on the sides and beneath, sometimes black spots on the upper surface of the body.

Size : Attains more than 1.22 mt. in length.

Distribution : Freshwaters and seas of India; Bangladesh, Pakistan, Burma, China, Malay-Archipelago. Found in Matla river system in West Bengal.

Remarks : Very common and not considered a food fish, taken rarely by the poorer section. Mostly confined to estuarine waters in the state.

Family MORINGUIDAE

Genus *Moringua* Gray, 1831

1831. *Moringua* Gray, *Zool. Misc.* p. 9 (type-*M. lateralis* Gray).

2. *Moringua raitaborua* (Hamilton)

(Fig. 2)

1822. *Muraena raitaborua* Hamilton, *Fish. Ganges.* pp. 25, 364.

1981. *Moringua raitaborua* Jayaram, *F.W. Fishes of India.* Handbook No. 2, Calcutta, Z.S.I., p.28.

Common english name : Worm eel.

Diagnostic characters : Length of head from snout to gill-opening 6 to 6.5 in the distance from snout to vent, eyes high up, 2 to 3 diameters from end of snout; Jaws of equal length in front or the lower slightly longer, gill-opening a slit at the side of the pectoral fin, dorsal commences about the length of head posterior to the anus, anal originates a short distance behind the anus, both fins are interrupted in the middle but posteriorly developed and joined with the caudal, distinct lateral line.

Colour : Coppery, olive, becoming silvery below; some black dots over the body.

Size : Attains to at least 56cm in length.

Distribution : Estuaries of Ganga (India) : Bangladesh : Malay-Archipelago found in Hooghly estuaries in West Bengal.

Remarks : Not commonly found; mostly riverine confined to estuarine zones particularly the Sunderban-complex areas fed by the Malta and Bidyadhari rivers of south 24-Parganas district.

Family OPHICHTHIDAE

Genus *Pisodonophis* Kaup, 1856

1856. *Pisodonophis* Kaup, *Arch. Naturgesch.*, 22.p. 47 (Type *P. cancrivorus* Kaup, logotypic).

3. *Pisodonophis boro* (Hamilton)

(Fig. 3)

1822. *Ophisurus boro* Hamilton, *Fish. Ganges*, p.20, pl. 5, fig. 5 (Type locality-eastuaries near Calcutta).

1984. *Pisodonophis boro*, Talwar & Kacker, *Commercial Sea fishes of India*, Handbook (4), *zool.Surv.India.* p.249, text-fig.103.

Common english name : Boro fish.

D. 320-400; P. 13; A. 250-270.

Diagnostic characters : Length of head 3.5 to 4 in the distance between snout and vent, eyes 2-3 diameters from the snout, and nearer to angle of mouth; upper jaw longer; cleft of mouth extends beyond postorbit, dorsal and anal low, not extending to caudal tip; dorsal origin at a distance from pectoral base, pectorals rounded or pointed.

Colour : Greenish olive above and pale greenish white below, minute black spots over the body.

Size : Attains to 91.5cm in length.

Distribution : India (Ganga and its tributaries) : Bangladesh, Burma, S. Africa, China, Philippines, Malay-Archipelago, Thailand, Formosa. Found in Hooghly river system in West Bengal.

Remarks : Common in estuaries and Sundarbans adjoining Matla and Bidyadhari rivers of S.24 Parganas district of the state.

Order CLUPEIFORMES

Family CLUPEIDAE

Genus *Hilsa* Regan, 1916

1916. *Hilsa* Regan, *Ann. Mag. nat. Hist.*, 19(8), p.303 (type-*Paralosa durbanensis* Reg.).

4. *Hilsa ilisha* (Hamilton)

(Fig. 4)

1822. *Clupanodon ilisha* Hamilton, *Fish, Ganges*, p.243, pl.19, fig.73 (Type locality-Ganges estuaries).

1985. *Hilsa ilisha*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India, Rec. zool. Suerv.India*, Occ. Paper No. 64, p. 17, fig. 5.

Local name : Ilish/Hilsha.

D.18-19; P.15; V.9; A.19-22; C.19; L.1. 46-49.

Diagnostic characters : Length of head 4.2 to 4.5 in total length, lower edge of operculum more than twice in height of operculum, eyes with broad adipose eye-lids, maxilla reaches a little beyond the posterior border of eye, dorsal and ventral surfaces equally convex, dorsal origin nearer to snout end than to caudal base, lateral transverse scales 17 to 20, post ventral scutes 14-15.

Colour : Silvery, shot with gold and purple.

Size : Attains to 46cm in length.

Distribution : Ganges at Calcutta, Kanpur, Allahabad, Benaras, Buxor, Patna, Monghyr, West Bengal, Orissa, Vizagapatnam, Coromondal coast, Malabar, Cochin and Bombay coasts, Cauvery river, Tanjore. Bangladesh, Pakistan, Burma, Sri Lanka, Iraq, Persian Gulf and China. Found in Hooghly river system in West Bengal.

Remarks : It's widely known scientific name has been retained as such being a very popular Indian clupeoid fish of considerable economic importance all over India. It has been recently revised to '*Hilsa (Tenualosa) ilisha*' (Whithead, 1973) and '*Macrura ilisha*' (Misra, 1976). Most popular foodfish of West Bengal of high economic importance.

Fig. 1



Fig. 2



Fig. 3

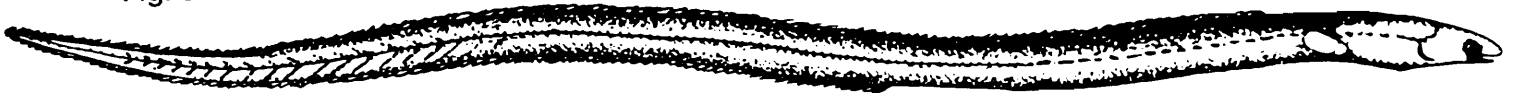


Fig. 4

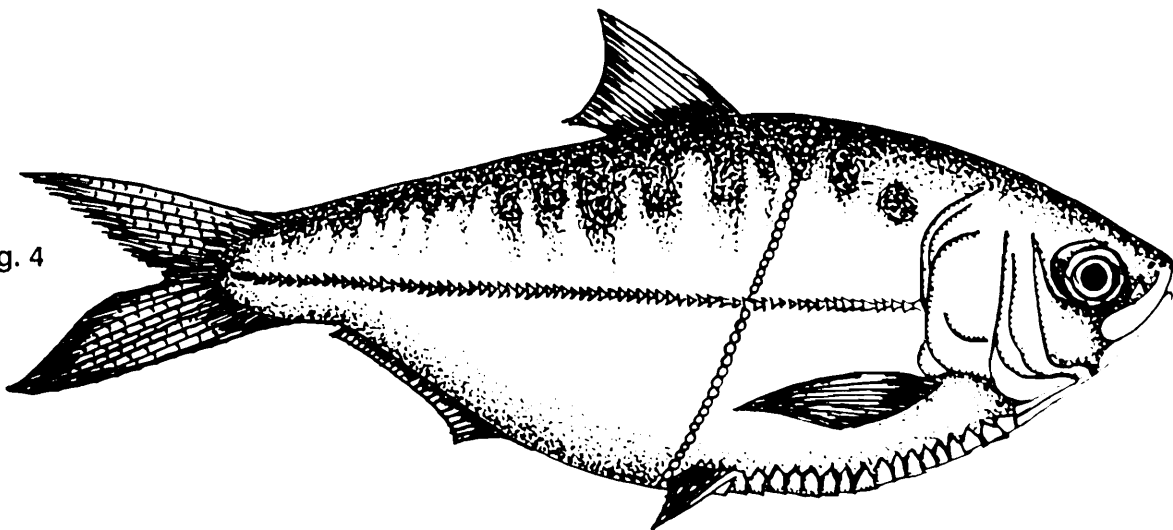


Fig. 1. *Anguilla bengalensis bengalensis* (Gray & Hardw.); Fig. 2. *Moringua raitabarua* (Ham.); Fig. 3. *Pisodonophis boro* (Ham.); Fig. 4. *Hilsa ilisha* (Ham.).

Genus *Gudusia* Fowler, 1911

1911. *Gudusia* Fowler, *Proc. Acad. nat. Sci. Philad.*, 63, p.207 (type-*Clupanodon chapra* Ham., Orthotypic).

5. *Gudusia chapra* (Hamilton)
(Fig. 5)

1822. *Clupanodon chapra* Hamilton, *Fish. Ganges*, pp. 248, 383 (type locality-Upper parts of the Ganges).
1985. *Gudusia chapra*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No. 64, p.15.

Local name : Khoira.

D.14-16; P.13; V.8; A. 21-24; C. 17; L.1. 80 -110.

Diagnostic characters : Length of head 4.3 to 4.5 in total length, eyes with broad adipose lids, ventral profile more convex than dorsal file, dorsal fin nearer to caudal base than to snout end, post and pre-ventral scutes 9 to 10 and 18 to 19 respectively.

Colour : Silvery with or without a dark shoulder spot, sometimes golden tinge at sides and bluish black on the black.

Size : Attains to 20.3cm in length.

Distribution : Freshwaters of Assam, West Bengal, Bihar, Orissa, Upper parts of Ganges, Bombay as far south as the Krishna river : Bangladesh, Pakistan, Penang. Found in Matia river system in West Bengal.

Remarks : A clupeoid fish that can be found throughout West Bengal in freshwaters more particularly in the monsoon months. Economically less important due to dense bones and less flesh.

Genus *Gonialosa* Regan, 1917

1917. *Gonialosa* Regan, *Ann. Mag. nat.*, 19(8), p.315 (type-*Chatoessus modestus* Day, Orthotypic).

6. *Gonialosa manmina* (Hamilton)
(Fig. 6)

1822. *Clupanodon manmina* Hamilton, *Fish. Ganges*, pp.247, 383 (Type locality-branches of the Ganges).
1985. *Gonialosa manmina*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No. 64. p. 14.

Local name : Khoira.

D.14-15; P.15; V.8; A. 22-24; L.1. 58-65.

Diagnostic characters : Length of head 4.6 to 5 in total length; eye 3 to 3.2 in head length, maxilla short, not reaching eye orbit; snout prominent, dorsal origin nearer to snout than to base of caudal, 17 strong scutes between throat and base of pelvic fin and 13 behind it.

Colour : Silvery glossed with gold, bluish-green back and usually a black shoulder spot, fins yellowish, caudal and dorsal with dark edges.

Size : Attains to 27.9cm in length.

Distribution : Tributaries of Ganges, Jamuna, Brahmaputra and Mahanadi rivers; spreading all over India through the tanks and estuaries of major Indian rivers except in the Deccan, southern and western India : Bangladesh, Pakistan, Sri Lanka. Found in Hooghly river system in West Bengal.

Remarks : Economically less important due to dense bones, less flesh and small size. Live in freshwaters.

Genus *Corica* Hamilton, 1822

1822. *Corica* Hamilton, *Fish. Ganges*, pp. 253, 283 (type-*Corica soborna* Hamilton, Monotypic).

7. *Corica soborna* Hamilton

1822. *Corica soborna* Hamilton, *Fish. Ganges*, pp. 253, 383 (type locality-Ganges river).

1984. *Corica soborna*, Talwar & Kacker, *Commercial sea fishes of India*, Handbook (4), *Zool. Surv. India*, p. 168, text-fig. 65.

Local name : Khoira/Khude-khoira.

D.15-16; P.13; V.8; A.2/12-13 + ii; C. 19; L.1.

Diagnostic characters : Length of head 5.2 to 5.5 in total length, eyes 3.5 in head, equal to snout; cleft of mouth oblique, maxilla reaching to midorbit; dorsal fin arises rather nearer to the base of caudal than the snout, anal base longer than dorsal base, pre-ventral scutes 10-11, post-ventral scutes 7-8.

Colour : Brownish shot with silver with light band.

Size : Rarerly attains to above 5cm in length.

Distribution : Orissa (Mahanadi river system), West Bengal : Bangladesh, Pakistan, Malaya, S. W. Borneo, Thailand, Sumatra. Found in Hooghly river system in West Bengal.

Remarks : Full of Bones and small sized one of little economic importance.

Family NOTOPTERIDAE

Key to the species of genus *Notopterus*

1. Gape of mouth extending beyond hind edge of orbit, upper profile of head deeply concave, dorsal profile deeply convex.....*Notopterus chitala*
- Gape of mouth not extending beyond hind edge, upper profile of head almost flat, dorsal profile simply convex.....*Notopterus notopterus*

Order OSTEGLLOSSIFORMES

Family NOTOPTERIDAE

Genus *Notopterus* Lacepede, 1800

1800. *Notopterus* Lacepede, *Hist. Nat. Poiss.*, 2. p. 183 (type-*Gymnotus notopterus* Pallas).

8. *Notopterus chitala* (Hamilton)

(Fig. 7)

1822. *Mystus chitala*, Hamilton, *Fish Ganges*, pp.236,382 (type locality-larger freshwater rivers of Bengal).

1985. *Notopterus chitala*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ. Paper No.64, p.19, fig.6.

Local name : Chital.

D. 9-10(1-2/7-9); P.16; V.6; A.110-125(135); C.12-14.

Diagnostic characters : Length of head 4.6 in total length, eyes 7 to 8 in head length, upper profile of head deeply curved and concave, dorsal side highly convex with sharp contrast to the plain ventral surface, small scales on body, opercles, some fins and head region; rudimentary ventral fin, anal and caudal fins confluent.

Colour : Silvery sides, coppery black with about 15 silvery transverse bars, two distinct dark spots on the caudal region, fins with grayish spots.

Size : Attains to 1.2 mt in length.

Distribution : Assam, West Bengal, Orissa, U. P., Bihar : Bangladesh, Pakistan, Burma, Thailand, Malay and Indonesia. Found in Hooghly and its tributaries in West Bengal.

Remarks : This fish is very much popular all over West Bengal for its good taste and rich oil content in the abdominal region ('Pete'). Upper part of the body (dorsal side) full of thin bones and not liked by the local people ('gada'). Found to live in big rivers only.

9. *Notopterus notopterus* (Pallas)

1769. *Gymnotus notopterus* Pallas, *Spec.Zool.* 7. p.40, pl.6. fig.2 (type-locality-Ponds and rivers of Bengal).

1985. *Notopterus notopterus*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec.zool. Surv. India*, Occ. Paper No. 64 p.20.

Local name : Falui/Fali

D. 7-8(1-2/6-7); P.17; V.5; A. 100-110 : C. 19; L. 1.225.

Diagnostic characters : Length of head 4.1 to 5.5 in total length, dorsal profile not much convex as that of ventral, eyes 4.5 to 5 in head length, maxilla reaches to mid orbit, preorbital serrated; dorsal small, situated midway between snout and caudal fin base; anal and caudal united, pelvic rudimentary; scales on the opercle larger than those on body.

Colour : Silvery sides with bluish-gray back, golden yellow tinge on head, fine grayish spots all over the body, golden eyes.

Size : Grows to 61cm in length.

Distribution : Ponds, Tanks, rivers and brackish waters of West Bengal, Assam, Punjab, U.P., Chilka Lake, Orissa, Madras, Deccan, Malabar, Poona : Bangladesh, Burma, Pakistan, Malay, Indonesia, Thailand. Found in Hooghly and its tributaries in West Bengal.

Remarks : A popular food-fish all over West Bengal, though, very much known for its dense thin bones.

Key to the species of genus *Chela*

1. Cleft of mouth very much oblique, abruptly directed upwards; lateral line scales 34-37, larger, not many on body.....*Chela (C) laubuca*
 Cleft of mouth moderately oblique, directed upwards; lateral line scales 55-65, small, much more numerous on body.....*Chela (C) cachi*

Order CYPRINIFORMES
 Family CYPRINIDAE
 Subfamily CULTRINAE (Abramidinae)
 Genus *Chela* Hamilton, 1822

1822. *Chela* Hamilton, *Fish.Ganges*, p. 383 (type-*Cyprinus cachus* Ham., designed by Bleeker in 1822).

10. *Chela (Chela) cachus* (Hamilton)

1822. *Cyprinus cachus* Hamilton, *Fish. Ganges*, pp. 258, 384 (type locality-rivers of Bengal).

1981. *Chela (Chela) cachus*, Jayaram, *F. W. Fishes of India*, Handbook No.2, Calcutta, Z.S.I., p. 74.

Local name : Chela.

D. 9(2/7); P. 10; V. 5-6; A. 22-24 (2-3/18-21); L. 1. 55-65.

Diagnostic characters : Length of head 5.5 to 6 in total length, eyes 3 to 4 in head length, cleft of mouth moderately oblique, ventral with an elongate outer ray extending to middle or even end of anal fin, pectoral fin elongated; 4 rows of scales between lateral line and pelvic base.

Colour : Silvery with a brownish lateral band, dorsal and caudal fins yellowish.

Size : Attains to 10.2 cm in length.

Distribution : Freshwaters of West Bengal, Assam, Orissa, M.P., Madras, Karnataka : Bangladesh, Pakistan. Found in Damodar and Rupnarayan river systems in West Bengal.

Remarks : Not found commonly. Little economic importance because of its small size and full of thin bones. Live in small torrential streams and shallow rivers.

11. *Chela (Chela) laubuca* (Hamilton)

1822. *Cyprinus laubuca* Hamilton, *Fish.Ganges*, pp.260, 380 (type locality-ponds of northern parts of Bengal).

1981. *Chela (Chela) laubuca*, Jayaram, *F.W.Fishes of India*, Handbook No. 2, Calcutta, Z.S.I., p. 72.

Local name : Beki-Chela ('Beki' means curved, due to curved dorsal profile).

D. 10-11(2/8-9); P. 13; V. 7; A. 19-23(2/17-21); C. 19; L.1. 34-37.

Diagnostic characters : Length of head 5 to 6 in total length, upturned mouth with dorsal head profile curved upwardly, eyes 3 to 3.5 in head length, cleft of mouth very much oblique, origin of dorsal fin midway between hind border of eye and the extremity of the caudal fin, slightly behind anal origin; abdominal edge cutting from pectoral to anal fin.

Colour : Silvery with golden vertical stripes when fresh; two back marks, one at the base of caudal and the other at the base of pectoral.

Size : Attains to 8.9cm in length.

Distribution : West Bengal, Assam, Orissa, M.P. : Bangladesh, Pakistan, Sri Lanka, Sumatra, Nepal, Malaya. Found in Ajoy river system in West Bengal.

Remarks : A larvivoracious fish found to live more particularly in stagnant tanks, beels and canals all over West Bengal.

Genus *Securicula* Gunther, 18681868. *Securicula* Gunther, *Cat.Fish.Brit.Mus.*, 7. p.382 (type-*Cyprinus gora* Ham.).12. *Securicula gora* (Hamilton)1822. *Cyprinus gora* Hamilton, *Fish.Ganges*, pp.263, 384 (type locality-Ganges and its tributaries).1981. *Securicula gora*, Jayaram, *F.W.Fishes of India*, Handbook No.2, Calcutta, Z.S.I., p.73.*Local name* : Bara-Chela.

D.9-10(2-3/7); P. 15; V. 8; A. 15-16(2/13-14); L.1.140-160.

Diagnostic characters : Length of head 5 to 5.2 in total length, eyes 5 in head length, sub orbital ring of bones broader than eye diameter and covering 2/3rd portion of Cheek, snout longer than eye, dorsal origin slightly in front of anal origin, scales extended up to nostrils on the head.*Colour* : Silvery*Size* : Attains to at least 22.8 cm in length.*Distribution* : Freshwaters of West Bengal, Assam, Punjab, U.P., Bihar : Bangladesh, Pakistan. Found in Damodar river system in West Bengal.*Remarks* : Generally found to live in the tanks, beels, canals and rivers. It is often seen in the local fish markets more particularly during monsoon months.Key to the species of genus *Salmostoma*

1. Lt. line scales 86-100, length of head 5.2 times in total length.....*Salmostoma bacaila*
 Lt. line scales 99-1122
2. Length of head 5.5 times in total length.....*Salmostoma phulo phulo*
 Length of head 6 times in total length, lateral line scales 47-52*Salmostoma sardinella*

Genus *Salmostoma* Swainson, 18391839. *Salmostoma* Swainson, *Nat. Hist.* 2.p.184 (type-*Cyprinus bacaila* Hamilton).13. *Salmostoma bacaila* (Hamilton)

(Fig. 8)

1822. *Cyprinus bacaila* Hamilton, *Fish.Ganges*, pp.265, 384, pl.8 Fig.76 (type locality-freshwater rivers of all the Gangetic provinces).1985. *Salmostoma bacaila*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No. 64, P. 31*Local name* : Gang-chela.

D. 9(2/7), P. 13; V. 9; A. 13-15(2/11-13); C. 19; L.1.86-110.

Diagnostic characters : Length of head 5.2 to 6 in total length, eyes 3.5 to 3.7 in head length, suborbital ring of bones broad, nearly covering cheeks; pectoral nearly reaching ventral, dorsal fin origin half in advance of anal, small sized scales.*Colour* : Silvery all over.*Size* : Grows to at least 17.7cm in length.*Distribution* : Throughout India except Malabar, Travancore-Cochin, Karnataka and Madras : Pakistan, Bangladesh. Found in Jayanti river system in West Bengal.

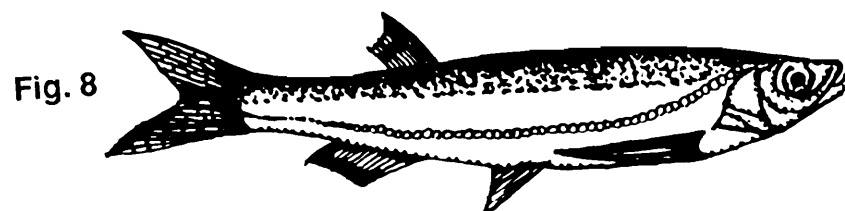
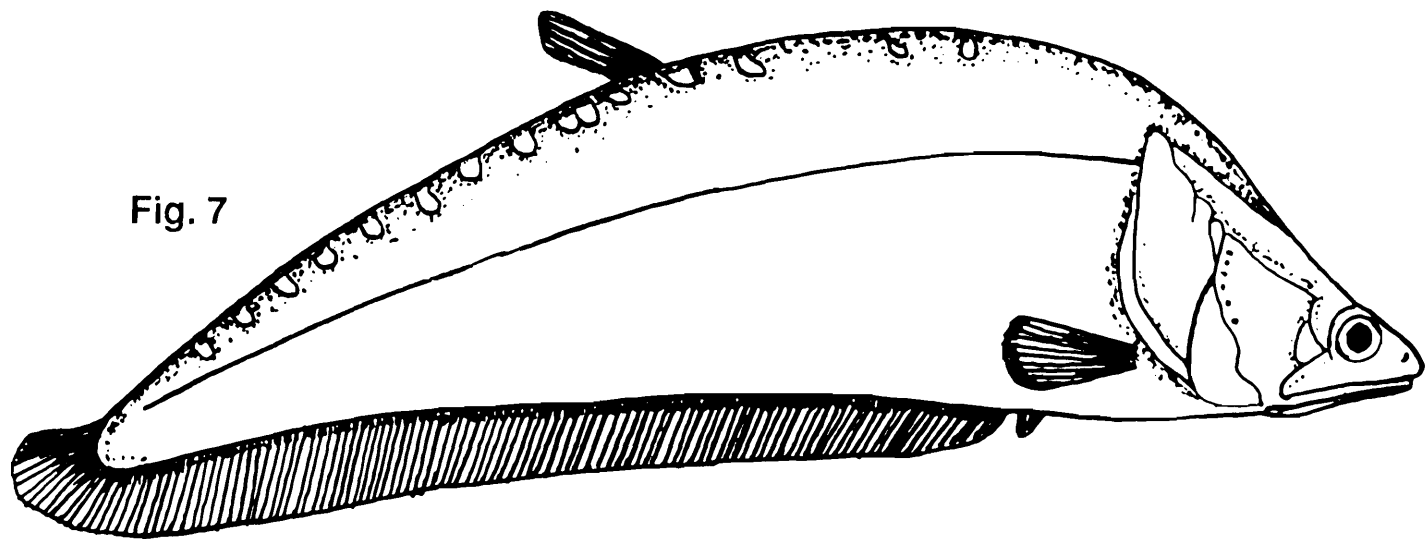
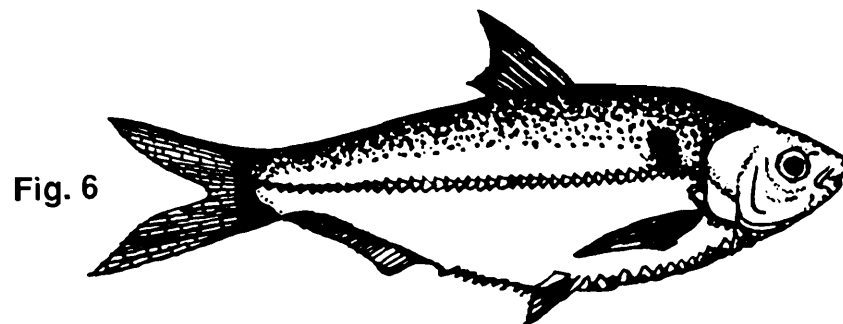
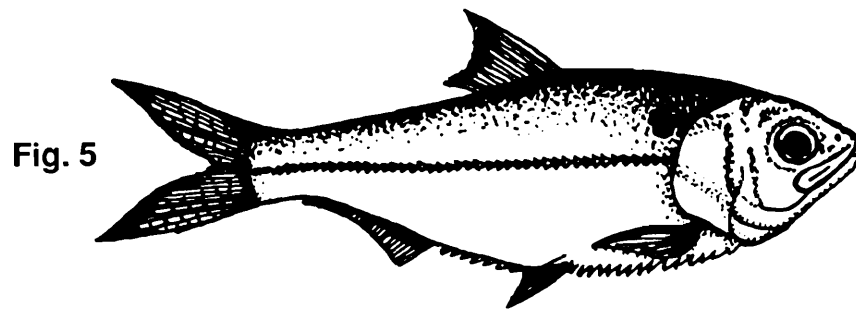


Fig. 5. *Gudusia chapra* (Ham.); Fig. 6. *Gonialosa manmina* (Ham.); Fig. 7. *Notopterus chitala* (Ham.) Fig. 8. *Salmostoma bacaila* (Ham.).

Remarks : Commonly found in the local fish markets during winter months. Known for its sweet taste, though small in size.

14. *Salmostoma phulo phulo* (Hamilton)

1822. *Cyprinus phulo* Hamilton, *Fish. Ganges*, p. 262 (type locality-rivers and ponds of N.E. parts of Bengal).

1985. *Salmostoma phulo phulo*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper no. 64. p. 32.

Local name : Chela.

D.9(2/7); P. 13; V. 9 : A. 18-19(2-3/16-18); C. 19; L.1. 99-112.

Diagnostic characters : Length of head 5.5 in total length, eye diameter 3.5 in head length, the maxilla extends to the front margin of orbit, abdominal profile cutting behind the base of pectoral fin, third suborbital bone nearly as deep as the uncovered part of the cheek below it, dorsal commences midway between the posterior extremity of orbit and caudal fin.

Colour : Silvery base with bright silvery lateral band.

Size : Attains to 12.5cm in length.

Distribution : India : Assam, West Bengal, Orissa, M.P., Deccan : Bangladesh. Found in the Bhagirathi river system in West Bengal.

Remarks : Commonly found to live in ponds, ditches, canals, paddy-fields (during monsoon period) all over West Bengal. Liked locally for its sweet taste inspite of its small size.

15. *Salmostoma sardinella* (Valenciennes)

1878. *Chela sardinella*, Day, *Fish. India*, p. 600, pl. 152, Fig.1.

1981. *Salmostoma sardinella*, Jayaram, *F.W. fishes of India*, Handbook No. 2, Calcutta, Z.S.I., p. 74.

Local name : Chela.

D. 9(2/7); P. 13; V. 8; A. 21(2/19); L.1. 47-52.

Diagnostic characters : Length of head 6 in total length, diameter of eye 3.5 to 4 in head length, maxilla extends to below the front edge of eye, suborbital rings broad but do not touch the preopercular ridge, dorsal originates above or slightly behind the origin of the anal.

Colour : Silvery.

Size : Grows to 15.2cm in length. Single specimen studied from Darakeswar river (Purulia Dt.), measures 12.5cm in length.

Distribution : Freshwaters of West Bengal, Orissa : Bangladesh, Burma, Pegu, Rangoon, Moulmein. Found in Hooghly river system in West Bengal.

Remarks : Found abundantly in monsoon months, in road-side ditches, canals, paddy-fields (confined waters during monsoon), small rivers etc.

Subfamily HYPOPTHALMICHTHYINAE

Genus *Hypophthalmichthys* Bleeker, 1859

1859. *Hypophthalmichthys* Bleeker, *Nat. Tijdschr. Ned. India*, 20, p. 433 (type-*Leuciscus molitrix* Valenciennes by original designation).

16. *Hypophthalmichthys molitrix* (Valenciennes)
(Fig. 9)

1975. *Hypophthalmichthys molitrix*, Jhingran, *Fish and fisheries of India*, p. 689-697.

1985. *Hypophthalmichthys molitrix*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*; *Rec. zool. Surv. India. Occ. Paper No. 64*, P. 68, fig. 30.

Local name : Silver carp.

D.3/7; A. 2-3/12-14; V. 1/7; L.1. 110 (28-33)/(16-28) 124.

Diagnostic characters : Length of head 3.3 in standard length, abdomen keeled up to the vent, pointed head with oblong body, snout bluntly rounded with lower jaw slightly protruding with a tubercle, small eyes and scales, origin of dorsal fin between tip of snout and base of caudal fin, pectoral reaching beyond the pelvic origin.

Colour : Silvery body, dark fins with conspicuous blood-red spots on the caudal peduncle region.

Size : Attains to average length of 81.4cm.

Distribution : India, South and Central China, U.S.S.R., Taiwan, Malayasia, Thailand, Sri Lanka, Japan, Bangladesh, Pakistan, Nepal, Philippines, Burma, Hongkong, Singapore, U.A.R. and Israel.

Remarks : An exotic fish now cultured all over India. In West Bengal it is now being extensively cultured and regarded as a major carp next to *L.rohita* (Rui), *C. catla* (Katla), *C. mrigala* (Mrigal) and *L. calbasu* (Kalbasu).

Key to the species of genus *Aspidoparia*

1. L.1.scales 38-42, upper jaw longer and overlapping the lower, cheek covered by a broad suborbital ring of bones*A.morar*
- L.1.scales 52-60, mouth considerably overhung by the snout, only half of the cheek covered by suborbital rings of bones*A.jaya*

Subfamily RASBORINAE

Genus *Aspidoparia* Heckel, 1843

1843. *Aspidoparia* Heckel, In : *Fenzl. Abdild. Thiere Pill.Syr.Fische.* p.186 (type *Aspidoparia sardinella* = *Aspidoparia morar* (Ham.).

17. *Aspidoparia morar* (Hamilton)
(Fig. 10)

1822. *Cyprinus morar* Hamilton, *Fish. Ganges*, pp. 264, 384, pl. 31, fig 75 (type locality-Yamuna and Tista rivers)

1985. *Aspidoparia morar*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, Occ. Paper No. 64, p. 49. fig. 16.

Local name : Chela.

D.9-10(2/7-8); P. 15; V. 8; A. 10-12(2/8-10); C.19; L.1. 38-42.

Diagnostic characters : Length of head 5 to 5.7 in total length, eye diameter 3.6 in head length, cheeks covered by broad suborbital ring of bones, upper jaw over hanging the lower jaw, dorsal origin midway between the hind margin of eye and caudal fin base, predorsal 20, no barbels.

Colour : Brownish black silvery sides divided by a burnished streak.

Size : Largest recorded length being 17.7cm.

Distribution : Freshwaters of all Indian states except the western coast and localities south of Krishna river : Pakistan, Bangladesh, Burma, Siam and Thailand. Found in the Mahananda river system in West Bengal.

Remarks : Most commonly found all over West Bengal particularly during summer and monsoon months. Known for its sweet taste.

18. *Aspidoparia jaya* (Hamilton)

1822. *Cyprinus jaya* Hamilton, *Fish, Ganges*, pp. 333, 392 (type locality-N.Bihar)

1985. *Aspidoparia jaya*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of Rec. zool. Surv. India*, Occ. Paper No. 64 p.49.

Local name : Chela.

D.9 (2/7); P. 15; V. 8; A. 9(2/7); C. 21; L. 1.52-60.

Diagnostic characters : Length of head 5.2 to 5.5 in total length, eye diameter 3.5 in head length, prominently overhung mouth, only about half of the cheek covered by the suborbital ring of bones, no barbels, origin of dorsal fin midway between snout and the caudal fin base, desiduous scales.

Colour : Dark black with silvery sides.

Size : Largest recorded specimens 10.2cm in length.

Distribution : Gangetic provinces, Assam, West Bengal, U.P. : Nepal, Bangladesh. Found in Mahananda river system in West Bengal.

Remarks : Found in plenty in rainy season all over West Bengal. It is commonly found in Calcutta fish markets mixed with *S.bacaila*, *S.p.phulo* and *C. (C) laubuca*. Liked locally specially when found in fresh condition.

Genus *Amblypharyngodon* Bleeker, 1860

1860. *Amblypharyngodon* Bleeker, *Ichth. Arch. Ind. Prodr.*, 2, p.409 (type-*Cyprinus mola* Ham.).

19. *Amblypharyngodon mola* (Hamilton)

1822. *Cyprinus mola* Hamilton, *Fish. Ganges*, pp. 334, 392, pl. 38, fig. 92 (type locality-ponds and freshwaters of the Gangetic provinces).

1985. *Amblypharyngodon mola*, Sen *Fish fauna of Assam and the neighbouring N.E. states of India, Rec. zool. Surv. India*, Occ. Paper No. 64, p. 51, fig. 17.

Local name : Morola/Maurala

D. 2/7; V. 9; P. 15; A. 2/5; C. 19; L. 1. 65-75.

Diagnostic characters : Length of head 5 in total length, eye diameter 3.5 in head length, no barbels, incomplete lateral line ceases after 15 scales, dorsal origin midway between front border of eye and caudal base, 9-10 rows between lateral line and pelvic base.

Colour : Silvery body with a deep greyish silvery lateral band, caudal and whole of the body covered with minute black dots.

Size : Largest recorded specimen 7.5 cm in length.

Distribution : Freshwaters throughout India except Malabar coast : Bangladesh, Pakistan Burma. Found in Hooghly river system in West Bengal.

Remarks : Amongst the smaller varieties, this fish is most popular and known for its sweet taste all over West Bengal. Found to live in ponds, canals, ditches, beels, rivers etc.

Key to the species of genus *Barilius*

1. Lateral line scales 43-46.....2
Lateral line scales 88-94.....3
2. Body with 14-15 vertical bluish bars.....*Barilius barila*
3. Two or more vertical rows of bluish blotches along the sides*Barilius bola*
No such blotches, each scale with a black spot only4
4. Short anal with 9 to 10 rays, lateral line scales 38 to 43.....*Barilius bendelisis*
Long anal with 13 to 15 rays5
5. Lateral line scales 70 to 75, two or more vertical rows of bluish blotches and bars along the sides.....*Barilius tileo*
Lateral line scales 42-44, 10-14 bluish bars..... *Barilius vagra vagra*

Genus *Barilius* Hamilton, 1822

1822. *Barilius* Hamilton, *Fish. Ganges*, p. 384 (type—*Cyprinus barila* Hamilton).

20. *Barilius barila* Hamilton

1822. *Cyprinus barila* Hamilton, *Fish. Ganges*, pp. 267, 394 (type locality-N.Bengal).

1985. *Barilius barila*, Sen *Fish fauna of Assam and the neighbouring N.E.states of India, Rec. zool. Surv. India, Occ. Paper No. 64.p.37.*

Local name : Koksa

D.9 (2/7); P. 13; V. 9; A. 13-14(3/10-11); C. 19; L. 1. 43-46.

Diagnostic characters : Length of head 5 to 5.5 in total length, eye diameter 3.5 to 4 in length, a small rostral pair of barbules, third suborbital bone wide and nearly touching the preopercular ridge, jaws of equal length anteriorly, dorsal origin midway between the hind margin of the orbit and the base of caudal fin, lower caudal lobe longer.

Colour : Silvery with 14-15 bluish bars on sides.

Size : Attains to 10.2cm in length.

Distribution : West Bengal, Orissa, Assam, N. India, Manipur, Bihar, M.P., Karnataka : Nepal, Bangladesh, Pakistan. Found in Mahananda and Tista river systems in West Bengal.

Remarks : Found to live in torrential shallow waters beset with rock boulders. Economically less important due to its dense bones and less flesh.

21. *Barilius bendelisis bendelisis* Hamilton

1807. *Cyprinus bendelisis* Hamilton, *Journey in Mysore*, 3, p.345, pl.32 (type locality-Rivers of Mysore).

1981. *Barilius bendelisis bendelisis*, Jayaram, *F.W.Fishes of India.Handbook No. 2, Calcutta, Z.S.I. p.88.*

Local name : Joia.

D. 9 (2/7); P. 15; V. 9; A. 9-10(2-3/7-8); C. 18; L.1. 38-43.

Diagnostic characters : Length of head 4.6 to 5.2 in total length, eye diameter 4.2 to 4.6 in head length, maxilla reaches to anterior third of eye, four short barbels, adult male with strong and large pectoral fin, pores on the snout and lower jaw, dorsal origin nearer to caudal base than the snout.

Colour : Silvery shot with purple, slaty descending bars from back to lateral line, each scale with a distinct black spot, fins tinged with orange.

Size ; Attains to 15.3cm in length.

Distribution : West Bengal, Assam, Punjab, Simla, U.P., Bihar, M.P., S. India : Bangladesh, Pakistan, Nepal, Sri Lanka. Found in Mahanadi and Tista river systems in West Bengal.

Remarks : Mostly remain confined in the hilly regions more particularly in shallow hill streams with beds beset with rock-boulders.

22. *Barilius bola* (Hamilton)

(Fig. 11)

1822. *Cyprinus bola* Hamilton, *Fish. Ganges*, pp. 274, 385 (type locality-Brahmaputra river).

1985. *Barilius bola*, Sen, *Fish fauna of Assam and the neighbouring N.E.states of India*, *Rec. zool. Surv. India*. Occ. Paper No. 64, p. 34.

Local name : Bhola.

D.10-11 (3/7-8); P. 13; V. 9; A. 13 (3/10); C. 19; L.1. 88-94.

Diagnostic characters : Length of head 4.5 to 4.6 in total length, eye diameter 4.5 to 7 in head length, deeply cleft mouth, a knob above symphysis of the lower jaw, suborbital ring of bones broad, no barbels, dorsal origin midway between preopercular angle and caudal base.

Colour : Silvery with two or more vertical rows of bluish blotches along the sides; fins tinged with orange.

Size : Grows to at least 30.4cm in length.

Distribution : West Bengal, Assam, U.P., Bihar, Punjab, Orissa, Bangladesh, Pakistan, Burma. Found in Mahananda and Tista river system in West Bengal.

Remarks : Found to live in torrential streams, hilly rivers particularly in N.Bengal regions. Sometimes this fish is mistaken by anglers as trout due to its large size, spots and colouration of its fins (orange tinged).

23. *Barilius vagra vagra* (Hamilton)

(Fig. 12)

1822. *Cyprinus vagra* Hamilton, *Fish. Ganges*, pp. 269, 385 (type locality-Ganges at Patna).

1985. *Barilius vagra vagra*, Sen *Fish fauna of Assam and the neighbouring N.E.states of India*, *Rec. zool. Surv. India*, Occ. Paper No. 64, P. 37.

Local name : Koksa.

D.9 (2/7); P. 16; V. 9 : A. 13-15 (2-3/11-12); C. 19; L.1. 42-44.

Diagnostic characters : Length of head 5 to 5.5 in total length, eye diameter 3.5 to 4 in head length, maxilla reaches to below middle of eye, lower jaw slightly longer, two pairs of barbels, dorsal origin midway between hind border of eye and base of caudal fin.

Fig. 9

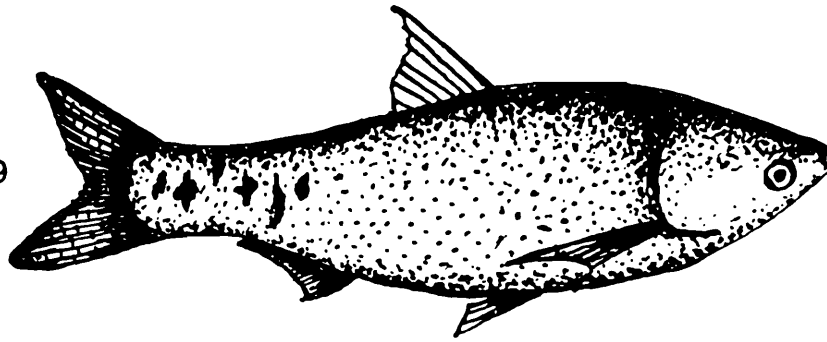


Fig. 10

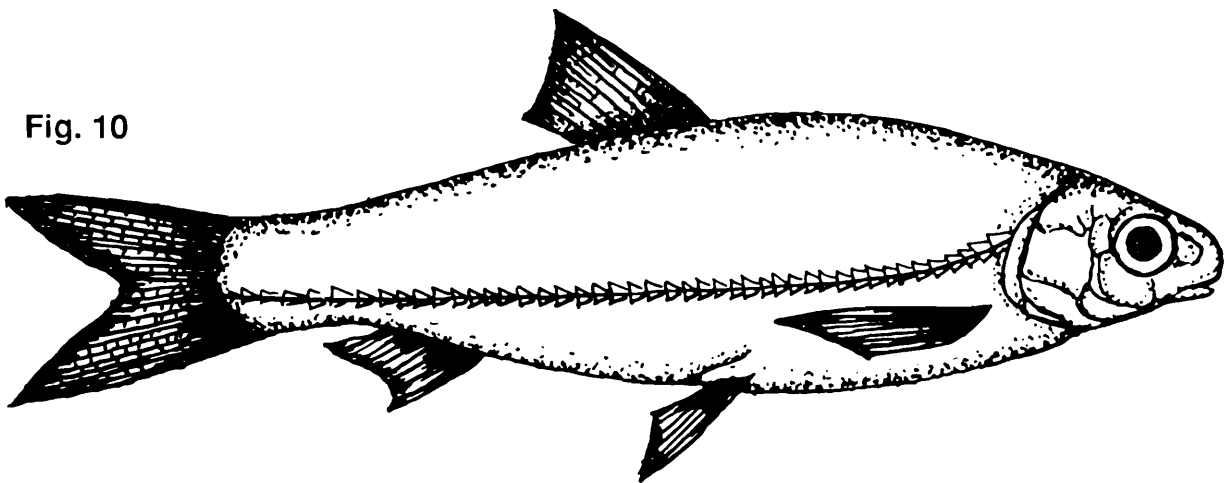


Fig. 11

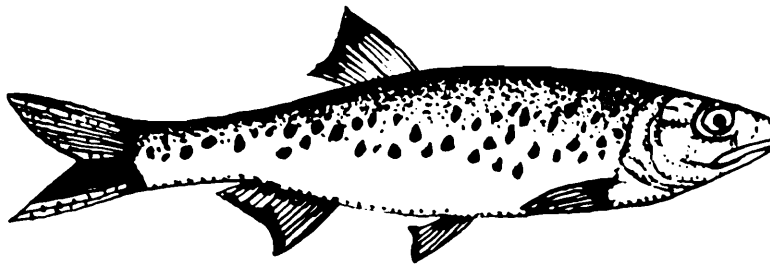


Fig. 12

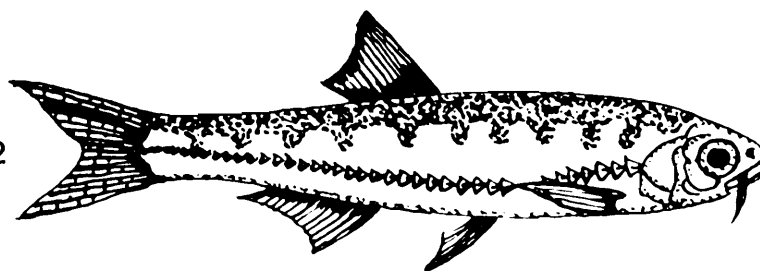


Fig. 9. *Hypophthalmichthys molitrix* (C.V.); Fig. 10. *Aspidoparia morar* (Ham.); Fig. 11. *Barilius bola* (Ham.); Fig. 12. *Barilius vagra vagra* (Ham.).

Colour : Silvery with 10 to 14 bluish bars descending from black, yellowish fins, caudal edged with black.

Size : Grows to at least 12.7cm in length.

Distribution : West Bengal, N. India, (Indus, Ganges, Yamuna, and Brahmaputra), Bihar, Punjab, W. Himalayas : Bangladesh, Nepal, Pakistan, Sri Lanka. Found in Mahananda and Tista river systems in West Bengal.

Remarks : Live in small hill streams, rivers with beds beset with pebbles and rock-boulders.

24. *Barilius tileo* (Hamilton)
(Fig. 13)

1822. *Cyprinus tileo* Hamilton, *Fish. Ganges*, p. 276 (type locality-Koshi river).

1985. *Barilius tileo*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India. Rec. zool. Surv. India, Occ. Paper No. 64*, p. 33, fig.8.

Local name : Koksa.

D.9 (2/7); P. 14; V. 9; A. 13 (3/10); C. 20; L. 1. 70-75.

Diagnostic characters : Length of head 4.7 to 5.2 in total length, eye diameter 4 to 4.5 in head length, upper jaw slightly longer, maxilla reaches beneath the middle of eye, abdominal profile more convex than the dorsal, snout pointed and head compressed, rudimentary barbels, axillary process well developed, dorsal origin midway between hind border of eye and caudal fin base.

Colour : Bluish black on the back and silvery sides with two or more rows of blue blotches or spots on the sides, fins tinged with grey, pink and yellow.

Size : Grows to at least 12.7cm in total length.

Distribution : West Bengal, Assam, E. Himalayas : Burma.

Remarks : Found to live in hill-streams and torrential rivers.

Key to the species of genus *Danio*

1. No barbels, lateral line scales 41 to 48, very deep, anal with 18 to 19 rays.....*Danio (D) devario*
Two pairs of well developed barbels, both rostral and maxillary much longer than eye diameter..2
2. Lateral line scales 38, anal with 17 to 18 rays*Danio (D) dangila*
Lateral line scales 26 to 28, anal with 15 to 16 rays3
3. Two pairs of barbels, rostral shorter, maxillary pair reaching end of opercle.....
.....*Danio (Brachydanio) rerio*
Two pairs of barbels, shorter than eyes (maxillary minute), lateral line scales 32 to 36, anal with 14 to 18 rays.....*Danio(D) aequipinnatus*

Genus *Danio* Hamilton, 1822

1822. *Danio* Hamilton, *Fish. Ganges*, pp. 321, 390 (type *Cyprinus dangila* Ham.).

25. *Danio (danio) aequipinnatus* (McClelland)
(Fig. 14)

1839. *Perilampous aequipinnatus* McClelland, *Asiat. Res.*, 19 (2), P.393, pl.60, fig.1, (type locality-Assam).

1985. *Danio (Danio) aequipinnatus*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No. 64, p.42, fig. 13.

Local name : Bashpata.

D.12-14(2/10-12); P.17; V.8; A.14-16 (2/12-14); C.19; L.1. 32-36.

Diagnostic characters : Length of head 5 in total length, eye diameter 4 in head length, cleft of mouth oblique, extending to below front margin of eye; two pairs of barbels, dorsal origin midway between centre of eyes and base of caudal.

Colour : Silvery white with bluish orange iridescent lateral bands, a wide bluish lateral band extending from centre of eye to caudal fin base, yellowish fins, dorsal and anal with bluish bands.

Size : Attains to 15.2cm in length.

Distribution : Throughout India : Sri Lanka, Bangladesh, Burma, Thailand. Found in Damodar, Jayanti and Ajoy river systems in West Bengal.

Remarks : Popularly known as an aquarium fish all over West Bengal. Commonly found to live in tanks, rivers, hill-streams and confined waters in the paddy-fields during monsoon months.

26. *Danio (Danio) devario* (Hamilton) (Fig. 15)

1822. *Cyprinus devario* Hamilton, *Fish.Ganges*, pp. 341, 393, pl. 1.6, fig 94 (type locality-rivers and ponds).

1985. *Danio (Danio) devario*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*. Occ. Paper No. 64, p. 40.

Local name : Bashpata.

D.18-19 (3/15-16); P. 13; V. 8; A. 18-19 (3/15-16); C. 19; L. 1. 41-48.

Diagnostic characters : Length of head 5 to 5.2 in total length, eye diameter 3 in head length, lower jaw longer, maxilla reaching below front margin of eye, no barbels, third suborbital broad, dorsal commences midway between the anterior margin of orbit and caudal base, in front of anal fin; predorsal scales 16, caudal lunate.

Colour : Greenish above and silvery at sides, three horizontal bluish lines bordered by yellow bands extending backwards to caudal, sometimes a bluish iridescent band roughly along the lateral line, front part reticulated at its centre by steel blue lines.

Size : Grows to 10.2 cm in length.

Distribution : West Bengal, Assam, Eastern Himalayas, Punjab, U.P., Bihar, Orissa, M.P., Deccan, Ahmedabad : Bangladesh, Pakistan. Found in Damodar, Jayanti and Ajoy river systems in West Bengal.

Remarks : Commonly fancied as an aquarium fish for its very attractive colour pattern.

27. *Danio (Danio) dangila* (Hamilton) (Fig. 16)

1822. *Cyprinus dangila* Hamilton, *Fish, Ganges*, pp. 321, 390(type locality-mountain streams of Monghyr).

1985. *Danio (Danio) dangila*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No. 64, p.41.

Fig. 13

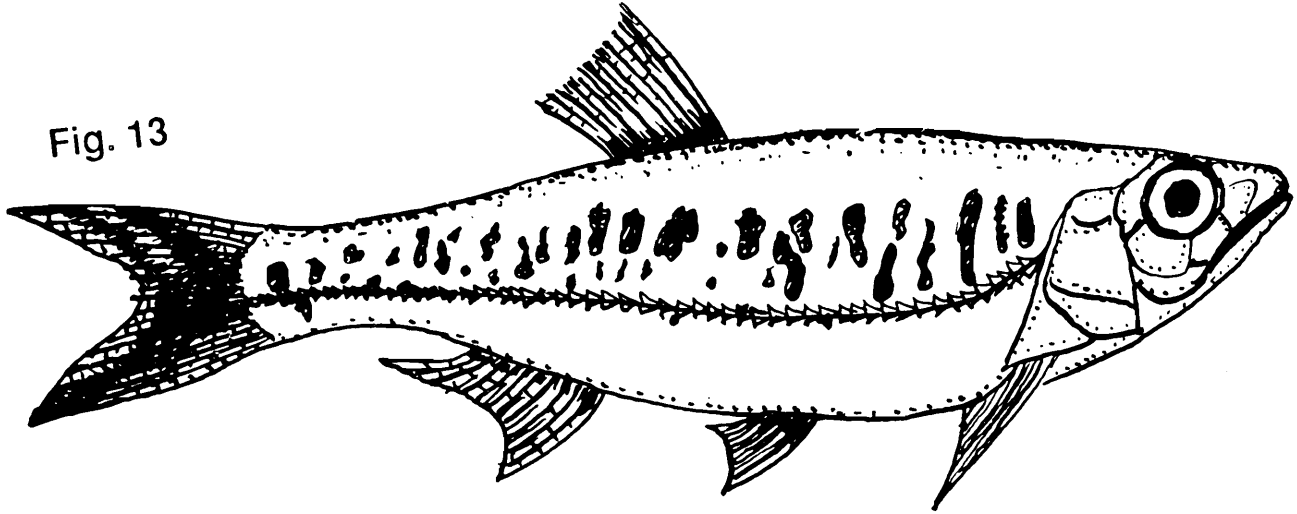


Fig. 14

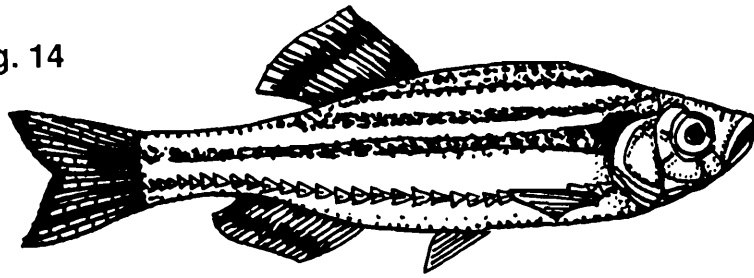


Fig. 15

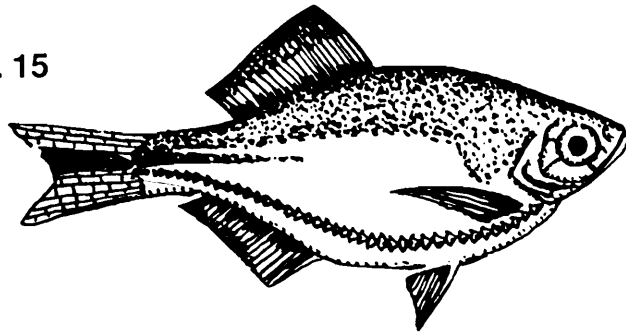


Fig. 16

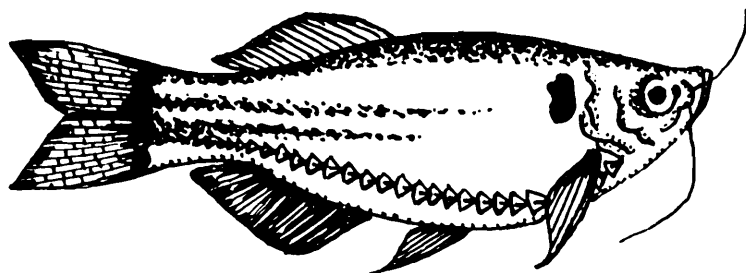


Fig. 13. *Barilius tileo* (Ham.); Fig. 14. *Danio (Danio) aguipinnatus* (McCl.); Fig. 15. *Danio (Danio) devario* (Ham.); Fig. 16. *Danio (Danio) dangila* (Ham.).

Local name : Nipati.

D.11-13; P. 13; V. 7-8; A. 16-18; C. 20; L. 1.38.

Diagnostic characters : Length of head 5 in total length, intermediate shape between *D.devario* and *D.aequipinnatus*, two pairs of barbules, rostral barbules a little shorter than the head, maxillary pair slightly longer, a black spot behind gills.

Colour : Silvery with 3 parallel longitudinal blue or dark lines running through the mid body half way along the tail, a black spot (sometimes fading) behind the gills.

Size : Largest recorded length being 15cm.

Distribution : West Bengal, Assam, Bihar, U.P. : Bangladesh, Burma. Found in Damodar river system in West Bengal.

Remarks : Generally found to live in shallow waters and hill-streams but can be found in rivers too.

28. *Danio (Brachydanio) rerio* (Hamilton)

(Fig. 17)

1822. *Cyprinus rerio* Hamilton, *Fish. Ganges*, p.323 (type locality-Koshi river).

1985. *Danio (Brachydanio) rerio*, Sen, *Fish fauna of Assam and the neighbouring N.E.States of India. Rec. zool. Surv. India, Occ. Paper No. 64*, p.43.

Local name : Anju.

D. (2/7); P. 13; V. 8; A. 15-16(2-3/12-13); C. 19; L. 1.26-28.

Diagnostic characters : Length of head 5 to 5.2 in total length, two pairs of barbels, rostral barbels short, maxillary pair reaching end of opercle; dorsal commences opposite to anal, caudal deeply forked.

Colour : Body beset with bands, four metallic blue longitudinal bands separated by three narrow silver ones, three lower blue bands produced on the caudal, dorsal with blue edging.

Size : Largest recorded length being 5cm.

Distribution : India, Bangladesh, Burma. Found in all the major river systems in West Bengal.

Remarks : A popular aquarium fish fancied for its attractive blue bands.

Genus *Esomus* Swainson, 1839

1839. *Esomus* Swainson, *Nat. Hist. Fish.*, 2. p.285 (type *Esomus vittatus* Swainson = *Cyprinus danrica* Hamilton).

29. *Esomus danricus* (Hamilton)

(Fig. 18)

1822. *Cyprinus danrica* Hamilton, *Fish. Ganges*, pp. 325, 390 pl. 16, fig.88(type locality-ponds and ditches of Bengal).

1985. *Esomus danricus*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India, Rec. zool. Surv. India, Occ. Paper No. 64*, P. 44.

Local name : Dadhikha/Danrika.

D. 8 (2/6); P. 15; V. 9; A. 8(3/5); L.1. 30-34.

Diagnostic characters : Length of head 5.2 to 5.5 in total length, eyes 3.2 to 3.5 in head, abdomen rounded, narrow mouth directed obliquely upwards, two pairs of barbules, the longest

maxillary barbels reach to the base of pelvics or sometimes up to caudal fin, suborbital bones broad, dorsal origin nearer to caudal fin than to pectoral base, predorsal scales 18.

Colour : Silvery body with a broad black lateral band (sometimes found absent).

Size : Attains to 12.7 cm in length.

Distribution : West Bengal, Assam, Punjab, U.P., Bihar, M.P., Orissa, Madras, Ahmedabad : Bangladesh, Burma, Pakistan, Sri Lanka, Malaya, Thailand and Malaya Archipelago. Found in Subarnarekha river system in West Bengal.

Remarks : A larvicidal fish generally found in road-side ditches, canals, pools, streams and ponds more particularly in rainy season.

Key to the species of genus *Rasbora*

1. Barbels absent. Lateral line scales 30-34, a dark brown lateral band.....
.....*Rasbora daniconius daniconius*
- Barbels present2
2. Lateral line scales 31-34, a faint lateral line streak, no barbels*Rasbora rasbora*
- Lateral line 40-44, a pair of rostral barbel*Rasbora elanga*

Genus *Rasbora* Bleeker, 1860

1860. *Rasbora* Bleeker, *Act. Soc. Indo-Neel.*, 7, p. 435 (type-Cyprinus *rasbora* Ham.).

30. *Rasbora daniconius daniconius* (Hamilton)

(Fig. 19)

1822. *Cyprinus daniconius* Hamilton, *Fish. Ganges*, p.327, pl. 15, fig. 89 (type locality-Rivers of S. Bengal).

1981. *Rasbora daniconius daniconius*, Jayaram, *F.w. fishes of India*, Handbook No. 2, Calcutta, Z.S.I., p. 84.

Local name : Daniconi/Dhera/Darkina.

D.9 (2/7); P. 15 : V. 9; A. 7 (2/5); C. 19; L. 1. 30-34.

Diagnostic characters : Length of head 4.5 to 5 in total length, no barbels, dorsal profile more convex than ventral, opening of mouth undulating, predorsal scales 14, origin of dorsal nearer to caudal fin base.

Colour : Greenish yellow back with silvery sides, a bluish lateral band (or a dark brown band) along the lateral line from snout to tail, fins pale orange, caudal lobes tinged with black.

Size : Attains to 20.3cm in length.

Distribution : India, Bangladesh, Pakistan, Burma, SriLanka, Malaya. Found in Rupanarayan, Mahananda and Darakeswar river system of West Bengal.

Remarks : The blue lateral stripe or band may be found sometimes only on the caudal region, may be due to age or maturity; in younger forms this band is very much bright silvery, live in streams, pools ponds and canals as well as paddy-fields during rainy seasons all over the state.

31. *Rasbora rasbora* (Hamilton)

1822. *Cyprinus rasbora* Hamilton, *Fish. Ganges*, pp. 329, 391, pl. 2, fig. 90 (type locality-ponds of Bengal).

1985. *Rasbora rasbora*, Sen, *Fish fauna of Assam and the neighbouring N.E.states of India*, *Rec. zool. Surv. India*, Occ, Paper No. 64, p. 47.

Local name : Dari-kana.

D. (2/7); P. 15; V. 9; A. 7(2/5); C. 19; L.1. 31-34.

Diagnostic characters : Length of head 5 in total length, eyes 3.5 in head, abdominal profile more convex than the dorsal, jaws well marked, dorsal commences nearer to the base of caudal fin than snout, concave lateral line, predorsal scales 12.

Colour : A black band passes from centre of eyes to caudal fin base, sometimes a spot at the side of the caudal fin base, in young ones a bright silvery band bordered with yellow passes along the sides.

Size : Grows to 10.2 to 12.8cm in length.

Distribution : West Bengal, Assam, Gangetic provinces, Coromandel coast : Bangladesh, Burma, Thailand, Malay, Siam. Found in all the major systems in West Bengal.

Remarks : Most commonly found in the freshwaters all over West Bengal.

32. *Rasbora elanga* (Hamilton)

1822. *Cyprinus elanga* Hamilton, *Fish, Ganges*, pp. 281, 386(type locality-rivers and ponds of Bengal).

1985. *Rasbora elanga*, Sen, *Fish fauna of Assam and the neighbouring N.E.states of India*. *Rec. zool. Surv. India*. p.47.

Local name : Elanga.

D.9(2/7); P.15; V. 8-9; A. (2/5); C. 19; L.1. 40-44.

Diagnostic characters : Length of head 5 to 5.5 in total length, pointed head, jaws of equal length with prominences and emarginations well marked (well developed), only one pair of short rostral barbels, dorsal commences midway between the posterior margin of the orbit and the base of caudal fin, abdomen rounded, cleft of mouth oblique, wavy opening of mouth due to prominences and emarginations in the lower and upper jaws respectively.

Colour : Silvery with a leaden band (sometimes) along the upper side.

Size : Attains to 20.3cm in length.

Distribution : West Bengal, Assam, Bihar : Bangladesh, Burma. Found in Hooghly river system in West Bengal.

Remarks : This species is often mistaken with *R. daniconius* but can be readily distinguished from it by the presence of a dark brown lateral band and increasing number of lateral line scales.

Subfamily CYPRININAE

Genus *Acrossocheilus* Oshima, 1919

1919. *Acrossocheilus* Oshima, *Ann. Carnegie Mus.*, 12, p.206 (type-*Gymnostomus formosanus* Oshima).

33. *Acrossocheilus hexagonolepis* (McClelland)

(Fig. 20)

1839. *Barbus hexagonolepis* McClelland, *Asiat. Res.* 19, pp.270, 336, pl.41, fig 3 (type locality-Upper Assam).

Fig. 17

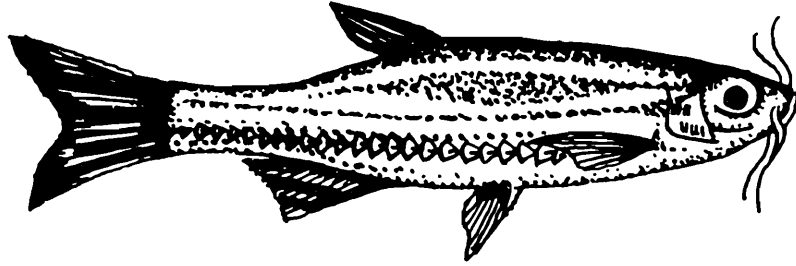


Fig. 18

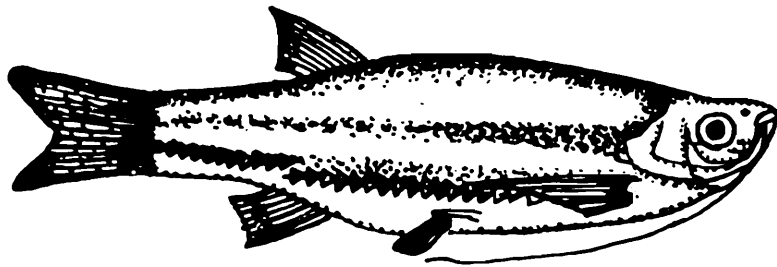


Fig. 19

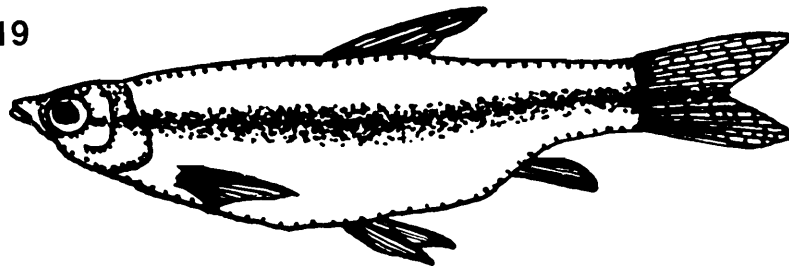


Fig. 20

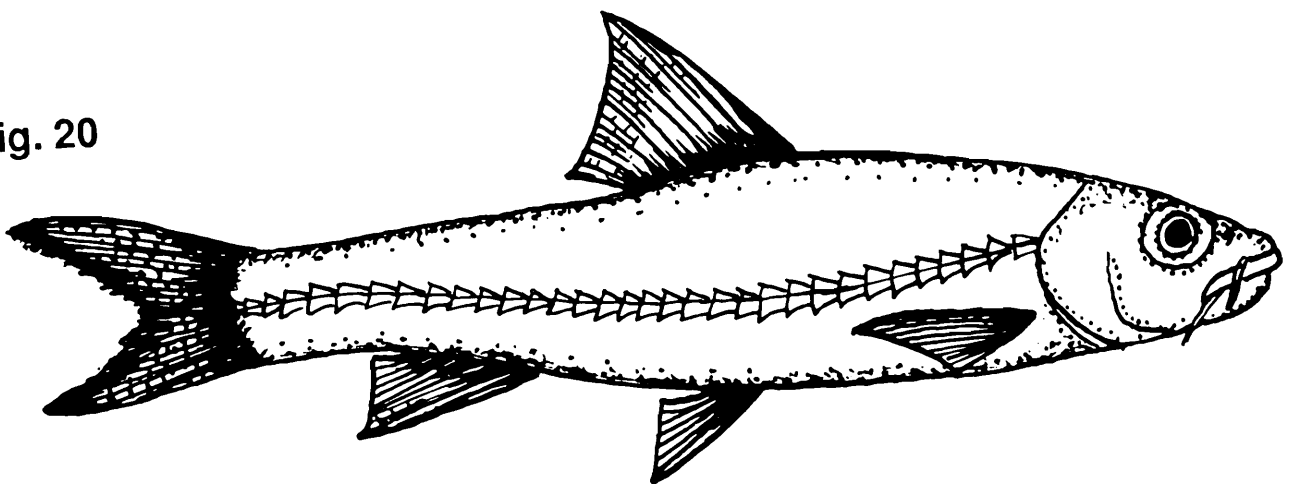


Fig. 17. *Danio (Danio) rerio* (Ham.); Fig. 18. *Esomus danricus* (Ham.); Fig. 19. *Rasbora daniconius daniconius* (Ham.); Fig. 20. *Acrossocheilus hexagonolepis* (McCl.).

1985. *Acrossocheilus hexagonolepis*, Sen, *Fish fauna of Assam and the N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No. 64, fig.15, p.48.

Local name : Buluk/Katli.

D. 12(3/9); P. 17; V. 9; A. 7(2/5); C. 19; L.1. 28-31.

Diagnostic characters : Length of head 5 to 5.5 in total length, eyes 2.6 to 4.2 in head, upper jaw longer, lower labial fold interrupted, sometimes pores on cheeks, two pairs of barbels, dorsal spine short, scales somewhat hexagonal, dorsal opposite to pelvic, predorsal scales 10-11.

Colour : Deep bluish-gray or olive green superiorly, silvery white below, a golden yellow lateral band above lateral line.

Size : Attains to 60.9 cm in length.

Distribution : West Bengal (Darjeeling Dt.), Assam, E.Himalayas, Meghalaya, Arunachal Pradesh : Nepal, Burma, Bangladesh, Pakistan, Thailand, Sumatra, Malay Archipelago. Found in Damodar river system in West Bengal.

Remarks : This species is very much confused with somewhat similar looking species *Puntius dukai* and *Puntius hexastichus* but can be readily distinguished from it by its typical 'hexagonal' scales. A commercially important fish lives in torrential waters of Darjeeling district mainly.

Genus *Chagunius* Smith, 1938

1938. *Chagunius* Smith, *Proc. Biol. Soc. Washington*, 51 p. 157(type-*Cyprinus chagunio* Ham.).

34. *Chagunius chagunio* (Hamilton) (Fig. 21)

1822. *Cyprinus chagunio* Hamilton, *Fish. Ganges*, pp. 295, 385 (type locality-Yamuna and the northern rivers of Bihar and Bengal).

1985. *Chagunius changunio*, Sen, *Fish fauna of Assam and the neighbouring N.E. states India*, *Rec. zool. Surv. India*, Occ. Paper No. 64, fig. 19, p. 53.

Local name : Jerriah Jerruah.

D. 11(3/8); P. 15; A. 8(3/5); C. 19; L.1. 44-47.

Diagnostic characters : Length of head 4.5 to 5 in total length, eyes 5 to 6.5 in head, suborbital region, cheeks and anterior superior margin of orbit covered with numerous pores, two pairs of barbels, upwardly directed mouth; dorsal commences between tip of snout and base of caudal fin, a strong serrated dorsal spine, predorsal scales 15.

Colour : Uniform silvery with a pinkish tinge, a black spot at the base of each scale on upper part of the body, fins yellowish, dorsal and caudal fins with reddish black tinge. 'Male is more brilliant throughout and the black fin tips more marked' (Shaw & Shebbeare, 1937).

Size : Attains to about 45.7cm in length.

Distribution : West Bengal (Darjeeling Dt.), E.Himalayas, Assam, Punjab, U.P., Bihar, Orissa : Bangladesh, Burma, Thailand, Siam, Nepal, Pakistan. Found in Kashai river system in West Bengal.

Remarks : Sunken pores on the snout and long dorsal rays in males are regarded as secondary sexual characters.

Genus *Catla* Valenciennes, 1844

1844. *Catla* Valenciennes, *Hist. Nat. Poss.*, 18, p. 140 (type-*Cyprinus catla* Ham.).

35. *Catla catla* (Hamilton)
(Fig. 22)

1822. *Cyprinus catla* Hamilton, *Fish. Ganges*, pp. 287, 318, pl. 13, fig. 8 (type locality-rivers and tanks of Bengal).

1985. *Catla catla*, Sen, *Fish fauna of Assam and neighbouring N.E.states of India, Rec. zool. Surv. India*, Occ. Paper No. 64, fig. 18, p. 52.

Local name : Katla.

D.3-4/14-16; P. 21; V. 9; A. 3/5; C. 19; L.1. 38-43.

Diagnostic characters : Length of head 4.2 to 4.7 in total length, eyes 6 to 7 in head, big head with wide mouth and big eyes, lower jaw prominent with lip doubled outwards below, depth of body remarkably high, eye diameter 6 to 7 in head length, dorsal profile more convex than the ventral side, caudal deeply forked, large scales.

Colour : Silvery with dark grey above and dull whitish on the belly. Pigmentation varies with the nature and condition of the habitats viz., tanks, beels and rivers.

Size : Grows to 1.82m in total length.

Distribution : Freshwaters throughout India as far south to the Krishna river; Bangladesh, Sri Lanka, Pakistan and Burma. Found in Hooghly river system in West Bengal.

Remarks : Most popular and an esteemed food fish all over West Bengal. Largely cultured in tanks and ponds throughout the state.

Key to the species of genus *Cirrhinus*

Lateral line scales 40 to 45, length of head 5 to 5.2 in total length, one pair of small rostral barbel*Cirrhinus mrigala*

Lateral line scales 35 to 38, length of head 6 to 6.5 in total length, one pair of rostral barbel, very short or may be absent*Cirrhinus reba*

Genus *Cirrhinus* Oken, 1817

1817. *Cirrhinus* (Oken), Cuvier, *Regne Animal.*, 2, ed.1, p.139 (type-*Cyprinus cirrhosus* Bleeker).

36. *Cirrhinus mrigala* (Hamilton)
(Fig. 23)

1822. *Cyprinus mrigala* Hamilton, *Fish. Ganges*, pp. 279, 389, pl.6, fig.79 (type locality ponds and freshwater rivers of the Gangetic provinces).

1985. *Cirrhina mrigala*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India, Rec. zool. Surv. India*, Occ. Paper No. 64, p.55, fig. 21.

Local name : Mrigal/Mrigal.

D. 2/12-13; P. 15; V. 9; A. 3/5; L.1. 40-45.

Diagnostic characters : Length of head 5 to 5.2 in total length, eyes 3.6 to 4 in head, upper lip entire, one pair of small rostral barbel within the fold of lip, width of body less than the length of head, dorsal profile more convex than the ventral, dorsal origin nearer to snout than to caudal fin base, moderately large scales, sharply forked caudal.

Colour : Dark grey dorsally with coppery tinge, bright golden big scales on the sides and silvery white on the belly, fins orange tinged with black, golden eyes.

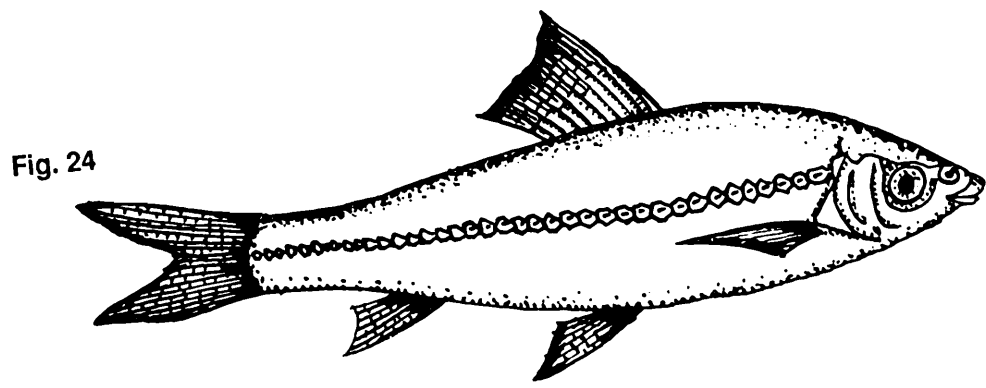
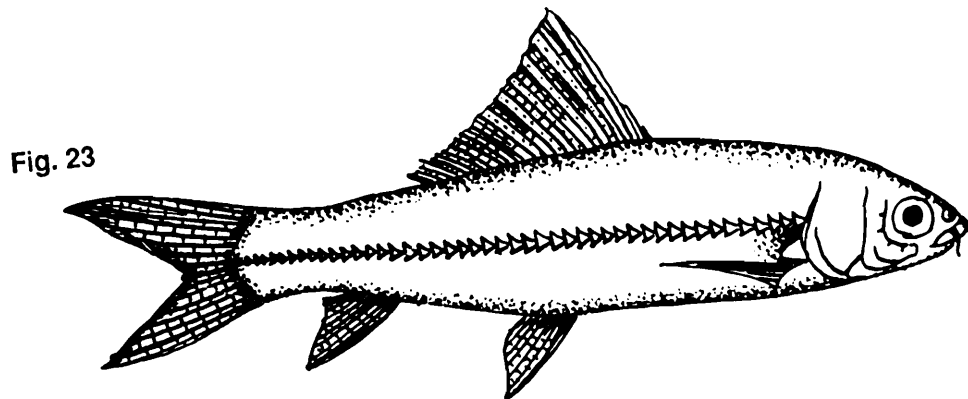
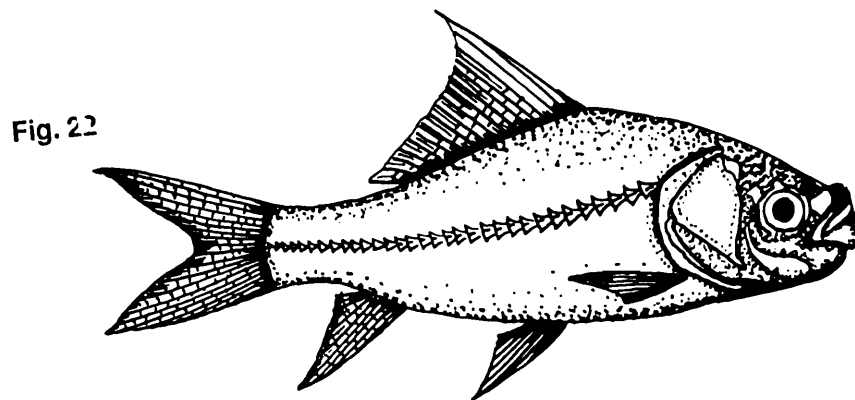
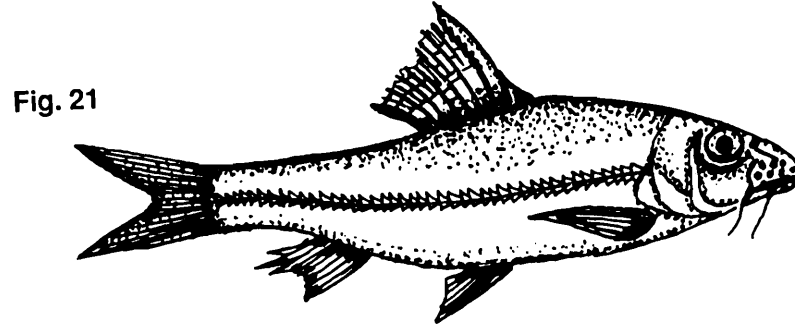


Fig. 21. *Chagunius chagunio* (Ham.); Fig. 22. *Catla catla* (Ham.); Fig. 23. *Cirrhina mrigala* (Ham.); Fig. 24. *Cirrhina reba* (Ham.).

Size : Grows to 91.4cm in total length.

Distribution : West Bengal, freshwaters throughout India : Bangladesh, Pakistan, Burma. Found in Damodar, Hooghly and Bhagirathi river systems in West Bengal.

Remarks : A popular carp of India of high economic importance. It is largely cultured all over the state being an esteemed food fish.

37. *Cirrhinus reba* (Hamilton)

(Fig. 24)

1822. *Cyprinus reba* Hamilton, *Fish. Ganges*, pp. 280, 386 (type locality-rivers and ponds of Bengal and Bihar).

1985. *Cirrhinus reba*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No. 64, p.54, fig. 20.

Local name : Kharke bata/Raig.

D.2-3/8-9; P. 16; V. 9; A. 3/5; C. 19; L.1. 35-38.

Diagnostic characters : Length of head 6 to 6.5 in total length, eyes 4 in head, upper lip fringed in the young, often entire in the adult forms; a thin cartilaginous layer covering the lower jaw, a pair of short rostral barbel only, dorsal fin origin nearer to snout, hexagonal scales.

Colour : Silvery, scales with dark edges forming longitudinal bands above lateral line, young sometime with a leaden lateral band, pelvic and anal fins bordered with orange.

Size : Grows to 30.4cm in total length.

Distribution : Throughout India : Bangladesh, Pakistan, Burma, Thailand. Found in the Hooghly river system in West Bengal.

Remarks : An esteemed food fish all over the state for its sweet taste inspite of its comparatively smaller size.

Genus *Cyprinus* Linnaeus, 1758

1758. *Cyprinus* Linnaeus, *Systema Naturae*, Ed.10, 1, p. 320.

38. *Cyprinus carpio carpio* Linnaeus

(Fig. 25)

1970. *Cyprinus carpio*, Holcik and Mihalik, *Freshwater Fishes* (The Hamlyn Publishing group, London).

1975. *Cyprinus carpio*, Jhingran, *Fish and Fisheries of India*, Delhi : Hindustan Publishing Corporation, pp. 678-689.

1981. *Cyprinus carpio carpio*, Jayaram, *F.W.Fishes of India*. Handbook No.2, Calcutta, Z.S.I., p. 94.

Local name : Common Carp/American Ruhi.

D.3-4/18-20 or 15-22; P. 1/15-16; V.2/8-9; C. 17-19; L. 1.30-40.

Diagnostic characters : Length of head 4.5 in total length, eyes 7 to 7.4 in head, continuous dorsal line, back rises abruptly beyond the head which is relatively small asymmetrically tapered, a small protusible mouth provided with strong lips and four barbels, no teeth, eyes placed relatively high on the head, fins regular and symmetrically arranged, dorsal fin nearer to snout, scales arranged in regular rows.

Colour : Golden yellow sides with dark back and white belly, fins dark and pink tinged.

Size : Grows to 86cm in total length.

Distribution : An exotic fish, first introduced in the plain districts of India in 1959. Now it is being cultured in almost all the states of India. It is also being cultured all over the world viz. U.S.S.R., China, Europe, Japan, Indonesia, Thailand, Malayasia etc.

Remarks : It is now commonly used as food fish throughout the state, though moderately liked by the local consumers, a less costly fish and always found in live condition. The other three recognised 'varieties' of Common Carp are : (1) *Cyprinus carpio var. nudus* Bloch (popularly known as leather carp, is almost without scales except for a single row of somewhat degenerated scales along the base of the dorsal fin and sometimes extending as far as the tail or even from head to tail) (2) *Cyprinus carpio var. communis* (body fully covered by regularly arranged rows of scales; this is the original form, now extensively cultivated in the Far East and popularly known as 'scale carp') and (3) *Cyprinus carpio var. specularis* Lacepede (popularly known as 'mirror carp' with body covered unevenly with a few large and bright scales. A large part of the body is, however, naked. Extremely variable species.

Genus *Ctenopharyngodon* Steindachner, 1866

1866. *Ctenopharyngodon* Steindachner, *Ver. Zool. Bot. Ges. Wien*, 16, p. 782 (type, *Ctenopharyngodon laticeps* Steindachner by original designation).

39. *Ctenopharyngodon idella* (Valenciennes)⁺

1975. *Ctenopharyngodon idella*, Jhingran, *Fish and fisheries of India, Delhi : Hindustan Publishing Corporation*, pp. 708-717.

1985. *Ctenopharyngodon idellus*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, Occ. Paper No. 64, p. 60.

Local name : Ghesho Rui/Grass Carp.

D. 3/7; **A.** 3/8; **L.1.** 43/ [(6.5-7)/5] 45.

Diagnostic characters : Length of head 4 to 4.5 in total length, elongated body, broad head with short round snout, no barbel, round snout, upper jaw slightly longer than lower, subterminal mouth, dorsal rounded originating slightly in advance of the pelvic base, pelvic fins not reaching vent, anal fin rounded, lateral line running along the middle of the caudal peduncle, scales moderately sized.

Size : Maximum reported size 1.2m in length.

Distribution : Originally belong to China and U.S.S.R rivers. In India first brought from Hongkong in December, 1959 by C.I.F.R.I., Pond Culture Division, Cuttack, Orissa, for rearing. Now it is being cultured all over India, besides China, U.S.S.R., Japan, Vietnam, Thailand, Malayasia, Sri Lanka, Taiwan, Nepal, Burma, Hongkong, Philippines, Singapore, Israel, Hungary, Rumania, U.S.A and Australia.

Remarks : It is now regarded as one of the major popular carps of India. In West Bengal it is more or less liked (moderately) for fresh condition in the market and less price. A popular exotic fish

⁺ It is *Ctenopharyngodon idellus* according to A.G.K. Menon (1974, p.7).

found all over West Bengal next to Common Carps and Silver Carps. Not seen commonly in the local fish markets as the Common and Silver carps.

Colour : Dark grey back, silvery on the belly, all the fins dark, base of each scale dark brown.

Key to the species of genus *Labeo*

1. Lower lip separated from isthmus by a post labial groove, branched dorsal rays 12 to 18 2
Lower lip not separated from isthmus by a post labial groove, branched dorsal rays 8 to 10..... 5
2. Lateral line scales 71 to 84 *Labeo gonius*
Lateral line scales 40 to 44 3
3. Branched dorsal rays 12 to 15, no cartilaginous layer on the inner side of both jaws..... 4
Branched dorsal rays 12 to 13, lateral line scales 40 to 42, bluish or brownish above and silvery below *Labeo rohita*
4. Lateral line scales 40 to 44, blackish becoming lighter below..... *Labeo calbasu*
Lateral line scales 37 to 40, L.tr. scales 7/6-7, a tubercle inside lower jaw above symphysis 5
5. No horny covering inside lower jaw..... *Labeo bata*
A thin horny covering inside upper jaw 6
6. Snout grooved, lateral line scales 41 to 44..... *Labeo dero*
Snout not grooved, a thin layer of cartilage to inner surface of lower lip..... 7
7. Lateral line scales 37 to 39 *Labeo boga*
Lateral line scales 40 to 42, snout without groove and very much obtuse..... 8
8. Frontal area beset with pores, caudal deeply forked, very distinct lateral lobes, lips not fringed....
..... *Labeo pangusia*
No frontal pores, no lateral lobes, thick fringed lips with a prominent inner fold below and above..... 9
9. Lateral line scales 42 to 44 *Labeo nandina*
Lateral line scales 44 to 47, snout with pores, continuous fringed thick lips, lower jaw with a horny covering inside..... *Labeo fimbriatus*

Genus *Labeo* Cuvier, 1817

1817. *Labeo* Cuvier, *Range Animal.*, 2 ed. 1, p. 194 (type, *Cyprinus niloticus* Forskal).

**40. *Labeo rohita* (Hamilton)
(Fig. 26)**

1822. *Cyprinus rohita* Hamilton, *Fish. Ganges*, pp.301, 388, pl.36, fig 85 (type locality-Gangetic provinces).

1985. *Labeo rohita*, Sen, *Fish fauna of Assam and the neighbouring N.E.states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p.70, fig. 32.

Local name : Ruhi/Rahu.

D.3/12-13; P. 17; V. 9; C. 19; L.1. 40-42.

Diagnostic characters : Length of head 4.5 to 5 in total length, eyes 4 to 6 in head, dorsal profile more convex than the ventral, snout obtuse, depressed and without labial lobe; a thin, very short maxillary pair of barbels, caudal deeply forked, dorsal situated between caudal base and snout.

Colour : Brownish blue or reddish blue (appears apparently reddish dark) on the back, silvery sides and dull white belly. Colour varies according to its various habitats viz. tanks, ponds, beels, jheels, lakes, rivers. Scales on the sides often tinged with red. Fins pinkish.

Size : Grows to a meter length.

Distribution : Throughout India : Bangladesh, Pakistan, Burma. Found in Hooghly and Damodar river systems in West Bengal.

Remarks : It is one of the most esteemed major carps of India particularly in West Bengal for its taste, less bones and big size. Largely cultured and used for stocking tanks all over India more particularly in West Bengal. Though originally riverine in nature but can be easily reared in tanks, bheries, canals, and beels also. A popular game fish all over West Bengal, being a number one food fish.

41. *Labeo bata* (Hamilton) (Fig. 27)

1822. *Cyprinus bata* Hamilton, *Fish. Ganges*, pp. 283, 386 (type locality-rivers and ponds of Bengal).

1985. *Labeo bata*, Sen, *Fish fauna of Assam and the neighbouring N.E.states of India.*; *Rec. zool. Surv. India*, Occ. Paper No. 64, p.69, fig.31.

Local name : Bata.

D.2-3/9-10; P. 18; V. 9; A. 2/5; C. 19; L.1. 37-40.

Diagnostic characters : Length of head 5.5 in total length, eyes 4 to 4.3 in head, dorsal profile more convex than the ventral, a pair of very short maxillary barbels, continuous thin lips, a tubercle inside lower jaw above symphysis, dorsal origin nearer to snout than to caudal base, caudal deeply forked.

Colour : Silvery, dark dorsally, fins stained with orange; fine black dots on the fin. Young ones sometimes with 3 to 4 lateral black spots.

Size : Grows to 60.9cm in length.

Distribution : West Bengal, Assam, Orissa, M.P., Krishna and Godavari rivers in the South : Bangladesh. Found in Damodar river system in West Bengal.

Remarks : Most popular minor carp of high economic importance throughout West Bengal. A good eating fish liked very much by the local people in spite of its small size. Also cultured extensively in 'Bheries' and estuaries of the Sundarbans (can tolerate salinity to some extent). Matla river near Canning is a prominent landing centre of this fish.

42. *Labeo boga* (Hamilton)

1822. *Cyprinus boga* Hamilton, *Fish. Ganges*, pp.268, 386, Pl. 28, fig. 80 (type locality-Brahmaputra river).

1985. *Labeo boga*, Sen, *Fish fauna of Assam and the neighbouring N.E.states of India*; *Rec. zool. Surv. India*, Occ. Paper No. 64, p. 71.

Fig. 25

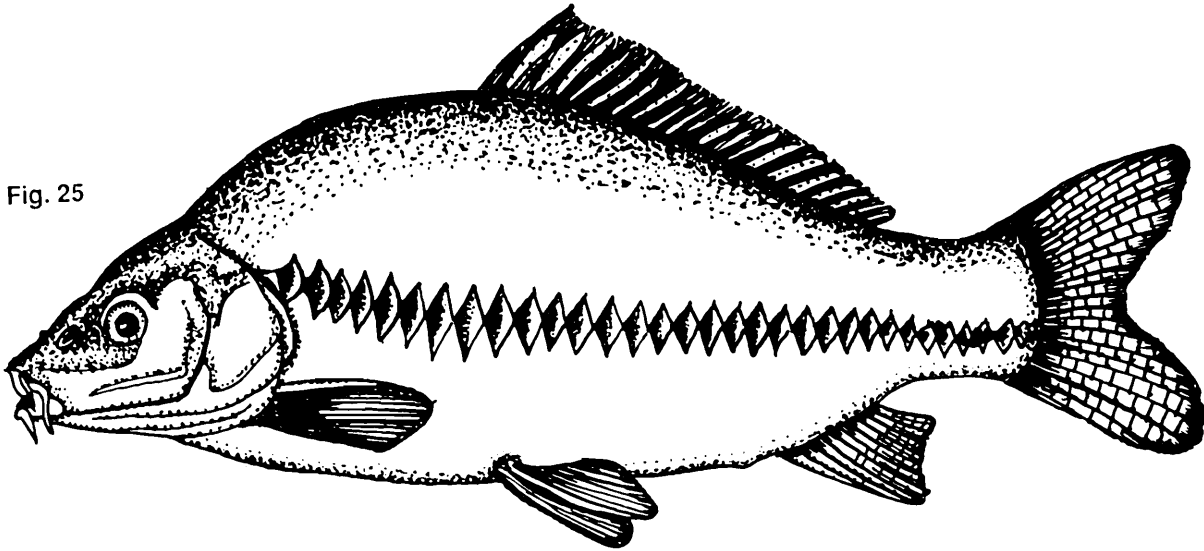


Fig. 26

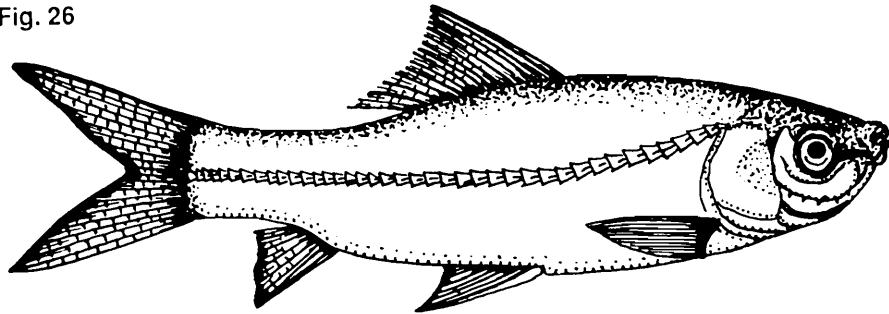


Fig. 27

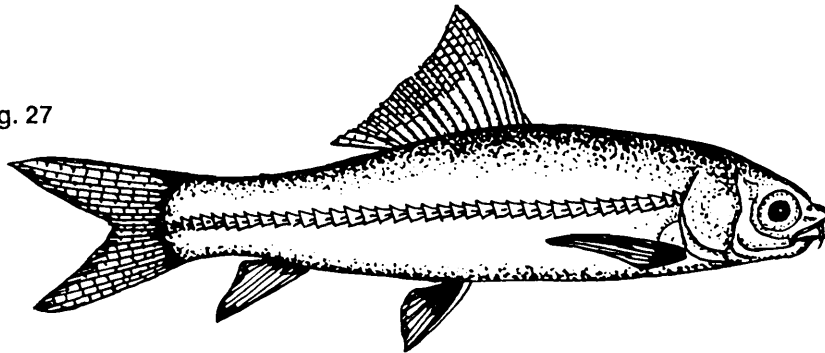


Fig. 28

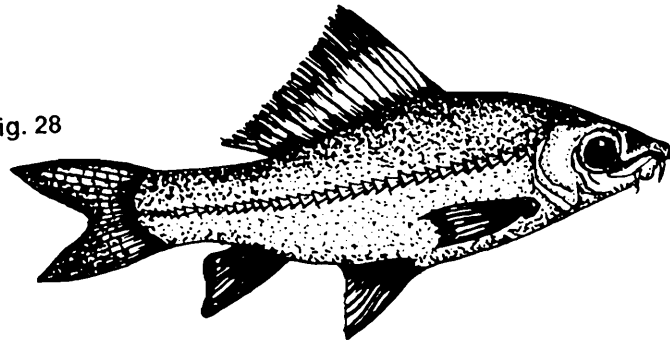


Fig. 25. *Cyprinus carpio carpio* (L.) – Popularly known as ‘Common carp.’; Fig. 26. *Labeo rohita* (Ham.); Fig. 27. *Labeo bata* (Ham.); Fig. 28. *Labeo calbasu* (Ham.).

Local name : Boga-Bata.

D.2-3/9-10; P. 16; V. 9; A. 2/5; C. 19; L.1. 37 to 39.

Diagnostic characters : Length of head 5.2 to 5.5 in total length, thick lips with a thin horny layer lining inside the lower jaw, snout without lateral lobes with a few large pores, two minute maxillary barbels, caudal deeply forked.

Colour : Dark along the back with silvery sides, coppery opercle, fin covered with black dots, caudal reddish.

Size : Grows to 34.4cm in length.

Distribution : Gangetic provinces, Punjab, U.P., Bihar, West Bengal (Darjeeling Dt.), Orissa, Madras : Bangladesh, Pakistan, Burma and Nepal. Found in Tista river system in West Bengal.

Remarks : Rarely seen in the Calcutta fish markets. Mostly transported to the local fish markets from N. Bengal regions (Darjeeling and Siliguri). An esteemed minor carp of economic importance.

43. *Labeo calbasu* (Hamilton)

(Fig. 28)

1822. *Cyprinus calbasu* Hamilton, *Fish. Ganges*, pp.297, 389 pl.2, fig 33 (type locality-Bengal).

1985. *Labeo calbasu*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India. Rec. zool. Surv. India*, Occ. Paper No. 64, p. 72, fig 33.

Local name : Kalbasu.

D. 3/13-15; P. 19; V. 9; A. 2/5; C. 19; L.1. 40-44.

Diagnostic characters : Length of head 5 to 6 in total length, eyes 4 to 5 in head, robust fish with both the dorsal and ventral profiles equally convex, mouth narrow, snout obtuse, depressed and without lateral lobe, 4 barbels, pores on the upper lip and snout, chin slopes away from mouth, caudal deeply forked.

Colour : Blackish or metallic grey all over the body, slightly lighter below, upper caudal lobes sometimes edged white, fins black.

Distribution : Throughout India : Bangladesh, Pakistan, Thailand and China. Found in Hooghly river system in West Bengal.

Remarks : A popular esteemed major carp of West Bengal, known for its sweet taste, has conspicuously a dull dead black colour all over the body.

44. *Labeo dero* (Hamilton)

(Fig. 29 a & b)

1822. *Cyprinus dero* Hamilton, *Fish. Ganges*, pp. 277, 371, 385, pl. 22, fig 78 (type locality-Brahmaputra river); P.

1985. *Labeo calbasu*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India. Rec. zool. Surv. India*, Occ. Paper No. 64, P. 74, figs. 35(a) and (b).

Local name : Katalkusi/Kursha.

D. 2-3/9-10; P. 17; V. 9; A. 2/5; L. 1. 41-44.

Diagnostic characters : Length of head 5 to 5.5 in total length, a slender form with more convex dorsal profile than the ventral, continuous lips, a horny layer to inside of lower jaw, snout deeply

grooved, covered with pores without lateral lobe (indistinctly present); a pair of short maxillary barbels.

Colour : Dark grey dorsally, silvery sides with fins grey with reddish tinge.

Size : Attains to 75cm in length.

Distribution : Freshwaters of West Bengal (Darjeeling Dt.), Assam, E.Himalayas, E.Punjab, U.P., W.Himalayas : Bangladesh, Pakistan, Burma, China. Found in Mahananda and Tista river systems in West Bengal.

Remarks : Very rarely found in West Bengal except a few specimens recorded by me in the Darjeeling fish market collected from Tista river. It is popularly known for its big size, availability and taste all over Assam.

45. *Labeo gonius* (Hamilton)

(Fig. 30)

1822. *Cyprinus gonius* Hamilton, *Fish. Ganges*, pp. 292, 387 (type locality-Bengal).

1985. *Labeo gonius*, Sen, *Fish fauna of Assam and the neighbouring N.E.states of India, Rec. zool. Surv. India, Occ. Paper No. 64, p. 73, fig. 34.*

Local name : Kurchi/Goni.

D. 2-3/13-14; P. 17; V. 9; A. 2/5; C. 19; L.1. 71-84.

Diagnostic characters : Length of head 5 to 5.5 in total length, eyes 4.5 to 5 in head, snout with prominent pores without lateral lobe, dorsal profile more convex than ventral, thick fringed lips, horny layer to inside of both jaws, 2 pairs of short barbels, dorsal origin nearer to snout than to caudal base, small scales, deeply forked caudal.

Colour : Greenish black dorsally and dull white on the sides and below, scales with dark margins giving impression of faint longitudinal lines.

Size : Attains to 1.52m in length.

Distribution : Freshwaters of Darjeeling Dt. of West Bengal, Assam, Bihar, U.P., as far as Krishna river in the south. Found in Mahananda and Tista river systems in West Bengal.

Remarks : Distinctly recognised on the spot itself for its faint longitudinal blackish lines, small scales and deeply forked caudal fin with sharply pointed lobes.

46. *Labeo pangusia* (Hamilton)

1822. *Cyprinus pangusia* Hamilton, *Fish. Ganges*, pp. 285, 386 (type locality-Koshi river).

1985. *Labeo pangusia*, Sen, *Fish fauna of Assam and the neighbouring N.E.states of India, Rec. zool. Surv. India, Occ. Paper No. 64, p.75.*

Local name : Utti.

D. 2/11; P. 15; V. 9; A. 2/5; C. 19; L.1. 40-42.

Diagnostic characters : Length of head 5.5 to 6 in total length, mouth with distinct lateral lobes, no groove across the narrow mouth, snout very much obtuse with pores above, a pair of short maxillary barbel inside the labial fold, deeply forked caudal fin.

Colour : Greenish green above, lighter on sides and below, fins sometimes tinged with red.

Size : Grows to 64cm in length (recorded).

Distribution : West Bengal, Assam : Bangladesh, Burma. Found in Mahananda river system in West Bengal.

Remarks : Mostly found in the Duars and Terai streams and rivers; otherwise, more or less confined to the Ganges and Brahmaputra drainage systems. Rarely seen in the plains all over West Bengal. A commercially important fish in North Bengal.

47. *Labeo fimbriatus* (Bloch)

1797. *Cyprinus fimbriatus*, Bloch, *Ichth.*, 12, p. 50, pl. 409 (type locality-Madras).

1962. *Labeo fimbriatus*, Misra, *An aid to commercial fishes, Rec. Indian Mus.*, 57(1-4), p.162.

D.3-4/15-18; P. 17; V. 9; A. 2/5; C. 19; L.1. 44-47.

Diagnostic characters : Length of head 6.2 to 6.5 in total length, eyes 3.7 to 4.5 in the length of head, dorsal profile more convex than the ventral, obtuse snout, overhung, swollen and beset with minute pores; no lateral lobe, a horny lining to the inside of both the jaws, 2 pairs of short rostral and maxillary barbels.

Colour : Silvery with blackish tinge, lighter on the sides and below; ventral, anal and lower caudal lobe stained with black, sometimes a diffused blackish blotch at the base of the caudal which is always present in the young forms.

Size : Attains to 45.5cm in length.

Distribution : West Bengal, Punjab, U.P., Orissa, Poona, M.P., S.India(except W.Ghat) : Nepal, Burma and Pakistan. Found in Hooghly river system in West Bengal.

Remarks : A good eating but bony minor carp of India lives in torrential rivers and streams. In West Bengal it is mostly found along the foot-hills of N. Bengal. Casually recorded in the plains.

48. *Labeo nandina* (Hamilton)

(Fig. 31)

1822. *Cyprinus nandina* Hamilton, *Fish. Ganges*, p. 300, pl. 8, fig. 84 (type locality-Mahananda R.).

1985. *Labeo nandia*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India, Rec. zool. Surv. India. Occ. Paper No. 64*, p. 75.

Local name : Nandi.

D.2-3/22-24; P. 15; V. 9; A. 2/5; C. 19; L.1. 42-44.

Diagnostic characters : Length of head 4.5 to 5 in total length, eyes 4.5 to 5 in the length of head, a stout fish with curved dorsal profile above the eyes, interorbital space flat, snout obtuse, slightly projecting beyond the jaws; no lateral lobe, fine pores on snout, lips thick and fringed with distinct lining (inner fold) above and below, 2 pairs of short barbels, dorsal fin midway between snout and caudal fin base, deeply forked caudal fin.

Colour : Dark greenish back becoming lighter on the sides and below, a few diffused blotches along the sides, some scattered scales are orange red at centres, iris red.

Size : Grows to 26cm in length.

Distribution : West Bengal, Assam : Bangladesh, Burma. Found in the Damodar and Hooghly river systems in West Bengal.

Remarks : A good eating minor carp of India, found to live in big rivers, distinctly spot identified for its curved (above the head) dorsal profile, reddish centres of many scattered scales (not marked in young forms).

Genus *Osteobrama* Heckel, 1842

1842. *Osteobrama* Heckel, *Ichth. Russegger's Reisen in Europe, Asian Und Africa*, 1, p. 1033 (type, *Cyprinus cotio* Ham.).

49. *Osteobrama cotio cotio* (Hamilton)
(Fig. 32)

1822. *Cyprinus cotio* Hamilton, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No. 64, p. 76, Fig. 36.

Local name : Mauwa/Chanda.

D. 3-4/8; P. 13; V. 10; A. 29-36 (2-3/27-33); C. 19; L.1, 55-70.

Diagnostic characters : Length of head 5.5 to 6 in total length, eyes 2.5 to 3 in the length of head, profile over nape concave, upper jaw slightly longer, no barbels, dorsal fin nearer to snout than to caudal fin base, dorsal spine weak and serrated, predorsal scales 24.

Colour : Silvery black back with a silvery (shinning when fresh) lateral band, sometimes a black blotch before the base of dorsal fin and another on the nape.

Size : Attains to 15.2 cm in length.

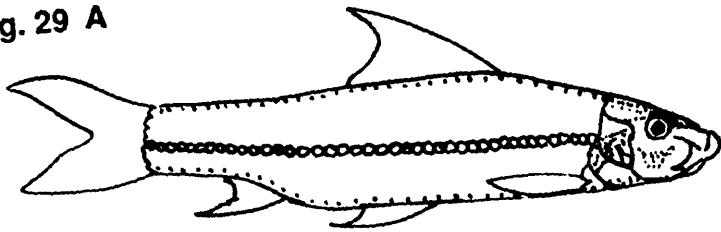
Distribution : All over India except Malabar and south of Krishna river : Bangladesh, Pakistan and Burma. Found in Hooghly river system in West Bengal.

Remarks : Found in plenty all over West Bengal specially during monsoon months; live in rivers, ponds, canals, road-side ditches, paddy-fields (during rains), as well as in swampy areas like beels, dried up marshy water bodies.

Key to the species of genus *Puntius*

1. Barbels absent 2
Barbels present 3
2. Lateral line scales 24 to 28, a black round spot on lateral line above caudal base (19 to 20 th scale), length of head 4.7 to 5 in T.L. *Puntius conchoni*
3. 2-pairs of barbels, lateral line scales 28-29 4
4. Length of head 5 to 5.2 in T.L. *Puntius dukai*
Length of head 4.5 in T.L., lateral line scales 23 to 26, a black spot at the base of dorsal fin... 5
5. Predorsal scales 8 to 9, a black spot at the caudal fin base *Puntius sophore*
Predorsal scales 10 to 12, lateral line scales 26 to 28, a dark blotch on lateral line (23 to 25th scale) 6
6. Length of head 4.5 to 4.7 in T.L. *Puntius chola*
Length of head 5 to 5.2 in T.L., deep body, no pores on snout 7
7. Lateral line scales 32 to 34, dorsal fin spine finely serrated *Puntius sarana sarana*
Lateral line scales 23 to 26, dorsal fin spine strongly serrated 8

Fig. 29 A



B

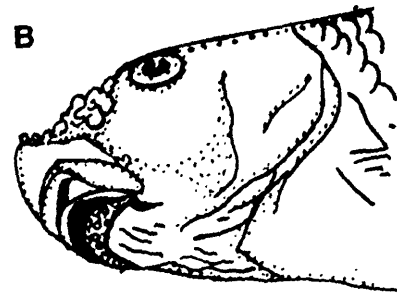


Fig. 30

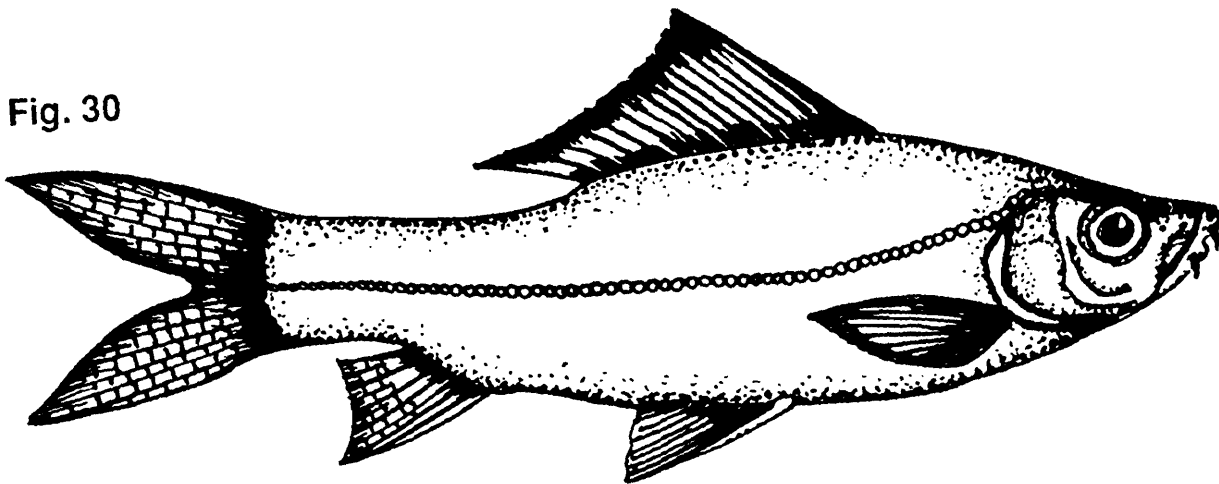


Fig. 31

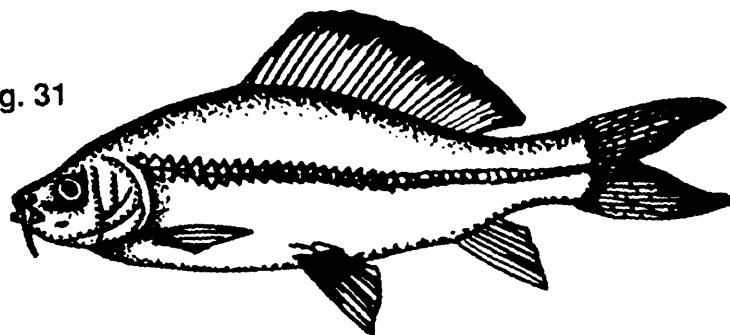


Fig. 32

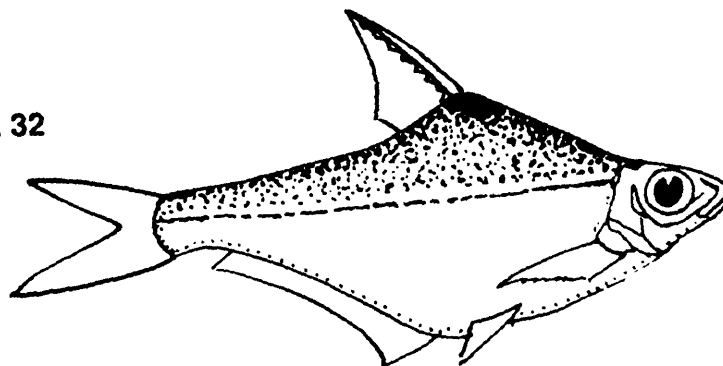


Fig. 29. (a) *Labeo dero* (Ham.) (b) Ventro-lateral view of head showing sharpness of lower jaw and papillated nature of inner surface of lower lip (deflected).; Fig. 30. *Labeo gonius* (Ham.); Fig. 31. *Labeo nandina* (Ham.); Fig. 32. *Osteobrama cotio cotio* (Ham.).

8. Lateral line ceases at 6 to 8 scales, length of head 5 in T.L., a large black spot behind the base of anal (18 to 21st scales on lateral line).....*Puntius ticto ticto*
Lateral line extends only up to 3rd or 4th scales from the gills, length of head 4 to 4.6 in T.L.. 9
9. Lateral line scales 20 to 23, 2 dark spots (elongated) on body, dorsal spine serrated.....
.....*Puntius phutunio*
Lateral line scales 23 to 24, a black band over the base of anal fin.....10
10. A silvery band along the sides, length of head 4.2 to 4.5 in T.L.....*Puntius gelius*
A large black blotch in the middle of the sides over the posterior extremity of anal fin, each scale with fine black spots11
11. Lateral line scales 22-23, length of head 4 to 4.5 in T.L., incomplete lateral line
.....*Puntius terio*
Lateral line scales 29 to 31, upper jaw longer, length of head 5 in T.L.....*Puntius guganio*

Genus *Puntius* Hamilton, 1822

1822. *Puntius* Hamilton, *Fish.Ganges*, pp. 310, 388 (type-Cyprinus sophore Ham.).

50. *Puntius conchoni* (Hamilton)

(Fig. 33)

1822. *Cyprinus conchoni* Hamilton, *Fish. Ganges*, pp. 317, 389 (type locality-Ponds of N.E. Bengal and in the river of Koshi and Ami).

1985. *Puntius conchoni*, Sen, *Fish fauna of Assam and the neighbouring N.E.states of India; Rec. zool. Surv. India*, Occ. Paper No. 64, p. 81.

Local name : Kanchan puthi.

D.3/8; P.11; V.9; A.2/5; C.19; L.1. 24-28.

Diagnostic characteres : Length of head 5 in total length, eyes 3 in the length of head, both the dorsal and ventral profiles equally convex, mild notch over the nape, no barbels, lateral line incomplete, dorsal fin with moderately strong serrated spine opposite to pelvid fin, predorsal scales 9.

Colours : Greenish grey dorsally becoming silvery on the sides, a large black blotch on the middle of the caudal peduncle (19-20 scales), fins orange coloured, dorsal fin tip tinged with black.

Size : Attains to 12.7cm in length.

Distribution : Assam, West Bengal, Orissa, Bihar, U.P., Pubjab, Decan : Bangladesh, Pakistan. Found in Hooghly river system in West Bengal.

Remarks : Found in plenty all over West Bengal particularly during monsoon periods; commonly found to live in tanks, beels, canals, paddy-fields (during rains), ponds, road-side ditches, rivers, small streams etc.

51. *Puntius chola* (Hamilton)

1882. *Cyprinus chola* Hamilton. *Fish. Ganges*, pp. 312, 389 (type locality-N.E. of Bengal).

1985. *Puntius chola*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India, Rec.zool.Surv.India*, Occ. Paper No. 64, p.84.

Local name : Kerrundi.

D. 3/8; P.15; V.9; A.2/5; C.19; L.1.26-28.

Diagnostic characteres : Length of head 4.5 to 4.7 in total length, narrow suborbital ring of bones, dorsal profile more convex than the ventral, dorsal fin origin midway between tip of snout and caudal fin base, a single pair of maxillary barbels, dorsal fin with osseous and smooth undivided rays, lateral line complete, predorsal scales 10 to 12.

Colour : Silvery, opercles shot with purple and gold (when extremely fresh); a dark blotch between 23rd and 25th scales, a dark mark (diffused black spot like) at the base of dorsal fin.

Size : Attains to 12.5cm in length.

Distribution : Throughout India. Sri Lanka, Pakistan and Burma. Found in Mahananda and Chemtu river system in West Bengal.

Remarks : Commonly seen in the ditches, tanks, canals, paddy-fields (during rains), streams and rivulets all over West Bengal, a dark mark is occasionally recorded behind the gill-opening.

52. *Puntius dukai* (Day)

1978. *Barbus dukai* Day, *Fishes of India*, pp.557, 564, pl. C × L111, fig.3.

1981. *Puntius dukai*, Jayaram, F.W. *Fishes of India*, Handbook No. 2, Calcutta, Z.S.I., p.200.

1982. '*Barbus dukai*' Sen and Jayaram, *The Mahseers of India : A review : zool. Surv. India, Occ. Paper No.39*, p.15.

Local name : Bhorkol/Buluk.

D.3-4/9; P.17; V.9; A.2/5; C.19; L.1.28-29.

Diagnostic characters : Length of head 5 to 5.2 in total length, a deeper form, eyes 3.5 in head length, presence of a double or triple row of even sized pores below the eye, 2-pairs of barbels, scales are comparatively bigger, deeply forked caudal.

Colour : Copper coloured (olive green) back rather than golden, including the eye; fins slate coloured instead of yellow, scales above the lateral line copper coloured at the edge and bronze-green at the base, scales below lateral line pale slate coloured.

Size : Attains to 13cm in length.

Distribution : N. Bengal (Tista river system).

Remarks : Confused with *Tor tor* due to 'its big sized scales, lateral line scales 28 to 29, colour, big size, sporting nature. The typical *Tor* character, the continuous lower labial fold is interrupted in this species'

53. *Puntius gelius* (Hamilton)

1822. *Cyprinus gelius* Hamilton, *Fish. Ganges*, pp. 320, 390 pl. 145, fig. 3 (type locality-N.E. part of Bengal).

1985. *Puntius gelius*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India : Rec.zoo.Surv.India, Occ. Paper No. 64*, p.84.

Local name : Gili-puthi.

D.2-3/8; P.15; V.9; A.3/5; C.19; L.1.23-24.

Diagnostic characters : Length of head 4.2 to 4.5 in total length, eye 2.5 in the length of head, dorsal profile more convex than the ventral, third suborbital bone broad, barbels absent, incomplete lateral line (ceasing after 5 or 6 scales), dorsal arises slightly in advance of the ventrals with osseous strong ray, deeply forked caudal fin.

Colour : Reddish brown, a black band on the tail (anterior to the base of caudal fin), dark blotches at the base of dorsal fin and below the head (anterior half of body), a black band at the base of anal fin.

Size : Attains to 5cm in length.

Distribution : West Bengal, Assam, Orissa and Bihar : Bangladesh, Pakistan. Found in Matla river system in West Bengal.

Remarks : Live in clear streams. 'Popularly known for eating its own eggs' (Sen, 1985). Due to its attractive coloured bands and small size it is used as an aquarium fish also. 'During courtship the male develops a red attractive courting costume and when the love making is over, it lays aside this gay attractive costume' (Sen, 1981, p.98).

54. *Puntius guganio* (Hamilton)

1822. *Cyprinus guganio* Hamilton, *Fish.Ganges*, pp.338, 339, 392 (type locality-Brahmaputra and Yamuna).

1985. *Puntius guganio*, Sen, *Fish fauna of Assam and the neighbouring N.E states of India: Rec.zool.Surv.India, Occ.Paper No.64*, p.79.

Local name : Gugani.

D. 2/8; P.12; V.9; A.7; L.1. 29-31.

Diagnostic characters : Length of head 5 in total length, eyes 3 in head length, small, oval and blunt head; small mouth, upper jaw longer, protruding; large eyes and situated far forwards on the sides of head, dorsal fin nearer to snout than to caudal fin base, incomplete lateral line.

Colour : Silvery, dotted back; a black band on the anterior half of the middle of body.

Size : Attains to 4cm in length.

Distribution : Gangetic provinces of West Bengal and Assam : Bangladesh. Found in Hooghly river system in West Bengal.

55. *Puntius phutunio* (Hamilton)

(Fig. 34)

1822. *Cuprinus phutunio* Hamilton, *Fish.Ganges*, pp.319, 390 (type locality-Northe East Bengal).

1985. *Puntius phutunio*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India, Rec.zool.Surv.India, Occ. Paper No.64*, p.80.

Local name : Phutuni-puthi.

D. 2-3/8; P.15; V.9; A.3/5; C.19; L.1.20-23.

Diagnostic characters : Length of head 4 to 4.6 in total, eyes 2.5 in the length of head, dorsal profile more convex than the ventral, small mouth, barbels absent, dorsal fin midway between snout and caudal fin base with osseous ray serrated, lateral line complete (up to 3 or 4 scales), predorsal scales 9.

Colour : Reddish brown with 2 black bands-one on the middle above caudal fin base and one below the head, a fading black band on the middle of dorsal fin, fins pale orange coloured.

Size : Grows to 7.5cm in length.

Distribution : West Bengal, Orissa, Assam : Bangladesh, Burma. Found in Panchenai river system in West Bengal.

Remarks : 'Popularly known as 'Dwarf Barb'. The sparkling silver glow or sheen of its scales is remarkable', 'very difficult to differentiate between male and female', 'phutuni means boasting in Bengali' (Sen, 1981, p.99).

56. *Puntius sophore* (Hamilton)

1822. *Cyptinus soph* Hamilton, *Fish.Ganges*, pp.310, 389, pl.19, fig.86 (type locality-ponds & rivers in the Gangetic provinces).

1985. *Puntius sophore*, Sen, *Fish fauna of Assam and the ighbouring N.E.states of India. Rec.zool.Surv.India*, Occ.Paper No.64, p.79.

Local name : Puthi (commonest species).

D.3/8-9; P.17; V.9; A.3/5; C.19; L.1.23-26.

Diagnostic characters : Length of head 5 in total length, eyes 3.5 to 4 in the length of head, dorsal profile more convex than the ventral profile, lateral line complete, barbels absent, predorsal scales 8-9, dorsal spine weak, entire.

Colour : Silver, often with a diffused spot at the caudal fin base, a smaller black spot close to the gill-opening, a dark diffused central spot at the base of dorsal fin, a scarlet lateral band often seen with fresh specimens, fins almost colourless.

Size : Grows to 12.7cm in length.

Distribution : Throughout India : Bangladesh, Burma, Nepal, Pakistan, S.China. Found in all the river systems in West Bengal.

Remarks : Most commonly scattered species all over West Bengal, found to live in road side ditches, tanks, beels, lakes, paddy-fields (during rains), rivers, rivulets, streams etc.

57. *Puntius sarana sarana* (Hamilton)

(Fig. 35)

1822. *Cyprinus sarana* Hamilton, *Fish.Ganges*, pp.307,388, (type locality-ponds and rivers of Bengal).

1985. *Puntius sarana sarana*, Sen, *Fish fauna of Assam and the neighbouring N.E.states of India, Rec.zool.Surv.India*, Occ.Paper No.64, p.79, fig.37.

Local name : Saral-puthi/Swarnaputhi.

D. 3/8; P.15; V.9; A.3/5; C.19; L.1.32-34.

Diagnostic characters : Length of head 5 to 5.2 in total length, eyes 4.2 to 4.7 in head length, dorsal profile more convex than the ventral, 2-pairs of barbels, interorbital space convex, no pores on the snout, dorsal commences slightly nearer to the snout than the caudal fin base, lateral line complete, dorsal spine finely serrated, predorsal scales 10 to 11.

Colour : Silvery, darkest dorsally; sometimes horizontal bands along the rows of scales in the upper half of the body, often a golden blotch on the opercle, greyish white fins.

Size : Attains to 30.4cm in length.

Distribution : Throughout India : Bangladesh, Burma, Sri Lanka, Thailand, Pakistan, S.China. Found in Hooghly, Mahananda and Damodar river system in West Bengal.

Remarks : Most popular species of economic importance all over West Bengal because of its comparatively big size (under this genus) and good oily taste. Lives in pools, lakes tanks, rivers, beels, streams, rivulets; can stand slight salinity.

58. *Puntius terio* (Hamilton)

1822. *Cyprinus terio* Hamilton, *Fish.Ganges*, pp.313, 389 (type locality-N.E.Bengal).

1985. *Puntius terio*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India. Rec. zool. Surv. India, Occ. Paper No.64*, p.85.

Local name : Teri-puthi.

D. 3/8; P.15; V.9; A.2/5; C.19; L.1.22-23.

Diagnostic characters : Length of head 4 to 4.5 in total length, eyes 2.7 in head length. body compressed, dorsally convex with a marked rise from snout to the base of dorsal fin, upper jaw slightly longer, barbels absent, dorsal arises slightly in advance of the ventral and situated midway between snout and base of caudal fin, its last undivided ray is osseous, entire, moderately strong; predorsal scales 9.

Colour : Silvery, greenish black along the back, each scale with numerous black dots anteriorly; two black blotches, one on the middle below anal fin and the other (indistinct) below the middle of the dorsal fin (mostly found in younger forms), fins yellowish orange.

Size : Attains to 7.5 to 10.0cm in length.

Distribution : West Bengal to Punjab, Assam, Orissa : Bangladesh, Pakistan.

Remarks : Popularly known as 'Terio Barb' 'The male during its mating turns to beautiful orange instead of red' (Sen, 1981, p.99). Also used as an aquarium minnow due to its attractive colours.

59. *Puntius ticto ticto* (Hamilton)

(Fig. 36)

1822. *Cyprinus ticto* Hamilton, *Fish.Ganges*, pp.314, pl. 8, fig.87 (type locality-S.E. Bengal).

1985. *Puntius ticto*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India. Rec. zool. Surv. India, Occ. Paper No.64*, p.82.

Local name : Tita-puthi.

D. 3/8; P.15; V.9; A.2/5; C.19; L.1. 23-26.

Diagnostic characters : Length of head 5 in total length, eyes 3 in head length, strongly compressed and elevated body, upper jaw slightly longer, dorsal ray strong, osseous, incomplete lateral line (ceasing after 6 or 8 scales), predorsal scales 11, caudal forked.

Colour : Silvery with 2 black lateral spots; 'during seasonal changes (March to September), this fish often develops bright red colour on the flanks and olive green on the back' (Sen, 1985, p.82). Colour changes take place in males during breeding season according to Dr. S. L. Hora.

Size : Attains to 10.2cm in length.

Distribution : Throughout India : Bangladesh, Burma, Pakistan, Thailand, Sri Lanka. Found in all the river systems in West Bengal.

Fig. 33

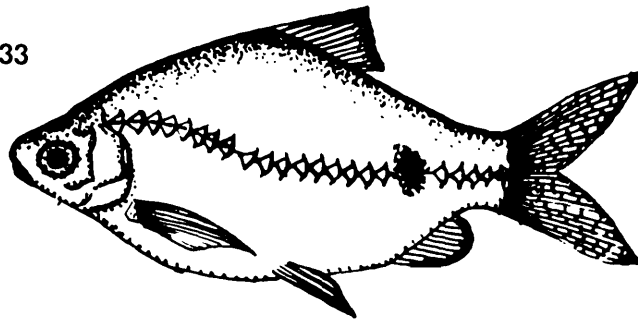


Fig. 34

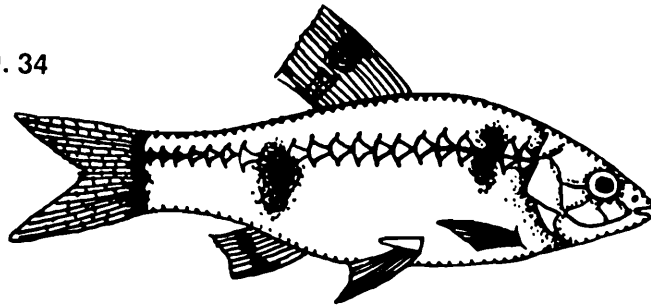


Fig. 35

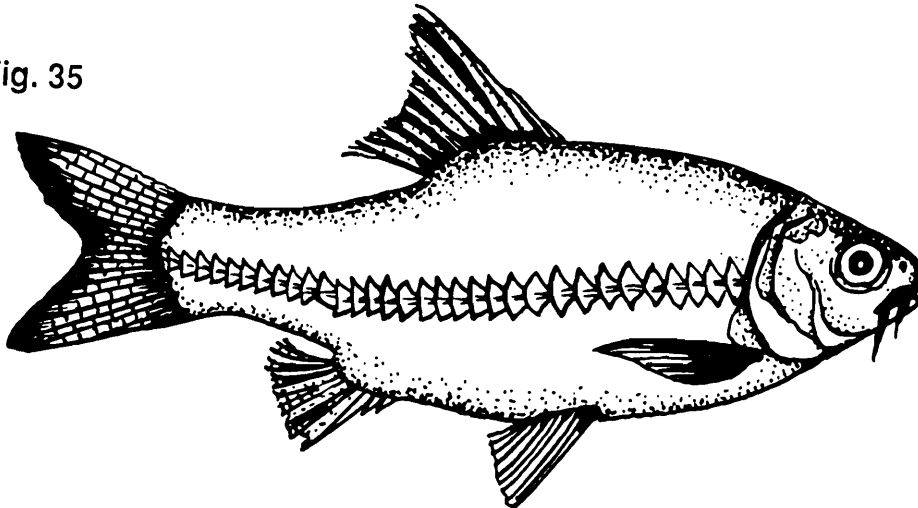


Fig. 36

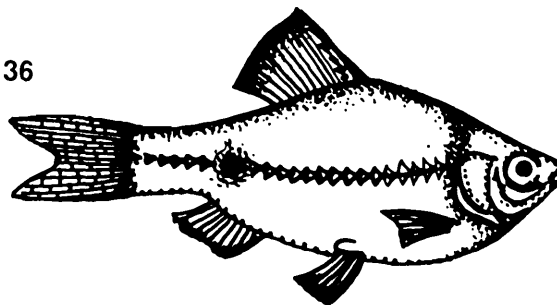


Fig. 33. *Puntius conchonioides* (Ham.); Fig. 34. *Puntius phutunio* (Ham.); Fig. 35. *Puntius sarana sarana* (Ham.); Fig. 36. *Puntius ticto ticto* (Ham.).

Remarks : One of the commonest, small and everywhere found species all over West Bengal. Not liked due to its slightly 'bitter' taste ('tita' = bitter). They offer brisk fishing in the village sides of West Bengal during monsoon season. Live in road-side ditches, tanks, beels, paddy-fields (during monsoon water-logging), rivulets, lakes, pools, streams etc.

Key to the species of genus *Tor*

Head length greater than depth of body, length of head 4 to 4.5 in T.L., lateral line scales 25 to 28.....*Tor putitora*

Head length shorter than depth of body, length of head 4.7 to 5.0. in T.L., lateral line scales 22 to 27*Tor tor*

Genus *Tor* Gray, 1834

1834. *Tor* Gray, *Ill.Ind.Zool.*, 2, pl.96 (type-*Cyprinus tor* Hamilton = *Tor hamiltoni* Gray).

60. *Tor tor* (Hamilton) (Fig. 37 & 38 a & b)

1822. *Cyprinus tor* Hamilton, *Fish. Ganges*, pp.305, 388 (type locality-Mahananda river).

1982. *Tor tor*, Sen & Jayaram, *The Mahseer fishes of India-A Review, Rec. zool. Surv. India, Occ. Paper No.39*, p.3, figs. 1 & 2.

1985. *Tor tor*, Sen, *Fish fauna of Assam and the neighbouring N.E.states of India, Rec. zool. Surv. India, Occ. Paper No.64*, p.89, fig.42.

Local name : Mahashol.

D. 3/9; P.19; V.9; A.2-3/5; L.1.22-27.

Diagnostic characters : Length of head 4.7 to 5.0 in total length, eyes 3.0 to 4.0 in head length, *fleshy thick lips with uninterrupted labial fold*, 2-pairs of barbels, dorsal profile more arched than ventral side, bigger scales, dorsal fin with smooth bony dorsal spine, opposite to pelvic origin; predorsal scales 9, caudal fin deeply forked.

Colour : Silvery green or greyish green dorsally with pinkish sides with gold above and light olive green below, lower fins reddish yellow.

Size : Grows to 1.5mt in length.

Distribution : All along the Himalayas, Punjab, Haryana, U.P., Bihar, West Bengal (Darjeeling Dt.), Assam, M.P. : Bangladesh, Pakistan, Burma and China. 'Ganga and Narmada are its principal habitats (Kulkarni, 1979). Found in Mahananda and Tista river systems in West Bengal.

Remarks : A Popular species of high esteemed economic importance; only casually recorded in the plains (imported from out side states) except N. Bengal. A popular game fish too noted for bigger scales, big barbels, uninterrupted labial fold.

61. *Tor putitora* (Hamilton) (Fig. 39)

1822. *Cyprinus putitora* Hamilton, *Fish.Ganges*, pp.303, 388 (type locality-Eastern parts of Bengal).

1982. *Tor putitora*, Sen & Jayaram, *The Mahseer fishes of India : A Review, Rec. zool.Surv. India, Occ. Paper No.39*, p.5, fig.3.

1985. *Tor tor*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, Rec. zool. Surv. India, Occ. Paper No.39, p.5, fig.3.

Local name : Mahashol.

D. 3/9; P.19; V.9; A.2-3/5; C.19; L.1.25-28.

Diagnostic characters : Length of head 4 to 4.5 in total length, eyes 3 to 5.3 in head length, head length comparatively bigger than body depth, 2-pairs of barbels, as long as eye; prominent adipose extension of lips, origin of dorsal fin midway between tip of snout and base of caudal, dorsal spine bony, strong but smooth; predorsal scales 9, bigger scales, thick lips with a continuous labial groove.

Colour : Usually greenish dorsally with light pinkish and silvery below, a broad light greyish blue or purplish lateral line found in live specimens, fins reddish yellow.

Size : Grows to 2.7m in length.

Distribution : All along the Himalayas, West Bengal (Darjeeling Dt.), U.P., Kashmir, Punjab, Assam, Orissa, Himalayas, Haryana, E. Himalayas : Nepal, Pakistan, Bangladesh. Found in Mahananda river system in West Bengal.

Remarks : A popular food fish of West Bengal of high economic importance. Casually seen in the Calcutta and vicinity bazars (imported from outside states) only. Noted for its bigger scales, bigger barbels, uninterrupted labial fold and sports.

Subfamily GARRINAE

Genus *Crossocheilus* van Hasselt, 1823

1823. *Crossocheilus* van Hasselt, *Algem.Konst.Letterbode*, 2.p.132 (type, *Crossocheilus oblongus* van Hasselt).

62. *Crossocheilus latius latius* (Hamilton)

1822. *Cyprinus latius* Hamilton, *Fish.Ganges*, pp.345 (type locality-Tista river).

1985. *Crossocheilus latius latius*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, Rec. zool. Surv. India, Occ. Paper No.64, p.56, fig.22.

Local name : Kala-bata.

D. 3/7-8; P.15; V.9; A.2/5; C.19; L.1.38-40.

Diagnostic characters : Length of head 6 to 6.5 in total length, eyes 3.5 to 5 in head length, dorsal profile more convex than ventral, mouth overhanging with a small lateral lobe, 2-pairs barbels, upper lip deeply indented on the edge, lower lip with a sharp horny covering, forked caudal.

Colour : Brownish or greenish olive back, lighter on sides and silvery beneath with irregular black spots.

Size : Grows to 15.2cm in length.

Distribution : All along the Eastern Himalayas, Assam, West Bengal, U.P., Bihar (northern areas) : Bangladesh, Burma. Found in Tista river system in West Bengal.

Remarks : Morphologically as well as in behavioural aspects it has got much similarities with *Garra* more particularly with *Garra annandalei* but can be distinguished by the characters viz., 1. head, length, 2. height of body, 3. distance from vent to caudal fin base and 4. height of caudal peduncle (Sen, 1985, p.57).

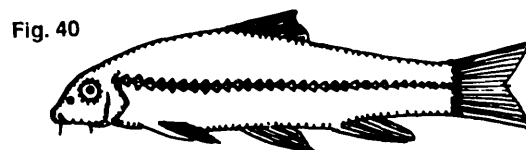
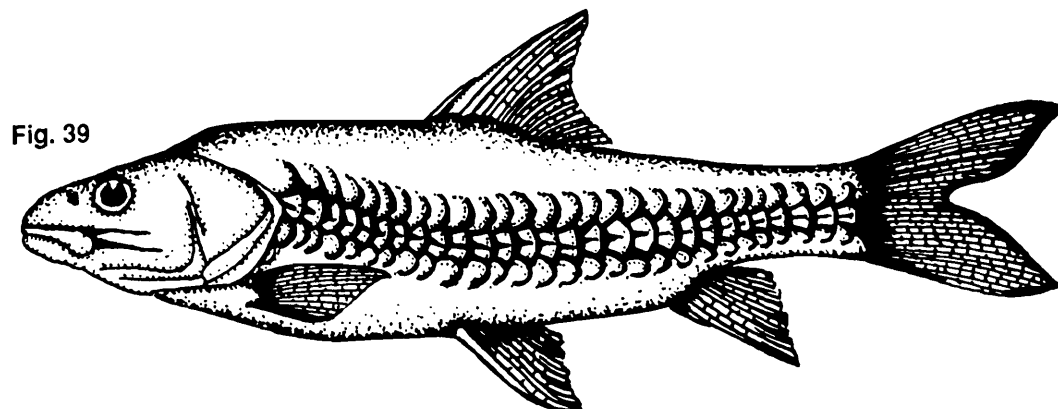
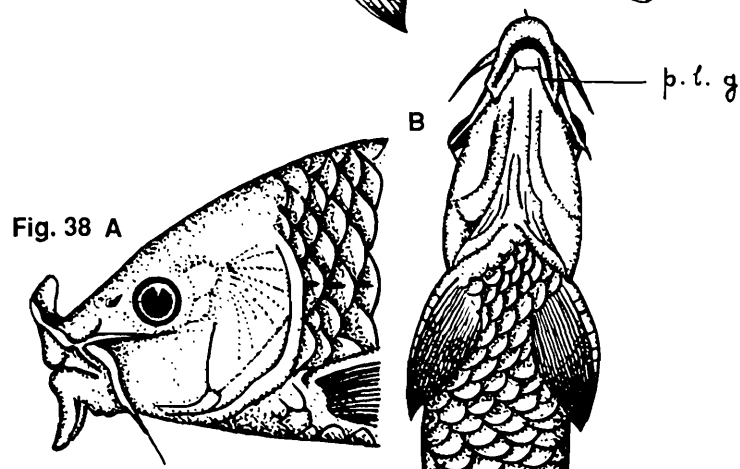
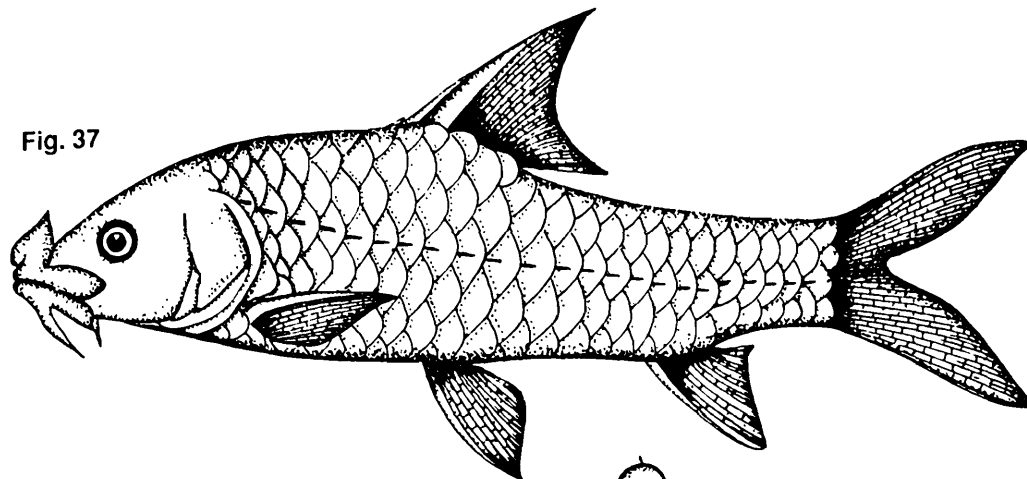


Fig. 37. *Tor tor* (Ham.) – Lateral view; Fig. 38. Oral features of Mahseer (a) Side view of head and forepart of body of a Mahseer, *Tor tor* (Ham.), showing hypertrophied tips extended (b) Ventral view of head and forepart of body of *Tor tor* (Ham.) showing continuous post labial groove (p.l.g.) and the enlarged lips with the median lobe of the lower lip; Fig. 39. *Tor putitora* (Ham.); Fig. 40. *Garra annandalei* (Hora).

Key to the species of genus *Garra*

1. Distance between vent to anal fin 3.7 to 4.0 in that between origins of pelvic and anal fins, caudal peduncle length 1.6 to 1.7 in T.L.....*Garra satyendranathi*
Distance between vent to anal fin 2.6 to 3.2 in that between origins of pelvic and anal fins, caudal peduncle length 1.0 to 1.4 in head length.....2
2. Lateral line scales 34 to 38*Garra annandalei*
Lateral line scales 32-34.....3
3. Snout covered with pores and with a well developed proboscis (formed due to the deep groove across it), length of head 5 to 5.5 in T.L.*Garra gotyla gotyla*
Snout with minute pores and without well developed probosis, lateral line scales 36.....4
4. Distance of vent from base of anal fin less than 4 times in that between anterior origin of anal and pelvic fins..... *Garra mullya*
Distance of vent from base of anal fin more than 4 times, snout either smooth or covered with a deep transverse depression, lateral line scales 32 to 36..... *Garra lamta*

Genus *Garra* Hamilton, 1822

1822. *Garra* Hamilton, *Fish.Ganges*, pp.343, 393 (type, *Cuprinus lamta* Hamilton).

63. *Garra annandalei* Hora
(Fig. 40)

1921. *Garra annandalei* Hora, *Rec.Indian Mus.*, p.657 (type locality-Mahanadi river below Darjeeling).

1938. *Garra annandalei*, Shaw and Shebbeare, *The fishes of Northern Bengal. J. roy. Asiat. Soc. Beng., Sci.*, Calcutta, 3, p.48.

1981. *Garra annandalei*, Jayaram, *F.W. Fishes of India*, Handbook No. 2, Calcutta, Z.S.I., p.135.

Local name : Choak-si/Ghor-poia.

D. 2/9; P.14; V.9; A.2/16; C.21; L.1.34-38.

Diagnostic characters : Length of head 6.0 in total length, eyes 4.5 in head length, elongated body, subcylindrical; semicircular mouth, inferior; a suctorial disc on the chin, 2-pairs of barbels (rostral and maxillary), both about the length of the orbit; no groove across the snout nor tubercles upon it, forked caudal.

Colour : Yellowish to coppery green, fins darker.

Size : Grows to 15.0 cm in total length.

Distribution : West Bengal (Darjeeling Dt.) and E.Nepal. Found in Mahananda river system in West Bengal.

Remarks : It has got much similarities with *Garra gotyla gotyla* but can be distinguished from it by the absence of groove across the snout and tubercles up on it.

64. *Garra gotyla gotyla* (Gray)
(Fig. 41)

1832. *Cyprinus gotyla* Gray. *Ill.Ind.Zool.*, *Hardwicke*, 2, pl.88, figs. 3,3a (type locality-Northern India).

1985. *Garra gotyla gotyla*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No. 64, p.64, fig.26.

Local name : Choak-si/Ghor-poia.

D. 2-3/8-9; P.15; V.9; A.2/5; C.17; L.1.32-34.

Diagnostic characters : Length of head 5 to 5.5 in total length, eyes 5 to 6 in head length, semicircular mouth, snout with a deep groove and covered with pores or conical tubercles, smaller eyes, mental disc broader than long, 2-pairs of barbels, dorsal origin in front of pelvic origin, caudal deeply forked.

Colour : Yellowish to coppery green or bluish grey above pale yellow below, fins darker. Sometimes a dark spot (found always present) behind gill-opening.

Size : Grows to 15.5cm in length.

Distribution : All along the Himalayas Viz, West Bengal (Darjeeling Dt.), Assam, Simla, (H.P.), Punjab, U.P., W.Himalayas : Bangladesh, Pakistan. Found in Tista, Mahananda and Darakeswar river systems in West Bengal.

Remarks : Live in hill-streams and torrential rivers. Most conspicuously characterised by a suction disc.

65. *Garra lamta* (Ham.)

(Fig. 42)

1822. *Cyprinus (Garra) lamta* Hamilton, *Fish.Ganges*, pp.343, 393 (type locality-Tinau river, Nepal).

1985. *Garra lamta*, Sen, *Fish, Fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p.62, fig.24.

Local name : Choak-si/Ghor-poia.

D. 2-3/8-9; P.15; V.9; A.2/5; C.17; L.1. 32-36.

Diagnostic characters : Length of head 5 to 5.5 in total length, eyes 5 to 8 in head length, fusiform body, laterally placed eyes slightly below the dorsal profile of head, almost invisible from below; short knob like proboscis in males but smooth without proboscis in females, tubercles on the snout sides, 2-pairs of barbels (longer in males), dorsal fin origin nearer to snout than to the caudal fin base, a scaly appendage near the base of pelvic fins in females, distinct mental disc, caudal slightly lobed, interorbital space convex.

Colour : Greenish with a bluish green band along the centre of the body and extending along the middle of the caudal fin, a dark spot behind the gill opening generally found.

Size : Grows to 20.2cm in total length.

Distribution : West Bengal (Darjeeling Dt.), Assam, Kumaon Himalayas, Sikkim : Nepal, Pakistan. Found in Kashai, Darakeswar, Mahananda and Tista river systems in West Bengal.

Remarks : A typical hill-stream fish conspicuously noted for its grooved proboscis.

66. *Garra mullya* (Sykes)

1841. *Chondrostoma mullya* Sykes, *Trans zool.Soc.*, Lond., 2, p.359 pl.62, fig.3 (type locality-Poona waterways).

1981. *Garra mullya*, Jayaram, *F.W. fishes of India*, Handbook No.2, Calcutta, Z.S.I., p.136.

Local name : Choak-si/Ghor-poia.

D. 2-3/8-9; P.15; V.9; A.2/5; C.17; L.1. 36

Diagnostic characters : Length of head 5 to 5.5 in total length, eyes 5 in head length, snout without well developed proboscis, dorsal profile more arched than ventral, dorsal origin slightly ahead of pelvic origin, 2-pairs of barbels, caudal almost truncate.

Colour : Olive green above, pale yellow below, fins darker (slightly).

Size : Grows to 12.7cm in total length.

Distribution : 'Throughout India except Assam and the Himalayas' (Jayaram,1981). Found in Mahananda and Tista river systems in West Bengal.

Remarks : *G. mullya* has got much similarities with *G. lamta* but can be distinguished from it by its sharply arched dorsal profile, absence of well developed proboscis, almost truncate caudal fin. A synonymised species with *G. lamta* (Menon, 1974, p.29) has been treated as a separate species by Jayaram (1981, pp.138.136).

67. *Garra satyendranathi* Ganguly & Datta

1973. *Garra satyendranathi* Ganguly and Datta, *Indian Biologist*, 5, pp.91-94, figs.1 & 2 (type locality-Subarnarekha river, Namkum, Bihar).

Local name : Ghor-poia/Choak-si.

D.2/8; P.11; V.1/7; A.2/5; C.19; L.1.34.

Diagnostic characters : Length of head 4 to 4.4 in standard length, snout entire, somewhat pointed with a few small tubercles, complete lateral line, proboscis absent, small eyes, length of suctorial disc 2.3-2.8 in the length of head and width of disc 1.6 to 1.7 in the width of head, cylindrical body, from tip of snout a gradual elevation up to origin of dorsal fin, dorsal fin nearer to end of snout than to caudal base, distance between vent to anal fin is 3.7 to 4 in that between anterior origins of ventral and anal fins, caudal almost truncate.

Colour : Dark grey above, pale along the sides and dull white below; a dark midlateral band along each side of body. A faint black spot on the supracleithral region and another on the caudal fin base.

Size : Maximum recorded length '83 mm' in total length (Holotype).

Distribution : Subarnarekha river, Nam kum, Bihar.

Remarks : This species has got close relationship with the members of the *Lamta* complex, and as such, included herewith for comparative studies sake though described from Bihar. Bihar being a bordering state of West Bengal has close geographical affinities with the *Lamta* complex of West Bengal.

Key to the species of genus *Psilorhynchus*

Eyes large, lateral in position; ventral surface behind pectoral base with scales.....
 *Psilorhynchus sucatio*

Eyes small, dorso-lateral in position; ventral surface behind pectoral base without scales or with irregularly distributed scales
 *Psilorhynchus balitora*

Family PSILORHYNCHIDAE

Genus *Psilorhynchus* McClelland, 1839

1839. *Psilorhynchus* McClelland, *Asiat. Res.*, 19, pp.300, 428 (type-Cyprinus balitora Ham.).

68. *Psilorhynchus balitora* (Hamilton)

1822. *Cyprinus balitora* Hamilton, *Fish.Ganges*, pp.348, 394 (type locality-rivers of N.E. Bengal).

1985. *Psilorhynchus balitora*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p.94.

Local name : Bali-tora.

D. 2/7-8; P.17; V.9; A.2/5; C.18; L.1.35.

Diagnostic characters : Length of head 5.2 in total length, eyes 4.2 in head length, head rounded, slightly depressed; back very much arched, a deep cleft extending from snout to the angle of mouth, thick lips, jaws with sharp edges without any horny covering, lips with round hard pores, some tiny pores on cheeks and snout; no barbels, pectorals and ventrals horizontal.

Colour : Reddish brown with irregular black spots forming complex bands, 3 bars on caudal fin.

Size : Grows to 6.2cm in total length.

Distribution : N. Bengal, Yamuna river in Delhi, R.Gomti. U.P., Assam : Bangladesh, Burma. Found in Mahananda and Tista river systems in West Bengal.

Remarks : Only found in the N.Bengal areas particularly in Darjeeling and Jalpaiguri districts.

69. *Psilorhynchus sucatio* (Hamilton)

(Fig. 43)

1822. *Cyprinus sucatio* Hamilton, *Fish.Ganges*, pp.347, 393 (type locality-rivers of N.Bengal).

1985. *Psilorhynchus sucatio*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p.95, fig.46.

Local name : Chepti.

D. 2/7-8; P.4/9-10; V.2/7-8; A.2/5; L.1.35-38.

Diagnostic characters : Length of head 6 in total length, eyes 3 in the length of head, depressed and spatulate, dorsal origin much nearer to the end of the tip of snout than to the ventrals, depth of body 5.5 in total length, caudal fin deeply forked, upper lobe slightly longer, pointed; paired fins horizontal, large eyes, spindle shaped body.

Colour : Light brown with scattered black spots or blotches above and below the lateral line. Sometimes greenish with scattered dots on the sides forming clouds, whitish below.

Size : Grows to 8.0cm in total length.

Distribution : West Bengal (Darjeeling Dt.), Assam : Bangladesh.

Remarks : Found to live in rapids, torrential rivers, hill-stream nullahs.

Key to the species of genus *Noemacheilus**

1. Length of head 6 to 6.2 in T. L., strongly developed nasal barbels.....2
- Length of head 5.5 in T. L., moderately developed nasal barbels.....3

2. 14 to 16 brown vertical bands wider than the inter spaces between them, a strongly built little fish *Noemacheilus rupicola inglisi*
3. 12-17 brown vertical bands, moderately built fish.....4
4. Caudal fin square or faintly lobed, a wide dark band across the caudal fin base
..... *Noemacheilus rupicola rupicola*
Caudal fin distinctly forked, 3-pairs of distinct barbels.....5
5. Length of head 5 in T.L., 7-9 vertical brown bands wider than the inter spaces between them
..... *Noemacheilus beavani*
Length of head 4.5 in T.L., irregularly blotched, a strongly built fish6
6. Caudal not distinctly forked..... *Noemacheilus botia botia*
Caudal distinctly forked, dorsal and caudal fins banded7
7. 13 blotches or bands along the sides, length of head 5.5 in T.L..... *Noemacheilus corica*
7-9 dark brown vertical bands wider than the inter spaces between them, a deep black spot or short bar at the base of caudal fin8
8. Length of head 5 in T.L. *Noemacheilus devdevi*
Length of head 4.5 to 5.5 in T. L., a slender little fish pointed at both ends, caudal fin marked at the base.....9
9. 9-10 dark brown vertical bands wider than the interspaces between them, paired fins horizontal and fan shaped *Noemacheilus savona*
7-17 or numerous brown vertical bands, caudal slightly lobed, dorsal and caudal fins with many rows of spots 10
10. Length of head 5 in T. L. *Noemacheilus multifasciatus*
Length of head 5.5 in T. L., more pointed snout, a black spot at the base of the first ray of dorsal fin..... 11
11. 9-12 vertical brown bands, caudal fin square-cut or slightly lobed *Noemacheilus scaturigina*
15 vertical brown bands..... 12
12. Caudal fin forked..... *Noemacheilus zonatus*
Caudal fin slightly lobed, faint indications of colour bands..... *Noemacheilus shebbeare*

Note – *Genus *Noemacheilus* belongs to family Homalopteridae according to latest revisionary works by Dr. A.G.K. Menon on Cobitoidea fishes (1987).

Family HOMALOPTERIDAE
Subfamily NOEMACHEILINAE

Genus *Noemacheilus* van Hasselt, 1823

1823. *Noemacheilus* van Hasselt, *Alg.Konst.Letterbode*, 2 (35),p.133 (type-*Noemacheilus fasciatus* van Hasselt).

* Menon, A.G.K. (1987). The fauna of India and the adjacent countries, Pisces, vol. IV. Cobitoidea : Homalopteridae. Fauna of India series. pp. 1-259, figs. 112, pls. XVI.

Fig. 41

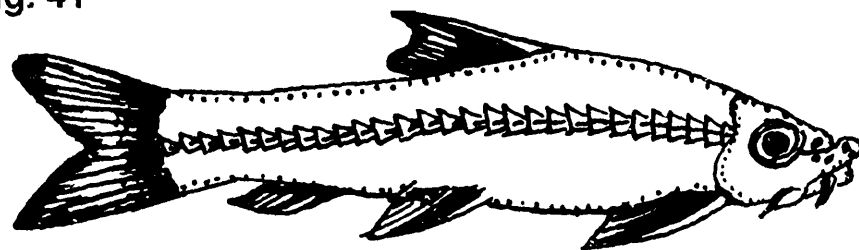


Fig. 42

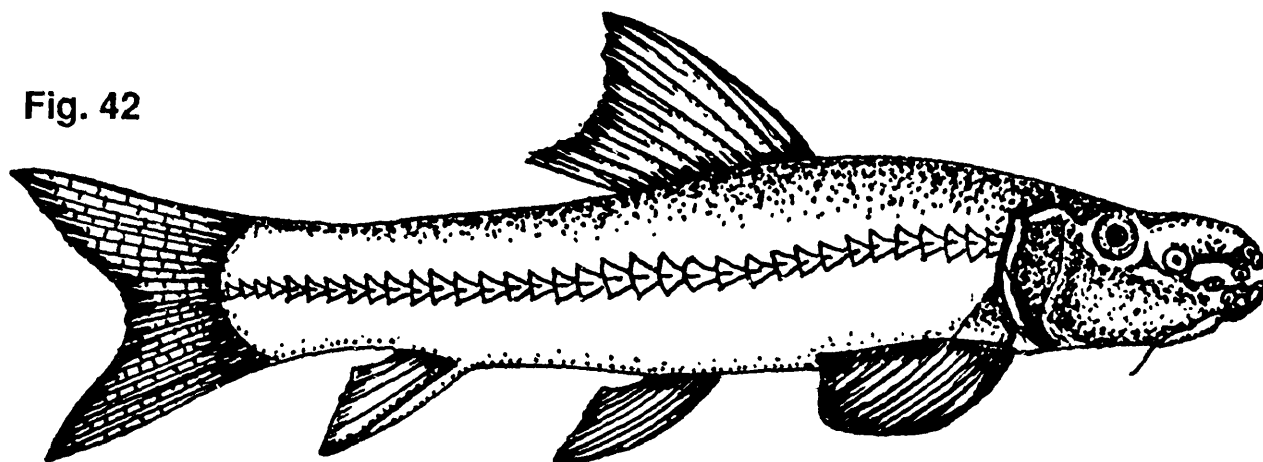


Fig. 43

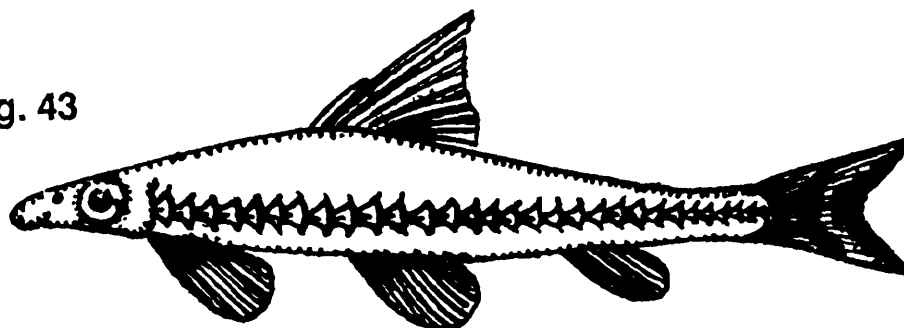


Fig. 44

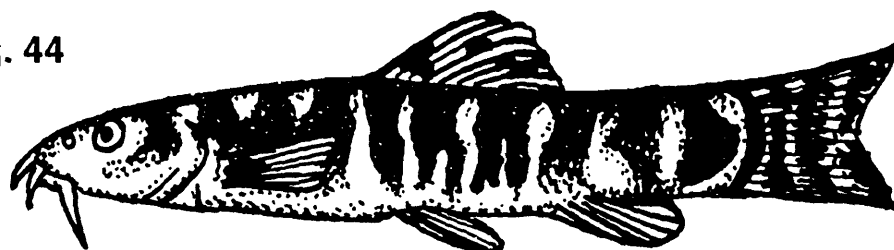


Fig. 41. *Garra gotyla gotyla* (Gray); Fig. 42. *Garra lamta* (Ham.); Fig. 43. *Psilorhynchus sucatio* (Ham.); Fig. 44. *Noemacheilus beavani* (Gunther).

**70. *Noemacheilus beavani* Gunther
(Fig. 44)**

1868. *Noemacheilus beavani* Gunther, *Cat.Fish.Brit.Mus.*, 7.p.350 (type locality-R.Koshi).

1985. *Noemacheilus beavani*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p.117, fig.60.

Local name : Bibhan-Khorkey.

D. 2/8; P.11; V.7; A.2/5; C.19.

Diagnostic characters : Length of head 5 in total length, eyes 4.3 in head length, small eyes, body elongated, 3-pairs of barbels, caudal fin distinctly lobed, dorsal with an oblique upper edge slightly nearer to the snout end, minute scales, preorbital not enlarged.

Colour : Body with 9 dark cross-bands, broader than the lighter interspaces; dorsal and caudal rays with blackish dots.

Size : Grows to 6.5cm in total length.

Distribution : West Bengal (Darjeeling), Assam, E.Himalayas, U.P., Meghalaya (Garo Hills): Nepal. Found in Mahananda and Tista river systems in West Bengal.

Remarks : Mostly found confined in small streams and ditches at the foot of the hills.

**71. *Noemacheilus botia botia* (Hamilton)
(Fig. 45)**

1822. *Cobitis botia* Hamilton, *Fish.Ganges*, pp.350, 394 (type locality-rivers of N.E. parts of Bengal).

1981. *Noemacheilus botia botia*, Jayaram, *F.W. fishes of India*, Handbook No.2, Z.S.I.p.153.

Local name : Khorkey-bata/Kharika-bata.

D. 2/10-12; P.11; V.8; A.2/5; C.17.

Diagnostic characters : Length of head 4.5 to 5.5 in total length, eyes 3.7 in head length, long barbels-the maxillary pair reaching to below the posterior edge of the eye, dorsal origin nearer to the snout end than to the caudal fin base, pectoral as long as head, caudal slightly notched, complete lateral line, distinct scales.

Colour : Greyish with 10 to 14 short bars on the lateral line and a number of irregular blotches forming bands over the back, dorsal fin orange tinged with rows of black spots, caudal with about 7 shaped bars.

Size : Grows to 7.5cm in total length.

Distribution : West Bengal (Darjeelig Dt. - Terai and Duars), Assam and all over N. India: Nepal, Burma, Pakistan, Bangladesh, Sri Lanka. Found in Mahananda and Tista river systems in West Bengal.

72. *Noemacheilus corica* (Hamilton)

1822. *Cobitis corica* Hamilton, *Fish.Ganges*, pp.359, 395 (type locality-R.Koshi).

1985. *Noemacheilus corica*, .Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p.116.

Local name : Khorika/Khorkey.

D. 2/8; P.13; V.8.A.2/5; C.17.

Diagnostic characters : Length of head 5.5 in total length, eyes 2 in the length of head, small; 3rd and 4th pectoral rays produced reaching the base of the ventral fin, origin of dorsal nearer to the snout end and anterior to the pelvics, scales visible in the posterior half of the body, eyes placed in the middle of head, caudal forked.

Colour : Bluish with about 13 black blotches along the middle of the side with smaller ones above and descending between the bigger blotches, usually a silvery band along the middle of the body.

Size : Largest recorded length being 9.8cm.

Distribution : West Bengal (Darjeeling Dt.), E. Himalayas; Assam.

Remarks : Live in the small hill-streams, foot-hills, ditches etc.

73. *Noemacheilus devdevi* Hora (Fig. 46)

1878. *Noemacheilus montanus* Day, *Fish.India*, p.661 (type locality-Himalayas).

1935. *Noemacheilus devdevi* Hora, *Rec.Indian Mus.*, 37, p.54, pl.3, figs. 5 & 6 (type locality Darjeeling and Sikkim Himalayas).

1981. *Noemacheilus devdevi*, Jayaram, *F.W. fishes of India*, Handbook No.2, Z.S.I., Calcutta, p.154.

Local name : Khorika/Khorkey.

D. 2/8; P.13; V.8; A.2/5; C.17.

Diagnostic characters : Length of head 5.5 in total length, eyes 6 in head length, a slender fish, upper profile slightly arched (dorsal profile between tip of snout and base of dorsal fin), ventral profile straight, indistinct scales embedded in the skins, pelvic fins bear a well developed appendix, axil, caudal furcate type.

Colour : Yellowish base with 7 to 9 brown bands which are narrow between them.

Size : Largest reported specimen being 8.7cm in total length.

Distribution : A small stream below Darjeeling, E.Himalayas.

Remarks : Live in small streams at the foot of hills below hills.

74. *Noemacheilus multifasciatus* C (Fig. 47)

1878. *Noemacheilus multifasciatus* Day, *Fish.India*, p.661 (type locality-Darjeeling).

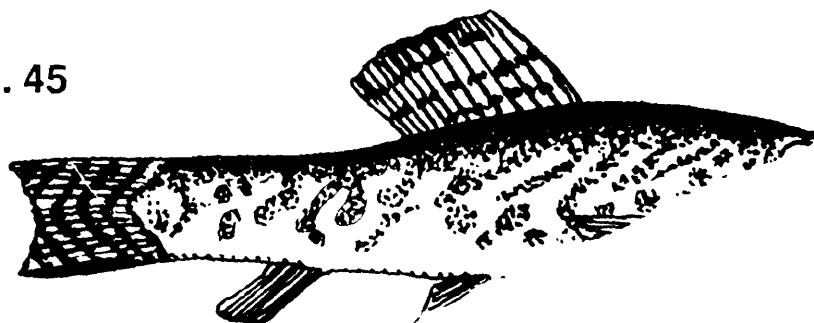
1985. *Noemacheilus multifasciatus*, Sen, *Fish fauna of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p.154.

Local name : Khorkey/Kharika.

D. 2/8; P.11; V.9; A.2/5; C.18.

Diagnostic characters : Length of head 5.5 in total length, compressed snout with narrow mouth, 3 pairs of barbels, origin of dorsal fin midway between snout tip and caudal fin base, complete lateral line, caudal slightly forked, scales small most prominent in the last half of the body.

Fig. 45



Fig

Fig. 45. *Noemacheilus* ...
Noemacheilus multifasciatus (Day); Fig. 48. *Noemacheilus* ...

Colour : Vertical bands as wide as the ground colour pass from back to the lower margin of the ventral side, numerous small bands in between the head and base of dorsal fin, a dark band at the base of caudal, dark marks on head radiating from eye, yellowish fins dorsal and caudal with 4 spotted bands.

Size : Grows to 8.3cm in total length.

Distribution : West Bengal (Darjeeling Dt.), Assam.

Remarks : Day's specimens in British Museum studied by Hora(1935) are with 'incomplete' lateral line. This species has got close similarities with *N.dayi* (N.W.provinces) but can be distinguished readily by the narrow and yellowish inter spaces in *N.dayi* compared to the wide and pale inter spaces in *N. multifasciatus*.

**75. *Noemacheilus rupicola rupicola* (McClelland)
(Fig. 48)**

1935. *Noemacheilus rupicola* Hora, *Rec.Indian Mus.*, 37,p.400 (type locality-mountain streams of Simla).

1974. *Noemacheilus rupicola rupicola*, Menon, *A check-list of the Himalayan and Indo-Gangetic plains fishes.*, Spl.Pub. (1), *J.Ind.Fish.Soc.India*, p.56.

1985. *Noemacheilus rupicola rupicola*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p.123.

Local name : Rupali-Khorkey.

D. 2-3/7-8; P.10; V.8; A.2/5; C.18.

Diagnostic characters : Length of head 5.5 in total length, eyes 7 to 7.5 in head length, minute in the middle of head; transverse mouth, snout obtuse in the adult, head nearly as wide as long, upper margin of dorsal oblique, it commences midway between nostrils and base of caudal fin; complete lateral line, caudal emarginate type.

Colour : Yellowish with 12 to 17 vertical brown bars or bands, a wide dark band across the caudal fin base, rows of black spots on the dorsal and caudal fin.

Size : Largest specimen recorded 10.2cm in total length.

Distribution : West Bengal (Darjeeling Dt.), Assam, Nagaland (Naga Hills), all along the Himalayas foot-hills : Nepal. Found in Tista river system in West Bengal.

Remarks : Hora (1935, p.58) described a new species *N. r. inglisi* distinguishing it from this species chiefly on the basis of more strongly developed nasal barbels, position and structure of paired fins with adhesive pads on the under surface (an indication for life in rapids).

**76. *Noemacheilus rupicola inglisi* Hora
(Fig. 49)**

1935. *Noemacheilus rupicola inglisi* Hora, *Rec.Indian Mus.*, 37, p.58 (type locality-Eastern Himalayan rivers below Darjeeling and Sikkim).

1985. *Noemacheilus rupicola inglisi*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p.124, fig.67.

Local name : Khorkey/Kharika.

D. 2/7; P.12; V.8; A.1/5; C.16.

Diagnostic characters : Length of head 4.5 to 5.1 in standard length, eyes 6 in head length, a stout, elongated fish with dorsal profile slightly arched, horizontally placed paired fins with adhesive pads on the under surface, strongly developed nasal barbels, roughly cylindrical in front, head short and broad, semicircular horizontal mouth with fleshy lips, barbels longer than eye diameter, small indistinct scales, caudal square or truncate.

Colour : Yellowish with 14 to 16 brown transverse belts, a black spot generally present on the anterior part of dorsal fin, dorsal and caudal fins with short dark stripes.

Size : Largest specimen recorded being 8.4cm in total length.

Distribution : West Bengal (Darjeeling Dt.), E.Himalayas, Assam-Himalayas and Sikkim. Found in Tista river system in West Bengal.

Remarks : It has got distinctly developed nasal barbels, smaller fins with pads on the outer rays on the under surface.

77. *Noemacheilus savona* (Hamilton)

(Fig. 50)

1822. *Cobitis savona* Hamilton, *Fish.Ganges*, pp.357, 394 (type locality-R.Koshi).

1885. *Noemacheilus savona*, Jayaram, *F.W. fishes of India*, Handbook No.2, Z.S.I., Calcutta, p.157.

Local name : Savon-khorkey.

D. 2-3/8; P.10; V.7; A.2/5; C.18.

Diagnostic characters : Length of head 4.5 to 5.5 in total length, eyes large, 2 diameters from the end of snout; head as broad as it is long without the snout, long barbels, dorsal origin between the anterior edge of orbit and base of caudal fin, before the origin of ventrals; caudal slightly emarginate, rounded lobes; incomplete lateral line, small scales most distinct in the posterior region.

Colour : Purplish with lighter abdomen, 10 to 12 narrow white bands, a black band at the base of the caudal fin, caudal with broken bands, 2 bands on the ventral and anal fins.

Size : Largest recorded length being 62mm.

Distribution : Eastern sub-Himalayan region. Found in Tista river system in West Bengal.

Remarks : A slender looking small fish with both ends pointed; fan-shaped paired fins. Live in clear streams.

78. *Noemacheilus scaturigina* (McClelland)

(Fig. 51)

1839. *Cobitis (Schistura) scaturigina* McClelland, *Asiat.Res.*, 19, pp.308, pl.53, fig.6 (type locality-Assam).

1985. *Noemacheilus scaturigina*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p.125.

Local name : Khorkey/Kharika.

D. 2/7; P.10; V.8; A.2/5; C.19.

Diagnostic characters : Length of head 4.2 to 5.5 in total length, eyes 4 to 5.4 in head length, a distinctly slender fish with a pointed snout, small mouth, semicircular, bordered by fleshy lips; sharp

lower jaw-shovel like; lateral line complete, inconspicuous scales, embedded in the skin (hinder part mostly); caudal slightly lobed.

Colour : Yellowish with 9 to 12 transverse brown bands, a black spot at the base of the first ray of the dorsal fin, a black band at the base of caudal fin, V-shaped stripes on the caudal fin.

Size : Largest recorded length being 5.5cm.

Distribution : E.Himalayas, Assam, Meghalaya, U.P. : Nepal. Found in Tista river system in West Bengal.

Remarks : Live in hill-streams beset with rock boulders and pebbles.

79. *Noemacheilus shebbearei* Hora

1935. *Noemacheilus shebbearei* Hora, *Rec.Indian Mus.*, 37, p.52, pl.3, figs.1 & 2 (type locality-rivers below Darjeeling).

1974. *Noemacheilus shebbearei*, Menon, *A check-list of the Himalayan and Indo-Gangetic plains fishes*, *J.Indl.Fish.Soc.India*, Spl. Pub. (1), p.58.

Local name : Khorkey/Kharika.

D.2/8; P/10; V.8; A.1/6; C.18.

Diagnostic characters : Length of head 5 in total length, body low with long and pointed head, dorsal profile arched, ventral straight; flattened belly, a bony sub-orbital spine below the anterior border of the eye, dorsal origin midway between tip of snout and caudal fin base, distinct barbels, caudal slightly lobed.

Colour : Dull black back and sides, pale olivaceous beneath; faint indications of colour bands.

Size : Grows to 5.0cm in length.

Distribution : N.Bengal (Darjeeling Dt.). Found in Tista river system in West Bengal.

Remarks : Live in clear streams. Barbels very much distinct (3-pairs). 'In general appearance this fish resembles *Homaloptera bilineata* or *H.modesta*' (Shaw & Shebbearei, 1937, p.77).

80. *Noemacheilus zonatus* (McClelland)

1839. *Schistura zonatus* McClelland, *Asiat. Res.*, 19, pp.308, 441, pl. 53, fig.1 (type locality-Upper Assam).

1985. *Noemacheilus zonatus*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p.124.

Local name : Mugah.

D. 2/7; P.11; V.8; A.2/5-6; C.17; L.1.110.

Diagnostic characters : Length of head 5 in total length, diameter of eye 1/5 of head length, compressed sides with pointed snout, barbels as long as eye, small but distinct scales, 12 rows of scales above lateral line and 13 rows from it to the base of ventral, caudal forked.

Colour : Yellowish with greenish tinge, about 15 dark brown bands or zones pass across the back and descend on either side below the lateral line, a few near the head, black marks on ventrals, pectorals and caudals spotted, rostral barbels orange.

Size : Largest recorded length being 6.0cm.

Distribution : West Bengal (Darjeeling Dt.), Yamuna and Ganga river systems in Bihar, Assam, Orissa : Bangladesh.

Key to the species of genus *Aborichthys*

The snout is a little shorter than the post orbital part of the head, 7 branched rays in the dorsal fin.....*Aborichthys kempi*

The snout is not shorter than the post orbital part of the head, almost equal to the post orbital part of head; 6 branched rays in the dorsal fin.....*Aborichthys elongatus*

Genus *Aborichthys* Chaudhuri, 1913

1913. *Aborichthys* Chaudhuri, *Rec.Indian Mus.*, 8, p.244 (type-*Aborichthys kempi* Chaudhuri).

**81. *Aborichthys elongatus* Hora
(Fig. 52)**

1921. *Aborichthys elongatus* Hora, *Rec.Indian Mus.*, 22, p.735 (type locality-Darjeeling-Himalayas).

1985. *Aborichthys elongatus*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p.105, fig.50.

Local name : Langai.

D. 2/6; P.10; A.2/5; C.19.

Diagnostic characters : Length of head 6 to 6.7 in total length, both the dorsal and ventral profiles almost straight and horizontal from behind the pectoral to the caudal fin base, mouth on the undersurface and bordered with thick lips, lower lip interrupted in the middle, dorsal in between tip of snout and caudal fin base, body very much elongated, cylindrical, laterally compressed; free caudal fin.

Colour : Dusky dull upper surface and sides, dull white below, body marked with alternating broad and narrow bands of yellowish orange colour forming almost complete rings on dorsal and ventral sides with slight interruptions, a black ocellus on the caudal fin base.

Size : Largest recorded specimen being 95mm in length (Hora, 1921).

Distribution : Darjeeling-Himalayas, Assam. Found in Tista river system in West Bengal.

Remarks : Remarkably elongated form with close similarities with *A. kempi* but can be easily distinguished from it by snout length, dorsal fin rays and position of dorsal fin.

82. *Aborichthys kempi* Chaudhuri

1913. *Aborichthys kempi* Chaudhuri, *Rec.Indian Mus.*, 8, p.245 (type locality-Abor Hills, Assam).

1985. *Aborichthys kempi*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p.104.

Local name : Bot-singhi.

D.2/7; P.11; A.25.

Diagnostic characters : Length of head 5 in total length, eyes 7.5 in head length. Small eyes; mouth inferior surrounded by a circular suctorial lip, fringed front and dilated into two fleshy knobs in the middle of lower jaw; incomplete lateral line, covering flaps of the gill-openings continuous with the isthmus skin, 6 barbels, extremely minute scales (deciduous), caudal fin entire.

Colour : Rings or loops of grey blotches on the head, 18 to 21 dark brown transverse stripes gradually disappearing at the ventral surface.

Fig. 49

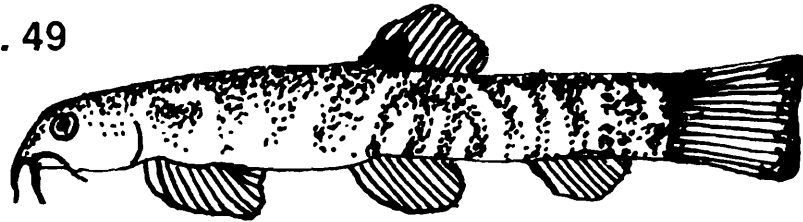


Fig. 50

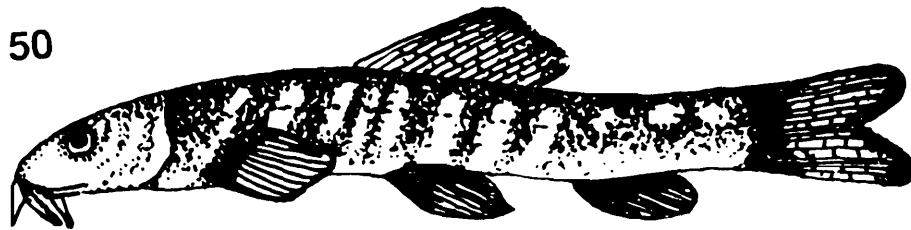


Fig. 51

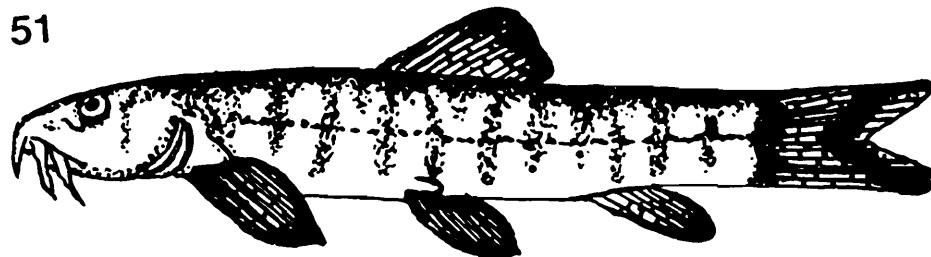


Fig. 52



Fig. 49. *Noemacheilus rupicola inglisi* (Hora); Fig. 50. *Noemacheilus savona* (Ham.); Fig. 51. *Noemacheilus scaurigina* (McCl.); Fig. 52. *Aborichthys elongatus* (Hora).

Size : Largest recorded specimen 19.6 cm in length.

Distribution : Garo and Abor-hills, Meghalaya; Upper Burma.

Remarks : This species is not found in West Bengal but has been included here for the sake of comparative studies with *A. elongatus* being a very closely allied species.

Key to the species of genus *Balitora*

Pectoral fin extended beyond commencement of pelvic fins, caudal fin almost of equal length.....
.....*Balitora maculata*

Pectoral fins do not extended or just reach pelvic fins, caudal fin lobes unequal, lower lobe longer.....*Balitora brucei*

Subfamily HOMALOPTERINAE

Genus *Balitora* Gray, 1830

1830-1832. *Balitora* Gray, *Ill.Ind.Zool.*, 1, pl.88, fig.1 (type-*Balitora brucei* Gray, India).

83. *Balitora maculata* Gray

1830-32. *Balitora maculata* Gray, *Ill.Ind.Zool.*, 1, pl.88, figs. 1 & 2, 2a (type locality-mountain streams of India).

1985. *Balitora maculata*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India, Rec. zool. Surv. India*, Occ. Paper No.64, p.98.

D.2/8; P.19; V.9; A2/5; C.17; L.1.70.

Diagnostic characters : Length of head 5.7 in total length, eye diameter 1/5 th of the length of head, snout broadly depressed with fringed lips, dorsal origin nearer to head than to caudal base, rostral barbels short, lateral line complete, pectoral nearly reaching the ventral, outer 8 rays of pectoral fin unbranched.

Colour : Dull olive becoming yellowish white beneath with large brown blotches all over the body.

Size : Largest recorded specimen 88mm in length.

Distribution : Darjeeling Dt. of West Bengal, Assam-Himalayas. Found in Tista river system in West Bengal.

Remarks : A typical torrential fish highly adapted to hill-stream life.

84. *Balitora brucei* Gray

1830-32. *Balitora brucei* Gray, *Ill.Zool.*, 1, pl.88, fig.1 (type locality-mountain streams of India).

1981. *Balitora brucei brucei*, Jayaram, *F.W. fishes of India*, Handbook No.2, Z.S.I., Calcutta, p.144.

D. 3/8; P.21; V.11; A.2/5; C.17; L.1.70.

Diagnostic characters : Length of head 6.5 in total length, eye diameter 2.5 from end of snout, broad and depressed snout with sharp margins, 3 pairs of barbels-pectoral nearly reaches the ventral, lower caudal lobe much longer, scales absent from chest to as far as the posterior margin of the base of the ventrals, anterior 9 rays of the pectoral unbranched.

Colour : Brownish with blackish blotches, caudal banded.

Size : Largest recorded specimen being 10.2 cm in length.

Distribution : Darjeeling, W. Bengal; Khasi Hills, Assam. Found in Tista system in West Bengal.

Remarks : A typically adapted fish to torrential life. Paired fins are highly modified like fan shaped structures.

Family COBITIDAE

Subfamily COBITINAE

Genus *Acanthopthalmus* v. Hasselt, 1823

1823. *Acanthopthalmus* van Hasselt, *Alg.Konst.Letterbode*, 2, p.132 (type-*Acanthopthalmus fasciatus* van Hasselt).

85. *Acanthopthalmus pangia* (Hamilton)

1822. *Cobitis pangia* Hamilton, *Fish.Ganges*, pp.355, 394 (type locality -N.E. parts of Bengal).

1985. *Acanthopthalmus pangia*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p. 103, figs.49 (a) & (b).

Local name : Pangya.

D. 2/6; P.10; V.6-7; A.2/5; C.17.

Diagnostic characters : Length of head 7.5 to 8 in total length, eyes minute, 3 pairs of barbels, elongated laterally compressed body, and erectile bifid suborbital spine present, dorsal commences in front of anal, entire caudal, distinct scales.

Colour : Light cinnamon or brownish yellow without any markings.

Size : Largest recorded specimen being 6.5cm in length.

Distribution : West Bengal (Darjeeling Dt.), Manipur : Burma and Indonesia.

Remarks : A typical hill-stream fish occasionally with or without pelvic fins, may be due to different ecological conditions. Hora (1930, p.435) suggested that fishes collected from still pools of Sivoke river are without pelvic fins and from torrential waters with pelvic fins.

Key to the species of genus *Lepidocephalus*

3 pairs of distinct barbels, origin of dorsal fin equidistant from anterior margin of eye and caudal base, caudal cut-square or convex with rounded corners*Lepidocephalus (L) guntea*

Very minute barbels, the maxillary pair only distinct, origin of dorsal fin nearer to caudal fin base than to tip of snout, caudal fin notched or concavely lunate ...*Lepidocephalus (L) annandalei*

Genus *Lepidocephalus* Bleeker, 1858

1858. *Lepidocephalus* Bleeker, *Nat. Tijdschr. Nederl. Indie*, 16, p.303 (type-*Cobitis macrochir* Bleeker).

**86. *Lepidocephalus (Lepidocephalus) guntea* (Hamilton)
(Fig. 53)**

1822. *Cobitis guntea* Hamilton, *Fish.Ganges*, pp.353, 395 (type locality-ponds and freshwaters of Bengal).

1985. *Lepidocephalus (Lepidocephalus) guntea*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p.112, fig.55.

Local name : Poia/Poa.

D. 2/6; P.8; V.7-8; A.2/5; C.16.

Diagnostic characters : Length of head 6 in total length, dorsal and ventral profiles more or less parallel but body depressed in front of dorsal fin, elongated body, head partly scaled, a large bifid suborbital spine below the eye, 3 pairs of barbels.

Colour : Dark brown on the dorsal side and yellowish white on the sides and below mixed with blackish specks, a dark median broad line composed of black spots stretching from gill to caudal fin base.

Size : Largest recorded specimen 9.6cm in length.

Distribution : All over India except Karnataka, Kerala and south of Krishna : Nepal, Bangladesh. Found in Mahananda, Tista and Hooghly river systems in West Bengal.

Remarks : A small, economically less important fish found always in mixed lots of other smaller forms in the fish markets throughout West Bengal. This is the only species found most commonly all over the state.

87. *Lepidocephalus (Lepidocephalus) annandalei* Chaudhuri

1912. *Lepidocephalus anandalei* Chaudhuri, *Rec.Indian Mus.*, 7, p.442, pl.40, fig.3, 3a, 3b (type locality-Mahananda and Tista river at Siliguri and Jalpaiguri, West Bengal).

1985. *Lepidocephalus (Lepidocephalichthys) annandalei*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p. 114, fig.58.

Local name : Poia/Poa.

D. 1/7; P.7-8; V.7; A.1/6; C.24-26.

Diagnostic characters : Length of head 6 and depth 8 in total length, elongated body with bifid preorbital spine, minute barbels, caudal-peduncle region narrow, caudal fin furcate type.

Colour : Light brown on the dorsal region, silvery on sides and below; minute dark specks on the dorsal region, a series of about 8 very short transverse bars along the dorsal ridge formed out of the dark specks. These specks are fewer in number and form irregular curved pattern above the lateral line forming about 11 short black dashes (interrupted with equal inter spaces).

Size : Attains to 5.5cm in length.

Distribution : Eastern-Himalayas, Assam. Found in Mahananda, Tista and Hooghly river systems in West Bengal.

Remarks : A small hill-stream fish found most frequently in the rock-pools at the foot-hills, torrential tributaries etc.

Genus *Somileptes* Bleeker, 1863

1863. *Somileptes* Bleeker, *Atlas. Ichth.Cypr.*, 3, p.3 (type-Cobitis gongota Hamilton).

88. *Somileptes gongota* (Hamilton) (Fig. 54)

1822. *Cobitis gongota* Hamilton, *Fish.Ganges*, pp.351, 394, (type-locality-N.Bengal rivers towards the Himalayas).

1985. *Somileptes gongota*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p.129, fig.70.

Local name : Ghor-poia.

D. 3/8; P.1/10; V.2/6; A.2/5; C.16.

Diagnostic characters : Length of head 5.2 in total length, upper profile of head abruptly curved or slanting leading to a narrow snout, body gradually narrows down to the peduncle from the highest rising point above eyes, a small bifid suborbital spine reaching below the middle of the orbit, dorsal fin entire, 3 pairs of barbels.

Colour : Light brownish with darker specks above, yellowish white below; brown odd shaped blotches with white margins on the body around 5 to 6 in numbers joining with oblique dark stripes, 2 dark patches on cheeks, fins yellowish, dorsal and caudal fins with transverse rows of dark spots.

Size : Largest recorded specimen being 9.8cm in length.

Distribution : N.Bengal and Assam. Found in Tista, Jayanti and Mahananda river systems in West Bengal.

Remarks : A typically adapted hill-stream fish.

Key to species of genus *Botia*

Snout long, its length considerably more than the post orbital distance*Botia rostrata*

Snout not very long, its length equal to less than post orbital distance.....*Botia dario*

Subfamily BOTINAE

Genus *Botia* Gray, 1831

1831. *Botia* Gray, *Zool. Misc.*, p.8 (type *Botia almorhae* Gray).

89. *Botia (Botia) dario* (Hamilton) (Fig. 55)

1822. *Cobitis dario* Hamilton, *Fish.Ganges*, pp.354, 394, pl.29 (type locality-rivers of Bengal).

1985. *Botia dario*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India, Rec. zool. Surv. India*, Occ. Paper No. 64, p.109.

Local name : Botya.

D. 3/9-10; P.14; V.8; A.2/5-6; C.19.

Diagnostic characters : Length of head 4.5 to 5 in total length, eyes 5 in head length, body laterally compressed, back convex mouse like, sharply arched down from dorsal fin base to the mouth end with short downward and pointed 4 pairs of barbels, a strong bifid backwardly curved spine below the eye, minute scales, caudal deeply forked.

Colour : Body with 7 or more dark brown oblique bands separated by yellowish ones, about 3 broken dark bands on the caudal fin.

Size : Attains to 8.9cm in length.

Distribution : West Bengal, Assam, Bihar, Punjab and Uttar Pradesh.

Remarks : A typical hill-stream fish.

90. *Botia (Botia) rostrata* Gunther (Fig. 56)

1868. *Botia rostrata* Gunther, *Cat.Brit.Mus.*, 7, p.367 (type locality-Bengal).

1832. *Botia dayi* Hora, *Rec.Indian Mus.*, 34, p.571 (Mahanadi river, Darjeeling-Himalayas).

1985. *Botia rostrata*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India, Rec. zool. Surv. India*, Occ. Paper No.64, p.110, fig.54.

Fig. 53

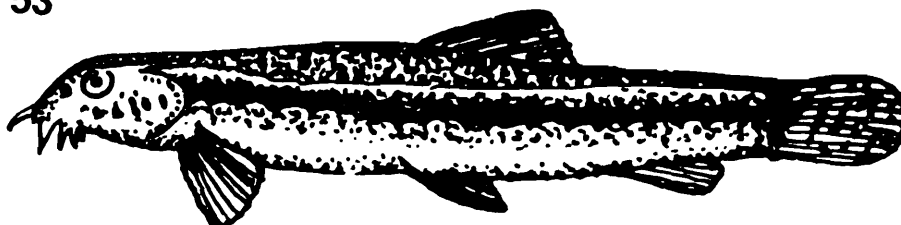


Fig. 54

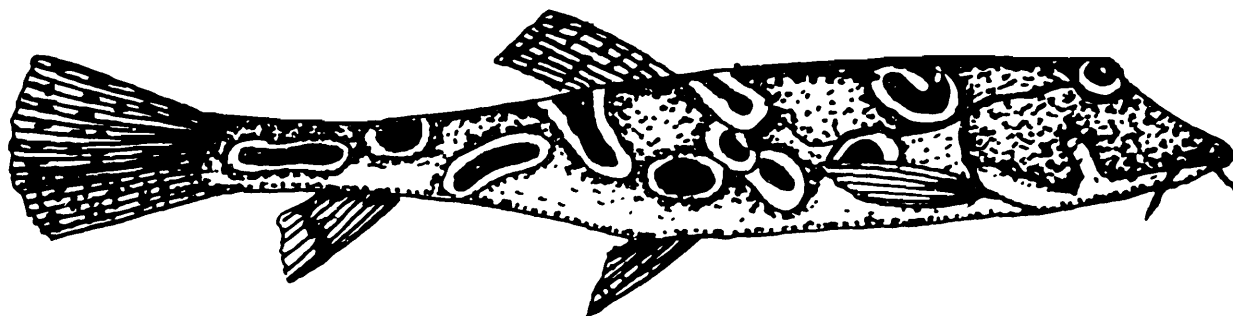


Fig. 55

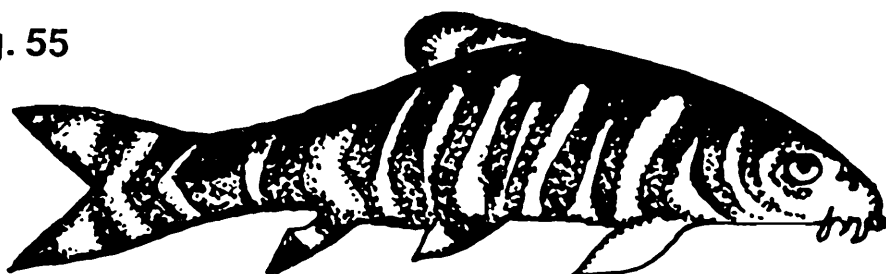


Fig. 56

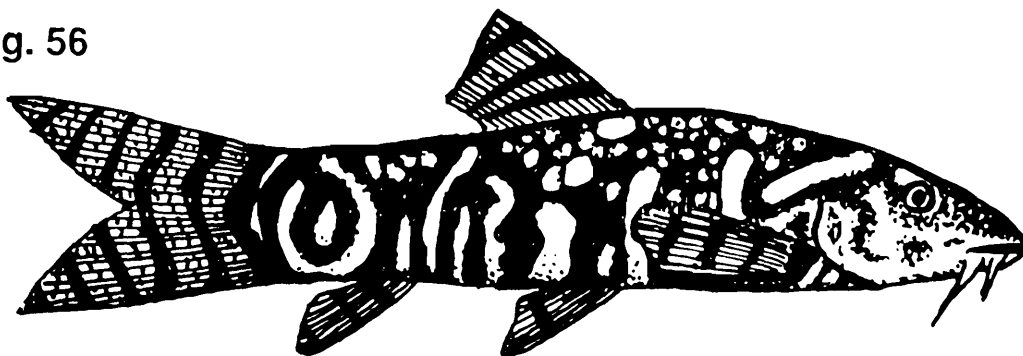


Fig. 53. *Lepidocephalus (L) guntea* (Ham.); Fig. 54. *Somileptes gongota* (Ham.); Fig. 55. *Botia dario* (Ham.); Fig. 56. *Botia (B) rostrata* (Gunther).

Local name : Botya.

D. 3/9; P.14; V.8; A.2/5; C.19.

Diagnostic characters : Length of head 5.5 in total length, eyes 7 in head length, head and body compressed, snout pointed, 4 pairs of barbels, dorsal origin between anterior margin of orbit and caudal fin base, scales minute.

Colour : Irregular and partly confluent with brown cross bands enclosing differently shaped round blotches of yellowish blue colours, fins with cross bands.

Size : Largest recorded specimen 12.0cm in length.

Distribution : West Bengal (Darjeeling Dt.), Assam-Himalayas.

Remarks : A typical hill-stream fish having close similarities with *B.geto* and *B.dayi*.

Key to the species of genus *Aorichthys*

Snout spatulate, caudal fin with 19-21 rays..... *Aorichthys seenghala*

Snout rounded, caudal fin with 17 rays..... *Aorichthys aor*

Order SILURIFORMES

Family BAGRIDAE

Genus *Aorichthys* Wu, 1939

1939. *Aorichthys* Wu, *Sinensia*, 10, p.131.

1971. *Aorichthys*, Jayaram, *Proc. zool. Soc.*, Calcutta, 24, p.149 (Replaces *Osteobagrus* Jayaram, elevated to a generic rank).

91. *Aorichthys seenghala* (Sykes)

(Fig. 57)

1839. *Platystoma seenghala* Sykes, *Trans.Zool.Soc.Lond.*, 2, p.371, pl.65, fig.2 (type locality-Mota Mula river, Poona).

1977. *Aorichthys seenghala*, Jayaram, *Rec.zool.Surv.India*, Occ. Paper No.8, p.40.

1985. *Aorichthys seenghala*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p.133, fig.72.

Local name : Arr-tengra.

D. 1/7; P.1/9; V.6; A.3/8-9; C.19-21.

Diagnostic characters : Length of head 4.5 in total length, eyes 7 to 8 in head length, spatulate snout, elongated body with 4 pairs of barbels-the longest maxillary pair reach to the end of the pelvics, upper jaw longer, cleft of mouth shallow, median longitudinal groove on head extends up to base of occipital process, dorsal spine weak, rugose as long as head; pectoral spine strong, serrated; long adipose dorsal fin equals or slightly exceeds rayed dorsal fin base, caudal bilobed with longer upper lobe.

Colour : Brownish along back, silvery on sides and below; a round black spot on the posterior end of adipose fin.

Size : Largest specimen recorded 1.5m.

Distribution : Large rivers of India up to Krishna river system in the south. Pakistan, Bangladesh, China.

Remarks : Large rivers of West Bengal are its common habitats. Specially distinguished for its typical long barbels and spatulate head.

92. *Aorichthys aor* (Hamilton)

1822. *Pimelodus aor* Hamilton, *Fish.Ganges*, pp.205, 379, pl.20, fig.68 (type locality-Rivers of Bengal and upper parts of Gangetic estuaries).

1977. *Aorichthys aor*, Jayaram, *Rec.zool.Surv.India*, Occ. Paper No.8, p.40.

1985. *Aorichthys aor*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p.132.

Local name : Aeir/Arr-tengra.

D. 1/7; P1/9-10; V.6; A.11-14; C.17.

Diagnostic characters : Length of head 4.5 to 5 in total length, eyes 5 to 8 in head length, depressed broad snout, upper jaw longer, median longitudinal furrow on head extended up to base of occipital process, 4 pairs of barbels, longest barbels (maxillary) reaching caudal base or even beyond; pectoral spine stronger than dorsal, rugose, but shorter; rounded snout, base of adipose dorsal equals the rayed dorsal or even more, pelvic origin below last dorsal rays.

Colour : Bluish leaden dorsally, becoming white on abdomen; yellowish fins tinged with grey, a black spot on dorsal.

Size : Largest specimen recorded 2mts. in length.

Distribution : West Bengal, Assam, Orissa, Punjab, N. India up to Krishna river system in the south. Pakistan, Bangladesh and Burma.

Remarks : Mostly a riverine fish but can be found occasionally in the small tributaries and during the monsoon spates.

Key to the species of genus *Batasio*

Adipose dorsal fin base longer than anal fin base, body marked with longitudinal bands and a dark shoulder spot.....*Batasio batasio*

Adipose dorsal fin base shorter or equal to anal fin base, body marked with oblique vertical bands or spots.....*Batasio tengana*

Genus *Batasio* Blyth, 1860

1860. *Batasio* Blyth, *J.Asiat Soc.Bengal*. 29, p.149 (type-*Pimelodus batasio* Hamilton, by original designation).

93. *Batasio batasio* (Hamilton)

1822. *Pimelodus batasio* Hamilton, *Fish.Ganges*, pp.179, 377 (type locality-Teesta river).

1977. *Batasio batasio*, Jayaram, *Rec.zool.Surv.India*, Occ. Paper No.8, p.17.

Local name : Batashi.

D. 1/7; P.1/5-8; V.6; A.3-4/9-10; C.17.

Diagnostic characters : Length of head 4.5 in total length, head and mouth small, eyes small and placed high up, 4 pairs of barbels-shorter than the head, dorsal spine strong, entire; pectoral spine strong and serrated internally, caudal lobed, adipose dorsal fin base longer than anal fin base, occipital process reaching basal bone of dorsal fin.

Colour : Dorsally leaden, whitish yellow beneath; body marked with longitudinal bands and a dark shoulder spot, a second one faintly curved above lateral line.

Size : Maximum size recorded 10.0cm in total length.

Distribution : Tista river system, N. Bengal. Bangladesh. Found in Tista river system in West Bengal.

Remarks : Mostly found in West Bengal in the northern parts. Being a closely allied species it is often confused with *M.vittatus* by people and fisheries workers but can be easily differentiated by its shorter barbels which do not extend beyond head and the continuous bands of teeth on lower jaws and palate. Economically less valued due to its smaller size and less flesh.

94. *Batasio tengana* (Hamilton)

1822. *Pimelodus tengana* Hamilton, *Fish.Ganges*, pp.176, 377, pl.39, fig.58 (type locality-Brahmaputra river).

1977. *Batasio tengana*, Jayaram, *Rec.Zool.Surv.India.*, Occ. Paper No.8, p.17.

1985. *Batasio tengana*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv.India.*, Occ. Paper No.64, p.134, fig.73.

Local name : Batashi.

D. 1/7-8; P.1/7-9; V.6; A.3-4/8-11; C.16-18.

Diagnostic characters : Length of head 4 to 4.5 in total length, eyes 6.5 in head length, body with oblique vertical bands or spots, adipose dorsal fin base shorter or equal to anal fin base, occipital process reaching basal bone of dorsal fin, pectoral fin serrated internally, mouth small with upper jaw slightly longer, caudal fin bluntly lobed.

Colour : Grey olivaceous, deeper above, lighter below; a prominent black spot on the nape, saddled shaped bands on body, not extending to ventral side, may be found.

Size : Largest specimen recorded 70mm in length.

Distribution : N. Bengal, Assam : Bangladesh, Burma, Thailand, Malayasia. Found in Tista river system in West Bengal.

Remarks : Generally found to live in torrential rivers. Economically less important due to its small size.

Genus *Chandramara* Jayaram, 1972

1972. *Chandramara* Jayaram, *Int.Revue ges.Hydrobiol.* 57, (5), p.816 (type-*Pimelodus chandramara* Hamilton, by original designation).

95. *Chandramare chandramara* (Hamilton)

1822. *Pimelodus chandramara* Hamilton, *An account of the fishes of the river Ganges and its tributaries*, pp.162, 375, (type locality-River Atrai).

1977. *Chandramara chandramara*, Jayaram, *Rec.zool.Surv.India*, Occ. Paper No.8, p.19.

1985. *Chandramara chandramara*, Sen, *Fish fauna of Assam and the neighbouring N.E.states of India*, *Rec.zool.Surv.India*, Occ. Paper No.64, p.135.

Local name : Kucho-tengra.

D. 1/7; P.1/5-6; V.6; A.13-17; C.16.

Diagnostic characters : Length of head 4 to 4.5 in total length, dorsal profile arched, small and compressed head with pores on ventral and lateral sides, snout somewhat rounded, subterminal mouth, moderately wide; large inferior eyes visible from below, barbels shorter than head, pectoral fin with outer ray long reaching almost ventral fin base, short anal fins, complete lateral line.

Colour : Pale olive, body speckled with dots, irregularly distributed all over the body, a distinct black spot on the shoulder and also one on the occiput.

Size : Largest specimen recorded 5.7cm in length.

Distribution : N. Bengal, Assam. Bangladesh.

Remarks : Actually it has got no specific local name, simply goes in the local fish markets along with other more or less similar looking forms (*M. vittatus*, *M. tengara* etc.) as 'Kucho-tengra' (Kucho = smallest size or very small sized).

Key to the species of genus *Mystus*

1. Brownish grey in colour with two longitudinal bands, one above the other, below the lateral line2
 Deep bluish brown above becoming dull below3
2. Eight barbels-maxillary pair reaching to anal fin, length of head 5.2 in T.L., caudal fin forked-upper lobe longer.....*Mystus bleekeri*
3. Length of head 4.2 in T.L., 8 barbels-maxillary pair reaching to middle or end of pelvic fin, short adipose dorsal fin, caudal fin moderately forked, upper lobe slightly longer....*Mystus gulio*
 Length of head 6 in T.L., 8 barbels-maxillary pair reaching caudal fin or beyond, long adipose dorsal fin commencing almost after the rayed dorsal fin4
4. Caudal fin deeply forked-upper lobe prominently longer, median longitudinal groove extending to base of occipital process.....*Mystus cavasius*
 Caudal fin moderately forked with almost equal lobes, median longitudinal groove not reaching base of occipital process.....5
5. Length of head 4.7 in T.L.....*Mystus vittatus*
 Length of head 4.3 in T.L.....6
6. Several vertical black spots along the anterior portion of lateral line, greyish brown above, dull white below.....*Mystus menoda menoda*
 No such vertical black spots, brilliant yellow with a shoulder spot and 5 black longitudinal lines..... *Mystus tengara*

Genus *Mystus* Scopoli, 1777

1777. *Mystus*., Scopoli, *Introduction ad naturalem*, p.451 (type-*Bagarius halepensis* Valenciennes = *Mystus pelusius* (Solander), by subsequent selection).

96. *Mystus bleekeri* (Day)

1846. *Bagrus keletius* (nec Valenciennes) Bleeker, *Nat. Geneesk Arch.Ned.Ind.*, 3(2), p.135 (type locality-Bengal).

1977. *Mystus bleekeri*, Jayaram, *Rec.Zool.Surv.India*, Occ.Paper No.8,p.29.

1985. *Mystus bleekeri*, Sen, *Fish fauna of Assam and neighbouring N.E. states of India*, *Rec. zool. Surv. India.*, Occ. Paper No.64, p.136.

Local name : Tengra.

D. 1/7; P.1/9-10; V.1/5; A.3/6-7; C.17..

Diagnostic characters : Length of head 5.2 to 5.5 in total length, eyes 4.5 in head length, obtuse snout, gape of mouth equals to half of the head region, median longitudinal groove shallow and reaching to base of occipital process; 4 pairs of barbels-maxillary extending to anal, pectoral spine serrated, stronger than dorsal one; origin of adipose dorsal fin just behind the rayed dorsal, caudal forked with upper lobe longer.

Colour : Brownish grey above, lighter below; 2 light longitudinal bands along the lateral line; a dark shoulder spot generally present.

Size : Largest specimen recorded 14.5cm in length.

Distribution : Generally confined to N. India, southernmost limit being the Mahanadi headwater commonly found in West Bengal.

Remarks : Live in tanks, lakes and rivers. Economically more or less important in West Bengal.

97. *Mystus cavasius* (Hamilton) (Fig. 58)

1822. *Pimelodus cavasius* Hamilton, *Fish.Ganges*, pp.203, 297, pl.11, fig.67 (type locality-Gangetic provinces).

1977. *Mystus cavasius*, Jayaram, *Rec.zool.Surv.India*, Occ, Paper No.8, p.29.

1985. *Mystus cavasius*, Sen, *Fish fauna of Assam and neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p.136, fig.74.

Local name : Tengra.

D. 1/7; P.1/8; V.1/5; A.11-13; C.16.

Diagnostic characters : Length of head 6 to 6.2 in total length, eyes 3.2 in head length, upper jaw longer with gape of mouth less than half of head length, 4 pairs of barbels-maxillary pair extending beyond caudal base, pectoral spine serrated, adipose dorsal fin long, arises just behind the rayed dorsal fin; caudal fin forked-upper lobe longer.

Colour : Yellowish abdomen and cheeks and dorsally leaden (when alive), a black shoulder spot and a dark blotch at the base of dorsal fin (casually seen); a bluish band along the lateral line may be seen occasionally.

Size : Largest recorded specimen 45cm in length.

Distribution : India, Bangladesh, Pakistan, Burma, Thailand, Malaysia. Found in Hooghly river system in West Bengal.

Remarks : Live in tanks, lakes, rivers and canals. Economically important in West Bengal.

98. *Mystus gulio* (Hamilton)

1822. *Pimelodus gulio* Hamilton, *Fish.Ganges*, pp.201, 379, pl.23, fig. 66 (type locality-Upper parts of Gangetic estuaries).

1977. *Mystus gulio*, Jayaram, *Rec.zool.Surv.India* Occ. Paper No.8, p.30.

Local name : Nuna-tengra.

D. 1/7; P.1/8-9; V.6; A.13-16; C.17.

Diagnostic characters : Length of head 4.2 to 4.6 in total length, eyes 5 to 6 in head length, broad with somewhat depressed snout, median longitudinal groove on head short not reaching base of occipital process, upper surface of head rough and granulated, upper jaw slightly longer, 4 pairs of barbels-maxillary pair extending to middle or end of pelvics, dorsal spine strong and serrated, strong pectoral spine, short adipose dorsal.

Size : Largest recorded length being 45.7cm.

Colour : Deep bluish brown on head and back with dull white below.

Distribution : India, Pakistan, Bangladesh, Burma, Thailand, Sri Lanka, Malaysia, Java, Sumatra, Borneo.

Remarks : Live in the estuaries, seas and tidal waters of West Bengal. Economically important in West Bengal.

99. *Mystus vittatus* (Bloch) (Fig. 59)

1797. *Silurus vittatus* Bloch, *Ichthyol.Hist.Nat.*, 11, p.40, pl. 371, fig. 2 (type locality-Tranquebar).

1977. *Mystus vittatus*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No. 8, p.38.

1985. *Mystus vittatus*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv.India*, Occ. Paper No. 64, p.138, fig.76.

Local name : Tengra.

D. 1/7; P.1/9; V.6; A.2-31/47-9; C.17.

Diagnostic characters : Length of head 4.7 to 5 in total length, eyes 4.5 to 6 in head length, median longitudinal groove on head short, wide, not extending to base of occipital process, occipital process rough, 4 pairs of barbels-maxillary extending to pelvics, dorsal spine finely serrated, adipose dorsal fin base equal to the interspace between the two fins, pectoral serrated, caudal forked.

Colour : Silvery with bright golden tinge, 5 narrow black prominent stripes on body above and below lateral line, a black shoulder spot usually present.

Size : Largest recorded length being 20.0cm.

Distribution : India, Pakistan, Bangladesh, Burma, Malaya, Thailand, Sri Lanka. Found in all the river systems in West Bengal.

Remarks : A widely distributed most popular species in West Bengal so far concerned other *Mystus* species in spite of its small size. It is also found to live in tidal waters besides its common habitats like tanks, ponds, roa-side nallahs and ditches, canals, tributaries etc.

100. *Mystus tengara* (Hamilton)

1822. *Pimelodus tengara* Hamilton, *Fish.Ganges*, pp.183,377, pl.23 fig. 60 (type locality-N. Bengal).

1977. *Mystus tengara*, Jayaram, *Rec.zool.Surv.India*, Rec.Occ. Paper No. 8, p.37.

1985. *Mystus tengara*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv.India*, Occ. Paper No.64, p.140.

Fig. 57

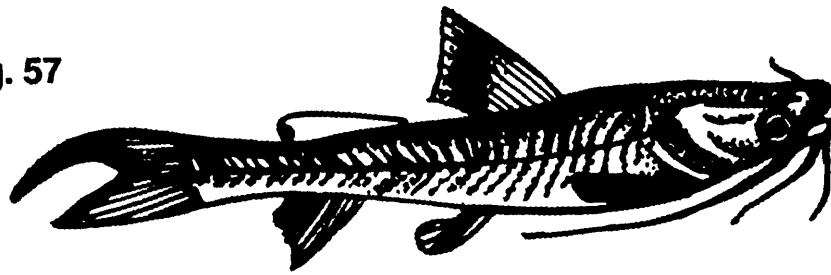


Fig. 58

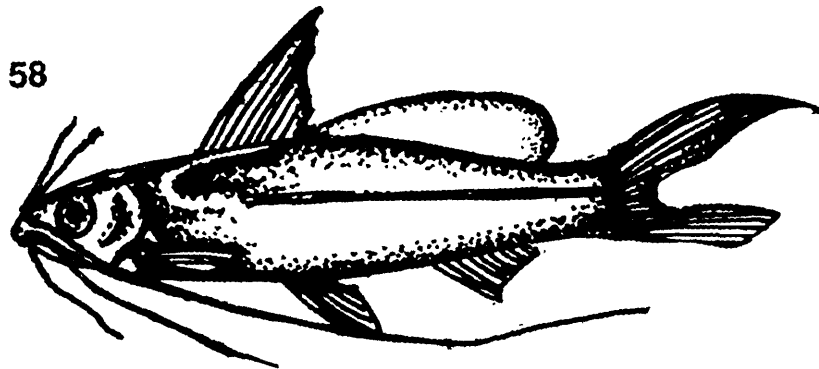


Fig. 59

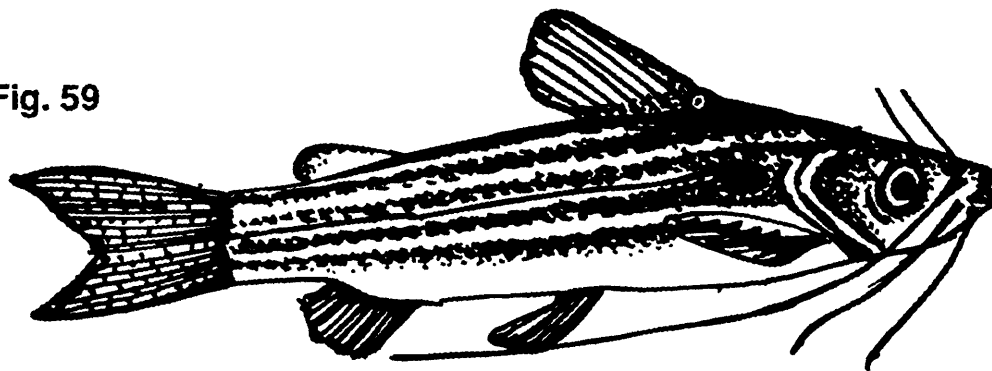


Fig. 60

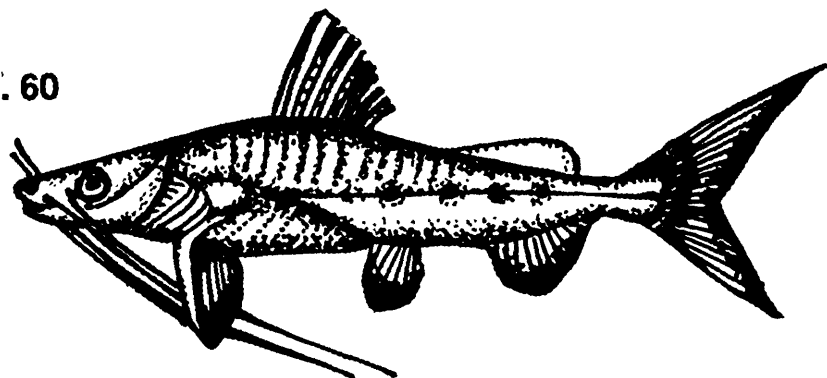


Fig. 57. *Aorichthys seenghala* (Sykes); Fig. 58. *Mystus cavasius* (Ham.); Fig. 59. *Mystus vittatus* (Bloch); Fig. 60. *Mystus menoda menoda* (Ham.).

Local name : Tengra.

D. 1/7; P.1/8; V.6; A.11-13; C.19.

Diagnostic characters : Length of head 4.3 in total length, eyes 3.5 in head length, median longitudinal groove on head reaching base of occipital process, dorsal origin near to adipose dorsal than to tip of snout, maxillary barbels reach base of pelvic fins, caudal peduncle not constricted, dorsal spine serrated anteriorly, caudal forked.

Colour : Bright yellow with a black shoulder spot, about 5 black longitudinal lines.

Size : Largest recorded length being 10.0cm.

Distribution : West Bengal, Assam, U.P., Punjab, Bihar, M.P., Orissa. Bangladesh, Pakistan. Found in Punarbhaba river system in West Bengal.

Remarks : Live in ponds, lakes, tanks, beels, paddy-fields (when flooded) etc. Very much similar looking with *M. vittatus* but can be easily distinguished from it by (1) position and extension of median longitudinal groove (reaching base of occipital process) (2) number of pectoral spine teeth and (3) geographical distribution. Absent in Southern India.

101. *Mystus menoda menoda* (Hamilton)
(Fig. 60)

1822. *Pimelodus menoda* Hamilton, *Fish.Ganges*, pp.203, pl.1, fig.72 (type locality-Koshi, Mahananda, North Bihar and Bengal).

1977. *Mystus menoda menoda*, Jayaram, *Rec.zool.Surv.India*, Occ. Paper No.8, p.33.

1985. *Mystus menoda menoda*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec.zool.Surv.India*, Occ. Paper No.64, p.137, fig.75.

Local name : Arr-tengra/Air-tengra.

D. 1/7; P.1/9; V.6; A.3-5/8; C.17.

Diagnostic characters : Length of head 4 to 4.6 in total length, eyes 7 in head length, small eyes; snout slightly flat, upper surface of head exposed, 4 pairs of barbels-maxillary pair reaching to end of pelvic fins, occipital process long, pectoral with a strong spine as long as head and serrated (20-23) internally, rugose externally.

Colour : Greenish brown above, dull white below; 8 or 9 small black spots along the lateral line.

Size : Attains to 30.0cm or more in length.

Distribution : N.E. India. Bangladesh and Burma.

Remarks : Closely alike *M. seenghala* in colour and shape but can be easily distinguished from it by the shape of head, absence of black spot on the adipose fin and presence of 8 or 9 black spots along the lateral line. A popular food fish of West Bengal.

Genus *Rita* Bleeker, 1859

1859. *Rita* Bleeker, *Acta Soc.Sc.Indo.Neerl.*, 4, p.60 (type-*Pimelodus rita* Hamilton, by autonymy).

102. *Rita rita* (Hamilton)
(Fig. 61)

1822. *Pimelodus rita* Hamilton, *Fish.Ganges*, pp.165, 376, pl.124, fig. 53 (type locality-Bengal).

1977. *Rita rita*, Jayaram, *Rec.zool.Surv.India*, Occ. Paper No.8, p.15.

Local name : Rita/Rita.

D. 1/6; P.1/10; V.8; A.4-5/9; C.19.

Diagnostic characters : Length of head 4 to 4.3 in total length; eyes 8 to 10 in head length, width of mouth about half of the head length, cubito-humeral process about three fourth of head, grannulated; a long smooth dorsal spine, occipital process notched in front to accommodate basal bone of dorsal, 3 pairs of barbels, dorsal spine very strong serrated.

Colour : Greenish grey above and sides, dull below.

Size : Largest recorded specimen being 1.2mt. in length.

Distribution : West Bengal (mostly N. Bengal), U.P., Bihar. Bangladesh, Pakistan and Burma. Found in Mahananda and Tista river systems in West Bengal.

Remarks : A strong bony fish not much liked locally as food, taken, mostly by poorer sections. One of the largest known cat-fishes found in Calcutta and vicinity fish markets (next to *Wallago attu*). 'It is able to live out of water for sometime because of cutaneous respiration' (Jayaram, 1977, p.15).

Key to the species of genus *Ompok*

1. Maxillary barbels longer than head, extending up to or beyond anal fin.....*Ompok bimaculatus*
 Maxillary barbels shorter than head, not extending up to anal fin.....2
2. Anal fin 22-56 rays *Ompok pabda*
 Anal fin 66-71 rays *Ompok pabo*

Family SILURIDAE

Genus *Ompok* Lacépède, 1803

1803. *Ompok* Lacépède, *Hist.Nat.Poiss.*, 5, p.49 (type-*Ompok siluroides* Lacépède, by monotypy).

103. *Ompok bimaculatus* (Bloch)
(Fig. 62)

1797. *Silurus bimaculatus* Bloch, *Ichthyol.Hist.Nat.Poiss.*, Part 2, p.17, pl.364 (type locality-Malabar).

1977. *Ompok bimaculatus*, Jayaram, *Rec.zool.Surv.*, Occ. Paper No.10, p.4.

1985. *Ompok bimaculatus*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec.zool.Surv.India*, Occ. Paper No.64, p.141, fig.77.

Local name : Pabda.

D. 4; P.1/12-14; V.8-9; A.2-3.59-73; C.17-18.

Diagnostic characters : Length of head 5 to 7 in total length, eyes 4 to 4.5 in head length, 2 pairs of barbels-maxillary pair longer than head, a short dorsal without spine much nearer to snout, anal rays long continuous, caudal forked with upper lobe longer.

Colour : Silvery shot with purple, a black blotch on the shoulder and often (when very fresh) one or two faint looking black lateral bands on the upper part of body, anal and caudal fins golden yellow, when alive.

Size : Largest recorded length being 45.7cm.

Distribution : India, Pakistan, Bangladesh, Burma. Found in Hooghly, Damodar and Bhagirathi river systems in West Bengal.

Remarks : It looks like *O. pabda* but can be easily distinguished from it by the shape of caudal fins (upper lobe longer and sharply pointed versus equally arched rounded lobes), length of barbels (longest maxillary pair reaching up to anal versus longest maxillary pair do not reach beyond the end of pectoral). Lives in rivers, lakes, ponds, etc. Extremely popular fish all over West Bengal, also a costly fish indeed.

104. *Ompok pabda* (Hamilton)
(Fig. 63)

1822. *Silures pabda* Hamilton, *Fish.Ganges*, p. 950.pl.25, fig.47 (type locality-Bengal).

1977. *Ompok pabda*, Jayaram, *Rec.zool.Surv.India*, Occ. Paper No.10, p.5.

1985. *Ompok pabda*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv.India*, Occ. Paper No.64, p.142.

Local name : Pabda.

D.4; P.1/11-13; V.7-8; A.2-3/50-54; C.17-19.

Diagnostic characters : Length of head 4.5 to 5.6 in total length, eyes 5.5 in head length, dorsal fin short, spineless; 2 pairs of barbels-longest maxillary do not reach beyond the end of pectorals, caudal with equally forked rounded arched lobes, pectoral spine serrated or rarely smooth.

Colour : Silvery glossed with gold with shoulder black spot. In fresh condition it is silvery green.

Size : Largest recorded length being 17.2cm.

Distribution : India, Bangladesh, Pakistan, Burma. Found in Hooghly, Damodar and Bhagirathi river systems in West Bengal.

Remarks : Lives in rivers, tanks, ponds etc. Extremely liked locally due to its rich oil content and sweet taste, a costly fish indeed.

105. *Ompok pabo* (Hamilton)

1822. *Silurus pabo* Hamilton, *Fish.Ganges*, p.153, pl.17, fig.48 (type locality-Brahmaputra river, Assam).

1977. *Ompok pabo*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.10, p.5.

1985. *Ompok pabo*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p.143.

Local name : Pabda.

D.5; P.1/14; V.9-10; A.3/63-68; C.17.

Diagnostic characters : Length of head 5 to 5.2 in total length, eyes 4 to 4.5 in head length, dorsal fin short spineless, maxillary barbels shorter than head, not extending up to anal fin; continuous anal fin, pectoral spine serrated or rarely smooth.

Colour : Silvery with a faint shoulder spot.

Size : Largest recorded length being 25.0cm.

Distribution : West Bengal; Assam. Bangladesh. Found in Hooghly, Damodar and Bhagirathi river systems in West Bengal.

Fig. 61

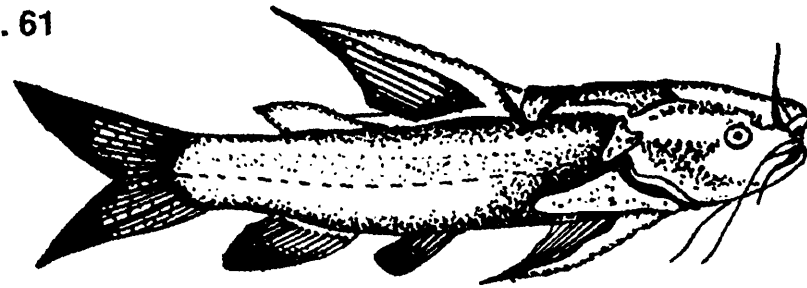


Fig. 62

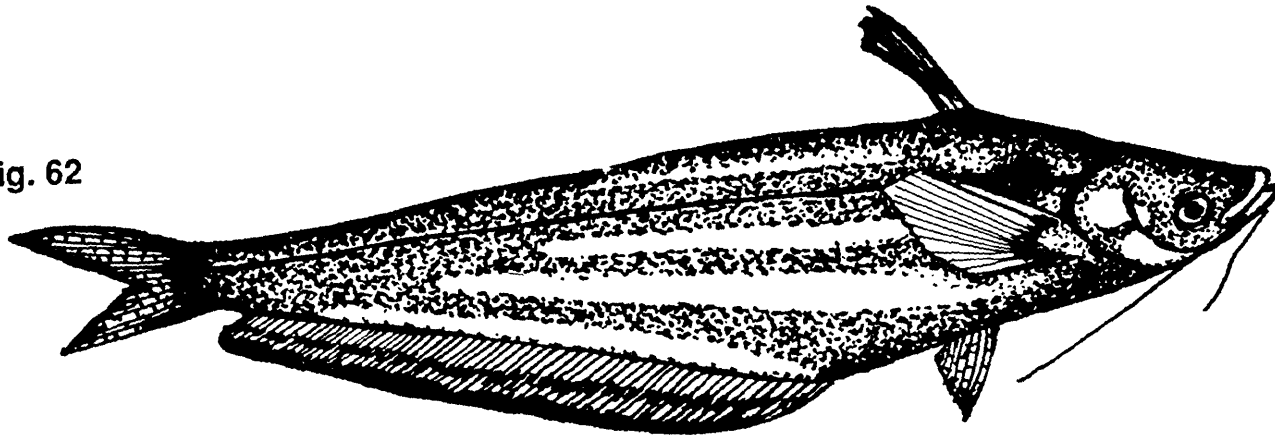


Fig. 63

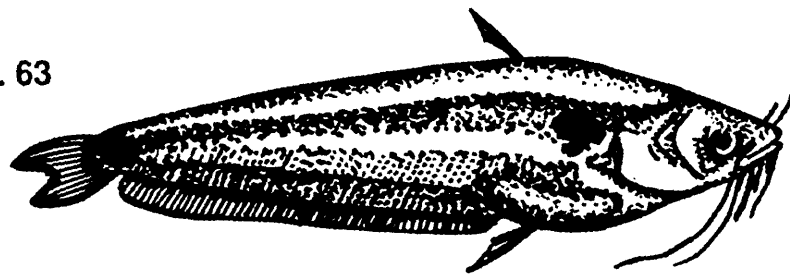


Fig. 64

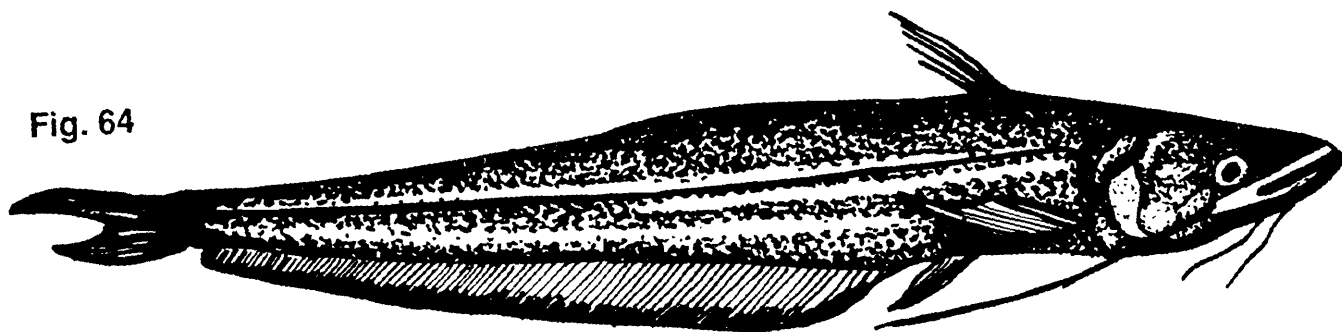


Fig. 61. *Rita rita* (Ham.); Fig. 62. *Ompok bimaculatus* (Bloch); Fig. 63. *Ompok pabda* (Ham.); Fig. 64. *Wallage attu* (Bloch).

Remarks : A popular food fish in West Bengal. It has got close similarities with its nearest species viz. *O. bimaculatus* and *O. pabda* but it can be easily distinguished from them by its number of anal rays 66 to 71 versus 59 to 73 and 52 to 58 respectively.

Genus *Wallago* Bleeker, 1851

1851. *Wallago* Bleeker, *Nat. Tijdschr.Nederl.Indie*, 2, p.202 (type-*Wallago dinema* Bleeker).

106. *Wallago attu* (Schneider)
(Fig. 64)

1801. *Wallago attu* Schneider, *Syst.Ichtyol.*, p.378, pl.75 (type locality-Malabar).

1977. *Wallago attu*, Jayaram, *Rec.Zool.Surv.India*, Occ. Paper No.10, p.6.

1985. *Wallago attu*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p.145, fig.79.

Local name : Boal.

D.5; P.1/13-15; V.8-10; A.4/82-89; C.17.

Diagnostic characters : Length of head 5 to 5.5 in total length, eyes 7 to 8 in head length, large depressed head, snout patulate, sub terminal mouth with wide gape reaching to or below; 2 pairs of barbels, dorsal fin without spine, adipose dorsal absent, anal fin very long, free from caudal fin.

Colour : Uniform silvery, grey becoming dull white below; when fresh a light green washed tinge can be seen on the back and cream colour on the sides mixed with a tinge of orange yellow (golden looking) band along the lateral line. I have observed to be coppery green when freshly caught from a beel near Bansdroni Kali temple (24-Parganas Dt.).

Size : Largest length recorded being 2mts.

Distribution : India, Bangladesh, Pakistan, Sri Lanka, Burma, Thailand, Malaya, Java, Sumatra and China. Found in Hooghly, Damodar, Bhagirathi and Mahananda river systems in West Bengal.

Remarks : It is a large giant sized voracious predatory cat fish popularly known as '*Freshwater Shark*' Due to its oil content and less bones it is more or less liked by the local people desirably smaller ones. Giant sized ones are cheaper and generally taken by the poorer section.

Family SCHILBEIDÆ

Genus *Ailia* Gray, 1831

1831. *Ailia* Gray, *Zool.Miscellany*, p.8 (type-*Malapterus* (sic) (*Ailia*) *bengalensis* Gray = *Malapterurus coila* Hamilton).

107. *Ailia coila* (Hamilton)
(Fig. 65)

1822. *Malapterurus coila* Hamilton, *Fish.Ganges*, pp.158, 375 (type locality-freshwater rivers of Bengal, Ganges).

1977. *Ailia coila*, Jayaram, *Rec.zool.Surv.India*, Occ. Paper No.10, p.13.

1985. *Ailia coila*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*. *Rec. zool. Surv. India*, Occ. Paper No.64, p.146, fig.80.

Local name : Kajri/Kajoli.

D.0; P1/14-16; V.6; A.58-71; C.19.

Diagnostic characters : Length of head 6 to 7 in total length, eyes 3.5 to 3.7 in head length, upper jaw longer and overhung by the snout, 4 pairs of barbels-long, extending to almost middle of body; a small adipose dorsal.

Colour : Silvery to dull brown colour.

Size : Largest recorded 17.7cm.

Distribution : India, Bangladesh, Pakistan. It is mainly confined to Ganga, Brahmaputra and Jamuna drainage systems. Found in Hooghly and Matla river systems in West Bengal.

Remarks : It is a popular food fish of West Bengal inspite of its small size and thinly flattened brittle body due to its good taste.

Key to the species of genus *Clupisoma*

Abdomen edge keeled throughout, maxillary barbels not reaching pelvics, anal fin with 40-44 rays.....*Clupisoma prateri*

Abdominal edge keeled between pelvic and vent, maxillary barbels reaching pelvic fin, anal with 29-36 rays *Clupisoma garua*

Genus *Clupisoma* Swainson, 1839

1839. *Clupisoma* Swainson, *Nat.Hist.Fish.Animal*, 2, p.306 (type-*Silurus garua* Hamilton).

108. *Clupisoma prateri* Hora

1937. *Clupisoma prateri* Hora, *J.Bombay nat.Hist.Soc.*, 39(4), p.671 (type locality-Burma).

1977. *Clupisoma prateri*, Jayaram, *Rec.zool.Surv.India*, Occ. Paper No. 10, p.20.

Local name : Ghero/Gharua.

D.1/6-7; P.1/11; V.6; A.40-44.

Diagnostic characters : Length of head 5.2 to 6.4 in total length, abdominal edge keeled throughout, pectorals reaching to pelvics, mandibular barbels reaching posterior margin of operculum.

Colour : Brown dorsally, silvery below and sides.

Size : Largest length recorded being 23.2cm.

Distribution : West Bengal (Darjeeling Dt.), Sone R., Bihar; Allahabad, U.P. Bangladesh, Burma.

Remarks : Very little known in West Bengal. Occasionally appear in the Darjeeling and around fish markets.

109. *Clupisoma garua* (Hamilton)

(Fig. 66)

1822. *Silurus garua* Hamilton, *Fish.Ganges*, pp.156, 375, pl.21, fig.50 (type locality-freshwater rivers of Gangetic provinces).

1977. *Clupisoma garua*, Jayaram, *Rec.zool.Surv.India*, Occ. Paper No.10, p.18.

1985. *Clupisoma garua*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p.147.

Local name : Ghero/Gharua.

D.1/7; P.1/11; V.6; A.3/26-33; C.17.

Diagnostic characters : Length of head 5.5 to 6.5 in total length, eyes 3.5 to 4 in head length, upper jaw longer, barbels 4 pairs-maxillary pair reaching to middle or end of pelvic fin, adipose dorsal only can be seen with smaller from and absent in adult forms, pectoral spine stronger, serrated, almost as long as the dorsal spine; abdominal edge keeled between pelvics and vent.

Colour : Silvery grey dorsally, lighter below; fins with grey.

Size : Largest recorded length being 60.9cm.

Distribution : West Bengal, N. India, Bihar, Assam, Orissa, M. P. Bangladesh, Pakistan, Burma. Found in Jalangi and Bhagirathi river systems in West Bengal.

Remarks : Not generally taken in West Bengal being a known 'foul feeder' It lives in rivers, beels, lakes and tributaries; feeds on crabs, shrimps, small fishes, insects etc.

Key to the species of genus *Eutropiichthys*

Teeth on palate in a band wider than premaxillary band, nasal barbels reach hind border of head or slightly beyond.....*Eutropiichthys vacha*

Teeth on palate in a band narrower than premaxillary band or just equal to it, nasal barbels reach a short distance behind posterior edge of eyes.....*Eutropiichthys murius*

Genus *Eutropiichthys* Bleeker, 1862

1862. *Eutropiichthys* Bleeker, *Versl.Amterdam*. 14, p.398 (type-*Pimelodus vacha* Hamilton).

110. *Eutropiichthys murius* (Hamilton)

1822. *Pimelodus murius* Hamilton, *Fish Ganges*, pp.195, 378 (type locality-Mahananda river).

1977. *Eutropiichthys murius*, Jayaram, *Rec.zool.Surv.India*, Occ. Paper No.10, p.23.

1985. *Eutropiichthys murius*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec. zool. Surv. India*, Occ. Paper No.64, p.148.

Local name : Muri Bacha.

D.1/7; P.1/13-16; V.6; A.3-4.41-47; C.17.

Diagnostic characters : Length of head 5.5 to 6 in total length, eyes 3.3 in head length, laterally placed eyes with broad adipose circular lids; 4 pairs of barbels-maxillary pair reach pectoral base, dorsal fin with a weak spine, very thinly serrated externally; a very small adipose dorsal fin, caudal deeply forked.

Colour : Silvery grey, darkest dorsally, fins tinged with black (dorsal, pectoral and caudal fins).

Size : Largest length recorded being 20.0 cm.

Distribution : India, Bangladesh, Pakistan, The southern limit in India is the Mahanadi river system (Jayaram, 1977).

Remarks : Live in big rivers and tributaries in West Bengal, not found frequently in the local fish markets like *E. vacha*. A smooth skinned cat fish liked by the people for its rich oil content and less bones.

111. *Eutropiichthys vacha* (Hamilton)

(Fig. 67)

1822. *Pimelodus vacha* Hamilton, *Fish. Ganges*, pp.196, 378, pl. 19, fig.64 (type locality Gangetic provinces).

1977. *Eutropiichthys vacha*, Jayaram, *Rec. zool.Surv. India*, Occ. Paper No. 10, p.23.

1985. *Eutropiichthys vacha*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec.zool.Surv. India*, Occ. paper No.64, p. 149.

Local name : Bacha.

D.1/7; P.1/13-16; A.3-4/41-47; C.17.

Diagnostic characters : Length of head 5.5 to 5.7 in total length, eyes 3.5 to 3.7 in head length, eyes with broad adipose lids, cleft of mouth oblique reaching beyond midorbit, upper jaw longer, pointed and compressed snout, 4 pairs of barbels reaching beyond eyes or even as long as head, pectoral spine serrated as long as dorsal spine which is thin and serrated, caudal forked.

Colour : Greyish silvery, darkest back; pectoral and caudal fins edged with black.

Size : Largest length recorded being 30.4 cm.

Distribution : India, Bangladesh, Pakistan, Burma, Thailand. The Mahanadi forms the southern limit in India (Jayaram, 1977). Found in Hooghly river system in West Bengal.

Remarks : A popular food fish of West Bengal. Live in rivers, lakes, tanks, beels etc. A voracious eater feeding on small fishes, aquatic weeds and insects.

Genus *Pseudeutropius* Bleeker, 1862

1862. *Pseudeutropius* Bleeker, *Verst.Akad.Amsterdam*, 14, p.398 (type-*Eutropius brachyopterus* Bleeker).

112. *Pseudeutropius atherinoides* (Bloch)

1794. *Silurus atherinoides* Bloch, *Ausland.Fische.*, 8, p.48, pl.371, fig.1 (type locality-Tranquebar).

1977. *Pseudeutropius atherinoides*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.10, p.15.

1985. *Pseudeutropius atherinoides*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*; *Rec.zool.Surv.India*, Occ.Paper No.64, p.150.

Local name : Ghero/Gharua.

D.1/5-6/0; P.1/7; V.6; A.3/30-38.

Diagnostic characters : Length of head 5 to 5.5 in total length, eyes 2.5 to 3 in head length, ventro laterally placed with broad circular adipose lids; 4 pairs of barbels-maxillary larger than head, median longitudinal groove on the head broad, shallow and reaches to the base of occipital process; pectoral spine larger and stronger than the head, caudal deeply forked.

Colour : Silvery, greenish along the back; 3 to 4 longitudinal bands on sides formed due to black dots, a pale golden stripe along lateral line ending in a round black spot at caudal fin base.

Size : Maximum length recorded being 15.0cm.

Distribution : India, Bangladesh, Pakistan, Burma. Found in Hooghly and Matla river systems in West Bengal.

Remarks : Not liked locally. This fish is often mistaken by the buyers as 'Gharua' (*Clupisoma garua* -not taken being a 'foul feeder' all over West Bengal).

Genus *Silonia* Swainson, 1839

1839. *Silonia* Swainson, *Nat.Hist.Fish.Animal.*, 2, p.305 (type-*Pimelodus silondia* Hamilton., by subsequent designation).

113. *Silonia silondia* (Hamilton)
(Fig. 68)

1822. *Pimelodus silondia* Hamilton, *Fish.Ganges*, pp.160, 275, pl.7, fig.50 (type locality-Gangetic estuaries).

1977. *Silonia silondia*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.10, p.25.

Local name : Shilong/Dhayan/Dhann.

D.1/7; P.1/11-13; V6; A.40-46; C.17.

Diagnostic characters : Length of head 5.2 in total length, eyes 4 to 4.5 in head length broad snout with lower jaw longer, gape of mouth wide with cleft of mouth not extending to below eye, a pair of minute maxillary barbels, dorsal spine weak, finely serrated; pectoral spine stronger, serrated; caudal fin forked.

Colour : Silvery body with head and back dusky green, opercle and sides tinged with orange and yellow, caudal fin with a light red band.

Size : Maximum length recorded being 90.0cm.

Distribution : India, Pakistan, Bangladesh, Burma.

Remarks : In India mainly confined to North India. Mostly found at the estuaries of large rivers and tributaries. A good eating fish. Lives in rivers as well as tanks and reservoirs.

Family PANGASIIDAE

Genus *Pangasius* Valenciennes, 1840

1840. *Pangasius* Valenciennes, *Hist.Nat.Poiss.*, 15, p.45 (type-*Pimelodus pangasius* Hamilton, by original designation).

114. *Pangasius pangasius* (Hamilton)

1822. *Pimelodus pangasius* Hamilton, *Fish.Ganges*, pp.163, 376, pl.33, fig.52 (type locality-Estuaries of Bengal).

1977. *Pangasius pangasius pangasius*, Jayaram, *Rec.zool.Surv. India*, Occ.Paper No.10, p.26.

Local name : Pangash.

D.1/70; P.1/12-13; V.6; A.4-5/26-29; C.19.

Diagnostic characters : Length of head 5.5 to 6 in total length, eyes on the anterior part of head (lower surface), upper jaw longer, head blunt and moderately sized, distinctly granulated; snout rounded with thin lips, small teeth, 2 pairs of barbels-maxillary extends to pectoral base, adipose dorsal short and posteriorly free, caudal deeply forked, complete lateral line, dorsal and pectorals strongly serrated.

Colour : Silvery, dusky or yellowish green above; sides shot with purple, cheeks and under surface of head golden.

Size : Maximum length recorded 1.2m.

Distribution : India, Pakistan, Bangladesh, Burma, Thailand, Malaya, Java.

Remarks : This fish can be easily spotted in the fish markets by its typical golden cheeks and under surface of head (remains even under iced condition); the significant purple sides generally found in fresh condition only. A typical riverine fish, rarely found in tributaries. Found casually in the local fish markets, mostly imported from outside West Bengal states.

Fig. 65

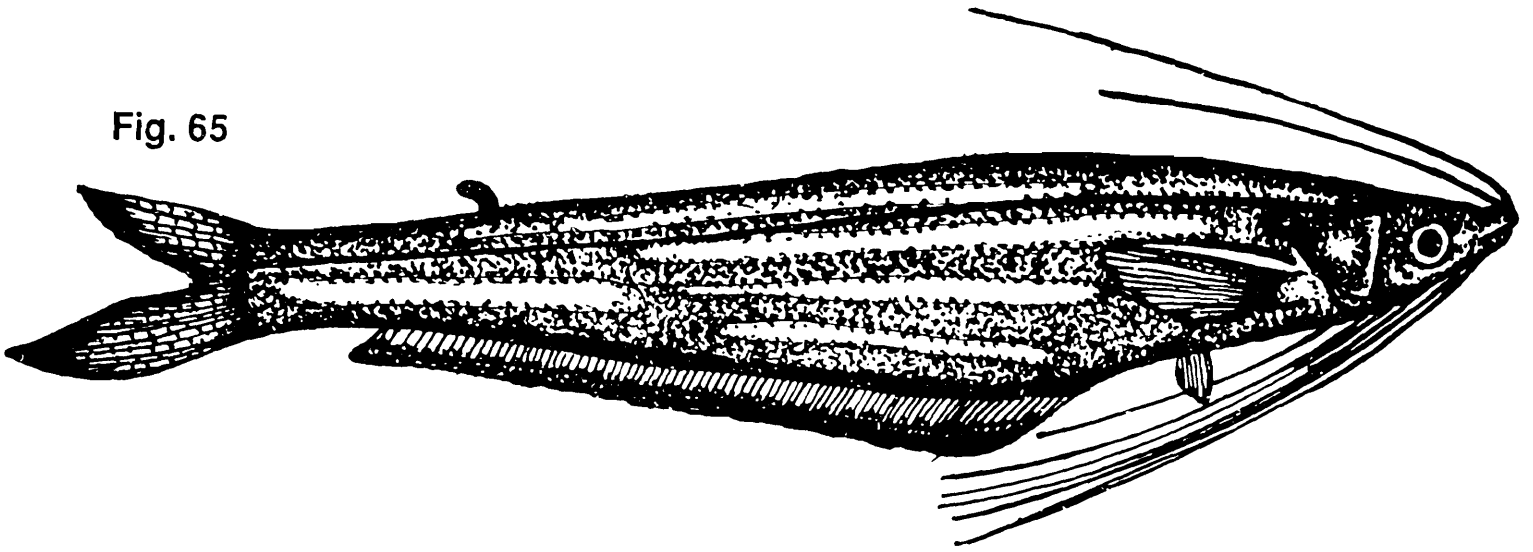


Fig. 66

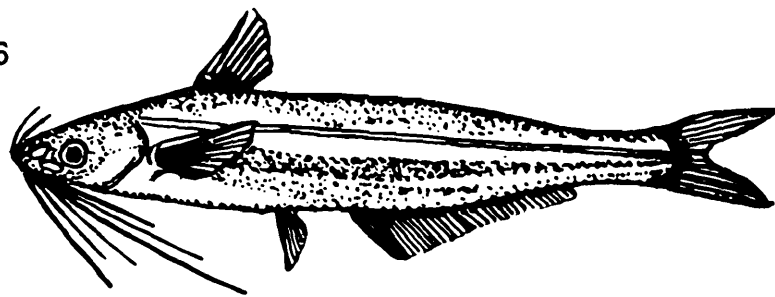


Fig. 67

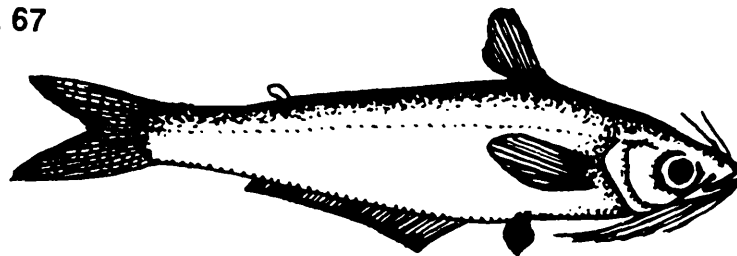


Fig. 68

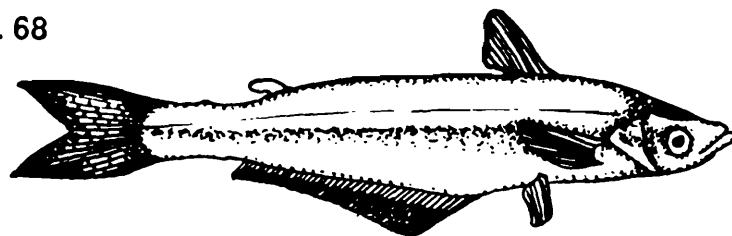


Fig. 65. *Ailia coila* (Ham.); Fig. 66. *Clupisoma garua* (Ham.); Fig. 67. *Eutropiichthys vacha* (Ham.);
Fig. 68. *Silonia silondia* (Ham.).

Family AMBLYCIPITIDAE

Genus *Amblyceps* Blyth, 18581858. *Amblyceps* Blyth, *Proc.Asiat.Soc.Beng.*, 27, p.281 (type-*Pimelodus mangois* Hamilton).115. *Amblyceps mangois* (Hamilton)1822. *Pimelodus mangois* Hamilton, *Fish.Ganges*, pp.199,379 (type locality Northern Bihar).1977. *Amblyceps mangois*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.10, p.29.1985. *Amblyceps mangois*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.152, fig.81.

D.1/6/0; P.1/7; V.6; A.2-3/7-9; C.19.

Diagnostic characters : Length of head 6.2 in total length, small eyes with wide mouth and lower jaw longer, body tapering uniformly from head to tail, no lateral line, adipose dorsal fin with broad base, caudal deeply forked with upper lobe longer.

Colour : Brownish grey, lighter beneath.

Size : Maximum length recorded 12.5cm.

Distribution : West Bengal (Darjeeling Dt.), all along the foot-hills of the Himalayas, Bihar, Assam, Nepal, N. Burma. Found in Tista river system in West Bengal.

Remarks : In general looking may be confused with *Olyra* but can be easily distinguished from it by its body shape, number of anal rays (9-12 vs. 17-19). Live in torrential waters.

Family SISORIDAE

Genus *Bagarius* Blecker, 18531853. *Bagarius* Blecker, *Verh.Bat.Gen.*, 25, p.121 (type-*Pimelodus bagarius*).116. *Bagarius bagarius* (Hamilton)

(Fig. 69)

1822. *Pimelodus bagarius* Hamilton, *Fish.Ganges*, pp.186, 378, pl.7, fig.62 (type locality-the Ganges).1979. *Bagarius bagarius*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.14, p.8.1985. *Bagarius bagarius*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.155, fig.82.

Local name : Bagha-Arr.

D.1/6/0; P.1/12; V.6; A.3/10-12; C.17.

Diagnostic characters : Length of head 3.7 in total length (without prolongation of caudal ray), depressed; upper jaw longer, small eyes, gape of mouth shorter, half of head length; 4 pairs of barbels-maxillary with broad bases, pectoral spine shorter and serrated; dorsal spine smooth, dorsal profile slightly arched, caudal fin deeply forked with prolonged upper lobe.

Colour : Distinctly marked with black bands and irregular brown and black blotches, greyish yellow body with scabrous skin.

Size : Maximum length recorded being 2.2m.

Distribution : West Bengal, N. India, Assam, Orissa, Bihar, Manipur, Maharashtra, Deccan, Burma, Nepal, Bangladesh, Pakistan, Thailand, Malaya. Found in Hooghly river system in West Bengal.

Remarks : Only known valid species under this genus; not a good eating fish due to its stiff and fibrous yellowish red flesh generally taken by poorer section. Also avoided by the local consumers due to its awful ugly looking and giant size.

Key to the species of genus *Conta*

Least height of caudal peduncle 5 to 8 in its length; pelvic origin below middle of rayed dorsal fin.....*Conta conta*

Least height of caudal peduncle 2.2 in its length, pelvic origin below last dorsal fin ray*Conta elongata*

Genus *Conta* Hora, 1950

1950. *Conta* Hora, *Rec.Indian Mus.*, 47, p.194 (type-*Pimelodus conta* Hamilton, by original designation).

117. *Conta conta* (Hamilton) (Fig. 70)

1822. *Pimelodus conta* Hamilton, *Fish.Ganges*, p.191 (type locality-River Mahananda, N. E. Bengal).

1979. *Conta conta*, Jayaram, *Rec.Zool.Surv.India*, Occ.Paper No.14, p.21, fig.14.

1985. *Conta conta*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.157, fig.83.

Local name : Kuta-kanti.

D.1/6/0; P.1/6; V.6; A.3/7-8; C.15.

Diagnostic characters : Length of head 5 in total length, median longitudinal groove on the head deep and extends to the base of the occipital, adhesive apparatus well developed, 4 pairs of barbels, strong dorsal spine nearly as long as head length, rugose anteriorly; pectoral spine shorter, denticulated internally; caudal fin rays greatly elongated, caudal deeply forked, upper lobe with a prolongation.

Colour : Yellowish brown with dark bands or blotches, black bands on fins.

Size : Maximum length recorded being 10.2cm.

Distribution : West Bengal, Naga-Hills, Assam.

Remarks : Mainly confined to N. Bengal (Darjeeling-Himalayas). A small fish typically adapted to torrential waters without food value.

118. *Conta elongata* (Day)

1871. *Hara elongata* Day, *Proc.Zool.Soc.* London, p.704 (type locality-Garo-hills, Assam).

1979. *Conta elongata*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.14, p.22.

1981. *Conta elongata*, Jayaram, *F. W. Fishes of India*, Handbook No.2, Calcutta, Z.S.I, p.247.

Local name : Kurkati/Karati.

D.1/6/0; P.1/6; V.6; A.3/7; C.17.

Diagnostic characters : Length of head 6.5 in total length, adhesive apparatus feebly developed, least height of caudal peduncle 2.2 in its length, pelvic origin below last dorsal fin ray, caudal fins prolonged.

Size : Maximum length recorded being 7.8cm.

Distribution : West Bengal (Darjeeling Dt.), Garo-hills, Meghalaya. Bangladesh.

Remarks : Live in torrential waters of N. Bengal only.

Genus *Erethistes* Muller & Troschel, 1845

1845. *Erethistes* Muller and Troschel, *Horae Ichthyol.*, 3, p.12, pl.1, fig.3 (type-*Erethistes pussilus* Muller and Troschel, by monotypy).

119. *Erethistes pussilus* Muller & Troschel

1845. *Erethistes pussilus* Muller & Troschel, *Horae Ichthyol.*, 3, p.12, pl.1, fig.3 (type locality-Assam).

1979. *Erethistes pussilus*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.14, p.15, fig.11.

1985. *Erethistes pussilus*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.158.

D.1/6; P.1/5-6; V.1/5; A.3/8; C.15.

Diagnostic characters : Length of head 3.6 to 4.3 in standard length, small eyes, 4 in snout length; hard triangular as broad as long, coarsely roughened snout with ridge on it ends in a point over the snout, gill openings narrow and separated from each other, dorsal fin with roughened and denticulated spine, pectorals with strong spines and extended to pelvic fin, body with 4 or 5 rows of tubercles, paired fins not plated below.

Colour : Brownish.

Size : Grows to 4.0cm in length.

Distribution : West Bengal (Darjeeling Dt.), Assam, Bihar, Orissa. Burma, Bangladesh.

Genus *Erethistoides* Hora, 1950

1950. *Erethistoides* Hora, *Rec.Indian Mus.*, 47, p.190 (type-*Erethistoides montana* Hora, by original designation).

120. *Erethistoides montana montana* Hora

1950. *Erethistoides montana* Hora, *Rec.Indian Mus.*, 47, p.191, pl.1, figs.10-12 (type locality-Tangla streams, Darang district, Assam).

1979. *Erethistoides montana montana*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.14, p.16.

1985. *Erethistoides montana montana*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.157.

D.1/5; A.9; P.1/6; V.6; C.13.

Diagnostic characters : Length of head 4.2 in total length, body greatly depressed and elongated, covered with small backwardly directed spines on the dorsal surface; flat and horizontal abdomen, snout projecting like a broad hood in front of mouth, small eyes dorsolaterally placed in the posterior half of head, gill-membranes fused with isthmus, pectoral spine strongly serrated along anterior margin, spine tips produced into a filiform process, emarginate type of caudal fin.

Colour : Dusky white dorsally and whitish below (sometime yellowish-white), body with 3 bands, a dark band on nape, dorsal and caudal fins banded.

Size : Grows to 3.08cm in total length.

Distribution : Assam, West Bengal (Darjeeling-Himalayas).

Remarks : Found to live in torrential waters without any fishery value.

Genus *Euchiloglanis* Regan, 1907

1907. *Euchiloglanis* Regan, *Rec.zool.Surv.India, India Mus.*, 1, p.158 (substitute name for *Chimarrhichthys* Sauvage, type-*Euchiloglanis davidi* Sauvage).

121. *Euchiloglanis hodgarti* (Hora)

1923. *Glyptosternum hodgarti* Hora, *Rec.Indian Mus.*, 25, p.38, pl.2, figs.1, 2, 3 [type locality-Nepal(Pharping), Darjeeling and Abor-hills].
 1979. *Euchiloglanis hodgarti*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.14, p.50.
 1985. *Euchiloglanis hodgarti*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.160.

D.1/6/0; P.17; V.6; A.2/6; C.13.

Diagnostic characters : Length of head 5 in total length, body tapering towards the tail, flat and wide; 4 pairs of barbels, flattened belly, labial folds broadly interrupted, not reflected round the mouth; chest appears to be a flat adhesive surface bounded by the striated rays of pectoral and pelvic fins, maxillary barbels wide and spreading, adipose dorsal fin long.

Colour : Yellowish brown.

Size : Grows to 10.0cm in length.

Distribution : West Bengal (Darjeeling Dt.), Abor-hills, Meghalaya; U.P. [Kali river at Dharchula (Menon & Sen, 1966)]. Nepal, Bangladesh.

Remarks : Live in torrential waters. This species before 1966 was so far known along the Himalayas only as far westwards as Pharping in the Bhagmati drainage system of eastern Nepal (Hora & Silas, 1952). Our discovery of this species at Dharchula, U.P. in 1966 extended its known range of distribution further westwards along the Himalayas.

Key to the species of genus *Gagata*

- 7 dark bands over body descending up to lateral line, width of head 1.4 to 2.0 in its length, minute nasal barbels..... *Gagata cenia*
 No colour bands over body, head with 1.2 to 1.5 in its length, nasal barbels as long as eye diameter *Gagata gagata*

Genus *Gagata* Bleeker, 1858

1858. *Gagata* Bleeker, *Ichth.Arch.Ind.Prod.*, 1, p.204 (type-*Gagata typus* Bleeker=*Pimelodus gagata* Ham.)

122. *Gagata cenia* (Hamilton)
(Fig. 71)

1822. *Pimelodus cenia* Hamilton, *Fish.Ganges*, pp.174, 376, pl.31, fig.57 (type locality North Bengal).
 1979. *Gagata cenia*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.14, p.10.
 1985. *Gagata cenia*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.161, fig.85.

Local name : Keyakatta/Ketakata

D.1/6/0; P.1/7-9; V.1/5; A.2-3/10-12; C.17-19.

Diagnostic characters : Length of head 4.5 to 5 in total length, small subcutaneous eyes, dorsolaterally placed; body ventrally flattened, head covered with smooth skin with distinct snout and

overhanging mouth, small mouth, horizontal and crescentic; thick lips, fleshy and continuous at the angles of mouth; nasal barbels minute, pectoral fins plain, pelvic fins do not reach anal fin.

Colour : Yellowish brown above becoming silvery below, 3 dark bands on head and 4 on back descending up to lateral line.

Size : Largest recorded length being 15.2cm.

Distribution : West Bengal, Assam, Bihar, Orissa, Punjab, Delhi, U.P. Burma, Nepal, Pakistan, Thailand.

Remarks : Found to live in rivers and rivulets in shallow waters in shoals, can withstand salinity, to some extent.

123. *Gagata gagata* (Hamilton)

1822. *Pimelodus gagata* Hamilton, *Fish.Ganges*, pp.197, 279, pl.39, fig. 65 (type locality-rivers and estuaries of Bengal).

1979. *Gagata gagata* Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.14, p.10.

1981. *Gagata gagata*, Jayaram, *F. W. Fishes of India*, Handbook No.2, Calcutta, Z.S.I., p.239.

Local name : Jungla/Jangla.

D.1/6/0; P.1/9; V.6; A.3-9/11-12; C.19.

Diagnostic characters : Length of head 4.5 to 5 in total, width of head 1.2 to 1.5 in its length, pelvic fins reach anal fin, nasal barbels as long as eye diameter, caudal fin forked, median longitudinal groove on head extends to end of supraoccipital process.

Colour : Opaque yellow becoming dull grey below; no colour bands on body, except caudal fin, all fins coloured black.

Size : Attains to 30.4cm in length.

Distribution : West Bengal, N.India (Ganga and Brahmaputra river systems). Bangladesh, Burma.

Remarks : Live in shoals in shallow torrential rivers and rivulets beset with rock boulders and pebbles.

Key to the species of genus *Glyptothorax*

1. The thoracic adhesive apparatus longer than head, with a deep pit; head greatly depressed, broadly rounded anteriorly..... 2
 - The thoracic adhesive apparatus spindle shaped, longer than broad without a central pit; head bluntly pointed..... 3
2. Skin smooth, maxillary barbels with broad base reaching slightly beyond pectoral base.....
.....*Glyptothorax cavia*
3. Maxillary barbels with broad base reaching anterior margin of eye, skin denticulated, body spindle shaped*Glyptothorax telchitta*
 - Maxillary barbels with broad base reaching middle of pectorals 4

4. Head greatly depressed, longer than broad without a central pit.....
*Glyptothorax conirostrae conirostrae*

Head flattened, pointed anteriorly; the thoracic adhesive apparatus rhomboidal in shape very extensive from tip of pectoral fin base traversing through gill-membranes, maxillary extending beyond pectoral fin base*Glyptothorax horai*

Genus *Glyptothorax* Blyth, 1860

1860. *Glyptothorax* Blyth, *J. Asiat. Bengal*, 29, p.154 (type-*Glyptothorax trilineatus* Blyth by original designation).

124. *Glyptothorax cavia* (Hamilton)

1822. *Pimelodus cavia* Hamilton, *Fish. Ganges*, pp. 188, 378 (type locality-North Bengal).

1979. *Glyptothorax cavia*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.14, p.36.

1985. *Glyptothorax cavia*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No. 64, p.162.

D.1/6/0; P.1/8; V.1/5; A.2/9-10; C.18-21.

Diagnostic characters : Length of head 4.4 in total length, head very large and depressed, broadly rounded anteriorly, covered with bony plates forming ridges; small eyes, sub cutaneous; upper jaw longer, lips papillated, occipital process not reaching the base of dorsal, dorsal with a strong spine, low pectorals with a strong broad spine, adhesive disc on thorax encircling a deep central pit, caudal forked.

Colour : Brownish grey above, dirty yellow beneath and sides; sides and dorsal surface beset with deep coloured spots, bases of fins banded.

Size : Attains to 16.5cm in length.

Distribution : West Bengal, Assam, N. E. states : Burma, Bangladesh and Pakistan.

Remarks : Mostly found confined in the Darjeeling district in hill streams. A typically adapted hill-stream fish.

125. *Glyptothorax conirostrae conirostrae* (Steindachner)

1867. *Glyptosternum conirostrae* Steindachner, *Sitzber.Acad.Wiss.*, 55(1), p.532, fig.2, pl.6, fig.2 (type locality-Simla).

1979. *Glyptothorax conirostrae conirostrae*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.14, p.37.

1981. *Glyptothorax conirostrae conirostrae*, Jayaram, *F. W. Fishes of India*, Handbook No.2, Calcutta, Z.S.I., p.253.

D.1/6/0; P.1/9; V.6; A.2/9-10; C.17.

Diagnostic characters : Length of head 5.2 in total length, upper jaw longer, lips not fringed, occipital process 3 times as long as wide, 4 pairs of barbels-maxillary barbels with broad bases extend to the middle of pectoral fin, adhesive apparatus on thorax large, horse-shoe shaped, convex in front, with a large smooth space inside; smooth skin.

Colour : Brownish with fins stained with yellow and black.

Size : Attains to 10.5cm in length.

Distribution : West Bengal (Mahananda river, Siliguri), Punjab (Kangra valley) : China.

Remarks : Live in torrential rivers and rock-pools at the foot-hills.

Fig. 69

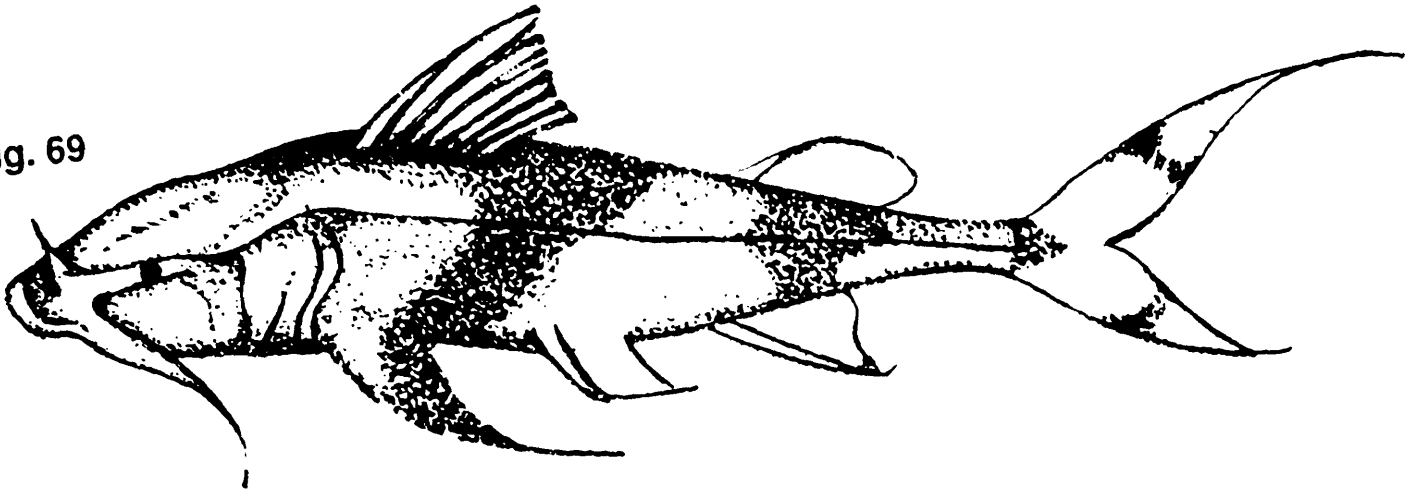


Fig. 70

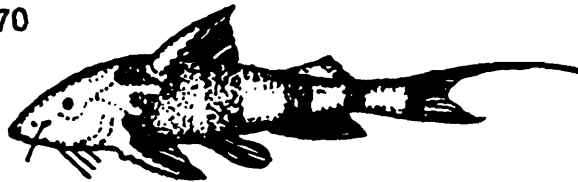


Fig. 71

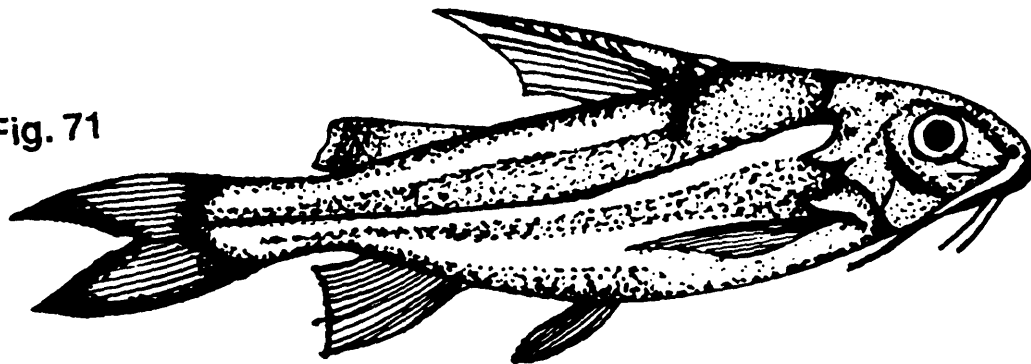
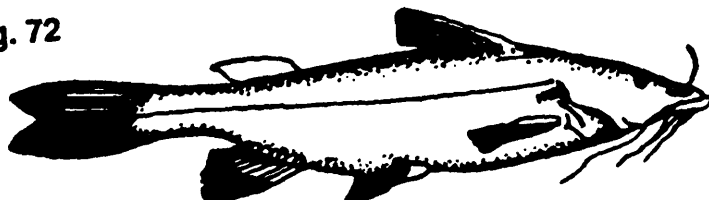
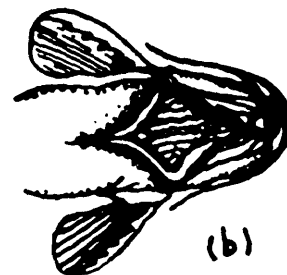


Fig. 72



(a)



(b)

Fig. 69. *Bagarius bagarius* (Ham.); Fig. 70. *Conta conta* (Ham.); Fig. 71. *Gagata cenia* (Ham.); Fig. 72. (a) *Glyptothorax horai* Shaw & Shebicare (b) Adhesive apparatus consists of longitudinal folds on lip and thorax.

126. *Glyptothorax horai* Shaw & Shebbeare
(Fig. 72)

1938. *Glyptothorax horai* Shaw & Shebbeare, *J. Bombay nat.Hist.Soc.*, 39, p.188 (type locality-Streams of Terai, N. Bengal).

1979. *Glyptothorax horai*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.14, p.38.

D.1/5-6; P.1/7-9; V.1/5; A.1/9-10; C.16-18.

Diagnostic characters : Length of head 4.5 in total length, width of head 7 in its total length, 4 pairs of barbels-the outer mandibular pair reach the base of pectorals, pectoral spines strong, adhesive apparatus on thorax very extensive from tip to pectoral base passing through gill-membranes, without any central pit.

Colour : Coppery grey dorsally and sides, pale brownish yellow beneath, fins light coppery tinged, caudal fin spotted.

Size : Attains to 9.0cm in standard length.

Distribution : West Bengal (Darjeeling Dt.), Koshi and Rihand river systems in the Vindhya range of mountains, Eastern-Himalayas. Nepal. Found in Mahananda and Tista river systems in West Bengal.

Remarks : Live in hill-streams; typically adapted to torrential life. Interestingly, the adhesive apparatus is extended to the tip in this species compared to all other species.

127. *Glyptothorax telchitta telchitta* (Hamilton)
(Fig. 73)

1822. *Pimelodus telchitta* Hamilton, *Fish.Ganges*, pp.185, 378 (type locality-Jungipur and Nathpur, Bengal and Bihar).

1979. *Glyptothorax telchitta*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.14, p.47.

1981. *Glyptothorax telchitta*, Jayaram, *F. N. Fishes of India*. Handbook No.2, Calcutta, Z.S.I., p.254.

D.1/6/0; P.1/7-9; V.1/5; A.2/9; C.16-18.

Diagnostic characters : Length of head 5.5 to 5.8 in total length, small eyes, interorbital space flat, upper jaw longer, skin covered with small longitudinally elevated scales, body spindle shaped, without any central pit; barbels shorter than head, caudal peduncle whip like.

Colour : Dark brown above and sides, dirty yellow beneath; head, sides and fins dark spotted; fins with spotted bands.

Size : Grows to 8.6cm in total length.

Distribution : West Bengal (Darjeeling Dt.), U.P., Bihar. Pakistan (Sind, Punjab, Sehwan). Found in Mahananda and Tista river systems in West Bengal.

Remarks : Live in small streamlets, pools connected with Terai and Duars rivers. A pectoral adhesive apparatus is interestingly present in this species.

Key to the species of genus *Hara*

1. Occipital process not reaching basal bone of dorsal fin, pectoral spine equal or slightly longer than head length, not very long.....2

Occipital process reaching basal bone of dorsal fin, pectoral spine very long, 1.5 in head length...
.....3

2. Median longitudinal groove on head short..... *Hara hara*

Median longitudinal groove short, not reaching the base of occipital process; occipital process not reaching basal bone of dorsal fin.....*Hara horai*

Genus *Hara* Blyth, 1860

1860. *Hara* Blyth, *J.Asiat.Soc.Bengal.*, 29, p.151 (type-*Hara buchani* Blyth=*Pimelodus hara* Ham.).

128. *Hara hara* (Hamilton)

1822. *Pimelodus hara* Hamilton, *Fish.Ganges*, p.190 (type locality-R. Koshi).

1979. *Hara hara*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.14, p.19.

1985. *Hara hara* Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.165.

D.1/6/0; P.1/6; V.6; A.3/7-8; C.15.

Diagnostic characters : Length of head 4.3 in total length, small head, snout obtusely sharp, not pointed; depressed body, broadly conical and ventrally flattened; subcutaneous small eyes, 9 in head length; occipital, cleithral and scapular processes prominent and naked; humeral process prominent on ventral side, four pairs of barbels, all annulated, maxillary pair with broad cutaneous flaps at their bases; dorsal and pectoral spines strongly serrated, caudal fin deeply lunate type, no thoracic adhesive apparatus, median longitudinal groove on head short.

Colour : Yellowish brown with broadly marked cross bands, fins with small cross bands.

Size : Attains to 13.5cm in total length.

Distribution : West Bengal (Darjeeling Dt.), Assam, Orissa, Gangetic provinces. Burma. Found in Mahananda and Tista river systems in West Bengal.

Remarks : A typically adapted fish to torrential waters without any fishery value. Live in hill-streams and pools in N. Bengal regions.

129. *Hara horai* Misra

1976. *Hara horai* Misra, *Fauna of India*, Pisces, Ed.2, 3, p.245, pl.1x, figs.1-9.

1979. *Hara horai*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.14, p.20.

D.2/6/0; P.1/6; V.6; A.2/8; C.17.

Diagnostic characters : Length of head 4.2 in total length, eyes small, subcutaneous, 9 in head length; skin thickly tuberculated, maxillary barbels with broad bases, reaching pectoral base; medial longitudinal groove not reaching the base of occipital process, no thoracic adhesive apparatus, dorsal fin with a strong serrated spine (internally), equal to head; occipital process not reaching basal bone of dorsal fin, ventral surface with glandular pores, caudal forked with lower lobe longer.

Size : Largest recorded length being 8.0cm.

Distribution : West Bengal (Terai and Duars) (Darjeeling Dt.).

130. *Hara jerdoni* (Day)

1870. *Hara jerdoni* Day, *J. Asiat.Soc.Beng.*, 39, p.39 (type locality-Sylhet now in Bangladesh).

1979. *Hara jerdoni* Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.14, p.19.

1985. *Hara jerdoni*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.166.

D.1/5/0; P.1/6; V.6; A.10; C.12.

Diagnostic characters : Length of head 3.5 to 3.7 in total length, snout depressed, pointed bluntly; subcutaneous small eyes-7.5 in head length, smooth skin, round abdomen, pectoral spine very long, occipital process reaching basal bone of dorsal fin, median longitudinal groove on head long, scapular and cubito-humeral processes well developed, no thoracic apparatus, rayed dorsal with a strong serrated spine (internally), caudal forked.

Colour : Brownish with irregular cross bands on body.

Size : Attains to 4.0cm in length.

Distribution : West Bengal (Darjeeling Dt.), Bihar, Assam. Bangladesh.

Remarks : Very much slippery when freshly caught and touched, may be due to the presence of large number of glandular pores on the ventral surface. Live in torrential waters, small sized bony fish without any fishery value.

Genus *Pseudecheneis* Blyth, 1860

1860. *Pseudecheneis* Blyth, *J. Asiat.Soc.Beng.*, 29, p.154 (type-*Glyptosternon sulcatus* McClelland).

131. *Pseudecheneis sulcatus* (McClelland) (Fig. 74)

1842. *Glyptosternon sulcatus* McClelland, *Calcutta J.nat.Hist.*, 2, p.578, pl.6 (type locality-Khasi Hills, Assam).

1979. *Pseudecheneis sulcatus*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.14, p.57.

1985. *Pseudecheneis sulcatus*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.167, fig.86.

D.1/6/0; P1/13; V.1/5; A.2-4/7-9; C.17.

Diagnostic characters : Length of head 6 in total length, small eyes-12.5 in head length, short head provided with a broad, oval adhesive apparatus ventrally composed of a series of transverse plates; thick lips, papillated and continuous around mouth; small inferior mouth, 4-pairs of barbels, gill-membranes united with each other with isthmus.

Colour : Darkish with some large irregular yellowish blotches, fins yellowish with black bands.

Size : Attains to 18.0 cm in length.

Distribution : West Bengal (Darjeeling Dt.), Meghalaya (Khasi Hills). Nepal (Himalayas).

Remarks : A typically adapted hill-stream fish, specially noted for its 14 horizontal ventral plates or folds.

Genus *Sisor* Hamilton, 1822

1822. *Sisor* Hamilton, *Fish.Ganges*, pp.208, 379 (type-*Sisor rhabdophorus* Hamilton, by monotype).

132. *Sisor rhabdophorus* Hamilton

1822. *Sisor rhabdophorus* Hamilton, *Fish.Ganges*, pp.208, 379 (type locality-Northern rivers of Bengal and Bihar).

1979. *Sisor rhabdophorus*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.14, p.58, fig.5A.

D.1/6; P.1/8; V.7; A.2/4; C.11.

Diagnostic characters : Length of head 5.5 in total length, small eyes, elongated body, head with numerous rough ridges, covered by very thin skin; upper jaw longer, lips thick, fleshy and papillated; inferior, small and transverse mouth; 6 pairs of barbels, 5 short mandibular pairs originating from lower labial fold, 5 plates on either side of dorsal fin present, 6 elevated scale-like plates along median line behind fin-last plate in the shape of spine, adipose dorsal fin present in the form of a spine, caudal fin truncate, upper caudal ray prolonged into a very long filament.

Colour : Blackish above, lighter below.

Size : Attains to 20.0cm in length.

Distribution : West Bengal (Darjeeling Dt.), Ganges, Yamuna and Brahmaputra river systems. Pakistan (Indus river system).

Remarks : A typically adapted hill-stream fish specially conspicuous for its prolonged upper caudal rays.

Family CLARIIDAE

Genus *Clarias* Scopoli, 1777

1777. *Clarias* Scopoli, *Introd.Hist.Nat.*, p.445 (type-*Clarias orontis* Gunther).

133. *Clarias batrachus* (Linnaeus)
(Fig. 75)

1758. *Silurus batrachus* Linnaeus, *Syst.Nat.* ed. 10, p.305 (type locality-Asia, Africa).

1980. *Clarias batrachus*, Jayaram, *Rec.zool.Surv.India, Occ.Paper No.23*, p.5, fig.2.

1985. *Clarias batrachus*, Sen, *Fish fauna of assam and the neighbouring N. E. states of India, Rec.zool.Surv.India, Occ.Paper No.64*, p.168, fig.87.

Local name : Magur.

D.62-76; P.1/8-11; V.6; A.45-58; C.15-17.

Diagnostic characters : Length of head 5.6 to 6 in total length, small eyes-8 in head length, upper jaw longer, head and tail vertically and laterally compressed respectively, a long dorsal fin, 4 pairs of barbels-maxillary being the longest reaching base of pectorals, caudal rounded, pectoral spine finely serrated but covered with skin, nostrils wide apart, mouth terminal, accessory respiratory organ present.

Colour : Reddish brown or greyish black uniformly, smooth skinned.

Size : Largest length recorded being 45.7cm.

Distribution : India, Bangladesh, Pakistan, Nepal, Sri Lanka, Burma, Thailand, Malaya, Philippines, Java and Malayasia. Found in Hooghly river system in West Bengal.

Remarks : One of the most commonly found species of siluroids; highly priced for its esteemed rejuvenating vigor and taste. Live in fresh, brackish as well as marshy waters such as lakes, tanks, beels, marshes etc.

Family HETEROPNEUSTIDAE

Genus *Heteropneustes* Muller, 1840

1840. *Heteropneustes* Muller, *Arch.Anta.Physiol.*, p.115 (type-*Silurus fossilis* Bloch, by original designation).

134. *Heteropneustes fossilis* (Bloch)
(Fig. 76)

1794. *Silurus fossilis* Bloch, *Nat.ausl.Fische*, 8, p.46, pl.370, fig.2 (type locality-Tranquebar).
1980. *Heteropneustes fossilis*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.23, p.12, fig.6(A).
1985. *Heteropneustes fossilis*, Sen, *Fish fauna of assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper no.64, p.169, fig.88.

Local name : Singhi.

D.6-7; P.1/7; V.6; A.60-79; C.17-23.

Diagnostic characters : Length of head 5.5 to 7 in total length, wide flat head, small eyes, 4 pairs of barbels-maxillary pair extending to middle of pectoral or to pelvic base, wide gill-opening, gill-cavity with an accessory respiratory apparatus, dorsal much shorter-nearer to snout end than to caudal base, pectorals not reaching pelvics, with a strong serrated poisonous spine; round caudal.

Colour : Dark purplish brown or leaden brown with two yellowish lateral bands in juveniles.

Size : Largest length recorded being 30.4cm.

Distribution : India, Pakistan, Bangladesh, Nepal, Burma, Sri Lanka, China and Thailand. Found in Hooghly river system in West Bengal.

Remarks : Most commonly found species of siluroids all over West Bengal; highly esteemed for its nourishing vigor and good taste. Live in fresh and brackish waters such as lakes, tanks, ponds, beels, marshes. The strong and sharp pectoral spine may cause painful wounds and bleeding if not held properly.

Family CHACIDAE

Genus *Chaca* Gray, 1831

1831. *Chaca* Gray, *Zool.Misc.*, p.9 (type-*Platystacus chaca* Hamilton, by monotypy).

135. *Chaca chaca* Hamilton,

1822. *Platystacus chaca* Hamilton, *Fish.Ganges*, pp.140, 374, pl.28, fig.43 (type locality-north-eastern parts of Bengal).
1980. *Chaca chaca*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.23, p.15, fig.7.
1985. *Chaca chaca*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.171, fig.89.

Local name : Chega/Chaga.

D.1/3-4; P.1/4-5; V.6; A.7-10; C.40-48.

Diagnostic characters : Length of head 3 in total length, small eyes-17 times in head length, flat body, vertically compressed; very large head covered with soft skin, broad and depressed with a very wide mouth-upper surface beset with tubercles and short spines; dorsal and pectoral spines strong enclosed in skin, caudal rounded, maxillary and mandibular barbels very small, body and head with short tentacles.

Colour : Dark brownish, lighter on chin, pectoral and pelvics lighter with dark dots.

Size : Largest length recorded being 20.0cm.

Distribution : West Bengal (Darjeeling Dt.), Assam. Bangladesh, Nepal, Burma, Malaya, Sumatra, Borneo, Malayasia and Banka.

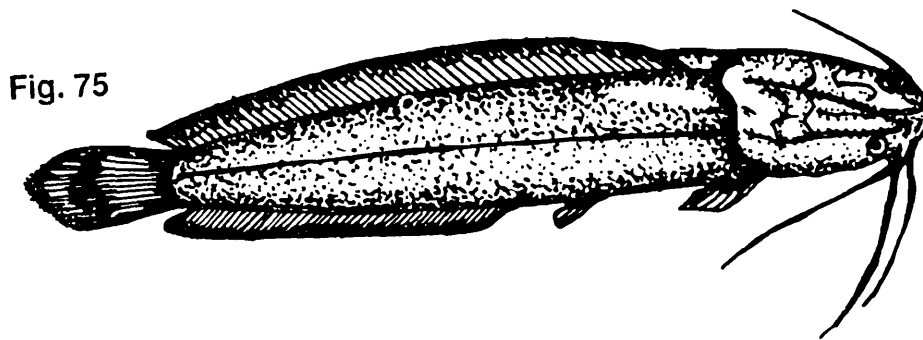
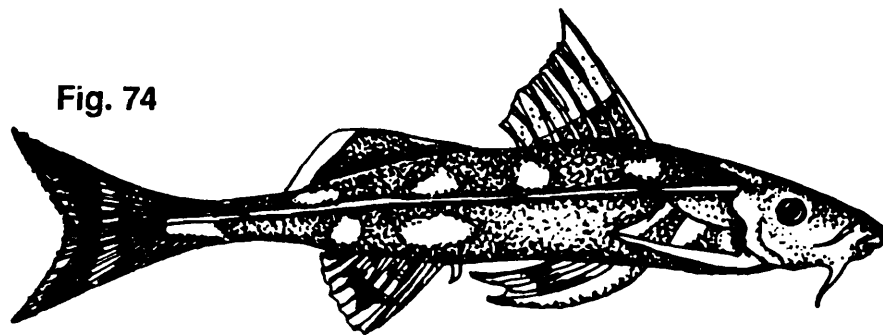
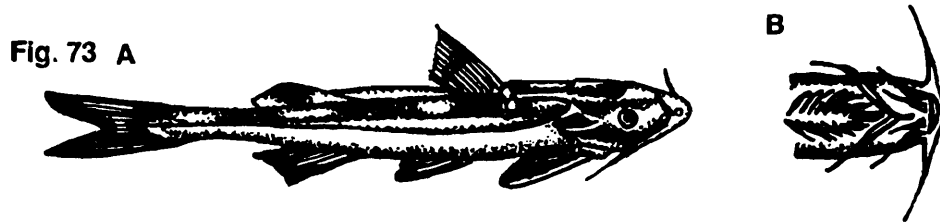


Fig. 73. (a) *Glyptothorax telchitta* (Ham.) (b) Adhesive apparatus on the chest; Fig. 74. *Pseudecheneis sulcatus* (McCl.); Fig. 75. *Clarius batrachus* (Lin.); Fig. 76. *Heteropneustes fossilis* (Bloch).

Remarks : Ugliest fish ever known and seen; it causes wounds to the feet of fishermen with its sharp dorsal spines when remain buried inside the mud. No commercial value. Live in lakes, tanks, tributaries, beels etc.

Key to the species of genus *Olyra*

Body depts 9-11 in S. L., anal fin rays 18-23..... *Olyra longicaudata*
 Body depth 11-12 in S. L., anal fin rays 17-18..... *Olyra kempi*

Family OLYRIDAE

Genus *Olyra* McClelland, 1842

1842. *Olyra* McClelland, *Calcutta, J. Nat.Hist.*, 2, p.588 (type-*Olyra longicaudata* McClelland).

136. *Olyra longicaudata* McClelland

1842. *Olyra longicaudata* McClelland, *Calcutta, J. Nat.Hist.*, 2, p.588, pl.21, fig.1 (type locality-Khasi-hills, Assam).

1980. *Olyra longicaudata*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.23, p.21, fig.10 (A).

1985. *Olyra longicaudata*, Sen, *Fish fauna of assam and th neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.173.

Local name : Bot-singhi.

D.8; P.1/4-6; V.5; A.18-23; C.14-16.

Diagnostic characters : Length of head 7 in total length, depressed, small eyes, subcutaneous, 10 in head length; subequal jaws, fleshy lips, maxillary barbels reaching pectoral base, gill-openings wide, pelvics not reaching anal, dorsal without spine, lanceolate caudal, entire with elongated central rays; elongated body with smooth skin.

Colour : Brownish above and lighter below.

Size : Largest length recorded being 7.3cm.

Distribution : West Bengal (Darjeeling Dt.), Assam. Burma.

Remarks : In West Bengal it is only found in northern regions particularly in the Duars, Terai, Kalimpong and Darjeeling. Taken by the local people as food. Live in torrential rivers and rivulets, rocks-pools etc.

**137. *Olyra kempi* Chaudhuri
(Fig. 77)**

1912. *Olyra kempi* Chaudhuri, *Rec.Indian Mus.*, 7, p.43, pl.11., figs.4, 4a, 4b (type locality-Mangaldai, Assam).

1985. *Olyra kempi*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.174, fig.90.

Local name : Bot-singhi.

D.7/0; P.1/4-6; V.6; A.17-19; C.15-16.

Diagnostic characters : Length of head 7.5 in total length, eyes 4.5 to 5 in head length, body subcylindrical, elongated and compressed; depressed head covered with soft skin, mouth terminal, transverse, upper jaw slightly longer, 4 pairs of barbels-maxillary pair the longest, reaching the base of pectoral fin and sometimes beyond the end of it, wide gill-opening, dorsal origin nearer to adipose

dorsal origin than to snout end, dorsal without spine, pelvics not reaching anal, caudal forked with upper lobe elongated.

Colour : Dark brown above, greyish white below, 3 longitudinal bands, fins dull white.

Size : Grows to 12.0cm in total length.

Distribution : West Bengal (Darjeeling Dt.), Assam.

Remarks : In this species lateral line is marked itself by a dark brown band; head and thorax characterised by pores.

Key to the species of genus *Arius*

Length of head 4.6 in T. L., median longitudinal groove on head rather shallow and does not reach the base of occipital process, teeth on palate villiform..... *Arius arius*

Length of head rather deep and reaches to the base of occipital process, teeth on palate globular...
.....*Arius gagora*

Family ARIIDAE

Genus *Arius* Valenciennes, 1840

1840. *Arius* Valenciennes, *Hist.nat.Poiss.*, 15,p.53 (type-*Pimelodus arius* Hamilton, by tautonymy).

138. *Arius arius* (Hamilton)

1822. *Pimelodus arius* Hamilton, *Fish.Ganges*, pp.170, 376 (type locality-estuaries of Bengal).

1982. *Arius arius*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No. 37, p.16, fig.12.

Local name : Arr/Air.

D.1/7; P.1/10; V.1/5; A.5-6/14-16; C.17.

Diagnostic characters : Length of head 4.6 in total length, eyes 3.5 in head length, median longitudinal groove on head shallow, not reaching occipital base; dorsal with a sharp serrated spine, pectorals reaching pelvic base with a strong serrated spine, pelvics reaching origin of anal fin, maxillary barbel reaching the first third of pectoral fin, caudal forked, smooth skin, upper surface of head with roughened lines, lateral line present.

Colour : Silvery along back, paler on sides and below, pectorals and dorsals edged with black, adipose with a distinct dark spot.

Size : Grows to 18.5cm in length.

Distribution : West Bengal, Orissa, Kerala. Bangladesh, Burma.

Remarks : Can be seen in large number in Calcutta fish markets during winter months from the Sundarban-complex-estuarine zones and Hooghly estuaries. Commercially less important because of its fibrous flesh. Live in big rivers and estuaries.

139. *Arius gagora* (Hamilton)

1822. *Pimelodus gagora* Hamilton, *Fish.Ganges*, pp.167, 376 (type locality-estuaries of Bengal).

1982. *Arius gagora*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.37, p.22.

Local name : Arr/Acir.

D.1/7; P.1/10; V.1/5; A.5-6/12-13; C.17.

Diagnostic characters : Length of head 6.7 in total length, eyes 7 to 8 in head length, depressed head, upper jaw longer, medial longitudinal groove narrow, deep reaching almost the base of occipital process; maxillary barbels shorter, dorsal with a serrated sharp spine, origin nearer to snout end than to caudal base; pectorals with a strong serrated spine, pelvics not reaching anal fin, caudal forked, smooth skin, whole of occipital process granulated, pectoral spine equals dorsal spine length.

Colour : Purplish above, becoming dull white beneath, fins stained with grey externally, adipose dorsal with a blackish spot.

Size : Grows to 45.7cm in length. Found in Hooghly river system in West Bengal.

Distribution : West Bengal, Orissa. Burma, Thailand, Bangladesh.

Remarks : Commonly found in the Calcutta fish markets during winter months collected from Hooghly estuaries and tidal rivers in and around the Sundarbans. Commercially less important due to its tasteless fibrous flesh.

Family PLOTOSIDEA

Genus *Plotosus* Lacepede, 1803

1803. *Plotosus* Lacepede, *Hist.nat.Poiss.*, 4, p.129 (type-*Platystachus anguillaris* Bloch=*Silurus anguillaris* Forskal, by monotypy).

140. *Plotosus canius* Hamilton
(Fig. 78)

1822. *Plotosus canius* Hamilton, *Fish.Ganges*, pp.142, 374, pl.15, fig.44 (type locality-rivers lower Bengal).

1982. *Plotosus canius*, Jayaram, *Rec.zool.Surv.India*, Occ.Paper No.37, p.38, fig.28(B).

Local name : Kan-magur.

D.1/5; D2 + A + C 117 + 124 + 15; P.1/10-11; V.12.

Diagnostic characters : Length of head 4.5 to 5.5 in total length, eyes 10 to 11 in head length, elongated body, transverse mouth bordered by thick, fleshy and papillated lips, 4 pairs of barbels around mouth, maxillary extending to bases of pectoral fins; two dorsal fins, caudal fin pointed confluent with second dorsal and anal fins.

Colour : Dark olive green above and sides, soiled creamy-buff below, barbels and fins greyish.

Size : Grows to 91.5cm in total length.

Distribution : Estuaries of India, Pakistan, Sri Lanka, Bangladesh and Indo-Australian archipelago as far as New Guinea. Found in Hooghly estuaries and Matla river system in West Bengal.

Remarks : Mostly found confined to the estuarine complex zones around the Sundarbans and southern islands of West Bengal. Often mistaken or confused by the local buyers as '*Clarias batrachus*' due to its close similarities with *P. canius*.

Order ATHERINIFORMES

Family BELONIDAE

Genus *Xenentodon* Regan, 1911

1911. *Xenentodon* Regan, *Ann.Mag.nat.Hist.*, (8) 7, p.382 (type-*Belone canicifa* Hamilton, by original designation).

141. *Xenentodon cancila* (Hamilton)

(Fig. 79)

1822. *Esox cancila* Hamilton, *Fish.Ganges*, pp.213, 380, pl.27, fig.70 (type locality-Gangetic provinces).1985. *Xenentodon cancila*, Sen, *Fish fauna of Assam and the neithbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.177, fig.93.*Local name* : Kankley/Kakley.

D.15-18; P.11; V.6; A.16-18; C.15.

Diagnostic characters : Length of head 2.6 in total length, both jaws elongated into a long beak, dorsal and anal fins similar looking and arranged symmetrically close to the tail, eye diameter 3 to 3.2 in head length, a deep median longitudinal groove on upper surface of head, elongated body, caudal fin slightly emarginate, lower jaw longer, last dorsal and anal rays not elongated.

Colour : Greenish-grey above, whitish along the abdomen, a silvery streak with a dark margin extends along the body, dorsal and caudal tipped darker, upper part of body beset with fine black spots.

Size : Largest recorded specimen being 30.4cm in total length.

Distribution : India, Bangladesh, Pakistan, nepal, Sri Lanka, Burma, Thailand and Malay-Archipelago. Found Matla river system in West Bengal.

Remarks : Commercially less important. Live in rivers, lakes, beels and canals.

Family CYPRINODONTIDAE

Genus *Aplocheilus* McClelland, 18391839. *Aplocheilus* McClelland, *Asiat.Res.*, 19, p.301 (type-*Aplocheilus chrysostigmus* McCllid.).142. *Aplocheilus panchax* (Hamilton)

(Fig. 80)

1822. *Esox panchax* Hamilton, *Fish.Ganges*, pp.211, 380, pl.3, fig.69 (type locality-Bengal).1985. *Aplocheilus panchax*, Sen, *Fish fauna of assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.176, fig.92.*Local name* : Te-Chokha.

D.7-11; P.15; V.6; A.15-17; C.13; L.1.31-34.

Diagnostic characters : Length of head 4 to 4.5 in total length, eyes 3.5 in head length, lower jaw longer, pectorals nearly as long as head, ventral small without any elongated ray, anal nearly square, caudal rounded, maxilla reaches to below the first third of the eye.

Colour : Upper surface greyish, becoming dull white on sides and beneath; fins yellowish, lower third of dorsal covered with a large black spot, dorsal, caudal and anal fins with orange margins.

Size : Largest specimen recorded being 8.9cm in total length.

Distribution : Fresh and brackish waters of West Bengal, U.P., Punjab, Assam, M.P., Andamans, Orissa. Bangladesh, Pakistan, Burma, Sri Lanka, Malay, Thailand.

Remarks : Greatly esteemed indigenous larvivorous fish of India known for its utility for malarial control. Commonly found in ditches and stagnant waters. Always found in soals.

Fig. 77

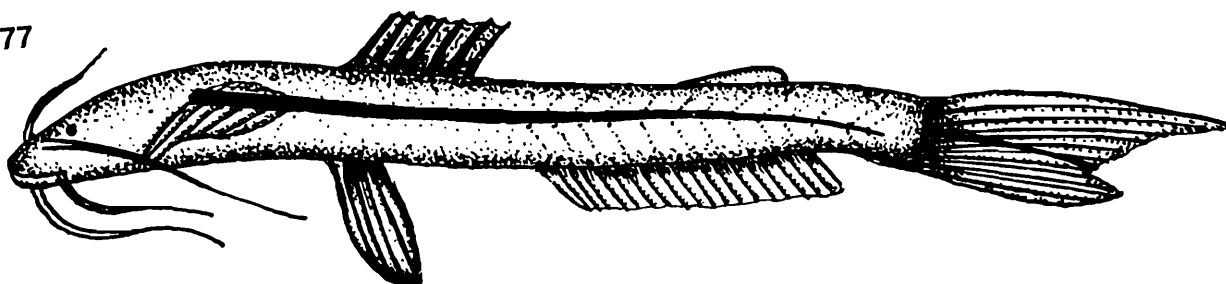


Fig. 78

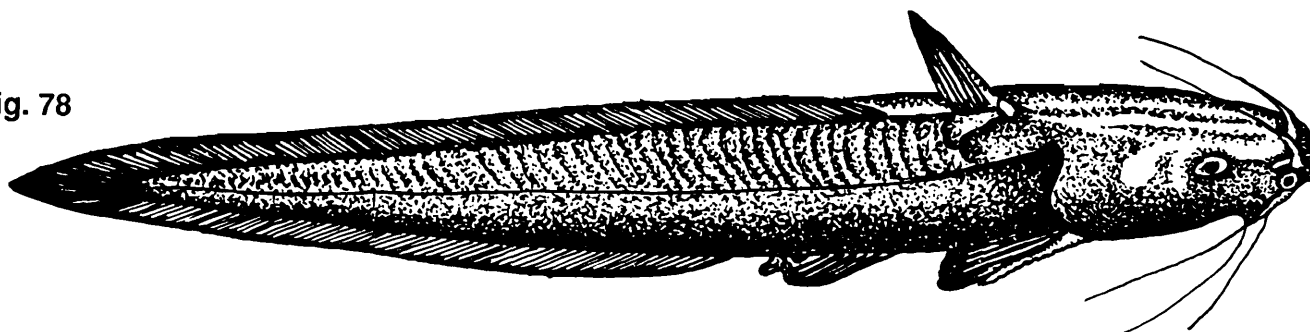


Fig. 79

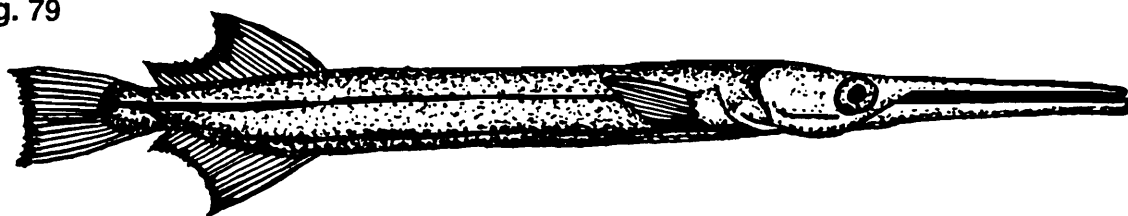


Fig. 80

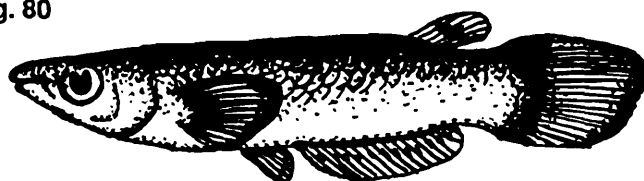


Fig. 77. *Olyra kempfi* (Chaudhuri); Fig. 78. *Plotosus canius* (Ham.); Fig. 79. *Xenentodon cancila* (Ham.); Fig. 80. *Aplocheilus panchas* (Ham.).

Genus *Oryzias* Jordan and Snyder, 1906

1906. *Oryzias* Jordan and Snyder, *Proc. U.S., Nat.Mus.*, 31, 1486, p.289 (type-*Poecilia latipes* Temminck and Schlegal).

143. *Oryzias melastigma* (McClelland)

1838. *Aplocheilus melastigma* McClelland, *Asiat.Res.*, pp.301, 427, pl.42, fig.3, pl.35, fig.4 (type-locality-Calcutta).

1981. *Oryzias melastigma*, Jayaram, *F. W. Fishes of India*, Handbook No.2, Calcutta, Z.S.I., p.296. D.6-7; P.15; V.6; A.20-24; C.15; L.1.27.

Diagnostic characters : Length of head 4.2 in total length, eyes 3 in head length, lower jaw slightly longer, pectoral as long as the head, small ventral, without any prolonged ray; caudal rounded, maxilla does not reach to below front edge of the eye.

Colour : Dull green above, pale white on the abdomen, outer portion of anal rays white edged, a narrow dark line along the middle of the body terminating to a dull spot at the base of caudal.

Size : Grows to 3.8cm in total length.

Distribution : West Bengal, Kerala, Tamil Nadu. Bangladesh, Burma, Thailand.

Remarks : Found to live in tanks, ponds, beels, ditches and stagnant waters, feeding upon larvae of aquatic insecta and mosquito-larvae-a known larvivorous fish. No commercial value except rarely used as aquarium fish. Always found in soals over the surface of water.

Family POECILIDAE

Genus *Gambusia* Poey

1854. *Gambusia* Poey, *Mem.Hist.Nat.Cuba*, 1, p.382 (type-*G. punctata* Poey, Orthotypic).

144. *Gambusia affinis patruelis* (Baird & Girard)

1853. *Heterandria patruelis* Baird and Girard, *Proc.Acad.nat.Sci., Philad.*, 6, p.390 (type locality-Rio Sabinal, Texas).

1981. *Gambusia affinis patruelis*, Jayaram, *F. W. Fishes of India*, Handbook No.2, Calcutta, Z.S.I., p.297.

D.1/13; P.1/15; V.9; A.8-10; L.1.32.

Diagnostic characters : Length of head 3.6 in total length, eyes 3 in head length, dorsal origin towards the caudal fin base, long anal process in the males, teeth conical and fixed, caudal peduncle longer than head, caudal rounded.

Colour : Uniform brownish olive, whitish below, faint dark lines and irregularly dotted marks on the body, dorsal and caudal fins with 2 or 3 cross bands.

Order GASTEROSTEIFORMES

Family SYNGNATHIDAE

Genus *Dorichthys* Kaup, 1853

1853. *Dorichthys* Kaup, *Arch.naturg.*, 19, pl.1, p.233 (type-*Doryichthys bilineatus* Heckel).

145. *Dorichthys deocata* (Hamilton)

(Fig. 81)

1822. *Syngnathus deocata* Hamilton, *Fish.Ganges*, pp.14, 363 (type locality-N. Bihar & Bengal).

1981. *Dorichthys deocata*, Jayaram, *F. W. Fishes of India*, Handbook No.2, Calcutta, Z.S.I., p.302.

D.30; P.15-Osseous rings 16 (on the body) + 32 (on tail).

Diagnostic characters : Length of head 7.5 in total length, body long, slender and sub-cylindrical with osseous rings, snout produced with small terminal mouth, dorsal in opposite to the vent covering 8 rings-2 before and 6 after the vent, caudal is very short, pelvic fins absent, anal present but very short.

Colour : Generally brown, bright red under the lateral line and dotted with blue; the female is orange in ground colour; each segment is ornamented with brown, olive and mauve.

Size : Attains to 11.5cm (male) and 14cm (female) in total length

Distribution : Small rivers of Terai, Duars, darjeeling (Darjeeling Dt.), Bihar : Bangladesh.

Remarks : A typical fish, commonly known as 'Pipe-fish'; conspicuous for its body rings. The male is smaller than the female and has a long groove on the abdomen to carry the eggs until they are hatched. Live in streams, rivers (torrential), rock-pools etc.

Family CHANNIDAE

Key to the species of genus *Channa*

1. Dark violet, spotted shot with purple, entire back covered with large black blotches; caudal and anal with a red edge 2
8 dark sloping bands with dark circular spots more plentiful above the lateral line, dorsal with a deep blue viridescence along its base with whitish orange along its outer edge, pectoral spotted in zones..... 3
2. Lateral line scales 60-65, dorsal rays 47-52, anal rays 34-36 *Channa barca*
3. Lateral line scales 45-50, anal rays 27, dorsal rays 39-40 *Channa stewartii*
Lateral line scales 60-70, anal rays 28-36, dorsal rays 45-55 4
4. 4 or 5 large ocelli on the lateral line (not present in young ones), a well-marked ocellus on the upper half of the caudal fin base, pectoral not spotted *Channa marulius*
Series of about 8 darker brown bands sloping from back, pectoral with 3 zone of lighter and dark colours..... 5
5. Lateral line scales 40-45, anal rays 21-23, dorsal, rays 32-37 *Channa orientalis*
Lateral line scales 50-57, anal rays 23-26, dorsal rays 37-45 6
6. Bands of grey or black from sides to abdomen, young with a large black ocellus at the end of base of dorsal, fins greyish..... *Channa striatus*
A series of about 8 darker bands above lateral line, fins spotted, lateral line scales 37-40, dorsal rays 29-32, anal rays 21-23..... *Channa punctata*

Order CHANNIFORMES

Family CHANNIDAE

Genus *Channa* Scopoli, 1777

1777. *Channa* Scopoli, *Introd.Hist.Nat.*, p.459 (type-*Channa orientalis* Bl. & Schn.).

146. *Channa barca* (Hamilton)
(Fig. 82)

1822. *Ophiocephalus barca* Hamilton, *Fish.Ganges.*, pp.67, 367, pl.35, fig.20 (type locality-Brahmaputra river near goalpara, Assam).

1985. *Channa barca*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.180, fig.94.

Local name : Baro-cheng.

D.47-52; P.16; V1/5; A.34-36; C.19; L1.60-65.

Diagnostic characters : Length of head 4 to 4.5 in total length, eyes 7 to 7.5 in head length, dorsal commences above the posterior extremity of the opercle, caudal rounded, plate like scales, predorsal scales 15, 9 rows of scales between eye and angle of opercle; anterior portion of scales rather smaller than that of the posterior portion, no barbels.

Colour : Dark violet above, becoming dull white shot with purple below; back and sides beset with large black blotches, dorsal, caudal and anal fins also covered with black blotches with red edges.

Size : Largest specimen recorded being 33.0cm in total length.

Distribution : West Bengal (Darjeeling Dt.), Assam. Bhutan. Found in Mahananda river system in West Bengal.

Remarks : Inhabits banks of rivers, tanks, ponds and beels within dug-out holes watching for its prey with its head out. Noted for its typical colouration. Taken as food by the poorer section.

147. *Channa marulius* Hamilton
(Fig. 83)

1822. *Ophiocephalus marulius* Hamilton, *Fish.Ganges*, pp.65, 367, pl.17, fig.19 (type locality-R. Ganges).

1985. *Channa marulius*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.181.

Local name : Sal/Gajal/Shal.

D.45-55; P.18; V.6; A.28-36; C.14; L.1.60-70.

Diagnostic characters : Length of head 4 to 5 in total length, eyes 1/7 of length of head, maxilla extended to half eye-diameter behind orbit, predorsal scales 16, no barbels, 10 rows of scales between orbit and angle of preopercle, cephalic pits multiple, caudal rounded.

Colour : Varies with environment-generally found with greyish green becoming lighter below, young ones conspicuous with a brilliant orange coloured lateral band, 4 to 5 roundish black blotches on the middle of the body below the lateral line (most significant distinguishing character from all other *Channa* species).

Size : Largest specimen recorded 1.2m. in total length.

Distribution : India, Sri Lanka, Pakistan, Bangladesh, Burma, Thailand and China. Found in Hooghly river systems in West Bengal.

Remarks : Known for its giant size. Generally taken by the poors. Commercially less important as very few take it as food throughout West Bengal purely, on superstitious ground.

Fig. 81



Fig. 82

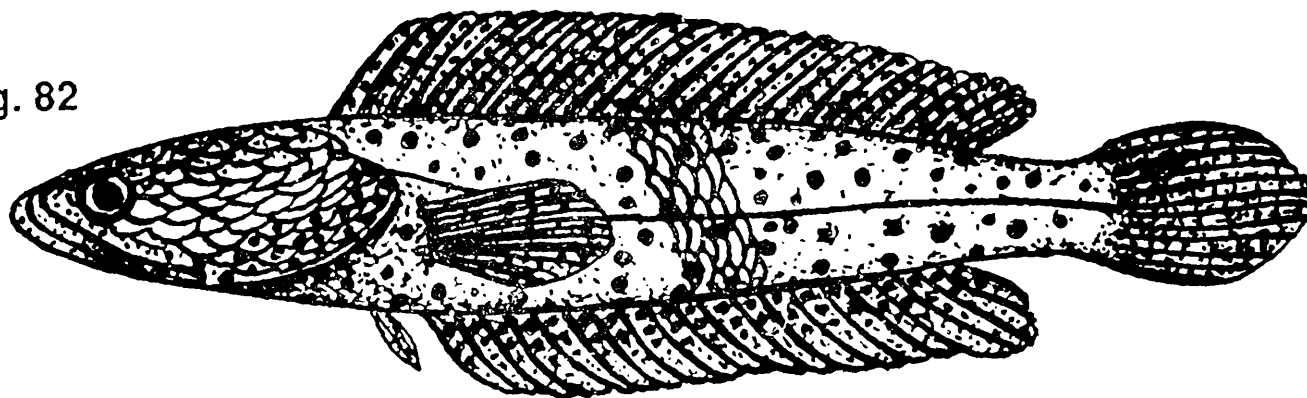


Fig. 83

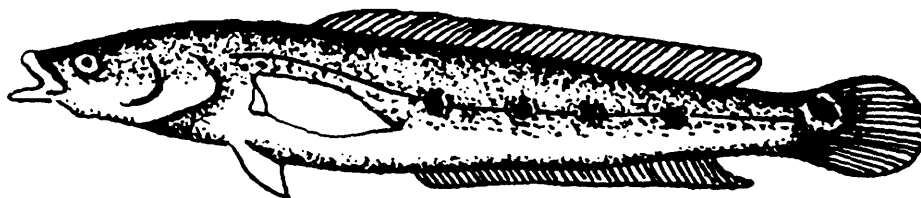


Fig. 84

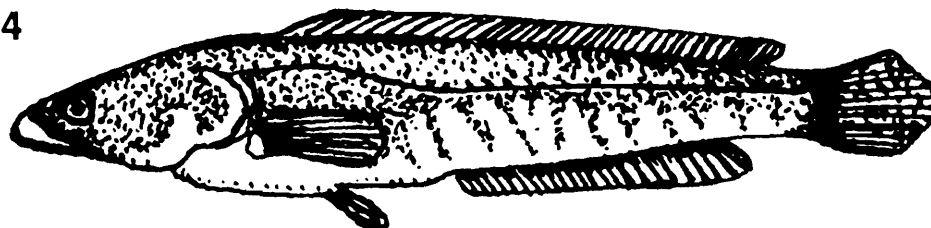


Fig. 81. *Dorichthys deocata* (Ham.); Fig. 82. *Channa barca* (Ham.); Fig. 83. *Channa marulius* (Ham.); Fig. 84. *Channa striatus* (Bloch).

148. *Channa striatus* (Bloch)
(Fig. 84)

1793. *Ophiocephalus striatus* Bloch, *Naturg.Susland.Fishche*, 2, p.141, pl.359 (type locality-Malabar).

1985. *Channa striatus*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.182, fig.95.

Local name : Shol.

D.37-45; P.17; V.6; A.23-26; C.13; L.1.50-57.

Diagnostic characters : Length of head 3.5 to 4 in total length, eyes 1/6 to 1/7 of length of head, lower jaw longer, 9 rows of scales between eye and angle of opercle, predorsal scales 18 to 20, maxillary reaching to below hind border of eye, caudal roundish, no barbels.

Colour : Dark greyish to black above, yellowish white beneath, conspicuous greyish bands descend from side to abdominal region, greyish fins.

Size : Attains to 91.4cm in total length.

Distribution : India, Sri Lanka, Bangladesh, Pakistan, Burma, Malaya Archipelago, Thailand, S. China, Philippine. Found in Hooghly, Damodar and Bhagirathi river systems in West Bengal.

Remarks : This is the most popular fish under this genus all over West Bengal. Commercially important and liked by all in west Bengal for its good taste and less bones. Live in rivers, tanks, beels, ditches, lakes etc. A known predatory fish also.

149. *Channa stewartii* (Playfair)
(Fig. 85)

1867. *Ophiocephalus stewartii* Playfair, *Proc.Zool.Soc.Lond.*, p.14, pl.3 (type locality-Cachar, Assam).

1985. *Channa stewartii*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.183, fig.96.

Local name : Dudu-Cheng.

D.39-40; P.17; V.6; A.27; C.14; L.1.45-50.

Diagnostic characters : Length of head 4 in total length, eyes 6.5 in head length, maxilla reaches beyond the hind border of eye, dorsal fin arises above the base of pectoral fin, scales on the upper surface of head plate like, cauda roundish.

Colour : Purplish black above becoming greyish white on sides and below, many scales with black round marks, fins dark, pectoral base yellowish in young ones with a blue basal blotch or spot, dorsal with yellow margins.

Size : Largest specimen recorded 25.4cm in total length.

Distribution : West Bengal, Eastern Himalajas, Arunachal Pradesh, Meghalaya, Andamans. Nepal. Found in Hooghly and Matla river systems in West Bengal.

Remarks : Not found commonly in West Bengal. Commercially less important. Mostly found in stagnant and muddy waters, dried up beels and swampy areas.

150. *Channa orientalis* (Schneider)1801. *Channa orientalis* Schneider, *Syst.Ichth.Bloch*.p.496, pl.90, fig.2 (type locality-India).1985. *Channa orientalis*, Sen, *Fish fauna of India Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.179.*Local name* : Chang.

D.32-37; P.15; V.6; A.21 + 23; C.12; L.1.40-45.

Diagnostic characters : Length of head 3.5 to 4.2 in total length, eyes 1/6 of length of head, maxilla reaches to below the hind edge of orbit, broad and irregular scales on the upper surface of head, predorsal scales 12, caudal fin roundish.*Colour* : Greenish above with some blackish spots on the body, base of pectoral fin with black bands, dull white or brownish-white on the sides and below.*Size* : Attains to 20.0 cm in total length.*Distribution* : India, Nepal, Pakistan, Bangladesh, Sri Lanka and Burma. Found in all the river systems in West Bengal.*Remarks* : Found to live in tanks, beels, bheries, canals, ponds, ditches, road-side canals. Commercially less important.151. *Channa punctatus* (Bloch)1793. *Ophiocephalus punctatus* Bloch, *Naturg.Ausland.Fishche*, 7, p.139, pl.358 (type locality-Malabar coast).1985. *Channa punctatus*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.182.*Local name* : Layata.

D.29-32; P.17; A.21-23; C.12; L.1.37-40.

Diagnostic characters : Length of head 3.3 to 3.6 in total length, eyes 7 to 8.5 in head length, lower jaw longer, maxillary reaching to below or behind hind border of eyes, predorsal scales 12, cephalic pits simple, five rows of scales between eye and angle of preopercle.*Colour* : Colour changes with environment, generally greenish grey above becoming yellow below, a dark stripe or band along the side of head and several short cross-bands descending from back, pectorals not spotted or striated.*Size* : Attains to 30.4cm in total length.*Distribution* : India, Nepal, Sri Lanka, Bangladesh, Pakistan, Burma, Malaya, China, Tahiti, Polynesia. Found in all the river systems in West Bengal.*Remarks* : A very much commonly seen fish found to live in road-side canals, paddy-fields (during rainy season), tanks, bheries, beels, ponds. Also thrives well in muddy and swampy areas.

Order SYMBRANCHIFORMES

Family SYMBRANCHIDAE

Genus *Monopterus* Lacepede, 18001800. *Monopterus* Lacepede, *Hist.Nat.Poiss.*, 2, p.138 (type-*Monopterus javanensis* Lac.).

152. *Monopterus cuchia* (Hamilton)
(Fig. 86)

1822. *Unibranchapertura cuchia* Hamilton, *Fish.Ganges*, pp.16, 363, pl.16, fig.14 (type locality-S. E. Bengal).

1985. *Monopterus cuchia*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.185, fig.97.

Local name : Kuchey/Kuchia.

A rudimentary dorsal only. P., V., A., and C. absent.

Diagnostic characters : Length of head 6 to 8 in the distance between snout and anus, eye diameter 2 to 3 in snout, an eel-shaped fish with a tapering tail which is flattened in a vertical plane, a single transverse ventral gill-opening, upper jaw slightly longer, fleshy lips, rudimentary dorsal commences slightly before anus, distinct scales longitudinally arranged.

Size : Attains to 60.9cm in total length.

Distribution : Fresh and brackish waters of Punjab, Orissa, West Bengal (Darjeeling Dt. and Sundarban-estuarine-complex zones of S. 24-Parganas Dt.), Assam, Pakistan, Bangladesh, Burma.

Remarks : People reluctant to take it as food probably due to its snake like appearance. Only taken by poorer section. Live in ditches, canals, bheries, beels etc. In summer days they live inside mud-holes near paddy-fields.

Genus *Ophisternon* McClelland, 1845

1845. *Ophisternon* McClelland, *J. nat.Hist.*, Calcutta, 5, p.197 (type-*Ophisternon bengalensis* McClelland, by monotype).

153. *Ophisternon bengalensis* McClelland

1845. *Ophisternon bengalensis* McClelland, *Calcutta, J. nat.Hist.*, 5, pp.197, 200, pl.11, fig.1 (type locality-Calcutta).

1981. *Ophisternon bengalensis*, Jayaram, *F. W. Fish of India*, Handbook No.2, Calcutta, Z.S.I., p.311, fig.174.

All the fins are low, the caudal is hardly conspicuous.

Diagnostic characters : Length of head 9 to 12 in the distance between the end of snout and anus, eyes 20 times in head, a single transverse ventral gill opening, snout anteriorly rounded, fleshy lips, upper jaw slightly longer, cleft of mouth extending to some distance behind the orbits, teeth in jaws fine and pointed, dorsal origin before anal origin, caudal not distinct, all fins low, scales absent, lateral line conspicuous.

Colour : Dull or dirty brownish-red becoming lighter below in estuaries; greyish black or blackish green becoming lightest below in clear waters.

Size : Attains to several feet in length.

Distribution : Estuaries and freshwaters of India (within tidal influence along the coasts). Pakistan, Burma, Sri Lanka, Malaya, Malay-Archipelago, Thailand, Indo-China, Philippines, N. S. and W. Australia,

Remarks : This fish is found more abundantly in West Bengal than in Malabar, particularly in the Sundarban-complex-estuarine zone near the Bay of Bengal. Commercially not important.

Order PERCIFORMES

Family CENTROPOMIDAE

Genus *Lates* Cuvier, 1828

1828. *Lates* Cuvier, *Hist.nat.Poiss.*, 2, p.88 (type-*Perca nilotica* L.)

154. *Lates calcarifer* (Block)

(Fig. 87)

1790. *Holocentrus calcarifer* Bloch, *Naturq.Ausland.Fishche*, 4, p.100, pl.244 (type locality-Japan).

1984. *Lates calcarifer*, Talwar and Kacker, *Commercial seafish of India*, Handbook No.4, p.356, fig.140.

Local name : Bhetki.

D.7-8/1/11-12; P.17; V.1/5; A.3/8-9; C.17; L.1.52-60.

Diagnostic characters : Length of head 3.6 to 4 in total length, eyes 5 to 6 in head, curved sloping snout, maxilla extends to below hind border of eye, preorbital and preopercle finely serrated-the later denticulated at the angle, lower jaw longer, no canines, two dorsals united at their base, the first one with 7-8 spines, caudal rounded, lateral transverse scales 6-7/13.

Colour : Grey shot with green on back, silvery below; sometimes golden tinge observed on the back when extremely fresh in condition.

Size : Attains to 91.4cm in total length.

Distribution : Wide spread in the Indo-Pacific region. Found in Hooghly estuaries and Matla river systems in West Bengal.

Remarks : Found to live in fresh and brackish waters of West Bengal in the Sundarban-estuarine-complex zones. Highly important commercially for its esteemed taste and less bones. Regarded as great delicacy all over West Bengal.

Key to the species of genus *Chanda*

2 or 3 large crooked teeth on either side of the lower jaw, body moderately deep, 2.7 to 3 height of body in T. L..... *Chanda nama*

All the teeth are small, body strongly deep, 2.3 to 2.5 height of body in T. L. *Chanda ranga*

Family CHANDIDAE

Genus *Chanda* Hamilton, 1822

1822. *Chanda* Hamilton, *Fish.ganges*, pp.103, 307 (type-*Chanda nalua* Hamilton).

1971. *Chanda*.Talwar, *Bull.Zool.Nomencl.*, 28, (3-4), pp.104-105 (*Chanda ranqa* Hamilton proposed as type species).

155. *Chanda nama* Hamilton

(Fig. 88)

1822. *Chanda nama* Hamilton, *Fish.Ganges*, pp.109, 371, pl.39, fig.37 (type locality-Bengal).

1985. *Chanda nama*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.187, fig.98.

Local name : Chanda.

D.7/1/13-17; P.13; V.1/5; A.3/14-17; C.17.

Fig. 85

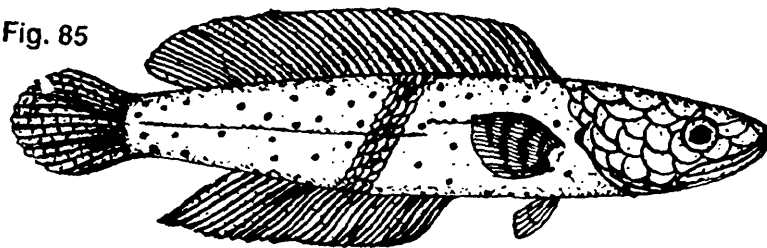


Fig. 86



Fig. 87

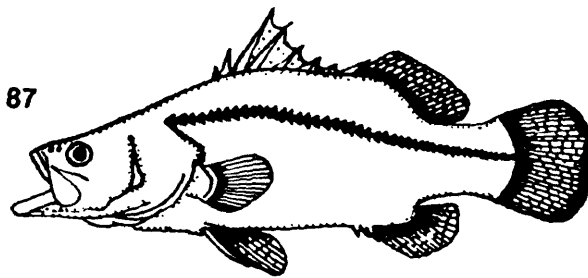


Fig. 88

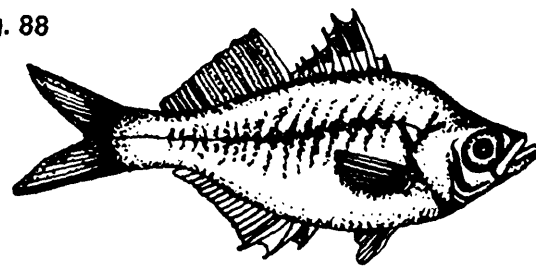


Fig. 85. *Channa stewartii* (Playfair); Fig. 86. *Monopterus albus* (Ham.); Fig. 87. *Lates calcarifer* (Bloch); Fig. 88. *Chanda nama* (Ham.).

Diagnostic characters : Length of head 4 to 4.5 in total length, deep and strongly compressed, laterally flat, dorsal and ventral profiles equally convex, lower jaw longer, maxilla reaching to below first third of eye, two dorsals united at their base, preorbital slightly serrated.

Colour : Yellowish olive (translucent), covered with minute black dots, fins orange.

Size : Largest specimen recorded being 7.6cm in total length.

Distribution : Throughout, India, Nepal, Bangladesh and Burma. Found in Hooghly, Mahananda and Punarbhaba river systems in West Bengal.

Remarks : Not commercially important due to its strong spines and scanty flesh.

156. *Chanda ranga* Hamilton
(Fig. 89)

1822. *Chanda ranga* Hamilton, *Fish.Ganges*, pp.113, 371, pl.16, fig.38 (type locality-Gangetic provinces).

1985. *Chanda ranga*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.188, fig.99.

Local name : Chanda.

D.7/1/13-15; P.11; V1/5; A.3/14-116; C.17.

Diagnostic characters : Length of head 3.2 to 4 in total length, maxilla reaches to below midorbit, small teeth, 2 dorsal united at their base, a recumbent dorsal spine present, body more deeper.

Colour : Olive, vertical fins with grey borders.

Size : Largest specimen recorded 7.2 to 10.2cm in length.

Distribution : Throughout India, Bangladesh, Nepal, Burma, Malaya, Thailand. Found in Hooghly, Mahananda and Punarbhaba river systems in West Bengal.

Remarks : Commercially not important due to its spines and scanty flesh. Morphologically both the *C. nama* and *C. ranga* resemble one another but can be distinguished by the presence of 2/3 large canines in the lower jaw in *C. nama* which are absent in *C. ranga*; more deeper body in *C. ranga* than *C. nama*. The genus *Chanda* is now restricted to its type species *Chanda nama* according to the opinion 121 of the International Commission on Zoological Nomenclature (Talwar, 1971).

Family NANDIDAE

Genus *Badis* Bleeker, 1853

1853. *Badis* Bleeker, *Verh.Bat.Gen.*, 25, p.106 (type-*Labrus badis* Ham.=*Badis buchanani* Blk.).

157. *Badis badis* (Hamilton)

1822. *Labrus badis* Hamilton, *Fish.Ganges*, pp.70, 386, pl.25, fig.23 (type locality-Gangetic provinces).

1985. *Badis badis*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.192.

Local name : Bot-Koi.

D.16-17/7-10; P.12; A.3/6-8; C.16; L.1.26-33.

Diagnostic characters : Length of head 4 to 4.5 in total length, eyes 3 to 3.5 in head length, elongated, laterally compressed body; head scaled, lateral line placed high on the body, interrupted on 8 or 9 scales from the caudal side, caudal rounded.

Colour : Body dark brown or dark green with a series of dark transverse bands, often missing when the fish is fully matured; bluish black spots or blotches on the body, on opercle, caudal fin base, shoulder.

Size : Largest recorded specimen 9.0cm in length.

Distribution : Throughout India, Bangladesh, Pakistan, Nepal, Burma.

Remarks : Commercially not important due to its spinous small body with less flesh. Not found commonly in West Bengal.

Genus *Nandus* Valenciennes, 1831

1831. *Nandus* Valenciennes (in C. & V.), *Hist.Nat.Poiss.*, 7, p. 481 (type-*Nandus marmoratus* Valenciennes).

158. *Nandus nandus* (Hamilton)
(Fig. 90)

1822. *Coius nandus* Hamilton, *Fish.Ganges.*, pp.96, 370, pl.30, fig.32 (type locality-Gangetic provinces).

1985. *Nandus nandus*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.193, fig.101.

Local name : Nadosh/Meni/Bheda.

D.12-14/11-13; V.1/5; A.3/7-9; L.1.46-57.

Diagnostic characters : Length of head 3 in total length, body laterally compressed, deeper with a nearly straight belly and arched back; pointed snout, mouth very much protractile with deep cleft of mouth eyes 5 to 6 in head length, maxilla reaching beyond post orbit, caudal rounded.

Colour : Greenish brown with bronze or brassy reflections (when alive), 3 vertical broad bands or patches on the body, narrow bands or spots across the fins.

Size : Attains to 17.7cm in length.

Distribution : India, Bangladesh, Pakistan, Burma, Thailand and Malaya. Found in Damodar, Hooghly and Bhagirathi river systems in West Bengal.

Remarks : A popular fish throughout West Bengal. Live in beels, tanks, bheries, ditches, rivers (mainly tributaries), paddy-fields (in rainy season), canals and lakes.

Family CICHLIDAE

Genus *Oreochromis* Trewavas, 1983

1983. *Oreochromis* Trewavas, *Bull.Brit.Mus.*, (N.H.), Zool., p.580.

159. *Oreochromis mossambica* (Peters)[†]
(Fig. 91)

1852. *Tilapia mossambica* Peters, *Monatsb.Akad.Wiss.*, Berlin, p.681.

[†]*Tilapia mossambica* (vide, Trewavas, 1983).

1952. *Tilapia mossambica*, Jones and Sarojini, *J.Bombay nat.Hist.Soc.*, **50**(3), fig.7, pl.36, pp.549-609.

1985. *Tilapia mossambica*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.189, fig.100 (= *O. mossambica*, p.12).

Local name : Tilapia/Telapia.

D.14-15/11-12; P.12-13; V.1/5; A.2/11; C.17.

Diagnostic characters : Length of head 4 in total length, deeper body with arched back; snout with a sloping curve, maxilla short, eye diameter 5 in head length, lower jaw slightly longer, cleft of mouth short, lateral line incomplete, caudal subtruncate.

Colour : Olive green with golden tinge (coppery) with each scale with a dark centre, vertical fins blackish with indistinct white spots.

Size : Attains to 23.0cm in length.

Distribution : Fresh and brackish water of India, Thailand, Malayasia, Philippines, Sri Lanka, Bangladesh, S. Africa, U.A.R., Vietnam, Congo, Madagascar, Rhodesia, Tanzania, Uganda, Zambia etc.

Remarks : An introduced fish (a native of the river of the east coast of Africa) found all over West Bengal-commercially less important. Adults are herbivorous but can feed upon worms, insects, crustaceans, fish larvae etc. when food is in great scarcity.

Family MUGILIDAE

Genus *Rhinomugil* Gill, 1863

1863. *Rhinomugil* Gill, *Proc.Acad.nat.Sci., Philad.*, **15**, p.169 (type-*Mugil corsula* Hamilton).

160. *Rhinomugil corsula* (Hamilton) (Fig. 92)

1822. *Mugil corsula* Hamilton, *Fish.Ganges*, pp.221, 381, pl.9, fig.97 (type locality-rivers of the Gangetic provinces and in the southern parts of Bengal).

1981. *Rhinomugil corsula*, Jayaram, *F. W. Fishes of India*, Handbook No.2, Calcutta, Z.S.I., p.346, fig.191.

Local name : Kharsula.

D.4/1/7-8; P.15; V.1/5; A.3/9; C.15; L.1.48-52.

Diagnostic characters : Length of head 4.5 to 4.7 in total length, eye diameter 1/7 of length of head without adipose lids, elevated; flat interorbital space, mouth angular, dorsal profile nearly horizontal, upper jaw longer and overhung by the snout, maxilla reaches to below the middle of the eye, upper lip thick, first dorsal nearer to the base of caudal, caudal slightly emarginate.

Colour : Dull brown superiorly becoming lighter along the abdomen, dorsal and caudal fins stained with grey, eyes golden.

Size : Attains to 45.7cm in length, range from 6.5 to 16.6cm in length.

Distribution : Rivers and estuaries of West Bengal; Bangladesh, Burma. Found in Hooghly estuaries and Matla river systems in West Bengal.

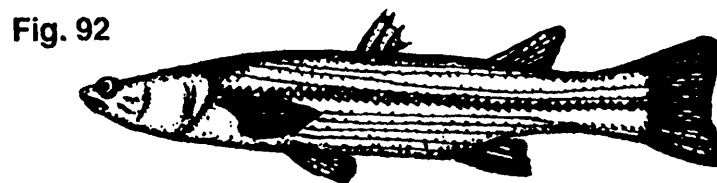
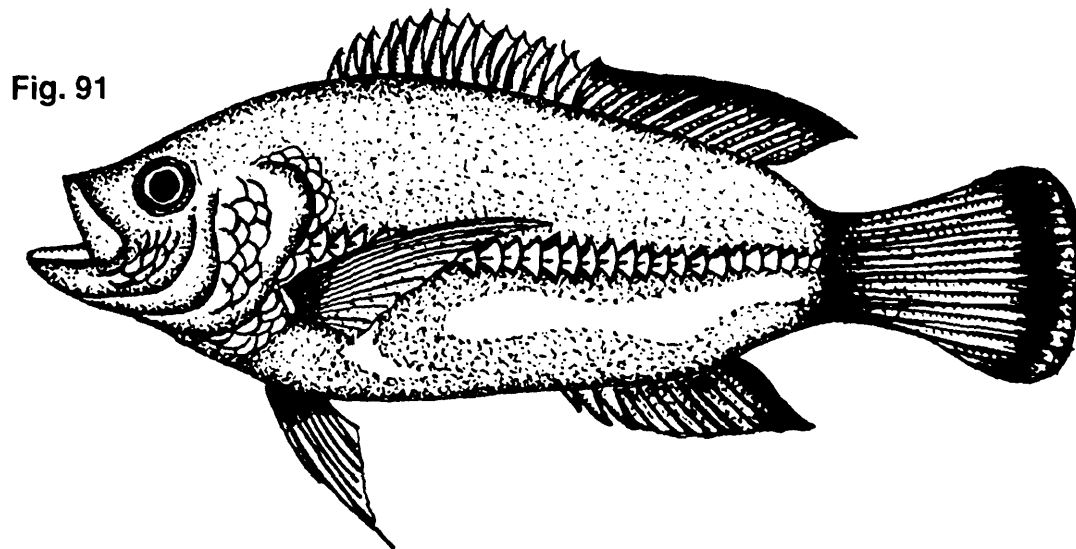
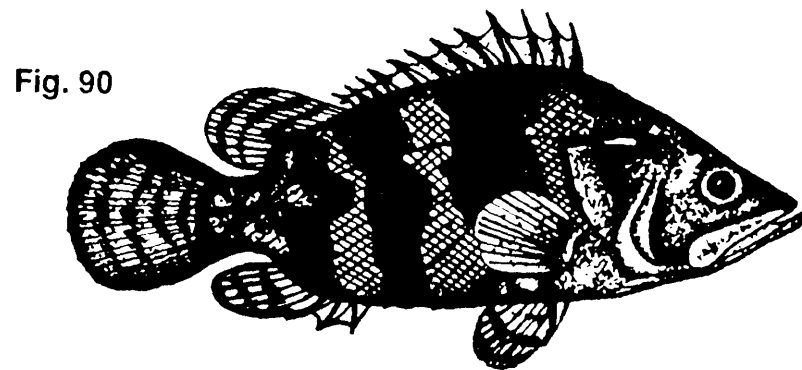
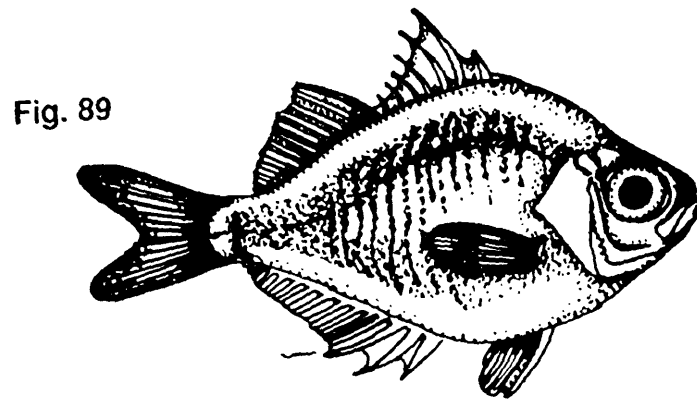


Fig. 89. *Chanda ranga* (Ham.); Fig. 90. *Nandus nandus* (Ham.); Fig. 91. *Oreochromis massambica* (Peters); Fig. 92. *Rhinomugil corsula* (Ham.).

Remarks : An excellent eating fish found to live far above tidal influence in fresh water. In West Bengal it is mostly found in plenty in and around the Sundarban-complex-estuarine zone. Commercially highly important for its good taste and less bones.

Genus *Liza* Jordan and Swain, 1884

1884. *Liza* Jordan and Swain, *Proc. U. S. nat.Mus.*, 7, p.261 (type-*Mugil capito* Cuvier).

161. *Liza parsia* (Hamilton)
(Fig. 93)

1822. *Mugil parsia* Hamilton, *Fish.Ganges*, p.215, pl.17, fig.71 (type locality-Hooghly R.).

1984. *Liza parsia*, Talwar and Kacker, *Commercial sea fishes of India, Handbook No.4*. Calcutta, Z.S.I., p.721.

Local name : Parshey.

Diagnostic characters : Length of head 5 to 5.2 in total length, diameter of eyes 2/7 of length of head with a well developed posterior adipose lid, upper surface of head slightly convex, snout rather depressed, upper lip thin and placed obliquely, first dorsal commences midway between the snout and the base of the caudal, each scale with distinct longitudinal lines.

Colour : A golden spot on the upper portion of the opercles, sometimes dark in the axilla, dorsal fins edged with black, caudal with a yellowish base and dark extremity.

Size : Attains to 12.7 to 15.4cm in length.

Distribution : Seas and estuaries of India.

Remarks : Most popular estuarine fish all over West Bengal found particularly in the Hooghly estuary and Sundarban-complex-estuarine zone. Commercially important, inspite of its small size, due to its excellent taste and less bones.

Genus *Sicamugil* Fowler, 1939

1939. *Sicamugil* Fowler, *Notul.Nat.Acad.Philad.* 17, p.9 (type-*Mugil hamiltonii*).

162. *Sicamugil cascasia* (Hamilton)

1822. *Mugil cascasia* Hamilton, *Fish.Ganges*, pp; 217, 380 (type locality-Northern rivers of Bengal).

1985. *Sicamugil cascasia*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India, Rec.zool.Surv.India, Occ.Paper No.64*, p.194.

D.4/1/8; P.15; V.1/5; A.3/8-9; C.14; L.1.36-39.

Diagnostic characters : Length of head 4.5 in total length, diameter of eyes 3.5 to 4 in length of head without adipose lids, head flattened superiorly, wide mouth, cleft of mouth being only one third of the extent of its gape, upper lip obliquely placed, opercle with a spine, maxilla faintly visible, first dorsal nearer to snout than to caudal base, caudal lunate.

Colour : Yellowish olive on top of head, greyish on back becoming silvery white below, fins not coloured.

Size : Attains to 10.2cm in length.

Distribution : Ganga, Yamuna and Brahmaputra river systems. Bangladesh, Pakistan (Indus river), Sri Lanka, Burma.

Remarks : Commercially not at all important due to its very small size and found occasionally in the local fish markets along with other small fishes. Live in and around Hooghly and Sundarban-complex-estuarine waters.

Family POLYNEMIDAE

Genus *Polynemus* Linnaeus, 1758

1758. *Polynemus* Linnaeus, *Systema Naturae*. ed.10, p.317 (type *Polynemus paradiseus* L.).

163. *Polynemus paradiseus* L.

(Fig. 94)

1758. *Polynemus paradiseus* Linnaeus, *Systema Naturae*, 1, (ed.10), p.317 (type locality-India).

1984. *Polynemus paradiseus*, Talwar and Kacker, *Commercial sea fishes of India*, Handbook no.4, Calcutta, Z.S.I., p.745, fig.309.

Local name : Topshey/Topshey.

D.7/1/15-16; P.15 + VII; V.1/5; A.2/12; C.19; L.1.70.

Diagnostic characters : Length of head 6 to 6.5 in total length, eyes 8 in head length, pectoral with 7 free rays, the longest being about twice the length of fish, a small spine on the shoulder, caudal deeply forked-upper lobe the longer.

Colour : Generally golden with a blackish wash along the back, fins stained greyish.

Size : Attains to 25.8cm in length.

Distribution : Coastal waters of West Bengal, Bombay, Bay of Bengal. Bangladesh, Pakistan (coasts of Sind), Burma, Malaya, Siam. Found in Hooghly estuaries and matla river systems in West Bengal.

Remarks : Legendarily famous all over West Bengal for its excellent taste and less bones. Mostly found in the Hooghly estuaries. Very rarely found in the local fish markets. Commercially highly important due to its traditional taste specially when tasted as 'fry'-a great luxury for the table indeed in West Bengal.

Family GOBIIDAE

Genus *Glossogobius* Gill, 1860

1860. *Glossogobius* Gill, *Proc.acad.nat.Sci.Philad.* p.146 (type-*Gobius platycephalus* Richardson).

164. *Glossogobius giuris giuris* (Hamilton)

(Fig. 95)

1822. *Gobius gutum* Hamilton, *Fish.Ganges*, pp.50, 360 (type locality-Lower parts of Padma river).

1985. *Glossogobius giuris*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.195, fig.102.

Local name : Beley.

D.6/1/8-9; P.20; A.1/8-9; C.17; L.1.30-34.

Diagnostic characters : Length of head 3.5 to 4 in total length, a long tapering fish with a somewhat vertically compressed, pointed head; eyes 4 to 8 in head length, lower jaw prominent, snout pointed, two dorsals placed closely, pelvics united forming a disc.

Colour : Olive to dusky green above, lighter below; 2 alternating rows of 4 to 6 blotches on body along the lateral line.

Size : Attains to 30.4cm in length.

Distribution : India, East Africa, Bangladesh, Sri Lanka, Pakistan, Malay Peninsula, China, Japan, Philippines, Australia, Indo-Australian-Archipelago and S. Pacific islands. Found in Damodar, Hooghly and Bhagirathi river systems in West Bengal.

Remarks : Commonly found to live in ditches, tanks, rivers (mainly tributaries), ponds, paddy-fields (during rainy season), beels, bheries etc. Commercially not important due to its 'bloodless' flesh and tastelessness. Locally consumed when freshly caught and sold in the local fish markets.

Family ANABANTIDAE

Genus *Anabas* Cuvier, 1817

1817. *Anabas* Cuvier, *Le Regne Animal.*, 2, p.339 (type-*Perca scandens* Daldorf, by monotype).

165. *Anabas testudineus* (Bloch)
(Fig. 96)

1795. *Anabas testudineus* Bloch, *Naturges.Ausland.Fische*, 6, p.121, pl.322 (type locality-Japan-'East Indies').

1985. *Anabas testudineus*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.197, fig.103.

Local name : Koi.

D.17-18/8-10; A.9-10/9-11; L.1.28-32.

Diagnostic characters : Length of head 3.5 to 3.6 in total length, eyes 4.5 to 5 in head, lower jaw slightly longer, opercle and preorbital serrated, a single dorsal longer than anal with 17 to 18 spines, 9 to 10 anal spines, lateral line interrupted, caudal rounded.

Colour : Greyish green above, greenish yellow or reddish yellow below; 4 wide cross bands on body.

Size : Grows to about 20.3cm in length.

Distribution : Throughout India, Bangladesh, Pakistan, Sri Lanka, Malay-Archipelago, Thailand, Indo-China, China, Philippines and Polynesia. Found in all the river systems in West Bengal.

Remarks : A costly fish found to live all over West Bengal in tanks, rivers (mostly tributaries), beels, ponds, paddy-fields (in rainy season), bheries etc. Traditionally known for its excellent taste.

Family BELONTIDAE

1845. *Ctenops* McClelland, *Calcutta J.Nat.Hist.*, 5, p.281 (type-*Ctenops nobilis* McClelland).

166. *Ctenops nobilis* McClelland

1845. *Ctenops nobilis* McClelland, *Calcutta J.Nat.Hist.*, p.281, pl.21, fig.1 (type locality-Rivers at Sikkim, N. Bengal frontier).

1981. *Ctenops nobilis*, Jayaram, *F. W. Fishes of India*, Handbook No.2, Calcutta, Z.S.I., p.381.

Local name : Chucho-Koi/Chuchloo-Koi.

D.5-6/7-8; P.12; A.5/23-25; C.16; L.1.28-31.

Fig. 93

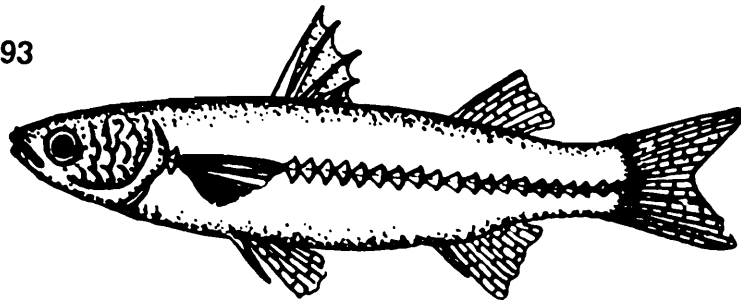


Fig. 94

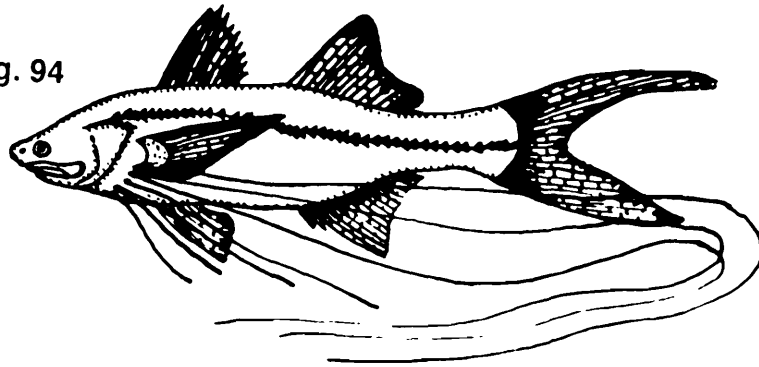


Fig. 95

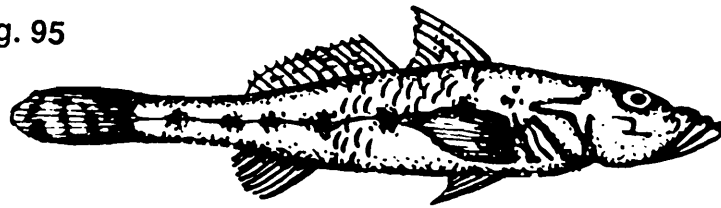


Fig. 96

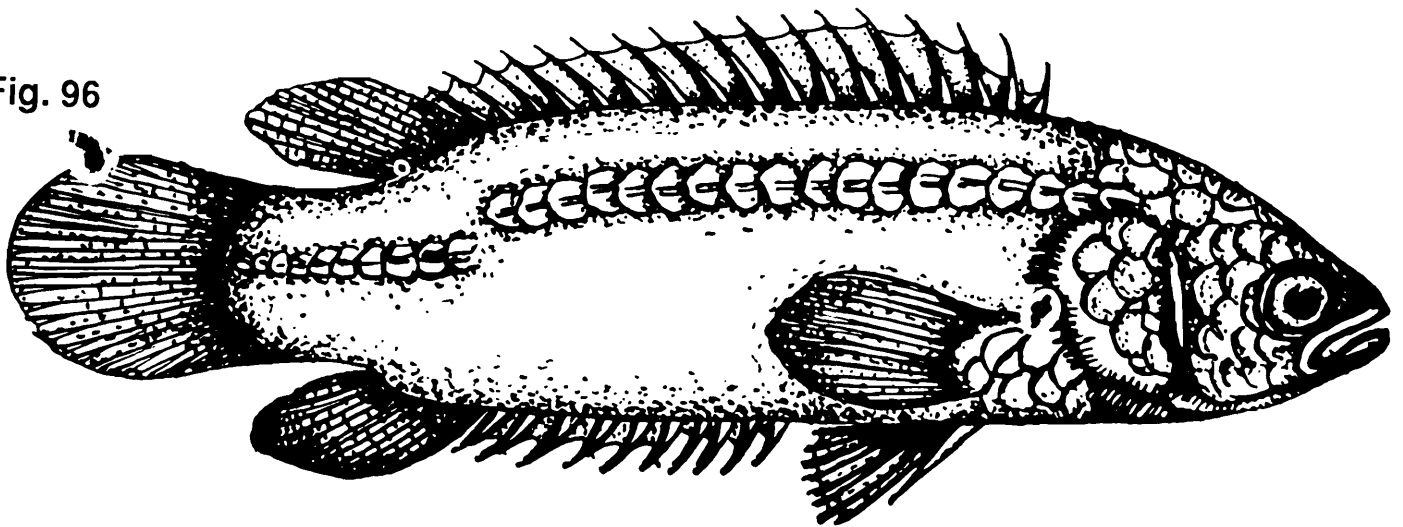


Fig. 93. *Liza parsia* (Ham.); Fig. 94. *Polynemus paradiseus* (L.); Fig. 95. *Glossogobius giuris giuris* (Ham.); Fig. 96. *Anabas testudineus* (Bloch).

Diagnostic characters : Length of head 3.5 to 4 in total length, eyes 3.5 in head length, compressed body, acute head with lower jaw longer, preorbital rather large and coarsely serrated, ctenoid scales, ventral outlook more curved than the dorsal, snout long and pointed, small mouth, oblique and protractile; dorsal situated in the last third of the body, outer pelvic ray prolonged into a filament.

Colour : Brown; an interrupted silvery white band passes from eye to the centre of the base of caudal fin, a second and third bands from the pectoral along the side and along the base of anal respectively.

Size : Attains to 10.0cm in length.

Distribution : West Bengal (N.E.), Assam and Bihar.

Remarks : Commercially not important due to its small size and less flesh. Live in small streams and tributaries.

Key to the species of genus *Colisa*

Caudal fin slightly notched or cut square, dorsal and caudal fins spotted with orange, 14 or more greenish bands on body (oblique), lateral line scales 29-31*Colisa fasciata*

Caudal fin rounded or slightly notched, dorsal and caudal fins barred in scarlet dots, scarlet and light bluish bands (less than 14), lateral line scales 26-28*Colisa lalius*

Genus *Colisa* Cuvier, 1831

1831. *Colisa* Cuvier (in C. & V), *Hist.Nat.Poiss.*, 7, p.359 (type-*Colisa vulgaris* Cuvier).

167. *Colisa fasciata* (Schnieder) (Fig. 97)

1801. *Trichogaster fasciatus* Schneider, *Syst.Ichth.Bloch.*, p.164, pl.36 (type locality-Tranquebar).

1985. *Colisa fasciata*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.199, fig.104.

Local name : Khalisha/Khalshey.

D.15-17/9-13; P.10; V.1; A.15-18/14-19; L.1.29-31.

Diagnostic characters : Length of head 3.7 to 4.2 in total length, body deep and laterally compressed, cleft of mouth small, dorsal and pelvic fins elongated, pelvic fin is a single filiform ray reaching at least to the base of caudal fin which is of semimarginate type, lateral line interrupted.

Colour : Greenish or bluish above, dirty white below; 14 or more orange (mixed with red) coloured vertical bands descend obliquely downwards from back to belly and bordered by blue bands, red eyes, ventral fins edged with red.

Size : Attains to 12.6cm in length.

Distribution : The estuaries of the ganges, Assam, Punjab, West Bengal, N. India. Nepal, Burma, Bangladesh, Pakistan. Found in Hooghly, Bhagirathi and Damodar river systems in West Bengal.

Remarks : Very much popular for its good taste all over West Bengal. Live in tanks, ponds, ditches, tributaries, paddy-fields (during rainy season).

168. *Colisa lalius* (Hamilton)1822. *Tricchogaster lalius* Hamilton, *Fish.Ganges*, pp.120, 372 (type locality-Gangetic provinces).1985. *Colisa lalius*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India.Rec.zool.Surv.India*, Occ.Paper No.64, p.198.*Local name* : Khalisha/Kholshey.

D.15-16/7-8; P.10; V.1; A.17-18/13-14; C.15; L1.26-28.

Diagnostic characters : Length of head 3.3 to 3.5 in total length, eyes 3.2 to 3.5 in head length, profile over eyes concave, preorbital denticulated, lower limb of preopercle serrated, subopercle entire, vertical fins densely scaled, the soft dorsal and anal part rounded. caudal rounded.*Colour* : Reddish blue with vertical bands, dorsal and caudal fins barred in scarlet dots.*Size* : Attains to 5.0cm in length.*Distribution* : Assam, West Bengal, Ganga and Yamuna river systems : Bangladesh, Borneo.*Remarks* : Not popular in West Bengal due to its small size and compressed body. Often found mixed up with *C. fasciatus* in the local fish markets. Live in ponds, beels, tanks, bheries, tributaries, paddy-fields (during rainy season).Key to the species of genus *Mastacembelus*Caudal confluent with dorsal and anal fins, dorsal spines 32-39, an undulating pattern in dark brown between the lateral line and the dorsal ridge, more prominent posteriorly
.....*Mastacembelus armatus armatus*Caudal not confluent with dorsal and anal fins, dorsal spines 21-26, no undulating pattern, white spots all over the body*Mastacembelus pancalus*

Order MASTACEMBELIFORMES

Family MASTACEMBELIDAE

Genus *Macrogathus* Lacepede,1800. *Macrogathus* Lacepede, *Hist.Nat.Poiss.*, 2, p.283 (type-*Ophidium aculeatum* Bloch).169. *Macrogathus aculeatus* (Bloch)

(Fig. 98)

1887. *Ophidium aculeatum* Bloch, *Naturges.Ausland.Fische*, 11, p.72, pl.159, fig.2 (type locality-East Indies).1985. *Macrogathus aculeatus*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India, Rec.zool.Surv.India*, Occ.Paper No.64, p.203, fig.107.*Local name* : Goichi.

D.16-20/44-54; P.23; A.2-3/44-52; C.15.

Diagnostic characters : Length of head 5 to 6 in total length, an eel shaped fish with tapering head and tail, narrow cleft of mouth, distinct lateral line, elongated fleshy snout, lower jaw much shortened, a single dorsal with 13 to 20 free spines, caudal not united with dorsal and anal fins.*Colour* : Greenish or brownish above fading to yellowish below; smaller ones with 4 to 9 large black ocelli along the base of the dorsal.*Size* : Largest recorded length being 38.0cm.

Distribution : India, Bangladesh, Pakistan, Nepal, Burma, Sri Lanka, Malay Archipelago, China, Thailand, Vietnam. Found in Hooghly and Bhagirathi river systems in West Bengal.

Remarks : Commercially not much important for its small size. Live in ditches, tanks, beels, bheries, ponds, tributaries.

Genus *Mastacembelus* Scopoli, 1777

1777. *Mastacembelus* Scopoli, *Introd.Hist.Nat.*, p.458 [type-*Mastacembelus unicolor* (C.&V.)].

170. *Mastacembelus armatus armatus* Lacepede

(Fig. 99)

1800. *Macrogathus armatus* Lacepede, *Hist.Nat.Poiss.*, 2, p.286 (type locality-not given).

1985. *Mastacembelus armatus armatus*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.202, fig.105.

Diagnostic characters : Length of head 6.5 to 7.5 in total length, an eel shaped elongated fish, trilobed snout with a fleshy prolonged projection, cleft of mouth narrow, a preorbital spine present, single long dorsal fin with 32-39 free spines, no pelvic fin, caudal united with dorsal and anal.

Colour : Brownish on back and lighter below with a row of black spots with an undulating pattern of dark bands and blotches on the body.

Size : Attains to 60.0cm in length.

Distribution : Fresh and brackish waters of India. Bangladesh, Pakistan, Burma, Sri Lanka, Malay, Thailand, S. China, Cambodia, Sumatra, Java, Vietnam. Found in Hooghly and Bhagirathi river systems in West Bengal.

Remarks : Most popular species under genus *Mastacembelus* in West Bengal for its long size, good girth and oily taste. Live in beels, bheries, tanks, canals, tributaries etc. Can thrive well inside dried up tank-beds during summer days.

171. *Mastacembelus pancalus* (Hamilton)

(Fig. 100)

1822. *Macrogathus pancalus* Hamilton, *Fish.Ganges*, pp.30, 364, pl.22, fig.7 (type-locality-Bengal).

1985. *Mastacembelus pancalus*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.202, fig.106.

Local name : Pankal/Pakal.

D.24-26/30-42; P.19; A.3/31-46; C.12.

Diagnostic characters : Length of head 5 to 5.5 in total length, small eyes, cylindrical, eel shaped, elongated body; cleft of mouth narrow, a long fleshy snout with a trilobed extremity, first dorsal with free spines, the soft dorsal and anal are separated from the caudal by a small notch, no pelvic fins.

Colour : Greenish olive along the back, yellowish beneath; fins yellowish with black spots, white spots on the body.

Size : Attains to 17.7cm in length.

Fig. 97

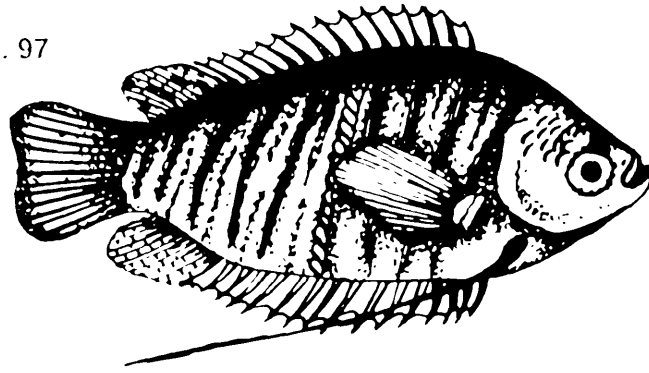


Fig. 98

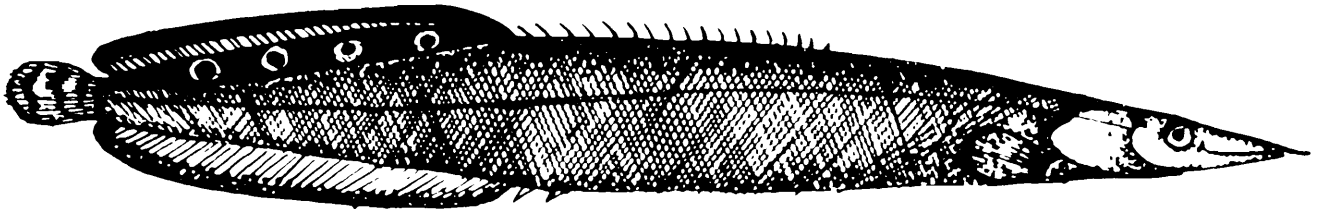


Fig. 99

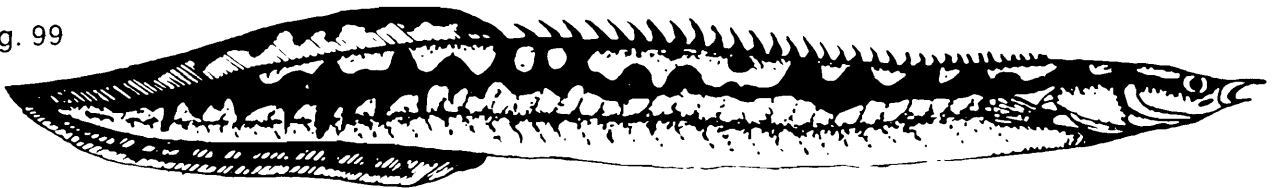


Fig. 100

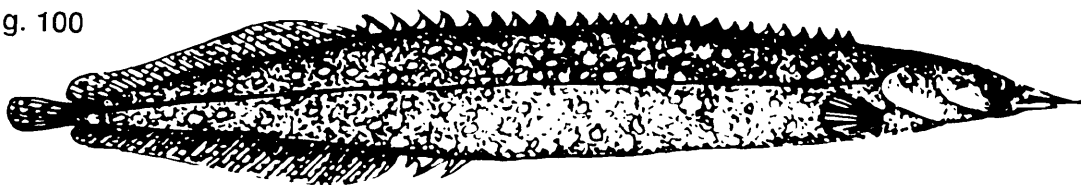


Fig. 101

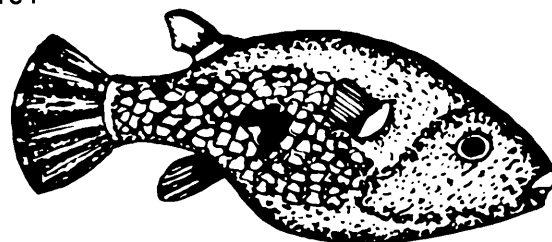


Fig. 97. *Colisa fasciata* (Sch.); Fig. 98. *Macrornathus aculeatus* (Bloch); Fig. 99. *Mastacembelus armatus armatus* (Lac.); Fig. 100. *Mastacembelus pancelus* (Ham.); Fig. 101. *Tetraodon cutcutia* (Ham.).

Distribution : India, Bangladesh, Pakistan. Found in Hooghly, Mahananda and Tista river systems in West Bengal.

Remarks : Commercially not much important due to its small size. Lives mostly in beels and mud-beds of dried up tanks, ditches, canals and tributaries.

Order TETRAODONTIFORMES

Family TETRAODONTIDAE

Genus *Tetraodon* Linnaeus, 1758

1758. *Tetraodon* Linnaeus, *Syst.Nat.*, Ed.10, p.332 (type-*Tetraodon lineatus* L.).

172. *Tetraodon cutcutia* Hamilton
(Fig. 101)

1822. *Tetraodon cutcutia* Hamilton, *Fish.Ganges*, pp.8, 362, pl.18, fig.3 (type locality-R. Ganges).

1985. *Tetraodon cutcutia*, Sen, *Fish fauna of Assam and the neighbouring N. E. states of India*, *Rec.zool.Surv.India*, Occ.Paper No.64, p.207.

Local name : Tapa/Tayapa.

D.10-11; P.21; A.10; C.7.

Diagnostic characters : Length of head equals its distance from the base of the dorsal fin, caudal fin 6 in total length, interorbital space flat and broad, nostril a single orific, fins are all round, no pelvic fins; large eyes, broad back, tapering rather abruptly to the tail.

Colour : Greenish yellow above becoming white on the abdomen, a light band passes from eye to eye, a large black ocellus on the side anterior to the dorsal fin, entire body marked with dark greenish reticulations enclosing lighter spaces.

Distribution : Freshwaters of West Bengal, Orissa, Assam. Bangladesh. Found in Hooghly and Mahananda river systems in West Bengal.

Remarks : A typical freshwater species found to live in tanks, tributaries, streams, beels. This is a banned fish all over West Bengal due to its poisonous effects. Several deaths, caused due to taking of this fish by the poors, have been reported several times in the local newspapers. Only poors take it as fish occasionally out of extreme poverty.

SUMMARY

Freshwater fish fauna of West Bengal, comprising 17 districts, has been revealed in detail taxonomically regarding their latest scientific names, latest references, local names, fin-formulae, diagnostic characters, colour-patterns, size-ranges, distributions, critical scientific remarks and key-characters. In all 172 species belonging to 10 orders, 38 families and 92 genera have been dealt with in detail in this paper. Out of the 92 genera, 30 genera comprising 64 species, are riverine fishes; 14 genera, comprising 39 species, are hill-stream fishes; 22 genera comprising 40 species, are freshwater-cum-marshy fishes; 10 genera, comprising 13 species, are torrential-fishes; 4 genera, comprising 4 species are exotic fishes with deep root all over West Bengal and 12 genera, comprising 12 species, are typically found freshwater-cum-estuarine fishes. A map showing drainage systems and different ecological distributions of different groups of fishes of West Bengal and 102 text-figures have been added for further scientific support.

MATERIAL STUDIED

1. *Anguilla bengalensis bengalensis* (Gray & Hardw.)
1 exe., 56.0cm., Matla R., Canning, Bengal; 8.3.48., M. L. Bhatia.
2. *Pisodonophis boro* (Ham.)
2 exs., 20.0-220cm., Pulta Water Works Settling Tanks, Barrackpore, W. Bengal; S. L. Hora, 8.5.1938.
3. *Hilsa ilisha* (Ham.)
1 exe., 29,0cm, Calcutta Fish Market, Calcutta Dt., 7.5.76, T. K. Sen.
4. *Gudusia chapra* (Ham.)
2 exs., 14.0-15.5cm, Harinavi, Canning; 24-Parganas Dt., 22.11.75., T. K. Sen.
5. *Gonialosa manmina* (Ham.)
3 exs., 9.5-11.5cm, Pulta Water Works, Setting Tanks, Barrackpore, W. Bengal; S. L. Hora, 8.5.1938.
6. *Notopterus notopterus* (Pallas)
2 exs., 15.5-20.0cm, Falta nullaha near Harindanga Block, 24-Parganas Dt., 7.5.85. T. K. Sen.
7. *Chela (Chela) laubuca* (Ham.)
3 exs., 4.0-4.5cm, Burdwan Fish Market, Burdwan Dt., 2.9.78., S. R. Pal., 1 exe., 7.0cm, Duars, N. Bengal; A. K. Sarkar (Duars Survey-1983).
8. *Salmostoma bacaila* (Ham.)
1 exe., 7.5cm, Jayanti, N. Bengal; 25.4.86., A. R. Kumar., 1 exe., 5.5cm, Muchia, Malda; 12.12.87., T. R. Mitra.
9. *Salmostoma phulo phulo* (Ham.)
1 exe., Katoa, Burdwan Dt., 2.9.67., D. P. Sanyal.
10. *Aspidoparia morar* (Ham.)
2 exs., 13.5-14.0cm, Mahananda R. Darjeeling Dt., 7.6.68., B. Roy.
11. *Aspidoparia jaya* (Ham.)
5 exs., 9.0-10.5cm, Duars, N. Bengal (Duars Survey-1983), A. K. Sarkar.
12. *Amblypharingodon mola* (Ham.)
8 exs., 5.5-6.5cm, Hooghly R., Uttarpara, Hooghly Dt., W. Bengal; 4.2.62., K. S. Misra.
13. *Barilius bendelisis bendelisis* (Ham.)
2 exs., 12.0-17.0cm, from a small stream at Siliguri, Darjeeling Dt., 7.1.65., D. P. Sanyal.
14. *Danio (Danio) aequipinnatus* (McCll.)
1 exe., 6.0cm, Kalyani, Nadia Dt., W. Bengal; 27.4.86., A. R. Kumar; 1 exe., 6.5cm, Jayanti, N. Bengal; 17.4.86. A. R. Kumar; 5 exs., 4.5-5.0cm, Bankura Fish Market (Domura); 2.7.66. T. K. Sen.; 7 exs., 4.5-7.4cm, Ajoy R., Birbhum Dt. 6.5.81.
15. *Danio (Danio) rerio* Ham.
6 exs., 2.5-3.0cm, Khejurdanga, Purulia Dt., 2.12.86. T. R. Mitra.

16. *Rasbora daniconius daniconius* (Ham.)
2 exs., 6.5-9.0cm, Rupnarayan R., Burdwan dt., P. K. Chakraborty, 5.6.78., 18 exs., 6.0-8.5cm, from a tank near Burdwan Rly. Stn., W. Bengal; 4.2.67, T. K. Sen.; 2 exs., 7.5-8.0cm, Duars. N. Bengal (Duars Survey-1938), A. K. Sarkar; 4 exs., 2.4-5.5. Ajodhya Hills, Purulia Dt., 1.12.86., T. R. Mitra.
17. *Chagunius chagunio* (Ham.)
1 exe., 21.0cm., Kasai R., Purulia Dt., W. Bengal; 27.12.79., T. K. Sen.
18. *Acrossocheilus hexagonolepis* (McCll.)
4 exs., 12.5-16.5cm., Damodar R., Burdwan Dt., R. K. Ghosh, 7.9.69.
19. *Catla catla* (Ham.)
2 exs., 18.5-19.9cm., Hooghly R. at Uluberia, Howrah Dt., 7.5.79., T. K. Sen.
20. *Cirrhinus reba* (Ham.)
1 exe., 10.5cm., Hooghly R. at Srerampur, Hooghly Dt., 9.6.64., T. K. Sen.
21. *Labeo rohita* (Ham.)
2 exs., 18.5-22.4cm., Hooghly river at Paranpur, 5.11.53., A. K. Dutta.
22. *Labeo bata* (Ham.)
5 exs., 7.5-10.5cm., Damodar R. near Durgapur Rly. station, Burdwan Dt., 7.7.80., T. K. Sen., 1 exe., 24.0cm., Calcutta fish Market, 4.5.69., T. K. Sen.
23. *Labeo calbasu* (Ham.)
1 exe., 11.0cm., Calcutta Fish Market, Calcutta Dt., 15.2.69., T. K. Sen.
24. *Labeo boga* (Ham.)
5 exs., 9.5-13.5cm., Siliguri, Tista R., P. Roychowdhuri, 5.7.61.
25. *Labeo gonius* (Ham.)
1 exe., 12.5cm., Siliguri bazar, Darjeeling Dt., 5.6.84, A. K. Sarkar., 2 exs., 12.5-13.5cm., Siliguri bazar, Darjeeling Dt., 6.9.74, M. Chandra.
26. *Labeo pangusia* (Ham.)
1 exe., 12.0cm., Darjeeling Fish Market, Darjeeling Dt. 6.6.84., A. K. Sarkar.
27. *Osteobrama cotio cotio* (Ham.)
2 exs., 7.0-8.5cm, Calcutta Fish Market, Calcutta Dt., 5.6.69., T. K. Sen.
28. *Puntius conchoni* (Ham.)
1 exe., 5.5cm., Pulta Water Settling Tanks, Barrackpur, W. Bengal, 7.5.73., S. Sur.
29. *Puntius chola* (Ham.)
13 exs., 5.5-7.5cm., Chemtu river, Siliguri, Darjeeling Dt., 27.2.57., A. G.K. Menon.
30. *Puntius gelius* (Ham.)
15 exs., 3.8-6.0cm., Matla R., Canning, 24-Parganas Dt., 9.10.72., T. K. Sen.
31. *Puntius guganio* (Ham.)
4 exs., 2.3-3.5cm., Malatipur, Hooghly R., 24-Parganas Dt., 26.3.37., S. L. Hora.

32. *Puntius sophore* (Ham.)
5 exs., 6.5-8.5cm., Pulta Water Works Setting Tanks, Barrackpore, 24-Parganas Dt., 1 exe., 9.5cm., Hooghly R. at Dhakhineswar, 24-Parganas Dt., 5.9.82., T. K. Sen., 6 exs., 4.5-8.0cm., Amta, Howrah Dt., 14.2.75., 5 exs., 6.0-8.0cm., Duars, Darjeeling Dt., N. Bengal. (Duars Survey-1983), A. K. Sarkar., 1 exe., 6.3cm., Nishipur, Malda Dt., T. R. Mitra, 23.11.87.
33. *Puntius dukai* (Day)
2 exs., 5.5-10.5cm. (caudal broken), Darjeeling Bazar, Darjeeling Dt., N. Bengal., (Tista R.), A. K. Hallows., date of collection-nil.
34. *Puntius phutun.'o* (Ham.)
3 exs., 8.5-14.5cm., Calcutta Fish Market., 10.6.83., T. K. Sen., 1 exe., 8.4cm., Siliguri, Darjeeling Dt., N. Bengal., 4.7.66., B. Chowdhury., 2 exs., 7.5-8.0cm., Tista R., Jalpaiguri, Jalpaiguri Dt., R. K. Ghosh, 4.2.67. 1 exe., 8.3cm., Haldia, Midnapore Dt., 23.4.86., A. R. Kumar.
36. *Tor tor* (Ham.)
2 exs., 10.5-12.0cm., Tista river, Darjeeling Dt., N. Bengal, 7.12.41., S. L. Hora.
37. *Crossocheilus latius latius* (Ham.)
1 exe., 9.5cm., Duars (Duars Survey-1983), A. K. Sarkar., 1 exe., 8.5cm., Tista river, Darjeeling Dt., 9.11.49., K. S. Misra., 2 exs., 6.0-8.0cm., Tista river, Kalimpong, Darjeeling Dt., 19.12.62., B. Roy.
38. *Garra annandalei* Hora
1 exe., 8.5cm., Mahananda river, W. Dinajpur Dt., 15.6.83., A. K. Sarkar.
39. *Tor putitora* (Ham.)
1 exe., 11.5cm., Tista river, Darjeeling Dt., 14.5.49., S. M. Das.
40. *Garra gotyla gotyla* (Gray)
2 exs., 7.5-8.5cm., Jhilimili Hills, Bankura, Bankura Dt., T. K. Sen, 2.6.79., 1 exe., Rangia Valley, Darjeeling Dt., N. Bengal, 8.6.68., B. Roy., 2 exs., 7.0-9.5cm., Shankosh river, Coochbihar Dt., 4.5.78., A. Manna., 2 exs., 6.5-7.5cm., Jayantia, N. Bengal., 14.4.86., A. R. Kumar.
41. *Garra lamta* (Ham.)
2 exs., 7.0-9.3cm., Bagmundi hills, Purulia Dt., 5.7.72., S. Ahmed.
42. *Garra mullya* (Sykes)
1 exe., 9.8cm., Birbhum hills, Birbhum Dt., 5.7.72., S. Ahmed.
43. *Psilorhynchus sucatio* (Ham.)
8 exs., 4.0-7.0cm., Duars (Duars Survey-1893), A. K. Sarkar.
44. *Noemacheilus rupicola inglisi* Hora
1 exe., 6.4cm., Ghoom (7000ft.), Darjeeling Dt., 7.6.54., S. M. Das (Donation from Darjeeling Natural History Museum).

45. *Noemacheilus rupicola rupicola* (McCl.)
2 exs., 4.0-5.0cm., Tist Valley, Darjeeling Dt., N. Bengal., 7.9.77., A. G. K. Menon.
46. *Tor putitora* (Ham.)
3 exs., 11.0-12.0cm., Siliguri Bazar, Darjeeling Dt., 7.9.59., Y Chaturbedi.
47. *Lepidocephalus (L) guntea* (Ham.)
5 exs., 7.0-8.5cm, Duars (Duars Survey-1983), A. K. Sarkar., 2 exs., 7.0-7.5cm., Calcutta bazar, 5.6.78., T. K. Sen., 6 exs., 7.0-10.0cm., Tista river, Darjeeling Dt., 9.12.39., 2 exs., Calcutta bazar, 7.5.69, T. K. Sen.
48. *Lepidocephalus (L) annandalei* Chaudhuri.
6 exs., 7.0-10.0cm., Tista river, Jalpaiguri Dt., N. Bengal., 5.7.69., R. K. Ghosh.
49. *Somileptes gongota* (Ham.)
3 exs., 10.0-11.0cm., Duars (Duars Survey-1983), A. K. Sarkar., 1 exe., 9.8cm., Siliguri bazar, Darjeeling Dt., date of collection-nil., 1 exe., 13.0cm., Jayantia, N. Bengal., 11.4.86., A. R. Kumar.
50. *Botia rostrata* Gunther
2 exs., 4.0-5.0cm., Jayanti, N. Bengal. 21.4.86., A. R. Kumar.
51. *Aorichthys aor* (Ham.)
1 exe., 19.5cm., Rupnarayan river, Midnapore Dt., R. K. Ghosh., 4.12.58.
52. *Batasio batasio* (Ham.)
1 exe., 5.5cm., Tista river, Darjeeling Dt. 1 exe., 5.3cm., Terai, Darjeeling Dt., date of collection-nil, B. Roy.
53. *Mystus tengara* (Ham.)
1 exs., 5.5cm., Kaliajunge, W. Dinajpur Dt., 1.12.87., T. R. Mitra.
54. *Mystus cavasius* (Ham.)
1 exe., 10.5cm., Hooghly river at Paranpur, 24-Parganas, Dt.5.6.66., S. C. Mitra.
55. *Mystus bleekeri* (Day)
1 exe., 11.0cm., Terai, Darjeeling Dt., 5.9.68., M. N. Acherjee.
56. *Ailia coila* (Ham.)
3 exs., 9.5-11.0cm., Bandel ghat, Hooghly R., Howrah Dt., 14.12.53.
57. *Clupisoma garua* (Ham.)
1 exe., 6.5cm., Kalayani, Nadia Dt., 27.4.86., A. R. Kumar.
58. *Eutropiichthys vacha* (Ham.)
1 exe., 12.5cm., Hooghly river at Nabadwip, Nadia Dt., 3.11.53., A. K. Datta., 1 exe., 10.0cm., Hooghly river at Paranpur, 24-Parganas Dt., 4.11.53., A. K. Datta.
59. *Pseudeutropius atherinoides* (Bloch)
2 exs., 7.5-13.0cm., Sundarbans, 24-Parganas Dt., Purchased from F. Day (1241).

60. *Ompok bimaculatus* (Bloch)
1 exs., 10.5cm., Sundarbans, L. Bengal, F. Day (459).
61. *Pangasius pangasius* (Ham.)
1 exe., 19.5cm., Hooghly river, Barrackpore, 24-Parganas Dt., Sept. 1954., Hooghly Survey Party.
62. *Amblyceps mangois* (Ham.)
12 exs., 3.5-6.5cm., Tista valley Darjeeling Dt., N. Bengal., 7.9.61., S. Ali., 1 exe., 7.4cm., Duars, (Duars Survey-1983), A. K. Sarkar.
63. *Bagarius bagarius* (Ham.)
2 exs., 10.5-17.5cm., Hooghly river at Paranpur, 6.12.53., Hooghly Survey.
64. *Conta conta* (Ham.)
1 exe., 3.5cm., Mahanadi river below Darjeeling, Shaw & Shebbeare., 2 exs., 3.5-4.0cm., Laska river, about 8 miles from Siliguri, N. Bengal, 19.3.32., D. D. Mukherjee., 1 exe., 4.5cm., Mahanadi river at Siliguri, N. Bengal., 20.3.32., D. D. Mukherjee.
65. *Euchiloglanis hodgarti* (Hora)
2 exs., 9.5cm., Riyang & Rangli rivers, Tista valley, G. E. Shaw & E. O. Shebbeare., 1 exe., 6.4cm., Tista River, Darjeeling Dt., 7.6.61., S. S. Khanna., 3 exs., 6.0-7.0cm., Duars, N. Bengal. A. K. Sarkar (Duars Survey-1983).
66. *Gagata cenia* (Ham.)
5 exs., 5.0-7.0cm., Nawabgunj, Hooghly Dt., 11.12.72., B. C. Saha., 4 exs., 5.5-6.5cm., Nawabgunj, Hooghly Dt., 7.9.68., T. K. Sen.
67. *Glyptothorax conirostrae conirostrae* (Steind.)
1 exe., 5.5cm., Mahananda river at Siliguri, N. Bengal, G. E. Shaw & E. O. Shebbeare.
68. *Glyptothorax cavia* (Ham.)
1 exe., 7.5cm., rivers below Darjeeling, N. Bengal, G. E. Shaw & E. O. Shebbeare.
69. *Glyptothorax telchitta telchitta* (Ham.)
2 exs., 7.5-8.0cm., rivers of Tarai and duars, N. Bengal, Shaw & Shebbeare.
70. *Eutropiichthys murius* (Ham.)
2 exs., 11.5-12.0cm. (S. L.), Duars & Tarai, Darjeeling Dt., N. Bengal, M. A. S. Menon.
71. *Hara jerdoni* (Day)
2 exs., 3.5-3.7cm., Tista valley, Darjeeling Dt., N. Bengal, 9.2.43., K. S. Misra. 1 exe., Tista river, Jalpaiguri Dt., 3.6.80., T. K. Sen.
72. *Clarius batrachus* (Lin.)
1 exe., 18.0cm., Calcutta bazar, Calcutta Dt., 14.5.69., T. K. Sen., 1 exe., 19.0cm., Calcutta Fish Market, 5.6.83., T. K. Sen.
73. *Heteropneustes fossilis* (Bloch)
6 exs., 10.0-11.5cm., Calcutta bazar, Calcutta Dt., 4.5.69., T. K. Sen., 4 exs., 5.0-6.5cm., Duars (Duars Survey-1983), N. Bengal, A. K. Sarkar.

74. *Chaca chaca* (Ham.)
1 exe., 19.5cm., Hanskhali beel, 20 miles from Krishnagar, Nadia Dt., 6.5.59., M. A. S. Menon.
75. *Olyra kempfi* Chaudhuri
5 exs., 5.5-6.5cm., Duars (Duars Survey-1983), A. K. Sarkar.
76. *Arius gagora* (Ham.)
1 exe., 18.5cm., Calcutta, Purchased from F. Day (421).
77. *Plotosus canius* (Ham.)
2 exs., 13.5-15.0cm., Bhagirathi river, Calcutta, 1.12.53., Z.S.I. survey party, (F.4458/2), 1 exe., Calcutta Fish Market, Calcutta Dt., 5.6.69., T. K. Sen., 6 exs., 10-11.5cm., Calcutta bazar, 17.6.69., T. K. Sen.
78. *Olyra longicaudata* (McCl.)
3 exs., Sevoke river below Rly. bridge, Darjeeling Dt., S. L. Hora, (F.11888/1).
79. *Xenentodon cancila* Ham.
3 exs., 14.5-16.5cm., Ashoknagar fish market, Tollygunj, Calcutta Dt., 7.12.80., T. K. Sen.
80. *Aplocheilus panchax* (Ham.)
17 exs., 3.5-5.0cm., Calcutta, J. T. Jenkins (F.5993-6009/1), 8 exs., 5.0-7.5cm., Calcutta, Capt. B. S. Chalam (F11032/1), 1 exe., 3.5cm., 24-Parganas Dt., Bengal Fisheries, (F.1884/1), 11 exs., 3.0-4.5cm., Calcutta bazar, F. Day, (632A.S.B.), 2 exs., 3.5-4.0cm., Salt Lake, Bamanghata, J. T. Jenkins., 8 exs., 3.0-4.0cm., Calcutta, B. L. Chaudhuri.
81. *Gambusia affinis patruelis* (B & G)
16 exs., 2.5-4.5cm., Metiaburuz, Kidderpore, Calcutta, 8.9.84., T. K. Sen.
82. *Channa punctatus* (Bloch)
2 exs., 9.0-12.5cm., Purulia, M. Mackenzie (F.11032/1).
83. *Channa barca* (Ham.)
1 exe., 17.5cm., Calcutta, Purchased from F. Day.
84. *Channa marulius* (Ham.)
2 exs., 18.5cm., -22.5cm., Calcutta bazar, Purchased from F. Day (F.1379-80/1).
85. *Channa orientalis* (Sch.)
1 exe., 8.5cm., Fatepur, W. Dinajpur, 25.11.87., T. R. Mitra., 1 exe., 8.0cm., Malda, 11.12.87. T. R. Mitra., 1 exe., 10.5cm., Mahananda river, W. Dinajpur Dt., 6.9.67.
86. *Channa stewartii* (Playfair)
1 exe., 11.0cm., Calcutta Fish Market, Calcutta Dt., 11.9.81., T. K. Sen., 2 exs., 10.4-11.0cm., Calcutta bazar, 7.9.69., T. K. Sen.
87. *Monopterus cuchia* (Ham.)
1 exe., 29.0cm., Calcutta bazar (purchased), 2 exs., 28.0-35.0cm., Calcutta bazar, A. S. B. (Cat.1040-1041).

88. *Dorichthys deocata* (Ham.)
5 exs., 12.0-13.0cm., Siliguri, N. Bengal, Shaw & Shebbeare.
89. *Ophisternon bengalensis* McCl.
3 exs., 28.5-29.5cm., Port Canning, Canning, 24-Parganas Dt. (Matla R.), 7.9.31.
90. *Lates calcarifer* (Bloch)
1 exe., 15.5cm., Calcutta, J. Anderson, 5.9.71 (9316).
91. *Chanda nama* (Ham.)
1 exe., 6.5cm., Fatepur, W. Dinajpur, 27.11.87., T. R. Mitra.
92. *Chanda ranga* (Ham.)
4 exs., 4.5-5.0cm., Kulik R., Rampur, W. Dinajpur, 25.11.87, T. R. Mitra.
93. *Nandus nandus* (Ham.)
1 exe., 9.0cm., Hooghly river at Ramnagar near Achipur, 24-Parganas Dt., 9.12.53.
94. *Badis badis* (Ham.)
147 exs., 2.5-4.0cm., Tista river, Darjeeling Dt., Nov.1938., S. L. Hora., 6 exs., 3.5-5.5cm., Tista river, Darjeeling Dt., 17.10.38., S. L. Hora (FF.2511), 2 exs., 5.0-6.5cm., Duars (Duars Survey-1938), A. K. Sarkar.
95. *Sicamugil cascasia* (Ham.)
3 exs., 3.5-5.5cm., Hooghly river at Gharpur, 5 miler down Ramnagar, 24-Parganas Dt., 10.12.53 (Hooghly Survey).
96. *Polynemus paradiseus* L.
2 exs., 9.5-11.5cm., Hooghly river near Nabadwip ghat, Nadia Dt., Sept. 1954., Hooghly Survey Party (F.4935/2), 8 exs., 9.5-17.5cm., Putla, Nawabjunj, Hooghly Dt. (F.2248/2-F.2285/2), 3 exs., 7.5-9.5cm., Fraserjunj, 22 km south of Namkhana, 9.12.65., K. V. Surjya Rao & S. Ahmed., 2 exs., 13.5-17.0cm., Hooghly R., Ramnagar, 24-Parganas Dt., 9.12.53. Hooghly Survey (F.4680/2), 3 exs., 11.5-19.5cm., Hooghly river at Paranpur, 24-Parganas Dt., 6.12.53., Hooghly Sutvey (F.4695/2).
97. *Glossogobius giuris giuris* (Ham.)
1 exe., 11.0cm., Damodar river, Burdwan Dt., 6.5.62., R. Mukherjee., 2 exs., 8.0-9.0cm., Jaldhaka river, Coochbihar Dt., 7.9.66., S. Ahmed.
98. *Anabas testudineus* (Bloch)
1 exe., 11.5cm., Jadu Babu's Fish market, Bhowanipore, Calcutta., 11.2.83., T. K. Sen.
99. *Colisa fasciata* (Sch.)
4 exs., 4.5-7.5cm., Ashoknagar fish market, Calcutta Dt., 7.9.69., T. K. Sen., 6 exs., 5.0-7.5cm., Brackishwater pool, Port Canning, L. Bengal., R. Hodgart (F.1411/1-F.1418/1).
100. *Mastacembelus pancalus* (Ham.)
3 exs., 13.5-16.5cm., Uluberia, Howrah Dt., 28.11.54., A. K. Datta (F.5850/2) (F.5850/2), 4 exs., 12.5-16.0cm., Siliguri, N. Bengal., Shaw & Shebbeare (F.11430/1).

101. *Mastacembelus armatus armatus* (Lac.)
2 exs., 15.5-17.5cm., Hooghly river, 1.12.53., A. K. Datta (Hooghly Survey) (F.4473/2).
102. *Macrogathus aculeatus* (Bloch)
4 exs., 4.5-6.4cm., Calcutta bazar, A. S. B. (Cat.345/Cat.344).
103. *Tetraodon cutcutia* Ham.
4 exs., 4.5-6.4cm., Siliguri, N. Bengal, G. E. Shaw and E. O. Shebbeare.

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MARINE AND ESTUARINE FISHES

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INTRODUCTION

The marine and estuarine fish faunal resources of West Bengal have surprisingly never been synthesised nor documented under a single cover. West Bengal has a coastline of 40 nautical miles, a greater portion of which is intersected by numerous rivers and estuaries. Saha & Majumdar (1970) in a fairly comprehensive report, discussed the fishery potential, both inshore and deep-water, of this maritime state.

As a part of a comprehensive programme of a survey of the faunal resources of West Bengal by the Zoological Survey of India, a study of the marine and brackish water species of bony fishes, sharks and batoid fishes was considered. This contribution is based on a study of the vast National Fish Collections in the Zoological Survey of India and also on recent surveys, besides published literature. Our leading idea was to achieve a compact and easily manageable account that would be at the reach of fish and fishery workers, and hence the text has been kept as succinct as possible. This obviously implies certain limitations of the paper as a means of scientific identification of all species. It is therefore recommended, in case of doubt, to consult Talwar's (1984) handbook '*Commercial Sea Fishes of India*' which is more comprehensive in nature. Misra's (1962) statements of geographical distribution of the foodfishes needs considerable revision in the light of new knowledge and many distributional records are questionable; some we have included with a caveat and with reservations.

SYNOPTIC ANALYSIS OF FISH FAMILIES

Key to Families

- 1 (a) Five separate gill-openings on each side (lateral or vertical) of body (Cartilaginous Fishes)2
- (b) Single gill-opening on each side of head (Bony Fishes) 14
- 2 (a) Gill-openings on lateral sides of head (Sharks)3
- (b) Gill-openings entirely on underside of head ; no anal fin (Skates & Rays) 10
- 3 (a) No anal finSQUALIDE
- (b) Anal fin present4
- 4 (a) head with lateral expansions or blades, like a double - edged axeSPHYRNIDAE
- (b) Head normal, not expanded laterally.....5

- 5 (a) Eyes behind mouth ; deep nasoral grooves connecting nostrils and mouth6
 (b) Eyes partly or entirely over mouth ; nasoral grooves absent8
- 6 (a) Caudal fin less than half the length of rest of sharkSTEGOSTOMATIDAE
 (b) Caudal fin more than half the length of rest of shark7
- 7 (a) Mouth huge and terminal ; head strongly depressedRHINIODONTIDAE
 (b) Mouth small and subterminal ; head cylindrical or moderately depressed. HEMISCYLLIIDAE
- 8 (a) No precaudal pits ; dorsal caudal fin margin smooth..... PROSCYLLIIDAE
 (b) Precaudal pits and rippled dorsal caudal margin present9
- 9 (a) Intestine with a spiral valve having 4 to 6 turnsHEMIGALEIDAE
 (b) Intestine with a scroll valveCarcharhinidae
- 10 (a) Body shark-like, moderately depressed only ; tail not distinctly marked off from the body sector (Skates)11
 (b) Body distinctly depressed ; tail more or less sharply marked off from the body sector (Rays)12
- 11 (a) Snout extremely prolonged as a flat, narrow and firm blade, the edges of which are armed with a single series each of tooth-like structures, saw-likePRISTIDAE
 (b) Snout wedge-shaped and fairly prolonged, but not as a blade nor with teethRHINOBATIDAE
- 12 (a) Caudal fin well developed ; skin soft and flabby; powerful electric organs in head regionTORPEDINIDAE
 (b) No caudal fin ; skin firm ; no electric organs in head region13
- 13 (a) Eyes and spiracles lateral on head ; small dorsal finMYLIOBATIDIDAE
 (b) Eyes and spiracles on top of head ; no distinct dorsal finDASYATIDAE
- 14 (a) Body bilaterally symmetrical15
 (b) Body not bilaterally symmetrical, highly compressed ; dorsal and anal fins long89
- 15 (a) Gill openings at base of pectoral fins ; first spinous ray of dorsal fin on head and modified into ilicium16
 (b) Gill openings before pectoral-fin base17
- 16 (a) Body globular-like ; gill opening below base of pectoral fin ; eyes lateral
ANTENNARIIDAE

- (b) Body much depressed and flattened ventrally ; gill opening in or above base of pectoral fin ; eyes dorsal.....OGCOCEPHALIDAE
- 17 (a) Gill openings reduced to a small opening on upper side of body ; body scalelessCALLIONYMIDAE
(b) Not as above18
- 18 (a) Body eel-like, elongate, round in cross-section ; gill-openings narrow, on sides of head ; no spinous rays in fins19
(b) Body not eel-like but if it does have an eel-like form then pelvic fins present23
- 19 (a) Body with minute embedded scales ; dorsal, anal and caudal fins well developed ; pectoral fins present.....ANGUILLIDAE
(b) Body naked (without scales)20
- 20 (a) Large canine teeth on vomer.....21
(b) No large canine teeth on vomer22
- 21 (a) Pectoral fins well developed.....MURAENESOCIDAE
(b) Pectoral fins absent.....MURAENIDAE
- 22 (a) Body extremely elongate, thread-like ; posterior nostril lateral or superior (not labial) ; branchios-tegal rays not overlapping midventrallyMOORINGUIDAE
(b) Body elongate, but not thread-like ; posterior nostril usually with in or piercing the upper lip ; branchios-tegal rays overlapping along the midventral lineMOORINGUIDAE
- 23 (a) Form of body eel-like.....CONGROGADIDAE
(b) Form of body not eel-like.....24
- 24 (a) Sucking disc on headECHENEIDIDAE
(b) No Sucking disc on head25
- 25 (a) Snout markedly elongate, tube-shaped, with a smallmouth at end of tube26
(b) Snout not tubular28
- 26 (a) No pelvic fins ; body elongate.SYNGNATHIDAE
(b) Pelvic fins present.....27
- 27 (a) Pelvic fin with one spine and four soft rays ; body extremely compressed, razorlike, with sharp ventralCENTRISCIDAE

- (b) Pelvic fin with six soft rays ; body depressed, elongateFISTULARIIDAE
- 28 (a) Pectoral fin with two distinct bases, the upper with rays attached and lower with several free filamentous raysOLYNEMIDAE
 (b) Pectoral fin with one29
- 29 (a) Weberian apparatus present ; head and body scaleless ; barbels around mouth30
 (b) Weberian apparatus absent; body usually with scales.....31
- 30 (a) Caudal fin roundedPLOTOSIDAE
 (b) Caudal fin forkedARIIDAE
- 31 (a) Mesocoracoid present32
 (b) Mesocoracoid absent.....38
- 32 (a) Dorsal fin inserted in posteriorhalf of bodyCHIROCENTRIDAE
 (b) Dorsal fin median, not far posterior on body33
- 33 (a) lateral line present34
 (b) lateral line absent36
- 34 (a) Jaws toothlessCHANIDAE
 (b) Jaws with35
- 35 (a) Scales small ; last dorsal finray not elongatedELOPIDAE
 (b) Scales large-sized ; last dorsal finray filamentousMEGALOPIDAE
- 36 (a) Articulation of lower jaw well behind eye, lower jaw usually slender ; snout piglike and projecting, lower jaw 'underslung'ENGRAULIDIDAE
 (b) Articulation of lower jaw under or only just behind eye, lower jaw deep7
- 37 (a) Anal fin moderate, with less than 30 finraysCLUPEIDAE
 (b) Anal fin long, with at least 30 finraysPRISTIGASTERIDAE
- 38 (a) Adipose dorsal fin present.....39
 (b) Adipose dorsal fin absent40
- 39 (a) Caudal fin trilobed; body semitransparentHARPADONTIDAE
 (b) Caudal fin forkedSYNODONTIDAE

- 40 (a) Pelvic fins absent, but if present then inserted below base of pectoral fins, or in front of them on throat41
 (b) Pelvic fins present and inserted normally on belly or not far behind pectoral fins, or, finally, under pectoral fins but more or less markedly behind verticle from posterior edge of pectoral fin base47
- 41 (a) Mouth very small; gill openings restricted ; scales usually modified as spines, shields or plates.....42
 (b) Mouth moderate ; gill openings normal45
- 42 (a) Teeth united into a solid beakTETRAODONTIDAE
 (b) jaw with distinct teeth (i.e. teeth not fused).....43
- 43 (a) Body encased in an armour of hexagonal bony plates that are marginally fused to form a solid box.....OSTRACIIDAE
 (b) Body compressed and usually fairly deep ; scales absent or modified44
- 44 (a) Skin hard, with large bony scalesBALISTIDAE
 (b) Skin fairly softTRIACANTHIDAE
- 45 (a) Head large, with eyes more dorsal than lateral ; body nakedBATRACHOIDIDAE
 (b) Not as above.....46
- 46 (a) Caudal fin separate from dorsal and anal fins.....BREGMACEROTIDAE
 (b) Second dorsal and anal fins continuous with tail, which tapers to a sharp pointMACROURIDAE
- 47 (a) No spines in fins ; opercular and preopercular margins without spines or serrations48
 (b) Spinous rays present if only in one fin49
- 48 (a) Mouth opening large, both jaws extended into long beaks with numerous needle-sharp teeth; scales small.....BELONIDAE
 (b) Mouth small, only lower jaw prolonged into a beak ; scales largeHEMIRAMPHIDAE
- 49 (a) Suborbital stay (a posterior extension of the third suborbital bone) present (it can be probed with a needle under skin of check) ; head bony, tend to be spiny.....50
 (b) Suborbital stay absent52
- 50 (a) Pelvic fins widely separated ; head greatly depressed, much broader than deepPLATYCEPHALIDAE
 (b) Pelvic-fin bases adjacent ; head not depressed, usually deeper than its breadth51

- 51 (a) Gill membranes free from isthmus ; wholly or partly scaledSCORPAENIDAE
 (b) Gill membranes united with isthmus ; no distinct scalesSYNANCEIIDAE
- 52 (a) Two short dorsal fins, widely separated from each other; pelvic fins subabdominal and markedly behind pectoral - fin base, about equidistant between pectoral - fin base and origin of first dorsal fin53
 (b) Dorsal fins with contiguous bases, but if (rather rarely) the fins are separate, than the separation is negligible and pelvic fins are situated not on belly but near base of pectoral fins54
- 53 (a) First dorsal fin with four spines ; teeth in jaws small , feeble, hidden or absent ; lateral line absentMUGILIDAE
 (b) First dorsal fin with five spines ; jaws with strong canine teeth ; lateral line well developedSPHYRAENIDAE
- 54 (a) Head large and cuboid, eyes dorsal or nearly so ; lateral line on upper part of sideURANOSCOPIDAE
 (b) Not as above.....55
- 55 (a) A peculiar occipital hook in males ; lateral line short and rudimentaryKURTIDAE
 (b) Not as above.....56
- 56 (a) Pelvic fins placed below pectoral fins , with one spine and 4 or 5 soft rays, often united.57
 (b) Pelvic fins not inserted below pectoral fins , and not united60
- 57 (a) Pelvic fins separate (no sucking disc), bases close together but not unitedELEOTRIDIDAE
 (b) Pelvic fins united58
- 58 (a) Two dorsal fins, separate or connected at their bases.....GOBIIDAE
 (b) One dorsal fin, which is very elongate ; body eellike59
- 59 (a) Pouchlike cavity in opercular region on each sideTRYPAUCHENIDAE
 (b) No pouchlike cavity in opercular region.....GOBIOIDIDAE
- 60 (a) Toothed saccular outgrowths in gullet behind last gill arch ; scales usually cycloid61
 (b) No toothed pharyngeal sacs62
- 61 (a) Body very deep ; dorsal fin continuousSTROMATEIDAE

- (b) Body rather elongate ; two dorsal fins, distinctly (though scarcely) separatedARIOMMATIDAE
- 62 (a) Premaxilla fixed (nonprotrusible63
- (b) Maxillary bone not very firmly attached to premaxillae which are hence free to move forward64
- 63 (a) Body spindle-shaped ; caudal fin well developed.....SCOMBRIDAE
- (b) Body very elongate and strongly compressed ; caudal fin absentTRICHIURIDAE
- 64 (a) Pelvic fin with two strong spines, separated by three soft rays ; annal fin with seven spinesSIGANIDAE
- (b) Pelvic fin with at most one spine.....65
- 65 (a) One or more spines on caudal peduncle.....ACANTHURIDAE
- (b) Caudal peduncle unarmed.....66
- 66 (a) Two long barbels behind chin which can be folded into a median groove on throat ; two widely separated dorsal finsMULLIDAE
- (b) No barbels on chin, or, if present (*Sciaenidae*), then dorsal fins not widely separated17
- 67 (a) Dorsal fin with 6 to 9 isolated spines, each depressible in a groove ; two silvery stripes on sides of body.....RACHYCENTRIDAE
- (b) Dorsal fin with no free spines68
- 68 (a) First two anal-fin spines detached from rest of fin (these spines partially or completely embedded in large specimens) ; scutes on straight part of lateral line usually presentCARANGIDAE
- (b) first two anal - fin spines not detached from rest of fin ; no scutes on caudal peduncle69
- 69 (a) Anterior rays of soft dorsal and anal fins markedly elongated, giving both fins a sickle shape ; pelvic fins usually small or vestigial; body deepMONODACTYLIDAE
- (b) Anterior rays of soft dorsal and anal fins elongated, but when elongated they do not give either fin a sickle shape70
- 70 (a) Body very deep , its maximum depth more than half the total length ; single dorsal fin, the spinous rays clearly distinguishable.....71
- (b) Body oblong or moderately deep, its maximum depth less than half the total length; when deep- bodied and with single dorsal fin , there are either no spinous rays or are difficult to distinguish72

- 71 (a) Anal fin with three spines ; gill membranes broadly united to isthmusEPHIPPIDIDAE
 (b) Anal fin with four spines ; gill membranes broadly united to isthmus ...SCATOPHAGIDAE
- 72 (a) Single dorsal fin with no spinous rays, or else difficult to distinguish from the soft rays
73
 (b) single or two dorsal fins, with well developed spinous rays74
- 73 (a) Dorsal fin originating on head ; forehead prominent (steep and high) in adult males ; pelvic fins presentCORYPHAENIDAE
 (b) Dorsal fin originating behind head ; forehead not prominent ; pelvic fins absent in adultsPARASTROMATEIDAE
- 74 (a) Two dorsal fins, well separated, but if close together then not joined by membrane75
 (b) Single dorsal fin, sometimes deeply notched between spinous and soft parts of fin, but in such cases the membrane joining the two parts is intact.....79
- 75 (a) Anal-fin base considerably longer than second dorsal - fin base ; mouth large, oblique, with two small canines at frontLACTARIIDAE
 (b) Anal-fin base as long as or shorter than second dorsal - fin base.....76
- 76 (a) Mouth small, maximum ending far short of eye or even before nostrils ; body elongateSILLAGINIDAE
 (b) Mouth moderate- sized or large ; maxilla reaching nostrils, but often extending beyond anterior margin of eye77
- 77 (a) pelvic fin without axillary scaly processAPOGONIDAE
 (b) pelvic fin with an axillary scaly process78
- 78 (a) Caudal fin forked ; scales cycloidAMBASSIDAE
 (b) Caudal fin rounded ; scales ctenoid.....CENTROPOMIDAE
- 79 (a) pelvic fins without an axillary scaly process ; anal-fin spines three80
 (b) pelvic fins with an axillary scaly process.....82
- 80 (a) Inner ray of pelvic fin attached to abdomen by membranePRIACANTHIDAE
 (b) Inner ray of pelvic fin not attached to abdomen by membrane.....81
- 81 (a) Mouth large, the maxilla extending to below hind margin of eye ; dorsal fin with 11 spinesSCRRANIDAE
 (b) Mouth small, the maxilla not extending beyond eye centre ; dorsal fin with 12 to 14 spinesTERAPONIDAE

- 82 (a) Anal fin with two spines ; lateral line scales extending to hind margin of caudal fin
.....SCIAENIDAE
(b) Anal fin with three spines ; lateral scales ending at caudal - fin base83
- 83 (a) Dorsal and anal fins rounded and symmetrical so that with the tail they appear as a single
three-lobed fin.....LOBOTIDAE
(b) Not as above.....84
- 84 (a) Mouth strongly protrusible85
(b) Mouth moderately protrusible86
- 85 (a) Head naked, upper surface with bony ridges and a nuchal spine on nape ..LEIOGNATHIDAE
(b) Head entirely covered with clearly visible scales, upper surface smoothGERRIDAE
- 86 (a) Distal end of premaxillae overlapping maxillae externally ; molarlike teeth present at sides
of jawsSPARIDAE
(b) Maxillae not overlapping hind tip of premaxillae87
- 87 (a) Suborbital process either absent or weakly developedHAEMULIDAE
(b) Suborbital process well developed, sometimes forming a spine posteriorly88
- 88 (a) Spinous rays in dorsal and anal fins moderately strong; teeth present on roof of mouth
.....LUTJANIDAE
(b) Spinous rays in dorsal and anal fins weak ; no teeth on roof of mouthNEMIPTERIDAE
- 89 (a) Dorsal fin not extending onto head (to or past eye) ; anterior dorsal finrays spinous
.....PSETTODIDAE
(b) Dorsal fin extending onto head at least to eyes ; dorsal fin without spinous rays90
- 90 (a) Preopercular margin free and visible, not covered by skin ; lower jaw generally prominent
.....91
(b) Preopercular margin not entirely free, hidden beneath skin ; lower jaw not prominent92
- 91 (a) Pelvic fin with one spine and five soft rays.....CITHARIDAE
(b) Pelvic fin without any spine, only soft raysBOTHIDAE
- 92 (a) Eyes on right side of body.....SOLEIDAE
(b) Eyes on left side of body.....CYNOGLOSSIDAE

SYSTEMATIC ACCOUNT

The coastal and offshore waters of West Bengal teem with 402 fish species. The Sandhead region is ranked as one of the richest fishing grounds in the Bay of Bengal for demersal fishes. These fishes are discussed below and organised along systematic lines following the scheme proposed by Nelson (1984) for bony and batoid fishes, and Compagno (1984a, 1984b) for sharks. The 168 new species discovered from West Bengal waters in earlier years, along with their current taxonomic status, is summarised in Table I. Further, a bibliography of the fish and fisheries of West Bengal, is also given.

Class CHONDRICHTHYES
Subclass ELASMOBRANCHII

Sharks sustain an important component in the coastal waters of West Bengal. Although they are essentially marine, a few species enter the estuaries and move upstream in the Ganga even beyond the tidal range. Bal and Rao (1984 : 47) give the catch statistics of the landings of elasmobranchs in West Bengal : 493m. tonnes in 1976 and 244m. tonnes in 1979. A very important use to which the elasmobranch fishes are put to is for the extraction of liver oils having a high medicinal value. Government-owned shark liver oil factories are functioning in West Bengal.

Order SQUALIFORMES
Family SQUALIDAE
(Dogfish sharks)

Small to moderately large sharks, are mostly confined to deeper waters. The body is cylindrical or slightly compressed, with inconspicuous ridges between pectoral and pelvic fins. Head with five gill-slits, all anterior to pectoral fins. Each dorsal fin preceded by a spine.

SPECIES OCCURRING IN WEST BENGAL : *Centroscyllium ornatum* (Alcock, 1889).

Remarks : *Centroscyllium ornatum* (Alcock) is a deep-water species, characteristic in having multicuspid teeth in the upper jaw and laterally grooved fin-spines. There are two syntypes of this species (ZSI regd. no. F11664 and F11666) in our collections.

Order ORECTOLOBIFORMES
Family HEMISCYLLIIDAE
(Bamboo sharks)

The bamboo sharks are a group of inshore tropical sharks of the Indo West Pacific, being confined to continental waters. They are slow-swimming bottom-dwellers. They are small and slender with nasoral grooves, perinasal grooves, short barbels, small transverse mouth in front of eyes, dorsolateral eyes, large spiracles below eyes, two spineless dorsal fins, the second dorsal fin well ahead of the anal-fin origin, a long, low keel-like rounded anal fin separated from the lower caudal origin by a narrow notch, and a long precaudal tail (Compagno, 1984).

SPECIES OCCURRING IN WEST BENGAL : *Chiloscyllium griseum* Muller & Henle, 1839 ; *Chiloscyllium indicum* (Gmelin, 1789) ; ? *Chiloscyllium plagiosum* (Bennett, 1830) ; ? *Chiloscyllium punctatum* Muller & Henle, 1838.

Key to Species

- 1 (a) Body and tail very slender ; numerous small dark spots and bars on body*Chiloscyllium indicum*
- (b) Body and tail moderately slender to relatively snout ; colour pattern varied but without numerous small dark spots and bars2
2. (a) Ground colour of body dark with numerous light spots*Chiloscyllium plagiosum*
- (b) Ground colour of body light, with or without scattered dark spots or dusky bands3
3. (a) Dorsal fin smaller than pelvic fins*Chiloscyllium griseum*
- (b) Dorsal fins larger than pelvic fins*Chiloscyllium punctatum*

Remarks : These sharks are among the most abundant along the coast of West Bengal. The slender bambooshark, *Chiloscyllium indicum* which is the most common species, may be distinguished in the field by its lateral ridges and numerous dark spots. In the grey bambooshark, *C. griseum* there are no lateral ridges on the body.

Family STEGOSTOMATIDAE
(Zebra sharks)

Body cylindrical, with prominent ridges on sides. Eyes laterally situated on head, behind mouth ; deep nasoral grooves connecting nostrils and ventral mouth. Gill slits small, the fifth overlapping fourth. First dorsal fin slightly larger than second fin ; anal fin larger than second dorsal fin ; caudal fin about half of total length.

SPECIES OCCURRING IN WEST BENGAL : *Stegostoma fasciatum* (Hermann, 1783).

Remarks : The zebra shark, *Stegostoma fasciatum* is regularly taken in inshore fisheries in West Bengal, the young of which is often observed in the Hoogly estuary. The young ones are dark brown above, yellowish below, with vertical yellow stripes and spots breaking the dorsal coloration into dark saddles. Caught in bottom trawls and gillnets.

Family RHINIODONTIDAE
(Whale shark)

Body enormous and robust, with a broad and blunt snout. Eyes very small. Mouth wide and terminal. Gill openings exceptionally large, the last two slits behind origin of pectoral fin, over finbase.

SPECIES OCCURRING IN WEST BENGAL : *Rhiniodon typus* Smith, 1828.

Remarks : Lloyd (1908) reported a specimen of *Rhiniodon typus* at the mouth of the River Hoogly. Because of its distinct characteristics it is easy to identify. It is the only spotted shark that has the mouth at the tip of the head ; it also has ridges along the sides of the body ; and it grows to an enormous length. This is the worlds' largest fish, with lengths upto 15.2 m. Although this species can weigh several tonnes, the flesh is not used for human consumption.

Order CARCHARHINIFORMES

Family PROSCYLLIIDAE
(Finback catsharks)

This is a small family of deepwater sharks. The trunk and precaudal is cylindrical or somewhat compressed. Spiracles moderately large and behind eyes ; nostrils without barbels, nasoral grooves well separated from mouth ; fifth gill-opening over origin pectoral fin. Two dorsal fins, second dorsal about as large as first. Caudal fin narrow and tapelike, relatively long, much less than half of total length.

SPECIES OCCURRING IN WEST BENGAL : *Eridacnis radcliffei* Smith, 1913.

Remarks : Compagno (1984b) reports this species from northern Bay of Bengal.

Family HEMIGALEIDAE
(Weasel sharks)

This is a small family of small to medium-sized sharks, with horizontally oval eyes, distinct spiracles, an arched mouth that reaches past anterior of eyes, moderately long labial furrows, moderately large bladelike teeth in the upper jaw, more or less cuspidate teeth in the lower jaw, two dorsal fins and an anal fin, the first dorsal base well ahead of pelvic bases, precaudal pits present, and the caudal fin with a strong ventral lobe.

SPECIES OCCURRING IN WEST BENGAL : ? *Hemipristis elongatus* (Klunzinger, 1871).

Remarks : This shark is regularly taken in artisanal fisheries in India, and perhaps inhabits West Bengal waters also. These sharks live on the continental shelf, mainly in coastal waters.

Family CARCHARHINIDAE
(Requiem sharks)

The Requiem sharks form the largest family among the elasmobranch fishes. All the members of the family have the appearance of "typical sharks" These sharks have round eyes, no nasoral grooves or barbels, usually no spiracles, a long arched mouth that reaches past anterior ends of eyes, moderately long labial furrows, more or less bladelike teeth in jaws, two dorsal fins and an anal fin, the first dorsal fin placed well ahead of pelvic bases, the second fin usually much smaller than the first, precaudal pits present, and the caudal fin with a strong ventral lobe. Further, the fifth gill-opening over or behind origin of pectoral fin.

Most species inhabit tropical continental coastal and offshore waters.

SPECIES OCCURRING IN WEST BENGAL : *Carcharhinus dussumieri* (Valenciennes, 1839) ; *Carcharhinus hemiodon* (Valenciennes, 1839) ; *Carcharhinus leucas* (Valenciennes, 1839) ; *Carcharhinus limbatus* (Valenciennes, 1839) ; *Carcharhinus melanopterus* (Quoy & Gaimard, 1824) ; ? *Carcharhinus sorrah* (Valenciennes, 1839) ; *Glyphis gangeticus* (Muller & Henle, 1839) ; *Lamiopsis temmincki* (Muller & Henle, 1839) ; *Rhizoprionodon acutus* (Ruppell, 1837) ; *Scoliodon laticaudus* (Muller & Henle, 1838).

Key to Species

- 1 (a) Second dorsal fin nearly or quite as large as first dorsal fin*Lamiopsis temmincki*
 (b) Second dorsal fin considerably smaller than first.....2
- 2 (a) Head greatly depressed and trowel-shaped ; post-ventral margin of caudal fin shallowly concave*Scoliodon laticaudus*
 (b) Head varying from conical to slightly depressed ; postventral margin of caudal fin deeply incised3
- 3 (a) Second dorsal fin well behind anal-fin origin*Rhizoprionodon acutus*
 (b) Second dorsal fin usually above vertical from anal-fin origin.....4
- 4 (a) Cusps of lower teeth prominently protruding when mouth is closed ; precaudal pits longitudinal (and not crescentic)*Glyphis gangeticus*
 (b) Cusps of lower teeth not prominently protruding when mouth is closed ; precaudal pits transverse and crescentic5
- 5 (a) Upper anterior teeth with broad triangular cusps, not well delimited from tooth-bases*Carcharhinus leucas*
 (b) Upper anterior teeth with narrow cusps, well delimited from bases6
- 6 (a) Second dorsal fin with a conspicuous black tip, but other fins without markings*Carcharhinus dussumieri*
 (b) Second dorsal fin either plain, dusky or black tipped, but other fins also with conspicuous black markings if black tipped.....7
- 7 (a) Second dorsal fin very low, with greatly enlarged inner margin, 2 to 3 times in fin-height*Carcharhinus sorrah*
 (b) Second dorsal fin higher, inner margin less than 2 times fin-height8
- 8 (a) Cusps of upper outer lateral teeth smooth-edged or weakly serrated ; an interdorsal ridge present*Carcharhinus hemiodon*
 (b) Cusps of upper lateral teeth strongly serrated ; no interdorsal ridge9
- 9 (a) Snout very short and bluntly rounded ; all fins black or dusky tipped*Carcharhinus melanopterus*
 (b) Snout longer and pointed ; at least some fins black tipped*Carcharhinus limbatus*

Remarks : The Gangetic shark, *Glyphis gangeticus* is a very rare species. The blacktip reef shark, *Carcharhinus melanopterus* is not uncommon in inshore shallow waters, including brackish water. *Rhizoprionodon acutus* is a very common small shark found in coastal waters to about 50m depth. *Rhizoprionodon oligolinx* Springer is to be looked for as it is common on the Orissa coast.

Family SPHYRNIDAE
(Hammerhead sharks)

Hammerheads are clearly distinguished from all other sharks by their flattened heads, extended into hammerlike lobes on each side. At its tip, each lobe bears an eye. In other features, the hammerheads resemble requiem sharks (Gilbert, 1967) to which they are closely related.

Hammerheads sharks inhabit surface waters in tropical and warm-temperate seas. The adults of most species are semi-oceanic while the young are found close shore. Reported to be dangerous to man.

SPECIES OCCURRING IN WEST BENGAL : *Eusphyrna blochii* (Cuvier, 1817) ; ? *Sphyrna lewini* (Cuvier, Griffith & Smith, 1834).

Key to Species

- 1 (a) Head with conspicuously long lateral extension from each side, 2 to 3 times as long as wide ; eyes and nostrils widely separated*Eusphyrna blochii*
- (b) Head with moderate extension from each side, greatest width of head more than 32% of total length.....*Sphyrna lewini*

Remarks : *Eusphyrna blochii* is a small species, probably harmless to people. It is commonly taken in fisheries in West Bengal. *Sphyrna lewini* contributes an important fishery on the Orissa coast (Talwar, 1974) and perhaps also inhabits West Bengal waters.

Order RAJIFORMES
(Skates and Rays : Batoid Fishes)

Along the West Bengal coast, rays and skates are generally more abundant, especially the former, than the sharks (James, 1973 : 485).

Suborder PRISTOIDEI
Family PRISTIDAE
(Sawfishes)

These sharklike rays have a long snout that is formidably armoured with sharp teeth along each side. Like rays, the sawfishes have gill-slits on the underside of the body on each side just behind the mouth, and the large pectoral fins are joined broadly to the head. The body is long and slim, more like that of a shark. Two distinct dorsal fins and a caudal fin. Sawfishes are cosmopolitan in distribution in warm to tropical seas, inhabiting shallow waters and straying into brackish or even fresh water.

SPECIES OCCURRING IN WEST BENGAL : *Anoxypristis cuspidatus* (Latham, 1794) : *Pristis microdon* Latham, 1974 ; *Pristis pectinata* Latham, 1974.

Key to Species

- 1 (a) Caudal fin with a prominent subterminal notch and a long ventral lobe ; rostral teeth depressed, broad and blade-like, in shallow broad sockets on rostrum*Anoxypristis cuspidatus*
- (b) Caudal fin without a subterminal notch, with a short ventral lobe or none ; rostral teeth narrow, not depressed, spike-like, in deep narrow sockets on rostrum2
- 2 (a) First dorsal fin inserted above pelvic-fin origin ; 24 to 34 pairs of rostral teeth*Pristis pectinata*
- (b) First dorsal fin placed almost entirely in advance of pelvic fins*Pristis microdon*

Remarks : *Anoxypristis cuspidatus* is a euryhaline species which is common at the mouth of the Ganga (Annandale, 1909). *Pristis microdon* and *P. pectinata* are fairly common in the Hooghly estuary. The latter species attains a length of 7.4 m and flesh is good eating. Their livers yield a valuable oil, which has a high content of vitamin A. The saw is reported to be used by some fishermen for religious purposes.

Suborder TORPEDINIOIDEI
Family TORPEDINIDAE
(Electric Rays)

Electric rays inhabit seas throughout the world. They have powerful electric organs, derived from branchial muscles, in the head region. Eyes are small and functional in most species, but rudimentary or obsolete in a few deepwater forms. Their bodies are soft and flabby compared to skates and other rays. The caudal fin is well developed. The disc is rounded anteriorly.

SPECIES OCCURRING IN WEST BENGAL : *Bengalichthys impennis* Annandale, 1909 ; *Narcine brunnea* Annandale, 1909 ; ? *Narcine maculata* (Shaw, 1804) ; *Narcine timlei* (Schneider, 1801) ; *Narke dipterygia* (Schneider, 1801).

Key to Species

- 1 (a) One dorsal fin present ; shallow groove around mouth and lips2
- (b) Two dorsal fins present ; deep groove around mouth3
- 2 (a) Eyes poorly developed, minute and sunken ; pectoral and pelvic fins poorly developed*Bengalichthys impennis*
- (b) Eyes well developed ; pectoral and pelvic fins well developed*Narke dipterygia*
- 3 (a) Posterior pectoral margins overlapping the anterior part of pelvic fins ; plain coloured upper side of disc*Narcine brunnea*
- (b) Posterior pectoral margins not overlapping anterior part of pelvic fins ; dark spots on upper side of disc4
- 4 (a) Teeth in 27 rows in upper jaw, 26 rows in lower jaw*Narcine maculata*
- (b) Teeth in 23 rows in upper jaw, 21 rows in lower jaw*Narcine timlei*

Remarks : *Bengalichthys impennis* which is restricted to the Bay of Bengal, is reported here for the first time from West Bengal. This species has minute sunken eyes (Garric, 1951). These ray species are mainly in shallow coastal waters and only occasionally caught as bycatch. *Narcine timlei* and *Narcine maculata* are characteristic in having dark spot on upper side of disc, whereas *N. brunnea* has a plain coloured upper side of disc.

Suborder RAJOIDEI
Family RHINOBATIDAE
(Guitar Fishes)

Guitarfishes have a distinct raylike body with the forward part rounded or heart-shaped. The snout is wedge-shaped, and the tail sector is not definitely marked off from the body. The caudal fin is relatively short and thick, but the two dorsal and anal fins are well developed. The gills are on the underside of the body. Dentides over body form a row on midline on back ; tail without spine.

The guitarfishes are shallow-water bottom feeders, often being found in bays and estuaries. They are ovoviviparous.

SPECIES OCCURRING IN WEST BENGAL : *Rhinobatos annandalei* Norman, 1926 ; *Rhinobatos granulatus* Cuvier, 1829 ; *Rhinobatos lionotus* Norman, 1926 ; *Rhinobatos obtusus* Muller & Henle, 1841 ; *Rhina ancylostoma* Schneider, 1801 ; *Rhynchobatus djeddensis* (Forsskal, 1775).

Key to Species

- 1 (a) Caudal fin bilobed ; origin of first dorsal-fin above pelvic fins2
- (b) Caudal fin not bilobed ; origin of first dorsal-fin behind pelvic fins3
- 2 (a) Snout long and pointed ; posterior margin of spiracles with two cutaneous folds
.....*Rhynchobatus djeddensis*
- (b) Snout broad and rounded ; no spiracular folds.....*Rhina ancylostoma*
- 3 (a) Anterior nasal valve extending only as far as level of anterior margin of nostril4
- (b) Anterior nasal valve extending across inner margin of nostril, often meeting that of
opposite side.....5
- 4 (a) First dorsal-fin base 2.2 to 2.4 times in interspace of dorsal fins ; a row of tubercles in
median line of back*Rhinobatos annandalei*
- (b) First dorsal-fin-base 2.7 to 2.9 times in interspace of dorsal fins ; rows of minute tubercles
in median line of back*Rhinobatos lionotus*
- 5 (a) Snout very long and narrow, the rostral ridges close together or joining throughout their
length.....*Rhinobatos granulatus*
- (b) Snout short and narrow, the rostral ridges separated throughout their length
.....*Rhinobatos obtusus*

Remarks : Species of this family may be caught in large quantities and together with other batoid fishes, they constitute a considerable part of the commercial catches.

Suborder MYLIOBATIDOIDEI
Family DASYATIDAE
(Sting Rays)

Stingrays are best known for their long, slim, whiplike tails that are armed with usually one or more long poisonous spines near the base ; many sharp, small teeth along the sides of the spine give the stingray its fearful reputation. These rays have the outer anterior margin of pectorals continuous along side of head, no distinct dorsal fin and no caudal fin.

Stingrays are marine and estuarine, but a few species penetrate fresh waters. Stingrays generally lie on the bottom, almost completely buried in the sand or soft sediment.

SPECIES OCCURRING IN WEST BENGAL : *Aetoplatea tentaculata* (Valenciennes, 1841) ; *Dasyatis microps* (Annandale, 1908) ; *Dasyatis zugei* (Muller & Henle, 1841) ; *Himantura bleekeri* (Blyth, 1861) ; *Himantura fluviatilis* (Hamilton-Buchanan, 1822) ; *Himantura imbricata* (Schneider, 1801) ; *Himantura marginata* (Blyth, 1861) ; *Himantura uarnak* (Forsskal, 1775) ; ? *Gymnura (Gymnura) japonica* (Schlegel, 1850) ; *Gymnura (Gymnura) poecilura* (Shaw, 1804).

Key to Species

- 1 (a) Disc extremely broad, more than 1.5 times as broad as long ; tail distinctly shorter than disc width ; no papillae on floor of mouth (Subfamily : Gymnurinae)2
- (b) Disc at most 1.3 times as broad as long ; tail (if complete) much longer than disc width ; floor of mouth with several fleshy papillae (Subfamily : Dasyatinae)4
- 2 (a) A small distinct dorsal fin near midlength of tail ; a small longitudinal cutaneous fold present on tail*Aetoplatea tentaculata*
- (b) No dorsal fin ; no cutaneous fold on tail3
- 3 (a) Tail armed with a small, weak serrate spine at its anterior third*Gymnura japonica*
- (b) Tail without spine*Gymnura poecilura*
- 4 (a) Tail with cutaneous folds, either above or below, or on both dorsal and ventral sides5
- (b) Tail without tail-folds7
- 5 (a) Disc diamond-shaped ; tail thick with prominent lower tail-fold*Hypolophus sephen*
- (b) Disc oval or rhomboid ; tail whip-like6
- 6 (a) Tail without cutaneous folds*Dasyatis microps*
- (b) Tail with cutaneous folds*Dasyatis zugei*

- 7 (a) Disc oval, with usually two stings8
 (b) Disc more-or-less diamond shaped, usually with a single functional sting10
- 8 (a) Ventral surface of disc entirely white ; disc width of adults under 25 cm*Himantura imbricata*
 (b) Ventral surface of disc with broad dark margin ; disc width of adults more than 1m9
- 9 (a) Length of snout more than one-third of disc length ; dorsal surface of disc with a striking vase-shaped area of flattened denticles medially and no denticles laterally*Himantura bleekeri*
 (b) Length of snout less than one-third of disc length ; dorsal surface of disc more or less uniformly covered with small, blunt denticles.....*Himantura fluviatilis*
- 10 (a) Dorsal surface of disc greyish*Dasyatis marginata*
 (b) Dorsal surface of disc of adults pale brown with dark markings ; young white with black spots*Dasyatis uarnak*

Remarks : The species of butterfly rays of the genus *Gymnura*, often classified in a separate family, Gymnuridae, are among the most handsome and graceful of all the rays. Their wings are as broad as the body is long, and are more or less pointed at their tips. The tail is very short. Their basic body colour is brownish gray and is attractively inscribed with purple, green, or dark brown lines. Compared to the typical stingrays, the butterfly rays are more active, spending less of their time at rest at the bottom. The dasyatid *Hypolophus sephen*, the stingray most commonly reported from fresh water in Southeast Asia, is a marine species (Compagno and Roberts, 1982). It occurs in marine and estuarine habitats. *Himantura marginata*, the marine and estuarine dasyatid, is common in the Hooghly at Calcutta, and attains a maximum size of only about 220 mms. *Himantura bleekeri* and *H. uarnak* have also been reported in the Hooghly estuary. *Gymnura japonica* probably occurs on the West Bengal coast, having been reported as *Pteroplatea micrura* (Bloch & Schneider) from Digha by Datta and Sen (1977). We were, unfortunately, unable to locate their study material in our collections. Talwar and Das (1975) discussed the identity of this species. Datta and Sen (1977) reported "*Trygon walga* (Russell)" from Digha, but *walga* is now considered a synonym of *Himantura imbricata*.

Family MYLIOBATDIDAE (Eagle Rays)

The members of this group have a distinct head region, with the eyes and spiracles located on each side. The head is marked off from the trunk. The eagle-rays are noted for their pavement - like teeth. The gill openings are about the length of eye. The tail is much longer than the disc ; venomous spine(s) present in some species. Small dorsal fin ; no caudal fin.

SPECIES OCCURRING IN WEST BENGAL : *Aetobatus narinari* (Blainville, 1816) ; *Aetomylaeus nichofii* (Schneider, 1801).

Key to Species

- 1 (a) Single series of teeth in each jaw ; caudal spine present*Aetobatus narinari*
 (b) Teeth in three series ; no spine on tail*Aetomylaeus nichofii*

Remarks : *Aetobatus narinari* has whitish spots or rings on dark background of disc, whereas *Aetomylaeus nichofii* has 3 to 5 greyish-blue bands. Both these species rather common and abundant in West Bengal, are not locally used for food.

Class OSTEICHTHYES
Order ELOPIFORMES
Suborder ELOPOIDEI
Family ELOPIDAE
(Lady Fishes)

The body is rounded and slightly compressed. Mouth terminal ; pseudobranchiae large. Single dorsal fin of soft rays, placed about the centre of the body and more or less opposite the pelvic fins. The caudal fin is long and deeply forked. The gular plate is well developed. Scales small and thin, cycloid.

SPECIES OCCURRING IN WEST BENGAL : *Elops machnata* (Forsskal, 1775).

Remarks : The tenpounder, *Elops machnata* inhabits coastal waters and is caught occasionally in West Bengal, but no special fishery for this species.

Family MEGALOPIDAE
(Tarpons)

Although primarily marine, these fishes are also known from brackish and even fresh waters. The body is compressed, and the mouth is terminal or superior. They have a long, deeply forked caudal fin and a single dorsal fin of soft rays, placed about the centre of body and inserted above the origin of pelvic fins ; the last ray of the dorsal fin is extended as a long filament. They have a fairly large, bony gular plate located under the mouth, between the two mandibles. There are also many sharp, small teeth in the mouth ; pseudobranchiae absent.

SPECIES OCCURRING IN WEST BENGAL : *Megalops cyprinoides* (Broussonet, 1782).

Remarks : *Megalops cyprinoides* is a pelagic species, usually found in coastal waters, including lagoons and estuaries of West Bengal. It is caught with gillnets, seines and trawls.

Order ANGUILLIFORMES
Family ANGUILLIDAE
(Freshwater Eels)

The anguillids differ from most of the other eel families in the possession of scales, which are embedded in the skin. These eels breed in the open ocean and ocean currents move the young larvae (leptocephali) coastward to where the juveniles invade fresh water. Most of the life is subsequently spent in streams and rivers but as maturity approaches the adults migrate seaward to spawn.

SPECIES OCCURRING IN WEST BENGAL : *Anguilla bengalensis bengalensis* (Gray, 1831) ; *Anguilla bicolor bicolor* McClelland, 1844.

Key to Species

- 1 (a) Dorsal-fin origin nearly above anus ; no edentulous grooves in tooth-bands*Anguilla bicolor*
- (b) Dorsal-fin origin about midway between gill-opening and anal fin ; edentulous groove in tooth-bands*Anguilla bengalensis*

Remarks : *Anguilla bengalensis bengalensis* is fairly abundant along the West Bengal coast, whereas *A. bicolor bicolor* is rather rare though fairly plentiful in certain other estuarine locations of the country.

Family MORINGUIDAE
(Worm Eels)

The worm-eels have an extremely elongate, thread-like body ; gill-openings low on body ; dorsal and anal fins reduced to low folds, posteriorly, and confluent with caudal fin ; eyes small and covered with skin ; no scales. All have feeble pectoral fins and are thought to be head burrowers rather than tail burrowers like some of the eels in other families.

SPECIES OCCURRING IN WEST BENGAL : *Moringua arundinacea* (McClelland, 1844) ; *Moringua raitaborua* (Hamilton-Buchanan, 1822).

Key to Species

- 1 (a) Depth of body 31 to 45 times in total length ; head length 8 to 10 times in total length ; vertebrae about 104*Moringua raitaborua*
- (b) Body more slender, its depth 47 to 50 times in total length ; head shorter, its length 10 to 12 times in total length ; vertebrae 115 to 130*Moringua arundinacea*

Remarks : Castle (1968) discussed the systematics of these eels wherein he showed that two species have been confused by a number of authors under the name *Moringua raitaborua* (Hamilton-Buchanan, 1822). This species is short, stubby with a relatively long head and few vertebrae, whereas *M. arundinacea* is a more slender species with a shorter head and moderate number of vertebrae. The specimens described by Trewavas (1932 : 647) from the Hooghly are probably the latter species. Both these species are restricted to the Gangetic estuary.

Family MURAENIDAE
(Moray Eels)

The muraenids are identified by a combination of characteristics, important ones being the absence of pectoral fins, the dentition, the colour pattern, and the deep dorsal profile of the head. The typical moray's body is flattened from side to side, and the scaleless skin is thick and leathery. The dorsal and anal fins are low, sometimes almost hidden by the wrinkled skin around them. The gill openings are

restricted to small roundish lateral openings ; lateral line pores on head but not on body ; posterior nostril high on head ; most with long fanglike teeth. Many morays are attractively coloured.

SPECIES OCCURRING IN WEST BENGAL : *Echidna nebulosa* (Ahl, 1789) ; *Echidna zebra* (Shaw, 1797) ; *Lycodontis meleagris* (Shaw & Nodder, 1795) ; *Lycodontis sathete* (Hamilton-Buchanan, 1822) ; *Lycodontis tile* (Hamilton-Buchanan, 1822) ; *Siderea picta* (Ahl, 1789) ; *Thyrsoidea macrura* (Bleeker, 1854).

Key to Species

- 1 (a) Teeth mostly blunt, molarlike2
- (b) Teeth sharp, some of them fang-like or shark-like3
- 2 (a) Tail about half as long as rest of body ; body dark brown, with numerous narrow light cross-bars, yellow in life*Echidna zebra*
- (b) Tail about as long as rest of body ; body with numerous small spots or lines and two series of large, star-like patches*Echidna nebulosa*
- 3 (a) Tail (from anus to tip of caudal fin) about twice rest of body ; mouth very large*Thyrsoidea macrura*
- (b) Tail less than 1.5 times rest of body4
- 4 (a) No long median depressible fang in upper jaw, at most a single median stout conical tooth in front*Siderea picta*
- (b) One or more long median depressible fangs in front of upper jaw5
- 5 (a) Teeth in upper jaw in a single row*Lycodontis sathete*
- (b) Teeth in upper jaw in more or less two rows6
- 6 (a) Body dark purplish-brown covered with numerous, very small, yellow spots, less than eye-diameter.....*Lycodontis meleagris*
- (b) Body brownish-yellow to greenish, lighter below, with pupil-sized white specks (often absent in adults)*Lycodontis tile*

Remarks : There is no special fishery for members of this family in West Bengal. Some species are found in turbid waters and estuaries. Only occasionally caught and consumed fresh.

Two new leptocephalids, viz. *Leptocephalus milnei* and *L. vermicularis* were discovered by Southwell and Prashad (1919) from the Hooghly estuary.

Family OPHICHTHIDAE (Snake Eels)

Snake eels are tail burrowers and accordingly have very sharp, strong, spikelike tails. The nostrils are located in two short, stout barbels on tip of the snout, the posterior nostril usually within or

piercing the upper lip. In most snake eels the dorsal fin extends almost the full length of the body, originating just behind the head but stopping short of the tip of the tail ; the anal fin is much shorter. Pectoral fins are lacking or very small. Branchiostegal rays numerous and overlapping along the midventral line, forming a basketlike structure.

Most snake eels are small and very slender. Distribution is world-wide, mostly in inshore tropical seas.

SPECIES OCCURRING IN WEST BENGAL : *Lamnostoma orientalis* (McClelland, 1844) ; *Pisodonophis boro* (Hamilton-Buchanan, 1822).

Key to Species

- 1 (a) Pectoral fins present*Lamnostoma orientalis*
 (b) Pectoral fins absent*Pisodonophis boro*

Remarks : Pisodonophis boro is common in the Gangetic estuary. *Lamnostoma orientalis* contributes a minor fishery along the West Bengal coast.

Family MURAENESOCIDAE (Pike Congers)

Pike congers are small to large-sized fishes occurring in tropical waters, found on the continental shelf and slope. The eyes are large and covered with skin. The pectoral fins are well developed ; dorsal fin origin over pectoral-fin base. The mouth is large, extending well beyond eyes ; teeth large and prominent, especially in front, sharp, multiserial on jaws and typically in three rows on vomer ; a median row of canines flanked on each side by a row of much smaller teeth. Lateral line conspicuous. Gill openings large, almost meeting at midline.

SPECIES OCCURRING IN WEST BENGAL : *Congresox talabon* (Cuvier, 1829) ; *Congresox talabonoides* (Bleeker, 1853); *Muraenesox bagio* (Hamilton-Buchanan, 1822); *Muraenesox cinereus* (Forsskal, 1775).

Key to Species

- 1 (a) Principal vomerine teeth blade-like2
 (b) Principal vomerine teeth large and needle-like.....3
- 2 (a) Posterior nostrils slightly closer to eye than to anterior nostrils.....*Muraenesox bagio*
 (b) Posterior nostrils much nearer to eye than to anterior nostrils*Muraenesox cinereus*
- 3 (a) Pectoral fin length about 4 times in head length.....*Congresox talabonoides*
 (b) Pectoral fins longer, its length about 3.2 times in head length*Congresox talabon*

Remarks : The common pike conger, *Muraenesox bagio* constitutes the bulk of eels caught in West Bengal. These eels are good food fishes and sold mostly dry-salted or used as bait for shark fishing. *Congresox talabonoides* lives on soft bottoms in coastal waters to about 100m depth ; also in estuaries. Good catches of this eel are obtained in the Sandheads region between 40-70 metres, and the size range is 96-160 cms (Kuthalingam *et al.*, 1973)

Order CULPEIFORMES
Family CLUPEIDAE
(Herrings, Sardines)

The herrings, sardines, and their relatives form one of the world's most important group of food fishes. All the clupeids are noted for their oily flesh. The body itself is deeply compressed laterally and covered with deciduous scales, which form a knife-like ridge along the centre line of the undersurface of the body. The dorsal fin is placed near the centre of the body, and the caudal fin is deeply forked. Mouth inferior, superior, or terminal ; teeth usually absent. Head scaleless ; dorsal and pelvic fins rarely absent (both absent in *Raconda*). Lateral line existing on a few scales behind the head in some species, absent in others.

Most clupeids are marine, but some can tolerate low salinities and some shads (Alosinae) and gizzard-shads (Dorosomatinae) live temporarily or permanently in freshwater.

Key to Subfamilies

- 1 (a) Mouth inferior, lower jaw flared at corners ; last dorsal finray often filamentousDOROSOMATINAE
- (b) Mouth terminal, lower jaw not flared outward at corners ; last dorsal finray not filamentous2
- 2 (a) Upper jaw with a distinct notch at centreALOSINAE
- (b) Upper jaw without a median notch3
- 3 (a) A single (posterior) supramaxilla.....PELLONULINAE
- (b) Two supramaxillaeCLUPEINAE

Subfamily ALOSINAE
(Shads)

The Alosinae are marine, pelagic, estuarine or freshwater fishes. All are schooling fishes, and most or all are migratory.

SPECIES OCCURRING IN WEST BENGAL : *Hilsa (Hilsa) kelee* (Cuvier, 1829) ; *Hilsa (Tenuالosa) ilisha* (Hamilton-Buchanan, 1822) ; *Hilsa (Tenuالosa) toli* (Valenciennes, 1847).

Key to Species

- 1 (a) Fronto-parietal striae (on top of head) many, 8 to 14 ; gillrakers on inner arches distinctly curled outward ;*Hilsa kelee*
- (b) Fronto-parietal striae weakly developed, usually hidden by skin ; gillrakers on inner arches straight ; scales not perforated2
- 2 (a) Series of small spots along flanks ; head length 28 to 32% of standard length ; gillrakers 100 to 250 on lower arm of arch*Hilsa ilisha*
- (b) No spots on flank ; head length 25 to 27% of standard length ; gillrakers 60 to 100 on lower arm of arch*Hilsa toli*

Remarks : *Hilsa kelee* is pelagic species in coastal waters, which does not form large schools but enters artisanal fisheries in West Bengal. *Hilsa ilisha* is also a pelagic species in coastal waters, ascending rivers to breed. This is the most important of the Indo-Pacific shads, with a good fishery in the Hooghly. It is caught with fishing weirs and drift gillnets in the Hooghly estuary during upstream migration. It attains a length of 35 to 40 cms commonly, and is held in great esteem as a food fish in West Bengal. *Hilsa toli* is also marine, schooling in coastal waters, contributes a minor fishery in West Bengal, where it forms large concentrations in bays and creeks. Unlike *H. ilisha*, it is said not to ascend rivers to breed.

Subfamily CLUPEINAE
(Sardines, Herrings, Sprats)

The Clupeinae are mainly marine coastal and schooling species but some enter brackishwater. They are small or moderate-sized, with a normal pelvic-scut (i.e. with ascending arms) ; upper jaw rounded and not notched when seen from the front ; and two supra-maxillae present.

SPECIES OCCURRING IN WEST BENGAL : *Escualosa thoracata* (Valenciennes, 1847) ; *Herklotsichthys quadrimaculatus* (Ruppell, 1837) ; *Sardinella brachysoma* Blecker, 1852 ; *Sardinella fimbriata* (Valenciennes, 1847) ; *Sardinella gibbosa* (Blecker, 1849).

Key to Species

- 1 (a) Hind border of gill-opening smoothly rounded, with no dermal outgrowths ; pelvic finrays 7 ; silvery stripe on flanks*Escualosa thoracata*
- (b) Hind border of gill-openings with two distinct fleshy outgrowths ; pelvic finrays 8 or 9 ; flanks silvery2
- 2 (a) Fronto-parietal striae on top of head 3 to 6 ; last two anal finrays not enlarged*Herklotsichthys quadrimaculatus*
- (b) Fronto-parietal striae on top of head 7 to 14 ; last two anal finrays enlarged3
- 3 (a) Post-pelvic scutes usually 15*Sardinella gibbosa*
- (b) Post-pelvic scutes 12 to 144

- 4 (a) Posterior scales with numerous vertical striae, overlapping at centre of scales ; body deep, its deep 30 to 39% of standard length*Sardinella brachysoma*
- (b) Posterior scales with 4 or 5 vertical striae, interrupted at centre of scale ; body depth 25 to 35% of standard length*Sardinella fimbriata*

Remarks : The juveniles of the white sardine, *Escualosa thoracata* have been reported from the lower parts of the Hooghly river. The large and rectangular second supra-maxilla in this species is an excellent field character separating this from juveniles of *Hilsa ilisha*. The upper jaw is slightly notched as in the Alosinae, but the low pelvic finray count of 7 distinguishes this species from *Hilsa*. This is a pelagic species inhabiting coastal waters. Datta and Sen (1977) report *Sardinella longiceps* Valenciennes from Digha, but the occurrence of this species on the West Bengal coast is doubtful.

Subfamily DOROSOMATINAE (Gizzard Shads)

The Dorosomatinae are either marine, pelagic and apparently anadromous, or estuarine. They are deep-bodied, with a sharp ridge along the abdomen, and with the last ray of the dorsal fin of several species extended as a long filament. The mouth is inferior or subterminal, the upper jaw is not evenly rounded in front but with a distinct median notch into which the symphysis of the lower jaw fits.

SPECIES OCCURRING IN WEST BENGAL : *Anodontostoma chacunda* (Hamilton-Buchanan, 1822); *Anodontostoma thailandiae* Wongratana, 1983 ; *Nematalosa galathea* Nelson & Rothman, 1973 ; *Nematalosa nasus* (Bloch, 1795).

Key to Species

- 1 (a) Last dorsal finray produced, filamentous2
- (b) Last dorsal finray normal, not filamentous3
- 2 (a) A series of small spots along flanks ; a pair of grooves in the spongy skin on top of head, converging posteriorly ; hind edge of scales not toothed*Nematalosa galathea*
- (b) No spots along flanks ; no grooves on top of head ; hind edge of scales distinctly toothed*Nematalosa nasus*
- 3 (a) Second supra-maxilla paddle-shaped ; longest gillrakers on lower part of arch equal to or longer than corresponding gill filaments*Anodontostoma thailandiae*
- (b) Second supra-maxilla a splint ; longest gillrakers on lower part of arch less than corresponding gill filaments (and much less in larger fishes)*Anodontostoma chacunda*

Remarks : *Anodontostoma chacunda* and *A. thailandiae* contribute a minor fishery in the Hooghly during winter months. *Nematalosa nasus* is pelagic, in coastal waters, also entering estuaries where it is found in large numbers. *N. galathea* is probably restricted to the Hooghly, but we have not been able to collect any specimens. The taxonomic status of the latter species is still uncertain.

Subfamily PELLONULINAE

These are very small herring-like fishes which are characteristic in having the pelvic-scute normal ; mouth terminal ; anterior supra-maxilla absent ; anal fin short ; and pelvic finrays is 7.

SPECIES OCCURRING IN WEST BENGAL : *Corica soborna* Hamilton-Buchanan, 1822.

Remarks : This species appears to be restricted to estuarine waters, and contributes a minor fishery in West Bengal.

Family PRISTIGASTERIDAE
(Ilishas, Pellonas)

Pristigasterids are mostly marine coastal and schooling fishes of tropical and some subtropical seas. The body is compressed and fully scuted along belly. The mouth is directed more or less upward, the lower jaw projecting ; there are two supra-maxillae, and jaw teeth are small or minute. Dorsal fin short (absent in *Raconda*) ; anal fin long, with at least 30 finrays. Pelvic fins small (absent in *Opisthopterus*), with 6 or 7 finrays.

SPECIES OCCURRING IN WEST BENGAL : ? *Ilisha elongata* (Bennett, 1830) ; *Ilisha filigera* (Valenciennes, 1847) ; *Ilisha kampeni* (Weber & de Beaufort, 1913) ; *Ilisha megaloptera* (Swainson, 1839) ; *Ilisha melastoma* (Schneider, 1801) ; ? *Ilisha striatula* Wongratana, 1983 ; *Opisthopterus tardoore* (Cuvier, 1829) ; *Opisthopterus valenciennesi* Bleeker, 1872 ; *Pellona ditchela* Valenciennes, 1847 ; *Raconda russeliana* Gray, 1831.

Key to Species

- 1 (a) Toothed hypo-maxilla present*Pellona ditchela*
- (b) No toothed hypo-maxilla2
- 2 (a) No dorsal fin ; no pelvic fins ; anal fin very long*Raconda russeliana*
- (b) Dorsal fin present.....3
- 3 (a) Anal fin long, 51 to 65 finrays ; no pelvic fins4
- (b) Anal fin moderate, 34 to 53 finrays ; pelvic fins present5
- 4 (a) Body depth 27 to 33% of standard length ; pectoral fin equal to head length or greater ; pectoral finrays 12 to 14*Opisthopterus tardoore*
- (b) Body slender, 24 to 29% of standard length ; pectoral fin distinctly shorter than head length ; pectoral finrays 15 to 17*Opisthopterus valenciennesi*
- 5 (a) Swimbladder with a single long tube passing back down right side of body above anal-fin base6
- (b) Swimbladder with paired post-coelomic extensions7

- 6 (a) Total scutes 30 to 32 *Ilisha megaloptera*
 (b) Total scutes 34 to 38 *Ilisha filigera*
- 7 (a) Body depth 34 to 32% of standard length ; basal part of pseudobranch covered by a thin membrane *Ilisha kampeni*
 (b) Body depth 33 to 42% of standard length ; pseudobranch completely exposed 8
- 8 (a) Vertical striae on scales traversing whole scale or overlapping across centre of scale *Ilisha melastoma*
 (b) Vertical striae on scales not continuous, but with a distinct gap across centre of scales *Ilisha striatula*

Remarks : *Opisthopterus tardoore* and *Pellona ditchela* enter artisanal fisheries in the Hooghly estuary. *Raconda russeliana* is caught at the mouth of the Ganga, but juveniles are fairly common in the Sundarbans. *Opisthopterus valenciennesi* Bleeker is reported here for the first time from Indian waters, based on 7 specimens collected from the Gangetic delta during 1981 survey. This species closely resembles *O. tardoore*, which has a deeper body (27-33% of standard length versus 24-29%) and a longer pectoral fin and fewer finrays. *O. valenciennesi* was earlier known in the Indo-Pacific from the Java Sea, Singapore to East China Sea (Whitehead, 1985 : 296). These examples of *O. valenciennesi* collected at Bakkhali at the mouth of Hooghly, have been incorporated in the National Zoological Collections under Registration No F7910/2. Whitehead (1985 : 295) was uncertain regarding the natural distribution of *O. tardoore* north of Madras on the east coast of India. The present study confirms the occurrence of the species in West Bengal.

Family ENGRAULIDIDAE (Anchovies)

Small translucent silvery fishes, occurring often in immense shoals in coastal waters. They have a prominent snout that projects beyond the lower jaw which is small and inconspicuous, so that the fish appears to be chinless. This characteristic of the head and chin instantly enables one to recognise these fishes. The mouth is very large and the maxillary extremely long, extending well beyond eye. The single dorsal fin is almost at the centre of the body ; the pelvic fins are abdominal in position, often opposite the dorsal fin ; and the caudal fin is deeply notched. The adipose fin and lateral line are absent. Body translucent with a silvery stripe down the side.

The anchovies are small fishes that are always found in schools, never singly. They inhabit coastal waters, including creeks and estuaries.

SPECIES OCCURRING IN WEST BENGAL : *Coilia dussumieri* Valenciennes, 1848 ; *Coilia neglecta* Whitehead, 1968 ; *Coilia ramcarati* (Hamilton-Buchanan, 1822) ; *Coilia reynaldi* Valenciennes, 1847 ; *Setipinna brevifilis* (Valenciennes, , 1848) ; *Setipinna phasa* (Hamilton-Buchanan, 1822) ; *Setipinna taty* (Valenciennes, 1848) ; *Setipinna tenuifilis* Valenciennes, 1848 ; *Stolephorus baganensis* Hardenberg, 1931 ; *Stolephorus commersonii* Lacepede, 1803 ; *Stolephorus heterolobus* (Ruppell, 1837) ; *Stolephorus indicus* (van Hasslet, 1823) ; *Thryssa dussumieri* (Valenciennes, 1848) ; *Thryssa hamiltonii* (Gray, 1835) ; *Thryssa malabarica* (Bloch, 1795) ; *Thryssa purava* (Hamilton-Buchanan, 1822).

Key to Species

- 1 (a) Body tapering, 'rat-tailed' ; caudal fin and anal fins confluent2
 (b) Body normal ; caudal fin bilobed5
- 2 (a) Longitudinal three rows of orange/gold spots (light organs) on flanks of body ; free pectoral filaments 6*Coilia dussumieri*
 (b) No pearly spots on flanks of body3
- 3 (a) Pelvic finrays 9 or 10*Coilia ramcarati*
 (b) Pelvic finrays 74
- 4 (a) Free pectoral filaments 6*Coilia neglecta*
 (b) Free pectoral filaments 10 to 14*Coilia reynaldi*
- 5 (a) Abdominal scutes present only before pelvic-fin bases ; anal fin short, with less than 25 finrays6
 (b) Abdominal scutes present before and behind pelvic-fin bases ; anal fin longer, with more than 30 finrays9
- 6 (a) Anal fin inserted below or slightly behind last dorsal finrays ; muscular portion of isthmus not reaching to hind border of gill-membrane, leaving a small diamond-shaped bony urohyal plate exposed*Stolephorus heterolobus*
 (b) Anal-fin origin below last dorsal finrays ; muscular portion of isthmus extending forward to or beyond hind margin of gill-membrane7
- 7 (a) Predorsal spine present ; spine on pelvic-scuta present*Stolephorus baganensis*
 (b) No predorsal spine ; no spine on pelvic-scuta8
- 8 (a) Maxilla tip reaching to or only just beyond anterior border of preopercle
*Stolephorus indicus*
 (b) Maxilla longer, its tip reaching to gill-opening ; body more oval in cross-section
*Stolephorus commersonii*
- 9 (a) First pectoral finray filamentous10
 (b) First pectoral finray normal, not filamentous13
- 10 (a) Gillrakers on lower arm of first arch 13 or 14 ; serrae on rakers not forming distinct clumps*Setipinna tenuifilis*
 (b) Gillrakers on lower arm of first arch 17 to 2111
- 11 (a) Anal fin with 48 to 58 rays ; pre-pelvic scutes 20 to 29*Setipinna taty*
 (b) Anal fin with 69 to 81 rays ; pre-pelvic scutes about 1512

- 12 (a) Gillrakers 15-16 + 18-19 on first arch*Setipinna phasa*
 (b) Gillrakers 14-15 + 17 on first arch*Setipinna brevifilis*
- 13 (a) Maxilla long, extending to or beyond pectoral-fin base14
 (b) Maxilla short, reaching only to gill-opening to just beyond15
- 14 (a) Gillrakers serrae in distinct clumps ; lower gillrakers 16 to 20*Thryssa dussumieri*
 (b) Gillrakers serrae uneven but not clumped ; lower gillrakers 17 to 21*Thryssa purava*
- 15 (a) Lower gillrakers on first arch 1 to 15*Thryssa hamiltonii*
 (b) Lower gillrakers on first arch 17 to 19*Thryssa malabarica*

Remarks : Datta and Sen (1977) recorded *Thrissocele' kammalensis* (Bleeker) from Digha evidently based on Misra (1976). This species has been shown (Talwar, 1984 : 199) as not occurring in Indian waters. We have been unable to locate their study material in our collections. Some species (*Coilia dussumieri* and *Thryssa* species) concentrate in large numbers in the Hooghly estuary during the winter months. *Setipinna phasa* and *S. tenuifilis* contribute minor fishery in the Hooghly estuary.

Family CHIROCENTRIDAE (Wolf-herrings)

Chirocentrids are marine coastal fishes, widely distributed in the warmer parts of the Indo-Pacific region. They are pelagic inshore predators on small fishes. Anatomically, these fishes have one major feature as an adult that sets it apart from all other herrings. This is the presence of spiral valve in the intestine, a development found elsewhere only in the sharks and rays and a few of the primitive bony fishes. They have distinct gill-rakers and also have strong canine teeth for holding their prey. The wolf-herrings look like a herring and the rows of scales down the midline of the belly form a knifelike ridge, but no scutes. The dorsal fin is set far back, and the caudal fin is deeply forked. The body is elongate and compressed.

SPECIES OCCURRING IN WEST BENGAL : ? *Chirocentrus dorab* (Forsskal, 1775) ; *Chirocentrus nudus* Swainson, 1839.

Key to Species

- 1 (a) Upper part of dorsal fin black ; pectoral fin 11 to 13% of standard length
*Chirocentrus dorab*
 (b) No black markings on upper part of dorsal fin ; pectoral fin slightly longer, 13 to 18%
 standard length.....*Chirocentrus nudus*

Remarks : *Chirocentrus dorab* (Forsskal) has been reported in the literature (Misra, 1962) from the West Bengal coast but we have surprisingly not observed this species. *Chirocentrus nudus* Swainson is, however, reported here for the first time from the West Bengal coast. Sexually ripe specimens of *C. nudus* are found in December on the West Bengal coast, but detailed information about breeding season lacking.

Order GONORYNCHIFORMES
Family CHANIDAE
(Milkfish)

The milkfish, *Chanos chanos*, the only representative in its family, can easily be identified the following combination of (1) the dorsal fin opposite the pelvic fins ; (2) the very small terminal toothless mouth ; and (3) the large, deeply forked caudal fin. The scales are large, cycloid and silvery. In profile the milkfish bears a marked resemblance to the tenpounder (Family : Elopidae), but the latter has teeth. The body is compressed.

SPECIES OCCURRING IN WEST BENGAL : *Chanos chanos* (Forsskal, 1775)

Remarks : *Chanos* has a considerable commercial importance as a foodfish in Southeast Asia. In nature, the milkfish spawns in coastal shallows, and also in shallow brackish water. The larvae of milkfish have been observed in the Bakkhali region of the Lower Sunderbans (Basu and Pakrasi, 1976). This species is very important in many countries of the Indo-Pacific where it is cultured in ponds and tanks. In West Bengal it is occasionally caught and sold fresh. Females are highly fecund and can lay millions of eggs.

Order SILURIFORMES
Family ARIIDAE
(Sea Catfishes)

Sea catfishes are best known for the remarkable way they incubate their eggs. They have a sharp spine at the front of the dorsal fin and another in each of the pectoral fins ; usually three pairs of barbels around the mouth ; they also have an adipose fin ; caudal fin forked. Nostrils close together ; some bony plates (granulated bony shield) on head and near dorsal-fin origin.

The sea catfishes occur in large quantities in West Bengal and their flesh is said to be good. They are mostly marine but occur also in brackish water. The sharp pectoral and dorsal fin spines can inflict painful wounds.

SPECIES OCCURRING IN WEST BENGAL : *Arius arius* (Hamilton-Buchanan, 1822) ; *Aris caelatus* Valenciennes, 1840 ; *Arius dussumieri* Valenciennes, 1840 ; *Arius gagara* (Hamilton-Buchanan, 1822) ; *Arius jella* Day, 1877 ; *Arius maculatus* (Thunberg, 1792) ; *Arius parvipinnis* Day, 1877 ; *Arius platystomus* Day, 1877 ; *Arius sagor* (Hamilton-Buchanan, 1822) ; *Arius sona* (Hamilton-Buchanan, 1822) ; *Arius tenuispinis* Day, 1877 ; *Arius thalassinus* (Ruppell, 1837) ; *Batrachcephalus mino* (Hamilton-Buchanan, 1822) ; *Hemipimelodus jatius* (Hamilton-Buchanan, 1822) ; *Osteogeneiosus militaris* (Linnaeus, 1758)

Key to Species

- 1 (a) Mental barbels absent or rudimentary ; a pair of stiff, semi-osseous maxillary barbels present only*Osteogeneiosus militaris*
- (b) Mental barbels present ; maxillary barbels soft, not osseous2

- 2 (a) One or two pairs of barbels present around mouth - a pair of very small mandibular barbels with indications of inner (mental) ones (maxillary barbels absent) ; lower jaw longer than upper*Batrachocephalus mino*
- (b) Three pairs of barbels around mouth - two pairs of mandibular ; lower jaw equal to or shorter to upper jaw.....3
- 3 (a) Palate edentulous*Hemipimelodus jatius*
- (b) Palate toothed4
- 4 (a) Teeth on palate in three patches on either side, arranged in a large triangular group*Arius thalassinus*
- (b) Teeth on pa'ate in one or two patches on each side.....5
- 5 (a) Teeth on palate in one patch on each side (no teeth on vomer)6
- (b) Teeth on palate in two distinct patches on each side.....13
- 6 (a) Teeth on palate villiform, globular or conical.....7
- (b) Teeth on palate granular or molar-like.....8
- 7 (a) Teeth on palate in two triangular patches ; maxillary and outer mandibular barbels of unequal length*Arius caelatus*
- (b) Teeth on palate in two small pear-shaped patches on each side ; maxillary and outer mandibular barbels of nearly same length*Arius parvipinnis*
- 8 (a) Median longitudinal groove on top of head not — reaching to median keel of supraoccipital process9
- (b) Median longitudinal groove on top of head reaching to base of supraoccipital process ...10
- 9 (a) Eye large, its diameter 1.6 to 2.5 in interorbital width*Arius arius*
- (b) Eye smaller, its diameter 2.6 to 4 in interorbital width*Arius maculatus*
- 10 (a) Premaxillary tooth-band distinctly divided in middle ; palatine tooth-patch placed far back on roof of mouth*Arius tenuispinis*
- (b) Premaxillary tooth-band continuous ; palatine patch of teeth not placed far back on roof of mouth.....11
- 11 (a) Palatine tooth-patch pyriform-shaped ; snout duckbill-shaped.....*Arius platystomus*
- (b) Palatine patch of teeth oval, ovoid or elliptical-shaped ; snout not duckbill-shaped.....12
- 12 (a) Pectoral-fin spine longer than dorsal-fin spine ; anal finrays 14 to 16.....*Arius jella*
- (b) Pectoral-fin spine equal to dorsal-fin spine ; anal finrays 19*Arius gagora*

- 13 (a) Tooth-patches on palate arranged in longitudinal series, the anterior patch small and posterior patch large*Arius dussumieri*
 (b) Tooth-patches on palate transversely aligned.....14
- 14 (a) Basal plate before dorsal-fin distinctly large, butterfly-shaped ; outer palatine patch oval-shaped*Arius sagor*
 (b) Predorsal plate narrow, S - shaped ; outer palatine triangular-shaped*Arius sona*

Remarks : The commercial fishery on the north-east coast of India is supported mainly by two species : *Arius thalassinus* and *A. tenuispinis*. The former species is a marine species, often found in estuaries and brackish water. *Arius platystomus* lives close to the coast, in marine waters as well as in estuaries. *Arius gogora* and *Hemipimelodus jatius* are restricted to the Gangetic delta. *Arius jella* is fairly common in the commercial catches.

Family PLOTOSIDAE
(Eel Catfishes)

The body is eel-like, and the anal fin is long and confluent with the caudal fin which is pointed or bluntly rounded and extends on dorsal surface of body. The spines in the dorsal and pectoral fins are connected to venom glands that release venom into the stab wounds. The pain is excruciating. Four pairs of barbels are present. Compared to other marine catfishes, these are colourful which is not unusual for venomous animals

SPECIES OCCURRING IN WEST BENGAL : *Plotosus canius* Hamilton-Buchanan, 1822 ; *Plotosus lineatus* (Thunberg, 1787).

Key to Species

- 1 (a) Body with 2 or 3 yellow-white stripes ; maxillary barbels extending somewhat behind eyes.....*Plotosus lineatus*
 (b) Body without any stripes ; maxillary barbels extending to or beyond opercular margin*Plotosus canius*

Remarks : Both *Plotosus canius* and *P. lineatus* are primarily marine but are often found in estuaries and the mouths of rivers, and sometimes push well up to fresh waters. They contribute an important fishery in West Bengal. The flesh of both species is believed to have emenagogue properties. They attain a length of 180 cms, but more commonly less than 90 cms. Caught with bottom trawls, seines, traps and on hook and line.

Order AULOPIFORMES
Family HARPADONTIDAE
(Bombay Duck)

Head compressed ; eyes anteriorly placed and directed forward ; head and body naked except for scales along with the lateral line and part of the posterior half ; caudal fin trilobed. Mouth very large.

Lateral line extending as a median lobe of caudal fin. Nine pelvic fin rays. Inhabits coastal waters and estuaries.

SPECIES OCCURRING IN WEST BENGAL : *Harpadon nehereus* (Hamilton-Buchanan, 1822).

Remarks : *Harpadon nehereus* is caught in tremendous numbers in the Gangetic delta, and is eaten fresh as well as in the dried salted state. In Indian waters the distribution of Bombay duck is to a certain extent correlated with salinity, for it occurs commonly in river mouths and estuaries. Caught with bottom trawls, and December is the peak period of the catch. This fish is not very much relished locally and hence the catches are dried. The fish is caught practically throughout the Hooghly estuarine system (Krishayya, 1968).

Family SYNODONTIDAE
(Lizardfishes)

Body elongate, usually cylindrical and with an adipose fin. Mouth very large and terminal, with rows of numerous small, slender and pointed teeth which are visible even when mouth is closed ; teeth also on palate and tongue, those on palate in 1 or 2 bands. Head and body with scales along lateral line not enlarged.

SPECIES OCCURRING IN WEST BENGAL : *Saurida tumbil* (Bloch, 1795) ; ? *Saurida undosquamis* (Richardson, 1848) ; ? *Synodus variegatus* (Lacepede, 1803) ; ? *Trachinocephalus myops* (Forster, 1801).

Key to Species

- 1 (a) Pelvic finrays 8, the inner ray much longer than outer2
- (b) Pelvic finrays 9, the inner ray barely longer than outer3
- 2 (a) Mouth horizontal ;-anal-fin base shorter than dorsal-fin base*Synodus variegatus*
- (b) Mouth oblique, anal-fin base longer than dorsal-fin base*Trachinocephalus myops*
- 3 (a) About 8 dark spots on second dorsal finray and also on upper caudal finray ; stomach black*Saurida undosquamis*
- (b) No dark spots on second dorsal finray and upper caudal finray ; stomach white*Saurida tumbil*

Remarks : There is no special fishery for any of the species of this family in West Bengal. They are bottom-dwelling fishes, on open flats. *Saurida tumbil* is the most widespread and abundant, as well as the largest member of the family.

Order GADIFORMES
Family BREGMACEROTIDAE
(Codlets)

Body moderately elongate and with a relatively short head. Two dorsal fins, the first a single long ray on nape, the second with a long base, middle rays much shorter ; one long anal fin with middle

rays much shorter ; pelvic fins inserted under rear part of head, with long, thick rays that extend far beyond the origin of anal fin, with five rays. Scales relatively large ; lateral line adjacent to second dorsal fin.

SPECIES OCCURRING IN WEST BENGAL : *Bregmaceros macclellandi* Thompson, 1840.

Remarks : No special fishery for the spotted codlet which is only accidentally caught. Occurs over the continental shelf but possibly also oceanic, sometimes found in the Hooghly estuary. Caught with bagnets and trawls. The upper part of second dorsal fin is black or dark, a character helpful in distinguishing the species in the field.

Family MACROURIDAE
(Rattails)

Rattails are so named because of their long, tapering tails. The caudal fin is absent, and the long anal and second dorsal fins extend almost to the pointed lip of the body ; no true fin spines. Pelvic fins more or less thoracic. Scales small.

SPECIES OCCURRING IN WEST BENGAL : *Coryphaenoides lophotes* (Alcock, 1889).

Remarks : This is a benthopelagic species and lives at a depth of 300m.

Order BATRACHOIDIFORMES
Family BATRACHOIDIDAE
(Toadfishes)

Bottom dwellers, toadfishes commonly bury themselves in the sand or mud bottom. They dart from these hiding places to capture their prey. They have broad toadlike heads and very large mouths equipped with numerous sharp teeth. The lower jaw projects, and the slime-covered body tapers to a slim tail. The small spinous first dorsal fin with three solid spines is followed by a long soft-rayed dorsal fin. The pelvic fins are located far forward, under the chin and in front of the fanlike pectoral fins

SPECIES OCCURRING IN WEST BENGAL : ? *Austrobatrachus dussumieri* (Valenciennes, 1837) ; *Batrachthys grunniens* (Linnaeus, 1758).

Key to Species

- 1 (a) Pocket present in upper portion of pectoral axilla.....*Austrobatrachus dussumieri*
(b) No pocket in pectoral axilla*Batrachthys grunniens*

Remarks : The spines of these fishes may inflict wounds to people handling these fishes. *Batrachthys grunniens* occur in local artisanal or trawl fisheries, but are of no commercial importance. *Austrobatrachus dussumieri* probably occurs off the West Bengal coast.

Order LOPHIIFORMES
Family ANTENNARIIDAE
(Frogfishes)

Body ballon-shaped, covered with loose skin, with denticles. The mouth is large with numerous, small, villiform teeth. The gill opening is restricted to a small pore located behind and below pectoral-fin base. First dorsal fin spine free and modified as a lure, second and third dorsal spine also free from rest of fin, well developed, and covered by skin ; pectoral fin lobe elongate, leg-like. Pseudobranch and swimbladder present.

Species pelagic ; its unusual prehensile pectoral fin is used for clasping or moving on algal matter.

SPECIES OCCURRING IN WEST BENGAL : *Antennarius hispidus* (Bloch & Schneider, 1801).

Remarks : Schultz (1957) reviewed the fishes of this family. *Antennarius hispidus* has the background light tan, overlaid with zebra-like brown streaks ; all fins with blackish spots.

Family OGCOCEPHALIDAE
(Batfishes)

The body is much depressed and flattened ventrally ; head is prolonged into a snout that overhangs the small mouth. The gill-opening in or above pectoral base. A modified spine (illicium) of the dorsal fin hangs down as a tentacle from beneath the snout and serves as a lure, but no other spinous dorsal rays. The widely separated pelvic fins are stout and leglike, used for "walking" over the bottom. The pectoral fins are large that extend out at the sides of the head. Well-developed tuberclelike scales.

SPECIES OCCURRING IN WEST BENGAL : *Haliutaea stellata* (Vahl, 1758).

Remarks : *Haliutaea stellata* is a deep water species.

Order CYPRINODONTIFORMES
Suborder EXOCOETOIDEI
Family HEMIRAMPHIDAE
(Halfbeaks)

The halfbeaks are mainly marine, but some inhabit brackish as well as freshwaters. They live on the surface and are protectively coloured for this mode of life by being green or blue on the back, and silvery-white on the flanks and ventrally. The body is elongated, rounded, and flattened laterally only in the tail region. The single dorsal and anal fins are located far to the rear and directly opposite each other. They have a small mouth-opening, with an elongate lower jaw ; the upper jaw is short and triangular. The lateral line is low on body.

SPECIES OCCURRING IN WEST BENGAL : *Dermogenys brachyopterus* (Bleeker, 1853) ; *Hemiramphus far* (Forsskal, 1775) ; *Hyporhamphus limbatus* (Valenciennes, 1846) ; *Rhynchorhamphus georgii* (Valenciennes, 1846) ; *Zenarchopterus buffonis* (Valenciennes, 1846) ; *Zenarchopterus ectuntio* (Hamilton-Buchanan, 1822) ; *Zenarchopterus striga* (Blyth, 1859).

Key to Species

- 1 (a) Nasal papilla rounded, fanshaped or fimbriate, not projecting from margin of nasal fossa ; anal fin in males of usual structure ; oviparous2
- (b) Nasal papilla elongate and pointed, strongly projecting beyond nasal fossa ; anal fin in males more or less transformed into a copulatory organ4
- 2 (a) Preorbital ridge absent ; upper jaw scaleless ; 4 to 6 prominent elongated blotches on sides of body*Hemiramphus far*
- (b) Preorbital ridge present ; upper jaw scaly ; no blotches on sides of body3
- 3 (a) Nasal papilla fimbriate ; upper jaw arched, dome-shaped*Hyporhamphus limbatus*
- (b) Nasal papilla not fimbriate ; upper jaw flat or slightly arched ...*Rhynchorhamphus georgii*
- 4 (a) Dorsal fin placed far posterior to anal-fin origin*Dermogenys brachyopterus*
- (b) Dorsal fin inserted anterior to anal fin5
- 5 (a) Upper jaw nearly twice as long as broad*Zenarchopterus ectuntio*
- (b) Upper jaw as broad as long, or broader than long6
- 6 (a) Anal finrays 9 ; no coloured stripe along midline of snout.....*Zenarchopterus striga*
- (b) Anal finrays 11 to 14 ; a prominent dark brown stripe along midline of snout*Zenarchopterus buffonis*

Remarks : *Dermogenys brachyopterus* is based on a single specimen and has not been reported since its original discovery ; the species was erroneously placed in the genus *Zenarchopterus* by Jayaram (1981) (Talwar, 1987). All the placed in the genus *Zenarchopterus* are viviparous and have secondary sexual characters in the dorsal and anal fins, and also in the shape of the anal fin. They have been recorded from the Hooghly estuary. Tilak(1973) discussed the taxonomic status of *Z. striga*. Misra (1962 : 201) listed *Zenarchopterus dispar* (Valenciennes) from West Bengal, a species now shown by Collette (1974) as not occurring in India. *Hyporhamphus limbatus* is a coastal species which frequently enters the estuaries and fresh waters in West Bengal. This species is often as *Hemiramphus gaimardi* (Valenciennes) in the literature. The halfbeaks are epipelagic, sometimes leaping out of the water and gliding on the surface by vibrating the lower lobe of caudal fin. These fishes are of little commercial value and are not regularly found in local markets.

Misra (1962) lists one member of the family Exocoetidae, viz. *Parexocoetus mento* (Cuvier) (as *P. brachypterus*) from West Bengal, but we have not been able to observe any flying-fish from this area.

Family BELONIDAE
(Needlefishes)

Elongate fishes. Mouth opening large ; both upper and lower jaws elongate with numerous needlelike teeth. Scales small. They occur in marine as well as brackish and fresh waters. These fishes

live at the surface and are protectively coloured for this mode of life by being green or blue on the back and silvery white on the lower sides and belly.

SPECIES OCCURRING IN WEST BENGAL : *Strongylura leiura* (Bleeker, 1850) ; *Strongylura strongylura* (van Hasselt, 1823) ; *Tylosurus crocodilus crocodilus* (Peron & Le Sueur, 1821).

Key to Species

- 1 (a) Caudal peduncle with small black lateral keels ; caudal fin forked*Tylosurus crocodilus*
- (b) Caudal peduncle without lateral keel ; caudal fin rounded or emarginate.....2
- 2 (a) Caudal fin rounded ; a prominent round black spot near base of caudal fin*Strongylura strongylura*
- (b) Caudal fin emarginate ; no black spot near base of caudal fin*Strongylura leiura*

Remarks : These fishes are pelagic and are able to leap out of the water and skitter on the surface.

Order SYNGNATHIFORMES Suborder AULOSTOMOIDEI Family FISTULARIIDAE (Cornetfish)

The principal identifying mark of the cornetfish is the long filament extending from the centre of the forked caudal fin. Almost equally as long as the filament is the tubular snout. The body is elongate and depressed. The dorsal and anal fins are short - based and placed opposite ; no dorsal spines.

SPECIES OCCURRING IN WEST BENGAL : *Fistularia petimba* Lacepede, 1803.

Remarks : *Fistularia petimba* generally occurs in deep waters offshore. *Fistularia villosa* Klunzinger which usually occurs in shallow waters on the east coast of India, is likely to occur in West Bengal also. The former species is occasionally caught in bottom trawls and in artisanal fisheries, and may be easily distinguishing from the latter species in having a smooth skin and no scales midway on back.

Family CENTRISCIDAE (Shrimpfishes)

Shrimpfishes are long-snouted, deep-bodied fishes that have an extremely laterally flat body, razorlike. The body is almost entirely encased in a transparent armour consisting of numerous separate plates. The first dorsal spine is long and sharp at extreme end of the body, followed by two shorter spines ; soft dorsal fin and caudal fin displaced ventrally ; no lateral line ; mouth toothless.

SPECIES OCCURRING IN WEST BENGAL : *Aeoliscus strigatus* (Gunther, 1861).

Remarks : *Aeoliscus strigatus* has the unusual habit of swimming vertically, the head down.

Suborder SYNGNATHOIDEI
Family SYNGNATHIDAE
(Pipefishes and Seahorses)

The body is elongate and encased in a series of body rings. They have long, tubular snouts. Single dorsal fin present ; anal fin very small and usually with 2 to 6 rays. No pelvic fins ; caudal fin absent in some (in Seahorses) or greatly reduced ; tail (caudal peduncle) may be prehensile and employed for holding on to objects when caudal fin is absent. The gill openings are very small ; gills tufted and lobe-like.

Syngnathids are usually confined to shallow water. Seahorses and pipefishes are identical in anatomical features except for body shape. In Seahorses the head is bent down, joining the body almost at right angles, whereas pipefishes are straight. No species of seahorse has been reported from West Bengal.

SPECIES OCCURRING IN WEST BENGAL : *Hippichthys specifer* (Ruppell, 1838) ; *Ichthyocampus carce* (Hamilton-Buchanan, 1822) ; *Microphis cuncalus* (Hamilton-Buchanan, 1822)

Key to Species

- 1 (a) Brood pouch originates on trunk ; caudal finrays 9*Microphis cuncalus*
- (b) Brood pouch placed under tail ; caudal finrays 102
- 2 (a) Superior trunk and tail ridges confluent ; lateral tail ridge absent*Ichthyocampus carce*
- (b) Superior trunk and tail ridge discontinuous near rear of dorsal fin ; lateral ridge present
 *Hippichthys specifer*

Remarks : *Ichthyocampus carce* is most commonly reported from estuarine or low salinity waters (Dawson, 1977). Dawson (1977 : 603) designated a neotype for this species based on a female specimen in the British Museum, since Hamilton-Buchanan (1822) failed to designate type-material for this species. Weber and de Beaufort (1922) report this species from the "sea" and this may well be a euryhaline species. *Hippichthys specifer* is also a euryhaline species *Microphis cuncalus*, originally described from the vicinity of Calcutta, is best represented in estuarine habitats (Dawson, 1984 : 147).

Order SCORPAENIFORMES
Subfamily SCORPAENOIDEI
Family SCORPAENIDAE
(Scorpionfishes)

Body compressed ; head usually with ridges and spines (usually with two opercular and five preopercular spines). Dorsal fin usually single ; pectoral fins well developed. Scales usually ctenoid.

SPECIES OCCURRING IN WEST BENGAL : *Brachypterois serrulatus* (Richardson, 1846) ; *Pterois russellii* (Bennett, 1831).

Key to Species

- 1 (a) Dorsal fin spines short ; dorsal fin membrane between spines moderately incised
.....*Brachypterois serrulatus*
(b) Dorsal fin spines elongate ; dorsal fin membrane between spines deeply incised
.....*Pterois russellii*

Remarks : *Brachypterois serrulatus* and *Pterois russellii* are occasionally caught in bottom trawls. Scorpionfishes have enormous spines and should be handled with extreme care. Mostly found in inshore waters on rocky bottoms, but also occurring on sandy or muddy bottoms further offshore. Not valued as food in West Bengal nor in other parts of the country.

Family SYNANCEIIDAE

Body scaleless (except for buried scales along the lateral line and other parts of the body), usually covered with skin glands ; head large ; venom glands present near base of hypodermic-like dorsal fin spines.

SPECIES OCCURRING IN WEST BENGAL : *Minous coccineus* (Alcock, 1890) ; *Trachicephalus uranoscopus* (Bloch & Schneider, 1801).

Key to Species

- 1 (a) Lowermost ray of pectoral fin separated from rest of fin*Minous coccineus*
(b) No detached pectoral rays*Trachicephalus uranoscopus*

Remarks : Eschmeyer *et al* (1979) reported *Minous coccineus* at Sandheads from the mouth of the Hooghly.

Suborder PLATYCEPHALOIDEI Family PLATYCEPHALIDAE (Spiny flatheads)

Benthic fishes found in mud or sand bottoms of shelf areas at depths of about 75m or less. The head is extremely depressed, usually with ridges and spines ; mouth large, the lower jaw projects forward. There are two dorsal fins ; spinous dorsal is preceded by a single short isolated spine, usually with nine spines. Body elongate and cylindrical. Ctenoid scales cover body.

SPECIES OCCURRING IN WEST BENGAL : *Cociella crocodila* (Tilesius, 1812) ; *Grammoplites scaber* (Linnaeus, 1758) ; *Platycephalus indicus* (Linnaeus, 1758) ; *Sorsogona tuberculata* (Currier, 1829) ; ? *Suggrundus rodricensis* (Cuvier, 1829).

Key to Species

- 1 (a) Pored scales in lateral series 67 to 84 ; vomerine teeth in one transverse patch ; 2 or 3 black bars on caudal fin*Platycephalus indicus*
- (b) Pored scales in lateral line about 60 or fewer ; vomerine teeth in two separate patches.....2
- 2 (a) Bony ridges above and below eye either with small spines or finely serrated*Sorsogona tuberculata*
- (b) Bony ridges above and below eye bearing larger spines3
- 3 (a) All are most lateral line scales bearing a backward directed spine.....*Gramnoplites scaber*
- (b) Only anterior lateral line scales bearing a spine4
- 4 (a) Number of scale-rows slanting downward and backward above lateral line greater than number of pored lateral line scales*Cociella crocodila*
- (b) Number of scale-rows slanting downward and backward above lateral line about the same as the number of pored lateral line scales*Suggrundus rodricensis*

Remarks : These fishes are only accidentally caught in the catches in West Bengal.

Order PERCIFORMES
Suborder PERCOIDEI
Family AMBASSIDAE
(Perchlets)

Body oblong or oblong ovate, strongly compressed, the dorsal profile straight before dorsal fin insertion or concave above orbit. Mouth moderate, slightly protractile, teeth small, in bands on jaws and on palate. Preopercle, interopercle, antorbital and infraorbital bones often with ridges and serrate edges ; opercle without a prominent spine. Dorsal fin deeply notched, but continuous ; with a short concealed procumbent spine and 6 to 8 strong spines in front, followed by 1 spine and 9 to 11 soft rays. Anal fin with 3 spines and 8 to 11 soft rays. Caudal fin forked. Scales moderate to large, cycloid, rather deciduous.

Ambassids usually occur in schools near river mouths.

SPECIES OCCURRING IN WEST BENGAL : *Ambassis nalua* (Hamilton-Buchanan, 1822) ; *Ambassis kopsii* Bleeker, 1858.

Key to Species

- 1 (a) Supraorbital ridge with one spine ; hind margin of preoperculum serrated at angle only*Ambassis nalua*
- (b) Supraorbital ridge with 2 or 3 spines ; hind margin of preoperculum finely serrated*Ambassis kopsii*

Remarks : These fishes are small, translucent and brilliant silvery-yellow, occurring along coastlines and in estuaries. *Ambassis naluq* is common in the catches during winter months in West Bengal and is locally called 'Nalua-chanda'. *Ambassis kopsii* is reported here for the first time from West Bengal based specimens from the Hooghly estuary. These specimens were kindly identified by Mrs Sagarika Chaudhuri who is presently revising the group.

Family CENTROPOMIDAE
(Sea Perches)

Body elongate, or oblong, compressed, the dorsal profile concave at nape. Mouth large, with the lower jaw longer than upper ; teeth small, and in villiform bands on jaws, and on vomer and palatines. Opercle with a spine ; lower edge of preopercle serrated, with a strong spine. Dorsal fin with a very deep notch almost dividing spinous from soft part of fin ; anal fin with 3 spines and 7 or 8 soft rays ; caudal fin rounded. Scales large, ctenoid ; lateral line extending onto tail.

SPECIES OCCURRING IN WEST BENGAL : *Lates calcarifer* (Bloch, 1790)

Remarks : *Lates calcarifer* is a fairly large - sized bottom - living fish occurring in coastal waters and estuaries. It is a highly esteemed food fish and is taken mainly by artisanal fisheries, and marketed fresh. Caught with bottom trawls and bottom gillnets. Locally called 'bhetki', it attains a size of 150 cm.

Family SERRANIDAE
(Groupers)

The groupers have a basslike body shape with a strongly spined first dorsal fin and a soft-rayed second dorsal fin. Opercle with three spines - the main spine with one above it and one below it. Scales usually ctenoid ; lateral line complete and continuous. Caudal fin usually rounded, truncate or lunate. Pelvic fin with one spine and 5 soft rays ; anal fin spines three. The upper edge of opercle is free ; maxilla exposed.

SPECIES OCCURRING IN WEST BENGAL : *Epinephelus malabaricus* (Schneider, 1801) ;
Epinephelus tauvina (Forsskal, 1775) ; *Promicrops lanceolatus* (Bloch, 1790).

Key to Species

- 1 (a) Dorsal-fin spines shorter than anterior soft rays, increasing in length posteriorly ; body scales cycloid.....*Promicrops lanceolatus*
- (b) Dorsal-fin spines more or less equal in length to anterior soft rays, with the median rays longest ; body scales cycloid or ctenoid2
- 2 (a) Last dorsal-fin spine considerably shorter than third dorsal spine ; body scales ctenoid*Epinephelus malabaricus*
- (b) Last dorsal-fin spine subequal to third dorsal spine ; body scales cycloid except for a small patch at end of pectoral fin.....*Epinephelus tauvina*

Remarks : These are mostly demersal fishes, ranging from shallow coastal waters to moderate depths. They are mostly solitary species and they form breeding aggregations. Juveniles are often found in the Hooghly estuary. They are taken in bottom trawls. *Epinephelus tauvina* is the most common inshore species of grouper of West Bengal.

Family TERAPONIDAE
(Tigerperches)

This is an Indo-Pacific family of small to moderate-sized fishes found in marine and brackish water. The few species are usually conspicuously striped, with the stripes extending onto the caudal fin. The body is oblong to oblong-ovate, somewhat compressed. Opercle with two spines, the lower one larger and stronger. Dorsal fin single, with a small notch ; anal fin with 3 strong spines and 7 to 12 soft rays ; pelvic fins inserted behind base of pectoral fins ; caudal fin usually emarginate. Lateral line single and complete. Scales adherent, finely ctenoid.

SPECIES OCCURRING IN WEST BENGAL : *Terapon jarbua* (Forsskal, 1775) ; *Terapon puta* (Cuvier, 1829) ; *Terapon theraps* (Cuvier, 1829).

Key to Species

- 1 (a) Lateral line with 46 to 56 pored scales to hypural joint ; 6 to 8 rows of scales above lateral line to base of dorsal-fin sheath.....*Terapon theraps*
- (b) Lateral line with 70 or more pored scales to hypural joint ; 10 to 17 rows of scales above lateral line to base of dorsal-fin sheath2
- 2 (a) Four narrow, straight longitudinal dark stripes along side of body ; gillrakers 18 to 24 on lower limb of first arch.....*Terapon puta*
- (b) Three downwardly curved longitudinal stripes along side of body ; 12 to 15 gillrakers on lower limb of first arch*Terapon jarbua*

Remarks : Species of this family inhabit inshore waters and some are common in estuaries. They are good foodfishes and they are rather common in the catches. None of these species, however, is important enough to support a special fishery.

Family PRIACANTHIDAE
(Bigeyes)

Very large eyes, small rough scales, and bright red colour, rarely with a pattern, are the marks of the carnivorous bigeyes. The presence of a membrane connecting the inner ray of the pelvic fins with the abdomen is a great help in identification.

Bigeyes are bottom-dwelling carnivorous fishes, primarily nocturnal but may feed by day.

SPECIES OCCURRING IN WEST BENGAL : *Priacanthus tayenus* Richardson, 1846.

Remarks : This species is often caught in the trawl catches in depths ranging from 60 to 90m in West Bengal. *Priacanthus tayenus* is brilliant crimson red, and the pelvic fins with distinct blackish red spots.

Family APOGONIDAE
(Cardinalfishes)

Two separate dorsal fins and two anal fin spines are the identifying features of the family. These fishes usually occurs in shallow water.

SPECIES OCCURRING IN WEST BENGAL : *Apogon lateralis* Valenciennes, 1832.

Remarks : Misra (1962) listed this species from West Bengal but we have not been able to examine any specimen from this region.

Family SILLAGINIDAE
(Whitings)

A small family of small fishes of sandy shores and estuarine waters. Body elongate ; mouth small ; two dorsal fin (little or no interspace), first with 9 to 12 spines and second with 16 to 26 soft rays ; anal fin with two spines and 15 to 27 soft rays. These are good fishes, the flesh is of excellent flavour.

SPECIES OCCURRING IN WEST BENGAL : *Sillaginopsis panijus* (Hamilton-Buchanan, 1822) ; *Sillago sihama* (Forsskal, 1775).

Key to Species

- 1 (a) Snout and head greatly depressed ; second dorsal spine very elongate ; eyes very small
.....*Sillaginopsis panijus*
(b) Snout and head not depressed ; second dorsal spine not elongate ; eyes normal
.....*Sillago sihama*

Remarks : The main fishery for this species takes place in August-September in West Bengal. They are caught in the Hooghly estuary in very large numbers.

Family LACTRARIIDAE
(False trevallies)

Body oblong and strongly compressed. Mouth large, with prominent lower jaw ; each jaw with two small teeth at front. Two dorsal fins ; soft-rayed portion of dorsal and anal fins covered with scales (all scales easily shed) ; anal fin spines three.

A small family with a monotypic genus.

SPECIES OCCURRING IN WEST BENGAL : *Lactarius lactarius* (Schneider, 1801)

Remarks : This species is found in various types of habitats, usually in waters shallower than 100m. Caught mainly with bottom trawls and seines in West Bengal. Attains a size of 30 cm.

Family RACHYCENTRIDAE
(Cobia)

Body elongate, the head is depressed. Two dorsal fins, the first fin of about 8 very short isolated spines. Anal fin long, with 2 or 3 spines and 22 to 28 soft rays. Scales minute and embedded in thick skin. Two light bands on side of body.

SPECIES OCCURRING IN WEST BENGAL : *Rachycentron canadum* (Linnaeus, 1766).

Remarks : This is an essentially pelagic species.

Family ECHENEIDIDAE
(Remoras)

These slim fishes are easily recognised by the flat sucking disc on the top of their head. Developed from the first dorsal fin, the cephalic disc consists of a series of ridges and spaces that create a vacuum between the remora and the surface to which it attaches - usually sharks and other fishes. The skull is wide, depressed to support the disc, and the body is elongate and fusiform. Dorsal and anal fins long, lacking spines. The scales are small and cycloid, usually embedded in skin.

SPECIES OCCURRING IN WEST BENGAL : *Echeneis naucrates* Linnaeus, 1758.

Remarks : *Echeneis naucrates* is taken in coastal fisheries along with other fishes of little commercial interest in West Bengal.

Family CARANGIDAE
(Jacks, Scads)

This important family comprises fishes which vary greatly in shape and sizes, but most of them have one thing in common - they move with great speed. Some resemble mackerels and are equally swift ; they lack, however, the distinguishing row of finlets. Many have extremely small scales, but at the end of the lateral line these are enlarged to form a keel. There are three anal spines with the first two detached from the rest of the fin. Caudal fin widely forked. Body generally compressed (but ranging from deep to fusiform) ; only small cycloid scales in most species.

SPECIES RECORDED FROM WEST BENGAL : *Alectis ciliaris* (Bloch, 1788) ; *Alectis indicus* (Ruppell, 1830) ; *Alepes djedaba* (Forsskal, 1775) ; ? *Alepes vari* (Cuvier, 1833) ; *Atropus atropus* (Schneider, 1801) ; *Atule mate* (Cuvier, 1833) ; *Carangoides chrysophrys* (Cuvier, 1833) ; *Carangoides malabaricus* (Bloch & Schneider, 1801) ; ? *Carangoides praeustus* (Bennett, 1830) ; *Caranx carangus* (Bloch, 1793) ; *Caranx ignobilis* (Forsskal, 1775) ; ? *Caranx melampygus* Cuvier, 1833 ; *Caranx sexfasciatus* Quoy & Gaimard, 1824 ; *Decapterus russelli* (Ruppell, 1830) ; *Elagatis bipinnulata* (Quoy & Gaimard, 1824) ; ? *Gnathanodon speciosus* (Forsskal, 1775) ; *Megalaspis cordyla* (Linnaeus, 1758) ; *Scomberoides commersonnianus* Lacepede, 1802 ; *Scomberoides lysan* (Forsskal, 1775) ; *Scomberoides tala* (Cuvier, 1832) ; *Selar crumenophthalmus* (Bloch, 1793) ; *Trachinotus blochii* (Lacepede, 1801) ; ? *Uraspis helvolus* (Forster, 1775) ; *Uraspis uraspis* (Günther, 1860).

Key to Species

- 1 (a) Posterior part of lateral line with scutes ; pectoral fins relatively long, usually falcate2
 (b) No scutes in lateral line (only pored scales, not enlarged) ; pectoral fins short, not falcate
20
- 2 (a) One or more finlets behind second dorsal and anal fins3
 (b) No finlet in dorsal nor anal fins4
- 3 (a) A single detached finlet behind dorsal and anal fins.....*Dacapterus russelli*
 (b) Nine finlets behind second dorsal and anal fins*Megalaspis cordyla*
- 4 (a) Body supericially naked, the scales minute and embedded in skin ; first dorsal fin with 6
 small spines, not connected by a membrane5
 (b) Body with small scales, not embedded in skin ; first dorsl fin with 7 or 8 spines, connected
 by a membrane6
- 5 (a) Eye-diameter equal to or slightly less than suborbital depth ; gill-rakers long and fairly
 stout, 12 to 17 on lower arm*Alectis ciliaris*
 (b) Eye-diameter 1.4 to 1.7 times in suborbital depth ; gill-rakers short and stout, 21 to 26 on
 lower arm*Alectis indicus*
- 6 (a) A groove along belly*Atropus atropus*
 (b) No groove along belly7
- 7 (a) No teeth in upper jaw ; lips fleshy*Gnathanodon speciosus*
 (b) Teeth present in both jaws8
- 8 (a) Tongue, roof and floor of mouth white, the rest blue-black ; no teeth on roof of mouth
9
 (b) Lining of mouth not distinctly white and dark ; teeth present on roof of mouth (vomer and
 palatines)10
- 9 (a) Naked area of breast extends uninterupted to naked area of pectoral fins*Uraspis waspis*
 (b) Naked area of breast interrumped by scaly patch to naked area of pectoral fins
*Uraspis helvolus*
- 10 (a) Adipose eyelid almost completely covering eye, except for a small vertical slit
*Atule mate*
 (b) Adipose tissue leaving anterior half of eye exposed11

- 11 (a) Shoulder girdle with a deep furrow below large fleshy papilla*Selar crumenophthalmus*
 (b) No cleithral furrow on lower part of gill-opening.....12
- 12 (a) Both jaws with a single row of numerous, comblike teeth ; adipose eyelid covering posterior half of eye13
 (b) Dentition not as above ; adipose eyelid, if present, variously developed14
- 13 (a) Spinous dorsal fin jet black*Alepes vari*
 (b) Spinous dorsal fin pale*Alepes djedaba*
- 14 (a) Upper jaw with an outer series of moderate to strong canines and an inner band of fine teeth; lower jaw with a single row of teeth15
 (b) Dentition not as above18
- 15 (a) Breast completely scaled16
 (b) Breast naked ventrally, with a small patch of scales immediately in front of pelvic fins17
- 16 (a) Maxilla extending to vertical from front margin of eye ; anal finrays 19 or 20*Caranx melampygus*
 (b) Maxilla extending to vertical from middle of eye or beyond to posterior edge of eye ; anal finrays 14 to 16*Caranx sexfasciatus*
- 17 (a) Lateral line with 28 to 30 scutes*Caranx ignobilis*
 (b) Lateral line with 33 to 37 scutes.....*Caranx carangus*
- 18 (a) Lower surface of breast entirely scaly ; distal half of soft dorsal fin lobe black*Carangoides praeustus*
 (b) Lower surface of breast naked19
- 19 (a) Anal finrays 17 or 18 ; naked area of breast extending anteriorly above pectoral-fin base nearly to origin of lateral line as a triangular area bordering pectoral-fin base and operculum*Carangoides malabaricus*
 (b) Anal finrays 15 or 16 ; naked area of breast not extending anteriorly above pectoral-fin base.....*Carangoides chrysophrys*
- 20 (a) Second dorsal-fin base much longer than anal-fin base ; two light-blue stripes on side of body*Elagatis bipinulata*
 (b) Second dorsal and anal fin-base about equal in length21
- 21 (a) Body relatively deep ; scales normal, oval-shaped ; soft dorsal and anal fins strongly falcate*Trachinotus blochii*
 (b) Body slender scales elongate or needle-like ; soft dorsal and anal fins not strongly falcate22

- 22 (a) Total gillrakers on first arch 21 to 27 ; double series of 6 to 8 blotches on side of body*Scomberoides lysan*
 (b) Total gillrakers on first arch 8 to 1523
- 23 (a) Upper jaw extends well beyond posterior margin of eye ; in life, large oval blotches above or touching lateral line*Scomberoides commersonianus*
 (b) Upper jaw extends slightly beyond posterior margin of eye ; in life, vertically elongate blotches inter-secting lateral line*Scomberoides tala*

Remarks : This is one of the most important families of commercial fishes, often occurring in large quantities, their flesh being quite appreciated. Marketed mostly fresh. They are caught with trawls and seines. Some species are pelagic and schooling, while some, especially the juveniles, are found in estuaries.

Family CORYPHAENIDAE
(Dolphins)

These fishes are so distinctive in body shape and colour that it cannot be mistaken for any other fish. The streamlined body, tapering sharply from head to tail, is laterally compressed. The male has a high, straight forehead. The female's head is also high but slopes upward to the dorsal fin, which is inserted far forward - almost directly over the eyes - and extends to the deeply forked caudal fin. The anal fin is also long, stretching over half the length of the body. Generally, the dorsal fin and back are a deep oceanic blue, grading into green on the upper sides and yellow from the lateral line to the silvery belly. The large caudal fin and the pectoral and pelvic fins are yellow.

SPECIES OCCURRING IN WEST BENGAL : *Coryphaena hippurus* Linnaeus, 1758.

Remarks : In addition to being one of the most beautiful fishes in the seas, the dolphin is one of the fastest. *Coryphaena hippurus* is a pelagic species which inhabits open waters, sometimes approaching the coast, and is rather rare in West Bengal.

Family PARASTROMATEIDAE
(Black Pomfret)

Body deep and compressed. Dorsal fin with 4 or 5 short spines (embedded and not apparent in adults) followed by one spine and 42 to 44 soft rays ; anal fin with two rudimentary spines (embedded and not apparent in adults) followed by 1 spine and 35 to 39 soft rays. No pelvic fins in adult. A few enlarged scutes at end of lateral line in the form of keel. Scales small, cycloid, easily shed. Consists of a single widespread Indo-Pacific species.

SPECIES OCCURRING IN WEST BENGAL : *Parastromateus niger* (Bloch, 1795).

Remarks : Some authors place this species in the Carangidae. *Parastromateus niger* occurs in schools in deepish coastal waters. Near the bottom during the day, rises near the surface at night. Caught with gillnets, trawls and some seines. It attains a size of 30cm total length.

The moonfish, *Mene maculata* (Schneider, 1801), belonging to the family Menidae, is reported from the West Bengal coast by Misra (1962 : 246) but this report appears to be a presumptuous note on its natural distribution along the east coast of India. This species may easily be spotted out its dislike body, with a sharp breast, and the first pelvic ray in adults is prolonged.

Family LEIOGNATHIDAE
(Slipmouths)

These are small Indo-Pacific fishes, chiefly marine in habitat but sometimes living in brackish water. They have deep, laterally compressed bodies and strongly protrusible mouths which form tubes when extended. Both the dorsal and anal fins have spines along their bases. Another peculiarity, slipmouths have luminous organs round the oesophagus, the light produced by bacteria. They give off a "soapy" mucous when handled.

SPECIES OCCURRING IN WEST BENGAL : *Gazza minuta* (Bloch, 1797) ; *Leiognathus blochii* (Valenciennes, 1835) ; *Leiognathus brevirostris* (Valenciennes, 1835) ; *Leiognathus daura* (Cuvier, 1829) ; *Leiognathus dussumieri* (Valenciennes, 1835) ; *Leiognathus equulus* (Forsskal, 1775) ; *Leiognathus fasciatus* (Lecepede, 1803) ; *Leiognathus splendens* (Cuvier, 1829) ; *Secutor insidiator* (Bloch, 1787) ; *Secutor ruconius* (Hamilton-Buchanan, 1822) ;

Key to Species

- 1 (a) Distinct canine teeth in jaws ; protracted mouth points forward*Gazza minuta*
(b) No canine teeth in jaws2
- 2 (a) Mouth, when protracted, forming a tube pointing upwards3
(b) Mouth, when protracted, forming a tube directed forward or downwards.....4
- 3 (a) Maxilla tip reaching to about level of lower margin of eye*Secutor ruconius*
(b) Maxilla tip reaching well below level of lower margin of eye*Secutor insidiator*
- 4 (a) Cleft of mouth opposite lower third of eye.....5
(b) Cleft of mouth at or below lower edge of eye.....6
- 5 (a) Breast scaleless ; no dark blotch on nape*Leiognathus daura*
(b) Breast scaled ; a dark saddle-shaped blotch on nape*Leiognathus blochii*
- 6 (a) Dark saddle-shaped blotch on nape ; breast scaleless*Leiognathus brevirostris*
(b) No dark blotch on nape7
- 7 (a) Second dorsal spine distinctly elongated and filiform*Leiognathus fasciatus*
(b) Second dorsal spine not elongated8

- 8 (a) Dusky blotch on upper third of spinous dorsal fin*Leiognathus splendens*
- (b) No dusky blotch on spinous dorsal fin9
- 9 (a) Mandibular profile straight or slightly concave ; breast conspicuously scaly
.....*Leiognathus dussumieri*
- (b) Mandibular profile strongly concave ; scales on breast very thin and diaphanous giving the
breast a naked appearance*Leiognathus equulus*

Remarks : *Leiognathus equulus* is one of the largest species of slipmouths and the young ones are common in the catches of the Hooghly during November and December. The leiognathids inhabit coastal waters, down to about 40m depth, predominantly near the bottom, often entering estuaries. Caught with bottom trawls, also in bagnets and shore seines.

Family LUTJANIDAE
(Snappers)

The snappers are shallow-water inshore species. The mouth is large and the eyes are set high on the head. The lateral line is distinct and the scales are large. Typically, they have sharp teeth and a "snapper" look, which is due to the characteristically flattened top of the snout, giving the fish a shovel-headed appearance. Further, they have pointed pectoral fins, ten or eleven spines in the first dorsal fin which is joined to the second dorsal fin, and three spines in the anal fin.

SPECIES OCCURRING IN WEST BENGAL : *Lutjanus argentimaculatus* (Forsskal, 1775) ; *Lutjanus bengalensis* (Bloch, 1790) ; ? *Lutjanus carponotatus* (Richardson, 1842) ; ? *Lutjanus gilcheri* Fourmanoir, 1959 ; *Lutjanus johnii* (Bloch, 1792) ; *Lutjanus russelli* (Bleeker, 1849).

Key to Species

- 1 (a) Ground colour pale (mainly yellow in life) with a series of four longitudinal blue stripes
on side*Lutjanus bengalensis*
- (b) Colour not as above.....2
- 2 (a) Scale-rows above lateral line entirely horizontal or some scale rows rising obliquely from
middle part of dorsal fin3
- (b) Scale-rows above lateral line oblique4
- 3 (a) A large black spot on upper back present*Lutjanus johnii*
- (b) No black spot on upper back*Lutjanus argentimaculatus*
- 4 (a) Vomerine tooth-patch crescentric, without a medial posterior extension
.....*Lutjanus gilcheri*
- (b) Vomerine tooth-patch triangular or diamond-shaped with a median posterior extension
.....5

- 5 (a) Axil of pectoral fin with a distinct black spot on upper portion*Lutjanus carponotatus*
 (b) Axil of pectoral fin without a black spot*Lutjanus russelli*

Remarks : These are mostly demersal species, found from inshore waters to considerable depths, the juveniles of some species entering estuaries. *Lutjanus johnii* inhabits shallow coastal waters, including mangrove areas. The Bengal snapper, *L. bengalensis* is fairly common in the trawl catches. The reports of *Lutjanus kasmira* (Forsskal), *L. rivulatus* (Cuvier), *L. sanguineus* (Cuvier) and *L. vaigiensis* (Quoy & Gaimard) from West Bengal by Misra (1962) are not based of any material, and appear to be erroneous.

Family : LOBOTIDAE
(Tripletails)

The name 'tripletail' comes from the position and shape of their second dorsal and anal fin, which extend backward along the caudal peduncle so that the fishes appear to have a three-lobed, or triple, tail. The usual colour is brownish green, commonly with dark mottling along the side. The eyes are located far forward along the short snout, and immediately behind the eyes the body slopes upward sharply so that the fish appears to have a very high forehead.

This is a family of few species, whose representatives live predominantly in brackish waters and mouth of large rivers of south-east Asia.

SPECIES OCCURRING IN WEST BENGAL : *Datnioides quadrifasciatus* (Sevastianov, 1809) ;
 ? *Lobotes surinamensis* (Bloch, 1790).

Key to Species

- 1 (a) Upper jaw very protrusible ; second anal spine longer than third ; lateral line scales 55 to 62*Datnioides quadrifasciatus*
 (b) Upper jaw slightly protrusible ; second anal spine shorter than third ; lateral line scales 42 to 45*Lobotes surinamensis*

Remarks : *Datnioides quadrifasciatus* is common at the mouth of Ganga, but is not esteemed as a food fish. It attains a length of about 30 cm. *Lobotes surinamensis* is a sluggish fish inhabiting coastal waters and is likely to occur in West Bengal also.

Family GERREIDAE
(Mojarras)

Mojarras are small, silvery fishes that have an extremely protrusible mouth. The upper jaw fits into a clearly discernible slot when the mouth is not extended. The body is greatly compressed and the caudal fin forked. The spinous dorsal fin is high in front, sloping into the second, or soft-rayed, dorsal fin.

Mojarras are most common along sandy shores, some moving into brackish waters.

SPECIES OCCURRING IN WEST BENGAL : ? *Gerres (Gerres) abbreviatus* Bleeker, 1850 ; *Gerres (Gerres) oyena* (Forsskal, 1775) ; *Gerres (Gerres) poietii* Cuvier, 1829 ; *Gerres (Pertica) filamentosus* Cuvier, 1829 ; *Gerreomorpha setifer* (Hamilton-Buchanan, 1822).

Key to Species

- 1 (a) Dorsal fin spines 10*Gerreomorpha setifer*
 (b) Dorsal fin spines 92
- 2 (a) Second dorsal spine greatly elongated, longer than head*Gerres filamentosus*
 (b) Second dorsal spine not forming a long filament, usually much shorter than head3
- 3 (a) Body deep, its depth 2 to 3 times in standard length, forming a sharp angle at dorsal-fin origin*Gerres abbreviatus*
 (b) Body oblong, its depth 2.5 to 3.0 times in standard length4
- 4 (a) Pectoral fins long, extending beyond anal-fin origin*Gerres oyena*
 (b) Pectoral fins shorter, not extending to anal-fin origin*Gerres poietii*

Remarks : Misra (1962) reported *Gerres oblongus* Cuvier from the West Bengal coast, but this appears to be doubtful. Species of this family are fairly common in West Bengal, and are caught with beach seines and bottom trawls.

Family HAEMULIDAE (Grunts)

The grunts look much like the snappers, but they differ from them primarily in the dentition, having very feeble jaw teeth and very potent pharyngeal teeth. The dorsal fin is continuous, with 10 strong spines (?) and 8 or 9 (?) soft rays ; anal-fin spines three, the second spine often strong. Two pores and a median pit on chin

SPECIES OCCURRING IN WEST BENGAL : *Pomadasys argenteus* (Forsskal, 1775) ; *Pomadasys argyreus* (Valenciennes, 1833) ; *Pomadasys furcatus* (Schneider, 1801) ; *Pomadasys maculatum* (Bloch, 1797).

Key to Species

- 1 (a) A vertical black band about 8 scales wide, over nape, terminating about 3 scales below lateral line ; about six incomplete crossbars posterior to the vertical band ; spinous part of dorsal fin with a black blotch*Pomadasys maculatum*
 (b) Color not as above2
- 2 (a) Distinct (about 6) longitudinal stripes on side of body*Pomadasys furcatus*
 (b) At most faint grey longitudinal stripes on side of body3

- 3 (a) Body silvery, with conspicuous dark brown to blackish spots*Pomadasys argenteus*
 (b) Body uniformly silvery, no spots*Pomadasys argyreus*

Remarks : These fishes inhabit coastal waters to 40m depth. Caught in bottom trawls and shore seines. Misra (1962 : 264) listed the harry hotlip, *Plectorhinchus gibbosus* (Lecepede, 1802) (as *P. niger*) from West Bengal but this appears to a doubtful record.

Family SPARIDAE
(Seabreams)

These are deep-bodied fishes, usually equipped with powerful canine or incisor teeth in the jaws, and they may also have strong molar or grinding teeth. The eyes are placed high on the head just behind the hind margin of the mouth. The second, or soft, dorsal fin and the anal fin are both large and are about the same shape.

SPECIES OCCURRING IN WEST BENGAL : *Acanthopagrus berda* (Forsskal, 1775) ; *Acanthopagrus latus* (Houttuyn, 1782) ; *Rhabdosargus sarba* (Forsskal, 1775):

Key to Species

- 1 (a) Second anal spine not — markedly longer than third anal spine ; golden longitudinal lines on body*Rhabdosargus sarba*
 (b) Second anal spine much longer than third anal spine2
 2 (a) Anal and pelvic fins blackish*Acanthopagrus berda*
 (b) Anal and pelvic fins yellow*Acanthopagrus latus*

Remarks : Seabreams are demersal fishes inhabiting sandy or muddy bottoms of the continental shelf ; occasionally also found in estuaries. Misra (1962) reports *Argyrops spinifer* (Forsskal) from West Bengal but this appears to be doubtful.

Family NEMIPTERIDAE
(Threadfin Breams)

The nemipterids are snapper-like marine fishes that can often be recognised at a glance by the elongated rays of the upper lobe of the caudal fin and by similarly elongate rays of the pelvic fins. The dorsal fin is continuous, with 10 spines and 9 soft rays ; anal fin with 3 spines and 7 soft rays. There are no teeth on the palate.

SPECIES OCCURRING IN WEST BENGAL : *Nemipterus bipunctatus* (Ehrenberg, 1830) ; *Nemipterus japonicus* (Bloch, 1791) ; *Nemipterus tolu* (Valenciennes, 1830).

Key to Species

- 1 (a) Upper lobe of caudal fin prolonged into a filament.....*Nemipterus japonicus*
 (b) Upper lobe of caudal fin normal, with no filamentous prolongation2

- 2 (a) Dorsal-in spines much longer than its soft rays, very slender*Nemipterus tolu*
- (b) Dorsal-fin spines more or less subequal with its soft rays*Nemipterus bipunctatus*

Remarks : These are small fishes, mostly living in shallow coastal waters, on sandy or muddy bottoms. *Nemipterus bipunctatus* contributes a fishery in West Bengal and is reported in the literature as *N. bleekeri* Day which is now considered its synonym. This species is bottom-living, to 100m depth.

Family SCIAENIDAE
(Croakers)

Croakers are known for the noises they make. Typically, these fishes have a muscle close to the gasbladder, and when the muscle is vibrated, the bladder acts as a resonator and amplifier for the sound. Almost all are inshore fishes usually found over sandy bottoms ; some species move readily into brackish and fresh water. The croakers have a long dorsal fin, with a deep notch separating spinous from soft portion ; anal fin is short, with two spines ; a rounded snout is typical of many of them, and some have small barbels under the chin. The lateral line is exceptionally long, extending onto the caudal fin. The majority are considered marketable food fishes. The croaker is very important in West Bengal during winter months.

SPECIES OCCURRING IN WEST BENGAL : *Bahaba chaptis* (Hamilton-Buchanan, 1822) ; *Chrysochir aureus* (Richardson, 1846 ; *Daysciaena albida* (Cuvier, 1830) ; *Dendrophysa russelli* (Cuvier, 1830) ; *Johnius (Blythsciaena) macropterus* (Bleeker, 1853) ; *Johnius (Johnieops) dussumieri* (Cuvier, 1830) ; *Johnius (Johnieops) sina* (Cuvier, 1830) ; *Johnius (Johnieops) vogleri* (Bleeker, 1850) ; *Johnius (Johnius) belangerii* (Cuvier, 1830) ; *Johnius (Johnius) carutta* Bloch, 1793 ; *Johnius (Johnius) coitor* (Hamilton-Buchanan, 1822) ; *Johnius (Johnius) macrorhynchus* (Mohan, 1976) ; *Nibea maculata* (Schneider, 1801) ; *Nibea soldado* (Lacepede, 1802) ; *Macrospinosa cuja* (Hamilton-Buchanan, 1822) ; *Otolithoides biauritus* (Cantor, 1850) ; *Otolithes cuvieri* Trewavas, 1974 ; *Otolithes ruber* (Schneider, 1801) ; *Pama pama* (Hamilton-Buchanan, 1822) ; *Panna microdon* (Bleeker, 1849) ; *Panna heterolepis* Trewavas, 1977 ; *Pennahia macrocephalus* (Tang, 1937) ; *Pennahia macrophthalmus* (Bleeker, 1850) ; *Protonibea diacanthus* (Lacepede, 1802) ; *Pterotolithus maculatus* (Kuhl & van Hasselt, 1830).

Key to Species

- 1 (a) Gasbladder with one or two branched appendages2
- (b) Gasbladder with more than two pairs of arborescent (branched) appendages7
- 2 (a) Gasbladder appendages wholly directed forward from anterior end of bladder*Macrospinosa cuja*
- (b) Gasbladder appendages with at least the main part lying parallel to bladder3
- 3 (a) Soft dorsal fin with 24 to 26 rays*Bahaba chaptis*
- (b) Soft dorsal fin with 27 to 45 rays4

- 4 (a) Gasbladder with one diverticulum on each side, attached near posterior end ; caudal fin acutely pointed5
 (b) Gasbladder with diverticulum on each side arising from anterior end and immediately dividing into a cephalic and an abdominal branch6
- 5 (a) Soft dorsal fin with 27 to 32 rays*Otolithoides biauritus*
 (b) Soft dorsal fin with 40 to 45 rays*Pama pama*
- 6 (a) Gillrakers 11 to 13 on lower arm of first arch*Panna microdon*
 (b) Gillrakers 16 on lower arm of*Panna heterolepis*
- 7 (a) Gasbladder carrot-shaped8
 (b) Gasbladder hammer-shaped18
- 8 (a) Anterior pair of pores on front of chin separated by symphysis9
 (b) Anterior pair of pores on chin close together behind symphysis or united by a groove ...14
- 9 (a) Outer upper teeth enlarged and spaced but no outstanding canines10
 (b) One or two pairs of canines near symphysis of upper or both jaws11
- 10 (a) Caudal fin truncate ; mental pores two pairs*Pennahia macrophthalmus*
 (b) Caudal fin rhomboid ; mental pores three pairs*Pennahia macrocephalus*
- 11 (a) Canine teeth in upper jaw only ; mouth inferior*Chrysochir aureus*
 (b) Canine teeth in both jaws ; lower jaw projecting12
- 12 (a) Soft anal - fin with 10 or 11 rays*Pterotolithus maculatus*
 (b) Soft anal - fin with 7 or 8 rays13
- 13 (a) Gillrakers 8 to 11 on lower arm of first arch*Otolithes tuber*
 (b) Gillrakers 12 to 17 on lower arm of first arch*Otolithes cuvieri*
- 14 (a) First pair of gasbladder appendages branching on posterior surface of transverse septum, not entering head; bars and black spots on body*Protonibea diacanthus*
 (b) Anterior pair of gasbladder appendages cephalic, extending into head15
- 15 (a) Teeth of lower jaw uniform, small ; a barbel on chin*Dendrophysa russelli*
 (b) Teeth of lower jaw differentiated in size.....16
- 16 (a) A pair of minute barbels on chin*Daysciaena albida*
 (b) No barbels on chin17
- 17 (a) Soft dorsal fin with 28 to 31 rays ; body plain*Nibea soldado*
 (b) Soft dorsal fin with 24 to 25 rays ; body with five bars on side*Nibea maculata*

- 18 (a) A barbel on chin *Johnius macropterus*
 (b) No barbel on chin 19
- 19 (a) Teeth in lower jaw more or less enlarged, spaced 20
 (b) Teeth in lower jaw in a band, uniform in size of with a few inner ones slightly enlarged
 22
- 20 (a) Gillrakers 13 to 5 on lower arm of first arch *Johnius vogleri*
 (b) Gillrakers 9 to 12 on lower arm of first arch 21
- 21 (a) Snout and preorbit inflated *Johnius dussumieri*
 (b) Snout decurved, but not inflated *Johnius sina*
- 22 (a) Scales on head and on at least upper anterior part of body cycloid *Johnius carutta*
 (b) Scales on occiput and whole body (except breast) ctenoid 23
- 23 (a) Gillrakers 10 to 13 on lower arm of first arch ; snout prominent and projecting
 *Johnius coitor*
 (b) Gillrakers 5 to 10 on lower arm of first arch 24
- 24 (a) Snout swollen, projecting *Johnius macrorhynchus*
 (b) Snout steeply rounded, not projecting *Johnius belangerii*

Remarks : Rao and Sinha (1968) erroneously reported *Johnius novaehollandiae* Bleeker from the Ganges delta. This is clearly *Johnius coitor*. *Bahaba chaptis* is a rare species and was only in recent years rediscovered (Trewavas and Talwar, 1972) after this original discovery in 1822. The species is restricted to the Gangetic delta in our area. *Macrospinosa cuja* is also restricted to the Gangetic delta and contributes a fairly good fishery during winter months. *Daysciaena albida* also contributes a good fishery in the Hooghly estuary during winter months. *Johnius glaucus* (Day) is often reported in the literature from West Bengal but these record appear to be of *Johnius macrorhynchus*. Misra (1962) listed *Johnius dussumieri* (Valenciennes) (as *Sciaena dussumieri*), *Johnius (Johnieops) aneus* (Bloch, 1793) (as *Johnius osseus*), *Kathala axillaris* (Cuvier) and *Paranibea semiluctuosa* (Cuvier) from West Bengal waters, but these four listings appear to be doubtful. Talwar and Sinha (1973) designated a neotype of *Johnius carutta* based on a Hooghly specimen.

Family MULLIDAE (Goatfishes)

The goatfish is rather elongate in shape, and has widely separate spiny-rayed and soft-rayed dorsal fins ; and a forked caudal fin, anal fin with one or two small spines. Two long, tactile barbels under the chin enable the goatfishes to locate small items of food.

SPECIES OCCURRING IN WEST BENGAL : *Parupeneus indicus* (Shaw, 1803); *Upeneus sulphureus* Cuvier, 1829; *Upeneus vittatus* (Forsskal , 1775).

Key to Species

1. (a) No teeth on roof of mouth ; a large dark blotch at midpoint of caudal peduncle*Parupeneus indicus*
- (b) Teeth on roof of mouth2
- 2 (a) Caudal fin with black crossbars on both lobes*Upeneus vittatus*
- (b) No cross-bars on caudal fin*Upeneus sulphureus*

Remarks : Goatfishes live mostly in shallow waters, on sandy or muddy bottoms. These fishes are not common in West Bengal Caught with shore seines and bottom trawls.

Family MONODACTYLIDAE
(Moonfishes)

Body strongly compressed and deep. Mouth small, with feeble teeth. Single dorsal fin with a long base, with 7 or 8 spines, anal fin with three spines, long base; dorsal and anal fin spines small Pelvic fins minute. Scales small , ctenoid. Body silvery.

SPECIES OCCURRING IN WEST BENGAL : *Monodactylus argenteus* (Linnaeus, 1758).

Remarks : *Monodactylus argenteus* inhabits freshwater, estuaries and harbours, and appears to be rare in West Bengal. We could collect only a single specimen from Digha. Misra (1962 : 276) listed *M. falciformis* Lacepede, 1801, from West Bengal but this is doubtful since this species does not occur on the east coast of India.

Family TOXOTIDAE
(Archerfishes)

The body is deep and laterally compressed. Eyes large. Mouth fairly large, terminal (lower jaw protruding), and highly protractile. Single dorsal fin , with 4 or 5 strong spines and 12 to 14 soft rays. Anal fin with 3 spines and 15 to 17 rays Scales small to moderate.

SPECIES OCCURRING IN WEST BENGAL :*Toxotes chatareus* (Hamilton - Buchanan, 1822) ?
Toxotes jaculator (Pallas, 1766)

Key to Species

- 1 (a) Dorsal fin with 4 spines; four or five black bars on upper sides of body ...*Toxotes jaculator*
- (b) Dorsal fin with usually five spines ; six or seven alternating large and small black spots*Toxotes chatareus*

Remarks : These species inhabit mangrove- lined estuaries in West Bengal.

Family EPHIPPIDIDAE
(Space-fishes)

Body deep, almost circular, and laterally compressed. Head fairly short, with a steep upper profile. Mouth small ; no teeth on vomer and palatines. Gill membranes united to isthmus. Spinous portion of dorsal fin distinct from soft-rayed portion (except in *Platax*); anal fin spines three.

SPECIES OCCURRING IN WEST BENGAL : *Drepane longimana* (Bloch and Schneider, 1801) ; *Drepane punctata* (Linnaeus, 1758) ; *Platax pinnatus* (Linnaeus, 1758).

Key to Species

- 1 (a) Spinous portion of dorsal fin continuous with soft portion ; pectoral fins shorter than head, rounded*Platax pinnatus*
- (b) Spinous portion of dorsal fin distinct from soft-rayed portion ; pectoral fins longer than head, falcate2
- 2 (a) Dorsal fin with 8 spines, the third spine longest*Drepane longimana*
- (b) Dorsal fin with 7 spines, the fourth spine longest.....*Drepane punctata*

Remarks : *Drepane punctata* is a coastal species, often entering estuaries. It attains a length of about 25cm and is a rather common species in West Bengal. The occurrence of *D. longimana* in West Bengal is reported here for the first time based on eight specimens collected from Bakkhali at the mouth of the Ganga. These specimens have been incorporated in the National Collections under registration no. F 7910/2. The systematic status of *D. longimana* has been discussed by Lele (1924) and murthy (1969). The batfish, *Platax pinnatus* is common but not particularly abundant. Misra (1962 : 279) lists the spadefish, *Ephippus orbis* (Bloch, 1787) from West Bengal but this appears to be doubtful. This species may be easily recognised in the field by its 4 or 5 black bars on body, short and rounded pectoral fins and densely scaled body.

Family SCATOPHAGIDAE
(Scats)

Typical of the group, the body is high and greatly compressed. There are four strong anal spines; first dorsal spine procumbent.

These are coastal fishes primarily but move into shallow brackish waters.

SPECIES OCCURRING IN WEST BENGAL : *Scatophagus argus* (Bloch, 1788).

Remarks : Young ones of *Scatophagus argus* which are usually dark in colour, are common at the mouth of the Ganga and its estuary. A quite common species in the Hooghly estuary, usually occurring in schools.

Misra (1962) refers to two members of the family Chaetodontidae, viz. *Heniochus acuminatus* (Linnaeus) and *Chaetodon vagabundus* Linnacus from West Bengal, but we have no specimens nor any data to support this contention.

Suborder MUGILOIDEI
Family MUGILIDAE
(Mulletts)

The mulletts are torpedo-shaped, shallow-water, schooling fishes usually found over sandy or muddy bottom. They are blunt-nosed and small-mouthed; teeth small or absent; widely separated spiny-rayed (with four spines) and soft-rayed dorsal fins; pelvic fins subabdominal, with one spine and five branched soft rays; lateral line absent or very faint; stomach muscular and intestine exceedingly long.

SPECIES OCCURRING IN WEST BENGAL : *Liza macrolepis* (Smith, 1849) ; *Liza parsia* (Hamilton - Buchanan, 1822) ; *Liza subviridis* (Valenciennes, 1836) ; *Liza tade* (Forsskal, 1775) ; *Liza vaigiensis* (Quoy & Gaimard, 1824); *Mugil cephalus* Linnaeus, 1758 ; *Rhinomugil corsula* (Hamilton - Buchanan, 1822) ; *Valamugil buehanani* (Bleeker, 1853) ; *Valamugil cunnesius* (Valenciennes, 1836) ; *Valamugil seheli* (Forsskal, 1775) ; *Valamugil speigleri* (Bleeker, 1858).

Key to Species

- 1 (a) Head concave between eyes, the latter projecting above this level*Rhinomugil corsula*
- (b) Head flattened dorsally, the eyes not projecting above this level2
- 2 (a) Hind tip of maxilla not curved below tip of premaxilla ; pectoral axillary scale very long
.....*Mugil cephalus*
- (b) Hind tip of maxilla curved below tip of premaxilla3
- 3 (a) Scales without membranous digitated hind margin ; pectoral axillary scale rudimentary or
absent4
- (b) Scales with membranous digitated hind margin ; pectoral axillary scale very long8
- 4 (a) Anal finrays 8 ; caudal fin slightly emarginate.....*Liza vaigiensis*
- (b) Anal finrays 9 ; caudal fin deeply emarginate5
- 5 (a) Pelvic fin reaching vertical behind base of fourth spine of first dorsal fin ; 13 transverse
scales*Liza macrolepis*
- (b) Pelvic fin reaching vertical in front of fourth spine of first dorsal fin ; 9 or 10 transverse
scales6
- 6 (a) Second dorsal - fin origin on vertical through posterior half of anal - fin base*Liza tade*
- (b) Second dorsal - fin origin over first half of anal - fin base7
- 7 (a) Preorbital bone broad, fills space between lip and eye.....*Liza parsia*
- (b) Preorbital bone narrow, not filling space between lip and eye.....*Liza subviridis*

- 8 (a) Adipose tissue cover half to most of iris9
 (b) Adipose tissue only a rim around eyes10
- 9 (a) Lateral line scales 30 to 35*Valamugil cunnesius*
 (b) Lateral line scales 37 to 40*Valamugil speigleri*
- 10 (a) Lateral line scales 32 to 35*Valamugil buchanani*
 (b) Lateral line scales 38 to 42*Valamugil seheli*

Remarks : These fishes inhabit coastal waters and estuaries. Most species are adaptable to great changes in salinity. These are important foodfishes in West Bengal. Misra (1962 : 213) listed *Liza melinoptera* (Valenciennes, 1836) (as *Chelon oligolepis*) from estuaries of the Ganges at Sundarbans but this requires confirmation.

Suborder SPHYRAENOIDEI
 Family SPHYRAENIDAE
 (Barracudas)

Barracudas draw unusual interest because of their sharp, fearsome teeth. They have large forked caudal fins, large eyes, and usually dark blotches on a silvery background. The dorsal fins are widely separated, and the lower jaw projects beyond the upper. Slim and cigar-shaped, barracudas occur in warm waters throughout the world. When young, they travel in schools. Large individuals are typically solitary.

SPECIES OCCURRING IN WEST BENGAL : *Sphyraena jello* Cuvier, 1829 ; *Sphyraena obtusata* Cuvier, 1829.

Key to Species

- 1 (a) Two gill-rakers present on first arch*Sphyraena obtusata*
 (b) No gill - rakers on first arch*Sphyraena jello*

Remarks : Mostly occurring in coastal waters, from the surface to 100m depth. They are of some importance as food, the flesh being delicate and well favoured. Usually marketed fresh. Caught mainly by trawls and gillnets. Misra (1962 : 209) erroneously listed *Sphyraena acutipinnis* Day from West Bengal, a species restricted to Pakistan.

Suborder POLYNEMOIDEI
 Family POLYNEMIDAE
 (Threadfins)

Typical of the threadfins is an anchovy - type head with rounded snout and recessed lower jaw ; the mouth which is on the underside of the head, is not obvious unless it is open. The eyes are large.

There are two dorsal fins, widely separated, and a deeply forked caudal fin. The pectoral fin is divided into two parts, the lower portion consisting of four to eight long, free filamentous rays not attached to each other.

SPECIES OCCURRING IN WEST BENGAL : *Eleutheronema tetradactylum* (Shaw, 1804) ; ? *Polydactylus heptadactylus* (Cuvier, 1829) ; *Polydactylus indicus* (Shaw, 1804) ; *Polydactylus plebeius* (Broussonet, 1782) ; *Polydactylus sextarius* (Bloch, 1801) ; *Polynemus paradiseus* Linnaeus, 1758 ; *Polynemus longipectoralis* Weber & de Beaufort, 1922 ; *Polynemus* sp.

Key to Species

- 1 (a) Pectoral fin inserted high on body, the upper part of its base in level with the middle line of body ; lateral line with its anterior part rising in a long, low curve2
- (b) Pectoral fin inserted low, the upper part of its base well below the middle line of body ; lateral line nearly straight4
- 2 (a) Pectoral fin with eight free filamentous rays.....*Polynemus* sp.
- (b) Pectoral fin with seven free filamentous rays3
- 3 (a) Three upper pectoral filamentous rays extending far beyond caudalfin tip*Polynemus paradiseus*
- (b) Two upper pectoral filamentous rays extending far beyond caudalfin tip, but the third filament reaching only to tip of caudal fin*Polynemus longipectoralis*
- 4 (a) Lower lip absent, except towards the rictus ; teeth extending on exterior part of jaws*Eleutheronema tetradactylum*
- (b) Lower lip fully developed, extending far forward ; no teeth on exterior part of jaws5
- 5 (a) Pectoral fin with five free filamentous rays.....6
- (b) Pectoral fin with six or seven free filamentous rays7
- 6 (a) Eyes small, the diameter about 7 times in head length ; upper free pectoral filament reaching anal-fin origin.....*Polydactylus indicus*
- (b) Eyes large, the diameter 3.8 to 4 times in head length ; upper free filament not — reaching anal - fin*Polydactylus plebeius*
- 7 (a) Pectoral fin with seven free filamentous rays.....*Polydactylus heptadactylus*
- (b) Pectoral fin with six free filamentous rays*Polydactylus sextarius*

Remarks : These species inhabit shallow coastal waters, some of which also enter the estuaries. *Eleutheronema tetradactylum* is more an estuarine species, the young ones of which are found in abundance in the lower reaches of the estuaries of West Bengal, viz., Hooghly estuary and Matlah

estuary at Port Canning (Chopra, 1951 ; Malhotra, 1953). This is one of the species supporting the major threadfin fishery of Sunderbans (Bhimachar, 1969). It grows to a fairly large size and its flesh is highly appreciated in West Bengal. *Polynemus paradiseus*, commonly called 'mango fish' because of its long pectoral filaments, is also an estuarine species which is known to enter the Hooghly river up to 300 km from sea for breeding, from about April to June (Chopra, 1951). This species along with *Polydactylus indicus* contributes to the threadfin fishery of the Sunderbans. *Polynemus longipectoralis* has only recently been reported from West Bengal (Talwar and Mukherjee, in press).

Suborder TRACHINOIDEI
Family CONGROGADIDAE
(Eel - like blennies)

Body elongate with small cycloid scales. Dorsal and anal fins long ; one spine before dorsal fin ; no anal spines. Pelvic fins absent. Caudal fin confluent with dorsal and anal fins, or slightly separated. Mouth protractile; gill membranes united; opercle with strong, posteriorly directed spine on upper margin. Three lateral lines.

SPECIES OCCURRING IN WEST BENGAL : *Halidesmus thomaseni* (Nielsen, 1960).

Remarks : *Halidesmus thomaseni* is reported here for the first time from the West Bengal coast based on a single specimen (ZSI regd. no. F. 7590/2 as *Pholioides thomaseni*) from Digha. Mohan (1967) reported this species from Gujarat and Andhra Pradesh subsequent to its original discovery from Karachi (Pakistan) and Bombay. Winter bottom (1982) discussed its generic relationship. In this species there are three lateral lines of which the middle one is complete and the other two continue nearly to base of caudal fin.

Family URANOSCOPIDAE
(Stargazers)

Head large and cuboid. Mouth extremely oblique; lips fringed. Eyes dorsal or nearly so. Dorsal and anal fins moderately long; pelvic fins narrowly separated, with one spine and five soft rays, located under the throat. Two large, double - grooved poison spines, with a venom gland at each base, just above the pectoral fin and behind the opercle. Body covered with small smooth scales.

Typically, the fishes lie buried with only their bulbous eyes and mouths protruding above the surface of the sand.

SPECIES OCCURRING IN WEST BENGAL : *Uranoscopus cognatus* Cantor, 1850.

Suborder CALLIONYMOIDEI
Family CALLIONYMIDAE
(Dragonets)

This is a group of small benthic marine fishes (except two euryhaline species). A sharp preopercular spine, usually in the form of hooks, and a very small gill-opening on the upper part of the head are two of the identifying marks of the dragonets, a group of small, often highly coloured

fishes with slender, anteriorly flattened bodies. The pelvic fins are jugular, located ahead of the pectoral fins, and the inner rays of the pelvics are longer than the outer rays. The body is naked.

SPECIES OCCURRING IN WEST BENGAL : *Callionymus carebares* Alcock, 1890; *Callionymus fluviatilis* Day, 1875; *Callionymus megastomus* Fricke, 1982; *Callionymus recurvispinnis* (Li, 1966); *Callionymus sagitta* Pallas, 1770; *Eleutherochir opercularis* (Valenciennes, 1837)

Key to Species

- 1 (a) Operculum with a free flap of skin*Eleutherochir opercularis*
- (b) Operculum without a free flap of skin2
- 2 (a) Dorsal margin of preopercular spine with small antrorse serrae
.....*Callionymus recurvispinnis*
- (b) Dorsal margin of preopercular spine with large curved points3
- 3 (a) First dorsal fin with three spines*Callionymus megastomus*
- (b) First dorsal fin with four spines4
- 4 (a) Head length 2.7 to 3.1 in standard length*Callionymus carebares*
- (b) Head more than 3.4 in standard length5
- 5 (a) Second dorsal fin ix, 1*Callionymus fluviatilis*
- (b) Second dorsal fin viii, 1*Callionymus sagitta*

Remarks : *Callionymus fluviatilis* Day which was originally discovered from the Hooghly R. at Calcutta, is a euryhaline species. *C. megastomus* is only known from the Bay of Bengal off Calcutta (Fricke, 1983). *C. carebares* occurs in the Bay of Bengal at depths of 135m on sand or mud bottoms. *Eleutherochir opercularis* lives in shallow sand and mud bottoms in the sea, but is a euryhaline species.

Suborder GOBIOIDEI Family ELEOTRIDIDAE (Sleepers)

The largest of the gobioid fishes are the eleotrids, which lack the sucking disc. All species have the pelvic fins separated either completely to the base or almost to it. Their name is derived from a common species habit of resting on the bottom as though "sleeping" and rarely moving from this position unless disturbed.

SPECIES OCCURRING IN WEST BENGAL : *Butis butis* (Hamilton - Buchanan, 1822); *Butis melanostigma* (Bleeker, 1849); *Eleotris fusca* (Bloch & Schneider, 1801); *Eleotris lutea* Day, 1876;

Eleotris melanossoma (Bleeker, 1852); *Odonteleotris macrodon* Bleeker, 1853; *Ophieleotris aporos* (Bleeker, 1854); *Ophiocara porocephala* (Valenciennes, 1837).

Key to Species

- 1 (a) Preopercle without spines2
- (b) A single downwardly directed strong spine at angle of preoperculum6
- 2 (a) Bony crests (serrated ridges) on head in interorbital space3
- (b) No bony crests on head4
- 3 (a) Maxilla tip extends to below middle of eye; depth of body more than 20% of standard length*Butis melanostigma*
- (b) Maxillary shorter, not extending beyond anterior edge of eye; depth of body not — more than 20% of standard length*Butis butis*
- 4 (a) Scales small, 90 or more in longitudinal series*Odonteleotris macrodon*
- (b) Scales moderate, 23 to 40 in longitudinal series5
- 5 (a) Sensory canal pores on snout, interorbital and posterior margin of preoperculum ; pit organs in longitudinal and transverse lines*Ophiocara porocephala*
- (b) Sensory canal pores restricted to posterior margin of preoperculum ; pit organs only in longitudinal lines*Ophieleotris aporos*
- 6 (a) Pit organs rather indistinct ; predorsal scales 23 or 24 ; preoperculum and operculum scaled on upper part only.....*Eleotris lutea*
- (b) Pit organs very prominent ; predorsal scales 40 to 50 ; preoperculum and operculum totally scaled7
- 7 (a) Scales in longitudinal series 45 to 55 ; predorsal scales 40 to 45*Eleotris melanosoma*
- (b) Scales in longitudinal series 60 to 68 ; predorsal scales about 50*Eleotris fusca*

Remarks : *Butis butis* is reported to be fairly common in the Gangetic delta, but we have no specimens in our collections. *Butis melanostigma* inhabits the brackish waters only. *Eleotris fusca* and *E. melanosoma* also inhabit the brackish waters of West Bengal. *E. lutea* is restricted to the Gangetic delta of the mainland of India. *Odonteleotris macrodon*, *Ophieleotris aporos* and *Ophiocara porocephala* inhabit the estuarine waters of West Bengal.

Family GOBIIDAE (Gobies)

Gobies are small bottom-dwelling fishes that are usually less than 15 cms. The bases of their pelvic fins are united, forming a sucking disc with which they hold onto the bottom. In typical members of the family there is no lateral line. The second, or soft-rayed, dorsal fin and the anal fin

mirror each other in size and shape. The family consists of numerous species, most of them marine but some inhabiting brackish or fresh waters. Gobies commonly rest on the bottom, sometimes propped on their pelvic fins, and they dart quickly from place to place. Some live in burrows in the sand or mud. Many species of gobies live in tidal pools or close to shore.

SPECIES OCCURRING IN WEST BENGAL : *Acentrogobius caninus* (Valenciennes, 1837) ; *Acentrogobius cauerensis* (Bleeker, 1853) ; *Acentrogobius globiceps* (Hora, 1923) ; *Acentrogobius ornatus* (Ruppell, 1828) ; *Acentrogobius viridipuncatatus* (Valenciennes, 1837) ; *Apocryptes bato* (Hamilton-Buchanan, 1822) ; *Apocryptodon madurensis* (Bleeker, 1849) ; *Awaouichthys menoni* Chatterjee, 1978 ; *Bathygobius fuscus* (Ruppell, 1828) ; *Boleophthalmus boddaerti* (Valenciennes, 1837) ; *Boleophthalmus dussumieri* Valenciennes, 1837; *Brachygobius nunus* (Hamilton-Buchanan, 1822); *Cryptocentrus gymnocephalus* (Bleeker, 1853); *Glossogobius giuris* (Hamilton-Buchanan, 1822); *Gobiopsis macrostomus* Steindachner, 1860; *Gobiopterus chuno* (Hamilton-Buchanan, 1822); *Oligolepis acutipennis* (Valenciennes, 1837); *Oxudercus dentatus* Eydoux & Souleyet, 1842; *Parachaeturichthys polynema* (Bleeker, 1853); *Parapocryptes serperaster* (Richardson, 1846); *Periophthalmodon schlosseri* (Valenciennes, 1837); *Periophthalmodon tredecemradiatus* (Hamilton-Buchanan, 1822); *Periophthalmus keelreuteri* (Pallas, 1770); *Periophthalmus pearsei* Eggert, 1935; *Pseudapocryptes lanceolatus* (Bloch & Schneider, 1801); *Scartelaos histophorus* (Valenciennes, 1837); *Stigmatogobius hoevenii* (Bleeker, 1851); *Stigmatogobius sadanundio* (Hamilton-Buchanan, 1822)

Key to Species

- 1 (a) Teeth of lower jaw in a single row2
- (b) Teeth of lower jaw in several rows14
- 2 (a) Second dorsal fin elongated; teeth of lower jaw sub-horizontal; scales cycloid3
- (b) Second dorsal fin not — elongated.....10
- 3 (a) Free lower eyelid absent4
- (b) Free lower eyelid present8
- 4 (a) Teeth in lower jaw pointed5
- (b) Teeth in lower jaw truncate or bilobate6
- 5 (a) Scales in longitudinal series about 80*Parapocryptes serperaster*
- (b) Scales in longitudinal series about 100*Pseudapocrypte lanceolatus*
- 6 (a) Front teeth in upper jaw not caninoid; scales in longitudinal series about 100
.....*Apocryptes bato*
- (b) Front teeth in upper jaw caninoid; scales in longitudinal series 40 to 907

- 7 (a) Flanks of body with indistinct blotches; second dorsal fin without blotches
.....*Apocryptodon madurensis*
- (b) Flanks of body without blotches; second dorsal fin with a brownish blotch at its posterior
extremity*Oxuderces dentatus*
- 8 (a) Teeth in lower jaw pointed; chin with barbels*Scartelaos histophorus*
- (b) Teeth in lower jaw obliquely notched; chin without barbels9
- 9 (a) Flanks of body with dark spots or oblique bands; first dorsal fin greyish with blue spots
.....*Boleophthalmus boddaerti*
- (b) Flanks of body without spots or bands; first dorsal fin purplish with black spots
.....*Boleophthalmus dussumieri*
- 10 (a) Eye not prominent, free eyelid wanting*Gobiopterus chuno*
- (b) Eye prominent, free lower eyelid developed; base of pectoral fin muscular11
- 11 (a) Teeth in upper jaw in one row12
- (b) Teeth in upper jaw in two rows13
- 12 (a) First dorsal fin lower than body, triangular, with 8 to 10 rays; predorsal scales 22 to 24
.....*Periophthalmus pearsei*
- (b) First dorsal fin higher than body, convex with 10 to 17 rays; predorsal scales 32 to 34
.....*Periophthalmus koelreuteri*
- 13 (a) Pelvic fins totally united, the basal membrane well developed*Periophthalmodon*
- (b) Pelvic fins only united at base, the basal membrane absent
.....*Periophthalmodon tredecemradiatus*
- 14 (a) Inner margin of shoulder girdle with some fleshy cirri ; gill membranes fused to a free fold
across isthmus*Awaouchthys menoni*
- (b) Inner margin of shoulder girdle without any fleshy cirri15
- 15 (a) Foremost median scale on nape enlarged and unpaired16
- (b) Foremost median scale on nape not unpaired nor enlarged17
- 16 (a) Flanks of body with distinct transverse bands ; predorsal scales 11 to 13
.....*Stigmatogobius hoevenii*
- (b) Flanks of body without transverse bands ; predorsal scales 8 to 10
.....*Stigmatogobius sadanundio*

- 17 (a) Upper pectoral finrays usually free and silky18
 (b) Upper pectoral finrays not free and silky23
- 18 (a) Head depressed.....*Bathygobius fuscus*
 (b) Head subcylindrical.....19
- 19 (a) Infraocular pit organs in longitudinal lines ; preoperculum and operculum naked
*Acentrogobius ornatus*
 (b) Infraorbital pit organs in both longitudinal and transverse lines ; preoperculum scaled or
 naked, operculum at least partly scaled20
- 20 (a) Anal with 11 finrays ; a violet streak from lower border of eye as its centre to hind margin
 of upper jaw*Acentrogobius cauerensis*
 (b) Anal with 9 finrays ; no violet streak below eye21
- 21 (a) Predorsal scales 7 or 8*Acentrogobius globiceps*
 (b) Predorsal scales 17 to 3022
- 22 (a) Predorsal scales 17 to 20*Acentrogobius caninus*
 (b) Predorsal scales 30*Acentrogobius*
- 23 (a) Gill membranes fused to a free fold across isthmus*Glossogobius giuris*
 (b) Gill membranes not fused together to a free fold24
- 24 (a) Barbels on head25
 (b) No barbels on head.....26
- 25 (a) Barbels on chin, snout and lateral head*Gobiopsis macrostomus*
 (b) Barbels restricted to chin only*Parachaeturichthys polynema*
- 26 (a) Caudal fin not longer than head.....*Brachygobius nunus*
 (b) Caudal fin longer than head27
- 27 (a) Head naked ; scales in longitudinal series 25 to 30*Oligolepis acutipennis*
 (b) Head at least partly scaled ; scales in longitudinal series 117 to 124
*Cryptocentrus gymnocephalus*

Remarks : The mudskippers *Periophthalmus* spp. and *Boleophthalmus* spp. live on mudflats along mangrove shores. When the tide recedes, they stay on the mud, hopping or "skipping" about over the surface like frogs or toads. Like them, too, they have large heads and bulbous eyes. Their pectoral fins

are used like legs. *Glossogobius giuris* is the only relished food-fish amongst the gobioids of West Bengal. *Apocryptes bato* and *Pseudapocryptes lanceolatus* occur in large numbers in the Hooghly estuary and though not very much relished, form a major part of the yield.

Koumans (1941 : 278) examined specimens of *Apocryptodon madurensis* from Port Canning and Uttarbhag, Lower Bengal in the ZSI collections, but these are presently not traceable. Chatterjee and Siddiqi (1976 : 82) reported *Periophthalmus weberi* Eggert, 1935, from Roopnarayan R. in the Gangetic delta, a species which probably also inhabits estuarine waters. *Periophthalmodon schlosseri* has been reported from West Bengal (as *Gobius septemradiatus* Hamilton-Buchanan) but we have no specimens in our collections. *Acentrogobius caninus* (Valenciennes) is reported here for the first time from the east coast of India based on 7 from the Gangetic delta. These specimens have been incorporated in our collections under registration no F7911/2 and F7912/2.

Family GOBIOIDIDAE (Eellike gobies)

These eellike gobies are marine, brackish and freshwater. Like the true gobies, the pelvic fins usually form an adhesive disc. The extremely long dorsal fin has 4 to 6 spinous rays, followed by 28 to 60 soft rays but the spiny-rayed and soft-rayed portions are continuous rather than separate as in true gobies. The eyes are very small.

SPECIES OCCURRING IN WEST BENGAL : *Brachyamblyopus urolepis* (Bleeker, 1852) ; *Odontamblyopus rubicundus* (Hamilton-Buchanan, 1822) ; *Pseudotrypauchen multiradiatus* (Hardenberg, 1931) ; *Taenioides anguillaris* (Linnaeus, 1758) ; *Taenioides buchanani* (Day, 1873) ; *Taenioides cirratus* (Blyth, 1861).

Key to Species

- 1 (a) Chin and lower jaw with barbels ; canine teeth in both jaws2
- (b) No barbels on chin and lower jaw ; no canines in jaws5
- 2 (a) Pectoral fin as long as pelvic fin, about 70% of head length ...*Odontamblyopus rubicundus*
- (b) Pectoral fin much shorter than pelvic fin, about 30% of head length3
- 3 (a) Dorsal and anal fins separated from caudal fin bt a deep notch ; caudal fin rhomboid
.....*Taenioides cirratus*
- (b) Dorsal and anal fins continuous with caudal fin ; caudal fin pointed4
- 4 (a) Dorsal, anal and caudal fins black ; preanal distance more than 40% standard length
.....*Taenioides buchanani*
- (b) Dorsal, anal and caudal fins yellowish ; preanal distance less than 40% of standard length
.....*Taenioides anguillaris*

- 5 (a) Chin with pores ; pectoral finrays 17 or 18*Brachyamblyopus urolepis*
 (b) Chin without pores; pectoral finrays about 40*Pseudotrypauchen multiradiatus*

Remarks : *Odontamblyopus rubicundus* occurs in large numbers in the Hooghly estuary and though not relished very much, forms a major part of the yield of the gobioids. The three species of the genus *Taenioides* recorded from West Bengal occur only in the Gangetic delta at the mouth of river Hooghly. Koumans (1941) examined specimens of *Brachyamblyopus urolepis* (Bleeker) from Lower Bengal, but we were unable to trace these specimens in our collections. *Pseudotrypauchen multiradiatus* has been recorded from Sandheads (mouth of the Hooghly river) only in India.

Family TRYPAUCHENIDAE
(Burrowing gobies)

Like the true gobies, they usually have a sucking disc under the body. In life they are pink or blue in colour. The spiny-rayed and soft-rayed portions of the extremely long dorsal fin are continuous rather than separate as in the gobies.

SPECIES OCCURRING IN WEST BENGAL : *Amblyotrypauchen arctocephalus* (Alcock, 1890) ; *Ctenotrypauchen microcephalus* (Bleeker, 1860) ; *Trypauchen vagina* (Bloch & Schneider, 1801) ; *Trypauchenichthys sumatrensis* Hardenberg, 1931.

Key to Species

- 1 (a) Pelvic fins separate to base*Trypauchenichthys sumatrensis*
 (b) Pelvic fins united2
 2 (a) Pelvic fins completely united, forming a funnel-shaped disc*Trypauchen vagina*
 (b) Pelvic fins united but emarginate posteriorly3
 3 (a) Canine teeth present*Amblyotrypauchen arctocephalus*
 (b) Canine teeth absent*Ctenotrypauchen microcephalus*

Remarks : *Trypauchen vagina* and *Ctenotrypauchen microcephalus* inhabit the Hooghly estuary, while *Amblyotrypauchen arctocephalus* and *Trypauchenichthys sumatrensis* have only be recorded at the mouth of the river Hooghly in West Bengal.

Suborder KURTOIDEI
Family KURTIDAE
(Humpheads)

The body is oblong and much compressed, with small cycloid scales; head naked except the preopercle and opercle. Mouth large; teeth in villiform bands in jaws, smaller ones on palatines. Opercle bones thin and paper-like. Dorsal fin single, with spines and soft rays ; anal fin with two spines and 31 or 32 soft rays; pelvic fin with one spine and 5 soft rays ; caudal fin deeply forked. Lateral line short and rudimentary. Males with occipital hook, used for carrying eggs.

SPECIES OCCURRING IN WEST BENGAL : *Kurtus indicus* Bloch, 1786.

Remarks : *Kurtus indicus* contributes a good fishery in January, February and November in West Bengal and it is much relished (Kuthalingam *et al.*, 1973).

Suborder ACANTHUROIDEI
Family ACANTHURIDAE
(Surgeonfishes)

Just in front of thecaudal fin, on the sides of the caudal peduncle, the surgeonfishes have sharp "knives", which not only are the source of their name but also are a mark of identification. Body deep and strongly compressed. Dorsal profile of head steep; eye high on head. Single dorsal fin, with spines and soft rays ; caudal fin lunate. Gill-openings restricted. Scales small.

SPECIES OCCURRING IN WEST BENGAL: ? *Acanthurus triostegus* (Linnaeus, 1758).

Family SIGANIDAE
(Rabbitfishes)

The siganids can always be identified by the presence of two spines on each pelvic fin. The two spines are on the margins of the fins and are separated by three soft rays. In addition, the rabbitfishes have an increased number of anal spines - seven of them - preceding the soft rays. These, as well as the thirteen dorsal fin spines, have along the sides deep grooves containing venom glands. Another peculiarity is a very short first dorsal spine that is directed forward rather than backward.

SPECIES OCCURRING IN WEST BENGAL : *Siganus canaliculatus* (Park, 1797) ; *Siganus javus* (Linnaeus, 1766).

Key to Species

- 1 (a) Last dorsal fin spine equal to or shorter than first dorsal spine*Siganus canaliculatus*
(b) Last dorsal fin spine much longer than first dorsal spine*Siganus javus*

Remarks : The members of this family do not form the object of a special fishery in West Bengal as they do not occur in large quantities. They inhabit shallow coastal waters, including estuaries.

Suborder SCOMBROIDEI
Family TRICHIURIDAE
(Ribbonfishes)

This family is distinguished by their much-flattened or compressed silvery body, which is almost ribbonlike and tapers to a slim, usually pointed tail. The head is spear-shaped and the teeth are prominent. The dorsal fin begins just behind the head and extends almost the full length of the body; there is a small anal fin.

Ribbonfishes are swift swimmers, usually staying close to the bottom. Common in shallow coastal waters. The flesh is edible and tasty, but scanty.

SPECIES OCCURRING IN WEST BENGAL : *Eupleurogrammus glossodon* (Bleeker, 1860) ; *Eupleurogrammus muticus* (Gray, 1831) ; *Lepturacanthus pantului* (Gupta, 1966) ; *Lepturacanthus savala* (Cuvier, 1829) ; *Trichiurus gangeticus* (Gupta, 1966) ; *Trichiurus lepturus* Linnaeus, 1758.

Key to Species

- 1 (a) Pelvic fins scale-like; lower hind margin of gill cover convex2
 (b) Pelvic fins absent; lower hind margin of gill cover concave3
- 2 (a) A pair of fangs at tip of lower jaw; eyes close to dorsal profile of head
*Eupleurogrammus glossodon*
 (b) No fangs at tip of lower jaw; eyes not near head contour*Eupleurogrammus muticus*
- 3 (a) First anal spine large, half of eye-diameter4
 (b) First anal spine small, shorter than diameter of pupil5
- 4 (a) Snout long, 2 to 2.5 in head length; eye small, its diameter 7 to 9 in head length
*Lepturacanthus savala*
 (b) Snout short, about 3 times in head length, its diameter 5 to 7 in head length
*Lepturacanthus pantului*
- 5 (a) Pectoral spine serrated*Trichiurus gangeticus*
 (b) Pectoral spine not serrated*Trichiurus lepturus*

Remarks : Benthopelagic species, found in coastal waters to about 100m depth. Species of this family occur in large quantities. Caught with bagnets in estuaries, seines in inshore waters and with trawls offshore.

Family SCOMBRIDAE

(Mackerels)

Characteristic torpedo-shaped powerful body. Two dorsal fins (depressible into grooves) with finlets behind second dorsal and anal fins; first dorsal fin inserted well behind head; pectoral fins inserted high on body; pelvic fins with six rays, placed beneath the pectoral fins. Scales cycloid and minute; slender caudal peduncle with two keels.

The Scombridae is a family of epipelagic fishes that are important components of commercial fisheries in India, but not so in West Bengal.

SPECIES OCCURRING IN WEST BENGAL : *Rastrelliger kanagurta* (Cuvier, 1817); *Scomberomorus commerson* (Lacepede, 1800) ; *Scomberomorus guttatus* (Bloch & Schneider, 1801).

Key to Species

- 1 (a) A single pair of oblique keels near the end of caudal peduncle; five dorsal and five anal finlets*Rastrelliger kanagurta*
- (b) Two small keels with an additional midlateral keel on either side of caudal peduncle; 8 to 12 dorsal and 8 to 10 anal finlets2
- 2 (a) Lateral line abruptly curving downward under second dorsal fin; numerous wavy vertical bars on sides of body*Scomberomorus commerson*
- (b) Lateral line gradually descending posteriorly; dark prominent spots on sides of body*Scomberomorus guttatus*

Remarks : Samuel (1968 : 58) lists the little tunny, *Euthynnus affinis* (Cantor) as of commercial importance in West Bengal, but the occurrence of the tuna in this region is doubtful. We have observed this species at times in Calcutta markets but these catches on enquiry came from neighbouring states. Samuel (1968) also lists *Makaira indica* (Cuvier) (as *Tetrapturus brevirostris*), belonging to the family istiophoridae, from West Bengal, but the black marlin is restricted to the Gulf of Mannar, Kerala and Bombay in the country. The two species of *Scomberomorus* are epipelagic and neritic species, and contribute to a minor fishery in West Bengal. Caught mainly with gillnets and by trawling.

Suborder STROMATEOIDEI Family ARIOMMATIDAE (Ariommas)

Body moderately deep, rounded and compressed. Mouth small, with minute teeth on jaws, no teeth on roof of mouth but toothed pharyngeal sacs present. Two distinct but scarcely separated dorsal fins, the first with ten slender spines; anal fin with three short spines; pelvic fins present in adults. Caudal peduncle square in cross-section, with two low, fleshy lateral keels on each side. Scales large and thin, cycloid, easily detachable. Silvery fishes, with a purplish tinge.

SPECIES OCCURRING IN WEST BENGAL : ? *Ariomma indica* (Day, 1870).

Remarks : *Ariomma indica* inhabits the mid-waters of the continental shelf and contributes a fishery on the Andhra Pradesh coast. There is no definite record of this species from West Bengal but is likely to show up when the deep-water collections are examined.

Family STROMATEIDAE (Silvery pomfrets)

Schooling fishes, the pomfret has a nearly round body, as deep as it is long, and lacks pelvic fins. The pectoral fins are long and pointed, the snout blunt, and the teeth weak.

Pomfrets are pelagic, medium-sized fishes, inhabiting shallow waters, generally in coastal areas, sometimes entering estuaries.

SPECIES OCCURRING IN WEST BENGAL : *Pampus argenteus* (Euphrasen, 1788) ; *Pampus chinensis* (Euphrasen, 1788).

Key to Species

- 1 (a) Five to ten flat blade-like spines preceding the median fins; fins deeply falcate
*Pampus argenteus*
 (b) No spines preceding median fins; fins never deeply falcate*Pampus chinensis*

Remarks : Both these fishes are usually captured by trawling and are among the finest of food fishes. The silver pomfret, *Pampus argenteus* is found in coastal waters from 5 to 100m depth, whereas the chinese pomfret, *P. chinensis* is found in shallow waters, sometimes in the Hooghly estuary. Marketed fresh.

Order PLEURONECTIFORMES Suborder PSETTODIDEI Family PSETTODIDAE (Indian Halibuts)

This is the most primitive of the five families of flatfishes. They differ from all other flatfishes in that they have spinous rays in the dorsal and pelvic fins, and the dorsal fin origin well posterior to eyes. Mouth large with strong teeth. Eyes on left or right side of body.

SPECIES OCCURRING IN WEST BENGAL : *Psettodes erumei* (Schneider, 1801).

Remarks : This species live on sandy muddy bottoms of the continental shelf, down to about 100m depth. Caught mainly in bottom trawls and bottom gillnets, but is not common in the catches.

Suborder PLEURONECTOIDEI Family CITHARIDAE (Flounders)

Eyes dextral. Dorsal fin extending onto head in front of upper eye; dorsal and anal fins without spines. Pelvic fins with one spine and five soft rays; pelvic-fin bases short. Preopercular margin distinct, not covered with skin. Branchiostegal membranes separated from each other. Anus placed on eyed side.

SPECIES OCCURRING IN WEST BENGAL : *Brachypleura novae-zeelandiae* Gunther, 1862.

Remarks : This is a deep water species and reported to occur down to 200m.

Family BOTHIDAE
(Lefteye Flounders)

Eyes sinistral; pelvic fins without a spine; branchiostegal membranes connected. Edge of preopercle free.

Bothids have the ability to change colour rapidly in order to more nearly match their background.

SPECIES OCCURRING IN WEST BENGAL : ? *Engyprosopon grandisquamis* (Temminck & Schlegel, 1846) ; *Pseudorhombus arius* (Hamilton-Buchanan, 1822) ; *Pseudorhombus elevatus* Ogilby, 1912 ; *Pseudorhombus javanicus* (Bleeker, 1853) ; *Pseudorhombus malayanus* Bleeker, 1866 ; *Pseudorhombus triocellatus* (Bloch, 1801).

Key to Species

- 1 (a) Pelvic-fin base of eyed side normally much longer than that of blind side*Engyprosopon grandisquamis*
- (b) Pelvic-fin base of eyed side equal to that of blind side.....2
- 2 (a) Anterior rays of dorsal fin longer than those that follow; three large conspicuous dark blotches forming a triangle on ocular side of body*Pseudorhombus triocellatus*
- (b) Anterior rays of dorsal fin not prolonged.....3
- 3 (a) Scales ctenoid on blind side of body*Pseudorhombus malayanus*
- (b) Scales cycloid on blind side of body4
- 4 (a) Scales ctenoid on ocular side of body; upper profile of head notched*Pseudorhombus elevatus*
- (b) Scales on ocular side of body more or less ctenoid anteriorly, mostly cycloid posteriorly; upper profile of head usually evenly curved*Pseudorhombus javanicus*

Remarks : These are bottom-dwelling fishes, usually burrowing in sand or mud bottoms of the continental shelf. Although never caught in large quantities, some species are often present in the catches.

Suborder SOLEOIDEI
Family CYNOGLOSSIDAE
(Tonguesoles)

Eyes on the left side of the head, a pointed tail, and the absence of ribs are characteristics that readily identify the tonguesoles. The dorsal, caudal, and anal fins are united. There are no pectoral fins. The eyes are very small and set close together. The preopercle is hidden beneath the skin.

SPECIES OCCURRING IN WEST BENGAL : *Cynoglossus arel* (Schneider, 1801) ; *Cynoglossus cynoglossus* (Hamilton-Buchanan, 1822) ; *Cynoglossus lida* (Bleeker, 1851) ; *Cynoglossus lingua* Hamilton-Buchanan, 1822 ; *Cynoglossus macrostomus* Norman, 1928; *Cynoglossus puncticeps* (Richardson, 1846) ; *Cynoglossus semifasciatus* Day, 1877 ; *Paraplagusia bilineata* (Bloch, 1784) ; ? *Paraplagusia blochii* (Bleeker, 1851) ; *Symphurus gilesii* (Alcock, 1889)

Key to Species

- 1 (a) No lateral line on ocular side of body ; mouth terminal*Symphurus gilesii*
- (b) Two or three lines on ocular side of body; mouth inferior2
- 2 (a) Lips with rows of fringed tentacles3
- (b) Lips smooth, not fringed.....4
- 3 (a) Scales 13 to 15 between upper and middle lateral lines; rostral hook not reaching beyond lower eye*Paraplagusia blochii*
- (b) Scales 16 to 19 between upper and middle lateral lines; rostral hook long , usually reaching beyond lower eye.....*Paraplagusia bilineata*
- 4 (a) Scales cycloid on blind side of body5
- (b) Scales ctenoid on blind side of body6
- 5 (a) Scales 7 to 9 between lateral lines on ocular side of body.....*Cynoglossus arel*
- (b) Scales 11 or 12 between lateral lines on ocular side of body*Cynoglossus lingua*
- 6 (a) Angle of mouth distinctly nearer to gill-opening than to tip of snout*Cynoglossus lida*
- (b) Angle of mouth nearer to tip of snout than to gill-opening7
- 7 (a) Cleft of mouth extending far back to posterior margin of fixed eye*Cynoglossus macrostomus*
- (b) Cleft of mouth extending to only middle or about posterior border of fixed eye8
- 8 (a) Scales 16 to 19 between lateral lines*Cynoglossus puncticeps*
- (b) Scales 11 to 14 between lateral lines9
- 9 (a) Snout rounded and short, about 27% of head length*Cynoglossus semifasciatus*
- (b) Snout somewhat pointed and longer, about 32% of head length...*Cynoglossus cynoglossus*

Remarks : These fishes inhabit muddy bottoms of the continental shelf including estuaries, but *Symphurus gilesii* probably occurs off the West Bengal coast down to 400m depth. Caught mainly in bottom trawls and are considered fairly good foodfishes.

Family SOLEIDAE
(Soles)

Soles are flatfishes that typically have a very rounded body. The small eyes are close together and are on the right side of the head; the preopercular edge is hidden under the skin and scales of the head. The dorsal fin is inserted far forward on head.

SPECIES OCCURRING IN WEST BENGAL : ? *Euryglossa macrolepis* (Bleeker , 1859); *Euryglossa pan* (Hamilton-Buchanan, 1822) ; *Heteromycteris oculus* (Alcock, 1889) ; *Synaptura albomaculata* Kaup, 1858 ; *Synaptura commersoniana* (Lacepede, 1802) ; *Zebrias altipinnis* (Alcock, 1890) ; *Zebrias quagga* (Kaup, 1858).

Key to Species

- 1 (a) Snout forming a distinct hook*Heteromycteris oculus*
- (b) Snout not forming a distinct hook2
- 2 (a) Opercular membrane on both sides of body joined to upper rays of pectoral fins3
- (b) Opercular membrane not joined to pectoral fins4
- 3 (a) Body with 10 or 11 dark bars on ocular side of body.....*Zebrias quagga*
- (b) Body with 14 cross-bands on ocular side of body*Zebrias altipinnis*
- 4 (a) Body elongate ; a bony process on snout5
- (b) Body oblong; no bony process on snout6
- 5 (a) Scales on head and nape of ocular side (of body) larger than those on body ; no tentacle between the nostrils.....*Synaptura commersoniana*
- (b) Scales on head and body similar in size ; a tentacle between the nostrils*Synaptura albomaculata*
- 6 (a) Pectoral fins of both sides well developed.....*Euryglossa pan*
- (b) Pectoral fin of right side rudimentary*Euryglossa macrolepis*

Remarks : Soles are found in shallow coastal waters, over sandy and muddy bottoms. They are not common in the catches. Misra (1962) listed *Solea ovata* Richardson, 1846, and *Euryglossa orientalis* (Bloch, 1801) from West Bengal but these records appear to be suspect.

Order TETRAODONTIFORMES
Suborder BALISTOIDEI
Family TRIACANTHIDAE
(Triplespines)

These are shallow-water benthic fishes, restricted to the Indo-Pacific. The spinous dorsal fin with five visible spines, and the second dorsal fin with 20 to 26 soft rays. Pelvic spine long. Caudal fin deeply forked.

SPECIES OCCURRING IN WEST BENGAL : *Pseudotriacanthus strigilifer* (Cantor, 1849); *Triacanthus biaculeatus* (Bloch, 1786) ; *Triaxiphichthys weberi* (Chaudhuri, 1910).

Key to Species

- 1 (a) Scale-covered ventral surface of pelvis posteriorly distinctly tapered to a point*Pseudotriacanthus strigilifer*
- (b) Scale-covered ventral surface of pelvis almost as wide anteriorly as posteriorly2
- 2 (a) Snout slender, with the dorsal profile distinctly concave and the ventral profile sinuous*Triaxiphichthys weberi*
- (b) Snout stout, with the dorsal profile nearly straight*Triacanthus biaculeatus*

Remarks : Annandale and Jenkins (1910 : 11) refer to *Triacanthus brevirostris* Temminck & Schlegel from the Bay of Bengal, a species now considered conspecific with *T. biaculeatus*. In this species the second dorsal spine is shorter than half the first. These fishes are benthic, occurring on sandy and weed-covered bottoms. Caught as bycatch in bottom trawls and gillnets. These fishes are not used as food and considered as trash fish.

Family BALISTIDAE (Triggerfishes)

The body profile among the triggers is an asset in group identification. They have an outer series of eight teeth in each jaw as well as an inner series of six plate-like teeth in the upper jaw. The pelvic fins are absent, but a pelvic spine is usually present. Three dorsal spines; all soft fins with branched rays. The scales are in regular series and plate-like. The caudal peduncle is depressed.

SPECIES OCCURRING IN WEST BENGAL : *Canthidermis rotundatus* (Proce, 1822).

Remarks : This species is only accidentally caught as bycatch in commercial bottom trawls. Misra (1962 : 317) lists the starry triggerfish, *Abalistes stellatus* (Lecepede, 1798) from West Bengal but its occurrence appears to be doubtful.

Family OSTRACIIDAE (Boxfishes)

Small fishes, the body almost completely encased in a bony carapace formed of enlarged, thickened scale plates, usually hexagonal in shape and firmly sutured to one another. Spinous dorsal fin absent; pelvic fins absent.

Slow-swimming benthic-dwelling fishes.

SPECIES OCCURRING IN WEST BENGAL : *Rhynchostracion nasus* (Bloch, 1785).

Remarks : This species is caught mainly in bottom trawls on the continental shelf, down to 50m depth.

Suborder TETRAODONTOIDEI
Family TETRAODONTIDAE
(Puffers)

Body naked or with only small scattered prickles. The teeth are fused to form a beak, but separated by a median suture so that the fish are literally "four toothed", as their family name describes. Dorsal and anal fins usually each with 7 to 12 soft rays. The body is rounded in cross-section.

Puffers have the ability to inflate their bodies with air or water or both , gulping quickly, and turning upside down so that they float to the surface. The flesh (especially the viscera) of some puffers contains the alkaloid poison tetraodotoxin, produced by the fish, which can be fatal.

SPECIES OCCURRING IN WEST BENGAL : *Arothron immaculatus* (Bloch & Schneider, 1801) ; *Arothron nigropunctatus* (Bloch & Schneider, 1801) ; *Arothron stellatus* (Bloch & Schneider, 1801) ; *Chelonodon fluviatilis* (Hamilton-Buchanan, 1822) ; ? *Chelonodon nigriviridis* (Proce, 1822) ; *Chelonodon patoca* (Hamilton-Buchanan, 1822) ; *Fugu oblongus* (Bloch, 1786) ; *Kanduka michiej* Hora, 1924 ; *Lagocephalus inermis* (Temminck & Schlegel, 1844) ; *Lagocephalus lunaris* (Bloch & Schneider, 1801) ; *Lagocephalus sceleratus* (Gmelin, 1789); ? *Tetraodon cutcutia* (Hamilton-Buchanan, 1822).

Key to Species

- 1 (a) Dorsal fin absent; anal fin vestigial *Kanduka michiej*
- (b) Dorsal and anal fins well developed 2
- 2 (a) Nostril a short, rounded tube with a terminal opening, not or only scarcely two-lipped
 *Tetraodon cutcutia*
- (b) Nostril an upright sac with two openings, or a solid bifid tentacle or an upraised cup with
 two fleshy lobes 3
- 3 (a) Nostril either an upraised cup with two fleshy lobes or a solid bifid tentacle 4
- (b) Nostril an upright sac with two openings 9
- 4 (a) A single lateral line on side of body 5
- (b) Two lateral lines, the upper joining the lower, in the region above or behind the anal fin... 7
- 5 (a) Back, sides, and caudal fin with dark spots, the underside light or with dark oblique bands
 anteriorly *Arothron stellatus*
- (b) Back, sides, and caudal fin dark with white spots, underside light with dark longitudinal
 bands 6

- 6 (a) Body uniform or with longitudinal stripes *Arothron immaculatus*
 (b) Small, round, black spots scattered on sides of head, body and tail
 *Arothron nigropunctatus*
- 7 (a) Nostril a round depression surrounded by a low rim, produced into a posterior and an
 anterior flap *Chelonodon patoca*
 (b) Nostril a short stem with two rounded lobes at its tip 8
- 8 (a) Back of body with 3 or 4 dark blotches in longitudinal row *Chelonodon fluviatilis*
 (b) Back and sides of body with more or less regular rounded spots which are quite evenly
 scattered and only occasionally confluent, never forming broad blotches
 *Chelonodon nigroviridis*
- 9 (a) Caudal fin rounded or truncate *Fugu oblongus*
 (b) Caudal fin lunate to emarginate 10
- 10 (a) No spines on back *Lagocephalus inermis*
 (b) The whole, or almost whole of back spiny 11
- 11 (a) Caudal peduncle compressed; body without spots *Lagocephalus lunaris*
 (b) Caudal peduncle depressed, wider than deep behind dorsal fin; body with spots superiorly
 *Lagocephalus sceleratus*

Remarks : Tetraodon cutcutia has been reported from estuarine regions of West Bengal but this clearly a freshwater species. *Chelonodon nigroviridis* has been doubtfully reported from Calcutta (Dackers, 1975) but this is also a freshwater species.

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SUMMARY

The 402 fish species inhabiting marine and estuarine waters of West Bengal (India) are organised along systematic lines and discussed. Further, the 168 new species of fishes discovered in this area in earlier years, are tabulated, and their taxonomic status stated. A complete taxonomic bibliography of the marine ichthyofauna of West Bengal is also given.

TABLE I

Marine fishes discovered from West Bengal, with current status

Original Name	Current Name
Family Squalidae	
<i>Paracentroscyllium ornatum</i> Alcock, 1889	<i>Centroscyllium ornatum</i> (Alcock)
Family CARCHARHINIDAE	
<i>Carcharias (Prionodon) gangeticus</i> Muller & Henle, 1841	<i>Glyphis gangeticus</i> (Muller & Henle)
<i>Carcharias (Physodon) muelleri</i> Valenciennes, 1839a	<i>Scoliodon laticaudus</i> (Muller & Henle)
Family SPHYRNIDAE	
<i>Zygaena laticeps</i> Cantor, 1837	<i>Eusphyrna blochii</i> (Cuvier)
Family TORPEDINIDAE	
<i>Narcine brunnea</i> Annandale, 1909	---
Family RHINOBATIDAE	
<i>Rhinobatus annandalei</i> Norman, 1926	<i>Rhinobatos annandalei</i> (Norman)
<i>Rhinobatus lionotus</i> Norman, 1926	<i>Rhinobatos lionotus</i> (Norman)
Family DASYATIDAE	
<i>Raja sancur</i> Hamilton-Buchanan, 1822	<i>Hypolophus sephen</i> (Forsskal)
<i>Raja fluviatilis</i> Hamilton-Buchanan, 1822	<i>Himantura fluviatilis</i> Hamilton-Buchanan)
<i>Trygon bleekeri</i> Blyth, 1861	<i>Himantura bleekeri</i> (Blyth)
<i>Trygon crozieri</i> Blyth, 1861	<i>Dasyatis zugei</i> (Muller & Henle)
<i>Trygon ellioti</i> Blyth, 1861	<i>Himantura uarnak</i> (Forsskal)
<i>Trygon marginatus</i> Blyth, 1861	<i>Himantura marginata</i> (Blyth)
Family MYLIOBATIDIDAE	
<i>Myliobatis macroptera</i> McClelland, 1841	<i>Aetobatus narinari</i> (Euphrasen)

Family MEGALOPIDAE

Cyprinodon cundinga Hamilton-Buchanan, 1822*Megalops cyrinoides* (Broussonet)

Family ANGUILLIDAE

Muraena bengalensis Gray, 1831*Anguilla bengalensis* (Gray)*Anguilla brevirostris* McClelland, 1844*Anguilla bengalensis* (Gray)*Anguilla nebulosa* McClelland, 1844*Anguilla bengalensis* (Gray)

Family MORINGUIDAE

Aphthalmichthys gangeticus Flower, 1912Status uncertain, probably an
ophichthid (*vide* Castle, 1986 : 18)*Moringua linearis* Gray, 1831*Moringua raitaborua* (Hamilton-Buchanan)*Moringua lumbriciformis* kaup, 1856*Moringua raitaborua* (Hamilton-Buchanan)*Muraena vamos* Hamilton-Buchanan, 1822*Moringua raitaborua* (Hamilton-Buchanan)*Ptyobranhus arundinaceus* McClelland, 1844*Moringua arundinacea* (McClelland)*Ptyobranhus brevis* McClelland, 1844*Moringua raitaborua* (Hamilton-Buchanan)*Ptyobranhus erythreus* McClelland, 1844*Moringua raitaborua* (Hamilton-Buchanan)*Ptyobranhus gracilis* McClelland, 1844*Moringua raitaborua* (Hamilton-Buchanan)*Ptyobranhus guthrianus* McClelland, 1844*Moringua raitaborua* (Hamilton-Buchanan)*Ptyobranhus medius* McClelland, 1844*Nomen dubium* (*vide* Castle, 1968 : 21)*Ptyobranhus multidentatus* McClelland, 1844*Moringua raitaborua* (Hamilton-Buchanan)*Ptyobranhus parvidentatus* McClelland, 1844*Moringua raitaborua* (Hamilton-Buchanan)*Rataboura hamiltoni* Gray, 1831*Moringua raitaborua* (Hamilton-Buchanan)*Rataboura hardwickii* Gray, 1831*Moringua raitaborua* (Hamilton-Buchanan)

Family MURAENIDAE

Leptocephalus milnei Southwell & Prashad, 1919

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Leptocephalus vermicularis Southwell & Prashad, 1919

—

Lycodontis longicaudata McClelland, 1844*Lycodontis sathete* (Hamilton-Buchanan)*Muraenophis sathete* Hamilton-Buchanan, 1822*Lycodontis sathete* (Hamilton-Buchanan)*Muraenophis tile* Hamilton-Buchanan, 1822*Lycodontis tile* (Hamilton-Buchanan)*Strophidon literata* McClelland, 1844*Lycodontis tile* (Hamilton-Buchanan)*Strophidon maculata* McClelland, 1844*Lycodontis tile* (Hamilton-Buchanan)*Strophidon punctata* McClelland, 1844*Lycodontis tile* (Hamilton-Buchanan)

Family OPHICHTHIDE

Ophisurus boro Hamilton-Buchanan, 1822*Pisodonophis boro* (Hamilton-Buchanan)*Ophisurus caudatus* McClelland, 1844*Pisodonophis boro* (Hamilton-Buchanan)*Ophisurus harancha* Hamilton-Buchanan, 1822*Pisodonophis boro* (Hamilton-Buchanan)

Ophisurus hijala Hamilton-Buchanan, 1822
Ophisurus minimus McClelland, 1844
Ophisurus rostratus McClelland, 1844
Ophisurus vermiformis McClelland, 1844

Pisodonophis boro (Hamilton-Buchanan)
Pisodonophis boro (Hamilton-Buchanan)
Pisodonophis boro (Hamilton-Buchanan)
Pisodonophis boro (Hamilton-Buchanan)

Family MURAENESOCIDAE

Muraena bagio Hamilton-Buchanan, 1822
Muraenesox bengalensis McClelland, 1844
Muraenesox hamiltoniae McClelland, 1844
Muraenesox tricuspidata McClelland, 1844

Muraenesox bagio (Hamilton-Buchanan)
Muraenesox cinereus (Forsskal)
Muraenesox cinereus (Forsskal)
Muraenesox cinereus (Forsskal)

Family CLUPEIDAE

Clupanodon chacunda Hamilton-Buchanan, 1822
Clupanodon ilisha Hamilton-Buchanan, 1822
Pellona micropus Valenciennes, 1847

Anodontostoma chacunda (Hamilton-Buchanan)
Hilsa (Tenuulosa) ilisha (Hamilton-Buchanan)
lisha melastoma (Schneider)

Family ENGRAULIDIDAE

Clupea phasa Hamilton-Buchanan, 1822
Clupea purava Hamilton-Buchanan, 1822
Coilia cantoris Bleeker, 1853
Coilia neglecta Whitehead, 1968
Coilia quadrangisimalis Valenciennes, 1848
Coilia whiteheadi Babu Rao & Jayaswal, MS
Engraulis brevifilis Valenciennes, 1848
Myxus ramcarati Hamilton-Buchanan, 1822

Setipinna phasa (Hamilton-Buchanan)
Thryssa purava (Hamilton-Buchanan)
Coilia ramcarati (Hamilton-Buchanan)
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Coilia ramcarati (Hamilton-Buchanan)
Coilia reynaldi Valenciennes
Setipinna brevifilis (Valenciennes)
Coilia remcarati (Hamilton-Buchanan)

Family ARIIDAE

Ageneiosus mino Hamilton-Buchanan, 1822
Arius acquibarbis Valenciennes, 1840
Arius ariodes Gunther, 1864
Arius buchanani Day, 1877
Bagrus gagorides Valenciennes, 1839b
Pimelodus arius Hamilton-Buchanan, 1822
Pimelodus gagora Hamilton-Buchanan, 1822
Pimelodus jatius Hamilton-Buchanan, 1822
Pimelodus nenga Hamilton-Buchanan, 1822
Pimelodus sagor Hamilton-Buchanan, 1822
Pimelodus sona Hamilton-Buchanan, 1822

Batrachocephalus mino (Hamilton-Buchanan)
Arius caelatus Valenciennes
Arius caelatus Valenciennes
Arius arius (Hamilton-Buchanan)
Arius sona (Hamilton-Buchanan)
Arius arius (Hamilton-Buchanan)
Arius gagora (Hamilton-Buchanan)
Hemipimelodus jatius (Hamilton-Buchanan)
Arius caelatus Valenciennes
Arius sagor (Hamilton-Buchanan)
Arius sona (Hamilton-Buchanan)

Family PLOTOSIDAE

Plotosus canius Hamilton-Buchanan, 1822

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Family GALAXIIDAE

Galaxias indicus Day, 1888*Nomen dubium* (vide McDowall, 973 : 191)

Family HARPADONTIDAE

Osmerus nehereus Hamilton-Buchanan, 1822*Harpadon nehereus* (Hamilton-Buchanan)

Family MACROURIDAE

Macrurus lophotes Alcock, 1889*Coryphaenoides lophotes* (Alcock)

Family BATRACHOIDIDAE

Batrachoides gangene Hamilton-Buchanan, 1822*Batrachthys grunniens* (Linnaeus)

Family HEMIRAMPHIDAE

Esox ectuntio Hamilton-Buchanan, 1822*Zenarchopterus ectuntio* (Hamilton-Buchanan)*Hemirhamphus brachynopterus* Bleeker, 1853*Dermogenys brachynopterus* (Bleeker)*Hemirhamphus neglectus* Day, 1869*Zenarchopterus ectuntio* (Hamilton-Buchanan)*Hemirhamphus plumatus* Blyth, 1859*Rhynchorhamphus georgii* (Valenciennes)*Hemirhamphus striga* Blyth, 1859*Zenarchopterus striga* (Blyth)

Family BELONIDAE

Belone tenuirostris Blyth, 1859*Strongylura leiura* (Bleeker)

Family SYNGNATHIDAE

Syngnathus carce Hamilton-Buchanan, 1822*Ichthyocampus carce* (Hamilton-Buchanan)*Syngnathus cuncalus* Hamilton-Buchanan, 1822*Microphis cuncalus* (Hamilton-Buchanan)

Family SYNANCEIIDAE

Uranoscopus adhesipinnis Blyth, 1861*Trachicephalus uranoscopus* (Bloch & Schneider)

Family PLATYCEPHALIDAE

Calliomorus chaca Hamilton-Buchanan, 1822*Platycephalus indicus* (Linnaeus)

Family CENTROPOMIDAE

Coius vacti Hamilton-Buchanan, 1822*Lates calcarifer* (Bloch)

Family AMBASSIDAE

Chanda nalua Hamilton-Buchanan, 1822*Ambassis nalua* (Hamilton-Buchanan)

Family SERRANIDAE

Bola coioides Hamilton-Buchanan, 1822 *Epinephelus malabaricus* Schneider)

Family TERAPONIDAE

Coius trivittatus Hamilton-Buchanan, 1822 *Terapon puta* (Cuvier)

Family SILLAGINIDAE

Cheilodipterus panijus Hamilton-Buchanan, 1822 *Sillaginopsis panijus* (Hamilton-Buchanan)

Family LEIOGNATHIDAE

Chanda ruconius Hamilton-Buchanan, 1822 *Secutor ruconius* (Hamilton-Buchanan)

Family LUTJANIDAE

Coius catus Hamilton-Buchanan, 1822 *Lutjanus johni* (Bloch)
Holocentrus bengalensis Bloch, 1790 *Lutjanus bengalensis* (Bloch)

Family LOBOTIDAE

Coius binotatus Gray, 1831 *Datnioides quadrifasciatus* (Sevastianov)
Coius polota Hamilton-Buchanan, 1822 *Datnioides quadrifasciatus* (Sevastianov)

Family GERREIDAE

Chanda setifer Hamilton-Buchanan, 1822 *Gerreomorpha setifer* (Hamilton-Buchanan)

Family HAEMULIDAE

Coius gudgutia Hamilton-Buchanan, 1822 *Pomadasys argenteus* (Forsskal)
Polotus nitidus Blyth, 1859 *Pomadasys argenteus* (Forsskal)

Family SPARIDAE

Coius datnia Hamilton-Buchanan, 1822 *Acanthopagrus latus* (Houttuyn)

Family SCIAENIDAE

Bola chaptis Hamilton-Buchanan, 1822 *Bahaba chaptis* (Hamilton-Buchanan)
Bola coibor Hamilton-Buchanan, 1822 Status uncertain (*vide* Trewavas, 1977 : 373)
Bola coitor Hamilton-Buchanan, 1822 *Johnius coitor* (Hamilton-Buchanan)
Bola cuja Hamilton-Buchanan, 1822 *Macropsinosa cuja* (Hamilton-Buchanan)
Bola pama Hamilton-Buchanan, 1822 *Pama pama* (Hamilton-Buchanan)
Dendrophysa hoogliensis Sinha & Rao, 1969 *Daysciaena albida* (Cuvier)

Johnieops macrorhynchus Mohan, 1976*Otolithus submaculatus* Blyth, 1861*Panna heterolepis* Trewavas, 1977*Sciaena (Corvina) nasus* Steindachner, 1966*Sciaenoides asper* Blyth, 1861*Sciaenoides hardwickii* Blyth, 1861*Wak menoni* Talwar & joglekar, 1970*Johnius macrorhynchus* (Mohan)*Pterotolithus maculatus* (Kuhl & van Hasselt)

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Johnius belangerii (Cuvier)*Macrospinosa cuja* (Hamilton-Buchanan)*Pama pama* (Hamilton-Buchanan)*Johnius sina* (Cuvier)

Family TOXOTIDAE

Coius chatareus Hamilton-Buchanan, 1822*Toxotes chatareus* (Hamilton-Buchanan)

Family SCATOPHAGIDAE

Chaetodon pairatalis Hamilton-Bochanan, 1822*Scatophagus argus* (Bloch)

Family MUGILIDAE

Mugil buchanani Bleeker, 1853*Mugil planiceps* Valenciennes, 1836*Valamugil buchanani* (Bleeker)*Liza tade* (Forsskal)

Family POLYNEMIDAE

Polynemus aureus Hamilton-Buchanan, 1822*Polynemus risua* Hamilton-Buchanan, 1822*Polynemus sele* Hamilton-Buchanan, 1822*Polynemus teria* Hamilton-Buchanan, 1822*Polynemus toposui* Hamilton-Buchanan, 1822*Polynemus paradiseus* Linnaeus*Polynemus paradiseus* Linnaeus*Polydactylus indicus* (Shaw)*Eleutheronema tetradactylum* (Shaw)*Polynemus paradiseus* Linnaeus

Family CALLIONYMIDAE

Callionymus fluviatilis Day, 1875*Callionymus megastomus* Fricke, 1982

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Family ELEOTRIDIDAE

Cheilodipterus butis Hamilton-Buchanan, 1822*Cheilodipterus culius* Hamilton-Buchanan, 1822*Eleotris buccata* Blyth, 1861*Eleotris humeralis* Valenciennes, 1837*Eleotris incerta* Blyth, 1861*Eleotris macrodon* Bleeker, 1853*Butis butis* (Hamilton-Buchanan)*Eleotris fusca* (Bloch & Schneider)Status uncertain (*vide* Koumans, 1941 : 329)*Butis butis* (Hamilton-Buchanan)*Eleotris fusca* (Bloch & Schneider)*Odonteleotris macrodon* (Bleeker)

Family GOBIIDAE

Awaouichthys menoni Chatterjee, 1978*Boleophthalmus histophorus* Valenciennes, 1837*Gobius alcockii* Annandale, 1906

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Scartelaos histophorus (Valenciennes)*Brachygobius nunus* (Hamilton-Buchanan)

<i>Gobius bato</i> Hamilton-Buchanan, 1822	<i>Apocryptes bato</i> (Hamilton-Buchanan)
<i>Gobius changua</i> Hamilton-Buchanan, 1822	<i>Pseudapocryptes lanceolatus</i> (Bloch & Schneider)
<i>Gobius chuno</i> Hamilton-Buchanan, 1822	<i>Gobiopterus chuno</i> (Hamilton-Buchanan)
<i>Gobius novemradiatus</i> Hamilton-Buchanan, 1822	Status uncertain (<i>vide</i> Koumans, 1941 : 329)
<i>Gobius nunus</i> Hamilton-Buchanan, 1822	<i>Brachygobius nunus</i> (Hamilton-Buchanan)
<i>Gobius Slinianus</i> Hamilton-Buchanan, 1822	<i>Boleophthalmus boddaerti</i> (Valenciennes)
<i>Gobius sadanundio</i> Hamilton-Buchanan, 1822	<i>Stigmatogobius sadanundio</i> (Hamilton-Buchanan)
<i>Gobius septemradiatus</i> Hamilton-Buchanan, 1822	<i>Periophthalmodon schlosseri</i> (Valenciennes)
<i>Gobius viridis</i> Hamilton-Buchanan, 1822	<i>Scartelaos histophorus</i> (Valenciennes)
<i>Periophthalmus pearsei</i> Eggert, 1935	—

Family GOBIOIDIDAE

<i>Amblyopus buchanani</i> Day, 1873a	<i>Taenioides buchanani</i> (Day)
<i>Amblyopus cirratus</i> Blyth, 1861	<i>Taenioides cirratus</i> (Blyth)
<i>Amblyopus hermannianus</i> Valenciennes, 1837	<i>Odontamblyopus rubicundus</i> (Hamilton-Buchanan)
<i>Gobioides rubicundus</i> Hamilton-Buchanan, 1822	<i>Odontamblyopus rubicundus</i> (Hamilton-Buchanan)

Family TRYPACHENIDAE

<i>Amblyotrypauchen fraseri</i> Hora, 1924b	<i>Amblyotrypauchen arctocephalus</i> (Alcock)
<i>Gobius ruber</i> Hamilton-Buchanan, 1822	<i>Trypauchen vagina</i> (Bloch & Schneider)

Family TRICHIURIDAE

<i>Trichiurus gangeticus</i> Gupta, 1966	—
<i>Trichiurus pantului</i> Gupta, 1966	<i>Lepturacanthus pantului</i> (Gupta)

Family BOTHIDAE

<i>Pleuronectes arius</i> Hamilton-Buchanan, 1822	<i>Pseudorhombus arius</i> (Hamilton-Buchanan)
<i>Pleuronectes nauphala</i> Hamilton-Buchanan, 1822	<i>Pseudorhombus javanicus</i> (Bleeker)

Family CYNOGLOSSIDAE

<i>Achirus cynoglossus</i> Hamilton-Buchanan, 1822	<i>Cynoglossus cynoglossus</i> (Hamilton-Buchanan)
<i>Cynoglossus brevis</i> Gunther, 1862	<i>Cynoglossus puncticeps</i> (Richardson)
<i>Cynoglossus buchanani</i> Day, 1869	<i>Cynoglossus cynoglossus</i> (Hamilton-Buchanan)
<i>Cynoglossus hamiltonii</i> Gunther, 1862	<i>Cynoglossus cynoglossus</i> (Hamilton-Buchanan)
<i>Cynoglossus lingua</i> Hamilton-Buchanan, 1822	—
<i>Cynoglossus macrostomus</i> Norman, 1928	—
<i>Plagusia bengalensis</i> Bleeker, 1853	<i>Cynoglossus cynoglossus</i> (Hamilton-Buchanan)

Family SOLEIDAE

<i>Pleuronectes pan</i> Hamilton-Buchanan, 1822	<i>Euryglossa pan</i> (Hamilton-Buchanan)
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Family TRIACANTHIDAE

Triacanthus weberi Chaudhuri, 1910*Triphichthys weberi* (Chaudhuri)

Family TETRAODONTIDAE

Gastrophysus microphthalmus Blyth, 1861*Fugu oblongus* (Bloch)*Kanduka michiei* Hora, 1925c

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Tetrodon fluviatilis Hamilton-Buchanan, 1822*Chelonodon fluviatilis* Hamilton-Buchanan)*Tetrodon patoca* Hamilton-Buchanan, 1822*Chelonodon patoca* (Hamilton-Buchanan)*Tetrodon tepa* Hamilton-Buchanan, 1822*Lagocephalus lunaris* (Temminck & Schlegel)

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HEMICHORDATA

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INTRODUCTION

Hemichordates commonly known as acorn worms or tongue worms are predominantly marine, but a few brackish water forms have been recorded from different estuarine mudflats of the world. Hemichordates are a conspicuous group of animals of kingdom bearing immense evolutionary significance that display a unique combination of chordate as well as nonchordate features. They belong to the deuterostome group of animals having enterocoelous coelome.

An enteropneust hemichordate worm has been discovered and reported by Singh and Choudhury in 1984 and 1988 from the deep mud bed of detritus rich salt marshes of the deltaic Sundarbans, West Bengal (88° to 89°29' E meridians and 21° to 22°30' N latitudes) which supports the world's most magnificent mangrove ecosystem sheltered in the famous Hooghly-Matla estuarine complex that experience inundation and exposure twice in 24 hours. This apparently new hemichordate worm *Saccoglossus* sp. is the only known members of the Phylum Hemichordata, from West Bengal.

The material was first collected from the mudflats of Prentice Island, bordered by the Saptamukhi waters, a giant tributary of the river Ganges. Later, the *Saccoglossus* specimens have been found and collected by the present authors from many other islands and mudflats of Sundarbans mangrove ecosystem, viz., Sagar Island, Chandanpiri mudflats, Lothian Island, Diacomplex, Bhagabatpur, Bhubaneswari mudflats, Sajnakhali, Jharkhali, Netidhopani mudflats, etc.

Interest of zoologists in India in the Enteropneusta (Hemichordata) dates back to 1904 when K. R. Menon made known to the existence of *Saccoglossus* (= *Dolicoglossus*) *bournei* at the Madras coast and published a monograph on it. Since then seven species of enteropneusts have been reported from the Madras coast by different workers (Ramanujam, 1935; Kurian, 1949; Sundara Rao and Ranga Rao, 1949; K. Pampapathi Rao, 1955a, 1955b; Balasubrahmanyam, 1959). These are *Ptychodera flava* from Krusadai Island; *Saccoglossus madrasensis* Rao, 1955; *Glandiceps stiasny* Rao, 1953; *Glossobalanus elongatus* Spengel; *Glossobalanus minutus* (Kowalevsky, 1866); *Glandiceps coramandelicus* Menon, 1904, and *Ptychodera flava* Eschscholtz, 1825.

MATERIAL AND METHODS

The Hemichordate worms were collected from the intertidal mudflats of the Hooghly-Matla estuarine complex. To collect the enteropneust worms their faecal castings (Fig. 1) on the exposed mudflats were spotted out during the receding tide and then the soil was removed by hand following the inner zig-zag tunnels of the worms. The animals were washed carefully by surrounding waters and kept in a plastic container with sufficient intertidal water. Very weak solution of formalin, diluted alcohol, Magnesium chloride (MgCl₂) etc. were used for narcotization. MgCl₂ gave the best result.

The fully narcotized specimens were then preserved either in 4% neutral formalin or 70% alcohol. General anatomy was studied by dissection, while the details of microanatomy was studied from series of microtome sections.

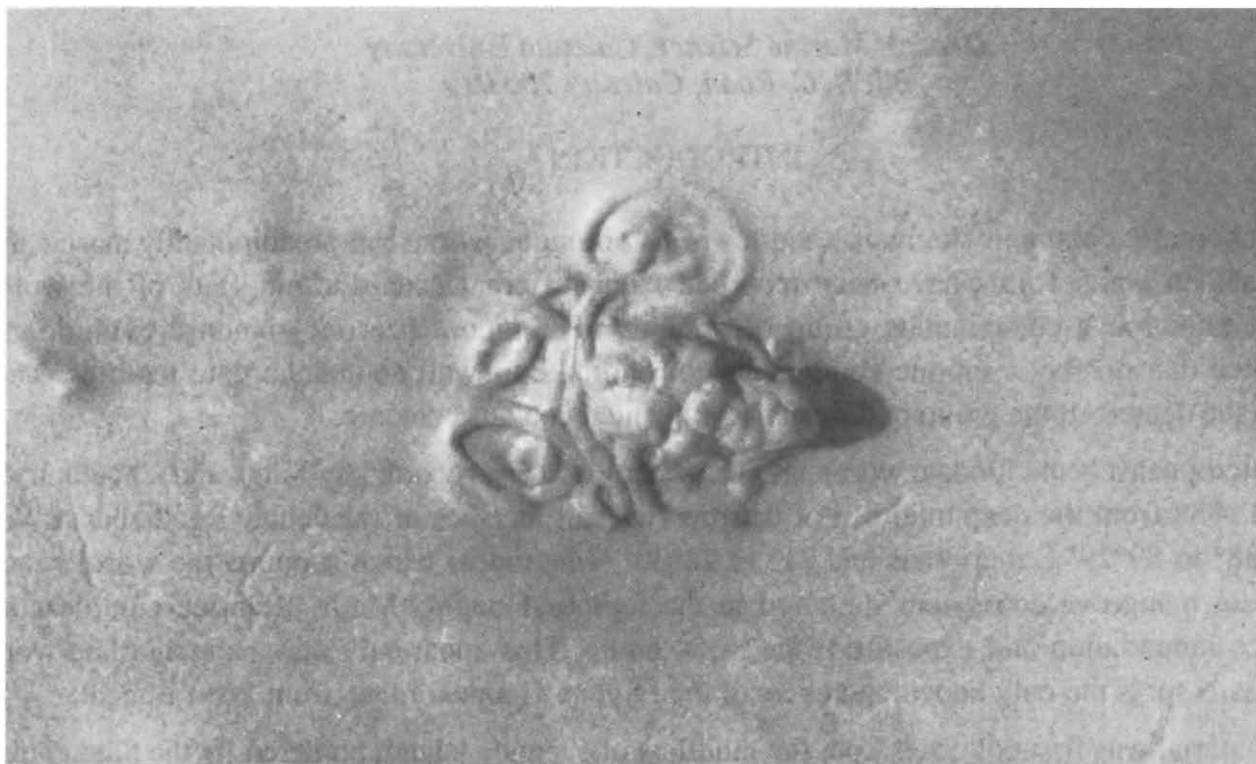


Fig. 1. Photograph of the characteristic design of the faecal casting of *Saccoglossus* sp. on the mudflats of mangrove swamps of Sundarbans.

SYSTEMATIC ACCOUNT

Phylum HEMICHORDATA
Class ENTEROPNEUSTA

Vermiform, solitary hemichordates with numerous gill slits and straight intestine; without tentaculated arms; no sub-divisions higher than family have been recognised.

Family HARRIMANIIDAE

Members of this family lack lateral hepatic sacculations, genital wings, branchial synapticulae and lateral septa.

Genus *Saccoglossus* Schimkewitsch, 1892

Enteropneust with a very long proboscis; collar as long as broad; lateral genital ridges and many small distinct gill pores.

Type species : *Balanoglossus merschkowskii* Nic Wagner

Remarks : Spengel (1893) proposed the name *Dolicoglossus* as a sub genus of the genus *Balanoglossus* for those enteropneusts having exceptionally long proboscis being unaware that Schimkewitsch (1892) had already erected the genus *Saccoglossus* for enteropneusts of this type. In 1939 Van der Horst revived the name *Saccoglossus* introduced by Schimkewitsch and shifted *Dolicoglossus* into its synonymy.

Saccoglossus sp.

Material : 19 exs.; S/S No. 1/1 to 1/19; Prentice Island, Sundarbans, South 24 Parganas, West Bengal; Coll. B. N. Singh and A. Choudhury; 15.11.1981; deposited at S. D. Marine Biological Research Institute, Sagar Island, India.

Description : (Fig. 2B, 2C) *Saccoglossus* sp., a member of the Enteropneusta, Phylum Hemichordata displays a long and vermiform body characteristically divisible into three distinct zones, viz., proboscis, collar and trunk (Fig. 2A). Length of the longer specimens so far unearthed ranges between 35 cm and 50 cm. Proboscis colour is creamy white, collar is light orange and the trunk is yellowish in the branchial sector in particular. Sexual dimorphism is distinct in this species during breeding season.

Proboscis : It is the first anterior segment of the body and is highly extensible. It measures up to 5.4 cm in the largest living specimen and bears median longitudinal groove throughout its length, both dorsally and ventrally. The proboscis is broader at the posterior end and gradually tapers at the anterior end. The posterior end is connected with the second body segment, the collar, by a narrow cylindrical stalk, the neck or proboscis stalk. On the left dorsal side of the stalk is a pore the proboscis pore (= coelomostome). On the ventral surface of the proboscis base leading to the proboscis stalk is a characteristic U-shaped depression - the ciliary organ, playing the most important role in the filter mechanism of the hemichordate worm.

Proboscis coelom is paired and separated distinctly by a thick tissue septum arranged dorsoventrally. At the proximal end of the proboscis the paired coelomic pouches become narrow and enter the proboscis stalk. The right pouch ends blindly but the left one forms a dilated chamber called the end sac which opens dorsolaterally by a single proboscis pore.

Stomochord : The stomochord is well developed and is formed by the anterior extension of the dorsal wall of the buccal cavity is diverticulum and occupies a position dorsal to the proboscis skeleton. It extends distally into the proboscis coelom.

Proboscis skeleton : Proximal part of the proboscis stalk and the roof of the buccal cavity are supported by a chitinous proboscis skeleton. It consists of a median plate and two posterior extensions - the horns or crura in the shape of an inverted 'Y' diverging backwards to be inserted and anchored into the inner surface of the dorso-lateral wall of the buccal cavity. The median plate bears a median keel and is placed in the proboscis stalk between the buccal epithelium ventrally and the buccal diverticulum dorsally.

Glomerulus : The glomerulus is paired and occupies a ventrolateral position on either side of the stomochord. It is a compact mass of fine tubules which are responsible for the removal of metabolic wastes.

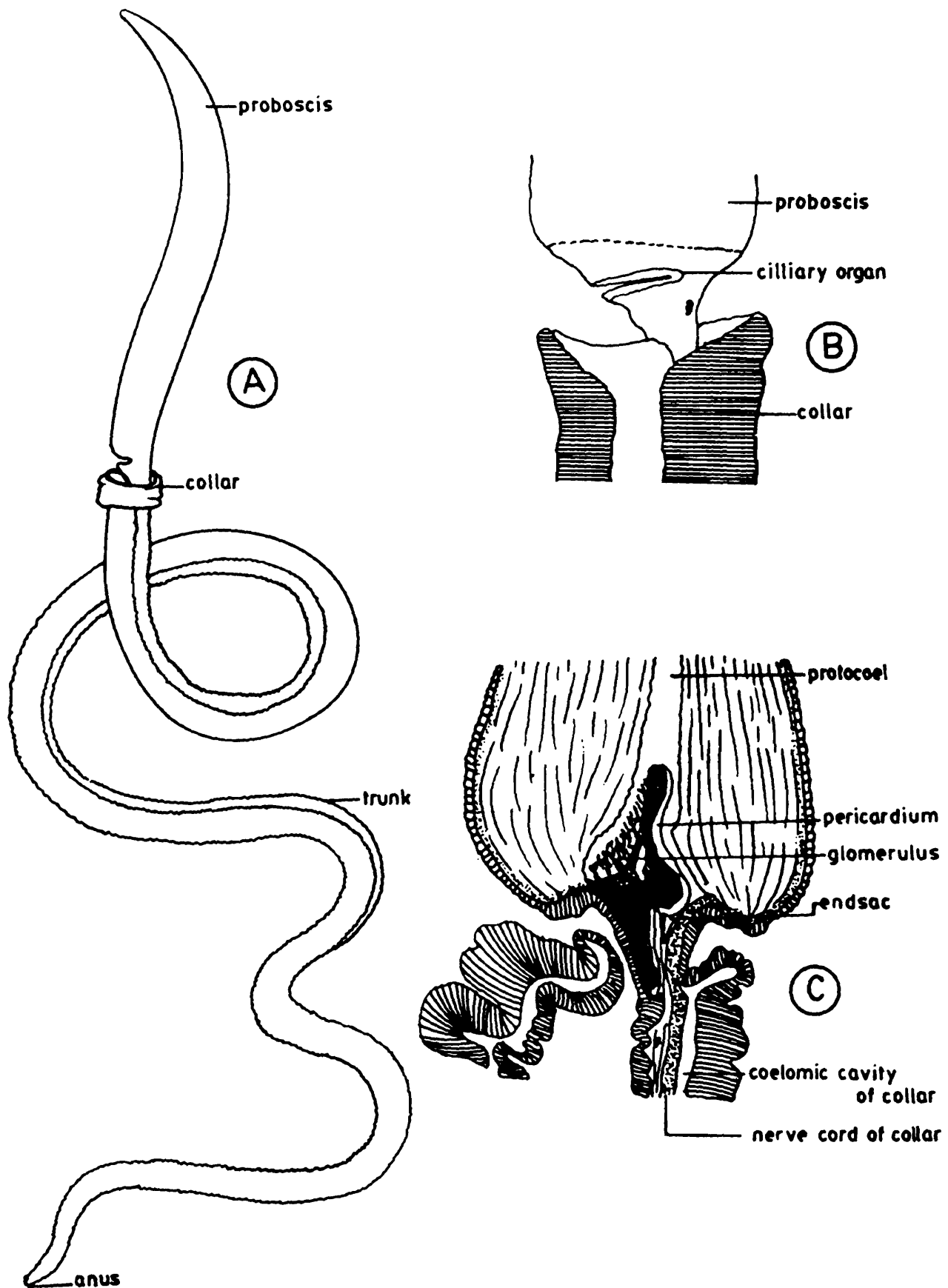


Fig. 2. Macroanatomy of *Saccoglossus* sp. A. Entire worm; B. Enlarged view of proboscis-collar junction; C. Macroanatomy of proboscis-collar junction.

Collar : It is a broad and plain band-like structure just behind the proboscis measuring 4 mm in length and 3.5 mm in diameter. At its posterior end is a concentric ring-like groove. Oral aperture is situated at the anterior end of the collar on the ventral side of the proboscis stalk. The paired collar coeloms are placed on the dorso-lateral side of the buccal cavity. The right and left coelomic cavities are completely separated from each other by the median neural keel, nerve cord, dorsal blood vessel and the paired perihæmal cavities. Two collar pores (Lateral coelomostomes) are present dorso-laterally, one on either side of the collar; communicating with the respective collar coeloms.

Trunk : This segment of the body is of variable length in different specimens and is very fragile. It measures 40 to 45 cm from behind collar to the vent which is terminal in position. Anterior two-third of the trunk length bears a conspicuous median dorsal groove formed by the right and left elevated and slightly incurved genital ridges. Mid-dorsal line of the trunk wall is slightly convex bearing the impression of the dorsal epidermal nerve cord.

Proximal part of the trunk is recognised as the branchial sector because of the presence of the series of paired branchial pores (85 to 168 pairs) on either side. The branchial region measures 2.5 to 3.2 cm in length. Distal part of the trunk is gradually tapered. Internally, the pharynx is perforated dorsolaterally by paired gill-slits which embraces the dorsal two-third of the pharynx. Ventral part of the pharyngeal cavity is enveloped by the non-branchial membrane. Two distinct types of gill filaments, viz., septa and tongue are visible in ventral parallel rows.

On the middorsal line of the pharynx there is an epipharyngeal ridge, runs continuously up to the oesophageal zone.

The paired trunk coelomic cavities are completely occupied by the gonads; thereby totally obliterating the space.

On the dorsal and ventral sides the almost obliterated trunk coeloms are separated by the dorsal and ventral mesenteries containing blood vessels. The branchial sector is followed by a small oesophageal zone 2 to 3 cm long. In this zone 5 to 6 pairs of intestinal pores open dorsolaterally in the dorsal groove.

Post oesophageal zone is the longest part of the whole body. Anterior two-third of this body segment bears dorsal groove formed by the genital ridges. Beyond this zone the trunk is cylindrical and the genital ridges are absent. Posterior part of the trunk bears transversally arranged dorsal and dorsolateral epidermal papillae and terminated by the anal opening.

Remarks : *Saccoglossus* sp. reported from mangrove swamps of Sundarbans, West Bengal, appears to be a new species and the fourteenth member of the family Harrimaniidae, Class Enteropneusta, Phylum Hemichordata. This will be communicated after further examination for publication.

Saccoglossus sp. inhabits the midlittoral zone of the estuarine mudflats just near the forest edge, located in mangrove swamps of Sundarbans delta. Worms remain completely buried 10 to 20 cm deep in the muddy substratum forming a zig-zag U-shaped tunnel. This worm lives in association with other infauna, viz., Nemertines, Polychaetes, Actinarians, rajor calms and other Bivalves, Crustaceans like crabs, shrimps, etc.

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ARCHAEOZOOLOGICAL REMAINS FROM WEST BENGAL, INDIA

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INTRODUCTION

The work – a brief resume on the archaeozoological remains from the State of West Bengal, studied so far, unraveled a marvellous past scenario which may take us retrospectively to the zone of present day Bankura, Birbhum and Purulia, where we may well imagine as a fact, some twenty – thirty thousand years ago, lion with its pride used to slumber under shady trees, after a heavy meal on black buck or nilgai, spotted hyaena chuckled from the bush, before hesitantly approaching a left over carcas; far away by the side of a meandering river, a large buffalo with magnificently curved horns was masticating in the reeds, some where to a little distance, a herd of grazing black buck, suddenly became alert by the presence of an ambushing leopard and galloped away with lightning speed, or in the chilly winter noon, a large gharial, opening its jaws, as if to exhibit the array of innumerable pointed teeth, busked on gravel-filled river bank to warm itself up.

During next twenty thousand years, not only this area, but also other places of the State, which were either arable or situated close to some rivers (for fishing advantage) became inhabited by the Neolithic farmers, who retained their hunting dogs for guarding, but also started keeping some economically important indigenous species; pig, buffalo, fowl etc.

Later, with the entrance to the Chalcolithic and Ferro – Chalcolithic stages the people started keeping more milch and flesh animals and beasts of burden and transport. Besides the indigenous pig, cattle, buffalo and elephant, they very soon acquired the goat, sheep and horse. The camel, probably very occasionally reached the state. However, its remains from Chalcolithic Bharatpur suggest that two thousand five hundred years ago, the site established a sort of nexus with the far off Western States (Table 1).

In a nut-shell, the present study of animal remains gives us some ideas of the past animal life as well as the initial history of the domesticated animals in the State. However, it is hoped, that with the exploration of rest of the State, specially, the northern districts, the Archaeozoologists would be able to enlighten the readers more about all these unknown facts.

The study on the animal remains not only helps in determining ancient people's inter-species relation, but also in assessing the fauna in space and time, a number of constituent species of which might have disappeared by now (Table 2).

It is known that vegetation and animal life are shaped by environmental factors - climate, soil, altitude etc. and are influenced greatly by any change in these factors. So, correct identification of species in a particular period from a locality or site enable researchers to determine the environment prevalent at the time. Moreover, correct analysis of the remains of different breeds of domesticated animals, throws interesting light on their origin and migration.

Considerable progress has been made on the archaeozoological investigation on the material unearthed from the State of West Bengal, though began only in the early sixties.

The cultural heritage in the State dates back as early as to Palaeolithic phase. From this pebble – tool making stage, with passing of time, gradual development in the life-style of ancient inhabitants, brought forth Neolithic, Chalcolithic and Iron Age cultures at different sites, which ultimately merged with present advanced stage through a brief historical and Mediaeval periods. Invariably, in every phase the people left behind some relics of their own used artifacts as well as some skeletal remains of animals, be it domestic or wild. As already proven, explorations and excavations of these sites would unravel diversified species, some of which are extinct by now and some on which we had no earlier idea. The state largely belongs to the monotonous alluvial plain formed by the Ganga and Brahmaputra on the Bengal Basin (see map). But the northern high altitudinal zone (Darjeeling, Jalpaiguri) of the State, has been formed by the orogenic process and composed of hilly sub-Himalayan ranges. On the other hand, the western section of the State (Bankura, Purulia and parts of Midnapur) is formed of the secondary lateritic deposition on a medley of the ancient Archaean-Proterozoic rocks, Gondwana rocks underlain in places by Neogene sediments. The southern or lower section is consisting of immature deltaic or estuarine sediments of recent to subrecent time. Naturally, these varied landscapes harboured diversified species and with the change in geomorphology and human cultural pattern, the distribution of animals were also influenced from time to time.

However, in this paper, we would restrict our study dealing with the description of Archaeozoological species only, i.e., on remains either recovered from settlement sites or having antiquity not older than Early Hominid culture in the State, that have been strewn in some quarternary rocks. As such, the Permo-Triassic fossils of fish, amphibia and reptiles recovered from Gondwana rocks in this State (Ranigunge, Asansole) from time to time are not included here.

A brief discussion on the species unearthed from the State of West Bengal follows the description of the remains of different species, according to their systematic order. The registration number (if any) and name(s) of the investigator(s) preceded by the collector's name(s) have been given in parenthesis.

MATERIAL AND METHODS

The ancient animal remains are generally retrieved through archaeological excavations (Plate I) from settlement, cemeteries and kitchen midden sites. Though infrequently, specimens of archaic importance are also recovered from flood-filled peats or alluvial deposits, either through accidental digging or exposure caused by erosion. However, entombed remains in different sites are generally incomplete and fragile. So, during the process of recovery, even for apparently hard fossils, adequate care is taken lest the specimens get damaged. Very brittle bone fragments are needed to be chemically strengthened by the application of shellac solution (in spirit) or vinyl acetate, before, plucking from situe. Detached or dislocated fragments from a bigger specimen, are required to be articulated again with the help of synthetic resins or adhesives to restore the original shape.

In an excavation, the most critical job of the Archaeological, is to label each of the specimens with relevant data *viz.*, site, locus, stratum, depth etc., besides the information about associated archaic objects *viz.*, potterics, coins, tools etc. Antiquity of the remains may be ascertained from the

TABLE 1

The domesticated species of mammals recorded from some early settlement sites in the State of West Bengal

Domesticated Animal	Earliest Record In the State	Possible Centre & Period of Domestication	Remarks
DOG (<i>Canis familiaris</i>)	Bhaluksoda (Late pleistocene) Binpur (Neolithic)	Undecided, some held that wolf-like canid was domesticated 10,000 years ago in northern Israel & Iraq.	The pariah type of Indian dog is the most ancient domesticated animal in this country. Probably were possessed by the Neolithic aborigines.
PIG (<i>Sus scrofa cristatus</i>)	Binpur (Neolithic)	Remains of earliest bred, a small size animal were recovered from Cayonu in the South Anatolia dated 7,000 B.C.	The Indian native pig <i>S.S. cristatus</i> , was domesticated during Neolithic phase. Midnapur, Bankura and adjoining zone is the possible centre.
HUMPED CATTLE (<i>Bos indicus</i>)	Bhaluksoda (Late pleistocene) Binpur (Neolithic).	Indus Valley & Mesopotamia, both older than 3000 years B.C. are believed to be pioneer in domesticating the large humped cattle.	Occurrence of the remains from Binpur & Bhaluksoda proves that a small breed of humped cattle was already domesticated by the aborigin 5000 years ago.
BUFFALO (<i>Bubalus bubalis</i>)	Pandu Rajar Dhibi (Chalcolithic) Mangolkot (Chalcolithic) Kotasur (Chalcolithic)	It was held earlier that Indus Valley (2500 B.C.) might be possible centre of domestication of buffalo.	Present study confirms that domestic buffalos were already deployed by the Chalcolithic farmers of this State 3000 years ago.
GOAT (<i>Capra hircus aegagrus</i>)	Pandu Rajar Dhibi (Chalcolithic)	Zagros in between present Iraq and Iran about 7000 B.C.	The remains from Pandu Rajar Dhibi (Chalcolithic) probably belonged to a short size animal.
SHEEP (<i>Ovis orientalis vignei</i>)	Bharatpur (Ferro-Chalcolithic)	The zone between Palestine, Lebanon and southern Turkey, about 8000 years ago (Mesolithic).	Very possibly appeared first in this site through traders.
ONE-HUMPED CAMEL (<i>Camelus dromedarius</i>)	Bharatpur (Ferro-Chalcolithic)	Somewhere in Arabia, about 5000 years ago.	Reached the site probably through traders.
HORSE (<i>Equus caballus</i>)	Kotasur (Chalcolithic) Bharatpur (Ferro-Chalcolithic)	Central Asia & Eastern Europe, about 3500 B.C.	The settlement sites of Kotasur and Bharatpur are dated to be 2500 to 2800 years B.P.
ELEPHANT (<i>Elephas maximus</i>)	Binpur (Neolithic) Jamtholgore (Meso Neo.)	India, about 5000 years ago.	The elephant was made domesticated by the aborigines of north-east India.

TABLE 2

The list of extinct species from the State of West Bengal (extinct during Pleistocene and Holocene period)

Species	Locality	Period/Culture	Environment
1. <i>Gavialis gangeticus</i>	Barrackpur	Late Holocene (3500 years)	Warm, moist, proestuarine.
<i>Gavialis gangeticus</i>	Pandu Rajar Dhibi	Early Historic (2500 years)	Warm, moist, inundated alluvial plain
<i>Gavialis gangeticus</i>	Saragdih	Late pleistocene (20,000 to 30,000 years)	Warm, humid, river bourn lateritic terrace.
<i>Gavialis gangeticus</i>	Kansara	Late pleistocene (20,000 to 30,000 years)	Warm, humid, river bourn lateritic terrace
2. <i>Panthera cf. leo</i>	Susunia	Late pleistocene (20,000 to 30,000 years)	Warm, humid, open high land with grass land and shrubs.
3. <i>Crocota sp.</i>	Susunia	Late pleistocene (20,000 to 30,000 years)	Warm, humid, open high land with grass land and shrubs.
4. <i>Equus onager khur</i>	Susunia	Late pleistocene (20,000 to 30,000 years)	Warm, less humid, open high hard soil with patches of grass land.
<i>Equus onager khur</i>	Babladanga	Middle to late Pleistocene (35,000 to 20,000 years)	Warm, less humid, open high hard soil with patches of grass land.
<i>Equus onager khur</i>	Hatinal	Pleistocene (20,000 years and above)	Warm, less humid, open high hard soil with patches of grass land.
<i>Equus onager khur</i>	Baltora	Pleistocene (20,000 years and above)	Warm, less humid, open high hard soil with patches of grass land.
5. <i>Giraffa cf. camelopardalis</i>	Jamthol	Lower Palaeolithic to Mesolithic (15,000 to 20,000 years).	Warm, less humid, with thorny shrubs and trees.
6. <i>Boselaphus namadicus</i>	Pairasol	Late Pleistocene (20,000 to 30,000 years)	Summer hot, humid, winter cold, dry, upland with grass land & shrubs.
<i>Boselaphus namadicus</i>	Babladanga	Late Pleistocene (20,000 to 30,000 years)	Summer hot, humid, winter cold, dry, upland with grass land & shrubs.
<i>Boselaphus namadicus</i>	Biribari	Middle Pleistocene (35,000 years)	Summer hot, humid, winter cold, dry, upland with grass land & shrubs.
<i>Boselaphus namadicus</i>	Dhuliapur	Middle Plesitocene (35,000 years)	Summer hot, humid, winter cold, dry, upland with grass land & shrubs.
7. <i>Boselaphus tragocamelus</i>	Bharatpur	Ferro-Chalcolithic (2200 to 2800 years).	Summer hot, humid, winter cold, dry, upland with grass land & shrubs.
8. <i>Bos namadicus</i>	Susunia	Late Pleistocene (20,000 to 30,000 years)	Warm, humid, tropical rain forest with grass lands.

Species	Locality	Period/Culture	Environment
<i>Bos namadicus</i>	Ahuri	Middle to Late Plesitocene (15,000 to 20,000 years)	Warm, humid, tropical rain forest with grass lands.
<i>Bos namadicus</i>	Tentulrakha	Middle to Late Pleistocene (15,000 to 20,000 years)	Warm, humid, tropical rain forest with grass lands.
<i>Bos namadicus</i>	Biribari	Middle Pleistocene (15,000 years).	Warm, humid, tropical rain forest with grass lands.
<i>Bos namadicus</i>	Jamthol	Lower Palaeolithic to Mesolithic (15,000 to 20,000 years).	Warm, humid, tropical rain forest with grass lands.
<i>Bos namadicus</i>	Bharatpur	Holocene (Ferro-Chalcolithic) 2700 years	Warm, humid, tropical rain forest with grass lands.
<i>Bos namadicus</i>	Mochpol	Late Holocene (Mauryan period) 2600 years	Warm, humid, tropical rain forest with grass lands.
9. <i>Bos namadicus bengalensis</i>	Chandraketugarh	Late Holocene (Mauryan period) 2600 years	Hot, humid, alluvial inundated grass land.
<i>Bos namadicus bengalensis</i>	Biribari	Middle Pleistocene (35,000 years)	Hot, humid, alluvial inundated grass land.
<i>Bos namadicus bengalensis</i>	Dhankora	Early Neolithic (5,000 years)	Hot, humid, alluvial inundated grass land.
10. <i>Bubalus Palaeindicus</i>	Saragdih	Late Pleistocene (20,000 to 30,000 years)	Hot, humid, riverine with swampy grass land.
<i>Bubalus Palaeindicus</i>	Dhankora	Early Neolithic (5,000 years)	Hot, humid, riverine with swampy grass land.
11. <i>Hystrix crassidens</i>	Susunia	Late Pleistocene (20,000 to 30,000 years)	Moderately worm & humid undulated land with bushes & ground vegetations.
<i>Hystrix crassidens</i>	Babladanga	Middle to Late Pleistocene (35,000 to 20,000 years)	Moderately worm & humid undulated land with bushes & ground vegetations.
12. <i>Palaeoloxodon</i> sp.	Beldanga	Late Pleistocene (20,000 to 30,000 years)	Warm, humid, plains or hills with fresh water vegetation.
<i>Palaeoloxodon</i> sp.	Kansara	Late Pleistocene (20,000 to 30,000 years)	Warm, humid, plains or hills with fresh water vegetation.

cultural chronology or from the rate of fossilisation and also could be obtained from the age of stratified rock, in case it yields the fossils. Isotopic method for age determination is possible only when the remains are sufficiently old (say older than fifty thousand years) and contains radioactive elements like C-14/Flourien or Lead.

After recovery, the animal remains are categorised by the Zoological according to their groups e.g. mollusca, pisces, mammalia etc. then again sorted out topographically e.g. shells, valves, skulls, horns, antlers, mandibles, vertebrae etc. or portion thereof.

The final and most important task lies in the identification of the species i.e. remains of which animal ? Is it a crab, a turtle, a horse ? More important is to assign the scientific binomial or trinomial zoological nomenclature than to attribute a common name which risks to be a misnomer.

The determination of the age of one individual animal at the time of its death may be ascertained from the condition of teeth eruption, dental, erosion, stage of ossification, development of antlers or horns and number of annual growth rings in the centrum or otoliths in the case of fish.

Similarly, the sexing of the animal may also be possible when specimens exhibit some sex-orienting characters. Generally male animals and their skeletons are larger or stouter than those of the females. Of course, exceptions are there in some species of turtles, aquatic mammals and in rabbit. Almost invariably, the antlers or horns are found to grow in the male deer and antelopes while their females do not bear these. The canines or tusks in the male elephant and boar are generally more robust than those of the females. However, precaution should be taken in dealing with the remains of castrated animal in which the male or secondary sexual characters are not much developed. The obturator foramens in most of the females in mammals are rather roundish and spacious than those of the males.

Besides the specific identification, status of the animal, whether it belonged to wild or domestic, indigenous or exotic, rare or common species, have been added in the report.

ABBREVIATIONS AND SYMBOLS USED

Arch. surv. = Archaeological Survey of India; Arch. W. B. = Directorate of Archaeology, Govt. of West Bengal; G.S.I. = Geological Survey of India; Z.S.I. = Zoological Survey of India; Univ. Burd. = University of Bardhaman; Univ. Cal. = University of Calcutta; Univ. Delhi = University of Delhi; Gen. = Genus; Sp. = Species; Spp. = More than one species; lt. = Left; rt. = Right; I = Incisor; C = Canine; P = Premolar; M = Molar; Pl. = Plate; Fig. = Figure; (F) = Fossilised; * = Extinct in West Bengal; ** = Absolutely extinct.

List No. 1 : Some General Characters of the Girdles and Limb Bones in the Mammals for sorting in the Preliminary Stage.

PELVIC GIRDLE : Each half of the girdle comprising of three more or less flat bones i.e.; Ilium, Pubis and Ischium, having a deep socket at their junction.

FEMUR : Long roundish shaft, proximal end with a ball-like head smaller than that of

- the convex head of humerus, generally on a neck; distal end with two condyles, separated by a deep groove.
- SCAPULA : Flat, roughly triangular often fan-like, with a ridge (spine) along length, proximally with a cavity for accommodation of the head of humerus (glenoid).
- HUMERUS : Shaft a little twisted; more or less robust, with comparatively larger head; having ridges with deep fossa at the distal end for articulation with radius and ulna, presence of deltoid ridge.
- TIBIA : Shaft proximally more triangular, with relatively flat ridges; distal end claw-like to fit a pulley.
- FIBULA : Slender, often flattened, shaft with small relatively flat articulations.
- RADIUS : Proximal articulation with two or three hollows, other end complicated with a number of facets, cross-section of shaft 'D' shaped.
- ULNA : Shaft distally narrowed but proximally keeled with the large articulating notch before the free end.
- METAPODIALS : Proximal end flat but the distal end with two knuckles with central ridge.
- PHALANGES : Proximal end with articulating depression, the distal end knuckle-shaped.

SYSTEMATIC DESCRIPTION

Phylum MOLLUSCA
 Class GASTROPODA
 Order MESOGASTROPODA
 Family CYCLOPHORIDAE
 Genus *Cyclophorus* Montfort, 1810

Cyclophorus sp.
 (A Land Snail)

Material : One dry empty shell (Arch. W.B., 1976; M. Ghosh, Z.S.I.) from Jamtholgora.

Family AMPULARIDAE
 Genus *Pila* Boltcn, 1798

Pila globosa (Swainson)
 (The Apple-Snail)

Material : Five dry soil-filled shells (Arch. W.B., 1987; M. Ghosh, Z.S.I.) from Mainagar.

Family VIVIPARIDAE
 Genus *Bellamyia* Jousseau, 1886

Bellamyia bengalensis (Lamarck)
(The Common Pond Snail)

Material : Three dry shells (Arch. W.B., 1987; M. Ghosh, Z.S.I.) from Mainagar.

Order NEOGASTROPODA
Family TURBINELLIDAE
Genus *Turbinella* Lamarck, 1799

Turbinella pyrum (Linnaeus)
(The Chank-Shell)

Material : Broken columellar folds of the shell (Univ. Cal. 1988; M. Ghosh, Z.S.I.) from Mangolkot.

Phylum ARTHROPODA
Class CRUSTACEA
Order DECAPODA
Family POTAMONIDAE

Undet. fresh water crab.

Material : Fragment of calcified tibia (Arch. W.B. 1985; M. Ghosh, Z.S.I.) from Pandu Rajar Dhibi; Fragment of calcified tibia (Univ. Cal. 1988; M. Ghosh, Z.S.I.) from Mangolkot.

Phylum CHORDATA
Class OSTEICHTHYS
Order CYPRINIFORMES
Family CYPRINIDAE
Genus *Catla* Cuvier & Valenciennes, 1844

***Catla* sp.**
(The Katla Fish)

Material : An opercular bone (Arch. W.B. 1985; M. Ghosh, Z.S.I.) from Pandu Rajar Dhibi.

Undet. Carp remains

Material : A number of pleural ribs (Univ. Cal. 1988; M. Ghosh, Z.S.I.) from Mangolkot.

Order SILUROIDEA
Family BAGRIDAE
Genus *Rita* Bleeker, 1853

***Rita* sp.**
(The Rita Fish)

Material : One proatlas (Arch. W.B. 1985; M. Ghosh & U. Saha, Z.S.I.) from Pandu Rajar Dhibi.

Genus *Mystus* Hamilton, 1822

Mystus sp.
(The Aor Fish)

Material : One pectoral spine (Arch. W.B. & S. Banerjee, 1987; M. Ghosh & U. Saha, Z.S.I.) from Boral; Broken lt. pectoral spine (Univ. Cal. 1988; M. Ghosh, Z.S.I.) from Mangolkot. Condylar portion of the rt. pectoral spine (Arch. W.B. 1985; M. Ghosh, Z.S.I.) from Pandu Rajar Dhibi.

Order PERCIFORMES
Family ANABANTIDAE
Genus *Colisa* Cuvier, 1831

Colisa cf. fasciata (Bloch)
(The Kholisha Fish)

Material : A charred skeleton impressed on the bottom of an earthen pot (Arch. W.B. & S. Banerjee, 1986; M. Ghosh, Z.S.I.) from Boral.

Undet. Telcostean fish

Material : Thirtyseven vertebrae and cranial portion (Arch. Surv. & Univ. Burd. 1971; S. Banerjee, Z.S.I.) from Bharatpur.

Class REPTILIA
Order CROCODILIA
Family GAVIALIDAE
Genus *Gavialis* Opperl, 1811

* *Gavialis gangeticus* (Gmelin)
(The Gharial)

Material : (F) Posterior portion of mandible with three teeth sockets (G.S.I. Type No. 19144), and three isolated teeth (G.S.I. Type No. 19145) (Arch. W.B. & G.S.I. 1960; D.C. Dassarma & others, G.S.I.) from Saragdih and Kansara. Post orbital portion of skull (Sp. No. PBQA 1) and three vertebrae (Sp. No. PBQA 2,3,4) (Univ. Cal.; P.K. Sen & M. Banerjee, Univ. Cal) from Barrackpur. A dorsal scute (Arch. W.B. 1985; M. Ghosh & U. Saha, Z.S.I.) from Pandu Rajar Dhibi.

Family CROCODILIDAE
Genus *Crocodylus* Gmelin, 1789

Crocodylus palustris (Lesson)
(The Marsh-Crocodile)

Material : Three teeth; Fragment of lower jaw (Arch. W.B. 1984; M. Ghosh & U. Saha, Z.S.I.) from Boral.

Crocodylus porosus Schneider
(The Salt-Water Crocodile)

Material : Teeth; Maxilla and Mandible (Arch. W.B. 1984; M. Ghosh & U. Saha, Z.S.I.) from Boral.

Order TESTUDINES
Family TRIONYCHIDAE
Genus *Lissemys* Smith, 1931

Lissemys punctata punctata (Bonnaterre)
(The Spotted Flap Shell Turtle)

Material : Fragmentary plastron and carapace (Arch. W.B. 1984; M. Ghosh & U. Saha, Z.S.I.) from Boral. Broken carapace (Univ. Cal. 1988; M. Ghosh, Z.S.I.) from Mangolkot.

Genus *Chitra* Gray, 1844

Chitra indica (Gray)
(The Asiatic Soft Shell Turtle)

Material : Three fragmentary pieces of coastal plates of carapace with rib attachment (Sp. Nos. PBQA 5,6,7); One completely preserved coastal plate with rib attachment joint to a single neural plate with few vertebrae; One slightly broken part of the coastal plate of carapace (Sp. No. PBQA 8); A well-preserved carapace (Sp. No. PBQA 9) (Univ. Cal.; P.K. Sen & M. Banerjee, Univ. Cal.) from Barrackpur. Broken carapace and plastron (Arch. W.B. 1984; M. Ghosh & U. Saha, Z.S.I.) from Boral. Fragmentary plastron (Univ. Cal. 1988; M. Ghosh, Z.S.I.) from Mangolkot.

Genus *Trionyx* Geoffrey, 1809

Trionyx gangeticus Cuvier
(The Ganges Soft Shell Turtle)

Material : Fragment of carapace and plastron (Arch. W.B. 1986; M. Ghosh & U. Saha, Z.S.I.) from Bhaluksoda. Fragment of plastron (Arch. Surv. & Univ. Burd. 1971; S. Banerjee, Z.S.I.) from Bharatpur. One broken hypoplastron; One Femur (Arch. W.B. 1983; K.D. Saha & others, Z.S.I.) from Boral. Fragment of carapace (Arch. Surv. 1975; S. Banerjee & others, Z.S.I.) from Tamluk.

Family TESTUDINIDAE
Genus *Batagur* Gray, 1855

Batagur baska Gray
(The Common Batagur Turtle)

Material : (F) Portion of scapula (G.S.I. Type No. 19146), one epiplastron (G.S.I. Type No. 19147) and some isolated fragments of plastron (G.S.I. Type No. 19148) (Arch. W.B. & G.S.I. 1960; D.C. Dassarma & others, G.S.I.) some unregistered carapace and limb bones from Biribari, Saragdihi and Kansara. Seven fragments of plastron (Univ. Cal. 1988; M. Ghosh, Z.S.I.) from Mangolkot.

Order CHELONIA
 Family EMYDIDAE
 Genus *Hardella* Gray, 1870

Hardella thurji Gray
 (The Brahminy River Turtle)

Material : A complete plastron (Arch. W.B. & S. Banerjee, 1984; M. Ghosh & U. Saha, Z.S.I.) from Boral.

Family CHELONIDAE
 Genus *Lepidochelys* Fitzinger, 1843

Lepidochelys olivacea (Eschscholzbz)
 (The Olive Ridley Turtle)

Material : Lower jaw and carapace (Arch. W.B. & S. Banerjee, 1984 : M. Ghosh & U. Saha, Z.S.I.) from Boral.

Class AVES
 Order GALLIFORMES
 Family PHASIANIDAE
 Genus *Gallus* Rafinesque, 1815

Gallus gallus murghi Robinson & Kloss
 (The Indian Red Jungle Fowl)

Material : Distal end of humerus (Arch. Surv. & Univ. Burd. 1971; S. Banerjee, Z.S.I.) from Bharatpur. Fragment of humerus, broken shaft of tibia and distal phalanx (Univ. Cal. 1988; M. Ghosh, Z.S.I.) from Mangolkot. Broken shaft of femur, distal condylar bone of lt. Tibia, charred broken oblique process of sternal bone, broken coronoid bone and broken scapula (Arch. W.B. 1985; M. Ghosh & U. Saha, Z.S.I.) from Pandu Rajar Dhibi.

Order COLUMBIFORMES
 Family COLUMBIDAE
 Genus *Columba* Linnaeus, 1758

Columba sp.
 (The Pigeon)

Material : Broken shaft of tibia (Univ. Cal. 1988; M. Ghosh, Z.S.I.) from Mangolkot.

Class MAMMALIA
 Order CARNIVORA
 Family FELIDAE
 Genus *Felis* Linnaeus, 1758

Felis chaus Guldenstaedt
(The Jungle Cat)

Material : One canine tooth and fragment of rt. femur with head (Arch. Surv. 1964; B. Nath & M. Ghosh, Z.S.I.) from Mahisdal.

Genus *Panthera* Oken, 1816

* *Panthera cf. leo* (Linnaeus)
(The Lion)

Material : (F) Portion of rt. mandibular ramus with P4 and M1 (No. 18710) (Arch. W.B.; A.K. Dutta, Z.S.I.) from Susunia.

Panthera pardus Linnaeus
(The Leopard)

Material : (F) A fragment of mandible with the carnassial (K.D. Saha & party, 1984; K.D. Saha & others, Z.S.I.) from Jhirkoria (Susunia).

Family CANIDAE

Genus *Canis* Linnaeus, 1758

Canis aurius indicus Linnaeus
(The Jackal)

Material : Occipital portion of skull with condyles, upper lt. canine and 5th metatarsal of lt. pes (Arch. W.B. 1985; M. Ghosh & U. Saha, Z.S.I.) from Pandu Rajar Dhibi. A skull, rt. humerus, rt. & lt. femur, lt. tibia and pelvis (Arch. W.B. 1984; K.D. Saha & others, Z.S.I.) from Boral.

Canis lupus pallipes Linnaeus
(The Wolf)

Material : One canine and one claw (Arch. Surv. 1964; B. Nath & M. Ghosh, Z.S.I.) from Mahisdal.

Canis familiaris Linnaeus
(The Pariah Dog)

Material : Broken vertebra, rt. tibia and shaft of radius used as a scraper (Arch. W.B.; M. Ghosh & U. Saha, Z.S.I.) from Bhaluksoda. rt. mandible of young one, cervical vertebra, thoracic vertebra and lt. tibia (Arch. W.B.; M. Ghosh & U. Saha, Z.S.I.) from Jamtholgora. Isolated canine, premolars and molars (Arch. W.B.; M. Ghosh, Z.S.I.) from Binpur. Fragment of ulna (Arch. Surv. 1971; S. Banerjee, Z.S.I.) from Bharatpur.

Family HYAENIDAE

Genus *Crocuta* Kaup, 1828.

* *Crocuta* sp.
(The Spotted Hyacna)

Material : (F) Portion of lt. mandibular ramus with molar and three premolars (Paschim Banga Paribrajak Samity; A.K. Dutta, G.S.I.) from Susunia.

Order PERISSODACTYLA
 Family EQUIDAE
 Genus *Equus* Linnaeus, 1758

* *Equus onager khur* Lesson
 (The Asiatic Wild Ass)

Material : (F) Isolated upper and lower molars (Nos. 19122-19141), one hoof (No. 19143) and distal part of one metatarsal (No. 19142) (Arch. W.B. & G.S.I.; D.C. Dassarma & others, G.S.I.) from Hatinal, Baltora, Gogra, Kansara and Babladanga. Upper rt. M2, broken lt. mandible with P2 - P4 and M1 - M3 (Z.S.I., 1969 & 1982; M. Ghosh & others, Z.S.I.) from Dhankora.

Equus caballus Linnacus
 (The Horse)

Material : Fragments of tibiae and metatarsal (Arch. Surv. 1971; S. Banerjee, Z.S.I.) from Bharatpur. Third phalanx (Arch. Surv. 1975; S. Banerjee, Z.S.I.) from Tamluk. Almost entire skeletal remains (Z.S.I. 1984; M. Ghosh, Z.S.I.) from Gayeshpur. Lower rt. premolar (P. K. Panda & S. Pal. 1982; M. Ghosh & others, Z.S.I.) from Kotasur.

Family RHINOCEROTIDAE
 Genus *Rhinoceros* Linnaeus, 1966

Rhinoceros unicornis Linnaeus
 (The One-Horned Rhinoceros)

Material : (F) Broken lower jaw with teeth, thoracic vertebra, fragment of rib, astragalus, cuneiform, fragment of radius and sternal bone (N.C. Das, 1990; M. Ghosh & others, Z.S.I.) from Sonarpur.

Order ARTIODACTYLA
 Family SUIDAE
 Genus *Sus* Linnaeus, 1758

Sus scrofa Linnaeus
 (The Wild Boar)

Material : (F) Lower last molar (No. 19106), lower second molar (No. 19107), lower last premolar (No. 19108) and broken lower canine (No. 19109) (Arch. W.B. & G.S.I. 1960; Dassarma & others, G.S.I.) from Kansara.

Sus scrofa cristatus Wagner
 (The Indian Pig)

Material : Damaged upper 2nd molar of young one (Arch. W.B., 1984; M. Ghosh, Z.S.I.) from Binpur. (F) Broken lower jaw with teeth, rt. maxillary portion with teeth and fragment of frontal bone

(Arch. W.B. ; M. Ghosh & U. Saha, Z.S.I.) from Jamtholgora. Broken limb bones and teeth (Arch. Surv. & Univ. Burd. 1971; S. Banerjee, Z.S.I.) from Bharatpur. Fragment of rt. mandible with P4, apical portion of lt. canine, broken lower rt. canine, fragmentary scapula and lt. humerus (Univ. Cal. 1988; M. Ghosh, Z.S.I.) from Mangolkot. Fragment of lt. mandible with M3, damaged body of mandible with incisors, broken zygomatic arch, fragment of rt. maxilla with P3 & P4, fragment of frontal bone with supra orbital foramen and 4th metatarsal (Arch. W.B. 1985; M. Ghosh & U. Saha, Z.S.I.) from Pandu Rajar Dhibi. Ramus of rt. mandible, isolated teeth, fragments of metatarsal and metacarpals, broken limb bones (Arch. Surv. 1975; S. Banerjee & M. Ghosh, Z.S.I.) from Tamluk. Broken rt. mandible with teeth (P.K. Panda & S. Pal, 1982; M. Ghosh & others, Z.S.I.) from Kotasur.

Family CERVIDAE

Genus *Axis* Smith, 1827

Axis axis Erxleben
(The Spotted Deer)

Material : Four isolated molars, two belonging to the upper and two belonging to the lower jaw (Arch. W.B. & G.S.I. 1960 : D.C. Dassarma & others, G.S.I.) from Tentulrakha. Distal end portion of rt. tibia, proximal end portion of rt. metacarpal (Arch. W.B.; M. Ghosh, Z.S.I.) from Biribari. Broken piece of lt. mandible, fragment of lt. scapula (Arch. W.B.; M. Ghosh & U. Saha, Z.S.I.) from Dhuliapur. Fragmentary antler, tibia and metatarsal (Arch. Surv. & Univ. Cal. 1971; S. Banerjee, Z.S.I.) from Bharatpur. Four fragments of antler (Arch. Surv. 1964; B. Nath & M. Ghosh, Z.S.I.) from Mahisdal. Antler and lower jaw (Arch. W.B. & S. Banerjee, 1984, 1984; K.D. Saha, Z.S.I.) from Boral. Fragment of antler (Arch. Surv. 1975; S. Banerjee & others, Z.S.I.) from Tamluk.

Axis porcinus Zimmerman
(The Hog Deer)

Material : Apical portion of lt. antler, erupting antler with pedicel of lt. side, a broken tine, broken right mandible with P1 – dP3 and M1, rt. humerus, broken lt. calcaneum and 2nd phalanx (Univ. Cal. 1988; M. Ghosh, Z.S.I.) from Mangolkot. Disc of thoracic vertebra, glenoid portion of scapula, two fragmentary rib, portion of rt. maxilla with M2 (Arch. W.B. 1985; M. Ghosh & U. Saha, Z.S.I.) from Pandu Rajar Dhibi.

Genus *Cervus* Linnaeus, 1758

Cervus duvauceli Cuvier
(The Swamp Deer)

Material : (F) Three incomplete horn core (Nos. 19083-85), part of a lt. mandible (No. 19086) many isolated molar (No. 19087) (Arch. W.B. & G.S.I. 1960; D.C. Dassarma & others, G.S.I.) from Babladanga, Saragdih and Beldiha. Four phalanges and two calcanei (Arch. Surv. & Univ. Burd. 1971; S. Banerjee, Z.S.I.) from Bharatpur. Fragmentary antlers (Arch. Surv. 1964; B. Nath & M. Ghosh, Z.S.I.) from Mahisdal. Distal fragment of lt. radius, with ulnar bone a fragment of metatarsal (Univ.

Cal. 1988; M. Ghosh, Z.S.I.) from Mangolkot. charred piece of mandible, distal fragment of rt. tibia and rib (Arch. W.B. 1985; M. Ghosh & U. Saha, Z.S.I.) from Pandu Rajar Dhibi. Upper lt. M2 and M3 (Arch. Surv. 1975; S. Banerjee & Others, Z.S.I.) from Tamluk. Antlers, teeth and limb bones (Arch. W.B. & S. Banerjee; M. Ghosh, K.D. Saha & others, Z.S.I.) from Boral.

Cervus unicolor Kerr.
(The Sambar)

Material : (F) Isolated upper molar (No. 19088), one lower molar (No. 19089) and one upper premolar (No. 19090) (Arch. W.B. & G.S.I. 1960; D.C. Dassarma & others, G.S.I.) from Saragdihi, Babladanga and Gogra. (F) One shaft of rt. tibia, olecranon process with ulnar shaft, rt. astragalus of young one, lt. scapho-cuboid and damaged shaft of metatarsal (Arch. W.B. 1986; M. Ghosh & U. Saha, Z.S.I.) from Bhaluksoda. Fragmentary antler (Arch. Surv. 1964; B. Nath & M. Ghosh, Z.S.I.) from Mahisdal.

Genus *Muntiacus* Rafinesque, 1815

Muntiacus muntjak Zimmermann
(The Barking Deer)

Material : (F) Two isolated upper cheek teeth and part of maxilla showing M1 and M2 (Arch. W.B. & G.S.I. 1960; Dassarma & others, G.S.I.) from Tentulrakha. (F) A shaft of tibia and ulnar bone with broken notch (Arch. W.B. 1986; M. Ghosh & U. Saha, Z.S.I.) from Bhaluksoda. Fragmentary rt. calcaneum and a proximal portion of rt. radius (Arch. Surv. & Univ. Burd. 1971; S. Banerjee, Z.S.I.) from Bharatpur.

Family BOVIDAE

Genus *Bos* Linnaeus, 1758

Bos indicus Linnaeus
(The Humped Cattle)

Material : Broken ramus of jaw with 1st to 3rd premolar and 1st, 2nd molar; fragment of rt. metatarsal (Arch. W.B. 1986; M. Ghosh & U. Saha, Z.S.I.) from Bhaluksoda. Upper and lower lt. premolar and upper lt. molar (Arch. W.B. 1981; M. Ghosh, Z.S.I.) from Binpur. Broken vertebrae, limb bones and phalanges (Arch. Surv. & Univ. Burd. 1971; S. Banerjee, Z.S.I.) from Bharatpur. Fragmentary ribs, shaft of humerus of young one, condylar portion of humerus, fragment of radius and head of femur (Univ. Cal. 1988; M. Ghosh, Z.S.I.) from Mangolkot. Broken 3rd thoracic rib, upper lt. 2nd molars, upper rt. 3rd molar, shaft bone of lt. metatarsal, distal end of metatarsal and condylar fragment of lt. humerus (Arch. W.B. 1985; M. Ghosh & U. Saha, Z.S.I.) from Pandu Rajar Dhibi. Mandibles, isolated teeth, vertebrae and limb bones (Arch. Surv. 1975; S. Banerjee & others, Z.S.I.) from Tamluk. Mandibles with teeth and broken limb bones (P. K. Panda & S. Pal, 1982; M. Ghosh & others, Z.S.I.) from Kotasur, Mandibles and broken skulls besides a number of limb bones (Arch. W.B. & S. Banerjee, 1983-85; M. Ghosh, K.D. Saha & others, Z.S.I.) from Boral.

***Bos gaurus* H. Smith**
(The Indian Bison)

Material : Fragmentary lt. femur and a 3rd phalanx (Arch. W.B. & S. Banerjee, 1986; K.D. Saha & others, Z.S.I.) from Boral. Fragmentary atlas, broken lt. humerus and fragmentary head of femur (Univ. Delh. 1981; M. Ghosh & others, Z.S.I.) from Bahiri.

** ***Bos cf. namadicus* Falconer**
(The Extinct Siwalik Cattle)

Material : (F) lt. ramus of mandible with 1st, 2nd and 3rd molar (Arch. W.B. 1969; S. Banerjee & U. Saha, Z.S.I.) from Susunia. Lt. 2nd and 3rd molar (Arch. W.B. 1973; S. Banerjee, Z. S.I.) from Mochpal. Cervical vertebra, fragments of rib, fragment of ulna, rt. calcaneum, rt. astragalus, 1st phalanx (Arch. Surv. & Univ. Burd. 1971; S. Banerjee, Z.S.I.) from Bharatpur. (F) Part of skull (No. 19058), rt. horn core, lt. horn core broken from base, isolated and broken piece of horn core (Arch. W.B. & G.S.I. 1960; Dassarma & others, G.S.I.) from Tentulrakha.

** ***Bos namadicus bengalensis* Ghosh**
(The Extinct Bengal Cattle)

Material : Lower rt. 2nd molar Chandraketurah. (F) Three isolated molar (Arch. W.B. 1986; M. Ghosh, Z.S.I.) from Biribari. Upper rt. 2nd molar (Arch. W.B. 1987; M. Ghosh & U. Saha, Z.S.I.) from Dhankora.

Genus ***Bubalus* Smith, 1827**

***Bubalus bubalis* (Linnaeus)**
(The Wild Buffalo)

Material : (F) Broken skull with massive horn core, complete lt. radius (Arch. W.B. 1987; M. Ghosh, Z.S.I.) from Dhuliapur. Lower lt. molar, upper lt. 2nd molar and upper 2nd premolar (Arch. W.B. 1988; M. Ghosh, Z.S.I.) from Kattara. (F) Skull with horns, vertebrae and limb bones (B. Mallik, 1989; S. Biswas & others, Z.S.I.) from Maslandpur. Fragments of mandible and isolated teeth (Arch. Surv. & Univ. Burd. 1971; S. Banerjee, Z.S.I.) from Bharatpur. Nasal bone, upper rt. 2nd premolar, broken 1st phalanx (Univ. Cal. 1988; M. Ghosh, Z.S.I.) from Mangolkot. Upper 1st molar, damaged upper 3rd molar, fragmentary rib, broken scapula (Arch. W.B. 1985; M. Ghosh & U. Saha, Z.S.I.) from Pandu Rajar Dhibi. Upper lt. 2nd molar, (P.K. Panda & S. Pal, 1982; M. Ghosh, Z.S.I.) from Kotasur. Broken mandibles, isolated teeth, vertebrae and limb bones (Arch. W.B. & S. Banerjee, 1984-85; M. Ghosh, K.D. Saha & others, Z.S.I.) from Boral. Lower jaw with teeth, vertebrae and broken limb bones (A. Sardar, 1985; M. Ghosh, Z.S.I.) from Canning.

** ***Bubalus palaeindicus* (Falconer & Cautley)**
(The Extinct Siwalik Buffalo)

Material : (F) Part of a skull with horn cores completely broken (G.S.I. Type No. 19059) Arch. W.B. & G.S.I.; D.C. Dassarma, Z.S.I.) from Saragdih, lt. mandible with P1-P2 and broken M2-M3 (Z.S.I. Colln.; M. Ghosh & others, Z.S.I.) from Dhankora.

Genus *Miotragoceros* Stromer, 1928**** *Miotragoceros cf. punjabicus* (Pilgrim)**
(The Extinct Siwalik Antelope)

Material : (F) A fragment of lt. ramus of mandible with P3 and M1-M3 (Arch. W.B. 1969; S. Banerjee & others, Z.S.I.) from Aduri, Susunia.

Genus *Boselaphus* de Blainville, 1816**** *Boselaphus namadicus* (Rutimeyer)**
(The Extinct Siwalik Nilgai)

Material : (F) A solitary rt. horn core with a part of frontal bone (No. 19068) (Arch. W.B. & G.S.I. 1960; Dassarma & others, G.S.I.) from Biribari.

***Boselaphus* sp.**
(The Nilgai)

Material : (F) Part of rt. mandible with M2 and M3 (No. 19069), two isolated molar M2 (No. 19070), lt. maxilla (No. 19071), two lower premolars (No. 19072) and part of femur (No. 19073) (Arch. W.B. & G.S.I. 1960; D.C. Dassarma & others, G.S.I.) from Biribari, Babladanga and Pairasol. (F) Fragmentary limb bones and lower jaw (Arch. W.B. 1987; M. Ghosh, Z.S.I.) from Dhuliapur.

*** *Boselaphus tragocamelus* Pallas**
(The Nilgai)

Material : Isolated teeth, vertebrae and fragment of limb bones (Arch. Surv. & Univ. Burd. 1971; S. Banerjee, Z.S.I.) from Bharatpur.

Genus *Antelope* Pallas, 1766***Antelope cervicapra* Linnacus**
(The Black Buck)

Material : (F) Numerous horn cores (Nos. 19076 & 19077), isolated teeth and and more or less complete mandibles (Nos. 19079 & 19080), and maxilla (No. 19078), broken skulls, one of these with portions of parietal and orbital, left horn core, lt. orbit, lt. maxilla with dentition. (No. 19074), another with maxillae, palate and vomer. One metatarsas (No. 19081) and one metatarsus (No. 19082). (Arch. W.B. & G.S.I. 1960; D. C. Dassarma & others, G.S.I.) from Pairasol. (F) Fragment of jaw with M3 (Arch. W.B. 1986; M. Ghosh & U. Saha, Z.S.I.) from Dhuliapur. (F) Fragment of maxilla with 1st - 3rd molar, fragment of rt. maxilla with 1st and 2nd molar, fragment of lt. mandible with broken 1st and 2nd molar, fragment of lt. mandible with 1st molar and condylar portion of rt. mandible (Arch. W.B. 1987; M. Ghosh & U. Saha, Z.S.I.) from Beldanga. (F) Numerous broken maxillae and mandible with teeth, broken horn cores and limb bones (Z.S.I. 1970-84; S. Banerjee & others, Z.S.I.) from Susunia.

Genus *Capra* Linnaeus, 1758

Capra hircus aegagrus Linnaeus
(The Domestic Goat)

Material : Fragment of mandible with teeth, proximal end of scapula and fragment of illium (Arch. Surv. & Univ. Burd. 1971; S. Banerjee, Z.S.I.) from Bharatpur. Fragments of horns and isolated teeth (Arch. Surv. 1964; B. Nath & M. Ghosh, Z.S.I.) from Mahisdal. Broken olecranon process and shaft of rt. humerus (Arch. W.B. 1985; M. Ghosh & U. Saha, Z.S.I.) from Pandu Rajar Dhibi. Mandibles with teeth, humerus, fragmentary limb bones and pelvic girdles (Arch. Surv. 1975; S. Banerjee & others, Z.S.I.) from Tamluk.

Genus *Ovis* Linnaeus, 1758

Ovis orientalis vignei Blyth
(The Domestic Sheep)

Material : Two distal fragment of lt. humerus and isolated M3 (Arch. Surv. 1971; S. Banerjee, Z.S.I.) from Bharatpur.

Family CAMELIDAE

Genus *Camelus* Linnaeus, 1758

Camelus dromedarius Linnaeus
(The One-Humped Camel)

Material : One upper 1st molar (Arch. Surv. 1971; S. Banerjee, Z.S.I.) from Bharatpur.

Family GIRAFFIDAE

Genus *Giraffa* Brisson, 1762

* *Giraffa cf. camelopardalis* Brisson
(The Giraffe)

Material : Broken shaft of lt. tibia, broken distal end of rt. tibia (Arch. W.B. 1969; S. Banerjee & M. Ghosh, Z.S.I.) from Jamthol, Susunia.

Order RODENTIA

Family MURIDAE

Genus *Rattus* Gray, 1821

Rattus rattus Linnaeus
(The Common Rat)

Material : Lower jaw with teeth and isolated upper incisor (Univ. Cal. 1988; M. Ghosh; Z.S.I.) from Mangolkot. Lower incisor (Arch. W.B. 1985; M. Ghosh & U. Saha, Z.S.I.) from Pandu Rajar Dhibi. lt. humerus (Arch. Surv. 1975; S. Banerjee & others, Z.S.I.) from Tamluk.

Family HYSTRICIDAE
Genus *Hystrix* Linnaeus, 1758

** *Hystrix crassidens* Ledekker
(The Extinct Porcupine)

Material : (F) Two upper teeth series (Nos. 19110 & 19111) and one upper incisor (No. 19112) with parts of maxilla, two lower teeth series (No. 19113) (Arch. W.B. & G.S.I. 1960; D.C. Dassarma & others, G.S.I.) from Babladanga, Gogra and Susunia.

Hystrix indica Kerr
(The Indian Porcupine)

Material : Apical portion of a quill (Arch. W.B. 1983; M. Ghosh, Z.S.I.) from Laljol Cave, Binpur.

Order PROBOSCIDEA
Family ELEPHANTIDAE
Genus *Elephas* Linnaeus, 1758

Elephas maximus Linnaeus
(The Indian Elephant)

Material : (F) Lamellar portion of molar (Arch. W.B. 1987; M. Ghosh, Z.S.I.) from Jamtholgora. Fragmentary molar (Arch. W.B. 1983; M. Ghosh, Z.S.I.) from Binpur. Distal end of rt. humerus (D.K. Maitey, 1981; M. Ghosh, Z.S.I.) from Gazitola, Debalaya. Fragmentary femur and tibia (Farakka Barrage Authority, 1974; S. Banerjee & M. Ghosh, Z.S.I.) from Farakka. Broken molar (P.K. Panda & S. Pal, 1982; M. Ghosh & others, Z.S.I.) from Kotasur. Proximal end of lt. radius (Arch. Surv. 1975; S. Banerjee & others, Z.S.I.) from Tamluk. Fragments of molar (Arch. W.B. 1984; K.D. Saha & others, Z.S.I.) from Boral.

Genus *Loxodonta* Cuvier, 1827
Subgenus *Palaeoloxodon* Matsumoto, 1924

** *Palaeoloxodon* sp.
(The Extinct Siwalik Elephant)

Material : (F) Upper lt. 3rd molar (No. 19115), lower rt 3rd molar (No. 19117), fragment of upper rt. 3rd molar (No. 19116) and lower lt. 3rd molar (No. 19118). A big tusk (No. 1912†), 1st phalanx of fore limb (No. 19120) (Arch. W.B. & G.S.I. 1960; D.C. Dassarma & others, G.S.I.) from Beldanga and Kansara.

DISCUSSION

The molluscan remains from the State belong to the extant species of gastropod. The fresh water *Bellamyia bengalensis*, locally known as gugli and used in dietary purpose by the aborigines and rural

people, occurs throughout the subcontinent. It is prolific in the ponds, lakes and streams. Some characters of the shell are : shell moderately large, top-shaped or turbinated, spire prominent, body whorl not very large when compared with the spire. The *Pila globosa*, commonly known as Apple-Snail and locally jal-samuk is also very common and edible. It occurs in Maharashtra, Uttar Pradesh, Madhya Pradesh, Bihar, Orissa, West Bengal and Assam but not recorded from Punjab or Himachal Pradesh. Some characters of the shell are : shell considerably large, globose, body whorl very large, spire considerably small. The terrestrial or land gastropod *Cyclophorus* sp. is widely distributed in India and very common in moist, shady places. Some characters of the shell are : shell larger in size, inner lip and outer lips of the aperture strongly thickened and reflected, foot broad and not grooved. The marine *Turbinella pyrum*, commonly known as Chank-Shell and locally shankho is deemed to be sacred by the Hindus. These shells have long been used in blowing as horn during religious rites, for medicinal purposes and also in fashioning as ornaments. The species abounds in the shallow coastal waters of Tuticorin, Rameswaram, Sri Lanka, Gulf of Mannar, Palk Bay, Gulf of Kutch and Andaman & Nicobar groups of islands. Some characters of the shell are : shell large, thick, pear-shaped, covered with dark brownish heavy periostracum, spire elevated, body whorl large, inflated, slightly angulated, anterior canal equal to the height of a spire, operculum horny, narrow and elongated.

The fragmentary tibial portions, supposed to be of the fresh-water crabs, are hollowed inside and made of hard chitinised cuticle and unlike molluscan shell was not acted upon by the dilute inorganic acid. The decapods possess uniramous body appendages and five pairs of walking legs. A number of species of fresh water crabs have been widely distributed in ponds, lakes and streams in the tropical subcontinent.

The reported fish bones from the State belong to the fresh-water osteichthys groups and represent mainly the Indian major carps like *Labeo rohita*, commonly known as rohu, *Catla catla*, commonly known as katla and a few bagrid cat fishes e.g., *Mystus* sp. and *Rita* sp. It is noteworthy, that the remains from Pandu Rajar Dhibi were of very large size carps and probably caught from the rivers like Ajoy and its tributaries. A charred impression of a fish (Pl.II, Fig.2), resembling *Colisa* sp., commonly known as kholisa, was found at the bottom of one earthen pot unearthed from Mediaeval Boral. All these fishes are common and extensively distributed in North India. The fish bones are generally characterised by having irregular, flat shapes and rough texture. The vertebrae which are common-sight occurrence in the archaeological sites, are amphicoelous, constricted at the middle and bear dorsal neural spines and paired parapophysis. The caudal vertebrae bear the hemal spine below. The branchiostegal arches resemble the ribs of mammal but are generally delicate and have a groove along the outer length. The dorsal and pectoral spines in the cat fishes are very strong bones and frequently unearthed in the excavations. These are dagger-like, little curved, pointed and often serrated posteriorly. The flat portions of the spines are tuberculated in the *Rita* sp. and striated in the *Mystus* sp. The opercular bones are trigonal (Pl.II, Fig.1), little convex or flat in shape and possess a notch proximally. The ribs, when present, specially the thoracic ribs, are well-curved, slender pointed and those in the carps show distinct narrow sulcation along their length.

The reptilian remains (Pls.III & IV) from the State are quite rich. These belong to two species of crocodiles, one of gharial, five of fresh water and one of marine turtles. Though, all the species are

still extant, their number and distributional areas have been greatly reduced and shrunken. Specially, the gharial is no more found in the State. It is noteworthy, that the reptilian remains have been recorded only from those sites which were situated within the proximity of present or ancient rivers. The mediaeval Boral, situated in the proximity of Sunderbans and through which the ancient Bhagirathi used to flow, yielded three species of river turtles, one of marine, two crocodilian species, one of the marsh and the other of salt. The gharial, in the form of semi-fossilised remains, have been recovered from Barrackpur (in close proximity to the river Hooghly) and from Baltora formations of Bankura (within the proximity of river Damodar & its tributaries). A scute of this species was also identified from the remains recovered from Pandu Rajar Dhibi near the river Ajoy. The remains of turtles are mostly fragments of either carapace or plastron (Pl.III, Fig.6-9). These structures are composed of bony plates which protect the animals dorso-ventrally. The cornified upper scutes on the carapace are generally destroyed in the soil action. The bony plates are flat or little convex and having prominent impressions of sutures. The geometrical shapes, number of plates and species-specific orientations help diagnosing the species. The jaws or maxillae of present day turtles do not bear teeth but possess sharp-edged hornified beak for cutting. The palatal bones are united, ossified and appears to be a solid structure. The union of prootic and opisthotic bones have been fused broadly with the quadrate and squamosal. The external nostrils have a common bony opening.

The bird remains from the State are scanty and belong to the jungle fowl and pigeon. Of course, the remains of fowl from Chalcolithic phase of Bharatpur (in Bardhaman) may belong to the semi-domesticated birds. The bird remains were recovered from the settlement sites, so they are assumed to be dietary relics. The native colourful domestic cock probably originated from the jungle fowl-its direct ancestral form and the domestication was likely brought about by the aborigines of eastern India in Neolithic period. The bird bones are generally delicate, light but strong and having comparative thin compact bony wall. The skull is having a large roundish brain case, single occipital condyle and large orbits. The cranium is without any suture. The vertebrae are characterised by having a saddle-shaped ends. The ribs possess a side branch or projection that abuts the rib behind. The sternum is vertically flat and very much expanded to accommodate the flight muscles. The coracoid of the girdle bone, unlike the mammalian, is very prominent. The ulna is comparatively stouter than the radius. The pelvic girdle in bird is a large bone, having a long ilium that fuses with the sacrum but the two pubis never unite as is found in the mammals. The femur is short but robust. The tarso-metatarsus in the hind legs are characterised by having three pulley-like articulating condyles.

The mammalian remains from the State of West Bengal belong mostly to the domesticated animals. However, some natural species and a few of comparatively very old chronology have also been unearthed from some typical zones (See Table No.1). Some of these species show interestingly an affinity with the present day Ethiopian fauna. The *Panthera leo*, *P. pardus*, *Crocuta* sp. and *Giraffa cf. camelopardalis* unearthed as fossilised remains from Bankura are estimated to be Late Pleistocene. Out of these, the *Crocuta* sp., commonly known as spotted hyaena and *Giraffa camelopardalis*, the giraffe were extinct in this subcontinent long back along with the Siwalik mammals in Northern India. Surprisingly, these species, though evolved and became extinct in this country, have succeeded to continue their existence through migration to and adaptation in Africa. On the contrary, the striped hyaena, *Hyaena hyaena*, reciprocated this phenomena through a reverse migration from Africa to India.

Among the other extinct species, worth mentioning are the *Equus onager khur*, *Bos namadicus* (or rather *Bos namadicus bengalensis*), *Bubalus palaeindicus*, *Boselaphus namadicus*, *Miotraocerus cf. punjabicus* (Pl.VII, Fig.33), *Hystrix crassidense* and *Palaeoloxodon* sp. (or rather *Elephas namadicus*). Fossilised remains of these species were unearthed from the quarternary deposits within the zone of Bankura, Purulia and Midnapur. It appears that a Holocene population of the extinct Siwalik Cattle, *Bos namadicus* Falconer, some how, could manage to thrive in the alluvial plains of West Bengal. This species, though derived from the Upper Pleistocene progenitor, *Bos namadicus*, exceeded the former in body proportions and dental measurements and have been grouped under the subspecies *Bos namadicus bengalensis* Ghosh (1977), of the former. The nomenclature of the extinct Pleistocene elephant from Bankura reported by Dassarma *et. al.* (1982), may more correctly be equated with *Elephas namadicus* in the line of a recent work by Tripathy & Basu (1983).

The remains of wild and natural species, which presently have very vulnerable status in the State are comprising *Rhinoceros unicornis* (Pl.VII, Fig.29), *Cervus duvauceli* (Fig.17 & 21), *Axis porcinus* (Fig.19, 20 & 22), *Bos qaurus*, *Bubalus bubalis* (wild) (Fig.23,24 & 27) and *Antilope cervicapra* (Fig.30, 31). The *Boselaphus tragocamelus*, commonly known as Nilgai, in all probability became extinct from the State only in the last century of the pre-Christian era. Fossil remains of Nilgai and Black Buck (*Antilope cervicapra*) (Pl.VII, Figs.30 & 31) from the quarternary deposits in the South-western districts of the State attest that out of the surviving four Asiatic species of antelopes, the ancestors of atleast these two species used to haunt the scrub jungles of Bankura and Birbhum, twenty to thirty thousand years ago. The only remains of *Rhinoceros unicornis*, the Great One-Horned Rhino, recently unearthed from Sonarpur, testify that the distribution of this species was extended up to the southern West Bengal from where it disappeared very recently. Of course, past occurrence of the *Rhinoceros sondaicus*, the Lesser One-Horned Rhino from Lower Bengal has been well recorded and representative skulls and skeletons are preserved the departmental repository.

The domesticated species of mammals from the State as represented by the bone remains from archacological sites (see Table No.2), cover *Canis familiaris* (The Pariah Dog), *Sus scrofa cristatus* (The Pig), *Bos indicus* (The Humped Cattle), *Bubalus bubalis* (The Buffalo), *Capra hircus aegagrus* (The Goat), *Ovis orientalis vignei* (The Sheep), *Equus caballus* (The Horse) and *Camelus dromedarius* (The One-Humped Camel).

It is definite that horse, camel, goat and sheep were not indigenously domesticated in the State. These were rather introduced slowly from the western countries. The horse was domesticated as a draft or transport animal in central Asia and East Europe about 3500 B.C. ago. However, the remains unearthed from Chalcolithic Bharatpur and Kotasur testify that the animal reached the area of present Barddhaman and Birbhum as early as first millennium B.C. The remains of horse from Gayeshpur are not much old and very likely belong to the same individual, a heavy-built dobbin type breed. The camel, so called ship of the desert was domesticated in southern Arabia about 3000 B.C. ago. This riding cum draft animal was indispensable to the Arab traders and West Asiatic nomads in their journey from place to place across the hot dry desert. Of course, very shortly the people of Rajasthan and Gujarat in India, learnt the domestication and deployed the animal in carriage and transport. However, the remains of camel from Iron Age phase of Bharatpur suggest that the animal reached the

area about 200 years B.C. ago, either directly through the Arabian merchants or via the traders of the aforesaid provinces.

The sheep and goats were domesticated about nine thousand years ago from the ancestral mountain-living wild species of Asia Minor and Kashmir. However, from the remains of goat unearthed from the State, it appears that a breed with short stature had been maintained by the farmers since 2500 years B.P.

The remains of pig, buffalo and elephant from the State, specially from sites older than one millennium B.C. are comprising both wild and domesticated animals. It is definite that the domesticated stock of these animals inherited their ancestry to the indigenous wild species. For example, it is observed that the piglings of domesticated pigs, specially in the area of Midnapur, Burdwan and South 24-Parganas very often show the characteristic pelage and horizontal stripes similar to those of the wild young. Actually, excepting more robust dentition, bit slender and longer limb bones, the wild animals that haunting in the neighbouring jungles are indistinguishable from those of the local breeds. The local breed of pig was very likely domesticated in the area of Midnapur and Burdwan during the Late Neolithic and Early Ferro-Chalcolithic phase, as evidenced from the study on the remains from Binpur, Jamtholgora, Bharatpur, Mangolkot and Pandu Rajar Dhibi.

The majority of the early domesticated breeds of buffalo, as testified by the unearthed remains from the State are of river type, characterised by having curved or sickle-shaped short horns and with elevated parietal bone. However, the wild progenitor of this breed is not found in the State. But the other breed i.e. swampy type with trigonal (in cross section) semi-circular horns and more or less plain parietal bone, certainly owe their origin to the still extant wild buffalo now restricted in the northern West Bengal. The remains of wild buffalo from Dhuliapur, Canning, Moslandpur and Boral belong to the swamp type.

The remains of the other domesticated animal unearthed from the State belong to the elephant. Remains of the animal from Early Historic settlement sites of Kotasur, Farakka, Debalaya and Tamruk, clearly prove that the people of the State not only learnt the technique to tame this huge wild animal prior to 500 years B.C. but also deployed the animal in town or port services. The remains of elephants from Binpur, Jamtholgora and Boral are probably of wild animals. It is mentionworthy that in practice, young animals are caught from the jungles, made domesticated by the animal trainer and then engaged in the works

The wild natural species of mammals which have been extinct from the State is listed in the Table No.1 and the earliest record of domesticated mammals in the State has been shown in the Table No.2.

Some characters of the mammalian skeleton are : Skull with two occipital condyles, long facial and narrow nasal bones, enlarged brain case bound anteriorly by alisphenoid and posteriorly by squamosal process, palate without ectopterygoid bone, reduced parasphenoid. Neck vertebrae seven, the elements of the first vertebra or atlas have been fused to form a ring capable to rotate around the odontoid process of axis, teeth heterodont and in sockets, modified according to food habit, shoulder girdle without interclavicle but with lateral supraspinatus fossa; feet and toes variously adopted for walking, running, climbing, burrowing, swimming and flying. Some general characters of the limb bones have been given under materials and methods.

TABLE 3

List of Animal species recorded during Archeological Survey

Species	Group	Site of Occurrence	Det/Studied by	Remarks
1. <i>Bellamyia bengalensis</i>	Gastropoda	Mainagar, 24-Parganas (S)	M. Ghosh, 1988 (un. pub.)	
2. <i>Cyclophorus</i> sp.	Gastropoda	Jamtholgora, Midnapur	M. Ghosh, 1988 (in press)	
3. <i>Pila globosa</i>	Gastropoda	Mainagar, 24-Parganas (S)	M. Ghosh (in press)	
4. <i>Turbinella pyrum</i>	Gastropoda	Mangolkot, Burdwan	M. Ghosh, 1988 (in press)	
5. Fresh water crab	Crustacea	Mangolkot, Burdwan	M. Ghosh, 1988 (in press)	
Fresh water crab	Crustacea	Pandurajar Dhibi, Burdwan	M. Ghosh & U. Saha 1985 (in press)	
6. <i>Catla Catla</i>	Osteichthys	Pandurajar Dhibi, Burdwan	M. Ghosh & U. Saha 1985 (in press)	
7. <i>Colisa</i> cf. <i>fasciata</i>	Osteichthys	Boral, 24-Parganas (S)	M. Ghosh & U. Saha 1985	
8. <i>Rita</i> sp.	Osteichthys	Pandurajar Dhibi, Burdwan	M. Ghosh 1991	
9. <i>Mystus</i> sp.	Osteichthys	Pandurajar Dhibi, Burdwan	M. Ghosh 1991	
<i>Mystus</i> sp.	Osteichthys	Mangolkot, Burdwan	M. Ghosh, 1988 (in press)	
0. <i>Mystus</i> sp.	Osteichthys	Boral, 24-Parganas (S)	M. Ghosh & U. Saha, 1988.	
1. Undet. carps	Osteichthys	Mangolkot, Burdwan	M. Ghosh, 1988 (in press)	
Undet. carps	Osteichthys	Pandurajar Dhibi, Burdwan	M. Ghosh & U. Saha 1985 (in press)	
2. <i>Crocodylus palustris</i>	Reptilia	Boral, 24-Parganas (S)	M. Ghosh & U. Saha, 1988.	
3. <i>Crocodylus porosus</i>	Reptilia	Boral, 24-Parganas (S)	M. Ghosh & U. Saha, 1988.	
4. <i>Gavialis gangeticus</i>	Reptilia	Babladanga; Kansara & Saragdih, Bankura	D.C. Dassarma & others, 1982.	
<i>Gavialis gangeticus</i>	Reptilia	Pandurajar Dhibi, Burdwan	M. Ghosh & U. Saha 1985 (in press).	
<i>Gavialis gangeticus</i>	Reptilia	Barrackpur, 24-Parganas (N)	P.K. Sen & M. Banerjee, 1984.	
5. <i>Batagur baska</i>	Reptilia	Biribari; Kansara & Saragdih, Bankura	D.C. Dassarma & others, 1982.	
<i>Batagur baska</i>	Reptilia	Mangolkot, Burdwan	M. Ghosh, 1988 (in press).	
5. <i>Chitra indica</i>	Reptilia	Barackpur, 24-Parganas (N)	P. K. Sen & M. Banerjee, 1984.	

Species	Group	Site of Occurrence	Det/Studied by	Remarks
<i>Chitra indica</i>	Reptilia	Boral, 24-Parganas (S)	M. Ghosh & U. Saha, 1988.	
<i>Chitra indica</i>	Reptilia	Mangolkot, Burdwan	M. Ghosh, 1988 (in press).	
17. <i>Hardella thurjii</i>	Reptilia	Boral, 24-Parganas (S)	M. Ghosh & U. Saha, 1988.	
18. <i>Lepidochelys olivacea</i>	Reptilia	Boral, 24-Parganas (S)	M. Ghosh & U. Saha, 1988.	
19. <i>Lissemys punctata punctata</i>	Reptilia	Mangolkot, Burdwan	M. Ghosh, 1988 (in press).	
<i>Lissemys punctata punctata</i>	Reptilia	Pandurajar Dhibi, Burdwan	M. Ghosh & U. Saha 1985 (in press).	
20. <i>Trionyx gangeticus</i>	Reptilia	Bhaluksoda, Bankura	M. Ghosh, 1987 (un pub).	
<i>Trionyx gangeticus</i>	Reptilia	Bharatpur, Burdwan	S. Banerjee, 1981.	
<i>Trionyx gangeticus</i>	Reptilia	Tamluk, Midnapur	S. Banerjee & others, 1975 (un pub).	
<i>Trionyx gangeticus</i>	Reptilia	Boral, 24-Parganas (S)	M. Ghosh & U. Saha, 1988.	
21. <i>Columba sp.</i>	Aves	Mangolkot, Burdwan	M. Ghosh, 1988 (in press).	
22. <i>Gallus gallus murghi</i>	Aves	Mangolkot, Burdwan	M. Ghosh, 1988 (in press).	
<i>Gallus gallus murghi</i>	Aves	Bharatpur, Burdwan	S. Banerjee, 1981.	
<i>Gallus gallus murghi</i>	Aves	Pandurajar Dhibi, Burdwan	M. Ghosh & U. Saha, 1985 (in press).	
23. <i>Hystrix crassidens</i>	Mammalia	Babladanga; Gogra & Susunia, Bankura	D.C. Dassarma & others, 1982	
24. <i>Hystrix indicæ</i>	Mammalia	Binpur, Midnapur	M. Ghosh, 1985 (in press).	
25. <i>Rattus rattus</i>	Mammalia	Mangolkot, Burdwan	M. Ghosh, 1988 (in press).	
<i>Rattus rattus</i>	Mammalia	Pandurajar Dhibi, Burdwan	M. Ghosh & U. Saha, 1985 (in press).	
<i>Rattus rattus</i>	Mammalia	Tamluk, Midnapur	S. Banerjee & others, 1975 (un pub).	
26. <i>Bos indicus</i>	Mammalia	Bhaluksoda, Bankura	M. Ghosh, 1987 (un pub.)	
<i>Bos indicus</i>	Mammalia	Bahiri, Birbhum	M. Ghosh & others, 1988 (in press.)	
<i>Bos indicus</i>	Mammalia	Pandurajar Dhibi, Burdwan,	M. Ghosh & U. Saha, 1985 (in press).	
<i>Bos indicus</i>	Mammalia	Binpur, Midnapur	M. Ghosh, 1985 (un pub).	
<i>Bos indicus</i>	Mammalia	Tamluk, Midnapur	S. Banerjee & others, 1975 (un pub).	

Species	Group	Site of Occurrence	Det/Studied by	Remarks
<i>Bos indicus</i>	Mammalia	Bharatpur, Burdwan	S. Banerjee, 1981.	
<i>Bos indicus</i>	Mammalia	Mangolkot, Burdwan	M. Ghosh, 1988 (in press).	
<i>Bos indicus</i>	Mammalia	Pandurajar Dhibi, Burdwan	M. Ghosh & U. Saha, 1985 (in press).	
27. <i>Bos gaurus</i>	Mammalia	Bahiri, Birbhum	M. Ghosh & others, 1988 (in press).	
<i>Bos gaurus</i>	Mammalia	Boral, 24-Parganas (S)	K. D. Saha & others, 1989 (in press).	
28. <i>Bos namadicus</i>	Mammalia	Aduri; Biribari & Tentulrakha, Bankura	D.C. Dassarma & others, 1982.	
<i>Bos namadicus</i>	Mammalia	Jamthol & Dhankora Bankura	M. Ghosh, 1987 (un pub).	
<i>Bos namadicus</i>	Mammalia	Susunia, Bankura	S. Banerjee & U. Saha, 1976.	
<i>Bos namadicus</i>	Mammalia	Biribari, Bankura	M. Ghosh, 1987 (un pub).	
<i>Bos namadicus</i>	Mammalia	Bharatpur, Burdwan	S. Banerjee, 1981.	
<i>Bos namadicus</i>	Mammalia	Jamtholgora, Midnapur	M. Ghosh, 1987 (un pub).	
<i>Bos namadicus</i>	Mammalia	Mochpal, 24-Parganas (N)	S. Banerjee, 1976.	
29. <i>Bos namadicus bengalensis</i>	Mammalia	Chandraketugarh 24-Parganas (N)	M. Ghosh, 1977.	
<i>Bos namadicus bengalensis</i>	Mammalia	Jamtholgora, Midnapur	M. Ghosh, 1987 (un pub).	
30. <i>Boselaphus tragocamelus</i>	Mammalia	Bharatpur, Burdwan	S. Banerjee, 1981.	
31. <i>Boselaphus namadicus</i>	Mammalia	Babladanga; Biribari & Pairasol; Bankura	D.C. Dassarma & others, 1982.	
32. <i>Boselaphus</i> sp.	Mammalia	Dhuliapur, Midnapur	M. Ghosh & U. Saha, 1985 (un pub).	
33. <i>Bubalus bubalis</i>	Mammalia	Bhaluksoda, Bankura	M. Ghosh, 1987 (un pub).	
<i>Bubalus bubalis</i>	Mammalia	Bahiri, Birbhum,	M. Ghosh & others, 1988 (in press).	
<i>Bubalus bubalis</i>	Mammalia	Kotasur, Birbhum	M. Ghosh & others, 1988 (in press).	
<i>Bubalus bubalis</i>	Mammalia	Bharatpur, Burdwan	S. Banerjee, 1981.	
<i>Bubalus bubalis</i>	Mammalia	Mangolkot, Burdwan	M. Ghosh, 1988 (in press).	
<i>Bubalus bubalis</i>	Mammalia	Pandurajar Dhibi, Burdwan	M. Ghosh & U. Saha, 1985 (in press).	
<i>Bubalus bubalis</i>	Mammalia	Kattara, Midnapur	M. Ghosh & others, 1988 (un pub).	

Species	Group	Site of Occurrence	Det/Studied by	Remarks
<i>Bubalus bubalis</i>	Mammalia	Maslandpur, 24-Parganas (N)	S. Biswas & others, 1988 (un pub).	
<i>Bubalus bubalis</i>	Mammalia	Boral, 24-Parganas (S)	M. Ghosh, U. Saha & K. D. Saha, 1988.	
<i>Bubalus bubalis</i>	Mammalia	Canning, 24-Parganas (S)	M. Ghosh, 1985.	
34. <i>Bubalus bubalis palaeindicus</i>	Mammalia	Dhuliapur, Bankura	M. Ghosh, 1987 (un pub).	
<i>Bubalus bubalis palaeindicus</i>	Mammalia	Saragdih, Bankura	D.C. Dassarma, 1982.	
<i>Bubalus bubalis palaeindicus</i>	Mammalia	Panihati, 24-Parganas (N)	Ghosh & U. Saha (un pub).	
35. <i>Antilope cervicapra</i>	Mammalia	Beldanga, Bankura	M. Ghosh & U. Saha, 1987 (un pub).	
<i>Antilope cervicapra</i>	Mammalia	Pairasol, Bankura	D.C. Dassarma & others, 1982.	
<i>Antilope cervicapra</i>	Mammalia	Dhuliapur	M. Ghosh & U. Saha, 1987 (un pub).	
36. <i>Miotragocerus cf. punjabicus</i>	Mammalia	Aduri, Bankura	S. Banerjee & others, 1987.	
37. <i>Capra hircus aegagrus</i>	Mammalia	Mahisdal, Birbhum	B. Nath & M. Ghosh; 1968 (un pub)	
<i>Capra hircus aegagrus</i>	Mammalia	Bharatpur, Burdwan	S. Banerjee, 1981.	
<i>Capra hircus aegagrus</i>	Mammalia	Pandurajar Dhibi, Burdwan	M. Ghosh & U. Saha, 1985 (in press).	
<i>Capra hircus aegagrus</i>	Mammalia	Binpur, Midnapur	M. Ghosh, 1985 (in press).	
<i>Capra hircus aegagrus</i>	Mammalia	Tamluk, Midnapur	S. Banerjee & others, 1975 (in press).	
38. <i>Ovis orientalis vignei</i>	Mammalia	Bharatpur, Burdwan	S. Banerjee, 1981.	
39. <i>Muntiacus muntjak</i>	Mammalia	Bhaluksoda, Bankura	M. Ghosh, 1987 (un pub).	
<i>Muntiacus muntjak</i>	Mammalia	Tentulrakha, Bankura	D.C. Dassarma, 1982.	
<i>Muntiacus muntjak</i>	Mammalia	Bharatpur, Burdwan	S. Banerjee, 1981.	
40. <i>Axis axis</i>	Mammalia	Baldiha; Kansara & Tentulrakha; Bankura	D.C. Dassarma & others, 1982.	
<i>Axis axis</i>	Mammalia	Biribari, Bankura	M. Ghosh, 1987 (un pub).	
<i>Axis axis</i>	Mammalia	Jamtholgora, Midnapur	M. Ghosh & U. Saha, 1987 (in press).	

Species	Group	Site of Occurrence	Det/Studied by	Remarks
<i>Axis axis</i>	Mammalia	Tamluk, Midnapur	S. Banerjee & others, 1975 (un pub).	
<i>Axis axis</i>	Mammalia	Bahiri, Birbhum	M. Ghosh & others, 1988 (in press)	
<i>Axis axis</i>	Mammalia	Mahisdal, Birbhum	B. Nath & M. Ghosh, 1968 (un pub)	
<i>Axis axis</i>	Mammalia	Boral, 24-Parganas (S)	M. Ghosh & U. Saha, 1988.	
41. <i>Axis porcinus</i>	Mammalia	Mangolkot, Burdwan	M. Ghosh, 1988 (in press).	
<i>Axis porcinus</i>	Mammalia	Pandurajar Dhibi	M. Ghosh & U. Saha, 1985 (in press).	
42. <i>Cervus duvauceli</i>	Mammalia	Beldanga; Beldiha & Saragdih, Bankura	D.C. Dassarma & others, 1982.	
<i>Cervus duvauceli</i>	Mammalia	Bahiri, Birbhum	M. Ghosh & others, 1988 (in press).	
<i>Cervus duvauceli</i>	Mammalia	Mahisdal, Birbhum	B. Nath & M. Ghosh, 1968 (un pub).	
<i>Cervus duvauceli</i>	Mammalia	Bharatpur, Burdwan	S. Banerjee, 1981.	
43. <i>Cervus duvauceli</i>	Mammalia	Mangolkot, Burdwan	M. Ghosh, 1988 (in press).	
<i>Cervus duvauceli</i>	Mammalia	Pandurajar Dhibi, Burdwan	M. Ghosh & U. Saha, 1985 (in press).	
<i>Cervus duvauceli</i>	Mammalia	Tamluk, Midnapur	S. Banerjee & others, 1975 (un pub).	
<i>Cervus duvauceli</i>	Mammalia	Boral, 24-Parganas (S)	M. Ghosh & U. Saha, 1988.	
44. <i>Cervus unicolor</i>	Mammalia	Babladanga; Gogra & Saragdih, Bankura	D.C. Dassarma & others, 1982.	
<i>Cervus unicolor</i>	Mammalia	Bhaluksoda, Bankura	M. Ghosh, 1987 (un pub).	
45. <i>Camelus dromedarius</i>	Mammalia	Bharatpur, Burdwan	S. Banerjee, 1981.	
46. <i>Giraffa cf. camelopardalis</i>	Mammalia	Jamthol (Susunia), Bankura	S. Banerjee & M. Ghosh, 1977.	
47. <i>Sus scrofa cristatus</i>	Mammalia	Kansara, Bankura	D.C. Dassarma & others, 1982.	
<i>Sus scrofa cristatus</i>	Mammalia	Bahiri, Birbhum	M. Ghosh & others, 1988 (in press).	
<i>Sus scrofa cristatus</i>	Mammalia	Kotasur, Birbhum	M. Ghosh & others, 1988 (in press).	
<i>Sus scrofa cristatus</i>	Mammalia	Mahisdal, Birbhum	B. Nath & M. Ghosh, 1968 (un pub)	
<i>Sus scrofa cristatus</i>	Mammalia	Bharatpur, Burdwan	S. Banerjee, 1981.	
<i>Sus scrofa cristatus</i>	Mammalia	Mangolkot, Burdwan	M. Ghosh, 1988 (in press).	
<i>Sus scrofa cristatus</i>	Mammalia	Pandurajar Dhibi, Burdwan	M. Ghosh & U. Saha, 1985 (in press).	

Species	Group	Site of Occurrence	Det/Studied by	Remarks
<i>Sus scrofa cristatus</i>	Mammalia	Binpur, Midnapur	M. Ghosh, 1985 (in press).	
<i>Sus scrofa cristatus</i>	Mammalia	Jamtholgora, Midnapur	M. Ghosh & U. Saha, 1987 (un pub).	
<i>Sus scrofa cristatus</i>	Mammalia	Tamluk, Midnapur	S. Banerjee & others, 1975 (un pub).	
<i>Sus scrofa cristatus</i>	Mammalia	Boral, 24-Parganas (S)	M. Ghosh & U. Saha, 1988.	
48. <i>Equus onager khur</i>	Mammalia	Babladanga; Gogra & Kansara, Bankura	K. D. Saha & others, 1969-75 (un pub).	
<i>Equus onager khur</i>	Mammalia	Hatinal, Burdwan	D. C. Dassarma & others, 1982.	
<i>Equus onager khur</i>	Mammalia	Baltora, Purulia	D. C. Dassarma & others, 1982.	
49. <i>Equus caballus</i>	Mammalia	Tamluk, Midnapur	S. Banerjee & others, 1975 (un pub).	
<i>Equus caballus</i>	Mammalia	Gayeshpur, Nadia	M. Ghosh, 1986 (un pub).	
50. <i>Rhinoceros unicornis</i>	Mammalia	Ramchandrapur, 24-Parganas (S)	M. Ghosh & others, 1992.	
51. <i>Felis chaus</i>	Mammalia	Mahisdal, Birbhum	B. Nath & M. Ghosh, 1968 (un pub).	
52. <i>Panthera cf. leo</i>	Mammalia	Susunia, Bankura	A. K. Dutta, 1976.	
53. <i>Panthera cf. leo pardus</i>	Mammalia	Jhirkoria (Susunia), Bankura	K. D. Saha & others, 1984.	
54. <i>Crocota sp.</i>	Mammalia	Susunia, Bankura	A. K. Dutta, 1976.	
55. <i>Canis lupus pallipes</i>	Mammalia	Mahisdal, Birbhum	B. Nath & M. Ghosh, 1968	
56. <i>Canis aurius</i>	Mammalia	Pandurajar Dhibi	M. Ghosh, 1990.	
<i>Canis aurius</i>	Mammalia	Boral, 24-Parganas (S)	K. D. Saha & others, 1989 (in press).	
57. <i>Canis familiaris</i>	Mammalia	Bhaluksoda, Bankura	M. Ghosh, 1987 (un pub).	
<i>Canis familiaris</i>	Mammalia	Bharatpur, Burdwan	S. Banerjee, 1981.	
<i>Canis familiaris</i>	Mammalia	Binpur, Midnapur	M. Ghosh, 1985 (in press).	
<i>Canis familiaris</i>	Mammalia	Jamtholgora, Midnapur	M. Ghosh, 1985 (in press).	
<i>Canis familiaris</i>	Mammalia	Tamluk, Midnapur	S. Banerjee & others, 1975 (un pub).	
58. (<i>Palaeoloxodon sp.</i>) = <i>Elephas namadicus</i>	Mammalia	Beldanga & Kansara, Bankura	D.C. Dassarma & others, 1982.	
59. <i>Elephas maximus</i>	Mammalia	Jamtholgora, Midnapur	M. Ghosh & U. Saha, 1987 (un pub).	
<i>Elephas maximus</i>	Mammalia	Laljol, Midnapur	M. Ghosh, 1985 (in press).	
<i>Elephas maximus</i>	Mammalia	Kotasur, Birbhum	M. Ghosh & others, 1990 (in press).	
<i>Elephas maximus</i>	Mammalia	Farakka, Murshidabad	S. Banerjee & M. Ghosh 1984 (un pub).	
<i>Elephas maximus</i>	Mammalia	Debalaya, 24-Parganas (N)	M. Ghosh, 1984.	

TABLE 4
Collection sites of animal remains

Sites	Districts	Geo-Coordinates	Period/Chronology
Aduri	Bankura	23°23' 09" N 87°00' 40" E	Middle to Late Pleistocene
Babladanga	Bankura	23°23' 09" N 87°00' 40" E	Middle to Late Pleistocene
Baldiha	Bankura	23°24' 03" N 87°04' 42" E	Late Pleistocene/upper Palaeolithic.
Bhaluksoda	Bankura	23°23' 06" N 87°00' 00" E	Late Pleistocene/Neolithic
Biribari	Bankura	23°25' 40" N 86°58' 30" E	Middle Pleistocene.
Dhankora	Bankura	23°22' 50" N 86°57' 54" E	Early Neolithic
Gogra	Bankura	23°27' 32" N 86°57' 03" E	Late Pleistocene.
Jamthol	Bankura	23°23' 40" N 86°56' 20" E	Lower Palaeolithic to Mesolithic.
Jhirkoria	Bankura	23°27' 30" N 86°00' 30" E	Lower Palaeolithic.
Kansara	Bankura	23°32' 26" N 87°03' 28" E	Late Pleistocene.
Pairasol	Bankura	23°30' 30" N 87°04' 06" E	Late Pleistocene.
Saragdih	Bankura	23°31' 34" N 87°05' 13" E	Late Pleistocene.
Susunia	Bankura	23°23' 38" N 86°58' 06" E	Late Pleistocene.
Tentulrakha	Bankura	23°35' 21" N 86°55' 22" E	Middle to Late Pleistocene.
Bahiri	Birbhum	23°38' 56" N 87°46' 20" E	Chalcolithic to Iron age
Kotasur	Birbhum	22°55' N 87°45' E	Chalcolithic.
Mahisdal	Birbhum	23°14' N 87° E	Chalcolithic to Iron Culture.
Bharatpur	Bardhaman	23°28' N 87°20' E	Chalcolithic to Iron Culture.
Hatinal	Bardhaman	23°42' 15" N 86°48' 22" E	Pleistocene.
Mangalkot	Bardhaman	23°32' 14" N 87°52' 20" E	Chalcolithic.
Pandurajar Dhibi	Bardhaman	23°34' N 87°43' E	Chalco to Early Historic.
Beidanga	Medinipur	23°28' 28" N 87°04' 06" E	Late Pleistocene.
Binpur	Medinipur	22°40' 50" N 86°41' 02" E	Neolithic.
Dhuliapur	Medinipur	22°38' 28" N 86°50' 44" E	Middle Pleistocene.

Sites	Districts	Geo-Coordinates	Period/Chronology
Jamtholgora	Medinipur	22°44' 11" N 86°40' 59" E	Mesolithic to Neolithic
Kattara	Medinipur	22°40' N 86°40' E	Palaeolithic to Neolithic.
Tamluk	Medinipur	22°21' N 87°53' E	Neolithic to Early Historic.
Farakka	Murshidabad	24°46' 25" N 87°48' 00" E	Early Historic to Mediaeval.
Gayeshpur	Nadia	22°51' N 88°30' E	Late Historic.
Baltora	Puruliya	23°37' 26" N 86°51' 30" E	Pleistocene.
Barrackpur	North 24-Parganas	22°47' 08" N 88°23' 00" E	Holocene.
Chandraketugarh	North 24-Parganas	22°29' 54" N 88°35' 20" E	Early Historic (Pre-Maurian).
Debalaya	North 24-Parganas	22°41' 10" N 88°40' 35" N	Early Historic (Pre-Maurian).
Maslandpur	North 24-Parganas	22°51' 26" N 88°42' 00" E	Holocene.
Mochpal	North 24-Parganas	22°43' 10" N 88°34' 18" E	Early Historic.
Panihati	North 24-Parganas	22°40' N 88°20' E	Historic/Subrecent.
Boral	South 24-Parganas	22°29' 54" N 88°35' 20" E	Early Historic to Mediaeval.
Canning	South 24-Parganas	22°19' 08" N 88°40' 21" E	Recent
Mainagar	South 24-Parganas	22°27' 17" N 88°22' 19" E	Early Historic to Mediaeval.
Ramchandrapure	South 24-Parganas	22°25' 50" N 88°24' 42" E	Sub-recent.

SUMMARY

Archaeozoological investigations in West Bengal reveal a total of 60 species and subspecies of animals belonging to Mollusca (4), Crustacea (1), Pisces (7), Reptilia (9), and Mammalia (37) (Table 3). These animal remains collected from 40 different sites in 9 districts (Table 4) of West Bengal, largely from southern part of the state indicate the past distribution of some species now extinct in the state or India, the approximate period of domestication of some wild species and the distribution range of some species now considered vulnerable.

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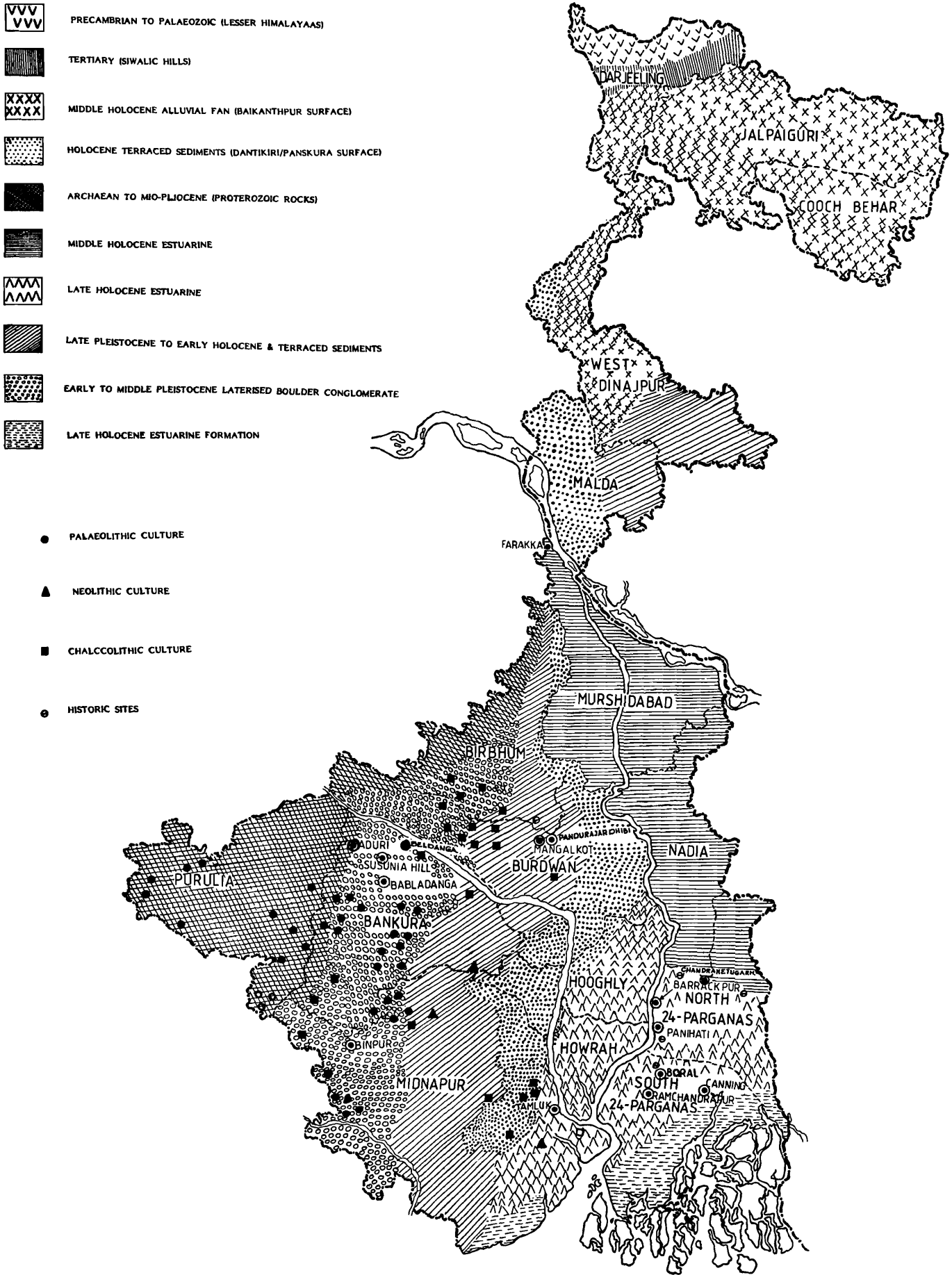
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MAP OF WEST BENGAL SHOWING THE CULTURAL SITES AND GEOMORPHOLOGICAL SECTIONS



-  PRECAMBRIAN TO PALAEOZOIC (LESSER HIMALAYAAS)
-  TERTIARY (SIWALIC HILLS)
-  MIDDLE HOLOCENE ALLUVIAL FAN (BAIKANTHPUR SURFACE)
-  HOLOCENE TERRACED SEDIMENTS (DANTIKIRI/PANSKURA SURFACE)
-  ARCHAEOAN TO MIO-PLIOCENE (PROTEROZOIC ROCKS)
-  MIDDLE HOLOCENE ESTUARINE
-  LATE HOLOCENE ESTUARINE
-  LATE PLEISTOCENE TO EARLY HOLOCENE & TERRACED SEDIMENTS
-  EARLY TO MIDDLE PLEISTOCENE LATERISED BOULDER CONGLOMERATE
-  LATE HOLOCENE ESTUARINE FORMATION

-  PALAEOLITHIC CULTURE
-  NEOLITHIC CULTURE
-  CHALCOLLITHIC CULTURE
-  HISTORIC SITES

scale - 1:1,130,000
 0 50 100
 1cm to 11.3 Kilometres

PLATE - I

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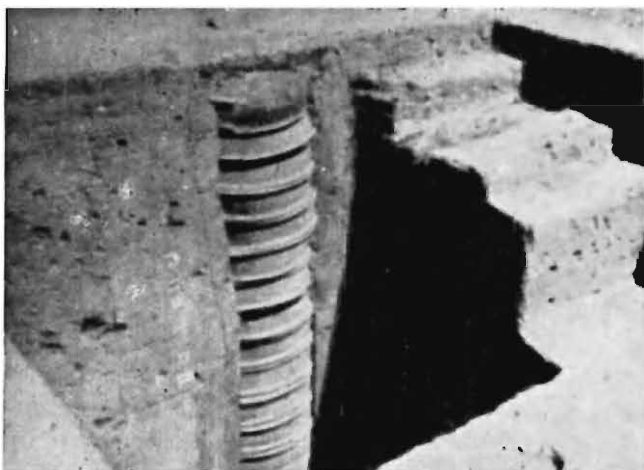


Fig -A

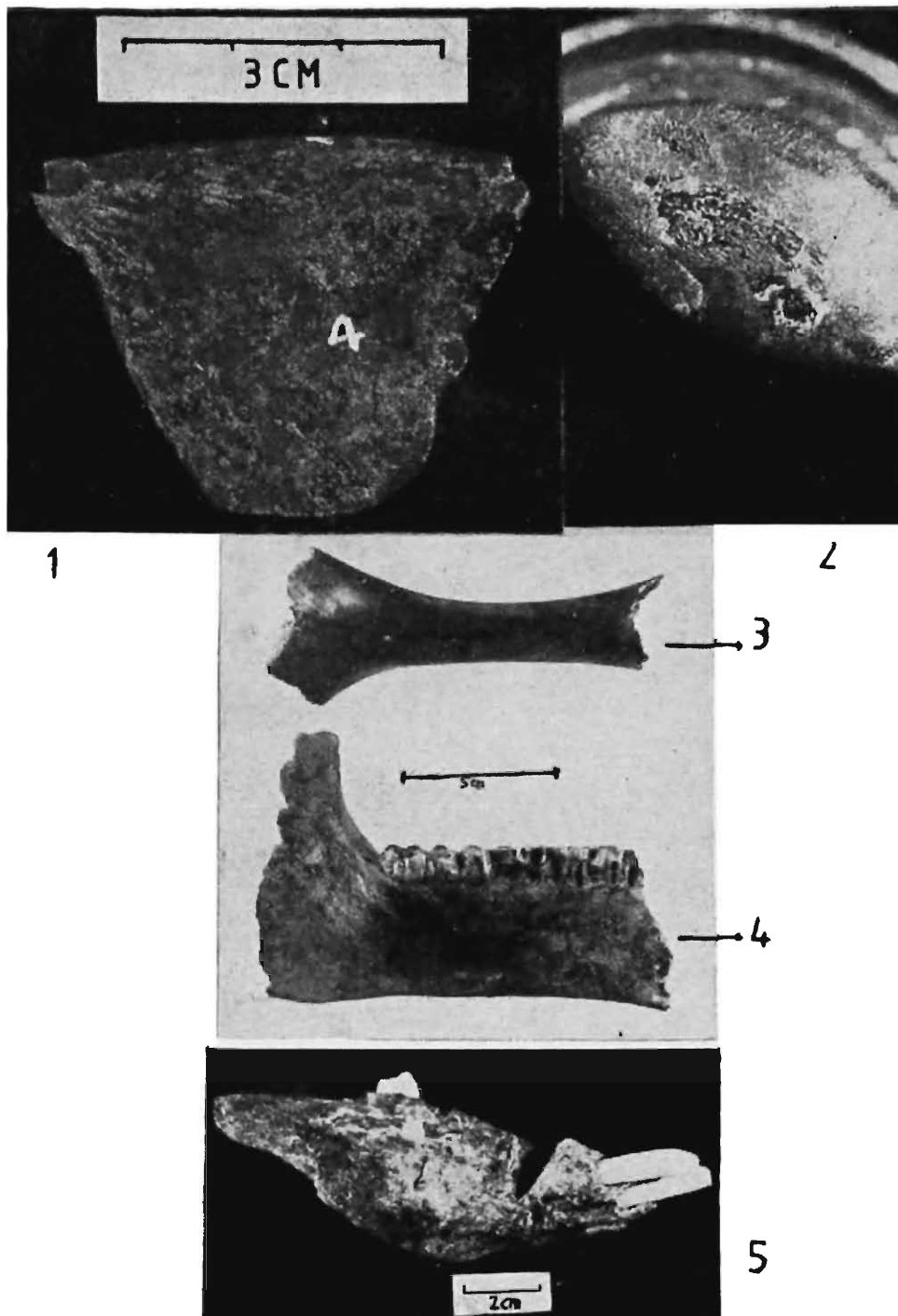


Fig -B

Figs. A. & B. Showing to typical excavated trenches at the Pandu Rajar Dhibi (Burdwan).

PLATE - II

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- Fig. 1 : Opercular bone of a carp from Mangolkot, Burdwan.
Fig. 2 : Charred skeleton of one fish impressed on the base of an earthen pot ('handi') from Boral, South 24-Parganas.
Fig. 3 : Left humerus without condylar ends of undetermined ungulate from Boral. South 24-Parganas.
Fig. 4 : Broken left mandible with teeth of wild boar. *Sus scrofa cristatus* from Boral, South 24-Parganas.
Fig. 5 : Broken mandible with the body and incisors of boar, *Sus scrofa cristatus* from Bahiri (note the cut mark).

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PLATE - III

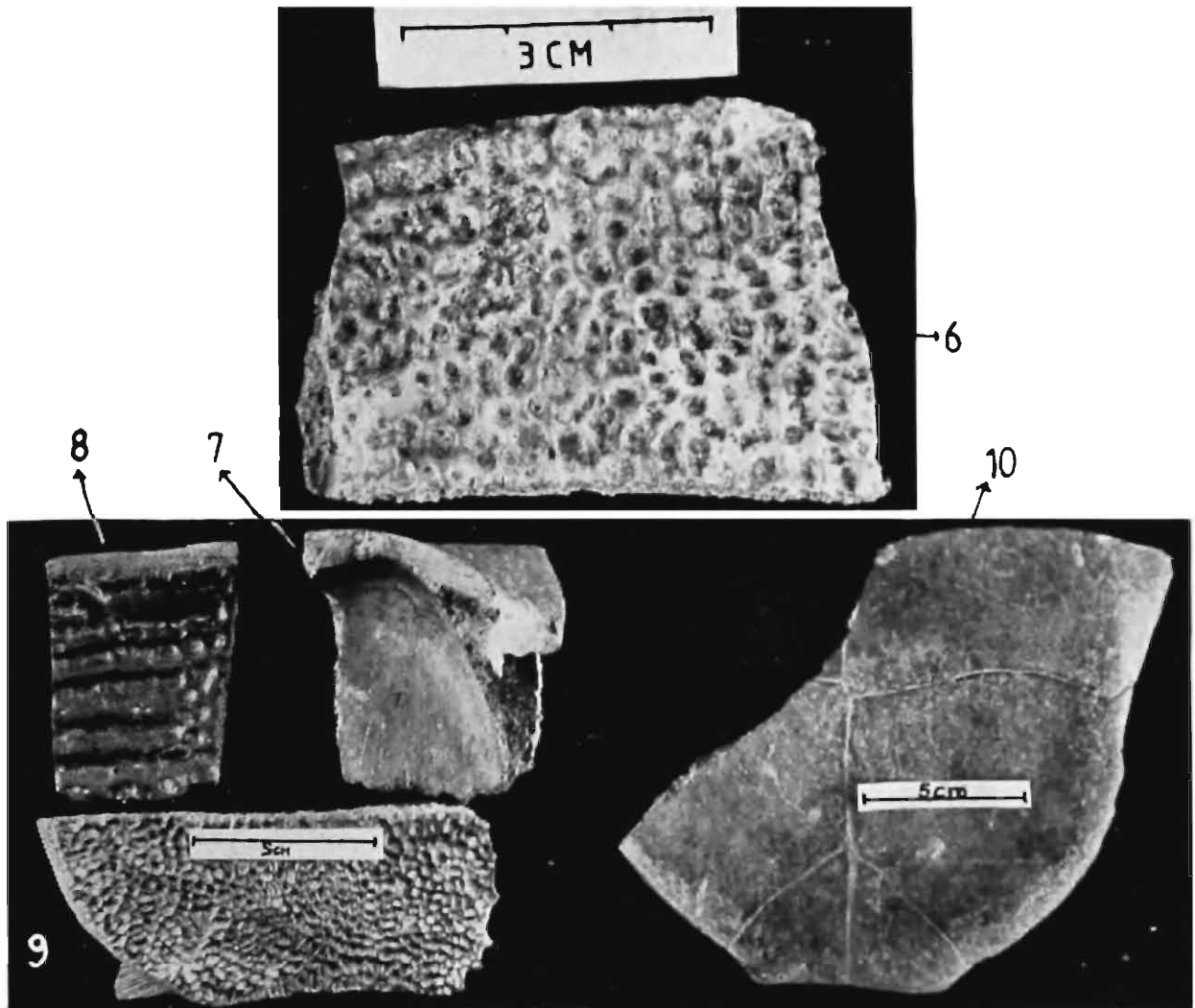


Fig. 6 : Broken hypoplastron of Narrow Headed Soft Shell Turtle *Chitra indica* from Mangolkot. Burdwan.

Fig. 7 : Piece of plastron of undetermined turtle from Boral, South 24-Parganas.

Fig. 8 : Piece of carapace of Indian Soft Shell Turtle, *Trionyx gangeticus* from Boral, South 24-Parganas.

Fig. 9 : Piece of carapace of Narrow Headed Soft Shell Turtle, *Chitra indica* from Boral, South 24-Parganas.

Fig. 10 : Broken plastron of Brahminy River Turtle. *Hardella thurji* from Boral, South 24-Parganas.

PLATE - IV

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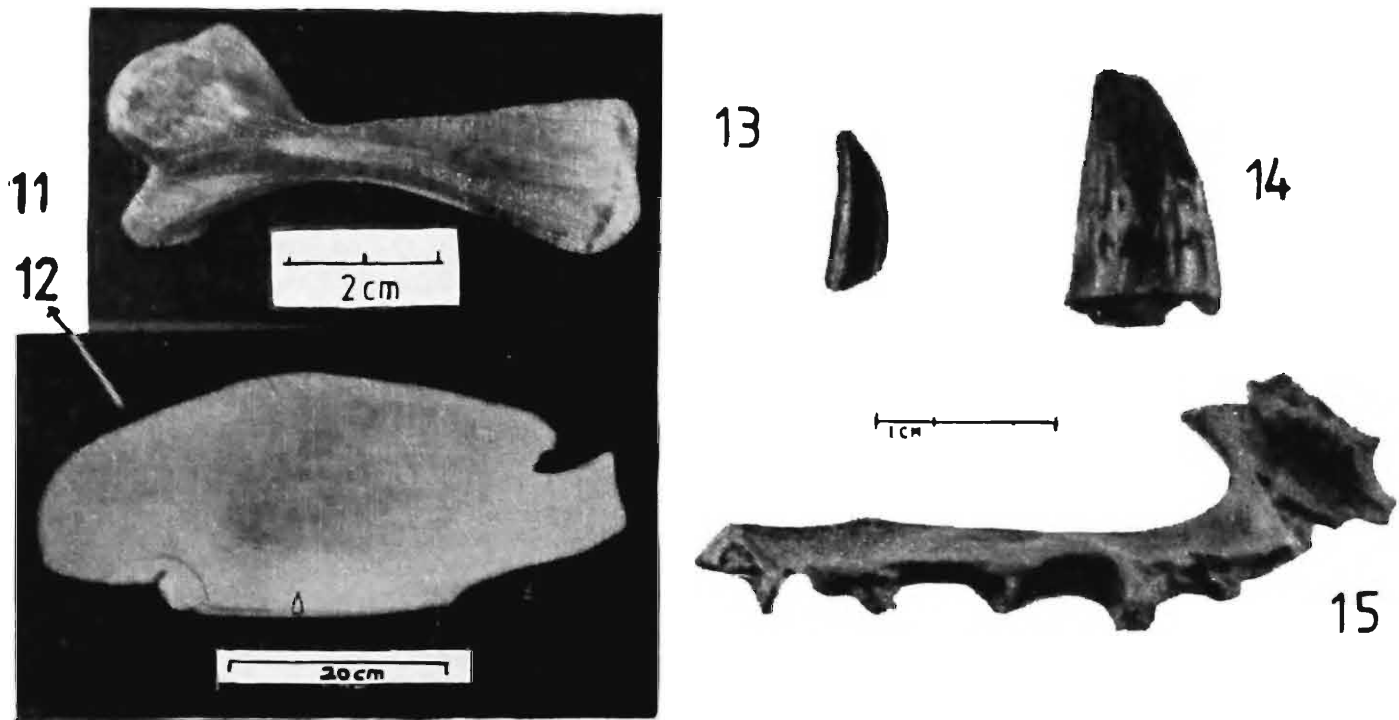


Fig. 11 : Left humerus of Indian Soft Shell Turtle, *Trionyx gangeticus* from Boral, South 24-Parganas.

Fig. 12 : Plastron of Brahminy River Turtle, *Hardella thurji* from Hadipur, North 24-Parganas.

Fig. 13 : Tooth of lower jaw of Marsh Crocodile, *Crocodylus palustris* from Boral, South 24-Parganas.

Fig. 14 : Tooth of lower jaw of the Salt Crocodile, *Crocodylus porosus* from Boral, South 24-Parganas.

Fig. 15 : Broken lower jaw with teeth sockets of Marsh Crocodile, *Crocodylus palustris* from Boral, South 24-Parganas.

PLATE - V

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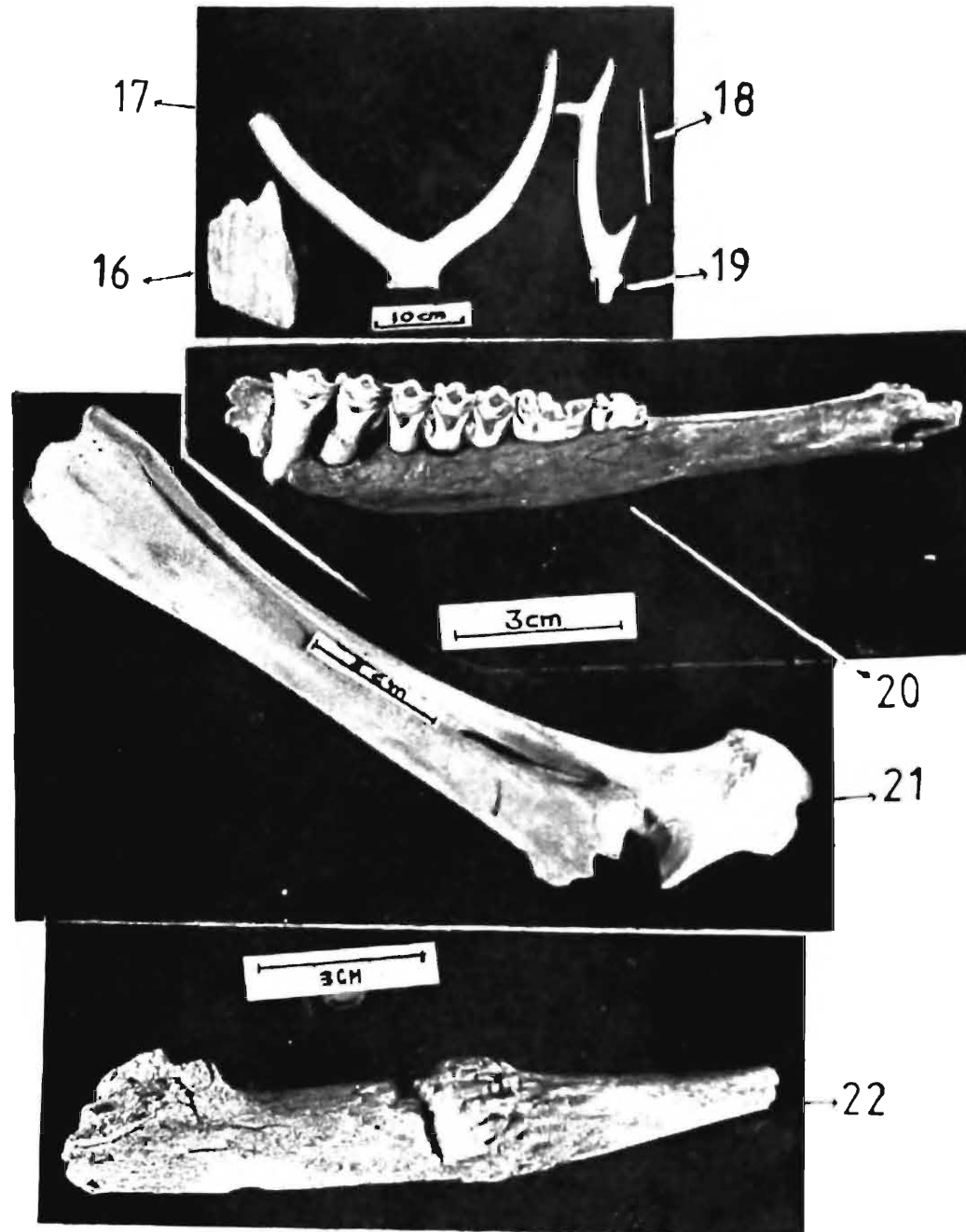


Fig. 16 : Lamellar portion of molar of Indian Elephant, *Elephas maximus* from Hadipur, North 24-Parganas.

Fig. 17 : Antler of *Cervus* sp from Hadipur, North 24-Parganas.

Fig. 18 : Undetermined mammalian fibula from Hadipur, North 24-Parganas.

Fig. 19 : Antler of Hog Deer, *Axis porcinus* from Hadipur, North 24-Parganas.

Fig. 20 : Broken right mandible with P₁P-3 and M₁ of Hog Deer, *Axis porcinus* from Mangolkot, Burdwan.

Fig. 21 : Complete right radio-ulna of Swamp Deer, *Cervus duvauceli* from Boral, South 24-Parganas.

Fig. 22 : Erupting antler with pedicel of Hog Deer, *Axis porcinus* from Mangolkot, Burdwan.

PLATE -VI

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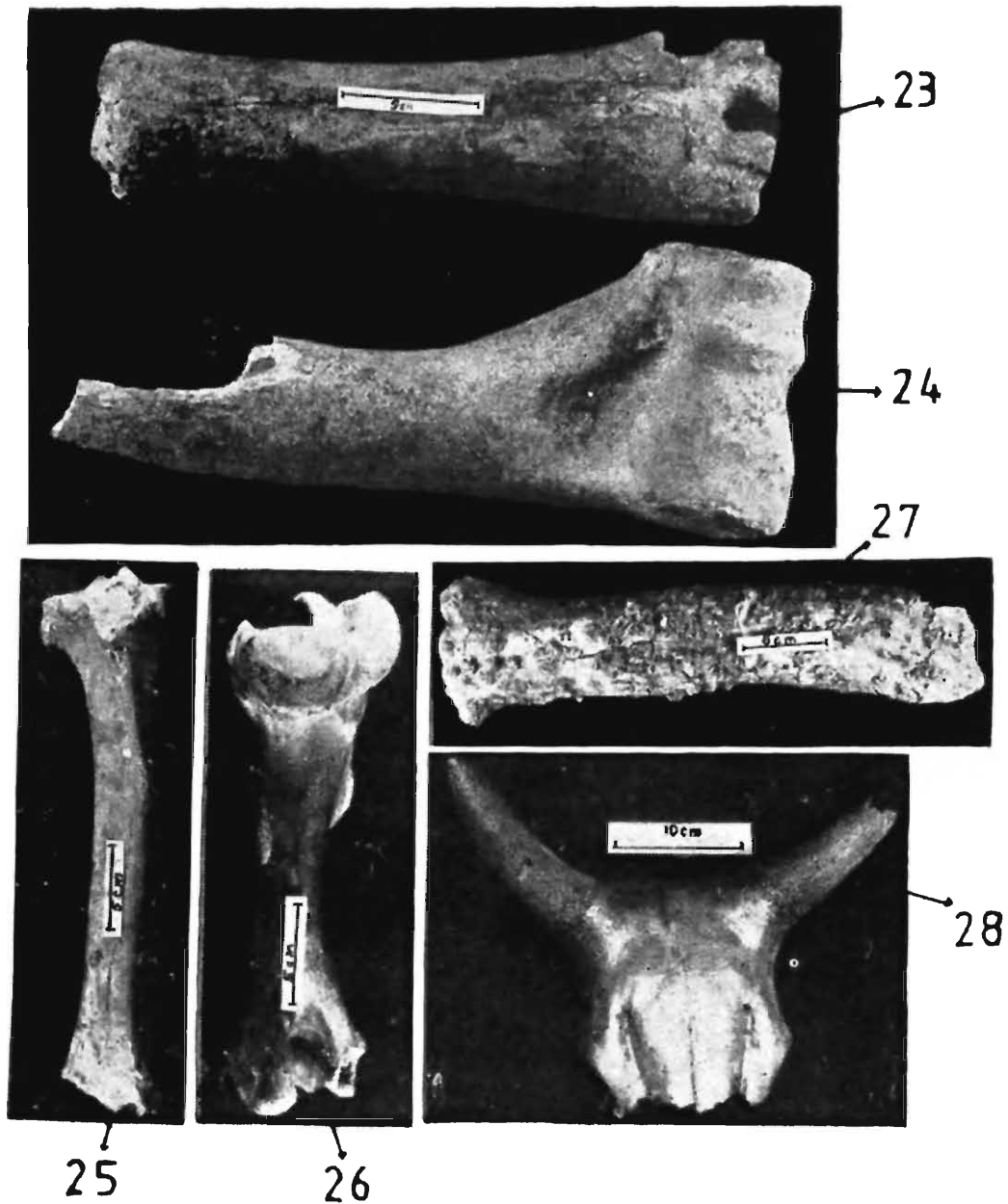


Fig. 23 : Left metatarsal of wild buffalo, *Bubalus bubalis* from Boral, South 24-Parganas,

Fig. 24 : Left humerus without head, of wild buffalo, *Bubalus bubalis* from Boral, South 24-Parganas.

Fig. 25 : Right tibia of cattle, *Bos* sp. from Boral, South 24-Parganas.

Fig. 26 : Right humerus of undetermined cattle akin to the species of *Connochaetus*, from Boral, South 24-Parganas.

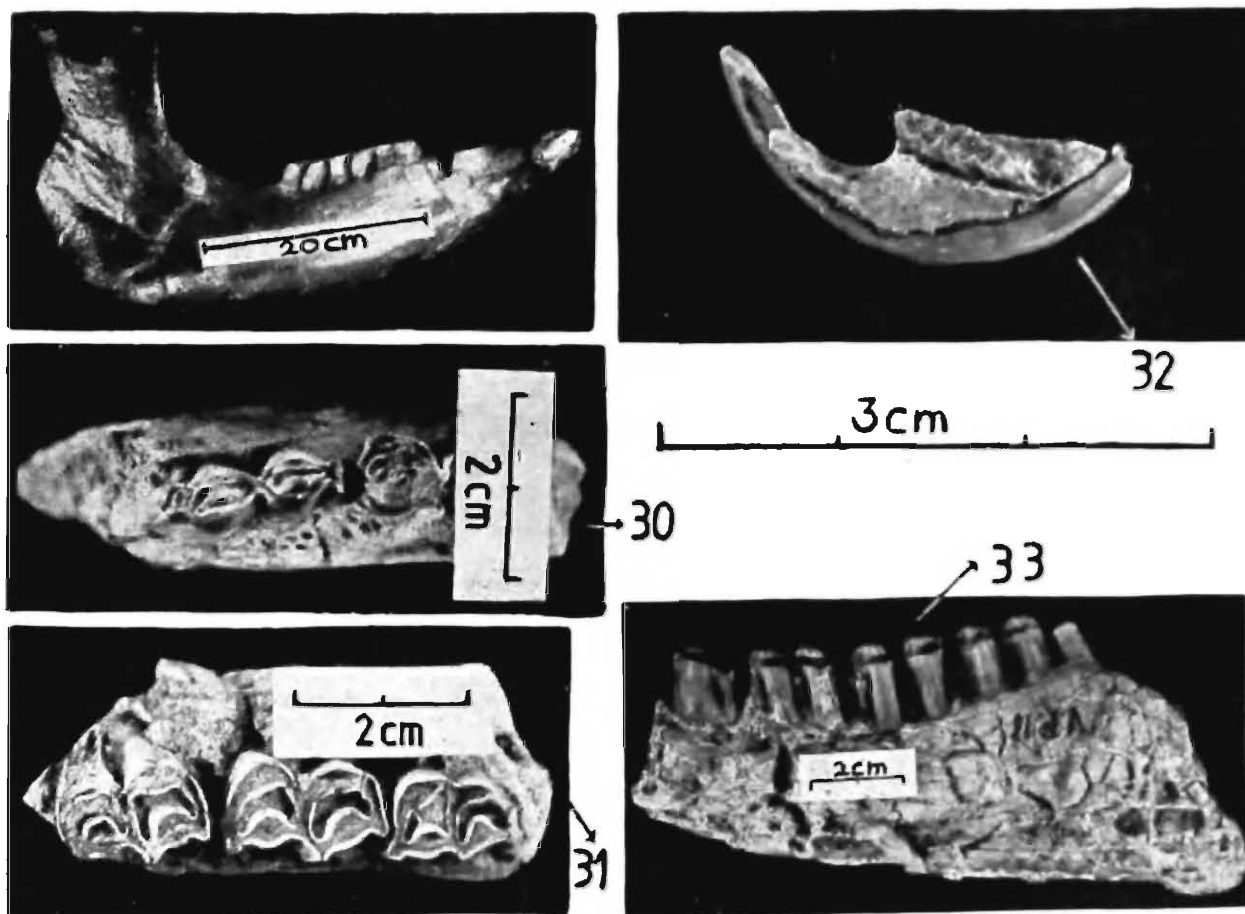
Fig. 27 : Fossilised specimen of left radius of Wild Buffalo, *Bubalus bubalis* from Dhuliapur, Midnapur.

Fig. 28 : Broken skull of Humped Cattle, *Bos indicus* from Central Calcutta (unearthed from three meters below by Metro Rail Authority)

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PLATE - VII

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- Fig. 29 : Lower jaw with teeth of the Great Indian One-Horned Rhinoceros, *Rhinoceros unicornis* from Sonarpur, South 24-Parganas.
- Fig. 30 : Fossilised fragment of left mandible with teeth P_2 & P_3 of the Black Buck, *Antelope cervicapra* from Aduri, Bankura.
- Fig. 31 : Fossilised fragment of maxilla with M_1 - M_3 of the Black Buck, *Antelope cervicapra* from Dhuliapur, Midnapur.
- Fig. 32 : Right mandible with incisor and three molars of House Rat, *Rattas rattus* from Mengolkot, Burdwan.
- Fig. 33 : Broken mandible of extinct antelope, *Miotragoceros of punjabicus* from Susunia, Bankura.

PLATE - VIII

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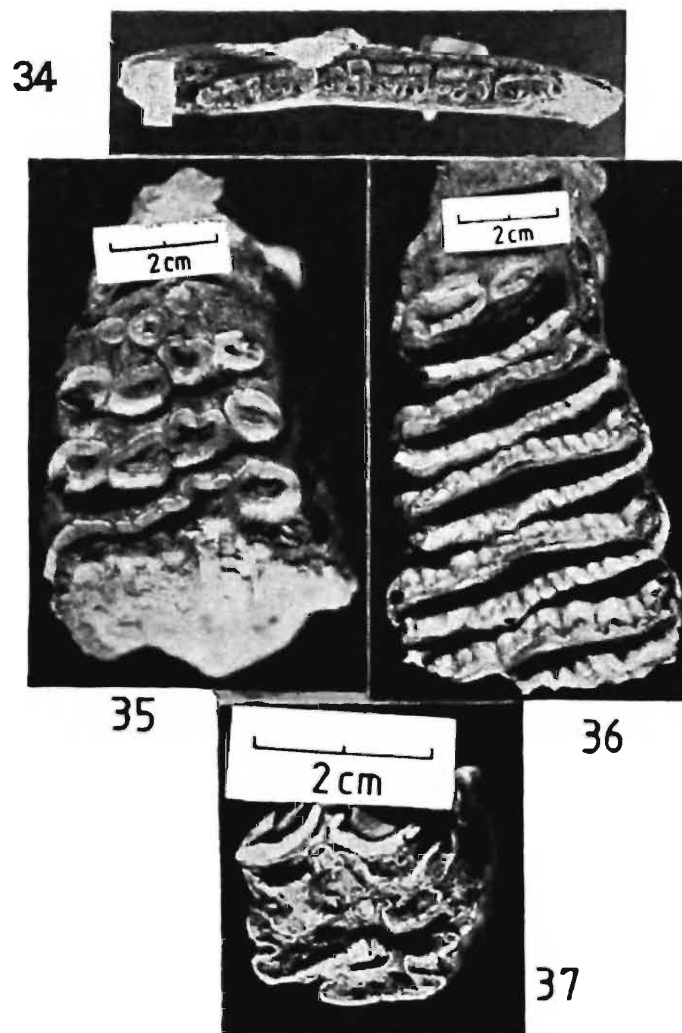


Fig. 34 : Broken left mandible with P_2 - P_4 and M_1 - M_3 of extinct Equine, *Equus* sp. from Jhirkoria, Bankura.

Fig. 35 & 36 : Two pieces of the molar tooth of domestic Indian Elephant, *Elephas maximus* from Kotasur, Birbhum.

Fig. 37 : Isolated upper right molar M_2 of extinct Equine, *Equus* sp. from Dhankora, Bankura.

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A.



B.

- A. Fishing operation in progress Shankarpur
(Midnapore dist., West Bengal)**
- B. Catfish catches at Shankarpur.**

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