ON A COLLECTION OF LITTORAL AND FRESHWATER FISHES FROM THE ANDAMAN ISLANDS.

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Scientific knowledge of the fishes of the Andaman Islands is very far from being comprehensive or exhaustive. The first papers, two in number, were by Blyth[1]; Day[2] wrote a paper based on the collection he made in 1869, and of course had many references to the Andamans in his *Fishes of India.* In recent time Annandale and Hora[3] contributed a valuable paper, and the late D. D. Mukerji[4] published an excellent paper still more recently. While writing this article the latest paper, by Rao and Hora,[5] was received; it constitutes a very satisfactory study of Andaman representatives of the genus *Andamia.*

The present paper is based on a collection sent me by the Zoological Survey of India, and adds considerably to our knowledge of the Andaman fish fauna. Nevertheless, even with the additions made here, the list of known Andaman fishes is but fragmentary. Although the collection here considered fills many gaps in the fish fauna of the Andamans, the fishes not represented in it are more surprising than those it contains. That is probably due to the manner of collecting, and not to any lack of fishes. Many of the specimens are small to very small, and were probably obtained in plankton hauls and in collecting small invertebrates. This would account for the restricted number of species represented in the collection, and for the remarkable gaps in it. Special attention was evidently paid to the fauna of the few Andaman freshwater streams. This is evinced by the nice series of such species as *Doryichthys insularis*, *Sicyopterus garra*, and *Vaimosa koumansi.*

In a number of instances the locality given was merely a station number. The following list of stations locates them more definitely; all were near Port Blair, South Andaman.

Station 1.—Shore collecting opposite Hope Town Jetty—Haddo shore.
„ 2.—Round about Phoenix Bay.
„ 3.—Around Ross Island.
„ 4.—Around Chatham Island.
„ 5.—Round about South Point.
„ 6.—About South Corbyn's Cove.
„ 7.—Round about Viper Island and Mitakhari.
„ 8.—About Hope Town Jetty at low tide.
„ 9.—Bamboo Flat (Jetty).
„ 10.—Dandas Point—*via* Louisabad and Mitakhari.
„ 11.—Shore collection round about Haddo jetty.

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[1] Blyth, E., *Journ. Asiat. Soc. Bengal* XXVII, pp. 270-272 (1858); *Journ. Asiat. Soc. Bengal* XXIX, pp. 145-147 (1860).
[2] Day, F., *Proc. Zool. Soc. London*, pp. 677-705 (1870).
[3] Annandale, N. and Hora, S. L., *Rec. Ind. Mus.* XXVII, pp. 33-41, pl. ii (1925).
[4] Mukerji, D. D., *Rec. Ind. Mus.* XXXVII, pp. 259-277, pl. vi (1935).
[5] Rao, H. S. and Hora, S. L., *Rec. Ind. Mus.* XL, pp. 377-401, pls. vii-x (1938).

The great majority of specimens were obtained around Port Blair, South Andaman ; the words South Andaman have therefore been dropped after Port Blair, to avoid unnecessary repetition.

Day and Mukerji both emphasize the extensive coral reefs and great clarity of the water surrounding the Andmans. We may be certain, in view of such ecological conditions, that the number of species now recorded from the Andamans is much less than half of those inhabiting the reefs about those islands.

The length given is always the standard length, unless otherwise specified.

I desire to convey my sincere thanks to Dr. Baini Prashad, Director of the Zoological Survey of India, and Dr. S. L. Hora, Assistant Superintendent, for sending me this very interesting collection to study, and for their unfailing courtesy and helpfulness at all times.

List of Species.

Family Clupeidae.

1. *Harengula punctata* (Rüppell).

Family Engraulidae.

2. *Stolephorus heterolobus* Rüppell.

Family Anguillidae.

3. *Anguilla bicolor* McClell.

Family Muraenidae.

4. *Gymnothorax hepatica* (Rüppell).
5. *Uropterygius marmoratus* (Lac.).

Family Cyprinidae.

6. *Rasbora daniconius* (Ham.).

Family Cyprinodontidae.

7. *Aplocheilus panchax* (Ham.).
8. *Oryzias melastigma* (McClell.).

Family Belonidae.

9. *Tylosurus strongylurus* (v. Hasselt).

Family Hemiramphidae.

10. *Hemiramphus dussumieri* C. and V.
11. *Zenarchopterus brevirostris* (Günther).

Family Exocoetidae.

12. *Cypselurus* sp.

Family Bothidae.

13. *Bothus pantherinus* (Rüppell).

Family Syngnathidae.

14. *Doryichthys insularis* Hora.
15. *Syngnathus djarong* Bleeker.
16. *Syngnathus spicifer* Rüppell.

Family Fistulariidae.

17. *Fistularia villosa* Klunzinger.

Family Ophicephalidae.

18. *Ophicephalus gachua* Ham.

Family Atherinidae.

19. *Atherina duodecimalis* C. and V.
20. *Atherina endrachtensis* Q. and G.
21. *Atherina temmincki* Bleeker.

Family Mugilidae.

22. *Mugil crenilabis* Forskål.
23. *Liza amarula* (C. and V.).
24. *Liza melinoptera* (C. and V.).
25. *Liza seheli* (Forskål).
26. *Liza troscheli* (Bleeker).
27. *Liza vaigiensis* (Q. and G.).

Family Carangidae.

28. *Selar boops* (C. and V.).
29. *Scomberoides tala* (C. and V.).
30. *Scomberoides toloo-parah* (Rüppell).

Family Leiognathidae.

31. *Leiognathus equulus* (Forskål).

Family Gerridae.

32. *Gerres abbreviatus* Bleeker.
33. *Gerres kapas* Bleeker.
34. *Gerres oblongus* C. and V.
35. *Gerres oyena* (Forskål).

Family Apogonidae.

36. *Apogon endekataenia* Bleeker.
37. *Apogon novemfasciatus* C. and V.
38. *Apogon sangiensis* Bleeker.
39. *Apogon* sp.
40. *Apogonichthys auritus* C. and V.

Family Ambassidae.

41. *Ambassis buruensis* Bleeker.
42. *Ambassis commersoni* C. and V.
43. *Ambassis interrupta* Bleeker.
44. *Ambassis urotaenia* Bleeker.

Family KUHLIIDAE.

45. *Kuhlia marginata* (C. and V.).
46. *Kuhlia taeniura* (C. and V.).

Family PLESIOPIDAE.

47. *Plesiops melas* Bleeker.
48. *Plesiops nigricans* (Rüppell).

Family LUTIANIDAE.

49. *Lutianus lutjanus* Bleeker.
50. *Lutianus russelli* (Bleeker).

Family SILLAGINIDAE.

51. *Sillago maculata* Q. and G.

Family SCATOPHAGIDAE.

52. *Scatophagus argus* (L.).

Family CHAETODONTIDAE.

53. *Holacanthus semicirculatus* C. and V.

Family TEUTHIDIDAE.

54. *Teuthis oramin* (Bl. and Schn.).

Family SCORPAENIDAE.

55. *Parascorpaena bleekeri* (Day).

Family PLATYCEPHALIDAE.

56. *Cocius crocodilus* (Tilesius).
57. *Platycephalus indicus* (L.).

Family POMACENTRIDAE.

58. *Abudefduf biocellatus* (Q. and G.).
59. *Abudefduf bonang* (Bleeker).
60. *Abudefduf leucogaster* (Bleeker).
61. *Abudefduf modestus* (Schlegel).
62. *Abudefduf saxatilis* (L.).
63. *Abudefduf sordidus* (Forskål).
64. *Pomacentrus tripunctatus* C. and V.

Family LABRIDAE.

65. *Halichoeres hyrtli* (Bleeker).
66. *Halichoeres leparensis* (Bleeker).
67. *Halichoeres notopsis* (K. and v. H.) (C. and V.).
68. *Labroides dimidiatus* (C. and V.).
69. *Lepidaplois* sp.

Family ELEOTRIDAE.

70. *Eleotris fusca* (Bl. and Schn.).
71. *Eleotris andamensis*, sp. nov.
72. *Ophiocara aporos* Bleeker.
73. *Ophiocara porocephala* (C. and V.).
74. *Ptereleotris andamensis*, sp. nov.
75. *Amblyeleotris* (*Andameleotris*) *raoi*, sp. nov.

Family GOBIIDAE.

76. *Bathygobius fuscus* (Rüppell).
77. *Chonophorus ocellaris* (Brouss.).
78. *Glossogobius biocellatus* (C. and V.).
79. *Glossogobius celebius* (C. and V.).
80. *Gobiodon quinquestrigatus* (C. and V.)
81. *Sicyopterus garra* Hora.
82. *Vaimosa hoeveni* Bleeker.
83. *Vaimosa koumansi* Mukerji.

Family PERIOPHTHALMIDAE.

84. *Periophthalmus barbarus* (L.).
85. *Periophthalmodon schlosseri* (Pallas).

Family GOBIOIDIDAE.

86. *Taeniodies caeculus* (Bl. and Schn.).

Family ECHENEIDAE.

87. *Echeneis naucrates* L.

Family CLINIDAE.

88. *Tripterygion fasciatum* M. Weber.

Family BLENNIIDAE.

89. *Blennius semifasciatus* Rüppell.
90. *Petroscirtes bankanensis* Bleeker.
91. *Petroscirtes filamentosus* (C. and V.).
92. *Petroscirtes mitratus* Rüppell.
93. *Enchelyurus flavipes* Peters.
94. *Salarias fuscus* Rüppell.
95. *Salarias saliens* (Forster).
96. *Salarias fasciatus* (Bloch.).
97. *Salarias kirki* Günther.
98. *Salarias andersoni* Day.
99. *Salarias periophthalmus* C. and V.
100. *Salarias lineatus* C. and V.
101. *Salarias raoi*, nom. nov.
102. *Salarias dussumieri* C. and V.
103. *Salarias edentulus* (Bl. and Schn.).
104. *Salarias frenatus* C. and V.
105. *Salarias marmoratus* Bennet.
106. *Salarias guttatus* C. and V.
107. *Salarias interruptus* Bleeker.

Family CARAPIDAE.

108. *Carapus homei* (Richardson).

Family TETRAODONTIDAE.

109. *Chelonodon patoca* (Ham.).
110. *Tetraodon immaculatus* Bl. and Schn.
111. *Tetraodon reticularis* Bl. and Schn.

Family ANTENNARIIDAE.

112. *Antennarius commersoni* (Shaw).

Family CLUPEIDAE.

Harengula punctata (Rüppell).

1835. *Clupea punctata*, Rüppell, *Neue Wirbelt., Fische*, p. 78, plate xxi, fig. 2.

Eighteen specimens, 66 to 95 mm. in length, were taken from Phoenix Bay, and five from 84 to 88 mm. in length at the Lime Kiln Jetty, Mount Harriot, Port Blair, South Andaman.

Family ENGRAULIDAE.

Stolephorus heterolobus Rüppell.

1835. *Stolephorus heterolobus*, Rüppell, *Neue Wirbelt., Fische*, p. 79.

One specimen, 68 mm. long, from South Point, Port Blair.

Family ANGUILLIDAE.

Anguilla bicolor McClelland.

1845. *Anguilla bicolor*, McClelland, *Cal. Journ. Nat. Hist.* V, p. 178, pl. vi, fig. 1.

This eel is common in the Andamans. Twelve examples, 90 to 315 mm. in length, were taken from pools in the bed of a dried-up stream near the Fisheries Laboratory, Port Blair, and another of 66 mm. was taken from Dhanikhari stream, South Andaman. I place here also 6 juvenile specimens from 45 to 50 mm. in length from Phoenix Bay, Port Blair. They are badly shrivelled, having been placed in very strong preservative.

Family MURAENIDAE.

Gymnothorax hepatica (Rüppell).

1828. *Muraena hepatica*, Rüppell, *Atlas, Fische Rothen Meers*, p. 120.

One specimen, 160 mm. long, from a creek at South Corbyn's Cove, Port Blair.

Uropterygius marmoratus (Lacépède).

1803. *Gymnomuraena marmorata*, Laécpède, *Hist. Nat. Poiss.* V, pp. 648, 650.

A specimen, 232 mm. long, was caught on Blair Reef, Phoenix Bay, and one of 195 mm. near South Corbyn's Cove, Port Blair.

Family CYPRINIDAE.

Rasbora daniconius (Ham.).

1822. *Cyprinus daniconius*, Hamilton, *Fishes Ganges*, p. 327, pl. xv, fig. 89.
1935. *Rasbora daniconius*, Mukerji, *Rec. Ind. Mus.* XXXVII, p. 259.

This handsome little Cyprinid is evidently abundant in places. The collection contains 29 examples, 28 to 54 mm. in length, from a stream near Base Camp, North Andaman. This species occurs throughout India, Burma, and Ceylon. In the Malay Peninsula and Malay Archipelago it is replaced by *Rasbora einthoveni* (Bleeker) with which it has been much confused.

Family CYPRINODONTIDAE.

For status of the oriental fish genera *Aplocheilus* and *Panchax* see Smith, H. M., *Proc. Biol. Soc. Washington* LI, pp. 165, 166 (1938).

The genera *Aplocheilus* and *Panchax* have long been confused, as Smith has shown in the paper cited above. Under the rules of zoological nomenclature *Panchax* becomes a synonym of *Aplocheilus*,

Aplocheilus panchax (Ham.).

1822. *Esox panchax*, Hamilton, *Fishes Ganges*, p. 211, pl. iii, fig. 69.
1870. *Haplochilus panchax*, Day, *Proc. Zool. Soc. London*, p. 700.
1877. *Haplochilus panchax*, Day, *Fishes India*, p. 523, pl. cxxi, fig. 3.
1922. *Panchax panchax*, Weber and de Beaufort, *Fishes Indo-Austr. Arch.* IV, p. 374, figs. 96, 97.
1925. *Panchax panchax*, Annandale and Hora, *Rec. Ind. Mus.* XXVII, pp. 34, 37.
1935. *Panchax panchax*, Mukerji, *Rec. Ind. Mus.* XXXVII, p. 259.

Annandale and Hora state that " this species is common in the quieter parts of jungle-streams in South Andaman ", but it evidently occurs plentifully throughout the Andamans. Specimens were examined as follows :—

1 of 30 mm. from a ditch in the jungle near Port Bonington, North Andaman ; 50 from 23 to 47 mm. in length, from a freshwater stream, Rangat Camp, Middle Andaman ; 10 from 30 to 65 mm. near Port Blair ; 1 of 21 mm. from a stream south of a creek near South Corbyn's Cove, Port Blair, South Andaman ; 8 from 18 to 31 mm. from a stream near Manglutan, South Andaman.

In 1870 Day stated : " This fish grows to a magnificent size in the Andamans, compared with what it attains in India " I do not know what its size is in India, but the largest of 97 specimens I collected in the Malay Peninsula from Singapore to Pinang was 42 mm. The largest Andaman examples are gigantic compared to those seen from Malaya and Ceylon.

Oryzias melastigma (McClelland).

1839. *Aplocheilus melastigma*, McClelland, *Indian Cyprinidae, Asiatic Researches*, XIX, p. 301.
1877. *Haplocheilus melastigma*, Day, *Fishes India*, p. 522, pl. cxxi, fig. 4.
1935. *Aplocheilus melastigma*, Mukerji, *Rec. Ind. Mus.* XXXVII, p. 259.

This is evidently a common and widespread denizen of Andaman freshwater streams. It is of course possible that it has been accidentally introduced, along with the fry of various carps imported from India to stock Andaman waters. At the same time, it may be native just as is *Aplocheilus panchax*.

Five examples from a shallow stream near Base Camp, North Andaman, are 26 to 28 mm. long.

The following are from South Andaman :—26 specimens, 11 to 22 mm. in length, from Tytler's Ghat ; 16 specimens, 20 to 34 mm., from a creek north of Corbyn's Cove, Port Blair ; and 26 specimens from 22 to 29 mm. in length taken at Austinabad Nālā, Port Blair ; these last were subject to tidal influence.

Family BELONIDAE.

Tylosurus strongylurus (v. Hasselt).

1823. *Belone strongylura*, van Hasselt, *Alg. Konst.-en Letterbode*, Deel I, p. 130.
1870. *Belone caudimaculata*, Day, *Proc. Zool. Soc. London*, p. 699.
1877. *Belone strongylurus*, Day, *Fishes India*, p. 512, pl. cxviii, fig. 6.
1922. *Tylosurus strongylurus*, Weber and de Beaufort, *Fishes Indo-Austr. Arch.* IV, p. 121.

Five specimens of this very easily recognized Gar, 105 to 125 mm. in length, were taken about Haddo Jetty, Port Blair.

Family HEMIRAMPHIDAE.

Hemiramphus dussumieri Cuv. and Val.

1846. Hemiramphus dussumieri, Cuvier and Valenciennes, *Hist. Nat. Poiss.* XIX, p. 33.
1877. *Hemiramphus reynaldi*, Day, *Fishes India*, p. 515.
1922. *Hemiramphus dussumieri*, Weber and de Beaufort, *Fishes Indo-Austr. Arch.* IV, p. 155.

This is evidently a common Half-beak in Andaman waters. 12 very young examples, only 18 to 28 mm. in length, were taken around Viper Island, Port Blair.

Zenarchopterus brevirostris (Günther).

1866. *Hemirhamphus brevirostris*, Günther, *Cat. Fishes* VI, p. 274.
1922. *Zenarchopterus brevirostris*, Weber and de Beaufort, *Fishes Indo-Austr. Arch.* IV, p. 168.
1922. *Zenarchopterus dispar*, Weber and de Beaufort, *Fishes Indo-Austr. Arch.* IV, p. 169, fig. 58.
1926. *Zenarchopterus brevirostris*, Mohr, *Zool. Jahrb.* LII, p. 250.

Four juvenile specimens, 40 to 54 mm. in length, were caught at Haddo Jetty, Port Blair.

Family EXOCOETIDAE.

Three juvenile specimens of a *Cypselurus*, 8 to 12 mm. in length, were taken off Viper Island, Port Blair.

Family BOTHIDAE.

Bothus pantherinus (Rüppell).

1828. *Rhombus pantherinus*, Rüppell, *Atlas Fische Rothen Meers*, p. 121, pl. xxxi, fig. 1.
1877. *Platophrys pantherinus*, Day, *Fishes India*, p. 425, pl. xcii, figs. 3, 4.
1934. *Bothus pantherinus*, Norman, *Monograph Flatfishes*, I, p. 233, fig. 177.

One specimen, 63 mm. long, from Ross Is., Port Blair.

Family SYNGNATHIDAE.

Doryichthys insularis Hora.

1925. *Doryichthys insularis*, Hora, *Rec. Ind. Mus.* XXVII, p. 38, pl. ii, fig. 1.

Fifteen examples of this interesting Pipe-fish, 67 to 89 mm. long, were taken from a stream near the wireless station, Port Blair, and a specimen, 133 mm. long, was caught in a stream west of Sipi Ghat, South Andaman. Hora had but 6 examples, the largest 97 mm. long.

Syngnathus djarong Bleeker.

1853. *Syngnathus djarong*, Bleeker, *Verh. Bat. Genoots.* XXV, p. 22.
1922. *Syngnathus djarong*, Weber and de Beaufort, *Fishes Indo-Austr. Arch.* IV, p. 79.

A specimen, 92 mm. long, from Chatham, Port Blair, and one of 89 mm. from off Viper Is., South Andaman.

Syngnathus spicifer Rüppell.

1835. *Syngnathus spicifer*, Rüppell, *Neue Wirbelt., Fische*, p. 143.
1878. *Syngnathus spicifer*, Day, *Fishes India*, p. 678, pl. clxxiv, fig. 1.

An example, 101 mm. long, from Viper Island, South Andaman.

Family FISTULARIIDAE.

Fistularia villosa Klunzinger.

1871. *Fistularia villosa*, Klunzinger, *Abh. Zool.-bot. Gesells. Wien* XXI, p. 516.
1922. *Fistularia villosa*, Weber and de Beaufort., *Fishes Indo-Austr. Arch.* IV, p. 12, fig. 5.

A specimen, 113 mm. long, from Port Blair, and one of 130 mm. taken north-west of Ross Island, Port Blair.

The *Fistularis serrata* of Day is probably *F petimba* Lacépède. He reported it from the Andamans in 1870 and 1876. His statement " This fish appears to delight in living in the mud " is not true of *F villosa*, at least within my experience.

Family OPHICEPHALIDAE.

Ophicephalus gachua Hamilton.

1822. *Ophiocephalus gachua*, Hamilton, *Fishes Ganges*, p. 68.
1870. *Ophiocephalus gachua*, Day, *Proc. Zool. Soc. London*, p. 694.
1876. *Ophiocephalus gachua*, Day, *Fishes India*, p. 367.
1935. *Ophicephalus gachua*, Mukerji, *Rec. Ind. Mus.* XXXVII, p. 259.

Four specimens, 57 to 120 mm. in length, were taken from stagnant pools in the bed of a stream, North Andaman, and one of 69 mm. was from Dhanikhari stream, South Andaman

Family ATHERINIDAE.

Atherina duodecimalis Cuv. and Val.

1835. *Atherina duodecimalis*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* X, p. 458.
1922. *Atherina duodecimalis*, Weber and de Beaufort, *Fishes Indo-Austr. Arch.* IV, p. 275.

18 specimens, 31 to 44 mm. in length, taken between Viper Island and Mitakhari, Port Blair, and one of 61 mm. from Station 1.

Atherina endrachtensis Quoy and Gaimard.

1824. *Atherina endrachtensis*, Quoy and Gaimard, *Voy. Uranie et Physicienne, Zoologie*, p. 334.
1922. *Atherina endrachtensis*, Weber and de Beaufort, *Fishes Indo-Austr. Arch.* IV, p. 270.

10 examples, 43 to 55 mm. long, from South Point, Port Blair, and one of 29 mm. long from Henry Lawrence Island, Ritchie Archipelago, Andamans.

Atherina temmincki Bleeker.

1853. *Atherina temmincki*, Bleeker, *Nat. Tijds. Ned. Ind.* V, p. 506.
1922. *Atherina temmincki*, Weber and de Beaufort, *Fishes Indo-Austr. Arch.* IV, p. 269.

A specimen, 37 mm. long, from Henry Lawrence Island, Ritchie Archipelago, Andaman Islands, seems to belong here.

Family MUGILIDAE.

Mugil crenilabis Forskål.

1775. *Mugil crenilabis*, Forskål, *Descrip. Anim.*, p. 73.
1870. *Mugil macrochilus*, Day, *Proc. Zool. Soc. London*, p. 685; (*pro parte*).
1876. *Mugil crenilabris*, Day, *Fishes India*, p. 355.
1922. *Mugil crenilabis*, Weber and de Beaufort, *Fishes Indo-Austr. Arch.* IV, p. 256.

5 specimens, 34 to 75 mm. in length, were taken in Murdakhari Bay, Port Blair, and one of 59 mm. from a rock pool near South Corbyn's Cove, Port Blair.

Liza amarula (Cuv. and Val.).

1836. *Mugil amarulus*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* XI, p. 128.
1876. *Mugil amarulus*, Day, *Fishes India*, p. 356.
1922. *Liza amarula*, Whitehouse, *Madras Fish Bull.* XV, p. 91.

5 specimens, 25 to 37 mm. in length, were taken from freshwater pools near South Corbyn's Cove, Port Blair.

Liza melinoptera (Cuv. and Val.).

1836. *Mugil melinopterus*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* XI, p. 146.
1861. *Mugil melinopterus*, Günther, *Cat. Fishes* III, p. 452.
1922. *Mugil melinopterus*, Weber and de Beaufort, *loc. cit.* IV, p. 246.

3 examples, 18 to 34 mm. in length, from South Corbyn's Cove, Port Blair, and one of 37 mm. from a stream west of Sipi Ghat, South Andaman.

Liza seheli (Forskål).

1775. *Mugil seheli*, Forskål, *Descrip. Anim.*, p. 73.
1876. *Mugil seheli*, Day, *loc. cit.*, p. 355.
1922. *Mugil seheli*, Weber and de Beaufort, *loc. cit.*, p. 252.

8 specimens, 54 to 102 mm. from Station 1, and two, 58 and 88 mm. long, from a creek north of South Corbyn's Cove, Port Blair.

Liza troscheli (Bleeker).

1858-9. *Mugil troschelii*, Bleeker, *Nat. Tijds. Ned. Ind.* XVI, p. 277.
1876. *Mugil troschelii*, Day, *loc. cit.*, p. 358.
1922. *Mugil troscheli*, Weber and de Beaufort, *loc. cit.*, p. 248.

4 examples, 29 to 45 mm. in length, from Tytler's Ghat, South Andaman, and two of 46 and 60 mm. from the Andamans.

Liza vaigiensis (Quoy and Gaimard).

1824. *Mugil vaigiensis*, Quoy and Gaimard, *Voy l'Uranie et l'Physicienne, Zool.*, p. 357.
1870. *Mugil waigiensis*, Day, *Proc. Zool. Soc. London*, p. 685.
1876. *Mugil waigiensis*, Day, *Fishes India*, p. 359, pl. lxxiii, fig. 4.
1922. *Mugil vaigiensis*, Weber and de Beaufort, *loc. cit.*, p. 244.

5 specimens, 12 to 38 mm. in length, from Tytler's Ghat, South Andaman, and one of 23 mm. from the west side of Long Island, Middle Andaman.

Anal III 8 ; scales 26 ; pectorals black or blackish. A wide ranging Mullet of easy recognition. It occurs from the Red Sea through the tropical Indian and Pacific oceans.

Family CARANGIDAE.

Selar boops (Cuv. and Val.).

1833. *Caranx boops*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* IX, p. 46.
1876. *Caranx boops*, Day, *Fishes India*, p. 218, pl. xlix, fig. 2.
1931. *Caranx (Selar) boops*, Weber and de Beaufort, *Fishes Indo-Austr. Arch.* VI, p. 209, fig. 43.

4 examples, 58 to 79 mm. in length, from Ross Island, and 2 of 72 and 74 mm. from Atlanta Point, Port Blair.

Scomberoides tala (Cuv. and Val.).

1831. *Chorinemus tala*, Cuvier and Valenciennes, *op. cit.* VIII, p. 377.
1870. *Chorinemus tala*, Day, *Proc. Zool. Soc. London*, p. 689.
1876. *Chorinemus tala*, Day, *Fishes India*, p. 231.
1876. *Chorinemus tala*, Day, *loc. cit.*, p. 232, pl. li A, fig. 3.
1931. *Chorinemus tala*, Weber and de Beaufort, *op. cit.* VI, p. 281.

A specimen, 48 mm. long, from South Point, Port Blair.

Scomberoides toloo-parah (Rüppell).

1828. *Lichia toloo parah*, Rüppell, *Atlas, Fischer Rothen Meers*, p. 91.
1876. *Chorinemus Sancti-Petri*, Day, *loc. cit.*, p. 230.
1931. *Chorinemus tolooparah*, Weber and de Beaufort, *op. cit.* VI, p. 278, figs. 54, 56*a*.

3 specimens, 60 to 71 mm. in length, were taken around Viper Island, Port Blair.

Family LEIOGNATHIDAE.

Leiognathus equulus (Forskål).

1775. *Scomber equula*, Forskål, *Descr. Anim.*, p. 75.
1876. *Equula edentula*, Day, *loc. cit.*, p. 238, pl. lii, fig. 1.
1931. *Leiognathus equulus*, Weber and de Beaufort, *op. cit.* VI, p. 322.

3 specimens, 30 to 35 mm. in length, were taken on the sea shore on the west side of Long Island near the coconut plantation, Middle Andaman. One of 53 mm. was obtained on the south coast of Rutland Island, Andamans.

Family GERRIDAE.

Gerres abbreviatus Bleeker.

1850. *Gerres abbreviatus*, Bleeker, *Verh. Batav. Gen.* XXIII, p. 11.
1870. *Gerres abbreviatus*, Day, *Proc. Zool. Soc. London*, p. 698.
1875. *Gerres abbreviatus*, Day, *Fishes India*, p. 99, pl. xxv, fig. 6.
1931. *Gerres abbreviatus*, Weber and de Beaufort, *op. cit.* VI, p. 344.

A specimen, 28 mm. long, was taken on the west coast of Long Island, Middle Andaman.

Gerres kapas Bleeker.

1851. *Gerres kapas*, Bleeker, *Nat. Tijds. Ned. Ind.* II, p. 482.
1876-77. *Diapterus kapas*, Bleeker, *Atlas Ichth.* VIII, p. 127, pl.
1931. *Gerres kapas*, Weber and de Beaufort, *Fishes Indo-Austr. Arch.* VI, p. 348.

A juvenile specimen, 21 mm. long, was taken from a freshwater pool near South Corbyn's Cove, Port Blair.

Gerres oblongus Cuv. and Val.

1830. *Gerres oblongus*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* VI, p. 479.
1875. *Gerres oblongus*, Day, *Fishes India*, p. 98, pl. xxv, fig. 2.
1931. *Gerres oblongus*, Weber and de Beaufort, *op. cit.* VI, p. 352.

A specimen, 34 mm. long, was caught in a creek north of South Corbyn's Cove, Port Blair.

Gerres oyena (Forskål).

1775. *Labrus oyena*, Forskål, *Descr. Anim.*, p. 35.
1875. *Gerres oyena*, Day, *op. cit.*, p. 99, pl. xxv, fig. 4.
1931. *Gerres oyena*, Weber and de Beaufort, *op. cit.* VI, p. 345.

A young example, 18 mm. long, was taken on the west coast of Long Island, Middle Andaman, and one of 30 mm. at Tytler's Ghat, South Andaman.

Family APOGONIDAE.

Apogon endekataenia Bleeker.

1852. *Apogon endekataenia*, Bleeker, *Nat. Tijds. Ned. Ind.* III, p. 449.
1873. *Amia endekataenia* Bleeker, *Atlas Ichth.* VII, p. 85, pl. cccx, fig. 2.
1929. *Apogon endekataenia*, Weber and de Beaufort, *op. cit.* V, p. 306.

A specimen of 58 mm. was secured on the south coast of Long Island, Middle Andaman; a young specimen, 20 mm. long, is merely labelled "Andamans".

Apogon novemfasciatus Cuv. and Val.

1828. *Apogon novemfasciatus*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* II, p. 154.
1875. *Apogon endekataenia*, Day, *Fishes India*, p. 59, pl. xvi, fig. 7.
1889. *Apogon fasciatus*, Day, *Fauna Brit. Ind.*, Fishes I, p. 494.
1929. *Apogon novemfasciatus*, Weber and de Beaufort, *op. cit.* V, p. 302.

4 specimens, 15 to 21 mm. in length, were captured on Blair Reef, Phoenix Bay, Port Blair.

Apogon sangiensis Bleeker.

1857. *Apogon sangiensis*, Bleeker, *Nat. Tijds. Ned. Ind.* XIII, p. 375.
1875. *Apogon sangiensis*, Day, *Fishes India*, p. 64, pl. xvii, fig. 3 (not fig. 4 as in text).
1873-76. *Amia sangiensis*, Bleeker, *Atlas Ich.* VIII, p. 85, pl. cccxix, fig. 4.
1929. *Apogon sangiensis*, Weber and de Beaufort, *loc. cit.* V, p. 343.
1930. *Amia sangiensis*, Fowler and Bean, *Bull. 100 U. S. Nat. Mus.* VIII, p. 104.

A faded and non-typical specimen, 49 mm. long, was taken at South Point, Port Blair.

Apogon sp.

11 very young specimens too small to determine, 7 to 9 mm. in length, were taken at Long Island, Middle Andaman.

Apogonichthys auritus Cuv. and Val.

1831. *Apogon auritus*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* VII, p. 443.
1870. *Apogonichthys auritus*, Day, *Proc. Zool. Soc. London*, p. 682.
1875. *Apogon auritus*, Day, *Fishes India*, p. 63, pl. xvii, fig. 2.
1930. *Apogonichthys auritus*, Fowler and Bean, *loc. cit.*, p. 6.

A specimen, 35 mm. long, was taken at Viper Island, Port Blair.

Family AMBASSIDAE.

Ambassis buruensis Bleeker.

1856. *Ambassis buruensis*, Bleeker, *Nat. Tijds. Ned. Ind.* XI, p. 396.
1929. *Ambassis buruensis*, Weber and de Beaufort, *Fishes Indo-Austr. Arch.* V, p. 417.

10 specimens, 49 to 73 mm. in length, from Viper Island, Port Blair.

Ambassis commersoni Cuv. and Val.

1828. *Ambassis commersoni*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* II, p. 176, pl. xxv.
1875. *Ambassis commersoni*, Day, *Fishes India*, p. 52, pl. xv, fig. 3.
1929. *Ambassis commersoni*, Weber and de Beaufort, *loc. cit.*, p. 406.

A specimen, 31 mm. long, is from a creek north of South Corbyn's Cove, Port Blair.

Ambassis interrupta Bleeker.

1852. *Ambassis interrupta*, Bleeker, *Nat. Tijds. Ned. Ind.* III, p. 696.
1870. *Ambassis macracanthus*, Day, *Proc. Zool. Soc. London*, p. 583.
1875. *Ambassis interrupta*, Day, *Fishes India*, p. 53, pl. xv, fig. 5.
1929. *Ambassis interrupta*, Weber and de Beaufort, *loc. cit.*, p. 415.

An example, 40 mm. long, was captured at South Point, Port Blair.

Ambassis urotaenia Bleeker.

1852. *Ambassis urotaenia*, Bleeker, *Nat. Tijds. Ned.* Ind. III, p. 257.
1870. *Ambassis urotaenia*, Day, *Proc. Zool. Soc. London*, p. 681.
1875. *Ambassis urotaenia*, Day, *Fishes India*, p. 55, pl. xv, fig. 8.
1929. *Ambassis urotaenia*, Weber and de Beaufort, *Fishes Indo-Austr. Arch.* V, p. 404.

One specimen, 42 mm. long, was caught off Viper Island.

Family KUHLIIDAE.

Kuhlia marginata (Cuv. and Val.).

1829. *Dules marginatus*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* III, p. 116, pl. lii.
1875. *Dules marginatus*, Day, *loc. cit.*, p. 67, pl. xviii, fig. 1.
1927. *Kuhlia marginata*, Herre and Montalban, *Phil. Journ. Sci.* XXXIII, p. 203, pl. i, fig. 3.
1929. *Kuhlia marginata*, Weber and de Beaufort, *loc. cit.* V, p. 271, fig. 72.

A specimen, 31 mm. long, was caught in a freshwater stream south of South Corbyn's Cove, Port Blair.

Kuhlia taeniura (Cuv. and Val.).

1929. *Dules taeniurus*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* III, p. 114.
1870. *Dules taeniurus*, Day, *Proc. Zool. Soc. London*, p. 682.
1875. *Dules taeniurus*, Day, *Fishes India*, p. 67, pl. xviii, fig. 2.
1927. *Kuhlia taeniura*, Herre and Montalban, *loc. cit.*, p. 200, pl. i, fig. 1.
1929. *Kuhlia taeniura*, Weber and de Beaufort, *loc. cit.*, p. 273.

A very young example, 16 mm. long, from the same locality as the preceding species.

Family PLESIOPIDAE.

Plesiops melas Bleeker.

1849. *Plesiops melas*, Bleeker, *Verh. Bat. Gen.* XXII, p. 9.
1929. *Plesiops melas*, Weber and de Beaufort, *Fishes Indo-Austr. Arch.* V, p. 378, fig. 91.

A specimen, 30 mm. long, was taken on the south coast of Long Island, Middle Andaman.

Plesiops nigricans (Rüppell).

1828. *Pharopteryx nigricans*, Rüppell, *Atlas, Fische Rothen Meers*, p. 15, pl. iv, fig. 2.
1870. *Plesiops corallicola*, Day, *Proc. Zool. Soc. London*, p. 685.
1875. *Plesiops nigricans*, Day, *Fishes India*, p. 128, pl. xxxi, fig. 5.
1929. *Plesiops nigricans*, Weber and de Beaufort, *loc. cit.*, p. 375.

An example, 64 mm. long, was obtained at Murdakhari Bay, Port Blair.

Family LUTIANIDAE.

Lutianus lutjanus Bleeker.

1790. *Lutianus lutjanus*, Bloch, *Naturg. Ausland. Fische* IV, p. 107.
1873. *Latianus lutjanus*, Bleeker, *Atlas Ichth.* VII, pl. cccxiv, fig. 3; 1876-77, *loc. cit.* VII, p. 52.
1875. *Lutianus madras*, Day, *Fishes India*, p. 47, pl. xiv, fig. 3.
1931. *Lutjanus lutjanus*, Fowler, *Bull. 100, U. S. Nat. Mus.* XI, p. 147.
1936. *Lutjanus lutjanus*, Weber and de Beaufort, *Fishes Indo-Austr. Arch.* VII, p. 251.

A specimen, 74 mm. long, was caught off Ross Island, Port Blair.

Lutianus russelli (Bleeker).

1849. *Mesoprion Russelli*, Bleeker, *Verh. Bat. Gen.* XXII, Perc. p. 41.
1870. *Mesoprion russellii*, Day, *Proc. Zool. Soc. London*, p. 680.
1873. *Lutjanus russellii*, Bleeker, *loc. cit.* VII, pl. ccc, fig. 2; 1876-77, *loc. cit.* VIII, p. 71.
1875. *Lutjanus fulviflamma*, Day, *Fishes India*, p. 41 (*partim*), pl. xii, fig. 5.
1936. *Lutjanus russelli*, Weber and de Beaufort, *loc. cit.* VII, p. 272.

2 specimens, 107 and 116 mm. in length, from the east coast of Ross Island, Port Blair.

Family SILLAGINIDAE.

Sillago maculata Quoy and Gaimard.

1824. *Sillago maculata*, Quoy and Gaimard, *Voy. l'Uranie et l'Physicienne, Zoologie*, p. 261, pl. liii, fig. 2.
1829. *Sillago maculata*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* II, p. 411.
1876. *Sillago maculata*, Day, *Fishes India*, p. 265, pl. lviii, fig. 4.
1877. *Sillago maculata*, Bleeker, *Atlas Ichth.* IX, pl. ccclxxxix, fig. 5.
1931. *Sillago maculata*, Weber and de Beaufort, *loc. cit.* VI, p. 174.
1933. *Sillago maculata*, Fowler, *Bull. 100, U. S. Nat. Mus.* XII, p. 423.

A specimen, 29 mm. long, from the west coast of Long Island, Middle Andaman.

Family SCATOPHAGIDAE.

Scatophagus argus (Linn.).

1766. *Chaetodon argus*, Linnaeus, *Syst. Nat.*, ed. 12, I, p. 464.
1788. *Chaetodon argus*, Bloch, *Ichtyologie* VI, p. 63, pl. cciv, fig. 1.
1870. *Scatophagus argus*, Day, *Proc. Zool. Soc. London*, p. 687.
1875. *Scatophagus argus*, Day, *Fishes India*, p. 114, pl. xxix, fig. 3.
1927. *Scatophagus argus*, Herre and Montalban, *Phil. Journ. Sci.* XXXIV, p. 8, pl. ii, fig. 2; pl. xii, fig. 2.
1929. *Scatophagus argus*, Fowler and Bean, *Bull. 100, U. S. Nat. Mus.* VIII, p. 35, fig. 1.
1936. *Scatophagus argus*, Weber and de Beaufort, *loc. cit.* VII, p. 6, figs. 3, 5.

A fine example, 108 mm. long, from North Bay, Port Blair; one of 21 mm. from a stream at Flat Bay, South Andaman, and 2 very young specimens, 8 and 9 mm. long, from Viper Island, Port Blair.

Family CHAETODONTIDAE.

Holacanthus semicirculatus Cuv. and Val.

1831. *Holacanthus semicirculatus*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* VII, p. 191.
1831. *Holacanthus semicirculatus*, Lesson, *Voy. Coquille, Poiss.* II, p. 173, pl. xxx, fig. 3.
1875. *Holacanthus nicobariensis* var. *semicirculatus*, Day, *Fishes India*, p. 112, pl. xxviii, fig. 6.
1927. *Holacanthus semicirculatus*, Herre and Montalban, *Phil. Journ. Sci.* XXXIV, p. 100, pl. xix, fig. 1.
1929. *Holacanthus semicirculatus*, Fowler and Bean, *U. S. Nat. Mus.* VIII, *Bull. 100*, p. 185, fig. 9.
1933. *Pomacanthus semicirculatus*, Brunner, *Proc. Zool. Soc. London*, p. 563, fig. 10.
1936. *Pomacanthus semicirculatus*, Weber and de Beaufort, *Fishes Indo-Austr. Arch.* VII, p. 141, fig. 36.

A specimen, 45 mm. long, was netted on the south coast of Long Island, Middle Andaman.

Brunner has placed *Pomacanthus lepidolepis* Bleeker under *Pomacanthus semicirculatus* C. and V., calling the former the adult form of the latter. In this he has been followed by Weber and de Beaufort. This is probably perfectly correct, but I do not like to accept it until a more complete series has been studied. I have observed specimens of typically marked *lepidolepis* that were much smaller than specimens of *H. lepidolepis* but 123 mm. in length, and examples of *H. semicirculatus* of 134, 138 and 165 mm. Large examples of *H. semicirculatus* seen by me, up to about 150 mm., showed no signs of colour transition to *H. lepidolepis*.

Family TEUTHIDIDAE.

Teuthis oramin (Bl. & Schn.).

1801. *Amphacanthus guttatus* var. *oramin*, Bloch and Schneider, *Syst. Ichth.*, p. 207, pl. xlviii.
1875. *Teuthis oramin*, Day, *Fishes India*, p. 168, pl. xl, fig. 6.
1928. *Teuthis oramin*, Herre and Montalban, *Phil. Journ. Sci.* XXXV, p. 165, pl. v, fig. 1.

A specimen, 92 mm. long, from South Corbyn's Cove, Port Blair.

Family SCORPAENIDAE.

Parascorpaena bleekeri (Day).

1875. *Scorpaena haplodactylus*, Day, *Fishes India*, p. 149, pl. xxxvi, fig. 2.
1878. *Scorpaena bleekeri*, Day, *Fishes India, Addenda and Corrigenda*, p. 747.

A specimen, 135 mm. long, from North Bay, Port Blair, and one of 38 mm. taken south of Long Island, Middle Andaman. Dorsal IX, I/9 ; anal III/5 ; scales in longitudinal series above lateral line 44 ; in transverse series to 6 above and 22 below the lateral line. The larger specimen has the pectoral I-5-XI ; the smaller specimen has the pectoral III-3-IX on one side, and II-4-IX on the other.

Family PLATYCEPHALIDAE.

Cocius crocodilus (Tilesius).

1812. *Platycephalus crocodilus*, Tilesius, *Krusenstern's Reise*, pl. lix, fig. 2.
1876. *Platycephalus punctatus*, Day, *Fishes India*, p. 277, pl. lx, fig. 3.
1891. *Platycephalus punctatus*, Sauvage, *Poiss. Madagascar*, p. 307, pl. xxxvi, figs. 5, 5*a*.
1908. *Thysanophyrys crocodilus*, Jordan and Richardson, *Proc. U. S. Nat. Mus.* XXXIII, p. 638, fig. 4.
1925. *Cocius crocodilus*, Jordan and Hubbs, *Memoirs Carnegie Mus.* X, p. 286.

2 specimens, 82 and 87 mm. in length, from Viper Island, Port Blair.

Platycephalus indicus (L.).

1758. *Callionymus indicus*, Linnaeus, *Syst. Nat.* ed. 10, p. 250.
1829. *Platycephalus insidiator*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* IV, p. 227.
1843. *Platycephalus insidiator*, Schlegel, *Fauna Japonica, Pisces*, p. 39, pl. xv, fig. 1.
1876. *Platycephalus insidiator*, Day, *Fishes India*, p. 276.
1908. *Platycephalus indicus*, Jordan and Richardson, *Proc. U. S. Nat. Mus.* XXXIII, p. 641.

Dorsal I-VI, I/12 ; anal I/12. Two examples from near Viper Island, Port Blair, their lengths 93 and 104 mm.

Family POMACENTRIDAE.

Abudefduf biocellatus (Q. and G.).

1825. *Glyphisodon biocellatus*, Quoy and Gaimard, *Voy. Uranie., Zool.*, p. 389.
1828. *Chaetodon brownriggi*, Bennett, *Fishes Ceylon*, p. 8, pl. viii.
1870. *Glyphidodon antjerius*, Day, *Proc. Zool. Soc. London*, p. 696.
1877. *Glyphidodon antjerius*, Day, *Fishes India*, p. 387, pl. lxxxi, figs. 4, 5.
1927. *Chrysiptera brownriggi*, Montalban, *Pomacentridae Phil. Is.*, p. 105.
1928. *Abudefduf biocellatus*, Fowler and Bean, *U. S. Nat. Mus.* VII, *Bull. 100*, p. 166.

The following were taken at Port Blair :—1 of 13 mm. at Blair Reef, Phoenix Bay ; 2, 20 and 25 mm. long, from a rock pool above high tide, south of Corbyn's Cove ; 4 from 12 to 22 mm., from Murdakhari Bay. A specimen 31 mm. long was taken at East Sound Island, north Andaman. An example 38 mm. long was collected north west of Ross Island, Andamans, and one of 30 mm. from " the Andamans."

Abudefduf bonang (Bleeker).

1853. *Glyphisodon bonang*, Bleeker, *Nat. Tijds. Ned. Ind.* III, p. 522.
1877. *Paraglyphidodon bonang*, Bleeker, *Atlas Ichth.* IX, pl. ccccciii, fig. 1.
1928. *Abudefduf bonang*, Fowler and Bean, *Bull. 100, U. S. Nat. Mus.* VII, p. 154.

A juvenile, but distinctively marked specimen 10 mm. long, from a freshwater stream, Middle Andaman.

Abudefduf leucogaster (Bleeker).

1845. *Glyphisodon leucogaster*, Bleeker, *Nat. Geneesk. Arch. Ned. Ind.* II, p. 523.
1877. *Glyphidodon leucogaster*, Day, *Fishes India*, p. 388, pl. lxxxi, fig. 3.
1927. *Abudefduf leucogaster*, Montalban, *Pomacentr. Phil. Is.*, p. 88.
1928. *Abudefduf leucogaster*, Fowler and Bean, *Bull. 100, U. S. Nat. Mus.* VII, p. 170.

A specimen, 28 mm. long, was taken at East Ross Island, South Andaman.

Abudefduf modestus (Schlegel).

1839-44. *Glyphidodon modestus*, Schlegel and Müller, *Nat. Ges. Nederl. Zool.* II, p. 23, pl. vi, fig. 2.
1870. *Glyphidodon modestus*, Day, *Proc. Zool. Soc. London*, p. 696.
1877. *Glyphidodon modestus*, Day, *Fishes India*, p. 388, pl. lxxi, fig. 6.

2 specimens, 28 and 74 mm. long, from a bay south of South Corbyn's Cove ; **3** from 15 to 72 mm. in length from Murdakhari Bay, and one of **59 mm.** from the east coast of Ross Island, all in Port Blair. Two **examples**, 62 and 66 mm. in length, are from the South Coast of Long **Island,** Middle Andaman.

Abudefduf saxatilis (Linn.).

1758. *Chaetodon saxatilis*, Linnaeus, *Syst. Nat.* ed. 10, p. 276.
1877. *Glyphidodon coelestinus*, Day, *Fishes India*, p. 386, pl. lxxxiii, fig. 2.
1927. *Abudefduf saxatilis*, Montalban, *Pomacentr. Phil. Is.*, p. 81, pl. xvii, fig. 2.
1928. *Abudefduf saxatilis*, Fowler and Bean, *Bull. 100, U. S. Nat. Mus.* VII, p. 124.

2 examples, 13 and 23 mm. long, of this Common Rock Pilot were **taken on** Blair Reef, Phoenix Bay, Port Blair.

Abudefduf sordidus (Forskål).

1775. *Chaetodon sordidus*, Forskål, *Descrip. Anim.*, p. 62.
1870. *Glyphidodon sordidus*, Day, *Proc. Zool. Soc. London*, p. 696.
1877. *Glyphidodon sordidus*, Day, *Fishes India*, p. 385, pl. lxxxiii, fig. 1.
1927. *Abudefduf sordidus*, Montalban, *Pomacentr. Phil. Is.*, p. 77, pl. xv, fig. 2.

At Port Blair 3 specimens, 10 to 20 mm. long, were taken at Viper Island and one of 36 mm. near Murdakhari Bay.

Pomacentrus tripunctatus Cuv. and Val.

1830. *Pomacentrus tripunctatus*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* V, p. 315.
1877. *Pomacentrus trilineatus*, Day, *Fishes India*, p. 382.

A specimen, 60 mm. long, from the east coast of Ross Island, and one of 58 mm. from Blair Reef, Phoenix Bay, Port Blair. From North Andaman one of 50 mm. was caught on the south coast of Long Island, and 3 from 15 to 16 mm. at Sound Island.

LABRIDAE.

Halichoeres hyrtli (Bleeker).

1856. *Julis (Halichoeres) hyrtlii*, Bleeker, *Act. Soc. Sci. Ind. Neerl.* I, p. 60.
1862. *Halichoeres hyrtlii*, Bleeker, *Atlas Ichth.* I, p. 120, pl. xxxix, fig. 2.
1877. *Platyglossus hyrtlii*, Day, *Fishes India*, p. 398, pl. lxxxviii, fig. 1.
1928. *Halichoeres hyrtlii*, Fowler and Bean, *Bull. 100, U. S. Nat. Mus.* VII, p. 285.

A juvenile example, 16 mm. long, from Sound Island, Middle Andaman.

Halichoeres leparensis (Bleeker).

1852. *Julis (Halichoeres) leparensis*, Bleeker, *Nat. Tijds. Ned. Ind.* III, p. 730.
1865. *Halichoeres leparensis*, Bleeker, *Atlas Ichth.* I, p. 119, pl. xlii, fig. 5.
1870. *Platyglossus leparensis*, Day, *Proc. Zool. Soc. London*, p. 697.
1877. *Platyglossus leparensis*, Day, *Fishes India*, p. 399, pl. lxxxiv, fig. 3.
1928. *Halichoeres leparensis*, Fowler and Bean, *loc. cit.*, p. 283.

2 specimens, 39 and 54 mm. in length, from the south coast of Long Island, Middle Andaman.

Halichoeres notopsis (Kuhl and van Hass.) (Cuv. and Val.).

1839. *Julis notopsis*, (Kuhl and van Hasselt) Cuvier and Valenciennes, *Hist. Nat. Poiss.* XIII, p. 485.
1870. *Platyglossus notopsis*, Day, *Proc. Zool. Soc. London*, p. 697.
1877. *Platyglossus notopsis*, Day, *Fishes India*, p. 398, pl. lxxxiv, fig. 4.
1928. *Halichoeres notopsis*, Fowler and Bean, *loc. cit.*, p. 267.

The following were obtained at Port Blair :—8 specimens, 9 to 24 mm. in length, from Murdakhari Bay ; 7 from 8 to 12 mm. from Ross Island ; 2 of 21 and 22 mm. from Blair Reef, Phoenix Bay. Five more, each about 10 mm. in length, from Brookesabad, South Andaman, also probably belong here.

Labroides dimidiatus (Cuv. and Val.).

1839. *Cossyphus dimidiatus*, Cuvier and Valenciennes, *loc. cit.*, p. 136.
1877. *Labroides dimidiatus*, Day, *Fishes India*, p. 393, pl. lxxxvi, fig. 1.
1928. *Labroides dimidiatus*, Fowler and Bean, *loc. cit.*, p. 222.

A specimen, 31 mm. long, taken north west of Ross Island, Andamans. In life it was deep blue, becoming paler on the under side, with a long pale blue band on either side, just below the dorsal fin, from the head to the caudal. The caudal fin had a pale blue triangular margin above and below.

Lepidaplois sp.

2 specimens, 10 and 12 mm. in length, from Murdakhari Bay, Port Blair.

Family ELEOTRIDAE.

Genus **Eleotris** (Gronow) Bloch and Schneider.

1763. *Eleotris*, Gronow, *Zooph.*, p. 83.
1801. *Eleotris*, Bloch and Schneider, *Syst. Ichthy.*, p. 65.
1856. *Culius*, Bleeker, *Bijdr. Ichth. Fauna Boero, Nat. Tijds. Ned. Ind.* XI, p. 411.
1927. *Eleotris*, Herre, *Gobies of the Philippines and China Sea*, p. 29.

This genus is readily distinguished by the downward curved spine at the lower angle of the preopercle, which, however, may be more or less concealed in large specimens. The body is thick, robust, little elevated, more or less cylindrical forward and compressed posteriorly, the head flattened above. The body is covered with ctenoid scales, 42 to 73 in a longitudinal series; there are from 23 to 50 cycloid predorsal scales, which may not reach the eyes, or may extend to the snout; the sides of the head may be naked or more or less scaled. The very small teeth are in several rows in each jaw, those of the outer row a trifle larger than the rest; no canines. Dorsal VI, I/8 or 9; anal I/8 or 9. The isthmus is broad; branchiostegals 6.

The species are usually small, some attaining a length of 225 mm. or more. They spend most of their life in freshwater streams, descending to the sea to spawn. In the Philippines the swarms of ascending fry are taken in great quantity in shallow bays and at river mouths, and are of considerable economic importance. The genus is widely distributed in Indo-Pacific waters, from the east coast of Africa to the Riu Kiu, Hawaiian and Society Islands.

Key to Andaman species of Eleotris.

A. Lateral scales 58 to 65.	
B. Lateral scales 58 to 65; transverse series 16 to 19; predorsal 48 to 50; interorbital and snout with scales	*Eleotris fusca.*
BB. Lateral scales 58-60; transverse series 19-20; predorsal 38-40; interorbital and snout scaleless ..	*Eleotris andamensis.*
AA. Lateral scales 48-52.	
B. Predorsal scales 37-42; transverse series 14 to 15 ..	*Eleotris melanosoma.*
BB. Predorsal scales 23; transverse series 12; posterior half with vertical bands	*Eleotris luteus.*

Eleotris fusca (Bloch and Schneider).

1801. *Poecilia fusca*, Bloch and Schneider, *Syst. Ichth.*, p. 453.
1860. *Eleotris cavifrons*, Blyth, *Journ. Asiat. Soc. Bengal*, p. 145.
1861. *Eleotris fusca*, Günther, *Cat. Fishes* III, p. 125.
1876. *Eleotris fusca*, Day, *Fishes India*, p. 313, pl. lxv, fig. 7.
1876. *Eleotris cavifrons*, Day, *Fishes India*, p. 313, pl. lxv, fig. 6.
1927. *Eleotris fusca*, Herre, *Gobies of Philippines*, p. 30, pl. ii, fig. 1.

Eleotris fusca is the commonest and most widely distributed member of the genus, ranging from Madagascar and the rivers of east Africa to the Philippines, Guam and the Marquesas.

6 specimens, 45 to 46 mm. in length, from Aberdeen, Port Blair, South Andaman, and 2 specimens, 21 and 23 mm. in length, from a freshwater stream at Beadonabad, Port Blair. From a freshwater pond on Sound Island, North Andaman were taken 3 examples, 73 to 84 mm. in length.

Eleotris andamensis, sp. nov.

Dorsal VI, I/8 ; anal I/8 ; scales in longitudinal series 58 to 60, in transverse series, between the origins of the second dorsal and anal, 19 or 20 ; predorsal scales 38 to 40. The predorsal scales extend forward to the interorbital space and there are a few scales on the upper part of the opercle ; the rest of the head is naked.

The body is thick, robust, with nearly horizontal dorsal profile, the ventral profile slightly curved, the form wedge-shaped when viewed from above. The depth is 4·9 to 5·2 times in the length, the large broad head 2·8 to 2·9 times ; the broadly rounded caudal 3·85 to 4. The eyes are rather small, dorsolateral in position, 5·3 to 5·4 times in the head, and about 1·3 in the interorbital which is 4 to 4·25 times in the head ; the short wide snout is about 4·35 times in the head. The mouth is strongly oblique, with projecting chin ; the maxillary extends beneath the front of the eye, its length 2·8 to 3 times in the head ; the teeth are typical of the genus. The vertical fins are low, the first dorsal not reaching the second when depressed ; the height of the first dorsal is 2·5 to 3, that of the second dorsal and anal 2·2 to 2·4 times in the length of the head ; the pectoral length is 4 to 4·5 times in the standard length, the small ventrals 5·4 to 5·5 times. The least depth of the caudal peduncle is 1·75 to 2 times in its own length, or 2·6 to 2·8 times in the head. The characteristic opercular spine of *Eleotris* is well developed.

The colour in alcohol is brown, the scales on the sides with darker centres which form short longitudinal streaks or bars, and more or less mottled with paler spots or blotches ; at the upper angle of the gill opening is a blackish spot ; 3 black stripes extend back from the eye, the upper one along the supraopercular groove, the other two diagonally on the preopercle. The first dorsal is cross barred by 2 or 3 rows of brown spots, the second dorsal and anal by 3 or 4 rows ; the caudal is barred by 5 or 6 rows of dark brown spots, and the pectoral is faintly barred by 5 to 8 cross rows of spots.

Here described from the type, 50 mm. long, and 2 paratypes, 43 and 49 mm. long. They were taken from a stream near Machligaon, Port Blair. 7 paratypes, 25 to 43 mm. long, were caught in a freshwater

stream north of the wireless station, Port Blair. Three juvenile specimens, 26 to 30 mm. in length, agree with the above in scale counts ; they were taken at Station 2, Andamans.

This *Eleotris* is close to both *E. fusca* and *E. melanosoma*, having the longitudinal scales of one and the predorsal scales of the other.

Ophiocara aporos Bleeker.

1854. *Eleotris aporos*, Bleeker, *Nat. Tijds. Ned. Ind.* VI, p. 59.
1870. *Eleotris ophiocephalus*, Day, *Proc. Zool. Soc. London*, p. 694.
1876. *Eleotris ophiocephalus*, Day, *Fishes India*, p. 312, pl. lxvii, fig. 2.
1927. *Ophiocara aporos*, Herre, *Gobies Philipp.*, p. 65, pl. v, fig. 2, and pl. xxviii, fig. 3.

Common in the Andamans. From Port Blair are 6 specimens, 41 to 60 mm. in length, taken from a freshwater stream near Machchi Line, and 2 of 28 and 34 mm., caught near the bridge over a freshwater stream at Beadonabad. One of 46 mm. is from Station 2, Andamans ; 2 of 45 and 50 mm. are from Middle Andaman, and one of 100 mm. is from a freshwater pond on Sound Island, North Andaman.

Ophiocara porocephala (Cuv. and Val.).

1837. *Eleotris porocephala*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* XII, p. 237.
1837. *Eleotris ophicephalus*, (Kuhl & v. Hass.) Cuvier and Valenciennes, *loc. cit.*, p. 239.
1876. *Eleotris porocephalus*, Day, *Fishes India*, p. 312, pl. lxvii, fig. 1.
1927. *Ophiocara porocephala*, Herre, *loc. cit.*, p. 69, pl. v, fig. 3.

4 specimens from 44 to 67 mm. in length were obtained from freshwater pools near South Corbyn's Cove, Port Blair. The description of *Eleotris ophicephalus* by Cuvier and Valenciennes, (not *E. ophiocephalus* as later authors stated it) does not differ from that of *E. porocephala* in any important respect. They distinctly state that *E. ophicephalus* has the same shape, fin count, scales, and head as *E. porocephala*. Therefore I cannot accept *O. ophicephalus* as the name of the second species of *Ophiocara* in the Andamans.

Ptereleotris andamensis, sp. nov.

Dorsal I/25 ; anal I/22-23 ; scales in longitudinal series more than 150 and apparently more than 180.

The body is elongate, low, rounded anteriorly, its posterior half compressed ; the dorsal profile is very gently convex, the ventral profile nearly horizontal. The depth is 6 times, the head 3·7, the caudal 4, the pectoral 5·4 times in the length. The large eye is high up, its upper edge flush with the dorsal profile, 3·85 times in the head and 1·2 times in the nearly flat interorbital, which is nearly 3·2 times in the head. The snout is short, blunt, 4·3 times in the head ; the least depth of the caudal peduncle is 2·7 times in the head.

The mouth is strongly oblique, the angle of the maxillary under the front part of the eye or the anterior margin of the pupil ; the teeth are minute, the specimens too young to have canines developed properly.

The first dorsal is low and well separated from the second dorsal, its height about half that of the second dorsal and approximately 3·5

times in the head. The second dorsal and anal are nearly opposite, the origin of the anal under the fourth ray of the second dorsal; both are highest anteriorly and of approximately equal height, or the anal is a little higher; the longest rays 1·8 or 2 times in the head. The length of the narrow ventral equals the annal height. The caudal is forked.

The body is covered with minute cycloid scales, embedded and difficult to make out and extending forward almost to the eyes.

The colour in alcohol is pale yellowish gray, without markings or spots on body or fins.

Described from the type, 27 mm. long; 3 paratypes are 19 to 24 mm. in length. All were taken on sandy bottom between corals, at Curlew Island, Stewart Sound, North Andaman.

This species is closest to *P. dispersus* Herre, but differs in the shape of dorsals, anal, and caudal, the relative position of the first and second dorsals, and other details.

Andameleotris, subgen. nov.

Dorsal VI, I/15-17; anal I/15-18; ventrals 1/3; branchiostegals 6. There are 75 to 80 minute embedded cycloid scales in a longitudinal series, and 20 or 22 in a transverse series between the origins of the second dorsal and anal. The head and predorsal region are naked.

The body is slender, compressed, elongate, the head short, with a large eye and nearly vertical mouth, the chin prominent; there is a pair of canines on each side of the lower jaw, some distance back of the symphysis. The teeth are apparently in two rows. The vertical fins are low, the second dorsal and anal of similar shape; the caudal varies from truncate to more or less forked, and is probably forked in adults.

The new sub-genus *Andameleotris* is placed in *Amblyeleotris* Bleeker, from which it differs in its larger number of fin rays, and apparently also in dentition. From *Ptereleotris* and related genera it differs in its much smaller number of scales and in the much smaller number of dorsal and anal rays.

Amblyeleotris (Andameleotris) raoi, sp. nov.

Dorsal VI, I/15-17; anal I/15-18; there are about 80 minute scales in a lateral series, apparently all cycloid, and 20 or 22 in a transverse series; there is a low predorsal fold or ridge extending forward to the nape.

The depth is 6·5 to 6·4, the head 4·33, the caudal 4 to 3·25, the pectoral 5·6 to 6, the ventral 5·6 to 7 times in the length. The circular eye is high up, its upper margin flush with the dorsal profile, 3 to 2·9 times in the head; the nearly flat interorbital is a little more than half the eye; the short blunt snout is twice or a little more than twice in the eye; the nearly vertical mouth does not extend beneath the eye and the length of the maxillary is a little less than that of the eye. The least depth of the caudal peduncle equals its length, 2·6 times in the head. The vertical fins are all low, the first dorsal not reaching the second when depressed, the second dorsal and anal highest in their anterior third, the last ray of each reaching the caudal base when depressed; the first dorsal height

is about two and a third times, the longest second dorsal ray 1·6 to 1·5, the longest anal ray 1·4 times in the head.

The colour in alcohol is uniform tan or very pale brown, with a darker band from the pectoral axil along the lower half of the body to the caudal base, on which is a conspicuous circular reddish black spot; on each side of the dorsal base is a narrow dark stripe; on the basal part of the hind half of the first dorsal is an elongate reddish black spot; the second dorsal and anal are more or less darkened by reddish brown dots; the caudal has a reddish band along its upper portion, widest at the rear, and a similar stripe extends from the basal black spot to the tip of the fin.

Described from the type, 17 mm. long, and 60 paratypes 8 to 15 mm. in length. They were taken on the west coast of Güitar Island, Middle Andaman, by Dr. H. S. Rao, after whom the species is named. The specimens are all very young. A field note by Dr. Rao states " adults in deeper waters."

Family GOBIIDAE.

Bathygobius fuscus (Rüppell).

1828. *Gobius fuscus*, Rüppell, *Atlas Reise, Fische*, p. 137.
1870. *Gobius albo-punctatus*, Day, *Proc. Zool. Soc. London*, p. 691.
1876. *Gobius albo-punctatus*, Day, *Fishes India*, p. 294, pl. lxiii, fig. 7.
1927. *Bathygobius fuscus*, Herre, *Gobies Philip.*, p. 113, pl. viii, fig 2.
1935. *Bathygobius fuscus*, Mukerji, *Rec. Ind. Mus.* XXXVII, p. 266.

At Port Blair the following were obtained :—3 specimens 21 to 40 mm. at South Corbyn's Cove, 1 of 27 mm. at Murdakhari Bay, and 5 from 14 to 41 mm. in length at East Ross Island. One of 38 mm. was taken south of Sound Island, North Andaman.

Chonophorus ocellaris (Broussonet).

1782. *Gobius ocellaris*, Broussonet, *Encyclop. Meth., Dec. Ichth.*, fig. 142.
1876. *Gobius ocellaris*, Günther, *Fische der Südsee* II, p. 177, pl. cviii, fig. C.
1927. *Chonophorus ocellaris*, Herre, *loc. cit.*, p. 218, pl. xvii, fig. 2.

An example, 30 mm. long, was taken from Dhanikhari stream, South Andaman.

Glossogobius biocellatus (Cuv. and Val.).

1837. *Gobius biocellatus*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* XII, p. 55.
1876. *Gobius biocellatus*, Day, *Fishes India*, p. 289, pl. lxiii, fig. 8.
1927. *Glossogobius biocellatus*, Herre, *loc. cit.*, p. 156, pl. xii, fig. 3.

One of 41 mm. from a creek north of South Corbyn's Cove, and one of 53 mm. from South Point, Port Blair. The last example is a melanistic form, quite unlike typical specimens.

Glossogobius celebius (Cuv. and Val.).

1837. *Gobius celebius*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* XII, p. 56.
1913. *Gobius (Glossogobius) celebius*, M. Weber, *Siboga Exped., Fische*, p. 468, fig. 94.
1927. *Glossogobius celebius*, Herre, *loc. cit.*, p. 158, pl. xxii, fig. 4.

2 specimens, 45 and 67 mm. long, were taken from a small stream, North Andaman.

Gobiodon quinquestrigatus (Cuv. and Val.).

1837. *Gobius quinquestrigatus*, Cuvier and Valenciennes, *loc. cit.*, p. 101.
1876. *Gobiodon quinque-strigatus*, Day, *loc. cit.*, p. 297.
1927. *Gobiodon quinquestrigatus*, Herre, *loc. cit.*, p. 294.

A specimen, 31 mm. long, was taken at Henry Lawrence Island, Ritchie Archipelago, Andamans.

Sicyopterus garra Hora.

1925. *Sicyopterus garra*, Hora, *Rec. Ind. Mus.* XXVII, p. 35, pl. ii, figs. 2-5.

This little fish is evidently abundant in Andaman streams. The members of this group live in stony or gravelly brooks and rivers, often in swift hill streams, going down to the sea to spawn. The following were collected at various times about Port Blair :—9 from 15 to 40 mm. near the wireless station ; 40 from 17 to 35 mm. from a freshwater stream south of South Corbyn's Cove ; 11 from 19 to 21 mm. from Dhanikhari stream and two 32 and 39 mm. long from a creek near Dhoby Line, Aberdeen. One of 52 mm. was taken at the foot of Mount Tytler, South Andaman.

Dorsal VII or VIII, I/9 or 10 ; scales in a longitudinal series 63 to 65. The first, second, and third dorsal spines may have filiform, elongated tips, the longest of them in one specimen being one and a half times the head and nearly twice the greatest depth. Hora gives the head 4 times in the length, but I find it 5 times in the length of the larger specimens. Hora's type specimen was 24 mm. long, which is about half the adult size. However, his excellent description leaves little to be added.

Vaimosa hoeveni Bleeker.

1851. *Gobius hoeveni*, Bleeker, *Nat. Tijds. Ned. Ind.* II, p. 426.

A specimen, 26 mm. long, was taken from a creek near coconut plantation on Long Island, Middle Andaman.

Dorsal VI, I/7 ; anal I/7 ; there are 30 scales in a longitudinal and 10 in a transverse series ; there are 13 predorsal scales and 12 or 14 opercular scales.

Vaimosa koumansi Mukerji.

1935. *Vaimosa koumansi*, Mukerji, *Rec. Ind. Mus.* XXXVII, p. 268, pl. v, figs. 3, 4.

Dorsal VI, I/6, rarely 7 ; anal I/6, rarely 5. Scales in a longitudinal series 25, in transverse 8 or 7 ; there are 6 predorsal scales ; opercular scales 5 or 6.

The excellent description prepared by Mr. Mukerji was made from his sole specimen and type, a male 29 mm. long. I have been able to examine the following : 93 examples, 8 to 25 mm. in length, from a creek north of South Corbyn's Cove, Port Blair, South Andaman ; 86 specimens 12 to 27 mm. in length from Dhanikhari stream near the junction of the Maymyo and Manglutan roads, South Andaman ; 6 specimens from the same locality, 14 to 20 mm. in length ; and 7 specimens 17 to

21 mm. in length from a fresh water stream near Weli village, Base Camp, Middle Andaman. The study of so many specimens has made it possible to make some additions and corrections to the description already published.

Young specimens are slender, with proportions quite different from those given by Mukerji. His description applies very well to all examples 18 mm. or more in length, so that an extended discussion of the measurements and form is unnecessary. There is naturally some variation in the depth, length of fins, size of eye, etc. In specimens of 18 mm. or more I find the head 2·9 to 3·1 times in the length ; the caudal and pectoral are equal, 3·8 to 4·1 in the length ; the eye and snout are nearly equal in length, or the snout may be a trifle greater, both about 4·5 times in the head.

It would appear that the extension of the maxillary nearly to the posterior angle of the preopercle is a male character ; unfortunately only two males of the extensive series are large enough to have the maxillary fully developed, although many have it extending beneath the middle of the eye. The maxillary does not seem to lengthen until males are more than 20 mm. long, and apparently does not extend beyond the eye until they are 25 mm. or more in length. It is not likely that the maxillary ever reaches beyond the middle of the eye in females ; some of the largest specimens have a small mouth with the maxillary scarcely extending beyond the front margin of the eye. The colour pattern of the head, with curved bands as shown in Mukerji's figures, is also a male character. None of the females have them. An elongate maxillary and curved bands on the sides of the head are male characters in several species of *Vaimosa,* but are found in both sexes in *V macrognathos* Herre, a Philippine species. In *V koumansi* the curved cheek bands are on adult males, but indications of them may be seen on specimens of 16 mm. and over.

Females and young males usually have a broad dusky bar from the eye downward and backward behind the mouth, with a broad yellow or pale spot behind it on the preopercle ; a short dark bar passes from the eye to the upper lip. Large specimens may have two dark bars or spots on the preopercle. The opercle has a large dark spot, and many dark dots over the rest of it ; similar dots may be sprinkled over the preopercle, pectoral base, and under side of the head.

Seen from above specimens show 5 broad dark brown cross bands over the back ; the first is before the dorsal, the second under the first dorsal, the next two under the second dorsal, and the fifth is over the middle of the caudal peduncle. Alternating with these is a row of 5 dark spots along the middle of the side, the first under the pectoral, the last at the caudal base and often much modified. Like eight or ten other species of *Vaimosa,* the present species has 2 black circular dots on the basal part of the caudal fin, but they are not very conspicuous and are often obscured by the last lateral spot, or fuse with it to form a ring, or are modified in some way so as to be obscured.

The first dorsal is clear, with 2 black crossbands, which are best developed posteriorly ; they may be modified in various ways, or may coalesce posteriorly so that the posterior half is covered with a single

large black patch. The second dorsal has three dark brown or blackish cross bands, a basal, median, and terminal; sometimes the median one is expanded to form a broad reticulated band. The anal membranes are more or less dusky, the rays clear. The caudal is barred by about 4 irregular dark brown cross bars. The pectorals and ventrals are usually clear, but may be somewhat darkened by minute dusky dots.

Family Periophthalmidae.

Periophthalmus barbarus (Linn.).

1766. *Gobius barbarus,* Linnaeus, *Syst. Nat.* ed. 10, p. 450.
1870. *Periophthalmus koelreuteri,* Day, *Proc. Zool. Soc. London,* p. 693.
1876. *Periophthalmus koelreuteri,* Day, *Fishes India,* p. 203, pl. lxiv, fig. 8.
1927. *Periophthalmus barbarus,* Herre, *loc. cit.,* p. 316, pl. xxiv, fig. 3.

Very abundant on muddy shores and in mangrove swamps. From Murdakhari Bay, Viper Island, and near South Corbyn's Cove 15 specimens, 23 to 95 mm. in length, were obtained. Two examples, 35 and 49 mm. long, were taken west of Long Island, Middle Andaman. 3 from 35 to 50 mm. are from near Point Bonington, North Andaman. 9 specimens from 22 to 48 mm. in length were taken at Station 9, and 6 from 25 to 45 mm. at Station 10, Andamans.

Periophthalmodon schlosseri (Pallas).

1769. *Gobius schlosseri,* Pallas, *Spicilegia* VIII, p. 3, pl. i, figs. 1-4.
1876. *Periophthalmus schlosseri,* Day, *loc. cit.,* p. 304, pl. lxvi, fig. 4.
1927. *Periophthalmus schlosseri,* Herre, *loc. cit.,* p. 320.

One example, 36 mm. long, from Tytler's Ghat and 5 from 38 to 43 mm. from Station 10; one of 48 mm. is from Port Bonington, North Andaman.

Family Gobioididae.

Taenioides caeculus (Bl. and Schn.).

1801. *Caepola caecula,* Bloch and Schneider, *Syst. Ichth.,* p. 241, pl. liv.
1876. *Gobioides caeculus,* Day, *loc. cit.,* p. 318, pl. lxviii, fig. 1.
1927. *Taenioides caeculus,* Herre, *loc. cit.,* p. 331.

2 examples, 40 and 50 mm. in length, from a muddy creek near South Corbyn's Cove, Port Blair.

Family Echeneidae.

Echeneis naucrates Linn.

1758. *Echeneis neucrates* (Misprint for *naucrates*), Linnaeus, *Syst. Nat.* ed. 10, p. 261.
1876. *Echeneis neucrates,* Day, *loc. cit.,* p. 257, pl. lvii, fig. 1.
1898. *Echeneis naucrates,* Jordan and Evermann, *Fishes North and Middle America* III, p. 2269, pl. cccxxix, fig. 796.
1928. *Leptecheneis naucrates,* Fowler, *Fishes Oceania* II, *Memoirs Bishop Mus.* X, p. 420, fig. 66.

One example, 152 mm. long, was caught at Viper Island, Port Blair.

Series BLENNIIFORMES.

Although Blennies are abundant on most rocky or coral shores and reefs in the Indo-Pacific tropics, they are not often collected. Accordingly most species are but little known. As they are small, and do not occur in schools on sandy shores, in open waters, or on smooth bottoms, they are not taken by commercial fishermen. Neither are they sought by seaside dwellers looking for food. Most of them are tide pool dwellers, but certain species live in deeper water on the bottom; some very small kinds live in the crannies of coral heads.

The ventral fins are of one spine and 1 to 3 rays; they are always jugular when present, and are never absent in Andaman species.

Two familes are known from the Andamans, the Clinidae, and the Blenniidae. Unquestionably *Xiphasia setifer*, family Xiphasiidae, also occurs there.

Family CLINIDAE.

Small tropical Blennies, nearly always having the body scaled. The spinous part of the dorsal fin is longer than the part composed of soft rays, or all the rays may be turned to spines. In some the dorsal has 2 spinous portions, and a short rayed part; the anal has one or two spines. They occur on coral reefs, especially on or within coral heads. Only one genus is known from the Andamans.

Tripterygion Risso.

1826. *Tripterygion*, Risso, *Hist. Nat.* III, p. 241.
1835. *Ennespterygius*, Rüppell, *Neue Wirbelt., Fische*, p. 2.

The short body is covered with small or moderate scales. There are 3 dorsal fins, the first of 3 or 4, the second of 10 to 24 soft spines, the last one of 7 to 14 rays. The anal has one or two soft spines and 14 to 22 rays. The ventrals are of 2 soft rays.

Tripterygion fasciatum M. Weber.

1913. *Tripteryium fasciatum*, M. Weber, *Siboga Expeditie, Fische*, p. 548, fig. 118.
1935. *Tripterygion* (*Enneaptrygius*) *fasciatum*, Mukerji, *Rec. Ind. Mus.* XXXVII, p. 272.

Dorsal IV, XII/7; anal I/15; there are 16 tubulated scales in the lateral line, and 15 more along the median line to the caudal base; the 7 lower pectoral rays are undivided, the 8 upper ones divided.

The depth is 4·6, the head 3·5, the caudal 4·4, and the pectoral 3·66 times in the length. The eye is 3 times, the snout 4·5 times in the head. The form is rather stout, the breadth of the head 1·25 times in its own length; the eyes are large and close together, the snout short and bluntly rounded. The dorsal and anal fins are low, the longest rays of the second and third dorsals twice in the head. There is a very small tentacle on the upper part of the left eye, but none on the right eye.

The colour in alcohol is gray, with 4 broad double dark brown cross bands over the back below the dorsals and extending well down the sides, and a dark brown band around the caudal peduncle at the caudal base; on the sides of the head, snout, and chin are irregular spots and

bands composed of red-brown dots. On the pectoral are 3 cross bars of dusky dots, and on the caudal are traces of dark cross bands; the first dorsal is largely blackish, the rays of the second and third dorsal dusky, with clear membranes; the anal has a series of dark spots along its base, and a submarginal row of reddish brown dots. The iris is more or less dark golden.

Here described from a specimen, 22 mm. long, taken by D. D. Mukerji at Station 9, Andaman Islands. From typical *T. fasciatum* this specimen differs markedly in having 4 spines in the first part of the dorsal, and only 7 rays in the last division of the dorsal; there are likewise only 8 divided pectoral rays, instead of 9. There are also differences in the colouration of the anal, pectoral, and caudal. At first I believed it to be a new species, but further study leads me to believe it to be but a variant of Weber's species.

Family BLENNIIDAE.

As treated here, this family includes all those elongate naked Blennies which have the soft spinous and soft rayed portions of the dorsal more or less subequal, and the tail never 4 to 6 times as long as the head and trunk together. The teeth are in a single, close-set, comb-like series, and may be either fixed or movable. The ventrals are jugular, with a spine and 2 to 4 rays. Pseudobranchiae are present.

This family includes a large number of fishes living in shallow coastal waters of tropical and temperate regions, nearly all of them small. A few live at considerable depths, and there are a very few freshwater species. The great majority are egg-laying. Most of them are carnivorous, but certain genera feed on algae. Some kinds are exceedingly active, and go about with lizard-like agility on exposed rocks at low tide, in search of food.

Key to the Genera of Blenniidae probably occurring in the Andamans.

A. Spinous and soft dorsal rays about equal in extent, always less than 50; teeth never with arrow-like tips; depth never more than 9 in length.

B. Teeth fixed, in one row in each jaw.

C. Gill opening wide, free from isthmus and extending forward below; a posterior canine in lower jaw, or may be present above also .. .. *Blennius* (p. 353).

CC. Gill opening restricted; a pair of canines, usually very large, in lower jaw and a pair of smaller ones above.

D. Dorsal and anal never both confluent with caudal; gill opening a little slit above upper angle of pectoral base .. .. *Petroscirtes* (p. 354).

DD. Dorsal and anal attached to caudal and more or less confluent; gill opening runs down along pectoral base .. .. .. *Enchelyurus* (p. 356).

BB. Teeth small, very many, movable, set on the gums.

C. An adhesive disk under lower jaw, behind mouth .. .. .. *Andamia* (p. 357).

CC. No adhesive disk behind mouth.

D. A fringe of small tentacles across nape .. *Cirripectes* (p. 353).

DD. No fringe of tentacles across nape .. *Salarias* (p. 357).

The genus *Cirripectes* includes those with a transverse row of tentacles across the nape. Day records a species of this genus from the coast of Ceylon, and others are known from the East Indies. There is little doubt that it dwells in Andamanese waters. The other genera listed are all represented in the Zoological Survey's Andaman collections.

Blennius Linn.

1758. *Blennius*, Linnaeus, *Syst. Nat.*, ed. 10, p. 256.

The deep oblong compressed body is naked, the head large, with the anterior profile nearly vertical or very steep. The mouth has a single row of slender, curved, close-set fixed teeth in each jaw, with a stout canine on each side below, and usually a pair of smaller canines in the upper jaw. The gill openings are wide, extending forward below, and free from the isthmus or forming a broad fold across it. The dorsal fin is entire, or may be somewhat emarginate, with slender flexible spines. The lateral line is only developed anteriorly. A genus with numerous species in warm temperate seas, some occurring in the lakes of northern Italy. Only a few species occur in East Indian and adjacent seas. They are all small and dull coloured. Only one kind is known to occur in Andaman waters.

Blennius semifasciatus Rüppell.

1835. *Blennius semifasciatus*, Rüppell, *Neue Wirbelt., Fische*, p. 134.
1935. *Blennius semifasciatus*, Mukerji, *Rec. Ind. Mus.* XXXVII, p. 273, pl. vi, fig. 5.

Dorsal XII/14 ; anal II/16.

The depth is 3·5, the head 3·08, the caudal 4·6 times in the length ; the prominent eye is 4·28, the snout 3·42 times in the head. The large head is broader and deeper than the trunk, with a nearly vertical snout ; the angle of the maxillary extends beyond a vertical from the hind margin of the eye. There is a broad fimbriate orbital tentacle ; the nasal tentacle is very slender, small, simple on one nostril, the other one bifid ; there are no tentacles or cirri on the nape or behind the eye. There is a stout curved posterior canine on each side of the lower jaw, and a smaller one on each side of the upper jaw.

The dorsal fin is of moderate height, beginning above the hind margin of the preopercle, its anterior portion lower than the rear half, which ends before the caudal. The longest rays of the first dorsal are twice in the head and 6·16 times in the length ; the longest second dorsal rays are 1·7 times in the head and 5·28 times in the length. The anal is quite low, its height 3 times in the length of the head. The anal spines have enlarged bulbous tips.

The colour in alcohol is gray to brownish gray, with 7 broad blackish brown cross bands over the back ; along the middle of the side they expand and coalesce to form a longitudinal band, which has almost disappeared on the caudal peduncle. The head is dull brown, with darker bands radiating downward from the eye and over the chin. The dorsal is reddish brown anteriorly, mottled with blackish, and with a large dusky spot above between the first and second spines. The

posterior part of the dorsal is pale reddish brown; the anal is dusky, the tips of the rays white; the other fins are unmarked.

A good specimen, 37 mm. long, and three very young ones, 11 to 13 mm. in length, were obtained at Station 9, Andaman Islands.

Petroscirtes Rüppell.

1837. *Petroscirtes,* Rüppell, *Atlas, Fische,* p. 110.

The naked body is more or less elongate, with a small or medium-sized head, which often has tentacles on the eye, and may also have them on the nape and nostrils; more rarely there are tentacles on the opercular and preopercular margins, on the chin, and on the throat. The snout is short, or of moderate length, and may be convex or elongate and conical. The mouth is often rather small, but may be rather large and extending to the hind margin of the eye. The teeth are fixed, in one row, with a very large (rarely medium-sized) curved posterior canine on each side of the lower jaw; the upper jaw has a pair of similar but much smaller canines. The gill opening is reduced to a small slit, or nearly circular aperture, above the upper angle of the pectoral base. The dorsal fin is continuous and undivided, but a few anterior rays may be elongated, filamentous, and semi-detached. The dorsal usually ends on the caudal peduncle before the caudal fin, but in a few kinds extends to the base of the caudal. The ventrals are jugular, composed of 2 or 3 rays. Unlike most Blennies, the fishes of this genus have an air bladder.

This is a group containing numerous species in the tropical portions of the Indian and Pacific Oceans, where they replace the genus *Blennius* of temperate regions. The species of *Petroscirtes* are common on coral reefs throughout, but as a rule they live in deeper water than do the Blennies of the genus *Salarias*. However, some kinds do not move off with the receding tide, but remain in shallow rocky pools or stay on exposed rocks until the incoming tide covers them again.

Unlike *Salarias*, they are carnivorous and certain species leap about on the rocks with great agility in pursuit of their prey. The name *Petroscirtes* or rock-springer is a very appropriate one. In life they use their fangs very freely, sinking them into one's fingers if handled. The three kinds listed here are probably a third of the Andaman species.

Key to the species of Petroscirtes *known from the Andamans.*

A. Dorsal with less than 30 rays.

B. No tentacles; no cross bands or stripes; colour olive to yellowish, with small brown spots and blue dots; fins yellow, dorsal and anal spotted and striped .. .. *P. bankanensis* (p. 355).

BB. 2 flap-like tentacles under chin and a pair on eyes; tentacles on margins of opercle and preopercle; caudal lunate with age .. .. *P. mitratus* (p. 355).

AA. Dorsal with 36-38 rays, anterior ones elongated and most with elongate tips; dark brown band from snout to caudal tip, sometimes with a blue or silvery stripe below it; a blue or silvery stripe below dorsal *P. filamentosus* (p. 355).

Petroscirtes bankanensis Bleeker.

1852. *Petroscirtes bankanensis*, Bleeker, *Nat. Tijds. Ned. Ind.* III, p. 727.
1861. *Petroscirtes bankanensis*, Günther, *Cat. Fishes* III, p. 237.
1913. *Petroscirtes bankanensis*, Weber, *Siboga Exp. Fische*, p. 540.

A juvenile specimen, 21 mm. long, was taken at Station 7, Andamans.

Dorsal 28 ; anal 19. A Philippine specimen of 25 mm. had the depth 5, the head 3·8, the caudal 4·1 times in the standard length. The Andaman and Philippine specimens had a pair of strong canines in the lower jaw, but none in the upper jaw, and no tentacles. Large examples have small canines above and a small tentacle behind the upper margin of the eye. The dorsal origin is above the rear edge of the preopercle.

The colour is olive above, yellowish below, with small brown spots and sprinkled with blue dots, which usually fade in alcohol. The yellow dorsal and anal are spotted and variegated with dusky. The caudal is not marked. This species, only known from the East Indies, Singapore, and the Philippines, reaches a length of 120 mm.

Petroscirtes filamentosus (Cuv. and Val.).

1836. *Blennechis filamentosus*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* XI, p. 280, pl. cccxxvi.
1861. *Petroscirtes filamentosus*, Günther, *Cat. Fishes* III, p. 231.
1876. *Petroscirtes filamentosus*, Günther, *Fische der Südsee* II, p. 196, pl. cxiv, fig.

A young specimen, 39 mm. long, was taken between Blair Reef and Chatham causeway, Port Blair. Dorsal 38 ; anal II/25. The anterior dorsal rays were not elevated. Snout conical, projecting well beyond the mouth. Lower canines of medium size, strongly hooked in a much flattened curve ; upper canines very small. A dark brown band runs from the tip of the snout over the eye and above the pectoral base to the caudal tip, the part on the caudal badly faded ; below this band is a pearl white stripe from the eye to the caudal base.

Typical and larger examples have the first 3 or 4 dorsal rays elongated, the first and second much the longest, and all the tips of the dorsal rays are more or less elongate and thread-like. The body is slender, elongate, laterally compressed, the depth 5·4 to 5·5, the head 3·7 the caudal 5·85 times in the length. There is a blue or silver stripe on the back just below the dorsal base.

This Blenny has been recorded from Celebes to the Tuamotu Archipelago.

Petroscirtes mitratus Rüppell.

1828. *Petroscirtes mitratus*, Rüppell, *Atlas, Fische*, pt. 111, pl. xxviii, fig. 1.
1855. *Petroscirtes barbatus*, Peters, *Wiegmann's Archiv*, p. 248.
1876. *Petroscirtes mitratus*, Günther *Fische der Südsee* II, p. 198.
1891. *Petroscirtes barbatus*, Sauvage, *Fauna Madagascar, Poiss.*, p. 383, pl. xxxviii, fig. 6.
1934. *Petroscirtes barbatus*, Herre, *Fishes 1931 Phil. Exped.*, p. 98.

Dorsal 25-27 ; anal 16-18.

The depth is 3·66 to 4, the head 3·4 to 3·66, the caudal 4·3 times in the length ; the eye equals the snout, 3·1 to 3·2 times in the head. The lower canines are of moderate size, the upper ones very small. The

first 3 dorsal spines are slightly elongated, the fourth one shorter than those preceding and following, the latter of uniform height except the 3 last, which are much shorter.

Under the chin is a pair of broad brownish flaps or barbels; on top of the eye is a similar one, which may be fringed; over the front rim of the eye is a small simple tentacle; just behind the eye is a very small tentacle; opposite the base of the first dorsal spine is a minute flap, and another is on the upper opercular margin; on the lower margin of the preopercle is a row of very small flaps. Any of these numerous cheek and opercular flaps may be absent.

In small specimens the caudal is broadly rounded, but with age it changes and becomes lunate by the extension of the upper and lower margins.

The colour in alcohol is light brown, with 5 wide dark brown cross bands; in the top of each, except the first, is a very pale ocellated spot, and on the sides are traces of similar spots. The dorsal and anal thickly spotted with reddish brown; the caudal is clear.

A specimen, 37 mm. long, was taken at Station 8, and 16 from 16 to 32 mm. at Station 9.

This Blenny is very wide spread, occurring from the Red Sea Mozambique, and Madagascar to the Philippines, Caroline Islands, and Samoa. It reaches a length of 75 mm.

Enchelyurus Peters.

1868. *Enchelyurus*, Peters, *Monatsber. Akad. Wiss. Berlin*, p. 268.

This genus is closely related to *Petroscirtes*, but differs as follows :—

(1) the dorsal and anal are both united to and more or less confluent with the caudal;

(2) the gill opening is wider, extending downward as far, or nearly as far, as the lower end of the pectoral base.

This is a small genus, containing four or five inconspicuous species found in the East Indies and tropical Pacific. Only one kind is known from the Andamans. It is possible that the discovery of additional species, or the study of a very large series of known species may show the genus to be a synonym of *Petroscirtes*. The differences which separate *Enchelyurus* and *Petroscirtes* are not profound and the examination of very large numbers of various species of both groups may show transitional stages, thus eliminating *Enchelyurus*.

Enchelyurus flavipes Peters.

1868. *Enchelyurus flavipes*, Peters, *Monatsber. Akad. Wiss. Berlin*, p. 268.
1913. *Enchelyurus flavipes* var. *nigerrima*, M. Weber, *Siboga Exped. Fische*, p. 545.
1934. *Enchelyurus flavipes* var. *nigerrima*, Herre, *Fishes 1931 Phil. Exped.*, p. 98.
1937. *Enchelyurus flavipes*, Herre, *Bull. Raffles Mus.* No. 13, p. 47.

A juvenile specimen, 31 mm. long, belonging to the variety *nigerrima*, was taken on the south coast of Long Island, Middle Andaman.

Dorsal 31-33 ; anal II/20 ; pectoral 16 ; ventral 2. The colour of the variety is uniformly blackish brown or black, including all fins. In the typical form the ventrals and pectorals are yellow, and an elongate yellow spot covers most of the caudal fin.

Andamia Blyth.

1859. *Andamia,* Blyth, *Journ. Asiat. Soc. Bengal,* p. 270.

This genus, set apart from other Blennies by the sucker or adhesive disk behind the mouth, was not represented in the collection. The specimens obtained were studied and reported upon by Rao and Hora[1], in a very valuable paper recently published, so that any remarks here are superfluous.

Salarias Cuvier.

1817. *Salarias,* Cuvier, *Règne Animal,* II, p. 251.

The slender, elongate body is naked. The movable teeth are very numerous and set on the gums ; many species have a pair of curved canines on the back part of the lower jaw. Tentacles may be present on the eyes, nape, and nostrils. A median longitudinal crest is present on males of many species and on both sexes in a very few species, while it is altogether lacking on a number of species. The dorsal fin is usually comparatively high, especially the anterior part ; it may be entire but most species have it more or less deeply notched between the spinous and rayed portions. It may be free from the caudal, or more or less completely attached to it. The gill opening is wide, forming a free fold across the isthmus. The ventrals comprise a spine and 2 or 3 rays.

The members of this genus are very agile and are rightly called rock skippers and lizard skippers. They are herbivorous fishes, grazing on the algae growing on rocks in pools. At low tide they stay in rock pools, or remain on exposed rocks, where some kinds jump about with the agility of lizards. Many of them are very handsomely coloured in life, with rich quiet harmonious markings and shades of brown, violet, blue, gray, green, reddish, white, and black.

If one quietly approaches a deep rocky pool he may find numerous species of *Salarias* living there ; some may be swimming, some clinging to the walls, some feeding, and almost always some will be seen " walking " or jumping around out of the water. If alarmed, they will give an astonishing exhibition of the agility and leaping powers of fish ; some flee with incredible bounding leaps toward deep water ; others may jump up a nearly vertical rock wall, skipping from one tiny roughness to another to a height of a meter and a half or more, in a most astonishing and unfishlike athletic exhibition till they reach the top and with a hop, skip, and a jump are gone.

The determination of preserved rock skippers is usually very difficult. The characteristic colour markings undergo great change or disppear altogether after death, so that very diverse species may come to look alike after being in alcohol some time. A large series of both fresh and

[1] Rao H. S. and Hora, S. L., *Rec. Ind. Mus.* XL, pp. 377-401, pl. viii-x (1938).

preserved material, *of both sexes*, is often needed for correct identification. The number and character of dorsal and anal spines and rays, the shape and extent of the dorsal, and the development of the tentacles and crest will usually enable one to name specimens if a goodly number are available for study. Fortunately a few strongly characterized species never lose their identification marks.

The collection contained 13 species of *Salarias*, and in the appended key I have included 4 more listed by Day from the Andamans. The 17 species here given most assuredly are not all that occur in Andamanese waters; I have no doubt that 20 or more species will ultimately be found there.

Key to Andaman species of Salarias.

(Based on preserved specimens.)

A. Dorsal entire or only slightly indented.

1. Entire and free from caudal.

B. Uniformly dark brown or black, or the caudal yellow; last rays of dorsal and anal often elongate, reaching last half of caudal; dorsal XII/17-19; anal 19 or II/18-19 .. .. *S. fuscus* (p. 361).

BB. Slate colour with 8-10 dim blackish cross bands alternating with 8-10 pairs of pale blue lines; head, nape, and pectoral base with black dots; males crested; dorsal XIII-XIV/20-22; anal II/24 .. .. *S. saliens* (p. 361).

2. With a slight indentation and attached to caudal; 6-8 wide dark brown cross bands; black dots and dashed above pectoral, becoming lengthwise lines along sides; large circular white or pale spots below and on pectoral base; broad fringed tentacles on eye, nape, and nostril .. .. *S. fasciatus* (p. 362).

AA. Dorsal notched.

3. Dorsal XIV-XVII.

C. Dorsal XVII/20-23; anal II/26-27 .. *S. kirki* (p. 362).

CC. Dorsal XIV-XV (by rare exception XIII)/19-21; anal II/24-26, rarely I/26; bluish dusky with 12 pairs of silvery cross-bands, margined by blackish lines, head and front half of body with many black dots; bands may disappear leaving black lines, or all markings may disappear; no canines; males crested . .. *S. andersoni* (p. 363).

4. Dorsal XII-XIII.

D. 2 rows of short blue or pearly or gray bars, often black margined, along sides; a circular blue or black spot on opercle; a blue or black bar below and blue or black spot behind eye; orbital tentacle simple, none on nape; a small canine below; males crested; dorsal XII/20-21; anal I or II/20-21 .. .. .. *S. periophthalmus* (p. 363).

DD. Without 2 rows of bars on sides as above.

E. A longitudinal crest on head.

F. Head, body, and fins reticulated with brown lines, enclosing circular or irregular spaces; canines in lower jaw; dorsal continuous with caudal; a long fringed orbital, a small fringed nasal tentacle, and a simple occipital one; dorsal XII-XIII/15; anal II/16-17 .. .. .. *S. vermiculatus* (p. 364).

FF. Surface not reticulated with lines.

G. With 4 to 10 longitudinal black lines on sides; no tentacle at nape.

H. No canines; dorsal attached to caudal, XII/22-24; anal II/23-24; 6-10 black lines along sides, becoming 4 or 5 posteriorly, where they may break into short spots and dots .. *S. lineatus* ♂ (p. 365).

HH. Canines present; dorsal free from caudal.

I. 5-6 black lines along sides, breaking up into spots near caudal; ocular tentacle simple; blue spot below eye; dorsal XII/20-21; anal II/18-19 *S. striolatus* ♂ (p. 365).

II. 10 dusky lines along sides; orbital tentacle simple, longer than eye; blue transverse stripes below and behind eye; large blue spot on opercle; dorsal XII/20-21 anal II/20-21 .. .. *S. bilitonensis* (p. 366).

GG. No black or dusky lengthwise parallel lines on sides.

J. Canines in lower jaw; dorsal free from caudal, XII-XIII/17-18; anal I-II/17-19; fringed cirrus on eye, nasal one very small, simple; none on nape .. .. .. *S. raoi* (p. 366).

JJ. Canines none; dorsal attached to caudal.

K. No yellow, orange, or pale longitudinal stripes.

L. Orbital tentacle fringed, nasal cirrus simple; none at nape; upper half of caudal cross-barred with rows of spots, lower half clear; dorsal XII-XIII/20-21; anal I/21-23 .. .. *S. dussumieri* (p. 367).

LL. Tentacles on eye and nape small, simple; nasal tentacle very small, usually 4 filaments; colour brown, usually with darker cross bars; anal with 2 rows bluish spots, or uniform; a diagonal dark bar behind eye, often vanishing; dorsal XIII/19-21, anal I/20-22 .. .. *S. edentulus* ♂ (p. 368).

KK. Upper part of side with 4-5 yellow, orange, or pale diffuse longitudinal stripes; short fringed tentacles at eye and nostril, none at nape; dorsal XII-XIII/23; anal I/23-24 *S. hasselti* ♂ (p. 368).

EE. No crest on head.

M. Upper lip crenulate or denticulate; dorsal free from caudal; strong canines in the lower jaw; orbital tentacle large, fringed.

N. Dark lines from eye over snout, sides of head, and throat; nasal tentacle minute, simple; none at nape. Dorsal XIII/15-17; anal I/17-19 or II/16-17 *S. frenatus* (p. 369).

NN. Sides mottled brown, with row of white spots below lateral median line; a black spot above pectoral base and dark streak behind eye; short fringed tentacle at nape and nostril; dorsal XII-XIII/14-16; anal I or II/16-17 .. .. *S. marmoratus* (p. 370).

MM. Upper lip entire.

O. A purplish or brown spot or ring on each side of the throat; body pale brown, with pale cross bands, forked below; a row of 15-20 black dots below dorsal, or irregular rows of black dots on upper half of body; 1 or 2 large circular white or pale blue spots on pectoral base; dorsal XI or XII/17-18; anal I/18-19 — *S. guttatus* (p. 370).

OO. No purple or brown spot on each side of throat.

P. Sides with 2 rows of short blue or pearl bars; a circular blue-black spot at upper angle of opercle; a blue or black bar below and spot behind eye; a small canine in lower jaw; dorsal XII/20-21; anal I or II/20-21 .. — *S. periophthalmus* ♀ (p. 363).

PP. Without blue or pearl bars along sides.

Q. Reddish brown with conspicuous rows of short blackish-brown bars and spots on sides; a simple tentacle on eye and small divided nasal one; none on nape; a minute canine in lower jaw; dorsal XIII/19-20; anal I/19-20 .. — *S. interruptus* (p. 371).

QQ. Body uniformly dotted with red or brown, or with longitudinal lines and bands on trunk.

R. Many reddish or dark brown dots or small spots all over body, dorsal, caudal and pectorals, on brown trunk with faint dark cross-bands; small simple tentacles on eye and nape; a very small one on nostril, usually of 4 filaments; dorsal XIII/19-21; anal I/20-22 .. — *S. edentulus* ♀ (p. 368).

RR. Body not dotted, but longitudinally banded or lined.

S. Upper part of side with 4 or 5 yellow or pale diffuse longitudinal stripes; short fringed tentacles on eye and nostril, none on nape; dorsal XII-XIII/23; anal I/23-24 — *S. hasselti* ♀ (p. 368).

SS. Sides with longitudinal black lines; no tentacles at nape.

T. No canines; dorsal attached to caudal; 6 to 10 black lines along sides, becoming 4-5 posteriorly, often breaking into short spots and dots at rear; orbital tentacle small, fringed; dorsal XII/22-24; anal II/23-24 .. — *S. lineatus* ♀ (p. 365).

TT. Canines present; dorsal free from caudal; 5-6 black lines along sides, breaking into short spots near caudal; ocular tentacle simple; blue spot below eye; dorsal XII/20-21; anal II/18-19 .. — *S. striolatus* ♀ (p. 365).

Salarias fuscus Rüppell.

1835. *Salarias fuscus*, Rüppell, *Neue Wirbelt., Fische*, p. 135, pl. xxxii, fig. 2.
1872. *Salarias holomelas*, Günther, *Ann. Mag. Nat. Hist.* (4) X, p. 399.
1876. *Salarias fuscus*, Day, *Fishes India*, p. 330, pl. lxx, fig. 2.
1876. *Salarias fuscus*, Günther, *Fische der Südsee* II, p. 202, pl. cxvi, fig. C.

Dorsal 29-31 ; anal 19 or II/18-19.

The much compressed body is deep and often pot-bellied, the upper profile slanting rapidly downward from the dorsal origin to the caudal peduncle ; the anterior profile is vertical or nearly so.

The depth is 2·7 to 2·8, the head 3·75 to 4 times in the length. The caudal fin is slender and elongate in small or medium-sized specimens, 2·5 to 2·7 in the length. The conspicuous eye is 3·75 to 4·25 times, the snout 2·5 to 2·7 in the head. The margin of the upper lip is fimbriate ; canine teeth none. Small simple tentacles on the eye and nape, often hard to find ; nasal tentacles very small either simple or divided. The dorsal is not notched, and is but slightly or not at all attached to the caudal. The last dorsal and anal rays are often much elongated, when they may extend nearly to the caudal tip.

The colour varies from dark brown to nearly black. The caudal fin varies from pure yellow to partly yellow, brown, and entirely black. The pectoral is usually yellow, with a circular black spot on the upper part of its base, but it also varies so that some individuals have dark brown pectorals.

I have seen no Andaman examples. It occurs however from the Red Sea to the Philippines, and unquestionably occurs in the Andamans ; Day had it from the Nicobar Islands.

Salarias saliens (Forster).

1788. *Blennius saliens*, Forster, *Itin.* II, p. 343.
1801. *Blennius tridactylus*, Bloch and Schneider, *Syst. Ichth.*, p. 176.
1836. *Salarias alticus*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* XI, p. 249.
1876. *Salarias tridactylus*, Day, *Fishes India*, p. 330, pl. lxx, fig. 3.
1876. *Salarias tridactylus*, Günther, *Fische der Südsee* II, p. 200, pl. cxvii, figs. C. and D.
1906. *Alticus saliens*, Jordan and Seale, *Bull. Bur. Fisheries* XXV, p. 421, fig. 111 (on p. 439).

Dorsal XIII-XIV/21-22 ; anal II/24 or 23. The depth is 6·5 to 7·6, the head 5·5 to 5·75, the caudal 4·2 to 5 times in the length. The eye is 3·85 to 4, the snout 1·85 times in the head. The body is slender, elongate, and compressed, with small head and nearly vertical anterior profile. The eyes are very far forward, high up and close together. The wide mouth has crenulate lips. Males have a small median crest on top of the head and a small trifid tentacle on the upper margin of the eye ; both are lacking in females. There is a very slight notch or slight depression between the anterior and posterior dorsals, the latter not reaching the caudal.

The colour is bluish gray, slaty blue, or darker, with 8 or 10 blackish cross bands, and as many pairs of bluish transverse lines on the sides ; a bluish silvery band from behind the eye to the upper lip and another from top of the head to the lower side of the opercle ; the entire head, pectoral base, and basal half of the pectoral sprinkled with black dots. The dorsal spines and rays are black, the membrane clear, with a submarginal

black band and a clear margin. The anal varies from dusky to clear, with a submarginal black band or row of black spots.

Not recorded from the Andamans, unless *S. andersoni* is a form of this wide-spread species. It ranges throughout the greater part of the tropical Indian and Pacific oceans.

Salarias fasciatus (Bloch).

1786. *Blennius fasciatus*, Bloch, *Ichtyologie* II, p. 110, pl. clxii, fig. 1.
1828. *Salarias quadripinnis*, Rüppell, *Atlas, Fische*, p. 112, pl. xxviii, fig. 2.
1870. *Salarias fasciatus*, Day, *Proc. Zool. Soc. London*, p. 694.
1876. *Salarias fasciatus*, Day, *Fishes India*, p. 330.
1876. *Salarias fasciatus*, Günther, *Fische der Südsee* II, p. 201, pl. cxv, fig. H.

Dorsal XII/19-20; anal I/19-20. The depth is 3·6 to 4, the head 4 to 4·3 times in the length. The eye is 3 to 3·4, the snout 2·75 to 3 times in the head. The orbital tentacle is bifid or trifid, the small nasal tentacle bifid; on each side of the nape is a characteristic broad fringed tentacle. Canines none. The entire dorsal is attached to the caudal fin; the anterior anal rays are more or less detached, with elongate tips.

In life the colour is more or less violet brown to bluish, with 6 to 8 broad brown cross-bands on the dorsal and trunk; between them, especially lower down and on the pectoral base, are sky blue circular spots; above on the forward half of the body are many blue-black dots which pass into lengthwise lines farther back. The dorsal has 2 or 3 rows of bluish or very pale spots.

In alcohol the colour is brown to bluish brown, with 6 to 8 broad darker cross-bands, which run upward on to the dorsal fin. The blue-black dots and lines are as in life. On the pectoral base, and lower part of head and body, are large yellowish or whitish circular spots, often with a dark central dot. The dorsal is as in life; the pale pectoral and caudal are barred by rows of dark brown or blackish spots; the anal is pale to dark brown, with 2 rows of dark brown dots, the ray tips usually white.

No examples were in the collection forwarded, but Day had it from the Andamans and no doubt it is common there. This large, heavy-bodied rock-skipper is one of the easiest to recognize of tropical Blennies, as it is entirely unlike any other. It is common in tide pools on rocky coasts, but when disturbed is one of the first fishes to leave. It climbs rocks with great agility and leaps over obstacles with great speed. The very large ones nearly always depart at the first hint of danger, and are thus rarely taken.

Females reach a length of 125 mm. or more, but males never get much over 75 mm. This species occurs from the Red Sea eastward through Polynesia. It is abundant about Singapore and in the East Indies, including the Philippines.

Salarias kirki Günther.

1868. *Salarias kirki*, Günther, *Ann. Mag. Nat. Hist.*, p. 458.
1876. *Salarias Kirkii*, Day, *Fishes India*, p. 331, pl. lxix, fig. 6.

Dorsal XVI-XVII/20-23; anal II/25-27.

The head is 6·5, the depth 7·5, the caudal 6 times in the total length. The fringed orbital tentacle is of moderate length and there is a median

crest on the head. The dorsal is slightly notched, and is entirely free from the caudal. The colour in alcohol is leaden to blackish, with traces of 6 or 8 paler bands; the dorsal is marked by diagonal dark lines running upward and backward; the anal margin is whitish.

A specimen, 71 mm. long, from East Ross Island, Port Blair, seems to belong here. Dorsal XVI/20; anal II/25.

Known previously from Zanzibar and the Sind coast of India.

Salarias andersoni Day.

1876. *Salarias Andersonii*, Day, *Fishes India*, p. 331.

Dorsal XIII-XV/19-21, and XVI/19; anal II/24-26 and I/26.

The depth is 7 to 7·5 or more, the head 5 to 6 times in the length. The body is elongate and slender, the fish evidently very agile in life. Males have a rather high rounded crest on the head; even the largest females have no crest, or only a thickened fold of skin along the median line. The notch between the dorsals is variable in depth, but is always well developed. The dorsal height is very variable; the anterior dorsal may be quite low but is often very high, nearly twice the height of the body, the longest rays 4·75 times in the length of the fish.

Well preserved specimens are dark plum colour, with 12 pairs of silvery or pearly cross bands, each band bordered by a blackish line on each side; the head and anterior half of the trunk are thickly sprinkled with black or very dark dots. The fins are all plum coloured or darker; the anal may have a pale margin, or be entirely whitish.

Some specimens are blue-black to brownish black, the cross band and lines having disappeared; the black dorsal is unmarked; the anal has a broad black margin, or the outer three-fourths is black. Other specimens have faded to reddish brown, with a pale-edged anal. Still others have kept the original ground colour but the silvery cross bands have disappeared, leaving their margins as 25 to 30 vertical bluish-black or lead coloured lines.

34 specimens, 31 to 54 mm. in length, from about Ross Island, 13 from Brookesabad, their lengths 45 to 65 mm., and one of 54 mm. from Perserverance Point, North Bay, Port Blair. Two examples, 45 and 46 mm. long, are from North Bay, Andamans.

This species is very close to *Salarias saliens*, but has a decidedly notched dorsal and a different number of fin rays, besides other differences which may be merely varietal and not actually specific.

Salarias periophthalmus Cuv. and Val.

1836. *Salarias periophthalmus*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* XI, p. 311, pl. cccxxviii.
1869. *Salarias andamanensis*, Day, *Proc. Zool. Soc. London*, p. 611.
1876. *Salarias periophthalmus* Day, *Fishes India*, p. 333, pl. lxix, fig. 5.
1876. *Salarias andamanensis*, Day, *Fishes India*, p. 332.
1876. *Salarias periophthalmus*, Günther, *Fische der Südsee* II, p. 207, pl. cxiv, figs. D and E.

Dorsal XII/20-22; anal I-II/20-21.

This very handsome rock-skipper is elongate, slender, and strongly compressed. The depth is 5 to 5·5, the head 4·4 to 4·6, the caudal 4·25 to 4·8, the pectoral 6 times in the length. The eye is 3·5 to 4, the snout

3 to 3·3 times in the head. Both sexes have a small curved posterior canine on each side of the lower jaw. Females have a small simple orbital tentacle; males have a longer one, equal to or longer than the eye, and a low median crest on the head; both sexes have a small simple nasal tentacle. The lips are entire.

In life the colour is roseate, with 5 to 7 broad violet or violet-brown cross bars, which divide and become red on the lower part of the body; along the sides are two rows of widely spaced short pearly blue bars, which are a highly characteristic feature of this easily recognized species. Males have a pearly blue circular spot on the opercle, and sometimes one or two blue spots behind the eye. Females have one or two pearly blue spots behind the eye and a pearly blue bar below it.

In alcohol the colour becomes leaden to brown or blackish brown, the cross bands dim or vanishing. The pearly blue bars and spots may remain, but more often blacken or may be dull dim whitish; they nearly always have black margins, which sometimes are the only remaining vestige of the blue bars. The dorsal is brown with a white margin, and several darker lines or rows of spots running upward and backward; the brown anal has a dusky marginal band; the brown caudal has a white upper margin, and cross rows of white spots on its basal portion.

2 specimens from Port Blair; one of 42 mm. is from South Point, and one of 52 mm. from Murdakhari Bay. A specimen of 32 mm. is from the east coast of Long Island, Middle Andaman. A field note on the South Point specimen says: " pink streaks on head; a dark blue spot one-half inch in front of caudal fin. Swims tail first when scared into holes in coral, and shelters there."

Females reach a length of 150 mm. This is one of the most agile of rock-skippers, as well as one of the handsomest and easiest to recognize. It occurs from the Andamans eastward throughout Polynesia, and is very abundant in the Philippines and East Indies.

Salarias vermiculatus Cuv. and Val.

1836. *Salarias vermiculatus*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* XI, p. 301.

1876. *Salarias vermiculatus*, Day, *Fishes India*, p. 335.

Dorsal XII-XIII/15; anal II/16-17; pectoral 14. The head equals the depth, 5 to 5·5 in the length, the caudal 6 times. The eyes are 4 times in the head. There is no crest on the head; the orbital tentacle is moderately long and fringed; there is an occipital tentacle, and a small fringed nasal one. There is a pair of large posterior canines in the lower jaw. The deeply notched dorsal is united to the caudal base; the upper five pectoral rays are very short, the lower 6 or 8 long with free extremities; the anterior 13 anal rays are deeply notched between, with free extremities.

The colour in alcohol is more or less brownish or grayish brown, with 8 or 9 more or less evident darker cross bars; the head, trunk, dorsal and anal vermiculate or reticulate with brown lines.

Obtained by Day in the Andamans. Said to attain " at least 8 inches in length." Occurring from the Andamans to the east coast of Africa. Description compiled. The caudal fin is undoubtedly included in the length as given by Day.

Salarias lineatus Cuv. and Val.

1836. *Salarias lineatus,* Cuvier and Valenciennes, *Hist. Nat. Poiss.* XI, p. 314.
1870. *Salarias lineatus,* Day, *Proc. Zool. Soc. London,* p. 695.
1876. *Salarias lineatus,* Day, *Fishes India,* p. 332, pl. lxx, fig. 8.

Dorsal XII/21-24 ; anal I/23-24. The depth is 5 to 5·3, the head 4·5 to 4·9, the caudal 5·65 to 5·5 times in the length. The eye is 3·8, the snout 2·9 times in the head. The body is slender, moderately elongate, compressed. The head is broadly convex, its anterior profile nearly vertical. The small orbital tentacle is finely fringed ; there is a similar but smaller nasal one ; no tentacles on the nape. Males have a low median crest on the head, which is wanting in females. No canines. The dorsal fin is deeply notched, and is attached to the caudal fin.

The colour in alcohol is leaden and darker, with 6 to 8 more or less evident darker vertical bands which often disappear entirely, and 6 to 10 black lines running lengthwise along the sides ; the lines usually decrease to 4 or 5 toward the rear, and may break up into spots or dots posteriorly ; there may be narrow black vertical and sinuous lines below the eyes and on the preopercle. The pale brown dorsal has 4 to 6 oblique dark brown lines, running upward and backward, with rows of spots on the rays ; the pale caudal has 4 dark brown cross bars ; the pale brown anal has a dark margin.

The Lined Rock-skipper is a common Andaman Blenny. From Port Blair the following were taken, their lengths 24 to 70 mm. :—5 from Murdakhari Bay ; 6 from East Ross Island and 1 from Ross Island ; 3 from a bay near South Corbyn's Cove. One example 75 mm. long was caught south of Sound Island, North Andaman, and 8 specimens, 36 to 72 mm. in length are from the " Andamans "

Salarias striolatus Day.

1876. *Salarias striolatus,* Day, *Fishes India,* p. 333.

Dorsal XII/20-21 ; anal II/18-19. The depth is 5·5, the head 5·25 times in the length. The simple ocular tentacle is an eye diameter in length, the simple nasal cirrus short ; none at the nape. Males have a very low occipital crest. There is a pair of small posterior canines in the lower jaw. The deeply notched dorsal fin is free from the caudal.

The colour is grayish, with indistinct vertical cross bands, and a blue spot below the eye ; 5 or 6 horizontal black lines begin at the tip of the pectoral and break up into spots as they near the caudal fin. The dorsal has 2 rows of spots, most distinct on the rear half ; the anal has a basal row of blue spots and a gray margin ; the caudal is irregularly cross-barred by 5 or 6 rows of spots. An Andaman species, according to Day, from whom the above is taken.

This fish is very close to *S. lineatus,* but is apparently distinct in the absence of a large series for comparison. It has a smaller number of fin rays, the dorsal is free from the caudal, has canines, lacks tentacles on the nape, and the orbital and nasal tentacles are different.

Salarias bilitonensis Bleeker.

1858. *Salarias bilitonensis*, Bleeker, *Nat. Tijds. Ned. Ind.* XV, p. 231.
1861. *Salarias bilitonensis*, Günther, *Cat. Fishes* III, p. 257.
1876. *Salarias bilitonensis* Day, *Fishes India*, p. 334, pl. lxxi, fig. 1.

Dorsal XII/20-21 ; anal II/20-21.

The depth is 6 to 7, the head and caudal each 5 to 5·5 times in the length, omitting the caudal, which was evidently included in the descriptions cited. There is a rather large crest on the head ; the simple orbital tentacle is as long as the eye, and the nasal cirrus is fringed ; none at the nape. The lower jaw has a pair of small posterior canines. The dorsal fin is deeply notched, and is not attached to the caudal fin according to Bleeker, who says " non cum pinna caudali unita "; Günther and Day give it as continued " on to the base of the caudal fin " The lower pectoral rays are longer than the upper ones.

The colour is greenish rose above, pearly below, with a bluish transverse streak below and one behind the eye ; 8 or 9 pairs of brownish cross-bars on the body, and about 10 longitudinal dusky violet or blackish lines or streaks on each side, converging posteriorly and ending before the caudal fin. The first half of the dorsal has brown spots with blue edges, the lower part of the second half with diagonal brown lines running up and back, the upper part with violet and blue lines and dots ; the anal is clear with a violet or dusky margin ; the upper part of the caudal is densely spotted with blue, forming vertical bars.

Day had this fish from the Andamans. It is close to *S. lineatus*, from which it may not be distinct. It has a smaller number of dorsal and anal rays than *S. lineatus*, possesses canines, the orbital tentacle differs, and differs in other minor particulars.

Salarias raoi, nom. nov.

1876. *Salarias alboguttatus*, Day, *Fishes India*, p. 334 ; (name preoccupied ; not *S. alboguttatus* Kner).

Dorsal XII-XIII/17-18 ; anal I-II/17-18, also I/19, and 19-21.

The depth varies with age and sex, from about 4·9 to 6·1 times in the length, the head 4·5 to 5. The eye is 4 to 4·4, the snout 2·75 to 3·25 times in the head. There is a low or medium-sized crest on the head ; the fringed orbital tentacle is less than or equal to the eye ; the simple nasal tentacle is very small ; none at the nape. There is a pair of small posterior canines in the lower jaw ; the upper lip is entire.

The colour in alcohol varies from pale tan or whitish, with 6 or 8 vertical brown double cross bands extending above on the dorsal, to those with bluish or greenish ground colour and nearly black cross bands. Along the sides of the lower half of the body are 2 to 5 rows of white spots ; usually but 2 rows are well developed and readily visible, one nearly median and becoming double or irregular posteriorly, and a lower one of larger and more elongate spots farther apart ; on the sides of the head, pectoral base, and beneath the pectoral are many small white spots. On the underside of the head are numerous conspicuous and very characteristic white spots that seldom disappear in preservative.

Another strongly fixed character is a dark brown or blackish spot on the lower part of the pectoral base; this spot, which is blue in life, is present on all specimens, no matter what other changes occur. Day says "two rather large brown ones", but I find but one. There is also a rounded or oval blue or blackish spot behind the eye. The first dorsal is more or less dusky, thickly strewn with small white dots and spots, and has a black spot above, between the first and second spines. The second dorsal is clear, with many brown lines running diagonally upward and backward. There is a brown or black spot at the base of the brown caudal, which is cross barred with 5 to 8 rows of small and more or less circular white spots, the outer rows becoming irregular. The anal is pale or colourless with a dark brown or blackish submarginal band, the tips of the rays often white. Rarely the pectoral is barred by rows of white dots.

24 specimens, 31 to 46 mm. in length, are from the "Andamans." The following are from Port Blair, their lengths 20 to 55 mm.:—55 from Ross Island, and 7 from East Ross Island; 50 from Murdakhari Bay; 1 from Corbyn's Cove, and 2 without specific locality other than Port Blair.

Salarias alboguttatus, described by Kner in 1867, is recognized at sight by the large violet or violet-brown spot on each side of the throat.

The handsome Blenny described above is evidently one of the commonest kinds in the Andamans. It is close to *Salarias nitidus* Günther, which has an undivided dorsal, and differs in several other respects.

Salarias dussumieri Cuv. and Val.

1836. *Salarias dussumieri*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* XI, p. 229.
1870. *Salarias dussumieri*, Day, *Proc. Zool. Soc. London*, p. 695.
1876. *Salarias dussumieri*, Day, *Fishes India*, p. 333, pl. lxx, fig. 7.

Dorsal XII-XIII/21; anal I/21-23.

A specimen, 109 mm. long, has the head 5, the depth 6, the caudal 5·45 times in the length. The eye is 5·375, the snout 3 times in the head. There is a moderate crest on the head; the fimbriate orbital tentacle has the outer half of several thread-like divisions. The lips are entire, the mouth without canines. The deeply notched dorsal is continuous with the caudal fin. The tips of the anal rays are elongate and free.

The colour of preserved specimens is dull dark to bluish brown, with more or less evident vertical blackish band or lines, or these broken into spots, but largely disappearing after long immersion in alcohol. The first dorsal is horizontally striped or spotted, the second dorsal diagonally marked; the upper half of the caudal is barred with cross rows of spots, the lower half clear. The anal is dark gray to dusky, and may be marginally darker, or the tips of the rays may be pale.

A specimen 53 mm. long is labelled "Andamans," and one of 42 mm. is from the east coast of Long Island, Middle Andaman. From Port Blair come the following:—two of 79 and 109 mm., from Blair Reef; 3 from 32 to 52 mm. from Murdakhari Bay, and 3 from East Ross Island.

Salarias edentulus (Bl. and Schn.).

1801. *Blennius edentulus*, Bloch and Schneider, *Syst. Ichth.*, p. 172.
1876. *Salarias quadricornis*, Day, *Fishes India*, p. 331, pl. lxx, fig. 4.
1876. *Salarias edentulus*, Günther, *Fische der Südsee* II, p. 206, pl. cxvii, fig. A ; (figure shows female).
1876. *Salarias quadricornis*, Günther, *Fische der Südsee* II, p. 209, pl. cxvii, fig. B ; (figure shows male).
1936. *Salarias edentulus*, Herre, *Publ. Field Mus. Zool.* XXI, p. 407.

Dorsal XIII, rarely XIV/19-21 ; anal I, rarely II/20-22 rays, or very rarely 23 or 24.

Depth 3·1 to 4, the head 4 times in the length in females ; in mature males the depth equals the head, 4·3 to 4·7 in the length. The eye is about 4 times, the snout about 2·66 in the head in females. Males have a slightly larger eye, 3·8 to almost 4, the snout 2·3 times in the head. Both sexes have a small simple orbital tentacle and a pair of small simple tentacles at the nape. The nasal tentacle is very small and usually divided into 4 filaments. Canines none. The high dorsal fin is deeply notched and broadly united with the caudal fin. The anterior anal rays have more or less elongate and swollen tips.

The sexes are much unlike in this species, and have been described under different names. *Salarias edentulus* of many authors is the female, while the male has been called *S. quadricornis*. A male character is the presence of a high median occipital crest, but at Makatea, one of the Tuamotu Archipelago in Polynesia, I caught females with a moderately high crest.

Day's figure shows the male. Preserved specimens vary greatly in colour ; typically males are brown with darker cross bars, but they may be uniform dark brown, or with a few darker spots left as the cross bars disappear ; others are black, with pale or whitish cross bars or narrow whitish cross lines. The forward half of the dorsal has longitudinal, the rear half diagonal rows of pale yellowish or whitish spots and lines, which usually disappear in alcohol. The anal has 2 rows or lines of bluish spots, which likewise usually disappear in preserved specimens : the rays are white tipped.

Typical females are like Günther's figure of *S. edentulus* cited above. In alcohol the colour is brown, faintly cross-barred by darker bands and thickly strewn with many reddish to dark brown spots. The dorsal, caudal, and pectorals are covered with similar but samller spots. The anal has 2 or 3 rows of dark brown spots, the rays white tipped.

A specimen, 67 mm. long, is from the south-east coast of Long Island Middle Andaman ; 3 others, 31 to 72 mm. in length, are labelled " Andamans "

Salarias hasselti Bleeker.

1850. *Salarias hasselti*, Bleeker, *Nat. Tijds. Ned. Ind.* I, p. 257, fig. 14.
1855. *Salarias Hasseltii*, Bleeker, *Nat. Tijds. Ned. Ind.* VIII, p. 174.
1876. *Salarias Hasseltii*, Day, *Fishes India*, p. 332.

Dorsal XII-XIII/23 ; anal I/23-24.

This Blenny is near *Salarias edentulus*, but is much slenderer, the depth 6·5 or 7 times in the length. There are no tentacles on the nape,

while those on the eye and nostril are short and arborescent. Canines none. Males have an elevated semi-elliptical occipital crest, which is lacking on females.

The body is bluish to violet rose above in life, pearly rose below, the head violet ; along the upper part of the side are 4 or 5 diffuse yellow or orange stripes, with more or less evident violet cross bands. The dorsals are spotted or obliquely striped with violet or dusky violet ; the anal is yellow in females, dusky in males, with a very dark margin ; the caudal is yellow in females, and dusky yellow in males, with bluish roseate stripes between the rays. In alcohol the colours largely disappear, the longitudinal stripes appearing as pale bands.

Day " obtained one specimen, 3 inches long, at the Andamans." I have seen no specimens, the description being compiled.

Salarias frenatus Cuv. and Val.

1836. *Salarias frenatus*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* XI, p. 342.
1876. *Salarias frenatus*, Day, *Fishes India*, p. 335, pl. lxx, fig. 9.
1891. *Salarias frenatus*, Sauvage, *Poiss. Madagascar*, p. 388, pl. xli a, fig. 5.

Dorsal XII-XIII/15-18 ; anal I/17-19 or II/16-19.

The depth is 4·2 to 5·1 times, the head 4·4 to 4·6, the caudal 4·25 to 4·4 in the length. The eye is 3·9 to 4, the vertical snout 2·5 to 2·75 times in the head. The broad, pointed tentacle equals the eye, its margins fimbriate ; a very small simple nasal tentacle, none at the nape. Very large specimens have a slight indication of a nuchal crest, but never develope a real crest. The upper lip is denticulated. The deeply notched dorsal is free from the caudal. The original description erred in saying that the dorsal is not divided.

In life there are more or less vertical pearly blue or white bands with dark margins on the snout, preopercle, opercle, and under side of the head. In alcohol the bands fade, leaving their margins as dark lines extending downward from the eye. The body colour of preserved specimens varies from slate blue, crossed by 8 or 10 darker blue bands, to bluish or brownish gray, with brown or bluish brown cross bands. Fading of the cross bands leaves them as spots along the sides. Some of the Andaman examples are so melanistic that the stripes on the head are almost entirely masked by the general dark brown colour, but the spots on the sides, shown in the figures of Day and Sauvage, can always be made out. The first dorsal is clear to dusky, often with a blackish spot above between the first and second spines ; the second dorsal with diagonal dark brown bands. The caudal varies from clear to dusky, typically cross-barred with rows of brown spots. The anal is clear, usually with a submarginal row of brown spots on the membrane. The pectoral is clear above, its lower half brown.

This well-marked Blenny is evidently very abundant at Port Blair, where the following were obtained, ranging in length from 12 to 63 mm.:— 52 from Ross Island ; 10 from East Ross Island ; 6 from South Corbyn's Cove ; 4 from Murdakhari Bay, and 2 labelled only Port Blair. One of 43 mm. is from Brookesabad, South Andaman. The collection also contains 71 specimens, 34 to 80 mm. in length, marked only "Andamans ".

Salarias marmoratus Bennet.

1828. *Salarias marmoratus*, Bennet, *Zool. Journ.* IV, p. 35.
1855. *Salarias arenatus*, Bleeker, *Nat. Tijds. Ned. Ind.* VIII, p. 173.
1876. *Salarias marmoratus*, Day, *Fishes India*, p. 335.
1876. *Salarias marmoratus*, Günther, *Fische der Südsee* II, p. 204, pl. cxvi, fig. B.

Dorsal XII-XIII/14-16 ; anal I-II/16-17. The dorsal fin is deeply notched, not extending on the caudal. The depth is 4·8 to 5·2, the head 3·8 to 4·3 times in the length. The marginally fringed orbital tentacle equals or nearly equals the eye. There is no crest on the head. The upper lip is rather coarsely crenulate. There is a strong canine in the lower jaw, and sometimes a small one in the upper jaw.

A specimen, 31 mm. long, from Murdakhari Bay, Port Blair, and one of 16 mm. from Brookesabad, South Andaman. Another of 32 mm. is from the east coast of Long Island, Middle Andaman.

These young specimens agree with the description of *S. arenatus*, which according to Günther is a synonym of *S. marmoratus*. They are pale tan or gray, with 7 double brown dark brown cross bars, which break up into spots, especially on the posterior half. There is a dot behind the eye, which in more typical specimens becomes a dark vertical bar. The dorsal and caudal are colourless, heavily marked with cross rows of brown spots.

Salarias guttatus Cuv. and Val.

1836. *Salarias guttatus*, Cuvier and Valenciennes, *Hist. Nat. Poiss.* XI, p. 28.
1905. *Salarias undecinalis*, Jordan and Seale, *Proc. U. S. Nat. Mus.* XXVIII, p. 800, fig. 18.
1936. *Salarias guttatus*, Herre, *Publ. Field Mus. Nat. Hist.* XXI, p. 409.

Dorsal XI-XII/17-18 ; anal I/18-19.

The body is slender, the posterior half laterally compressed, the front of the head vertical ; the depth is 4·4 to 4·8, the head 4 to 4·1, the caudal 4·1 to 4·5 times in the length. The eyes are very prominent, projecting upward and forward beyond the head contour ; the eye is 3 to 3·2, the snout 2·85 to 3 times in the head.

The low dorsal is deeply divided and free of the caudal fin. Small simple tentacles are present on the eyes, nape, and nostrils. There are no canines and no crest on the head.

The colour in alcohol is from pale brown to reddish brown, with 6 or 7 pale or white double cross bands on the sides, forked on the lower half ; often the upper part breaks up into white dots ; the body colour appears as darker bands between the pale bands. Many short vertical violet to violet black lines and dots are on the upper anterior half ; usually a row of 15 to 20 black dots is just below the dorsal fin and often a row of larger black dots runs from above the pectoral to the caudal base. A very important character is the presence of one or two large white or very pale brown circular spots on the lower pectoral base and right in front of it ; another equally important mark is a dark purplish or violet spot or ring on each side of the throat, which may turn to brown in alcohol. The dorsal and caudal are barred by rows of brown

spots on the rays ; the anal is more or less darkened marginally, with paler tips on the rays.

A specimen, 37 mm. long, was taken near Blair Reef, Port Blair. This distinctive rock-skipper has been known previously from Samoa to the Philippines and Singapore.

Salarias interruptus Bleeker.

1857. *Salarias interruptus*, Bleeker, *Nat. Tijds. Ned. Ind.* III, p. 68.
1861. *Salarias interruptus*, Günther, *Cat. Fishes* III, p. 250 (compiled).

Dorsal XIII/19-20 ; anal I/19-20.

A single example, 41 mm. long, from the " Andáman Islands " This handsome and little known Blenny was described by Bleeker from Buru, and is common in the Philippines, where I collected 50 specimens.

The depth and caudal are about equal in adults, 5 to 5·6 times, the head 4·2 to 4·5 times in the length ; the young are much slenderer, the depth 6·5 or more in the length. There is a small simple tentacle on the eye and a small bifid or trifid nasal one ; no tentacle on the nape and no crest. The lower jaw has a very small posterior canine on each side. The deeply notched dorsal is not attached to the caudal.

The colour in alcohol is warm reddish brown, with several rows of conspicuous short blackish brown to black lengthwise bars and spots. There are 3 rows of black spots on the first part of the dorsal and 4 or 5 rows on the rear half ; the caudal has 5 or 6 cross bars of similar spots. The anal has a row of black spots between the rays, a submarginal dusky band, and a white margin. Large examples have a blue dot or bar behind the eye, and sometimes one below it. This rock-skipper gets to be 60 mm. long, although few seem to exceed 50 mm.

Family CARAPIDAE.

Carapus homei (Rich.).

1844-48. *Oxybeles homei*, Richardson, *Vey. Erebus & Terror, Fishes*, p. 74, pl. lxiv, figs. 7-18.
1862. *Fierasfer homei*, Günther, *Cat. Fishes* IV, p. 382.
1928. *Carapus homei*, Fowler, *Mem. Bishop Mus.* X, p. 445.

A specimen, 80 mm. long, was taken from a large sea-urchin at Long Island, Middle Andaman. This strange little fish lives commonly in certain species of holothurians, but also takes up its residence in star-fishes and other echinoderms, and in pearl oysters. In life it is colourless or very pale and translucent.

Family TETRAODONTIDAE.

The flesh of some species of Puffer is violently poisonous, and all are dangerous or of very doubtful value as food. Day gives a list of 5 species of *Tetraodon* obtained by him at the Andamans, and observe that they are all used as food by Andamanese.

Chelonodon patoca (Ham.).

1822. *Tetrodon patoca*, Hamilton, *Fishes Ganges*, p. 7, pl. xviii, fig. 2.
1865. *Leiodon patoca*, Bleeker, *Atlas Ichth.* V, p. 76, pl. ccx, fig. 2.
1878. *Tetrodon patoca*, Day, *Fishes India*, p. 703, pl. clxxxii, fig. 4.
1924. *Chelonodon patoca*, Herre, *Phil. Journ. Science* XXV, p. 487.

7 very young specimens, 7 to 9 mm. in length, were taken at Viper Island, Port Blair, and one 16 mm. long at Tytler's Ghat, South Andaman.

Tetraodon immaculatus Bl. and Schn.

1801. *Tetraodon immaculatus*, Bloch and Schneider, *Syst. Ichth.* p. 507.
1865. *Crayracion manillensis*, Bleeker, *Atlas Ichth* V, p. 69, pl. ccviii, fig. 2.
1865. *Crayracion immaculatus*, Bleeker, *Atlas Ichth.* V, p. 75, pl. ccxi, fig. 1.
1870. *Tetrodon immaculatus*, Day, *Proc. Zool. Soc. London*, p. 703.
1878. *Tetrodon immaculatus*, Day, *Fishes India*, p. 703, pl. clxxxiii, fig. 4.
1924. *Tetraodon immaculatus*, Herre, *Phil. Journ. Sci.* XXV, p. 489.

2 young examples, 39 and 40 mm. long, were taken from a creek north of South Corbyn's Cove, Port Blair.

Tetraodon reticularis Bl. and Schn.

1801. *Tetraodon reticularis*, Bloch and Schneider, *Syst. Ichth.*, p. 506.
1865. *Crayracion testudineus*, Bleeker, *Atlas Ichth.* V, p. 71, pl. ccxii, fig. 3.
1870. *Tetrodon reticularis*, Day, *Proc. Zool. Soc. London*, p. 703.
1878. *Tetrodon reticularis*, Day, *Fishes India*, p. 705, pl. clxxx, fig. 5.
1924. *Tetraodon reticularis*, Herre, *loc. cit.* XXV, p. 491.

A juvenile specimen, 35 mm. long, from a creek north of South Corbyn's Cove, Port Blair.

Family ANTENNARIIDAE.

Antennarius commersoni (Shaw).

1798. *Lophie commersoni*, Lacépède, *Hist. Nat. Poiss.*, p. 327, pl. xiv, fig. 3.
1804. *Lophius commersoni*, Shaw, *Gen. Zool.* V, p. 387.
1817. *Chironectes commersonii*, Cuvier, *Mem. Mus.* III, p. 431, pl. xviii, fig. 1.
1865. *Antennarius commersonii*, Bleeker, *Atlas Ichth.* V, p. 20, pl. cxcvii, fig. 3.
1876. *Antennarius commersoni*, Günther, *Fische der Südsee* II, p. 163, pl. c, figs. B and C, and pl. cvi.

A young specimen, 23 mm. long, was taken from Murdakhari Bay, Port Blair.

CYCLOPIDES (CRUSTACÉS COPÉPODES) DE L'INDE.

III. Une revision des représentants indiens du sous-genre *Eucyclops* s. str. (Groupe *serrulatus*).

Par Knut Lindberg.

Introduction.

L'étude des formes du groupe *serrulatus*, c'est-à-dire des *Eucyclops* à branches de la furca munies d'une " scie " sur le rebord latéral, présente des difficultés très particulières. Des membres de ce groupe semblent abonder dans toutes les parties du monde et ils se rencontrent dans les habitats les plus divers. Conséquemment on peut s'attendre soit à en trouver de nombreuses espèces nettement distinctes, soit de constater l'existence d'une forme unique variable, ou d'un petit nombre de types présentant de grosses variations, mais montrant la présence de formes de passage reliant insensiblement les types extrêmes.

Parmi ceux qui étudient les Copépodes Cyclopides deux écoles s'opposent à l'heure actuelle : celle qu'on pourrait appeler des unicistes, qui semblent considérer que la plupart des Cyclopides sont cosmopolites et se trouvent représentés en Europe, les formes exotiques n'en étant le plus souvent que des variétés, et celle appelée par Gurney des " méticuleux ", qui tiennent compte de caractéristiques parfois très peu prononcées ou même douteuses en vue de la distinction d'espèces différentes.

Autant que je puis m'en rendre compte aucune de ces deux écoles ne possède encore, pour la grande majorité des espèces, de preuves basées sur des expériences génétiques en faveur de l'une ou de l'autre manière de voir. D'ailleurs il n'est pas certain que la réussite ou l'échec des entre-croisements expérimentaux entre formes ou espèces voisines apportera dans chaque cas de la lumière sur leur phylogénèse. Aussi, les raisons ne me sont pas connues, pourquoi l'évolution de formes hybrides en partant d'espèces apparemment distinctes, qui existe ailleurs dans le règne animal, ne puisse pas se produire dans certaines circonstances naturelles chez les Copépodes Cyclopides, même en cas de non-réussite d'expériences de laboratoire.

A part le genre *Mesocyclops* il n'y a peut-être pas de groupe parmi les Cyclopides dans l'étude duquel les deux écoles mentionnées s'opposent d'une façon plus manifeste que celui du sous-genre *Eucyclops* s. str. D'une part nous avons l'extrême simplification de Gurney, étudiant il est vrai seulement les espèces européennes, mais considérant évidemment les formes exotiques comme n'en étant que des races ou tout au plus des sous-espèces. Dans le sous-genre *Eucyclops* Gurney n'admet que 3 espèces distinctes : l'une à membrane hyaline de la première antenne à bord entier ou très finement denticulé, l'*E. agilis* Koch (=*E. serrulatus* (Fischer)) ; la deuxième, à membrane hyaline découpée sur la moitié proximale du douzième article en denticules plus ou moins

grosses, l' *E. macruroides* Lilljeborg ; la troisième, l' *E. macrurus* Sars, à serra rudimentaire. Ainsi Gurney, se rangeant à l'avis de Lowndes, ne trouve pas justifié la distinction du *E. agiloides* Sars ; l' *E. speratus* (Lillj.) et l' *E. lilljeborgi* (Sars) (=*C. serrulatus* var. *denticulata* Graeter) sont cependant décrits " par égard " pour les autorités qui les distinguent, mais comme des variétés, le premier d' *E. agilis*, le second d' *E. macruroides*.

Dans l'autre champs il y a Kiefer, taxonomiste exclusif, qui, autant que je sache, a jusqu' à ce jour admis l'existence de 44 espèces différentes du sous-genre *Eucyclops* s. str.

L'argument le plus important à mes yeux de Gurney en support de son travail d'unification c'est que la plupart des espèces européennes sont encore imparfaitement étudiées, leur amplitude de variation morphologique étant peu connue, ou pas connue du tout. Mais faudrait-il alors par suite de notre connaissance incomplète de la faune européenne s'abstenir à étudier et à décrire les formes exotiques ? A mon avis cela serait un geste de renoncement qui ne ferait que retarder encore l'avancement de nos connaissances générales.

Il faut bien se rappeler, qu'en fait de Copépodes Cyclopides la majeure partie du globe est encore inexplorée et que la description de bien de formes rencontrées pour la première fois ne peut se faire que d'après un matériel très restreint, et que par conséquent la signification réelle de ces espèces nouvelles restera parfois obscure, tant que sera incomplète notre connaissance de la faune des régions en question et notre conpréhension des conditions écologiques. Ainsi le travail systématique qui se fait de nos jours a forcément une qualite provisoire et il serait futile d'exiger qu'on considère comme des *noli me tangere* certaines espèces nouvelles décrites de régions peu connues et parfois même d'après un seul spécimen.

Le matériel étudié ici provient de l'ouest et du sud de l'Inde. L'examen de ces animaux a été d'autant plus malaisé que presque tous ont présenté à premier abord un aspect très uniforme dans leur habitus général. Leur longueur totale a peu varié ; la première antenne, toujours composée de 12 articles a, rabattue, atteint chez presque tous le rebord postérieur du deuxième segment thoracique ; les branches de la furca ont chez les femelles, avec très peu d'exceptions, été divergentes et de longueur trop variable chez les formes manifestement identiques pour qu'il ait été possible d'en tenir compte uniquement comme caractéristique spécifique ; elles ont presque toutes présentées une serra complète, dont la partie visible sur le rebord externe a bien entendu varié selon l'angle sous lequel l'animal a été examiné ; la formule des épines a été invariable (3-4-4-3) ; l'article terminal de l'endopodite de la quatrième paire de pattes a, tant dans ses dimensions que dans la structure de ses appendices terminaux, montré des variations en somme trop peu marquées et trop peu constantes, pour qu'elles aient pu servir de caractères diagnostiques absolus ; la lamelle basale réunissant la quatrième paire de pattes a présenté des aspects assez différents, mais, comme j'ai observé des variations aussi chez des spécimens d' *E. serrulatus* provenant de l'Europe, je n'ai pas cru possible d'en tenir compte ; les différences de structure du réceptacle séminal m'ont semblé trop légères

pour qu'il ait été justifié d'y attacher une signification diagnostique ; le rebord antérieur de la partie proximale a toujours présenté une concavité centrale. En ce qui concerne le mâle, chez lequel la configuration de la sixième patte est en général considérée comme ayant de l'importance spécifique, il a souvent été difficile de dire à quelle forme ils appartenaient, et, quand il a été possible de les ramener à une même espèce, des variations considérables, notamment dans la longueur de l'épine interne de la sixième patte, ont été constatées, et je n'ai pas trouvé praticable de séparer les espèces différentes d'après les caractères du mâle seul.

Dans l'étude de mon matériel indien j'ai en premier lieu tenu compte de la structure de la membrane hyaline de la première antenne. Je l'ai trouvée présente aux 3 derniers articles chez toutes les femelles adultes examinées et, selon que le bord libre de cette membrane s'est montré, d'une part entier ou très finement denticulé, ou présentant d'autre part des denticulations bien distinctes, il a été facile de séparer les animaux en deux groupes, dont le second a bientôt été trouvé ne contenir qu'une seule forme, l' *E. semidenticulatus* Lindberg.

Dans le premier groupe, des spécimens d'un habitat unique ont montré des branches de la furca très longues, et parallèles ou très faiblement divergentes, répondant aux caractéristiques d'*E. speratus* (Lillj.). En examinant la structure de la cinquième patte chez les animaux restants du premier groupe, qui en constituaient la grande majorité, il a été trouvé que beaucoup d'entre eux se conformaient presque entièrement aux caractéristiques d'*E. serrulatus* (Fischer), tel qu'il a été décrit en Europe, ayant une épine de la cinquième patte très élargie et montrant peu de différence de longueur entre la soie apicale interne et la soie apicale externe de la furca. D'autres ont prèsenté une épine de la cinquième patte bien moins large et une soie apicale interne de la furca le plus souvent considérablement plus longue par rapport à la longueur de la soie apicale externe, caractères distinctifs donnés par Sars et par Kiefer pour l' *E. agiloides* Sars. Certains spécimens ne se conformaient cependant ni à l'un ni à l'autre de ces deux types et se comportaient comme, des formes de passage. Enfin j'ai décrit sous le nom d' *E. microdenticulatus*, à une époque quand je ne connaissais pas encore les variations de la membrane hyaline de la première antenne chez *E. serrulatus* d'Europe, une forme présentant une très fine denticulation de cette membrane et un abdomen ornementé d'épines minuscules sur la face ventrale.

Pour dresser une liste complète des *Eucyclops* de l'Inde il faut encore ajouter 3 espèces déjà distinguées par Kiefer et une quatrième que j'ai décrite en 1937.

Je donnerai maintenant des descriptions aussi courtes que possible des membres indiens connus du sous-genre *Eucyclops* s. str. et des tableaux de mensurations des animaux étudiés ici. Ces tableaux ne peuvent d'ailleurs, malheureusement pas servir pour une évaluation statistique, comme des mensurations n'ont été faites que de très peu d'échantillons de chaque population. Ils sont donnés faute de mieux. A part le rejet de spécimens en mauvais état aucune sélection n'a été faite des animaux étudiés.

Eucyclops serrulatus (Fischer).

Femelle.—Longueur de 798 μ à 1168 μ (sans soies apicales). Trois derniers articles de la première antenne à membrane hyaline large, sans indentations du bord libre. Branches de la furca divergentes, de 3·96 à 6·9 fois aussi longues que larges. Serra partant près de la base de la branche de la furca, s'étendant sur le bord latéral pour s'arrêter au niveau de l'insertion de la soie latérale externe ; elle compte le plus souvent de 26 à 36 spinules, dont les 3 ou 4 dernières sont plus longues que les autres. Typiquement la soie apicale interne surpasse de peu en longueur celle de la soie apicale externe de la furca. Troisième article de l'endopodite de la quatrième paire de pattes en général moins allongé chez les animaux indiens que chez ceux d'Europe ; l'épine apicale interne de cet article surpasse l'épine apicale externe d'environ le tiers de sa longueur ; celle-la dépassant presque toujours la longueur de l'article qui la porte ; soies de cet article plus longues que celles des spécimens européens. Lamelle basale réunissant la quatrième paire de pattes munie de poils, tant longs que courts. Epine de la cinquième patte très large, sa largeur à la base égalant en général 3 fois celle de la soie médiane. Une tentative a été faite de la mesurer, mais les valeurs données ne sont qu'approximatives, car il a fallu estimer à l'oeil ce qui était en plus ou en moins d'une division du micromètre. Echancrure anale pourvue de poils. (Tableau I *a*).

Mâle.—Longueur de 674 μ à 864 μ. Branches de la furca parallèles, de 3·62 à 5·93 fois aussi longues que larges. Sixième patte formée d'une forte épine interne qui assez souvent atteint ou dépasse le bord postérieur du deuxième segment abdominal, d'une soie médiane assez mince, en général plus courte que l'épine et d'une fine soie externe, qui peut égaler, surpasser ou être inférieure à la longueur de l'épine. Longueur moyenne de l'épine de la sixième patte 36 μ. (Tableau I *b*).

Eucyclops agiloides Sars.

Femelle.—Longueur de 817 μ à 1073 μ (sans soies apicales). Membrane hyaline de la première antenne semblable à celle d' *E. serrulatus*. Branches de la furca souvent un peu moins divergentes et plus rapprochées à la base que celles d'*E. serrulatus* ; elles ont été trouvées de 3·71 à 6·65 fois aussi longues que larges. Serra semblable à celle d'*E. serrulatus*, mais les spinules sont en général plus petites, plus serrées, et plus nombreuses ; le plus souvent on en compte entre 34 et 46. Le nombre et l'aspect des spinules n'ont cependant aucun caractère absolu. Chez un spécimen d'*E. serrulatus* de la Suède j'ai compté 65 spinules dans la serra. Soie apicale externe de la furca, qui chez *E. serrulatus* est en général fortement dirigée au dehors, se trouve souvent moins écartée chez *E. agiloides*. Soie apicale interne de la furca, qui selon Sars et Kiefer doit être 1·5 fois aussi longue que la soie apicale externe, se trouve en effet être typiquement considérablement plus longue que la soie apicale externe. Mais, tandis qu'une soie apicale interne longue est d'une observation assez frequente chez *E. serrulatus*, une soie apicale interne courte semble rare chez *E. agiloides* (Nos. 38, 39). Ces rapports ainsi que ceux des dimensions et des appendices de l'article

terminal de l'endopodite de la quatrième paire de patte sont résumés dans le tableau ci-dessous. (Tableau II *c*).

Lamelle basale de la quatrième paire de pattes semblable à celle d'*E. serrulatus*. Epine de la cinquième patte bien moins forte que chez *E. serrulatus* ; typiquement environ 2 fois aussi large que la soie médiane. Echancrure anale offrant rien de distinctif. (Tableau II *a*).

Mâle.—Longueur de 636 μ à 807 μ. Branches de la furca parallèles de 2·9 à 5·06 fois aussi longues que larges. Les 3 appendices de la sixième patte sont le plus souvent de longueur à peu près égale. L'épine se termine en général vers le milieu du deuxième segment abdominal ; sa longueur moyenne est d'environ 29 μ. (Tableau II *b*).

Remarques.—Quand on a eu l'occasion d'examiner un assez grand nombre d'échantillons des deux types qui viennent d'être décrits et de les comparer à des exemplaires d'*E. serrulatus* d'Europe, qui cependant eux aussi semblent très variables, on ne peut pas éviter l'impression qu'il s'agit bien à l'origine de deux espèces distinctes. Toutefois, les formes intermédiaires sont nombreuses et on a parfois la plus grande difficulté à décider à quel type il convient de ramener certains spécimens.

La seule préference écologique que j'ai pu observer c'est que dans les puits je n'ai trouvé que des individus montrant les caractéristiques d' *E. agiloides* et dans ce genre de biotope je n'ai récolté ni d'exemplaires répondant à la diagnose d'*E. serrulatus*, ni de formes de passage. Bien que les femelles récoltées dans des puits étaient des *E. agiloides* typiques, les quelques mâles examinés ne l'étaient pas en ce qui concerne la structure de la sixième patte, ce qui donne à penser qu'une très longue épine de cette patte ne constitue pas un trait diagnostique absolu et spécifique dans le cas d'*E. serrulatus*.

Je joins des mensurations de quelques spécimens non-choisis d'*E. serrulatus* d'Europe (Tableau I *c*). Je dois ceux de la Suède à la grande obligeance du Prof. Sixten Bock de Stockholm et ceux de la Roumanie à l'amabilité du Dr. P. A. Chappuis de Cluj. Qu 'ils veuillent bien recevoir aussi ici l'expression de ma gratitude.

Eucyclops microdenticulatus Lindberg.

Femelle.—Longueur de 883 μ à 1159 μ (sans soies apicales). Trois derniers articles de la première antenne à membrane hyaline assez large montrant au fort grossissement de très fines indentations. Branches de la furca divergentes, de 3·96 à 5·73 fois aussi longues que larges. Serra semblable à celle d'*E. serrulatus*. Soie apicale interne considérablement plus longue que la soie apicale externe, mais en général moins longue que chez *E. agiloides* (rapport moyen de 15 spécimens 1·44 : 1). Epines des pattes natatoires montrant une ébauche de structure en lancette. Epine de la cinquième patte très élargie à la base, le plus souvent environ 3 fois aussi large que la soie médiane. Face ventrale des segments abdominaux ornementée de spinules.

Mâle.—Longueur de 731 μ à 836 μ. Branches de la furca parallèles, de 3·18 à 3·78 fois aussi longues que larges. Ornementation de la face ventrale des segments abdominaux (sauf le premier où les spinules sont absentes) semblable à celle de la femelle mais encore plus distincte.

Tendance d'apparence en lancette des épines des pattes natatoires plus prononcée que chez la femelle. Sixième patte formée de 3 appendices, dont la soie externe est presque toujours la plus longue ; l'épine interne ne fait en général que dépasser le milieu du deuxième segment abdominal.

Remarques.—Des examens répétés dernièrement de quelques spécimens à membrane hyaline finement indentée, que j'avais d'abord ramenés à cette nouvelle espèce, m'ont montré qu'il s'est agi dans leur cas d'*E. serrulatus* ; ces individus manquaient aussi l'ornementation de l'abdomen et avaient une structure un peu différente de la furca. D'autre part, je viens de rencontrer un spécimen répondant aux caractéristiques d'*E. agiloides* possédant une ornementation d'épines minuscules sur la face ventrale du premier et du quatrième segment abdominal. Il faudrait pouvoir étudier un matériel beaucoup plus complet pour être en état de se prononcer sur la signification d'*E. microdenticulatus*. (Description détaillée avec figures sous presse). (Tableau III *a* et *b*).

Eucyclops speratus (Lilljeborg).

La forme décrite par Lilljeborg comme une variété de son *Cyclops varius* (=*E. serrulatus* Fischer) ; établie par Sars comme une espèce distincte.

Grandes dimensions. Furca à branches parallèles ou très peu divergentes, plus de 6 fois aussi longues que larges. Serra à spinules très petites, présente selon Sars seulement sur la partie postérieure de la branche, mais étant d'après Lilljeborg " parfois " imperceptible et représentée sur sa figure comme s'étendant presque jusqu'à la base de la branche de la furca. Soie apicale interne en général beaucoup plus longue que la soie apicale externe. Cinquième patte à épine élargie, semblable à celle d'*E. serrulatus*, mais encore plus forte. Réceptacle séminal selon Sars à convexité du rebord antérieur, mais dessiné sur la figure de Gurney comme ayant la concavité usuelle du centre de la partie proximale. Le mâle ne semble pas offrir de traits diagnostiques.

Je n'ai rencontre des spécimens répondant à ces caractéristiques que dans un habitat unique, d'ailleurs le seul de son genre où j'ai eu l'occasion de pêcher des Cyclopides indiens (une petite mare à eau claire, sans aucune végétation, dans le fond de laquelle ne se trouvaient que d'épaisses couches de fragments de bois, y croupissant évidemment depuis bien d'années) (Tableau IV *a* et *b*).

Eucyclops defectus Lindberg.

Femelle décrite en 1937 d'après un spécimen unique récolté à Patchmarhi (Provinces Centrales). Longueur 960 μ. Branches de la furca légèrement divergentes, de 4·5 fois aussi longues que larges. Serra réduite à 2 ou 3 spinules situées très près de l'insertion de la soie latérale externe. Première antenne plus courte que chez les *Eucyclops* mentionnés jusqu'ici, ne faisant que dépasser légèrement le bord postérieur du premier segment céphalothoracique. Epine apicale interne de l'enp. 4 considérablement plus courte que l'article terminal (rapport de 1·16 : 1).

Chez aucun exemplaire d'*E. serrulatus* je n'ai rencontré un rapport aussi élevé et je n'ai vu un rapport semblable que chez un seul spécimen d'*E. agiloides* (No. 6). A présent il n'est pas possible de se prononcer sur la signification d'*E. defectus* puisqu'il n'est connu que d'après un échantillon unique.

Eucyclops permixtus Kiefer.

Décrit par Kiefer en 1928. Longueur de la femelle 800 à 820 μ. Furca à branches parallèles, environ 5 fois aussi longues que larges. Serra très courte, d'après le dessin elle semble composée de 8 à 9 spinules. Première antenne n'atteignant pas le rebord postérieur du premier segment céphalothoracique, à membrane hyaline étroite et entière. Epines apicales de l'exp. 4 et de l'enp. 4 en forme de lancettes. Epine de la cinquième patte mince et assez longue. Mâle environ 700 μ ; ne semble offrir rien de caractéristique ; les 3 appendices de la sixième patte sont de longueur à peu près égale selon le dessin. Récolté par Dr. Hora dans la vallée de la Kangra (Pendjab).

La remarque déjà faite à propos de l'espèce précédante s'applique également à cette forme, qui n'a été décrite que d'après 2 femelles et un seul mâle.

Eucyclops productus Kiefer.

Décrit par Kiefer en 1936, sans figures. Longueur de la femelle 1300 μ. Furca à branches parallèles, presque 9 fois aussi longues que larges. Serra complète. Première antenne atteint le bord postérieur du premier segment céphalothoracique ; membrane hyaline étroite et entière. Article terminal de l'enp. 4 et cinquième patte semblables à ceux d'*E. serrulatus*. Mâle à épine de la sixième patte bien développée. Une seule femelle et un mâle récoltés dans un étang dans le district de Ladakh (Cachemire).

Il convient de nouveau à répéter la remarque faite au sujet des 2 espèces prècèdantes.

Eucyclops semidenticulatus Lindberg.

Femelle.—Longueur de 807 μ à 1054 μ (sans soies apicales). Trois derniers articles de la première antenne munis d'une membrane étroite, découpée en très petites spinules, qui sont parfois presque imperceptibles sur le dixième et sur le onzième article ainsi que sur la moitie distale du douzième article, mais toujours très distinctes sur la moitie proximale du dernier article. Bien qu'elles y soient aisément visibles elles sont toujours fines et nombreuses. Branches de la furca très divergentes et assez éloignées l'une de l'autre à la base, de 4 à 7 fois aussi longues que larges. Serra bien développée s'étendant de la proximité de la base de la branche jusqu' au niveau de l'insertion de la soie latérale externe ; elle compte de 20 à 34 denticules, dont les plus distales sont un peu plus longues que les autres. Echancrure anale sans poils visibles.

Soie apicale externe forte, très écartée. Soie apicale interne à poils bien distincts mais espacés, elle est toujours considérablement plus longue que la soie apicale externe. Chez les 29 exemplaires étudiés la longueur de la soie apicale interne était supérieure à celle de la branche de la furca chez 8 et en était inférieure chez 21. La plupart des épines des deux branches des pattes natatoires présentent une ébauche de structure en lancette. Article terminal de l'enp. 4 environ 2·5 fois aussi long que large ; épine apicale interne de longueur à peu près égale à celle de l'article et mesurant le plus souvent presque 1·5 fois la longueur de l'épine apicale externe. Epine de la cinquième patte mince et relativement courte.

Mâle.—Longueur de 631 μ à 741 μ. Branches de la furca parallèles, de 3·42 à 5·19 fois aussi longues que larges. Chez 14 spécimens examinés la soie apicale interne de la furca surpassait la longueur de la branche de la furca chez 10, lui égalait chez un et en était inférieure chez 3. Cinquième patte semblable à celle de la femelle. Epine interne de la sixième patte forte, mais n'atteignant pas le rebord postérieur du deuxième segment abdominal.

Remarques.—Il est inutile de rappeler les caractéristiques distinguant l'espèce qui vient d'être décrite d'*E. serrulatus*, d'*E. agiloides* et d'*E. microdenticulatus*. D'*E. lilljeborgi* (Sars) elle diffère par les nombreuses petites spinules de la membrane hyaline de la moitié proximale du douzième article de la première antenne.

Les deux espèces auxquelles elle ressemble le plus sont l'*E. euacanthus* Sars et l'*E. macruroides* (Lillj.) Les points diagnostiques sont résumés ci-dessous.

Eucyclops euacanthus.	*Eucyclops semidenticulatus.*
Branches de la furca environ 4 fois aussi longues que larges.	Branches de la furca la plus souvent plus de 4 fois aussi longues que larges ; leur longueur pouvant atteindre 7 fois la largeur.
Soie apicale interne de la furca glabre	Soie apicale interne de la furca munie de poils.
Première antenne atteint à peine la longueur du premier segment céphalothoracique ou le dépasse de peu.	Première antenne atteint le rebord postérieur du deuxième segment thoracique.
Membrane hyaline d'apparence a peu près identique sur les 3 articles (selon le dessin de Kiefer).	Spinules de la moitié proximale du douzième article toujours bien plus apparentes et plus fortes qu'ailleurs.
Epines de la quatrième paire des pattes natatoires à membrane bordante très élargie, donnant l'aspect en lancette.	Epines de la quatrième paire des pattes natatoires ne montrant qu'une ébauche de cet aspect ; la structure en lancette étant beaucoup moins prononcée que celle représentée sur les figures de Sars et de Kiefer.
Lamelle basale de la quatrième paire de pattes pourvue de deux rangées de poils très courts ; l'une sur le bord libre et l'autre sur le milieu de la lamelle.	Lamelle basale de la quatrième paire de pattes pourvue de nombreux poils, tant courts que longs, disposés à des niveaux différents, l'aspect en étant tout à fait autre que celui dessiné par Kiefer.
Epine de la cinquième patte très courte et très grêle, ressemblant à une soie.	Epine de la cinquième patte, nettement spiniforme, bien plus forte et plus élargie que celle représentée sur la figure de Kiefer.

Eucyclops macruroides.	*Eucyclops semidenticulatus.*
Branches de la furca de 7 à 9 fois aussi longues que larges.	Branches de la furca de 4 à 7 fois aussi longues que larges.
Soie apicale interne de la furca beaucoup plus courte que la branche de la furca.	Soie apicale interne surpassant assez souvent la longueur de la branche de la furca.
Première antenne atteint le milieu du premier segment céphalothoracique.	Première antenne atteint le bord postérieur du deuxième segment thoracique.
Article terminal de l'enp. 4 allongé, à épines de structure normale.	Article terminal de l'enp. 4 moins allongé à épines présentant une ébauche de structure en lancette.

Eucyclops indicus Kiefer.

Décrit par Kiefer en 1927. Espèce très aberrante, dont la position semble incertaine, ressemblant à plusieurs égards plutôt à un *Tropocyclops* qu' à un *Eucyclops* s. str. Deux femelles et un mâle récoltés par Dr. Hora près de Darjiling.

RÉSUMÉ.

1. Une courte revision a été faite des espèces connues rapportées de l'Inde appartenant au sous-genre *Eucyclops* s. str.

2. Les seules espèces parfaitement individualisées et facilement séparables de toutes les autres formes indiennes sont l'*E. semidenticulatus* Lindberg et l'*E. indicus* Kiefer.

3. Des investigations beaucoup plus étendues et plus approfondies sont nécessaires pour arriver à une connaissance satisfaisante des autres espèces connues de l'Inde à present.

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Tableau Ia.

E. serrulatus ♀.

Localité.	No.	Longueur.	Furca. Long. : larg.	Furca. Soie ap. int. : soie ap. ext.	Enp. 4. Art. term. Long. : larg.	Enp. 4. Ep. ap. int. : ép. ap. ext	Enp. 4. Art. term. : ép. ap. int.	Cinquième patte. Epine : soie méd. (larg. approx.).
Nadiad. Mare dé rivière.	1	836	91 : 23=3·96 : 1	75 : 63=1·19 : 1	53 : 25=2·12 : 1	68 : 51=1·33 : 1	0·78 : 1	2·9 : 1
	2	969	91 : 22=4·14 : 1	75 : 50=1·5 : 1	50 : 20=2·5 : 1	66 : 46=1·43 : 1	0·76 : 1	2·5 : 1
	3	959	103 : 21=4·91 : 1	71 : 50=1·42 : 1	58 : 21=2·76 : 1	59 : 43=1·37 : 1	0·98 : 1	2·5 : 1
	4	864	90 : 19=4·74 : 1	75 : 50=1·5 : 1	50 : 23=2·17 : 1	55 : 40=1·37 : 1	0·9 : 1	2·5 : 1
Bombay. Jardin Zoologique. Etang.	5	845	96 : 23=4·17 : 1	68 : 65=1·05 : 1	50 : 21=2·38 : 1	61 : 35=1·74 : 1	0·82 : 1	3 : 1
	6	893	110 : 19=5·79 : 1	70 : 61=1·15 : 1	51 : 21=2·43 : 1	61 : 40=1·52 : 1	0·84 : 1	3 : 1
Lac Véhar (Ile de Salsette).	7	946	91 : 21=4·33 : 1	70 : 58=1·2 : 1	48 : 23=2·09 : 1	58 : 41=1·41 : 1	0·83 : 1	3 : 1
Adjanta, grottes. Mare.	8	1016	126 : 26=4·85 : 1	88 : 83=1·06 : 1	65 : 25=2·6 : 1	66 : 50=1·32 : 1	0·98 : 1	4·1 : 1
	9	950	117 : 22=5·32 : 1	86 : 81=1·06 : 1	58 : 26=2·23 : 1	70 : 50=1·4 : 1	0·83 : 1	3·1 : 1
Adjanta, grottes. Autre mare.	10	1026	143 : 25=5·72 : 1	86 : 83=1·04 : 1	63 : 28=2·25 : 1	80 : 58=1·38 : 1	0·7 : 1	3·1 : 1
	11	1092	150 : 23=6·25 : 1	83 : 76=1·09 : 1	66 : 26=2·54 : 1	73 : 51=1·43 : 1	0·9 : 1	2·4 : 1
	12	1035	138 : 25=5·52 : 1	86 : 76=1·13 : 1	65 : 30=2·17 : 1	76 : 58=1·31 : 1	0·86 : 1	3·1 : 1
	13	1168	135 : 23=5·87 : 1	86 : 80=1·07 : 1	65 : 26=2·5 : 1	78 : 50=1·56 : 1	0·83 : 1	3·1 : 1
	14	1064	130 : 27=4·81 : 1	86 : 83=1·04 : 1	65 : 25=2·6 : 1	75 : 50=1·5 : 1	0·87 : 1	2·9 : 1

Adjanta, grottes. Mare de rivière.	15	978	133 : 22=6·05 : 1	90 : 73=1·23 : 1	63 : 25=2·52 : 1	75 : 50=1·5 : 1	0·84 : 1	3·1 : 1
	16	1026	133 : 23=5·78 : 1	96 : 63=1·52 : 1	61 : 26=2·35 : 1	65 : 46=1·41 : 1	0·94 : 1	2·5 : 1
Adjanta, grottes. Bassin d'une chute d'eau.	17	921	126 : 25=5·04 : 1	83 : 75=1·1 : 1	65 : 26=2·5 : 1	71 : 50=1·42 : 1	0·92 : 1	3·1 : 1
	18	1064	142 : 28=5·07 : 1	95 : 90=1·06 : 1	71 : 30=2·37 : 1	88 : 58=1·52 : 1	0·8 : 1	4·1 : 1
	19	988	135 : 23=5·87 : 1	86 : 75=1·15 : 1	63 : 26=2·42 : 1	83 : 53=1·57 : 1	0·77 : 1	3·1 : 1
Adjanta, village. Rivière.	20	1102	150 : 25=6 : 1	101 : 66=1·53 : 1	66 : 25=2·64 : 1	78 : 53=1·47 : 1	0·85 : 1	3·1 : 1
Ellora, grottes. Ruisseau.	21	931	127 : 21=6·05 : 1	85 : 73=1·16 : 1	53 : 25=2·12 : 1	68 : 43=1·58 : 1	0·78 : 1	3·1 : 1
Ellora, village. Mare de rivière.	22	950	116 : 24=4·83 : 1	86 : 75=1·15 : 1	58 : 26=2·23 : 1	66 : 50=1·32 : 1	0·88 : 1	3·1 : 1
	23	912	120 : 23=5·22 : 1	83 : 75=1·1 : 1	61 : 26=2·35 : 1	73 : 50=1·46 : 1	0·84 : 1	2·7 : 1
Ellora, village. Citerne près du réservoir.	24	931	112 : 21=5·33 : 1	95 : 78=1·22 : 1	51 : 25=2·04 : 1	65 : 43=1·51 : 1	0·78 : 1	3·1 : 1
Ellora, village. Bassin d'une pagode.	25	1016	111 : 23=4·83 : 1	86 : 58=1·48 : 1	60 : 25=2·4 : 1	61 : 45=1·36 : 1	0·98 : 1	3·1 : 1
Aurangabad. Mare de rivière.	26	1035	116 : 23=5·04 : 1	85 : 50=1·7 : 1	56 : 26=2·15 : 1	60 : 43=1·39 : 1	0·93 : 1	2·7 : 1
	27	902	108 : 21=5·14 : 1	86 : 71=1·21 : 1	56 : 25=2·24 : 1	66 : 48=1·37 : 1	0·85 : 1	3·1 : 1
	28	1083	123 : 23=5·35 : 1	91 : 78=1·17 : 1	58 : 25=2·32 : 1	68 : 50=1·36 : 1	0·85 : 1	2·9 : 1
	29	1002	112 : 25=4·48 : 1	86 : 70=1·23 : 1	58 : 25=2·32 : 1	66 : 50=1·32 : 1	0·88 : 1	3·1 : 1

Tableau Ia (suite).

Localité.	No.	Longueur.	Furca. Long. : larg.	Furca. Soie ap. int. : soie ap. ext.	Enp. 4. Art. term. Long. : larg.	Enp. 4. Ep. ap. int. : ép. ap. ext.	Enp. 4. Art. term. : ép. ap. int.	Cinquième patte. Epine : soie méd. (larg. approx.).
Aurangabad. Ruisseau.	30	959	120 : 21=5·73 : 1	80 : 75=1·07 : 1	55 : 21=2·62 : 1	51 : 43=1·19 : 1	1·08 : 1	2·6 : 1
	31	950	117 : 23=5·09 : 1	83 : 78=1·06 : 1	61 : 26=2·35 : 1	60 : 48=1·25 : 1	1·02 : 1	3·1 : 1
	32	988	112 : 20=5·6 : 1	85 : 73=1·16 : 1	55 : 25=2·2 : 1	65 : 50=1·3 : 1	0·85 : 1	2·7 : 1
	33	988	120 : 22=5·45 : 1	83 : 75=1·1 : 1	56 : 26=2·15 : 1	66 : 45=1·47 : 1	0·85 : 1	2·7 : 1
Bhatkhera, près Latour. (Etat de Haïdérabad). Mare de la Mandjra.	34	959	103 : 21=4·9 : 1	75 : 63=1·19 : 1	48 : 23=2·09 : 1	53 : 38=1·39 : 1	0·9 : 1	3 : 1
	35	969	108 : 25=4·32 : 1	80 : 66=1·21 : 1	56 : 26=2·15 : 1	65 : 46=1·41 : 1	0·86 : 1	2·5 : 1
	36	1083	108 : 23=4·7 : 1	86 : 70=1·23 : 1	58 : 26=2·23 : 1	63 : 43=1·46 : 1	0·92 : 1	3·1 : 1
Palsap. (Etat de Haïdérabad). Mare de rivière.	37	931	116 : 21=5·52 : 1	83 : 68=1·22 : 1	56 : 26=2·15 : 1	66 : 41=1·61 : 1	0·85 : 1	2·3 : 1
	38	1016	106 : 21=5·05 : 1	90 : 70=1·29 : 1	53 : 23=2·3 : 1	66 : 41=1·61 : 1	0·8 : 1	2·5 : 1
Ramling, près Barsi. Mare.	39	997	108 : 20=5·4 : 1	83 : 61=1·36 : 1	55 : 26=2·12 : 1	73 : 50=1·46 : 1	0·75 : 1	2·6 : 1
	40	1073	133 : 20=6·65 : 1	88 : 76=1·16 : 1	58 : 29=2 : 1	58 : 40=1·45 : 1	1 : 1	2·6 : 1
Gharipouri, près Barsi. Petit ruisseau.	41	798	100 : 18=5·56 : 1	70 : 58=1·2 : 1	48 : 23=2·09 : 1	60 : 40=1·5 : 1	0·8 : 1	2·5 : 1
	42	855	105 : 20=5·25 : 1	86 : 70=1·23 : 1	56 : 21=2·67 : 1	68 : 46=1·48 : 1	0·82 : 1	2·5 : 1
Mahisgaon, près Kurduvadi. Rivière Sina.	43	855	117 : 20=5·85 : 1	88 : 71=1·24 : 1	57 : 25=2·28 : 1	66 : 45=1·47 : 1	0·86 : 1	2·5 : 1
	44	855	108 : 23=4·7 : 1	85 : 70=1·21 : 1	51 : 26=1·96 : 1	53 : 41=1·29 : 1	0·96 : 1	2·5 : 1
	45	1026	113 : 21=5·38 : 1	88 : 75=1·17 : 1	55 : 25=2·2 : 1	66 : 43=1·53 : 1	0·83 : 1	2 : 1

Pandharpour. Etang.	46	1045	113 : 21=5·38 : 1	81 : 71=1·14 : 1	50 : 25=2 : 1	61 : 41=1·49 : 1	0·82 : 1	3·1 : 1
	47	1073	145 : 21=6·9 : 1	83 : 71=1·17 : 1	..	..	..	4·1 : 1
	48	1064	121 : 23=5·26 : 1	95 : 71=1·34 : 1	56 : 26=2·15 : 1	66 : 44=1·5 : 1	0·85 : 1	3·1 : 1
Pandharpour. Petite rivière.	49	931	113 : 21=5·38 : 1	83 : 66=1·26 : 1	53 : 23=2·3 : 1	63 : 43=1·46 : 1	0·84 : 1	3·1 : 1
Pandharpour. Rivière Bhima.	50	807	108 : 20=5·4 : 1	71 : 66=1·08 : 1	53 : 25=2·12 : 1	60 : 38=1·58 : 1	0·88 : 1	3·1 : 1
Langarpeth. (Etat de Miradj).	51	940	120 : 25=4·8 : 1	98 : 80=1·22 : 1	..	..	..	3·1 : 1
Mare de rivière.	52	874	115 : 22=5·23 : 1	85 : 75=1·13 : 1	56 : 26=2·15 : 1	63 : 41=1·54 : 1	0·89 : 1	3·1 : 1
	53	987	103 : 23=4·48 : 1	83 : 71=1·17 : 1	55 : 26=2·12 : 1	62 : 41=1·51 : 1	0·89 : 1	3·1 : 1
Miradj. Mare de rivière.	54	921	111 : 22=5·04 : 1	90 : 71=1·27 : 1	56 : 26=2·15 : 1	63 : 45=1·62 : 1	0·89 : 1	2·5 : 1
	55	997	115 : 22=5·23 : 1	85 : 66=1·28 : 1	56 : 21=2·67 : 1	73 : 50=1·46 : 1	0·77 : 1	3·1 : 1
	56	978	125 : 25=5 : 1	100 : 78=1·28 : 1	56 : 26=2·15 : 1	66 : 48=1·37 : 1	0·85 : 1	2·7 : 1
Belgaum. Etang.	57	902	100 : 21=4·76 : 1	78 : 65=1·2 : 1	..	..	..	3·1 : 1
	58	1045	121 : 21=5·76 : 1	83 : 66=1·26 : 1	56 : 26=2·15 : 1	61 : 41=1·49 : 1	0·92 : 1	3·1 : 1
	59	988	108 : 21=5·14 : 1	91 : 70=1·3 : 1	58 : 24=2·42 : 1	65 : 45=1·44 : 1	0·89 : 1	3·1 : 1
Mettupalaiyam. Mare de rivière.	60	902	105 : 21=5 : 1	88 : 66=1·33 : 1	53 : 24=2·21 : 1	56 : 40=1·4 : 1	0·95 : 1	2·6 : 1
	61	902	116 : 23=5·04 : 1	95 : 66=1·44 : 1	53 : 23=2·3 : 1	65 : 43=1·51 : 1	0·81 : 1	2·5 : 1
Kotagiri. (Elk). Mare.	62	993	125 : 23=5·43 : 1	100 : 83=1·2 : 1	65 : 25=2·6 : 1	75 : 50=1·5 : 1	0·87 : 1	3 : 1
Coonoor. Etang.	63	1045	133 : 26=5·12 : 1	110 : 83=1·33 : 1	60 : 25=2·4 : 1	65 : 50=1·3 : 1	0·92 : 1	4·1 : 1

Tableau Ib.

E. serrulatus ♂.

Localité.	Longueur.	Furca. Long. : larg.	Furca. Soie ap. int. : soie ap. ext.	Enp. 4. Art. term. Long. : larg.	Enp. 4. Ép. ap. int. : ép. ap. ext.	Enp. 4. Art. term. : ép. ap. int.	Sixième patte. Epine : soie méd. : soie ext.	Atteint rebord post. du deuxième segm. abdom.
Nadiad. Mare de rivière.	698	78 : 16=4·87 : 1	61 : 42=1·45 : 1	38 : 17=2·24 : 1	45 : 33=1·36 : 1	0·84 : 1	40 : 31 : 36	+
Adjanta, grottes. Mare.	703	83 : 15=5·53 : 1	53 : 36=1·47 : 1	43 : 16=2·68 : 1	50 : 40=1·25 : 1	0·86 : 1	36 : 30 : 33	+
	769	83 : 14=5·93 : 1	63 : 36=1·75 : 1	43 : 18=2·39 : 1	50 : 38=1·32 : 1	0·83 : 1	31 : 26 : 36	—
	836	90 : 18=5 : 1	60 : 50=1·2 : 1	48 : 20=2·4 : 1	58 : 33=1·76 : 1	0·84 : 1	35 : 33 : 36	—
	822	86 : 18=4·78 : 1	66 : 50=1·32 : 1	46 : 18=2·55 : 1	55 : 41=1·34 : 1	0·86 : 1	41 : 30 : 35	—
Adjanta, grottes. Autre mare.	860	92 : 17=5·14 : 1	68 : 51=1·33 : 1	..	..	..	41 : 33 : 36	—
	807	83 : 18=4·61 : 1	66 : 50=1·32 : 1	48 : 19=2·53 : 1	58 : 43=1·35 : 1	0·83 : 1	41 : 36 : 36	—
Adjanta, grottes. Mare de rivière.	712	81 : 18=4·5 : 1	55 : 38=1·45 : 1	41 : 20=2·05 : 1	53 : 35=1·51 : 1	0·77 : 1	36 : 33 : 33	+
Adjanta, grottes. Bassin d'une chute d'eau.	750	92 : 19=4·84 : 1	63 : 46=1·37 : 1	48 : 20=2·4 : 1	56 : 36=1·56 : 1	0·86 : 1	41 : 35 : 36	+
Ellora, village. Citerne.	741	75 : 18=4·17 : 1	51 : 43=1·19 : 1	41 : 18=2·28 : 1	58 : 41=1·41 : 1	0·7 : 1	33 : 30 : 41	—
Ellora, village. Mare de rivière.	731	75 : 18=4·17 : 1	58 : 43=1·35 : 1	41 : 16=2·56 : 1	53 : 41=1·29 : 1	0·77 : 1	36 : 30 : 38	—
Aurangabad. Ruisseau.	750	83 : 20=4·15 : 1	66 : 50=1·32 : 1	48 : 18=2·67 : 1	50 : 33=1·52 : 1	0·96 : 1	38 : 33 : 41	+
	826	80 : 18=4·44 : 1	45 : 43=1·05 : 1	45 : 18=2·5 : 1	58 : 45=1·29 : 1	0·78 : 1	48 : 35 : 38	+

Aurangabad. Mare.	807	70 : 18=3·89 : 1	66 : 50=1·32 : 1	42 : 17=2·47 : 1	50 : 35=1·43 : 1	0·84 : 1	33 : 31 : 36	—
Aurangabad. Mare de rivière.	765	72 : 18=4 : 1	65 : 45=1·44 : 1	41 : 16=2·56 : 1	50 : 36=1·39 : 1	0·82 : 1	31 : 38 : 38	—
Poona. Bassin d'un jardin.	674	73 : 15=4·87 : 1	58 : 43=1·35 : 1	41 : 16=2·56 : 1	50 : 30=1·67 : 1	0·82 : 1	31 : 23 : 33	+
Bhatkhera, près Latour. (Etat de Haïdérabad). Mare, rivière Mandjra.	864	81 : 18=4·5 : 1	63 : 50=1·26 : 1	40 : 16=2·5 : 1	43 : 32=1·34 : 1	0·93 : 1	33 : 26 : 41	—
Palsap. (Etat de Haïdérabad). Mare de rivière.	769	75 : 16=4·69 : 1	61 : 41=1·49 : 1	41 : 18=2·28 : 1	50 : 33=1·52 : 1	0·82 : 1	35 : 30 : 38	—
Ramling, près Barsi. Mare.	836	86 : 18=4·78 : 1	55 : 45=1·22 : 1	..	..	..	31 : 27 : 38	—
Mahisgaon, près Kurduvadi. Rivière Sina.	693	75 : 18=4·17 : 1	66 : 38=1·74 : 1	41 : 18=2·28 : 1	51 : 35=1·46 : 1	0·8 : 1	33 : 33 : 33	+
Pandharpour. Etang.	851	83 : 16=5·19 : 1	66 : 50=1·32 : 1	45 : 17=2·65 : 1	51 : 40=1·27 : 1	0·88 : 1	38 : 33 : 43	—
Pandharpour. Petite rivière.	807	75 : 18=4·17 : 1	68 : 45=1·51 : 1	41 : 16=2·56 : 1	50 : 33=1·52 : 1	0·82 : 1	35 : 26 : 28	—
Pandharpour. Rivière Bhima.	712	76 : 21=3·62 : 1	66 : 38=1·74 : 1	41 : 16=2·56 : 1	50 : 33=1·52 : 1	0·82 : 1	35 : 26 : 28	+
Langarpeth. (Etat de Miradj). Mare de rivière.	722	76 : 17=4·47 : 1	56 : 41=1·37 : 1	..	..	..	35 : 25 : 33	+
	..	..	..	..	..	..	33 : 20 : 33	+
Miradj. Mare de rivière.	769	83 : 18=4·61 : 1	63 : 43=1·46 : 1	..	..	..	..	..
	717	76 : 18=4·22 : 1	61 : 48=1·27 : 1	41 : 20=2·05 : 1	56 : 41=1·37 : 1	0·73 : 1	38 : 30 : 33	+
Mettupalaiyam. Mare de rivière.	712	76 : 18=4·22 : 1	68 : 45=1·51 : 1	41 : 18=2·28 : 1	51 : 33=1·55 : 1	0·8 : 1	41 : 26 : 45	+

Tableau Ic.

E. serrulatus. Europèen.

Localité.	Longueur.	Furca. Long. : larg.	Furca. Soie ap. int. : soie ap. ext.	Enp. 4. Art. term. Long. : larg.	Enp. 4. Ép. ap. int.: ép. ap. ext.	Enp. 4. Art. term. : ép. ap. int.	Cinquième patte. Epine : soie (larg. approx.).
Suède. Lac Maelaren.	1235	167 : 26=6·42 : 1	105 : 78=1·35 : 1	83 : 32=2·59 : 1	83 : 58=1·43 : 1	1 : 1	2·7 : 1
	1026	143 : 26=5·5 : 1	85 : 70=1·21 : 1	66 : 30=2·2 : 1	78 : 50=1·56 : 1	0·85 : 1	2·7 : 1
	988	128 : 25=5·12 : 1	78 : 75=1·04 : 1	71 : 25=2·84 : 1	70 : 50=1·4 : 1	1·01 : 1	2·9 : 1
	1035	143 : 25=5·72 : 1	83 : 66=1·26 : 1	72 : 26=2·77 : 1	73 : 50=1·46 : 1	0·99 : 1	3·1 : 1
	1035	141 : 25=5·64 : 1	73 : 71=1·03 : 1	70 : 26=2·69 : 1	78 : 58=1·34 : 1	0·89 : 1	3·1 : 1
	1325	183 : 27=6·78 : 1	101 : 80=1·26 : 1	..	..	..	..
	1187	163 : 28=5·82 : 1	100 : 78=1·28 : 1	80 : 30=2·67 : 1	80 : 58=1·38 : 1	1 : 1	3·6 : 1
	1016	132 : 26=5·08 : 1	73 : 71=1·03 : 1	70 : 26=2·69 : 1	75 : 53=1·42 : 1	0·93 : 1	3·6 : 1
Suède. Lac Maelaren. Autre habitat.	988	131 : 25=5·24 : 1	80 : 76=1·05 : 1	63 : 26=2·42 : 1	66 : 53=1·25 : 1	0·95 : 1	2·7 : 1
	969	125 : 26=4·8 : 1	75 : 50=1·5 : 1	68 : 28=2·43 : 1	66 : 47=1·4 : 1	1·03 : 1	2·6 : 1
	950	120 : 28=4·28 : 1	76 : 65=1·17 : 1	68 : 26=2·62 : 1	66 : 50=1·3 : 1	1·05 : 1	3·1 : 1
Roumanie. Cluj.	969	116 : 28=4·14 : 1	83 : 66=1·26 : 1	65 : 23=2·83 : 1	66 : 48=1·37 : 1	0·98 : 1	3·1 : 1
	874	115 : 26=4·42 : 1	81 : 53=1·53 : 1	63 : 26=2·42 : 1	61 : 43=1·42 : 1	1·03·: 1	2·5 : 1

TABLEAU II*a*.

E. agiloides ♀.

Localité.	No.	Longueur.	Furca. Long. : larg.	Furca. Soie ap. int. : soie ap. ext.	Enp. 4. Art. term. Long. : larg.	Enp. 4. Ep. ap. int. : ép. ap. ext.	Enp. 4. Art. term. : ép. ap. int.	Cinquième patte. Epine : soie méd. (larg. approx.).
Ghatkopar. (Ile de Salsette). Mare de rivière.	1	931	91 : 20 = 4·55	83 : 55 = 1·5 : 1	55 : 21 = 2·62 : 1	51 : 40 = 1·27 : 1	1·08 : 1	2 : 1
	2	959	96 : 21 = 4·57	83 : 51 = 1·63 : 1	53 : 23 = 2·3 : 1	56 : 40 = 1·4 : 1	0·95 : 1	1·5 : 1
Lonavla. Mare de rivière.	3	950	115 : 21 = 5·48 : 1	93 : 60 = 1·55 : 1	63 : 23 = 2·74 : 1	56 : 43 = 1·3 : 1	1·12 :	2·5 : 1
	4	988	115 : 23 = 5 : 1	91 : 65 = 1·4 : 1	58 : 25 = 2·32 : 1	59 : 39 = 1·51 : 1	0·98 :	2·5 : 1
Malavli. Etang.	5	1092	110 : 21 = 5·24 : 1	86 : 58 = 1·48 : 1	56 : 25 = 2·24 : 1	58 : 38 = 1·53 : 1	0·97 : 1	2 : 1
	6	1007	113 : 20 = 5·65 : 1	93 : 56 = 1·66 : 1	65 : 18 = 3·61 : 1	55 : 36 = 1·53 : 1	1·18 : 1	2·1 : 1
Karli, grottes. Etang.	7	1102	115 : 23 = 5 : 1	88 : 63 = 1·39 : 1	61 : 25 = 2·44 : 1	61 : 46 = 1·33 : 1	1 : 1	1·5 : 1
	8	..	108 : 21 = 5·14 : 1	83 : 53 = 1·57 : 1	53 : 23 = 2·3 : 1	58 : 41 = 1·41 : 1	0·91 : 1	1 : 1
	9	893	100 : 20 = 5 : 1	93 : 61 = 1·52 : 1	56 : 24 = 2·33 : 1	58 : 40 = 1·45 : 1	0·97 : 1	2·2 : 1
	10	940	108 : 21 = 5·14 : 1	92 : 61 = 1·5 : 1	60 : 26 = 2·3 : 1	58 : 40 = 1·45 : 1	1·03 : 1	2 : 1
Mahablechvar. Etang.	11	940	96 : 23 = 4·17 : 1	100 : 70 = 1·43 : 1	53 : 21 = 2·52 : 1	65 : 41 = 1·59 : 1	0·81 : 1	2 : 1
Haidérabad. Réservoir Mir Alam.	12	893	108 : 21 = 5·14 : 1	80 : 58 = 1·38 : 1	58 : 23 = 2·52 : 1	58 : 43 = 1·35 : 1	1 : 1	2 : 1

Tableau IIa (suite).

Localité.	No.	Longueur.	Furca. Long. : larg.	Furca. Soie ap. int. : soie ap. ext.	Enp. 4. Art. term. Long. : larg.	Enp. 4. Ep. ap. int. : ép. ap. ext.	Enp. 4. Art. term. : ép. ap. int.	Cinquième patte. Epine : soie méd. (larg. approx.).
Kolpa, près Latour. (Etat de Haïdérabad). Puits.	13	864	100 : 22 = 4·55 : 1	85 : 51 = 1·67 : 1	53 : 23 = 2·3 : 1	65 : 48 = 1·35 : 1	0·81 : 1	1 : 1
	14	902	91 : 23 = 3·96 : 1	90 : 55 = 1·64 : 1	53 : 20 = 2·65 : 1	59 : 46 = 1·28 : 1	0·89 : 1	2 :
	15	855	100 : 23 = 4·35 : 1	81 : 55 = 1·47 : 1	56 : 25 = 2·24 : 1	61 : 45 = 1·36 : 1	0·92 : 1	2 :]
Thair. (Etat de Haïdérabad). Rivière Tirna.	16	855	96 : 21 = 4·57 : 1	80 : 50 = 1·6 : 1	53 : 23 = 2·3 : 1	58 : 45 = 1·29 : 1	0·91 : 1	2 : 1
	17	855	101 : 23 = 4·39 : 1	83 : 58 = 1·43 : 1	56 : 25 = 2·24 : 1	60 : 45 = 1·33 : 1	0·93 : 1	2 : 1
	18	874	96 : 23 = 4·17 : 1	78 : 50 = 1·56 : 1	57 : 23 = 2·48 : 1	58 : 48 = 1·2 : 1	0·98 : 1	1·8 : 1
	19	874	103 : 22 = 4·68 : 1	83 : 51 = 1·63 : 1	58 : 23 = 2·52 : 1	63 : 45 = 1·62 : 1	0·92 : 1	2 : 1
Réservoir Patri, près Barsi.	20	950	108 : 20 = 5·4 : 1	83 : 65 = 1·28 : 1	51 : 23 = 2·22 : 1	60 : 41 = 1·46 : 1	0·85 : 1	2 : 1
	21	836	97 : 20 = 4·85 : 1	76 : 60 = 1·27 : 1	50 : 23 = 2·17 : 1	56 : 41 = 1·37 : 1	0·89 : 1	2 : 1
	22	817	83 : 21 = 3·95 : 1	92 : 58 = 1·59 : 1	50 : 21 = 2·38 : 1	53 : 36 = 1·47 : 1	0·94 : 1	1·5 : 1
Gharipouri, près Barsi. Rivière.	23	902	115 : 21 = 5·48 : 1	108 : 71 = 1·52 : 1	58 : 23 = 2·52 : 1	58 : 41 = 1·41 : 1	1 : 1	1·8 : 1
	24	845	85 : 20 = 4·25 : 1	68 : 51 = 1·33 : 1	48 : 20 = 2·4 : 1	43 : 41 = 1·29 : 1	0·9 : 1	1·8 : 1
	25	912	86 : 21 = 4·1 : 1	80 : 50 = 1·6 : 1	50 : 20 = 2·5 : 1	54 : 40 = 1·35 : 1	0·93 : 1	2 : 1
	26	950	105 : 22 = 4·77 : 1	83 : 55 = 1·5 : 1	50 : 25 = 2 : 1	58 : 47 = 1·23 : 1	0·86 : 1	2 : 1
	27	955	108 : 24 = 4·5 : 1	88 : 63 = 1·39 : 1	53 : 25 = 2·12 : 1	53 : 36 = 1·47 : 1	1 : 1	2 : 1
Kurduvadi. Puits G.	28	902	103 : 20 = 5·01 : 1	75 : 46 = 1·63 : 1	58 : 21 = 2·76 : 1	63 : 50 = 1·26 : 1	0·92 : 1	2 : 1

Kurduvadi. Puits C. H.	29	883	78 : 21 = 3·71 : 1	91 : 51 = 1·78 : 1	50 : 23 = 2·17 : 1	52 : 35 = 1·49 : 1	0·96 : 1	2· : 1
Bhosra, près Kurduvadi. Puits B.	30	965	135 : 22 = 6·14 : 1	83 : 60 = 1·38 : 1	65 : 22 = 2·95 : 1	67 : 50 = 1·34 : 1	0·97 : 1	2·2 :1
Bhosra. Puits G.	31	1045	116 : 21 = 5·52 : 1	80 : 58 = 1·38 : 1	58 : 21 = 2·76 : 1	63 : 50 = 1·26 : 1	0·92 : 1	2 : 1
	32	978	108 : 20 = 5·4 : 1	76 : 50 = 1·4 : 1	53 : 24 = 2·21 : 1	63 : 50 = 1·26 : 1	0·84 : 1	2·2 : 1
	33	978	105 : 21 = 5 : 1	81 : 51 = 1·59 : 1	55 : 22 = 2·5 : 1	66 : 50 = 1·32 : 1	0·83 : 1	2 : 1
	34	788	90 : 21 = 4·29 : 1	88 : 55 = 1·6 : 1	53 : 20 = 2·65 : 1	58 : 41 = 1·41 : 1	0·91 : 1	2 : 1
	35	969	106 : 20 = 5·3 : 1	83 : 58 = 1·43 : 1	56 : 21 = 2·67 : 1	61 : 50 = 1·22 : 1	0·92 : 1	2·2 : 1
	36	855	91 : 22 = 4·14 : 1	83 : 53 = 1·57 : 1	53 : 21 = 2·52 : 1	61 : 50 = 1·22 : 1	0·87 : 1	1·8 : 1
Solapour. Etang.	37	855	90 : 23 = 3·91 : 1	75 : 53 = 1·42 : 1	55 : 25 = 2·2 : 1	66 : 45 = 1·47 : 1	0·83 : 1	2 : 1
Pandharpour. Réservoir.	38	864	100 : 23 = 4·35 : 1	76 : 56 = 1·36 : 1	53 : 23 = 2·3 : 1	53 : 41 = 1·29 : 1	1 : 1	2 : 1
Pandharpour. Etang.	39	1083	120 : 23 = 5·22 : 1	85 : 78 = 1·09 : 1	58 : 25 = 2·32 : 1	68 : 46 = 1·48 : 1	0·85 : 1	2 : 1
	40	988	133 : 20 = 6·65 : 1	81 : 75 = 1·08 : 1	58 : 26 = 2·23 : 1	65 : 46 = 1·41 : 1	0·89 : 1	2·1 : 1
Pandharpour. Petite rivière.	41	1054	125 : 20 = 6·25 : 1	83 : 68 = 1·22 : 1	60 : 25 = 2·4 : 1	68 : 45 = 1·51 : 1	0·88 : 1	2·1 : 1
Vengurla. Mare.	42	1073	108 : 22 = 4·9 : 1	88 : 61 = 1·44 : 1	55 : 21 = 2·62 : 1	53 : 36 = 1·47 : 1	1·04 : 1	2 : 1
	43	969	120 : 20 = 6 : 1	92 : 60 = 1·53 : 1	58 : 22 = 2·64 : 1	66 : 50 = 1·32 : 1	0·88 : 1	2·7 : 1
Quepem.(Goa). Rio de Padora.	44	826	90 : 21 = 4·29 : 1	63 : 51 = 1·24 : 1	48 : 21 = 2·29 : 1	50 : 33 = 1·52 : 1	0·96 : 1	2·1 : 1
Coonoor Torrent	45	1016	110 : 26 = 4·23 : 1	83 : 50 = 1·66 : 1	..	..	..	2 : 1

Tableau IIb.

E. agiloides ♂.

Localité.	Longueur.	Furca. Long. : larg.	Furca. Soie ap. int. : soie ap. ext.	Enp. 4. Art. term. Long. : larg.	Enp. 4. Ép. ap. int. : ép. ap. ext.	Enp. 4. Art. term. : ép. ap. int.	Sixième patte. Epine : soie méd. : soie ext.	Atteint rebord post. du deuxième segm. abdom.
Ghatkopar. Rivière.	665	60 : 15 = 4 : 1	62 : 33 = 1·89 : 1	40 : 16 = 2·5 : 1	45 : 33 = 1·36 : 1	0·89 : 1	28 : 26 : 38	—
Lonavla. Mare de rivière.	712	66 : 18 = 3·67 : 1	60 : 33 = 1·82 : 1	45 : 18 = 2·5 : 1	48 : 33 = 1·45 : 1	0·94 : 1	25 : 28 : 33	—
Malavli. Etang.	680	68 : 16 = 4·25 : 1	..	41 : 16 = 2·56 : 1	46 : 33 = 1·39 : 1	0·89 : 1	26 : 28 : 30	—
Karli. Etang.	684	68 : 16 = 4·25 : 1	60 : 36 = 1·67 : 1	46 : 17 = 2·7 : 1	48 : 33 = 1·45 : 1	0·96 : 1	25 : 26 : 28	—
Haïdérabad. Réservoir Mir Alam.	765	73 : 15 = 4·87 : 1	56 : 41 = 1·37 : 1	40 : 16 = 2·5 : 1	50 : 33 = 1·52 : 1	0·8 : 1	33 : 28 : 31	—
	731	75 : 18 = 4·17 : 1	60 : 33 = 1·82 : 1	46 : 20 = 2·3 : 1	50 : 38 = 1·32 : 1	0·92 : 1	28 : 28 : 33	—
Kolpa, près Latour. (Etat de Haïdérabad).	665	63 : 18 = 3·5 : 1	53 : 33 = 1·6 : 1	43 : 19 = 2·26 : 1	50 : 36 = 1·39 : 1	0·86 : 1	26 : 23 : 28	—

Thair. (Etate de Haïdérabad.) Rivière Tirna.	665	63 : 18 = 3·5 : 1	48 : 31 = 1·55 : 1	43 : 17 = 2·53 : 1	50 : 33 = 1·52 : 1	0·86 : 1	23 : 26 : 30	—
Réservoir Patri, près Barsi	722	77 : 16 = 4·81 : 1	63 : 50 = 1·26 : 1	41 : 16 = 2·56 : 1	50 : 31 = 1·61 : 1	0·82 : 1	36 : 33 : 36	+
Kurduvadi. Puits B.	769	75 : 18 = 4·17 : 1	58 : 36 = 1·61 : 1	41 : 17 = 2·41 : 1	51 : 43 = 1·19 : 1	0·8 : 1	30 : 21 : 33	—
Kurduvadi. Puits G.	703	75 : 18 = 4·17 : 1	56 : 33 = 1·69 : 1	48 : 18 = 2·67 : 1	53 : 43 = 1·23 : 1	0·9 : 1	32 : 25 : 33	—
Bhosra. Puits G.	712	73 : 15 = 4·87 : 1	45 : 31 = 1·45 : 1	43 : 18 = 2·39 : 1	50 : 39 = 1·28 : 1	0·86 : 1	31 : 26 : 28	—
Solapour. Etang.	703	58 : 20 = 2·9 : 1	58 : 31 = 1·87 : 1	43 : 20 = 2·15 : 1	53 : 38 = 1·39 : 1	0·81 : 1	25 : 28 : 28	—
Pandharpour. Petite rivière.	636	63 : 16 = 3·94 : 1	51 : 30 = 1·7 : 1	41 : 16 = 2·56 : 1	46 : 35 = 1·31 : 1	0·89 : 1	23 : 26 : 33	—
Vengurla. Mare.	717	66 : 16 = 4·12 : 1	68 : 35 = 1·94 : 1	41 : 16 = 2·56 : 1	50 : 28 = 1·78 : 1	0·82 : 1	33 : 31 : 33	—
	750	66 : 18 = 3·67 : 1	61 : 35 = 1·74 : 1	..	..	..	30 : 31 : 33	—
Coonoor Tor ent	807	91 : 18 = 5·06 : 1	83 : 58 = 1·43 : 1	46 : 21 = 2·19 : 1	60 : 40 = 1·5 : 1	0·77 : 1	43 : 31 : 36	+

Tableau IIc.

—	—	*E. serrulatus.*		*E. agiloides.*	
		Nombre.	Pourcentage approx.	Nombre.	Pourcentage approx.
Furca. Soie apicale interne : soie apicale externe		(63 spécimens.)		(44 spécimens.)	
	1·04 : 1 à 1·3 : 1	51	80·9	6	13·3
	1·31 : 1 à 1·5 : 1	9	14·3	19	42·2
	Au-dessus de 1·5 : 1	3	4·8	20	44·5
Enp. 4. Article terminal. Longueur : largeur.		(60 spécimens.)		(44 spécimens.)	
	1·96 : 1 à 2·1 : 1	7	11·6	1	2·2
	2·11 : 1 à 2·5 : 1	43	71·6	27	61·4
	Au-dessus de 2·5 : 1	10	16·6	16	36·4
Enp. 4. Article terminal. Épine interne : épine externe.					
	1·19 : 1 à 1·3 : 1	5	8·3	13	29·5
	1·31 : 1 a 1·4 : 1	16	26·7	11	25
	1·41 : 1 à 1·5 : 1	24	40	13	25·5
	1·51 : 1 à 1·6 : 1	11	18·3	6	13·6
	1·61 : 1 à 1·74 : 1	4	6·7	1	2·2
Enp. 4. Article terminal : épine interne.					
	0·7 : 1 à 0·8 : 1	11	18·3	.	..
	0·81 : 1 à 0·9 : 1	35	58·3	15	34·1
	0·91 : 1 à 1 : 1	12	20	23	52·3
	1·01 : 1 à 1·1 : 1	2	3·3	4	9
	1·11 : 1 à 1·18 : 1	..	..	2	4·5

TABLEAU IIIa.

E. microdenticulatus ♀.

Localité.	Longueur.	Furca. Long. : larg.	Furca. Soie ap. int. : soie ap. ext.	Enp. 4. Art. term. Long. : larg.	Enp. 4. Ép. ap. int. : ép. ap. ext.	Enp. 4. Art. term. : ép. ap. int.	Cinquième patte. Épine : soie (larg. approx.).
Kodaikanal. Mare près d'un torrent.	1064	120 : 21 = 5·73 : 1	103 : 63 = 1·63 : 1	....	....	....	2·9 : 1
	1007	108 : 25 = 4·32 : 1	110 : 70 = 1·57 : 1	63 : 23 = 2·74 : 1	75 : 50 = 1·5 : 1	0·84 : 1	2·6 : 1
	931	91 : 23 = 3·96 : 1	96 : 68 = 1·41 : 1	58 : 22 = 2·64 : 1	70 : 51 = 1·37 : 1	0·83 : 1	2·9 : 1
	1083	115 : 23 = 5 : 1	103 : 70 = 1·47 : 1	63 : 21 = 3 : 1	75 : 50 = 1·5 : 1	0·84 : 1	3·2 : 1
	997	130 : 23 = 5·65 : 1	100 : 75 = 1·33 : 1	55 : 25 = 2·2 : 1	62 : 46 = 1·35 : 1	0·89 : 1	3·2 : 1
	902	113 : 23 = 4·91 : 1	86 : 66 = 1·3 : 1	56 : 23 = 2·43 : 1	66 : 48 = 1·37 : 1	0·85 : 1	3·1 : 1
Kodaikanal. Bassin d'une chute d'eau.	931	113 : 23 = 4·91 : 1	91 : 53 = 1·72 : 1	63 : 25 = 2·52 : 1	75 : 56 = 1·34 : 1	..	2·9 : 1
	978	115 : 25 = 4·6 : 1	100 : 66 = 1·52 : 1	68 : 26 = 2·62 : 1	73 : 51 = 1·43 : 1	0·93 : 1	2·7 : 1
	950	115 : 23 = 5·1	86 : 61 = 1·41 : 1	68 : 25 = 2·72 : 1	73 : 51 = 1·43 : 1	0·93 : 1	2·5 : 1
Kodaikanal. Lac.	936	113 : 25 = 4·52 : 1	80 : 56 = 1·43 : 1	63 : 28 = 2·25 : 1	66 : 50 = 1·32 : 1	0·95 : 1	2·9 : 1
Ootacamund. Lac.	883	105 : 23 = 4·56 : 1	98 : 78 = 1·26 : 1	58 : 25 = 2·32 : 1	68 : 51 = 1·33 : 1	0·85 : 1	2·5 : 1
	988	117 : 25 = 4·68 : 1	100 : 63 = 1·59 : 1	70 : 28 = 2·5 : 1	68 : 51 = 1·33 : 1	1·03 : 1	2·5 : 1
	1054	116 : 25 = 4·64 : 1	100 : 83 = 1·2 : 1	61 : 23 = 2·65 : 1	70 : 50 = 1·4 : 1	0·87 : 1	3·2 : 1
	912	105 : 25 = 4·2 : 1	100 : 65 = 1·54 : 1	60 : 25 = 2·4 : 1	66 : 50 = 1·32 : 1	0·91 : 1	2·5 : 1
	1159	130 : 23 = 5·65 : 1	86 : 60 = 1·43 : 1	68 : 25 = 2·72 : 1	68 : 53 = 1·28 : 1	1 : 1	2·7 : 1

Tableau IIIb.

E. microdenticulatus ♂.

Localité.	Longueur.	Furca. Long. : larg.	Furca. Soie ap. int. : soie ap. ext.	Enp. 4. Art. term. Long. : larg.	Enp. 4. Ép. ap. int. : ép. ap. ext.	Enp. 4. Art. term. : ép. ap. int.	Sixième patte. Épine : soie mèd : soie ext.
Kodaikanal. Mare près d'un torrent.	788	68 : 18=3·78 : 1	66 : 38=1·74 : 1	46 : 18=2·55 : 1	60 : 40=1·5 : 1	0·77 : 1	41 : 33 : 40
	779	68 : 18=3·78 : 1	66 : 41=1·61 : 1	48 : 17=2·82 : 1	56 : 40=1·4 : 1	0·86 : 1	36 : 35 : 38
Kodaikanal. Bassin d'un chute d'eau.	731	75 : 20=3·75 : 1	63 : 40=1·57 : 1	56 : 21=2·67 : 1	65 : 43=1·51 : 1	0·86 : 1	30 : 33 : 38
	741	75 : 20=3·75 : 1	66 : 41=1·61 : 1	55 : 20=2·75 : 1	66 : 43=1·53 : 1	0·83 : 1	30 : 28 : 33
Kodaikanal. Lac.	836	70 : 22=3·18 : 1	58 : 33=1·76 : 1	51 : 20=2·56 : 1	53 : 41=1·29 : 1	0·96 : 1	26 : 28 : 40
Ootacamund. Lac.	760	70 : 21=3·33 : 1	56 : 31=1·8 : 1	....	....	..	26 : 31 : 33
	741	67 : 20=3·35 : 1	55 : 33=1·67 : 1	....	....	..	26 : 23 : 30

TABLEAU IV*a*.

E. speratus ♀.

Localité.	Longueur.	Furca. Long. : larg.	Furca. Soie ap. int. : soie ap. ext.	Enp. 4. Art. term. Long. : larg.	Enp. 4. Ép. ap. int. : ép. ap. ext.	Enp. 4. Art. term. : ép. ap. int.	Cinquième patte. Épine : soie mèd : soie ext.
Adjanta, grottes. Mare.	1064	146 : 21 = 6·95 : 1	96 : 58 = 1·66 : 1	....	....	..	36 : 55 : 50
	969	133 : 21 = 6·33 : 1	100 : 56 = 1·78 : 1	56 : 23 = 2·43 : 1	65 : 50 = 1·3 : 1	0·86 : 1	33 : 76 : 53
	1111	150 : 22 = 6·82 : 1	100 : 63 = 1·59 : 1	66 : 26 = 2·54 : 1	75 : 50 = 1·5 : 1	0·88 : 1	35 : 58 : 41
	1064	133 : 20 = 6·65 : 1	61 : 60 = 1·68 : 1	53 : 26 = 2·04 : 1	58 : 48 = 1·2 : 1	0·91 : 1	33 : 58 : x
	1045	133 : 20 = 6·65 : 1	92 : 58 = 1·59 : 1	58 : 25 = 2·32 : 1	65 : 41 = 1·59 : 1	0·89 : 1	..
	1045	142 : 23 = 6·17 : 1	91 : 61 = 1·49 : 1	63 : 25 = 2·52 : 1	71 : 53 = 1·34 : 1	0·89 : 1	..

TABLEAU IV*b*.

E. speratus ♂.

Localité.	Longueur.	Furca. Long. : larg.	Furca. Soie ap. int. : soie ap. ext.	Enp. 4. Art. term. Long. : larg.	Enp. 4. Ép. ap. int. : ép. ap. ext.	Enp. 4. Art. term. : ép. ap. int.	Sixième patte. Épine: soie mèd : soie ext.
Adjanta, grottes. Mare.	855	86 : 16 = 5·38 : 1	66 : 41 = 1·61 : 1	50 : 21 = 2·38 : 1	58 : 45 = 1·29 : 1	0·86 : 1	41 : 33 : 40
	826	96 : 16 = 6 : 1	68 : 41 = 1·66 : 1	48 : 21 = 2·29 : 1	56 : 41 = 1·37 : 1	0·86 : 1	45 : 33 : 36

Tableau V*a*.

E. semidenticulatus ♀.

Localité.	Longueur.	Furca. Long. : larg.	Furca. Soie ap. int.: soie ap. ext.	Enp. 4. Art. term. Long. : larg.	Enp. 4. Ép. ap. int. : ép. ap. ext.	Enp. 4. Art. term. : ép. ap. int.	Cinquième patte. Épine : soie (larg. approx.)
Kotagiri. Mare.	931	100 : 21=4·76 : 1	123 : 63=1·95 : 1	60 : 25=2·4 : 1	55 : 41=1·34 : 1	1·09 : 1	1·5 : 1
	864	108 : 21=5·14 : 1	118 : 63=1·87 : 1	61 : 25=2·44 : 1	63 : 40=1·57 : 1	0·97 : 1	2 : 1
	893	96 : 24=4 : 1	121 : 68=1·78 : 1	65 : 23=2·83 : 1	65 : 38=1·71 : 1	1 : 1	1·1 : 1
	902	95 : 23=4·13 : 1	121 : 58=2·09 : 1	58 : 21=2·76 : 1	60 : 40=1·5 : 1	0·97 : 1	1·06 : 1
Lac Véhar. Etang près du lac.	883	106 : 21=5·05 : 1	86 : 58=1·48 : 1	51 : 24=2·12 : 1	58 : 40=1·45 : 1	0·88 : 1	1·6 : 1
	893	116 : 20=5·8 : 1	101 : 60=1·68 : 1	56 : 26=2·15 : 1	61 : 41=1·49 : 1	0·92 : 1	..
	807	86 : 21=4·09 : 1	81 : 56=1·44 : 1	50 : 23=2·17 : 1	56 : 41=1·37 : 1	0·89 : 1	1·1 : 1
Lac Poval. Mare près du lac.	988	123 : 20=6·15 : 1	110 : 66=1·67 : 1	65 : 26=2·5 : 1	71 : 48=1·48 : 1	0·92 : 1	..
	931	125 : 22=5·68 : 1	106 : 66=1·6 : 1	63 : 26=2·42 : 1	65 : 45=1·44 : 1	0·97 : 1	1·5 : 1
	1016	136 : 25=5·44 : 1	116 : 65=1·78 : 1	65 : 23=2·83 : 1	63 : 43=1·46 : 1	1·03 : 1	1·1 : 1
	978	132 : 21=6·29 : 1	117 : 75=1·56 : 1	68 : 26=2·62 : 1	66 : 46=1·43 : 1	1·03 : 1	1·2 : 1
Lac Poval. Rivière près du lac.	902	101 : 19=5·37 : 1	85 : 50=1·7 : 1	51 : 22=2·32 : 1	55 : 41=1·34 : 1	0·93 : 1	1·5 : 1

Pandharpour Petite rivière. (Avril.)	969	116 : 21=5·52 : 1	111 : 63=1·76 : 1	65 : 25=2·6 : 1	60 : 41=1·46 : 1	1·08 : 1	1·06 : 1
	912	108 : 20=5·4 : 1	113 : 58=1·95 : 1	65 : 26=2·5 : 1	60 : 41=1·46 : 1	1·08 : 1	1·06 : 1
	855	108 : 22=4·9 : 1	103 : 61=1·69 : 1	....	....	..	1 : 1
	845	101 : 21=4·81 : 1	95 : 70=1·36 : 1	55 : 23=2·39 : 1	60 : 41=1·46 : 1	0·92 : 1	1 : 1
	912	120 : 20=6 : 1	110 : 66=1·67 : 1	58 : 25=2·32 : 1	61 : 36=1·69 : 1	0·95 : 1	1·1 : 1
Pandharpour. Petite rivière. (Décembre.)	969	125 : 24=5·28 : 1	108 : 78=1·38 : 1	71 : 25=2·84 : 1	71 : 48=1·48 : 1	1 : 1	1·5 : 1
	912	123 : 21=5·86 : 1	130 : 78=1·67 : 1	66 : 25=2·64 : 1	65 : 43=1·51 : 1	1·02 : 1	1·5 : 1
	1026	141 : 23=6·13 : 1	133 : 80=1·66 : 1	65 : 26=2·5 : 1	70 : 48=1·46 : 1	0·93 : 1	1·06 : 1
	931	128 : 23=5·56 : 1	100 : 61=1·64 : 1	63 : 25=2·52 : 1	65 : 43=1·51 : 1	0·97 : 1	1·06 : 1
Pandharpour. Réservoir.	864	106 : 18=5·89 : 1	103 : 66=1·56 : 1	56 : 23=2·43 : 1	51 : 36=1·42 : 1	1·09 : 1	1·5 : 1
Pandharpour. Rivière Bhima.	902	116 : 20=5·8 : 1	100 : 61=1·64 : 1	56 : 24=2·33 : 1	60 : 41=1·46 : 1	0·93 : 1	1·07 : 1
	855	108 : 20=5·4 : 1	116 : 65=1·78 : 1	56 : 24=2·33 : 1	60 : 41=1·46 : 1	0·93 : 1	1·06 : 1
	836	112 : 21=5·33 : 1	116 : 68=1·7 : 1	56 : 21=2·67 : 1	61 : 43=1·42 : 1	0·92 : 1	1·06 : 1
	912	125 : 22=5·68 : 1	100 : 60=1·67 : 1	63 : 21=3 : 1	58 : 43=1·35 : 1	1·09 : 1	1·5 : 1
Gharipouri, près Barsi. Ruisseau.	817	103 : 20=5·01 : 1	96 : 50=1·92 : 1	55 : 24=2·29 : 1	53 : 40=1·32 : 1	1·04 : 1	1·12 : 1
Ramling, près Barsi. Mare.	1054	130 : 21=6·19 : 1	108 : 63=1·71 : 1	63 : 26=2·42 : 1	66 : 43=1·53 : 1	0·95 : 1	1 : 1
	969	135 : 19=7·1 : 1	108 : 55=1·91 : 1	....	....	..	2 : 1

Tableau Vb.

E. semidenticulatus ♂.

Localité.	Longueur.	Furca. Long. : larg.	Furca. Soie ap. int. : soie ap. ext.	Enp. 4. Art. term. Long. : larg.	Enp. 4. Ép. ap. int. : ép. ap. ext.	Enp. 4. Art. term. : ép. ap. int.	Sixième patte. Épine : soie mèd. : soie ext.
Kotagiri. Mare.	741	66 : 16=4·12 : 1	103 : 40=2·57 : 1	41 : 17=2·41 : 1	40 : 30=1·33 : 1	1·02 : 1	23 : 16 : 25
	651	72 : 16=4·5 : 1	116 : 42=2·76 : 1	46 : 18=2·55 : 1	46 : 31=1·48 : 1	1 : 1	25 : 15 : 39
Lac Véhar. Etang près du lac.	631	73 : 16=4·56 : 1	100 : 33=3·03 : 1	46 : 20=2·3 : 1	45 : 33=1·36 : 1	1·02 : 1	25 : 20 : 23
	674	75 : 15=5 : 1	100 : 33=3·03 : 1	41 : 18=2·28 : 1	41 : 29=1·41 : 1	1 : 1	25 : 20 : 23
	655	73 : 16=4·56 : 1	103 : 33=3·12 : 1	41 : 19=2·16 : 1	43 : 30=1·43 : 1	0·95 : 1	23 : 20 : 25
Lac Poval. Mare près du lac.	674	75 : 16=4·69 : 1	75 : 33=2·27 : 1	45 : 19=2·37 : 1	43 : 31=1·39 : 1	1·05 : 1	20 : 16 : 26
Lac Poval. Rivière près du lac.	703	58 : 16=3·62 : 1	56 : 31=1·8 : 1	41 : 16=2·56 : 1	51 : 33=1·55 : 1	0·8 : 1	30 : 26 : 33
	655	65 : 17=3·82 : 1	55 : 33=1·67 : 1	63 : 25=2·52 : 1	66 : 45=1·47 : 1	0·95 : 1	21 : 25 : 28
Pandharpour. Petite rivière, (Décembre.)	712	83 : 16=5·19 : 1	113 : 36=3·14 : 1	45 : 19=2·37 : 1	48 : 36=1·33 : 1	0·94 : 1	28 : 16 : 33
	684	81 : 16=5·06 : 1	116 : 41=2·83 : 1	46 : 18=2·55 : 1	50 : 33=1·52 : 1	0·92 : 1	28 : 15 : 35
Gharipouri, près Barsi. Ruiseau.	636	68 : 16=4·25 : 1	108 : 33=3·27 : 1	43 : 18=2·39 : 1	43 : 31=1·39 : 1	1 : 1	20 : 11 : 33
	655	71 : 16=4·44 : 1	101 : 33=3·06 : 1	43 : 16=2·68 : 1	44 : 31=1·42 : 1	0·98 : 1	20 : 20 : 30
Coonoor. Etang.	722	70 : 18=3·89 : 1	80 : 35=2·29 : 1	50 : 18=2·78 : 1	53 : 40=1·32 : 1	0·94 : 1	25 : 25 : 33
Ramling. Mare près del a gare.	741	65 : 19=3·42 : 1	63 : 35=1·8 : 1	40 : 20=2 : 1	51 : 35=1·46 : 1	0·78 : 1	30 : 33 : 33

NOTES ON FISHES IN THE INDIAN MUSEUM.

XXXIX.—On the Systematic Position of *Matsya argentea* Day.

By Sunder Lal Hora, *D.Sc., F.R.S.E., F.N.I.*,
Assistant Superintendent, Zoological Survey of India, Calcutta.

In his " Supplement to the Fishes of India ", Day referred to a number of species represented in Col. Tickell's " volume of beautiful coloured drawings of Burmese fishes with their descriptions ", and of these seven were described by him as new to science. Among the new species, there are three freshwater forms, *viz.*, *Leiocassis fluviatilis* Day (*Loc.* Anin, a stream rising near Weywoon, Wagroo in the Tenasserim Provinces), *Acanthonotus argenteus* Day (*Loc.* Streams of the interior of the Tenasserim district) and *Rohtee cunma* Day (*Loc.* Moulmein). So far as I am aware these species are not represented in any collection and are only known from Day's account based on the coloured drawings and descriptions of Col. Tickell. It is no wonder, therefore, that considerable confusion prevails regarding their taxonomy. Through the courtesy of Mr. D. E. B. Manning, Divisional Forest Officer, Tavoy Division, Burma, the Zoological Survey of India received a fine collection of freshwater fishes from the Tavoy District during 1939, and among this lot representatives of Day's two species, *Matsya* (=*Acanthonotus*) *argentea* and *Rohtee cunma*, have been found. In this note the systematic position of the former is elucidated, while the latter will be dealt with subsequently in an account of the revision of the fishes of the genus *Rohtee* Sykes. I am very grateful to Mr. Manning for the gift of this valuable material from a very important zoogeographical district. His entire collection will be dealt with in a separate note.

In my[1] account of the systematic position, geographical distribution and evolution of the Cyprinoid genera with a recumbent predorsal spine I recognised Day's *Matsya*[2] as a valid genus and from his description regarded it as a form with only 5 branched rays in the anal fin[3]. It was on this presumption alone that *Spinibarbus* Oshima[4] and *Spinibarbichthys* Oshima[5] were relegated to its synonymy. From the fresh material I now find that in Day's species the anal fin is provided with 6

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[1] Hora, S. L., *Rec. Ind. Mus.* XXXIX, pp. 311-319 (1937).

[2] Day, F., *Faun. Brit. Ind. Fish.* I, p. 292, fig. 102 (1889). In his ' Supplement to the Fishes of India ', Day (p. 807) described *Acanthonotus* as a new genus, but later he discovered that the name was preoccupied by *Acanthonotus* Bloch and Schneider. Accordingly, he proposed *Matsya* to replace his *Acanthonotus*.

[3] Day in characterizing *Matsya* noted " anal short ", and in the description of the species he only noted " A.7 ", without giving any indication of the number of spines and branched rays in the anal fin. Ordinarily in Cyprinoid fishes " A. 7 " indicates 2 unbranched and 5 branched rays.

[4] Oshima, M., *Ann. Carnegie Mus.* XII, p. 217 (1919).

[5] Oshima, M., *Annot, Zool. Japon.* XI, p. 10 (1926).

branched rays, the last being divided to the base, and not with the usual Cyprinoid number 5. Since great importance has generally been attached to this character in the classification of the Cyprinoid genera, I am of the opinion that the Chinese genera *Spinibarbus* and *Spinibarbichthys* must be regarded as distinct from *Matsya*.

The only other Cyprinoid genus with a recumbent predorsal spine known so far is *Mystacoleucus* Günther[1], which is distinguished from the above-mentioned three genera by its relatively long anal fin. It has hitherto been characterised by the possession of 8-10 branched rays in the anal fin, but I[2] showed that *Rohtee ogilbii* Sykes of Southern India, with 13 to 14 branched rays in the anal fin, also belongs to this genus. In view of such a wide range of variation in the number of anal rays in the species at present included under *Mystacoleucus*, it seems reasonable to regard *Matsya* as a synonym of *Mystacoleucus*, the definition of which should be emended to comprise forms having 6-14 branched rays in the anal fin.

Besides Day and the writer, Vinciguerra[3] is the only ichthyologist who has commented upon the systematic position of *Matsya argentea*; he regarded it as a synonym of *Barbus altus* Günther[4], a species originally described from Siam and now known to inhabit Cochin-China[5] also. In referring his series of specimens from Kokariet and Meetan to *Barbus altus*, Vinciguerra attached considerable importance to the serration on the dorsal spine. He noted the presence of a predorsal spine in his specimens, which had not been described by Günther in the typical specimens of *B. altus*. However, on the authority of Boulenger, who compared one of his specimens with the type of Günther's species, he considered the two forms conspecific. At my request Dr. Trewavas re-examined this material and very kindly favoured me with the following note :—

" The type of *Barbus altus* Günther is a specimen of 65+14 mm. It is in rather poor condition but quite clearly it has no recumbent predorsal spine. We have other specimens from Siam which match it very well and agree with it in this respect. We have two specimens of Fea's collection from Kokariet and these both possess a recumbent predorsal spine; it seems that Boulenger was in error in identifying them with *B. altus*, in comparison with which they also have a more inferior mouth."

Several authors who have recorded *B. altus*[6] make no mention of a predorsal spine in this species, and it seems obvious, therefore, that Vinciguerra was misled in identifying his Burmese specimens as *B. altus*. I have examined two examples of the species from Fea's collection and find them almost identical with specimens in Mr. Manning's material.

In view of what has been stated above, *Matsya argentea* Day should now be designated as *Mystacoleucus argenteus* (Day). I give below a description of the species from fresh material.

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[1] Günther, A., *Cat. Fish. Brit. Mus.* VII, p. 206 (1868).

[2] Hora, S. L., *Rec. Ind. Mus.* XXXIX, p. 312, fig. 1 (1937).

[3] Vinciguerra, D., *Ann. Mus. Civ. Stor. Nat. Genova*, (2) IX, pp. 289, 290 (1890).

[4] Günther, A., *Cat. Fish. Brit. Mus.* VII, p. 119 (1868).

[5] Tirant, G., in P. Chevey's *Oeuvre ichthyologique de G. Tirant, Réimpression avec Révision synonymique*, p. 158 (1929).

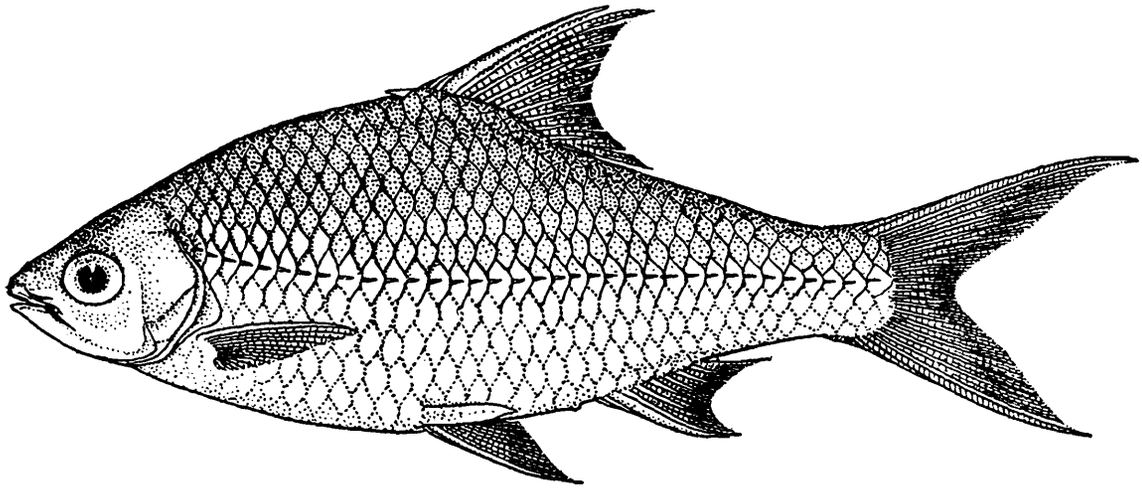
[6] Fowler, H. W., *Proc. Acad. Nat. Sci. Philadelphia* LXXXIX, p. 198 (1939).

Mystacoleucus argenteus (Day).

1888. *Acanthonotus argenteus*, Day, *Suppl. Fish. India*, p. 807.
1889. *Matsya argentea*, Day, *Faun. Brit. Ind. Fish.* I, p. 292, fig. 102.
1890. *Barbus altus*, Vinciguerra (*nec* Günther), *Ann. Mus. Civ. Stor. Nat. Genova*, (2) IX, p. 289.
1937. *Matsya argentea*, Hora, *Rec. Ind. Mus.* XXXIX, p. 311.

D. 4/8 ; A. 3/6 ; P. 15 ; V 8 ; C. 19+ ; L. l. 34-35 ; L. tr. $7\frac{1}{2}/4\frac{1}{2}$ up to base of pelvics.

Mystacoleucus argenteus is a greatly compressed, bream-like fish in which both the profiles are considerably arched. The dorsal surface

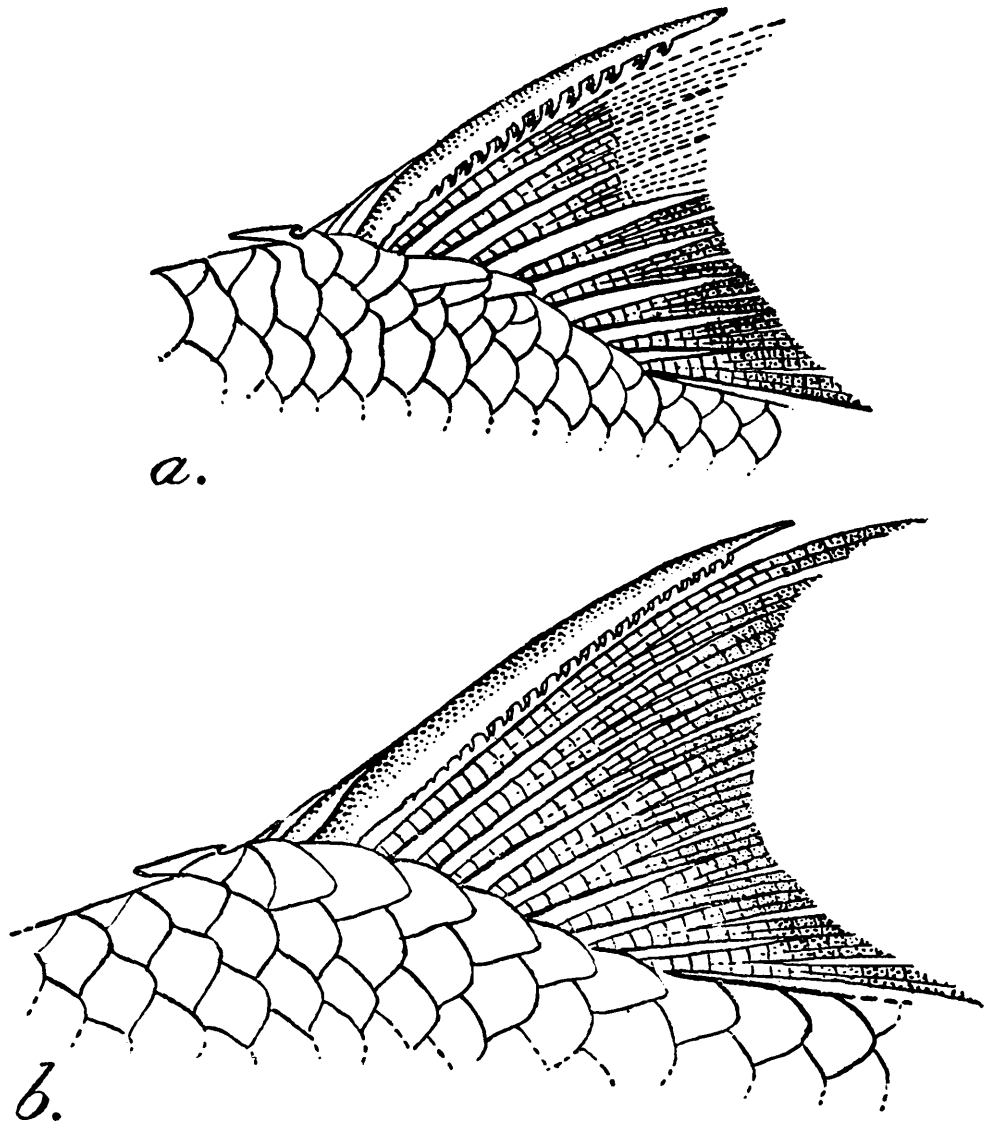


TEXT-FIG. 1.—Lateral view of a specimen of *Mystacoleucus argenteus* (Day) from Tavoy. × $\frac{2}{3}$.

between the head and the dorsal fin is sharp and keel-like, while behind the latter it is rounded. The ventral surface in front of the anal fin is somewhat flattish. The broadest part of the fish is the posterior part of the head. The head is short and broadly pointed anteriorly ; its length is contained about 4·7 times in the standard length ; its height at occiput is contained about 1·1 times and its breadth 1·6 times in its length. The depth of the body is slightly less than twice the length of the head and is contained from 2·5 to 2·6 times in the standard length. The caudal peduncle is almost one and a half times as long as broad. The eyes are large and lateral in position ; they are hardly visible from above or below. The diameter of the eye is considerably greater than the length of the snout, but is equal to or slightly greater than the inter-orbital width ; it is contained from 2·6 to 2·8 times in the length of the head. The mouth is small, inferior, semicircular and horizontal. The lips are thin ; the lower lip is reflected from the jaw which is sharp. The postlabial groove is interrupted in the middle. There are two pairs of short barbels.

The commencement of the dorsal fin is somewhat in advance of the pelvics, and is almost midway between the tip of the snout and the base of the caudal fin ; it is provided with 4 spines and 8 branched rays. The last spine is strong and bony, and denticulated along the posterior border.

In smaller specimens these denticulations are fewer and coarser [1]. The recumbent predorsal spine is short, but fairly strong and well marked.



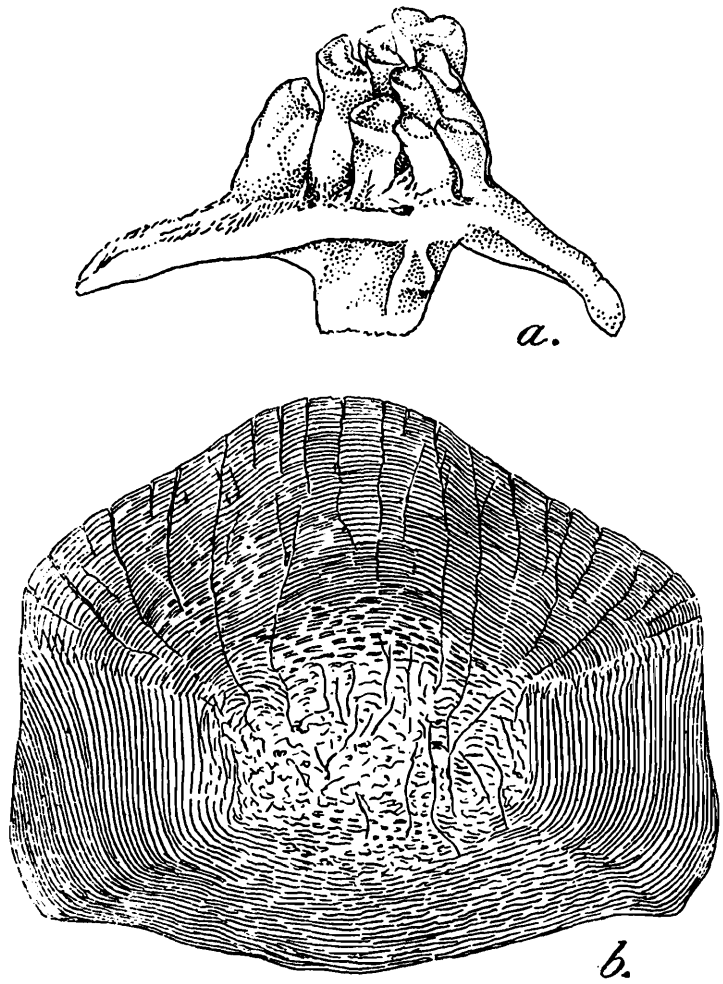
TEXT-FIG. 2.—Dorsal fin of *Mystacoleucus argenteus* (Day), showing nature of recumbent predorsal spine and denticulations on the dorsal spine. × 2.

a. Drawn from a specimen obtained by Dr. Fea in Burma ; *b*. Drawn from a specimen collected by Mr. Manning from Tavoy.

It is sharp and pointed both anteriorly and posteriorly. The pectoral fins are sharp above and slightly shorter than the head ; they are separated from the pelvics by a considerable distance. The pelvic fins are also pointed and possess prominent scaly appendages in their axils which are longer than the bases of the fins. The pelvics extend to the anal opening, but miss the base of the anal fin by a short distance. The anal fin possesses 3 spines and 6 branched rays ; the last spine is fairly well developed and the last branched ray is divided to the base. The caudal fin is deeply forked with both the lobes sharply pointed ; the upper lobe is slightly longer than the lower.

[1] It may be noted that Vinciguerra's largest specimen was 115 mm. in length and in two of his specimens examined by me the denticulations are certainly coarser than those in Mr. Manning's examples. It has been indicated already that the nature of serrations on the dorsal spine had influenced Vinciguerra to refer his specimens of this species to *Barbus altus* Günther.

The body is covered with large, thin, but firmly adhering scales. There are 34 to 35 scales along the lateral line, $7\frac{1}{2}$ rows between it and

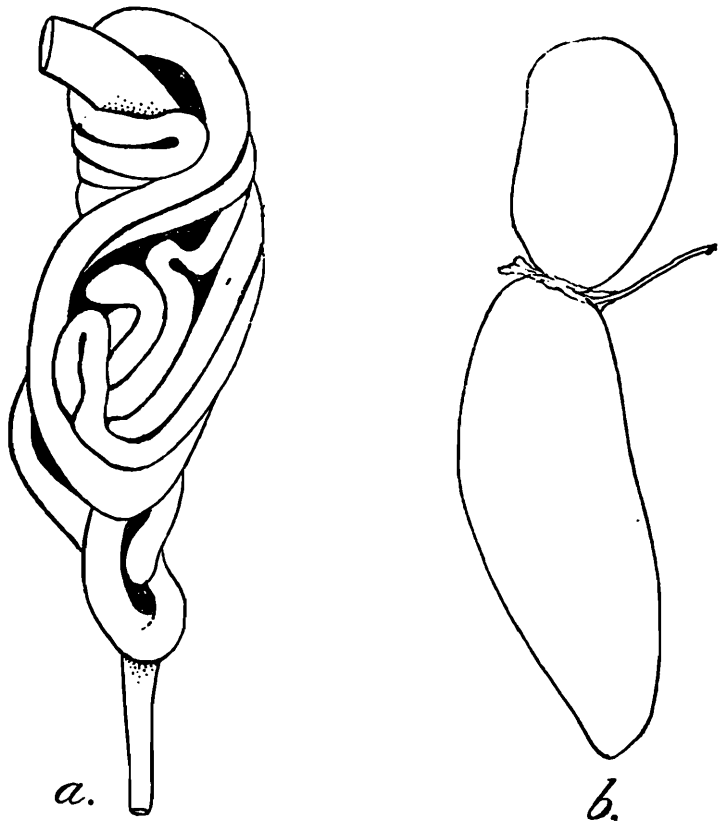


Text-fig. 3.—Pharyngeal teeth and scale of *Mystacoleucus argenteus* (Day).
a. Pharyngeal bone and teeth. × $5\frac{1}{3}$; *b*. A scale from below base of dorsal fin. × 10.

the base of the dorsal fin and $4\frac{1}{2}$ rows between it and the base of the pelvic fin. The unpaired fins possess scaly sheaths at their bases. A scale from below the base of the dorsal fin possess a broad, somewhat arched base, almost straight or slightly convex sides and a broadly pointed apex. The nuclear area is large and is situated more or less in the centre. The circulii are fine and numerous. There are a number of short, narrow radii in the apical region, only a few of which extend to the nuclear area. The pharyngeal teeth are arranged in three rows 4, 3, 2 : 2, 3, 4. The alimentary canal is long, narrow and greatly convoluted. The air-blader is of the usual Cyprinoid type but owing to the narrowness of the body cavity, especially towards the dorsal region, its shape is correspondingly modified. Posteriorly it is co-extensive with the body cavity which extends into the tail region for a short distance.

The colour of the preserved specimens is pale olivaceous, which is replaced above by gray and on the ventral surface becomes much lighter. The dorsal surface of the head and the ridge along the back are somewhat darker. The anterior face of the dorsal spine and the distal margin of

the fin are also darkish. There is a short dark band between the superior angle of the gill-opening and the orbit, which meets a semicircular band



TEXT-FIG. 4.—Alimentary canal and air-bladder of *Mystacoleucus argenteus* (Day). × 1⅓.

a. Alimentary canal; *b*. Air-bladder.

of the same colour across the nape. There are brownish marks on the snout and around the nostrils. The dorsal and the caudal fins are light gray, while the remaining fins are of a dull white colour.

Measurements in millimetres.

Standard length	123·0	124·2	124·3
Depth of body ..	46·0	50·0	49·0
Length of head	26·3	26·4	26·0
Width of head	15·5	16·5	16·0
Height of head at occiput	23·0	24·5	22·2
Length of snout ..	7·3	6·0	7·0
Diameter of eye ..	9·2	9·8	9·8
Interorbital width	9·7	9·8	10·3
Longest ray of dorsal	32·5	Damaged	
Longest ray of anal	18·8	18·5	Damaged
Length of pectoral	22·5	25·0	22·0
Length of pelvic	21·8	23·0	21·0
Length of caudal peduncle ..	23·0	22·0	22·0
Least height of caudal peduncle ..	14·0	14·3	15·0

ON A COLLECTION OF INDIAN OPILIONES OF THE GOVERNMENT MUSEUM OF MADRAS.

By C. Fr. Roewer, *Bremen.*

In 1938 I received for identification a small collection of Opilionids from the Government Museum of Madras. In this collection, mostly made by Prof. Dr. F. H. Gravely and Mr. E. Barnes, the following species were found :—

Suborder *LANIATORES.*

Family Assamiidae.

Subfamily *Polycoryphinae.*

Anaimalus gibbulus Roewer.

1 ♂, 1 ♀—Chingelput Distr. (Nagalapuram, 2,400 ft.)—Nr. 11661.
6 (♂, ♀)—Travancore (Munnar)—Nr. 11662.

Subfamily *Trionyxellinae.*

Nuwaria granulata Roewer.

1 ♀—Tinnevelly—Nr. 11675.

Nilgirius scaber Roewer.

1 ♀—Coorg (Mercara)—Nr. 11676.

Suborder *PALPATORES.*

Family Phalangiidae.

Subfamily *Gagrellinae.*

Zaleptus sulphureus Thorell.

1 ♂—Siam (Cheng Mai)—Nr. 11674.

Gagrella viridula Roewer.

7 (♂, ♀)—Cochin State (Kuriarkutti)—Nr. 11670.

Palniella viridiдorsata Roewer.

6 (♂, ♀)—Travancore (High Range)—Nr. 11671.

Strandia similis Roewer.

2 ♂, 1 ♀—Travancore (Murayur)—Nr. 11663.
2 ♂, 1 ♀—Travancore (High Range)—Nr. 11666.
1 ♀—Malabar Coast (Pattambi)—Nr. 11664.
1 ♂—Malabar Coast (Pattambi)—Nr. 11667.
1 ♂, 1 pull.—Cochin State (Kavali)—Nr. 11665.
1 ♂, 1 ♀—Kodaikanal (Palni Hills)—Nr. 11668.
1 ♀—Kodaikanal (Palni Hills)—Nr. 11669.

Paragagrella mysorea, sp. nov.

♂—Length of body 4 mm., 1st to 4th femora 9, 17, 9, 13 mm.; 1st to 4th legs 39, 77, 37, 54 mm.

♀—Length of body 6 mm., 1st to 4th femora 9, 19, 10, 14 mm.; 1st to 4th legs 39, 90, 38, 55 mm.

Surface of carapace, scutum and free tergites and sternites of abdomen uniformly granulated; ocular tubercle on each side of the median longitudinal furrow smooth, but basally on each side toothed; scutum only on 2nd area with one spine; surface of 1st to 4th coxae more coarsely granulated, edge of small humps of marginal rows of coxae straight, but not sharp. First article of chelicerae dorsally smooth. Palps: trochanter ventrally toothed, femur ventrally and patella dorsally scattered with small teeth, but without medial apophysis, tibia not toothed and 3 times longer than broad, tarsus of male with a ventral longitudinal row of very small teeth in basal half. Legs with toothed trochanters and femora; number of noduli on 1st to 4th femora 0-3-0-1.

Colour of the body blackish-brown; carapace black laterally, lighter brown medially, furrowed, ocular tubercle covered with white secretions, less in the female than in the male; scutum with a few ferruginous spots midway between the lateral margin and the median spine of the scutum, the spots are also covered with white secretions, which are also present on the sternites and the coxae of the legs. Chelicerae and palps dark-brown, but the tarsus of the latter pale yellowish. Legs ferruginous, but trochanters contrasting black.

2 ♂, 1 ♀, 1 pull.—Mysore State (Attikan)—Nr. 11672 (Typus !).

2 ♂, 1 ♀, 3 pull.—Mysore State (Biligirirangans) Nr. 11673 (cotypus !).

The types (Reg. No. 2147/18) are preserved in the collection of the Zoological Survey of India (*Ind. Mus.*), Calcutta.

ON SOME EARLY STAGES IN THE DEVELOPMENT OF THE SO-CALLED INDIAN SHAD, *HILSA ILISHA* (HAMILTON).

By K. KRISHNAN NAIR, *B.A., Officiating Gallery Assistant, Zoological Survey of India, Calcutta.*

(Plate V.)

CONTENTS.

INTRODUCTION.

Over a quarter of a century ago attempts were made both in Bengal and Madras to propagate *Hilsa* artificially on the lines followed for Shad in America. Artificial fertilisation of the eggs was carried out successfully in both places ; but whereas in Bengal the eggs could not be reared into larvae on account of the large quantities of the mud held in suspension in the river water and fungus attacks (Southwell and Prashad, 1918, p. 6), in Madras eggs were hatched out successfully (Sundara Raj, 1917, p. clxxxiv), and the present position in Madras is summed up as " the collection and hatching of *Hilsa* eggs continues as a routine at Madras (*sic*)" (Devanesen, 1939, p. 126). No detailed description of the eggs and early development of *Hilsa* has so far been published by the Madras Fishery Department, probably on account of the fact that the rearing of the delicate fry to the fingerling size in fresh waters has not so far been attempted. In his preliminary note on the spawning grounds and bionomics of *Hilsa*, Hora (1938) explained the circumstances under which young of *Hilsa* were found in great abundance in the settling tanks and filterbeds of the Calcutta water-works at Pulta. He also referred to the probable rate of growth of *Hilsa* as judged from measurements of 900 specimens collected from the isolated pucca settling tank No. 4 on the 21st November, 1937 Dr. Hora, with a view to elucidating the breeding season of this fish, and other fishes in the river Hooghly, had monthly collections made from this settling tank. After each collection the tank was dewatered almost completely and it can, therefore, be inferred that young fish only one month old or younger were collected each month. Such collections of young forms were made over a

period of one year. In the material thus obtained young *Hilsa* of different sizes were found in great abundance, especially from March to November, and these form the subject matter of the present article. The specimens described below were, however, obtained in November 1938.

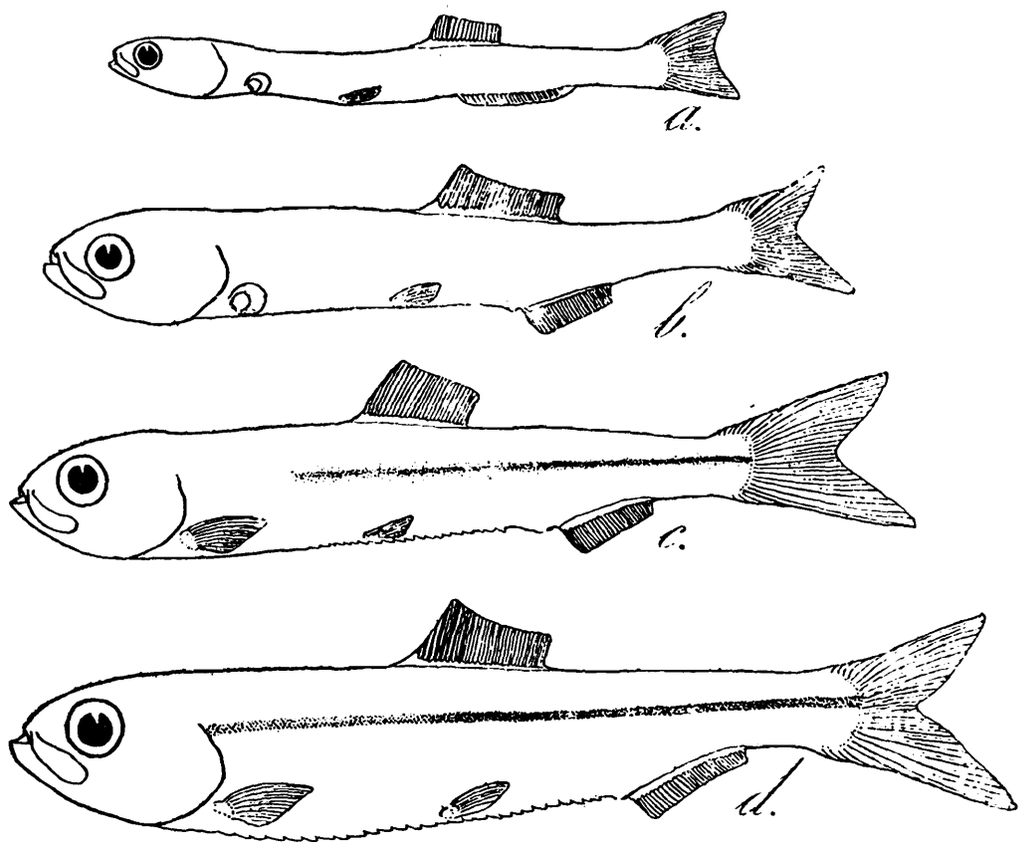
Lebour (1921, p. 428) found that in distinguishing fish larvae the number of vertebrae provides a very good and reliable character. Accordingly the young of *Hilsa* were cleared in caustic potash and stained with Alizarin, which enabled the number of vertebrae to be counted without any difficulty. In specimens treated with caustic potash, however, the counting of myotomes, was not possible. In the adult examples of *Hilsa* the usual number of vertebrae was found to be 46, very rarely 45 ; the first vertebra being the one immediately behind the head, and the last vertebra being the one with a modified neural arch behind which there is a urostyle. With the help of this character the youngest specimens that could definitely be assigned to *Hilsa* were 14 mm. in total length, a size which probably represents a few days' growth after hatching. At this stage the young are quite different from the adult fish and it is only after several marked changes that the adult form is assumed. Another point to which attention may be directed here is the fact that all specimens of the same size are not necessarily at the same stage of development, for, smaller specimens were sometimes found to have scutes, etc., better developed than somewhat larger examples. As in the earlier stages marked differences of structures are noticeable within very narrow limits of size, I have in the following account described a few stages with 1 mm. differences in their lengths.

I offer my grateful thanks to Dr. Baini Prashad, Director, Zoological Survey of India, for facilities for carrying out this investigation. To Dr. S. L. Hora I am highly indebted for the material, valuable suggestions and constant encouragement.

DESCRIPTION OF MATERIAL.

The body of a 14 mm. larva (text-fig. 1*a*) is slender, long and narrow ; its caudal end being almost as broad as the anterior region. It is devoid of any colour, though it is not quite transparent. The dorsal contour of the head is more convex and the eyes, which are big and bulging, are black with a silver lining around them. The mouth is large and the lower jaw is slightly longer than the upper. The maxilla is prominent even at this stage. The continuous larval skin fold has practically disappeared and all the fins, except the pectorals, are more or less provided with delicate supporting fin rays ; the rudiments of the pectorals can be seen just behind the gill openings with a few wavy slender ray-like supports which are not quite well developed at this stage. The rays of the caudal fin, however, are more developed and are distinctly segmented. The dorsal fin at this stage is situated far behind, but is in advance of the anal. The pelvic fins are anterior to the dorsal. The gills are formed, and so are the gill covers. The alimentary canal is a simple structure ; after some distance from the mouth it bends towards the left, and is continued anteriorly when it turns to the right and runs backwards as a straight tube to the anus.

In a larva of 15 mm. in total length, the head and the eyes are considerably more pronounced. The body is colourless except for a few



TEXT-FIG. 1.—Young *Hilsa* from 14 mm. to 22 mm. in total length. × 4½.
a. 14 mm.; *b*. 18 mm.; *c*. 20 mm.; *d*. 22 mm.

chromatophores at the bases of the anal and the caudal fins. There is also another set of chromatophores inside the body which begin behind the pectoral fins and are spread along the alimentary canal. The dorsal fin is placed slightly forward, so that, it commences just above the point where the pelvics terminate. The last ray of the dorsal fin, as in the case of Pilchard, Sprat, etc. (Lebour, 1921, p. 432), is double and without a proximal radial to support it. The pectoral fins are not fully formed, but they are represented by thick folds. In the anal fin, as in the dorsal, the last ray is double and is also without a proximal radial. The caudal peduncle is relatively longer and the caudal fin is the most developed among fins; its early development may be accounted for by the fact that it is the main organ for locomotion. The 19 principal rays of the adult caudal fin are already fully formed at this early stage and can be clearly seen in Alizarin preparations. The operculum is very thin and transparent. The air bladder is small and cylindrical; its posterior end reaches a point about midway between the pelvics and the anus. The intestine is very prominent and its characteristic convoluted inner walls could be seen through the body wall. The food of the larvae at this stage probably consists of minute organisms, such as diatoms, etc.

The general shape of the body of a specimen of 16 mm. in total length is similar to that of a larva of the 15 mm. size. The pectoral fins are more developed and there are slender rays to support them. The

posterior end of the alimentary canal can well be seen with its convoluted inner walls from the pelvics backward. The anus lies immediately below the point where the dorsal fin ends. The food of the larvae at this stage includes Ostracods, which were found in the alimentary canal of some individuals. The ventral margin of the body is not yet Clupeid in structure and form, but is rounded without any indication of scutes. In specimens of 17 mm. in total length, the pectoral fins have become bigger and the rays stronger. There are no scutes even at this stage. Ostracods and Copepods were found in the alimentary canals of some individuals.

In specimens of 18 mm. total length the body is still narrow (text-fig. 1*b*), the anal fin commences behind the middle of the dorsal fin which has shifted forwards, and contains a few more rays. The intestine is still visible through the body wall. The abdomen is not yet keeled and the scutes are generally absent, though a few projections may be noticed in front of the pelvic fins. In a few specimens of this size, however, four fine points of the scutes were seen in front of the pelvic fins. In Alizarin preparations, however, the bony parts of the developing scutes can be seen very clearly (text-fig. 2*a*). Among the contents of the alimentary canal a few bits of mica were seen. Presumably these had been accidentally ingested along with small planktonic organisms.

The general shape of the body in a specimen of 19 mm. in total length begins to take the Clupeid form. The longitudinal black stripes on the two sides of the body, which are fairly prominent in young *Hilsa*, make their appearance at this stage, but are restricted to the portions between the pelvic fins and the base of the caudal fin. There are a few chromatophores at the bases of the caudal and anal fins, and on the ventral side of the stomach also. The dorsal fin has shifted still further forwards and now lies exactly above the origin of the pelvic fins. The posterior end of the dorsal fin is considerably in advance of the anal fin. The abdomen along the mid-ventral line in its central part is more or less keel-shaped and bears 12 scutes in various stages of development; of these seven are in front of and five behind the pelvic fins (text-fig. 2*b*). The remainder of the abdominal margin is still smooth and does not exhibit any projections. The air bladder is still in the form of a cylindrical tube.

In specimens of 20 mm. in total length (text-fig. 1*c*) the dorsal fin has shifted still further forwards, so that it now lies slightly in advance of the origin of the pelvics. The anal fin is by now far behind the posterior end of the dorsal. There are a number of chromatophores on the caudal fin as well as at the base of the anal fin. The longitudinal black stripe on the body is longer and occupies about $\frac{3}{4}$th the length of the body. The air bladder at this stage is divided into two parts, a short and barrel-shaped anterior chamber which is connected by a short narrow neck with a posterior elongated tubular part. The abdomen is keel-shaped, and, generally speaking, about twenty scutes can be made out (text-fig. 2*c* and 2*d*).

In specimens of 21 mm. in total length, the longitudinal black stripes on the sides of the body are complete, and can be seen extending from the end of the operculum right up to the base of the caudal fin. The

posterior half of each stripe is broader and more prominent. The larvae seem to feed voraciously at this stage, for as many as 90 Copepods could be seen in the alimentary canal of one of the specimens examined. At this stage there are about 25 scutes on the abdomen. The chromatophores can be seen along the course of the alimentary canal and at the bases of the anal and caudal fins.

The black stripes are more prominent in specimens of 22 mm. in total length (text-fig. 1*d*). The shape of the body now almost approaches that of the adult form and the scutes have increased in number to 30, including the first six which are not fully developed. The 31st scute, which lies in front of the anus, is not yet developed. Copepods seem to be the main food of the larva, though an occasional Chironomid larva could also be seen in the alimentary canal.

A specimen of 27 mm. in total length shows most of the features characteristic of the adult fish. The shape of the body, the number of rays in the various fins are all identical with those of the adult, but the number of scutes is still thirty. The young at this stage are voracious feeders and, though delicate, are agile and quick in their movements.

GENERAL OBSERVATIONS.

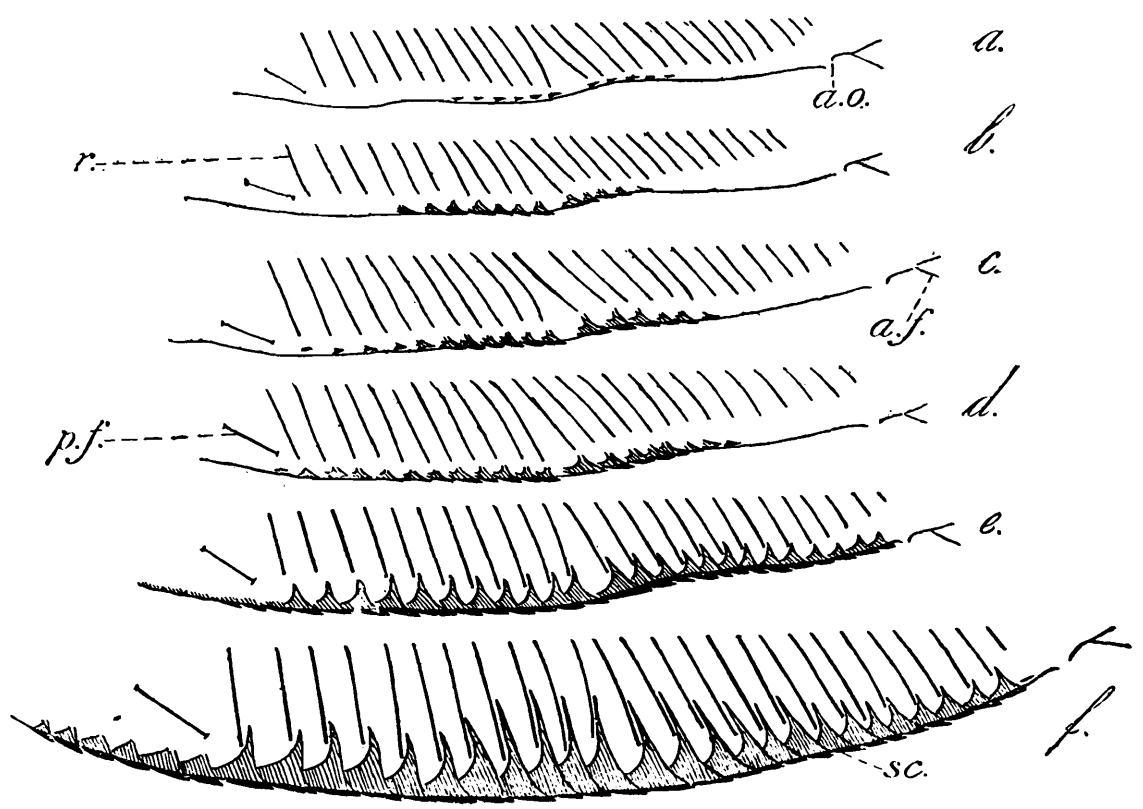
In the larval forms described above attention may specially be invited to the forward migration of the dorsal fin and anus, the development of the scutes, and to the relative proportions of the various parts of the body.

Forward movement of dorsal fin.—The dorsal fin shifts about 8 vertebrae in its migration forwards during the growth of the young from 16 mm. to 23 mm. in length. In a specimen of 16 mm., it commences above the 16th vertebra and ends above the 28th. Along with the growth of the larva, the dorsal fin travels gradually forwards and in a specimen of 23 mm. it commences above the 8th and ends above the 21st vertebra ; this is its permanent position in the adult fish. As in the case of the Pilchard and others (Lebour, 1921), the first two rays of both the dorsal and anal fins are supported by the first radial while the last one though double is counted as one. These last double rays of both the fins do not possess a proximal radial till the specimens attain a size of about 35 mm. in total length ; their proximals, however, are considerably smaller than those of the other rays.

Change in position of anus.—During the growth of *Hilsa* the anus begins to migrate forwards (Pl. V), as is already known in the case of Pilchard, Sprat and Herring (Lebour, 1921). This forward movement of the anus in relation to the vertebrae is clearly visible in Alizarin preparations. The figure in plate V is a diagrammatic representation of the forward movements of the dorsal fin and the anus in relation to the vertebrae of young *Hilsa* of various sizes. The anus moves over about 4 vertebrae (from 34th to 30th) during the growth of the fish from 16 mm. to 23 mm. size. Fage (1920) and Lebour (1921, p. 429) attribute this migration to unequal growth of the posterior part of the body. In the adult of *Hilsa*,

however, it is situated below the 34th vertebra which shows that at a later stage a backward shifting of the anus takes place. This backward shifting starts in specimens of about 24 mm. size and is very slow, for, the anus reaches its permanent position, *i.e.*, below the 34th vertebra, at a stage when the specimen is about 144 mm. in total length. This cannot be satisfactorily explained on an assumption of an unequal growth in the anterior region of the fish since there is no backward shifting in the position of the dorsal fin. On the other hand, it appears possible that the anus is mechanically shifted backwards by the growth of the abdominal scutes. These scutes grow posteriorly, in virtue of their position and attachment, and since they are partly within the body wall they tend to shift the muscles behind them along with their growth. The contour of the ventral side of the fish becomes more and more convex as the fish grows. This fact along with the very slow progress of the backward shifting of the anus seem to support this view. Along with the anus, the anal fin also is shifted backwards.

Development of scutes.—In an adult specimen there are 17 scutes in front of and 14 scutes behind the pelvic fins. All the scutes excepting the first six, which are in front of the first rib, are supported by ribs. Very rarely an additional scute appears in between the regular ones,



TEXT-FIG. 2.—Development of scutes in young *Hilsa* from 18 mm. to 31 mm. in total length. × 6.

a. 18 mm.; *b.* 19 mm.; *c.* and *d.* 20 mm.; *e.* 23 mm.; *f.* 31 mm.
a. f. anal fin; *a. o.* anal opening; *p. f.* pectoral fin; *r.* rib; *sc.* scutes.

and, in such cases it is not supported by a rib. Such an odd scute may generally be found between the regular 17th and 18th. The scutes originate in the form of short longitudinal pieces (text-fig. 2*a*) which appear in the position of the future scutes. These in course of time

develop into two roughly triangular plates laterally (text-fig. 2*b*) which send up an arm each at the dorsal angle to be supported by the corresponding rib. A representative series of the different stages of development is shown in figure 2. For studying the formation of the scutes, Alizarin stained specimens were used, and the figures reproduced here were made from such specimens with the help of a camera lucida.

A specimen up to 17 mm. in total length does not show any sign of the abdominal scutes and the ribs do not join ventrally. That is to say, the ribs of the stained specimens take the colour only as far as shown in the figures. In an 18 mm. specimen a few short longitudinal streaks, just in front of and behind the pelvics can be seen. The first scutes to form as such are the three or four immediately in front of the pelvics. Then three or four appear immediately behind the pelvics. In this way the scutes begin to appear, a few in front alternated by a few behind the pelvics until 30 of them are formed when the specimen is about 23 mm. in total length. The last scute, which is the one nearest the anus, is not developed till sometime afterwards. The last scute makes its appearance as a short longitudinal piece, devoid of any arms, in a specimen of 31 mm. in total length. This scute also sends up two lateral arms to meet the corresponding ribs and is well supported by the same when the specimen is about 33 mm. in total length.

Relative proportions of different parts.—The forward shifting of the dorsal fin referred to above is also clear from the table of measurements and proportions given below. In a specimen of 15 mm. in length the distance between the tip of the snout and the commencement of the dorsal fin is contained about 1·9 times and the distance between the dorsal and caudal fins is contained about 4·7 times in the total length. With the forward movement of the fin during growth the former distance is gradually reduced, so that in a specimen of 24 mm. in length it is contained about 2·6 times in the total length, while the latter distance is gradually increased so that in specimen of 24 mm. in length it is contained about 3·1 times in the total length.

It has been indicated above that the body is very narrow in the early stages ; this is borne out by the fact that the depth of body in a specimen of 15 mm. is contained about 7·9 times in the total length while the same proportion is reduced to about 5·3 in a specimen 24 mm. in length. It is of interest to record that whereas the depth of the body goes on increasing gradually the height of the caudal peduncle proportionately remains almost the same. The tables of measurements show that both the caudal fin and the head increase in size during the growth of the fish.

In the following table **A**. denotes the length of base of the anal fin ; **AC**., the distance between tip of snout and anus ; **C**., the length of caudal ; **CP**., the least height of the caudal peduncle ; **D**., the length of base of dorsal ; **DB**., the depth of body ; **DC**., the distance between dorsal and caudal ; **H**., the length of head ; **SA**., the distance between the tip of snout and anus ; **SD**., the distance between the tip of snout and the commencement of dorsal ; **T**., the total length of the fish.

Table of measurements and relative proportions.

T.	C.	$\frac{T}{C.}$	DB.	$\frac{T}{DB.}$	H.	$\frac{T}{H.}$	CP.	$\frac{T}{CP.}$	D.	$\frac{T}{D.}$	A.	$\frac{T}{A.}$	SD.	$\frac{T}{SD.}$	DC.	$\frac{T}{DC.}$	AC.	$\frac{T}{AC}$	SA.	$\frac{T}{SA.}$
mm.	mm.		mm.		mm.		mm.		mm.		mm.		mm.		mm.		mm.		mm.	
15	1·8	8·33	1·9	7·89	2·9	5·17	1·5	10·00	1·9	7·89	2·1	7·14	8·0	1·88	3·2	4·69	1·3	11·54	9·8	1·53
15	1·9	7·89	1·9	7·89	2·8	5·36	1·6	9·38	2·0	7·50	2·1	7·14	7·9	1·89	3·2	4·69	1·3	11·54	9·8	1·53
16	2·0	8·00	2·3	6·96	3·0	5·33	1·5	10·80	2·1	7·62	2·1	7·62	8·2	1·95	3·5	4·57	1·8	8·89	10·1	1·58
16	2·0	8·00	2·6	6·15	3·1	5·16	1·4	11·43	2·4	6·66	2·1	7·62	8·1	1·98	3·5	4·57	1·8	8·89	10·3	1·55
16	2·1	7·62	2·1	7·62	2·9	5·52	1·5	10·89	2·5	6·40	2·0	8·00	8·3	1·93	3·5	4·57	1·4	11·43	10·5	1·52
16	2·0	8·00	2·0	8·00	3·1	5·16	1·6	10·00	2·3	6·96	2·3	6·96	8·3	1·93	3·6	4·44	1·2	13·33	10·5	1·52
17	2·1	8·09	2·3	7·39	3·3	5·15	1·8	9·44	2·3	7·39	2·2	7·73	8·0	2·13	4·5	3·78	1·5	11·33	11·2	1·52
17	2·2	7·73	2·2	7·73	3·2	5·31	1·6	10·63	2·5	6·80	2·2	7·73	8·5	2·00	4·3	3·95	1·4	12·14	11·0	1·55
17	2·1	8·09	2·2	7·73	3·2	5·31	1·4	12·20	2·4	7·08	2·2	7·73	8·4	2·02	4·3	3·95	1·5	11·83	11·2	1·52
17	2·2	7·73	2·3	7·39	3·2	5·31	1·4	12·20	2·4	7·08	2·3	7·39	8·3	2·05	4·7	3·62	1·5	11·83	11·0	1·55
18	2·0	9·00	2·0	9·00	4·0	4·50	1·6	11·25	2·7	6·66	2·3	7·83	8·0	2·25	5·5	3·27	2·0	9·00	11·7	1·54
18	2·1	8·57	2·2	8·18	3·6	5·00	1·4	12·86	2·7	6·66	2·3	7·83	7·8	2·31	5·4	3·33	1·8	10·00	11·9	1·51
18	2·0	9·00	2·7	6·66	3·9	4·62	1·5	12·00	2·8	6·43	2·5	7·20	8·2	2·95	6·0	3·00	2·0	9·00	12·1	1·49
18	2·0	9·00	2·7	6·66	4·0	4·50	1·6	11·25	2·7	6·66	2·4	7·50	7·7	2·34	5·8	3·10	1·9	9·48	12·0	1·50
19	2·5	7·60	3·0	6·33	4·0	4·75	1·5	12·67	2·9	6·55	2·5	7·60	8·1	2·35	5·6	3·39	1·5	12·67	12·5	1·52
19	2·5	7·60	2·9	6·55	3·9	4·87	1·5	12·67	2·9	6·55	2·6	7·31	8·0	2·38	5·9	3·22	1·4	13·57	12·6	1·51

19	2·4	7·92	2·9	6·55	3·8	5·00	1·4	13·57	2·9	6·55	2·6	7·31	8·1	2·35	5·7	3·33	1·6	11·88	12·4	1·53
19	2·5	7·60	2·6	7·31	3·8	5·00	1·5	12·67	2·8	6·78	2·6	7·31	8·0	2·38	6·0	3·17	1·6	11·88	12·3	1·54
20	2·8	7·14	3·0	6 67	4·0	5·00	1·6	12·50	3·0	6·67	2·8	7·14	8·2	2·32	6·5	2·92	2·0	10·00	12·4	1·61
20	2·2	9·09	3·2	6·25	4·5	4·44	1·3	15·38	3·0	6·67	2·8	7·14	8·6	2·33	5·9	3·38	1·8	11·11	13·2	1·52
20	2·5	8·00	3·1	6·45	4·7	4·25	1·4	14·29	3·0	6·67	2·6	7·69	8·9	2·25	5·7	3·51	1·8	11·11	13·1	1·53
20	2·5	8·00	3·5	5·72	4·1	4·87	1·6	12·50	2·9	6·89	2·8	7·14	8·5	2·35	6·2	3·23	1·5	13·33	13·2	1·52
21	3·0	7·00	3·9	5·38	4·6	4·56	1·3	16·15	3·1	6·78	2·5	8·40	8·5	2·47	6·6	3·18	1·9	11·05	13·6	1·54
21	2·9	7·24	3·9	5·38	4·8	4·38	1·6	13·13	3·0	7·00	2·6	8·08	8·4	2·50	6·8	3·09	1·9	11·05	13·6	1·54
21	3·0	7·00	3·8	5·53	4·7	4·47	1·5	14·00	3·0	7·00	2·7	7·78	8·8	2·39	6·8	3·09	1·9	11·05	13·5	1·56
21	3·0	7·00	3·8	5·53	4·8	4·38	1·4	15·00	3·0	7·00	2·6	8·08	8·7	2·41	6·7	3·13	1·9	11·05	13·5	1·56
22	2·8	7·86	4·2	5·24	4·8	4·58	1·9	11·58	3·1	7·09	3·0	7·33	8·8	2·50	7·6	2·89	1·9	11·58	14·2	1·55
22	2·8	7·86	4·5	4·89	4·9	4·49	2·0	11·00	3·1	7·09	3·1	7·09	8·7	2·52	7·5	2·93	1·8	12·22	14·2	1·55
22	2·9	7·58	4·5	4·89	4·7	4·68	1·8	12·22	3·1	7·09	3·0	7·33	9·3	2·37	5·7	3·86	1·8	12·22	14·3	1·54
22	2·8	7·86	4·5	4·89	4·8	4·58	1·9	11·58	3·0	7·33	3·0	7·33	8·9	2·47	7·6	2·89	1·9	11·58	14·3	1·54
23	3·6	6·39	4·3	5·35	4·8	4·79	2·1	10·95	3·3	6·97	3·2	7·19	9·0	2·56	7·5	3·07	1·4	16·43	14·4	1·59
23	3·7	6·22	4·2	5·48	4·8	4·79	2·1	10·95	3·3	6·97	3·2	7·19	9·1	2·53	7·8	2·95	1·5	15·33	14·6	1·58
23	3·7	6·22	4·2	5·48	4·8	4·79	2·0	11·50	3·3	6·97	3·1	7·42	9·2	2·50	7·8	2·95	1·5	15·33	14·7	1·58
23	3·7	6·22	4·2	5·48	4·9	4·69	2·1	10·95	3·4	6·76	3·1	7·42	9·1	2·53	7·7	2·99	1·5	15·33	14·7	1·58
24	3·8	6·32	4·3	5·58	5·1	4·71	2·2	10·91	4·0	6·00	3·6	6·67	8·6	2·79	7·9	3·04	1·5	16·00	15·1	1·59
24	3·8	6·32	4·6	5·22	5·1	4·71	2·2	10·91	3·9	6·15	3·5	6·86	9·2	2·61	7·8	3·08	1·8	13·33	15·2	1·58
24	3·7	6·49	4·9	4·89	5·2	4·62	2·2	10·91	3·3	7·27	3·1	7·74	9·5	2·53	7·8	3·08	1·9	12·63	15·3	1·57
24	3·8	6·32	4·5	5·33	5·1	4·71	2·2	10·91	3·5	6·86	3·5	6·86	9·2	2·61	7·9	3·04	1·7	14·12	15·0	1·60

Summary.

The material of young *Hilsa* described in this article was obtained from the Pulta Water-works, Calcutta, and in determining the very young forms reliance was placed on the number of vertebrae which is believed to be a constant character. For the counts of vertebrae specimens were cleared in caustic potash and stained with Alizarin. Fourteen young stages of 14 mm. to 27 mm. in total length are described in detail and attention is directed to the changes in the relative proportions of the different parts of the fish during growth.

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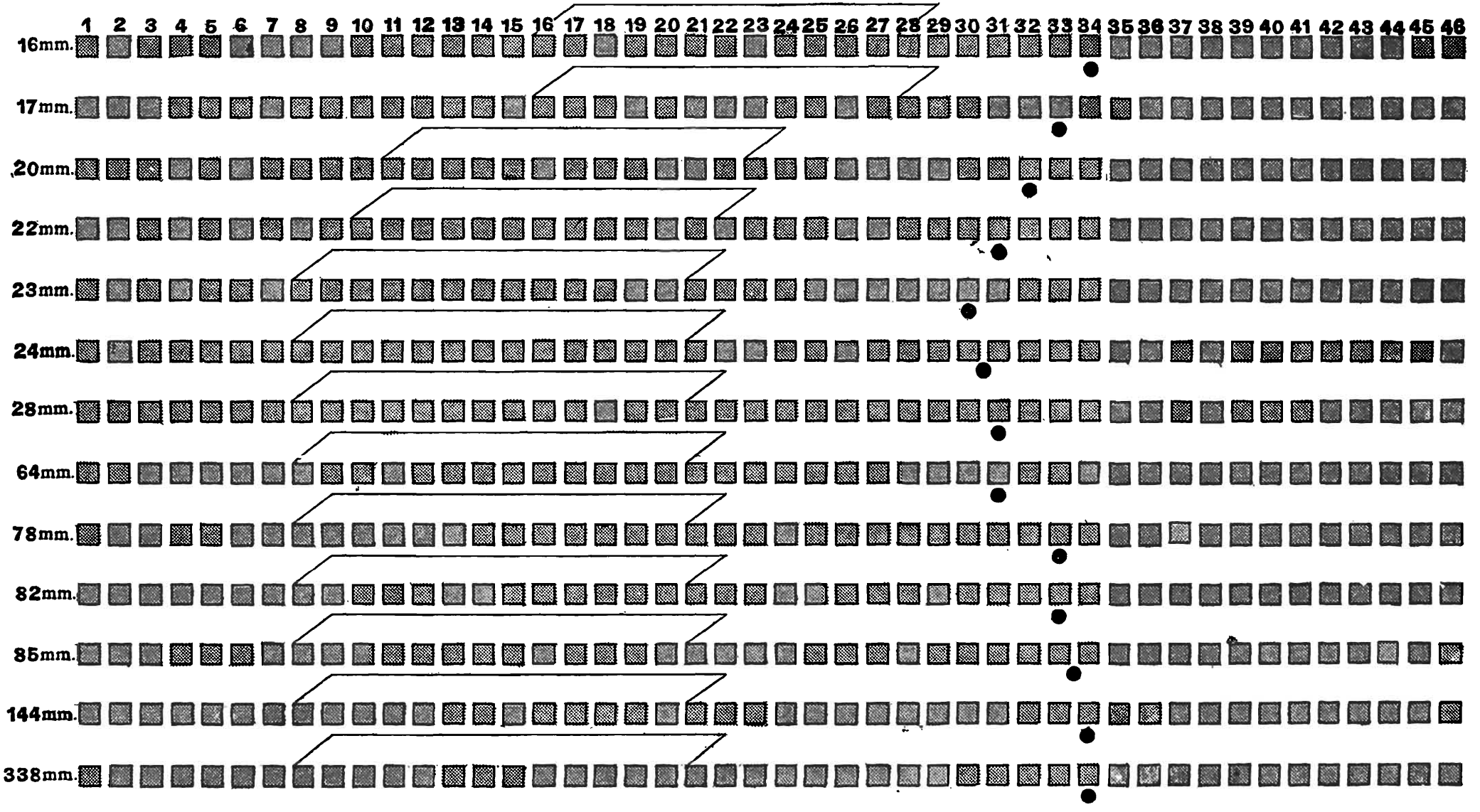
[1] Not consulted by the author.

EXPLANATION OF PLATE V.

Diagram showing the positions of the dorsal fin and anus in relation to the vertebrae in *Hilsa* of various sizes ranging in length from 16 mm. to 338 mm. in total length. The shaded squares indicate vertebrae, the black dots indicate the positions of anus during various stages of growth and the lines indicate the origin and extent of the dorsal fin.



Positions of dorsal fin and anus in relation to vertebrae in *Hilsa ilisha* (Hamilton).

NOTES ON SOME NEMATODES NEW TO INDIA.

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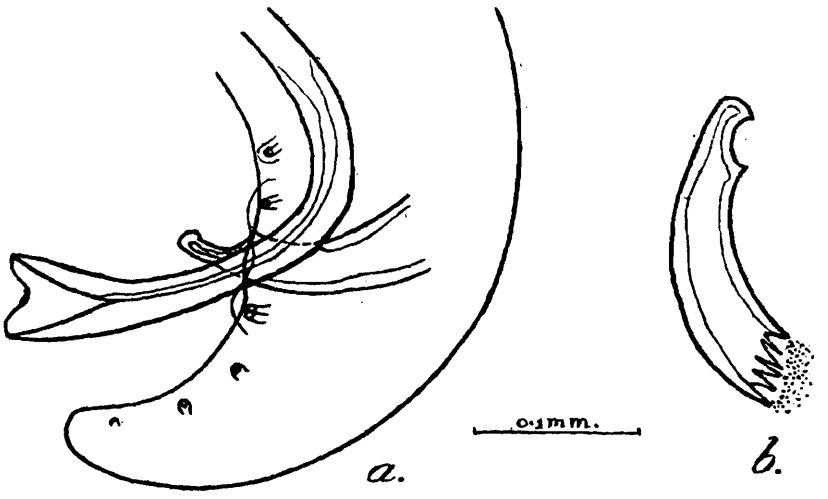
1. **Echinuria uncinata** (Rudolphi, 1819) Soloviev, 1912.

A collection of worms, which has been referred to this species, was recovered from the gizzard of a Garganey or Blue-winged Teal, *Querquedula querquedula* (Linn.), which died in the Calcutta Zoological Gardens. This worm has been found previously in several anseriform birds, including the domestic duck, and has been recorded from Europe, Africa and North America, but as far as the writer is aware this is the first occasion on which the species has been found in India.

The length given by Cram[1] is 9-10 mm. for males and 12-18·5 for females. In the present collection the males measured 7·4-8 mm. and the females 8·4-9 mm. and other dimensions were proportionately smaller.



TEXT-FIG. 1.—*Echinuria uncinata* (Rudolphi).
a. Tail of male, lateral view showing end of long spicule; *b*. Short spicule.

There is therefore a considerable difference especially in the case of the females, but the type of cordons, the arrangement of the spines anteriorly, the position of the vulva and the type of ovejector are all the same as are described for *E. uncinata*. In addition, the papillae on the tail of the male appear to be the same as figured by Schneider, except that one papilla of the most anterior pair on each side could not be seen, and the spicules, as far as can be judged from their inadequate description, appear to be similar. In view of these facts it is considered the difference in size is of no importance.

The spicules present very distinctive characters and as no detailed drawing of them ever appears to have been made a figure is given (text-

[1] Cram, E. B., *U. S. Nat. Mus. Bull.*, 140, p. 246 (1927).

fig. 1). This is considered worth while because Cram expresses the opinion that it is possible *E. uncinata* and *E. jugadornata* Soloviev, 1912, the type of the genus, are identical so the accurate determination of the anatomical characters is all the more important.

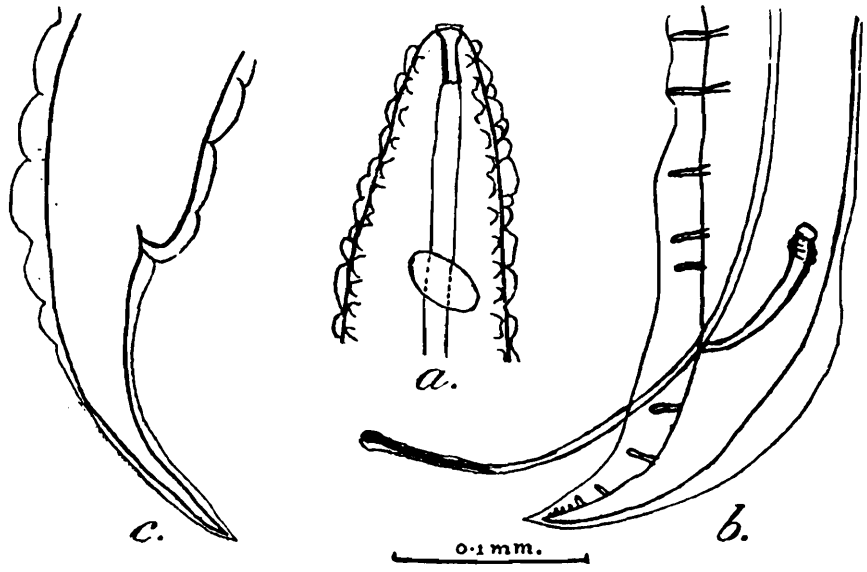
2. TWO NEMATODES FROM *CEBUS CAPUCINUS* (LINN.).

These two species of worms were collected from the intestine of a Capuchin monkey that died in the Calcutta Zoological Gardens.

Gongylonema capucini, sp. nov.

These worms have the typical, irregularly-disposed cuticular bosses on the anterior end which extend posteriorly for about 1 mm. There is a definite pharynx or vestibule which is slightly expanded anteriorly and which projects a short distance in front of the head (text-fig. 2*a*.).

The males are 5·4-6·3 mm. in length and 0·13-0·19 mm. in maximum diameter. The pharynx is 0·045-0·052 mm. in depth, the first part of the oesophagus is 0·37-0·32 mm. and the second part 1·6 mm. in length, a total length of 1·91-1·97 mm., measuring from the anterior extremity. The caudal alae are 0·26-0·28 mm. in length and are supported by 5 pairs of precloacal and four pairs of postcloacal pedunculate papillae, and in addition there is a group of 5 or 6 small sessile papillae on the ventral surface of the tail near its tip. The cloaca is 0·13-0·14 mm. from the tip of the tail. The spicules are unequal and dissimilar.



TEXT-FIG. 2.—*Gongylonema capucini*, sp. nov.

a. Anterior extremity; *b*. Male, posterior extremity, semi-lateral view; *c*. Female, posterior extremity, lateral view.

The short spicule is relatively stout and slightly curved, its proximal end is marked by a thickening with transverse grooves and its length is from 0·080-0·088 mm. The long spicule is much more delicate, its tip is slightly spatulate and is surrounded by a delicate membraneous expansion, and its length is about 0·52 mm. No gubernaculum could be definitely seen although there is a faint suggestion of a lightly-chitinized U-shaped structure just inside the cloaca (text-fig. 2*b*).

The single intact female measured 15·3 mm. in length and 0·19 mm. in maximum diameter. The vulva opens 2·06 mm. from the posterior extremity and the anus is 0·16 mm. from the same point. The tail narrows rapidly immediately behind the anus. The eggs are oval with thick shells and measure 40-48×28-30 μ (text-fig. 2*c*).

Two other species of *Gongylonema* have been recorded from monkeys, namely *G. macrogubernaculum* Lubimov[1], and *G. microgubernaculum* Gebauer[2]. The first of these was recovered from the lungs, oesophagus or stomach of *Cebus hypoleucus*[=*C. capucinus* (Linn.)][3], *Macacus rhesus*[=*Macaca mulatta* (Zimm.)] and *Cercopithecus talapoin*[=*Miopithecus talapoin* (Schreber)], and the second from the lungs of a *Silenus rhesus*, which in all probability is the same species *as Macaca mulatta* (Zimm.).

Gebauer evidently considered that Lubimov was dealing with more than one species of *Gongylonema* because he gives *G. macrogubernaculum* as a synonym (*pro parte*) of his species *G. microgubernaculum*, but he makes no explanation of his action.

The other species of *Gongylonema* recorded from other animals have been differentiated from *G. macrogubernaculum* and *G. microgubernaculum* by Lubimov and Gebauer respectively, so it is only necessary to differentiate the present species from these two to establish its position as new.

The present worm is less than half the length of either of the above species, in both sexes. The length of the long spicule in proportion to the length of the males is different in all three species for in the case of *G. macrogubernaculum* it is approximately 1 : 2·5, in *G. microgubernaculum* 1 : 7, and in the present species 1 : 11. The large and characteristic gubernaculum in *G. macrogubernaculum* and its apparent absence in the present species is another point of difference. Finally in *G. microgubernaculum* the proximal portion of the short spicule is different from that of the other two species, which are alike. It is noteworthy that the caudal papillae in all three species are similar.

On account of the above differences it is considered justifiable to suggest for this worm a new species and it is accordingly named *Gongylonema capucini*, sp. nov. Host: *Cebus capucinus* (Linn.).

Type.—The type slide (Reg. No. W3427/1) is preserved in the collection of the Zoological Survey of India (*Ind. Mus.*), Calcutta.

Molineus torulosus (Molin, 1861) Yorke & Maplestone, 1926.

This worm was originally found in the same host (*Cebus capucinus*). The present material agrees in all its anatomical details with the most recent description by Travassos[4], the only discrepancy being that the males are smaller being 6-6·2 mm. in length whereas Travassos gives the size as 8·2-9 mm.; the females agree with Travassos' measurements.

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[1] Lubimov, M. P., *Parasitology* XXIII, p. 446 (1931).
[2] Gebauer, O., *Zeitschr. f. Parasit.* V, p. 730 (1933).
[3] The latest scientific names of the species have been given within brackets.
[4] Travassos, L., *Monograph. do Inst. Osw. Cruz*, No. 1, p. 75 (1937).

ON A FURTHER COLLECTION OF AQUATIC RHYNCHOTA FROM THE RAJMAHAL HILLS, SANTAL PARGANAS, BIHAR, WITH A DESCRIPTION OF *MICROVELIA SANTALA*, SP. NOV.

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INTRODUCTION.

A former paper[1] dealt with the Aquatic Rhynchota collected mainly from the Rajmahal Sub-division of the Santal Parganas, Bihar. The present paper deals with a further collection of Aquatic Rhynchota from an area comprising the Pakur, Dumka and Deogarh Sub-divisions of the Santal Parganas which, at the instance of the Director, Zoological Survey of India, was surveyed by the senior author during the months of October, November and December 1938, in connection with investigations on the fauna of the Rajmahal Hills. The collections from this area are much more extensive than those from the Rajmahal area, and consist of twenty-two species as against thirteen found in the Rajmahal area. A new species of *Microvelia* Westw. is described in this paper under the name *Microvelia santala*, sp. nov. We have also included records of distribution for the various species dealt with in this paper based on the collections of the Zoological Survey of India. Most of the species have not been recorded before from the Santal Parganas.

The names of some of the small streams and less important rivers referred to in this paper were not to be found in any of the gazetteers or maps available and were mostly obtained by the senior author in the field from the Santals inhabiting the area.

We have to acknowledge our grateful thanks to Dr. Baini Prashad, Director, Zoological Survey of India, for his usual courtesy in helping us to prepare this paper for the press.

SYSTEMATIC ACCOUNT.

Family HYDROMETRIDAE.

Subfamily *MESOVELIINAE*.

Mesovelia vittigera Horváth.

1895. *Mesovelia vittigera*, Horváth, *Rev. Entomologie* XIV, p. 160.
1904. *Mesovelia mulsanti*, Distant (*nec* Buchanan-White), *Faun. Brit. Ind., Rhyn.* II, p. 169, fig. 122.
1905. *Mesovelia orientalis*, Breddin, *Mitt. Naturh. Mus. Hamburg* XXII, p. 129.
1909. *Mesovelia mulsanti*, Lefroy, *Rec. Ind. Mus.* III, p. 328.
1910. *Mesovelia mulsanti*, Distant, *Faun. Brit. Ind., Rhyn.* V (Appendix), p. 137.
1915. *Mesovelia vittigera*, Horváth, *Ann. Hist.-nat. Mus. Nat. Hungar.* XIII, pp. 550-552, fig. 6.

[1] Hafiz, H. A. and Mathai, G., *Rec. Ind. Mus.* XL, pp. 207-210 (1938).

1918. *Mesovelia mulsanti*, Paiva, *Rec. Ind. Mus.* XIV, p. 20.
1918. *Mesovelia vittigera*, Bergroth, *Philippine Journ. Sci.* XIII, D, p. 121.
1918. *Mesovelia vittigera*, Annandale, *Rec. Ind. Mus.* XIV, p. 207.
1918. *Mesovelia mulsanti*, Paiva, *Rec. Ind. Mus.* XV, p. 8.
1928. *Mesovelia vittigera*, Dover, *Treubia* X, p. 66.

We refer to this species two winged specimens from Jhobbo Stream, about a mile from Litipara Inspection Bungalow, Santal Parganas (4.xi.1938, collected along with three apterous forms of the new species of *Microvelia* West. described in this paper).

Horváth in his *Monographie des Mésovéliides* (1915, p. 550) drew attention to the fact that Distant's identification (*supra*, 1904, p. 169 and 1910, p. 137) of an Indian species as the American *Mesovelia mulsanti* Buch.-White is incorrect and he proposed to call them *M. vittigera*. The specimens in the collections of the Zoological Survey of India named as the latter species by Distant are therefore *Mesovelia vittigera* Horv.

This very common species is widely distributed, being known from the Philippines, New Guinea, the Indo-Malayan Region, India, Palestine, Syria, Egypt and Africa.

The species is represented in the collections of the Zoological Survey of India from the United Provinces: Naini Tal, 6,400 ft., Kumaon; Bihar: Pusa; Orissa: Barkuda Island, Chilka Lake; Madras Presidency: Chikkaballapura; Burma: Inlé Lake, Yawnghwe State; Andamans: Ross Island.

Subfamily *VELIINAE*.

Rhagovelia nigricans (Burmeister).

1936. *Rhagovelia nigricans*, Lundblad, *Ark. Zool.* XXVIII, No. 21, pp. 44-47.
1938. *Rhagovelia nigricans*, Hafiz and Mathai, *Rec. Ind. Mus.* XL, p. 207.

We provisionally refer to this species twelve winged adults and a nymph collected from Gukulpur River, about a mile and a half from Kunjbona Inspection Bungalow, Santal Parganas (1.xi.1938).

Genus **Microvelia** Westwood.

1904. *Microvelia*, Distant, *Faun. Brit. Ind., Rhyn.* II, p. 174.
1910. *Microvelia*, Distant, *Faun. Brit. Ind., Rhyn.* V (Appendix), p. 138.
1921. *Microvelia*, Bueno, *Bull. Brooklyn Ent. Soc.* XVI, pp. 87 and 92[1].
1925. *Microvelia*, Bueno, *Spolia Zeylanica* XIII, pp. 229, 230.
1926. *Microvelia*, Hale, *Rec. S. Austral. Mus.* III, pp. 202 and 206-208.
1934. *Microvelia*, Lundblad, *Arch. Hydrobiol. u. Plankton* XII (Supplement), pp. 285-287, 307-364 and 368-370.

Distant, in the works quoted above, did not publish any key for the Indian species of the genus but this was supplied by Bueno (1925, pp. 229, 230). Bueno's key included the following species of *Microvelia* as understood by the author: *M. albomaculata* Dist., *M. annandalei* Dist., *M. atromaculata* Paiva, *M. burmanica* Paiva, *M. diluta* Dist., *M. kumaonensis* Dist.[2], *M. lineatipes* Paiva, *M. repentina* Dist., *M. sexualis* Paiva, *M. singalensis* Kirk. and *M. longicornis* Bueno. With the exception of

[1] This work is unfortunately not available in Calcutta.
[2] In Bueno's key to the species (1925, p. 230) the specific name is spelt *kumaoensis*. This is apparently a *lapsus calami* for *kumaonensis*.

M. sexualis Paiva from Siam and *M. longicornis* Bueno from Ceylon, all the species mentioned above were known from macropterous forms only.

Lundblad, in his studies on the aquatic and semi-aquatic Hemiptera of Sumatra, Java and Bali (1934) recorded the Indian *M. diluta* Dist. (pp. 307-315, text-fig. 97), *M. annandalei* Dist. (pp. 318-320, text-fig. 99) and *M. douglasi* Scott (pp. 347-357 and 476, text-figs. 111-114) from these areas, and under *M. douglasi* Scott he definitely included *M. repentina* Dist., and with some doubt *M. singalensis* Kirk. and *M. kumaonensis* Dist. as synonyms.

Lundblad, in the latest revision of the genus *Microvelia* Westw. (1934, p. 285), recognises the following Indian species :—*M. albomaculata* Dist., *M. annandalei* Dist., *M. atromaculata* Paiva, *M. burmanica* Paiva, *M. diluta* Dist., *M. douglasi* Scott, *M. lineatipes* Paiva and *M. longicornis* Bueno. Apterous forms only are known in the case of *M. diluta* Dist. (♂ ♀), *M. douglasi* Scott (♂) and *M. longicornis* Bueno (♂ ♀). We give below a revised key of the male apterous forms of the Indian species including the new species, *M. santala* described in this paper.

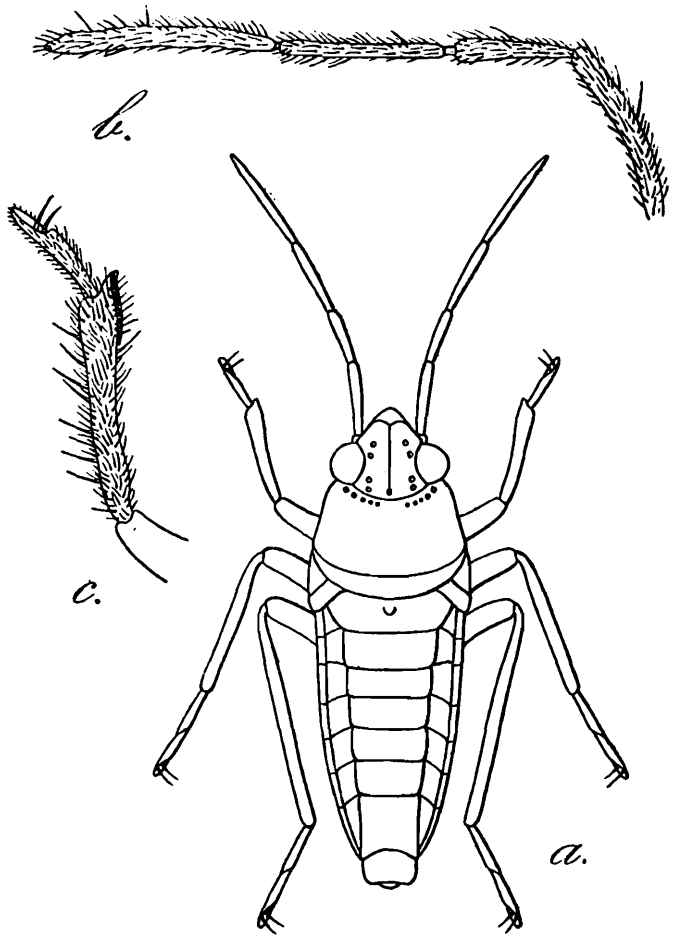
A. Intermediate tibiae distinctly smaller than femora	*douglasi* Scott.
Intermediate tibiae distinctly longer than femora	*longicornis* Bueno.
B. Intermediate tibiae slightly smaller than femora ; anterior legs only with tibial combs ..	*santala*, sp. nov.
Intermediate tibiae slightly longer than femora ; anterior and middle legs with tibial combs ..	*diluta* Dist.

Microvelia santala, sp. nov.

This species is readily distinguished by the presence of the tibial combs which are found only on the anterior pair of legs.

Apterous male (text-fig. *a*).—General colouration dull black ; body clothed with pale yellowish-brown pubescence ; apex of head shining black, general outline of head and body viewed from above narrowly obovate, tapering posteriorly and broadest at the prothorax ; a little more than thrice as long as wide. Head depressed at apex and subconically produced in front of eyes ; inner margins of eyes lined by fine silvery shining hairs which are wanting at the apex. Face of brown colour, clothed with a shining silvery pilosity. Rostrum yellowish-brown with a median longitudinal darker streak, black at apex. Vertex almost twice as long as the width between eyes, with two pairs of black punctae submarginally arranged on either side and bearing in the middle a fine shining black longitudinal line ending in a puncta near posterior margin of vertex. Antennae slender, shorter than insect by about half its length, four-jointed and clothed with pale brown pubescence intermixed with a few longer hairs of the same colour. Basal joint of antennae slightly curved, nearly one and one-third as long as the third joint and a little longer than the second (counted from the base) ; apical joint the longest (text-fig. *b*). Pronotum about twice as broad as long, convexly rounded posteriorly and prominently narrowed in front, dull black in colour and clothed with a pale yellowish-brown pubescence, with a few stout hairs along the sides ; dorsal surface with scattered small punctae, which are more prominent

along the anterior margin, but absent on the disc and at the middle of the anterior margin ; anterior margin of pronotum with a shining silvery



a. Dorsal view : × 20 ; *b.* Antenna : × *ca.* 47 ; *c.* Left anterior leg : × *ca.* 47.

pilosity which is interrupted in the middle but thicker at the anterior angles and extends over the sides. Posterior angles of metanotum with patches of shining silvery pilosity. Dorsum of abdomen dull black, clothed with a yellowish-brown pubescence. Lateral margins of abdominal segments, particularly the first segment and joints of the dorsal plates of connexivum covered with patches of shining silvery pilosity. Seventh tergite longer than broad. Both connexivum and genital segments furnished around their apices with sparsely arranged stiff hairs. Venter of abdomen shining black and sparsely clothed with a brownish pubescence. Legs long and slender, clothed with a pale pubescence intermixed with longer hairs. General colouration of legs brown but of coxae, trochanters, basal extremities of femora and apices of anterior tibiae pale yellowish. Intermediate tibiae slightly smaller than femora. Posterior femora a little less than half as long as tibiae and reaching apex of abdomen. Tibial combs present only on the anterior pair of legs and situated on the inner side of tibiae, extending to about a third of its length from the distal ends of tibiae (text-fig. *c*).

Length.—2·3 mm. Width of thorax at the broadest part 0·7 mm.

Holotype specimen.—No. 5831/H7, Zoological Survey of India (*Ind. Mus.*), Calcutta.

We refer to this new species three pinned male apterous specimens. In one of the specimens other than the Holotype the shining silvery

pilosity is not so perceptible on the abdomen ; this is probably due to the specimen having been originally preserved in spirit.

Locality.—Jhobbo Stream, about a mile from Litipara Inspection Bungalow, Santal Parganas (4.xi. 1938, collected along with two winged specimens of *Mesovelia vittigera* Horv.).

Subfamily *GERRINAE.*

Limnogonus nitidus (Mayr).

1904. *Gerris nitida,* Distant, *Faun. Brit. Ind., Rhyn.* II, p. 178.
1908. *Limnogonus nitidus,* Kirkaldy, *Sjostedt: Wissenschaftl. Ergebn. der schwed. zool. Exped. nach dem Kilimandjaro etc.* XII, *Hemiptera, Upsala,* pp. 21, 22.
1909. *Gerris nitida,* Lefroy, *Rec. Ind. Mus.* III, p. 328.
1910. *Gerris nitida,* Distant, *Faun. Brit. Ind., Rhyn.* V (Appendix), p. 142.
1918. *Gerris nitida,* Paiva, *Rec. Ind. Mus.* XIV, p. 23.
1928. *Gerris nitida,* Dover, *Treubia* X, p. 68.
1934. *Limnogonus nitidus,* Lundblad, *Arch. Hydrobiol. u. Plankton* XII (Supplement), pp. 371 and 387, 388, fig. 122.

We refer to this species six specimens collected in the Santal Parganas from the following localities :—One specimen from Jhobbo Stream, about one mile north of Litipara Inspection Bungalow (4.xi.1938, collected along with an example of *Metrocoris stâli* (Dohrn)] ; one specimen from Mondhaboun Stream, about two miles south-west of Litipara (5.xi.1938) ; one specimen from a stream about one mile from Amrapara on the way to Dumarchir (13.xi.1938) ; one specimen from Brahmani River, about one and a half miles from Saldaha (22.xi.1938) ; one specimen from a stream, near Masanjor Inspection Bungalow [2.xii.1938, collected along with two examples of *Limnogonus parvulus* (Stål)] ; one specimen from Bhamri River, about three miles south-west of Dumka Inspection Bungalow [5.xii.1938, collected along with an example of *Limnogonus parvulus* (Stål)].

The species is already known from Darjeeling, 6,900 ft. and Kurseong, 5,000 ft., Eastern Himalayas ; Pusa, Bihar ; Balighai near Puri, Orissa ; Trivandrum, Travancore ; Inlé Lake, Yawnghwe State and Rangoon, Burma ; Peradeniya, Ceylon ; Buitenzorg, Java ; Banau, Sumatra.

The species is represented in the collections of the Zoological Survey of India from Orissa : Gantasila, near Rambha, Chilka Lake, Satpara, Puri, between Khurda Road and Cuttack and Barkul ; Bihar : Katihar, Purneah district ; Bengal : Calcutta, Garia, Port Canning and Rajshahi ; Assam : Mangaldai and Cherrapunji, 4,400 ft., Khasi Hills.

Limnogonus parvulus (Stål).

1904. *Gerris tristan,* Distant, *Faun. Brit. Ind., Rhyn.* II, pp. 179, 180.
1905. *Gerris ysolt,* Breddin, *Mitt. Naturh. Mus. Hamburg* XXII, p. 130.
1910. *Gerris tristan,* Distant, *Faun. Brit. Ind., Rhyn.* V (Appendix), p. 144.
1915. *Gerris tristan,* Bergroth, *Zool. Meded. Leiden* I, p. 120.
1918. *Gerris tristan,* Paiva, *Rec. Ind. Mus.* XIV, p. 23.
1918. *Gerris tristan,* Paiva, *Rec. Ind. Mus.* XV, p. 8.
1919. *Gerris tristan,* Paiva, *Rec. Ind. Mus.* XVI, p. 364.
1925. *Gerris tristan,* Bueno, *Spolia Zeylanica* XIII, p. 227.
1928. *Gerris tristan,* Dover, *Treubia* X, pp. 68, 69.
1934. *Limnogonus parvulus,* Lundblad, *Arch. Hydrobiol. u. Plankton* XII (Supplement), pp. 371, 372 and 384-387, fig. 121, pl. xi.

We refer to this species six specimens from the following localities in the Santal Parganas :—One specimen from Gukulpur River, near Kunjbona Inspection Bungalow [1.xi.1938, collected along with an example of *Metrocoris stâli* (Dohrn)] ; one specimen from tributary of Tribani River, two miles east of Rajapokhar (28.xi.1938) ; two specimens from a stream, near Masanjor Inspection Bungalow [2. xii. 1938, collected along with a specimen of *Limnogonus nitidus* (Mayr)] ; one specimen from Nunbil River, near Kendghata (3.xii.1938) ; one specimen from Bhamri River, about three miles south-west of Dumka Inspection Bungalow [5.xii.1938, collected along with an example of *Limnogonus nitidus* (Mayr)].

Lundblad, in the work cited above, has considered *Gerris tristan* Kirk. from Ceylon and *Gerris ysolt* Bredd. from Java as synonyms of *Limnogonus parvulus* (Stål) from China.

This species is already known from Naini Tal, United Provinces ; Dhappa, Port Canning and Rajshahi, Bengal ; Sur Lake, Puri district, Orissa ; Moulmein, Burma ; Kandy and Pundaluoya, Ceylon ; Java ; China ; Formosa.

The species is represented in the collections of the Zoological Survey of India from the Punjab : Lahore ; United Provinces : Bhim Tal, 4,460 ft., Malwa Tal, 3,600 ft., Sat Tal, 4,500 ft. and Kathgodam, 1,200 ft. ; Bengal : Alipore, Calcutta, Garia, Berhampore Court and Murshidabad ; Assam : two miles east of Mangaldai ; Orissa : Barkul, Puri, Gantasila, near Rambha and Barkuda Island, Chilka Lake ; Cochin State : Parambikulam, 1,700-3,200 ft. ; Burma : Kawkareik, Amherst district ; Malay Peninsula : Selangor.

Cylindrostethus productus (Spinola).

1904. *Cylindrostethus productus*, Distant, *Faun. Brit. Ind., Rhyn.* II, p. 184, fig. 132.
1910. *Janias elegantulus*, Distant, *Faun. Brit. Ind., Rhyn.* V (Appendix), pp. 148, 149, fig. 80.
1925. *Cylindrostethus productus*, Bueno, *Spolia Zeylanica* XIII, p. 228.
1925. *Janias elegantulus*, Bueno, *op. cit.*, p. 228.
1929. *Cylindrostethus ? scrutator* Kirk. (=*Janias elegantulus*), Esaki, *Ann. Mag. Nat. Hist.* (10) IV, p. 416.

We refer to this species five specimens from Gukulpur River, near Kunjbona Inspection Bungalow, Santal Parganas (1.xi.1938).

Bueno (1925, p. 228) in his study of the third or fourth instar nymphs of *Cylindrostethus producius* (Spin.) pointed out that the description of the nymphs of this species agreed in every respect with that of *Janias elegantulus* Dist. He, therefore, considered Distant's *J. elegantulus* to be a nymph of the former species. Esaki (1929, p. 416), apparently unaware of Bueno's work and only considering Distant's figure of *J. elegantulus* opined that Distant's species was an immature form of a species of *Cylindrostethus* Fieb. and very likely *C. scrutator* Kirk. We have no doubt about the identity of the specimens before us, which are all adult forms. In the light of the synonymy given above, the distribution of this species would now be Kulattupuzha, western base of Western Ghats, Travancore ; Bombay ; Kandy and Suduganga River, Matale, Ceylon.

The species is represented in the collections of the Zoological Survey of India from Bihar: Manbhum and Chakradharpur; Travancore: Manoor River, Pallode, 20 miles north-east of Trivandrum, Quilon and Tenmalai, western side of Western Ghats; Bombay Presidency: Neckal, *ca.* 2,000 ft., Satara district and Castle Rock, North Kanara district; Ceylon: Haragama and Peradeniya.

Metrocoris stâli (Dohrn).

1904. *Metrocoris stâli*, Distant, *Faun. Brit. Ind., Rhyn.* II, p. 190 (description of apterous form).
1910. *Metrocoris stâli*, Distant, *Faun. Brit. Ind., Rhyn.* V (Appendix), p. 158 (description of macropterous form).
1926. *Metrocoris stâli*, Esaki, *Ann. Hist.-nat. Mus. Nat. Hungar.* XXIV, pp. 123, 124.
1929. *Metrocoris ? stâli* (=*Gerastratus foveatus* Dist.), Esaki, *Ann. Mag. Nat. Hist.* (10) IV, p. 417.

We refer to this species nine specimens taken from the following localities in the Santal Parganas:—One specimen from Gukulpur River, near Kunjbona Inspection Bungalow [l.xi.1938, collected along with an example of *Limnogonus parvulus* (Stål)]; one specimen from Jhobbo Stream, about one mile north of Litipara Inspection Bungalow [4.xi.1938, collected along with an example of *Limnogonus nitidus* (Mayr)]; three specimens from Bansloi River, Amrapara (10.xi.1938); three specimens from Ikri River, near Dumarchir (15.xi.1938); one specimen from Yarow River, about two miles from Katikund Inspection Bungalow (26.xi.1938).

The species is represented in the collections of the Zoological Survey of India from the Punjab: Kalka, Ambala district and Pinjore, Patiala State; United Provinces: Bhim Tal, 4,450 ft.; Bombay Presidency: Mahabaleshwar, *ca.* 4,200 ft., and Medha, *ca.* 2,200 ft., Satara district and Datar Hill near Junagadto, Kathiawar.

Esaki (1929, p. 417) doubtfully considered *Gerastratus foveatus* Dist. to be a synonym of this species. We have examined the poorly preserved type of the latter species and are inclined to agree with Esaki's conclusions.

Family NEPIDAE.

Laccotrephes ruber (Linné).

1906. *Laccotrephes ruber*, Distant, *Faun. Brit. Ind., Rhyn.* III, pp. 18, 19.
1917. *Laccotrephes ruber*, Paiva, *Mem. Asiat. Soc. Bengal* VI, p. 80.
1924. *Laccotrephes ruber*, Hale, *Rec. S. Austral. Mus.* II, p. 507, pl. xxxiv, figs. 4, 5.
1938. *Laccotrephes ruber*, Hafiz & Mathai, *Rec. Ind. Mus.* XL, p. 208.

We refer to this rather common species forty-two adults and one nymph from the following localities in the Santal Parganas:—One specimen from a hill-stream, about six miles north of Litipara (3.xi.1938); one specimen from a sluggish stream, about one mile from Amrapara on the way to Dumarchir (13.xi.1938); seven specimens from Ikri River, very near its source, close to Dumarchir (15.xi.1938, one example was found with its proboscis inserted into the mid-ventral line of a small prawn, *Caridina* sp.); eight specimens from Gumra River, about two miles

north-east of Katikund Inspection Bungalow (20.xi.1938); three specimens from Brahmani River, about one and a half miles from Saldaha (22.xi.1938); two specimens from a dirty muddy drying-up pond, about three miles west of Katikund Inspection Bungalow (25.xi.1938); one specimen from Yarow River, about one and a half miles due south of Katikund on the road to Jhilimili (26.xi.1938); two specimens from Darua River, about half a mile from Deoghar Inspection Bungalow (30.xi.1938); two specimens from Ajay River, near Sarath (1.xii.1938); two specimens from a stream, close to Masanjor Inspection Bungalow (2.xii.1938); three specimens (two adults and one nymph) from Nunbil River, near Kendghata (3.xii.1938); five specimens from Dwarka River, near Sikaripara (4.xii.1938).

The species is represented in the collections of the Zoological Survey of India from Bihar: Chapra and Pusa; Madras Presidency: Nilgiri Hills; Bombay Presidency: Igatpuri and Medha.

Laccotrephes griseus (Guérin).

1910. *Laccotrephes griseus*, Distant, *Faun. Brit. Ind., Rhyn.* V (Appendix), p. 314.
1917. *Laccotrephes griseus*, Paiva, *Mem. Asiat. Soc. Bengal* VI, p. 80.
1938. *Laccotrephes griseus*, Hafiz & Mathai, *Rec. Ind. Mus.* XL, p. 208.

We refer to this species nine examples collected from the following localities in the Santal Parganas:—One specimen from a hill-stream, about six miles north of Litipara (3.xi.1938); two specimens from Jhobbo Stream, about one mile north of Litipara Inspection Bungalow (4.xi. 1938); one specimen from Karla River, about one and a half miles south of Litipara Inspection Bungalow (8.xi.1938); one specimen from Brahmani River, about one and a half miles from Saldaha (22.xi.1938); four specimens from a stream, near Masanjor Inspection Bungalow (2.xii.1938).

Ranatra filiformis Fabricius.

1906. *Ranatra filiformis*, Distant, *Faun. Brit. Ind., Rhyn.* III, pp. 21, 22.
1907. *Ranatra filiformis*, Montandon, *Ann. Soc. Ent. France* LXXVI, p. 57.
1909. *Ranatra filiformis*, Montandon, *Ann. Hist.-nat. Mus. Nat. Hungar.* VII, p. 66.
1912. ? *Ranatra filiformis*, Nowrojee, *Mem. Dept. Agric. Ind., Ent. Ser.* II, pp. 165-168, pl. xx, figs. 1-4.
1917. *Ranatra filiformis*, Paiva, *Mem. Asiat. Soc. Bengal* VI, p. 80.
1924. ? *Ranatra filiformis*, Hale, *Rec. S. Austral. Mus.* II, p. 520.
1934. *Ranatra filiformis*, Lundblad, *Arch. Hydrobiol. u. Plankton* XII (Supplement), pp. 36-38, text-fig. 7.
1938. *Ranatra filiformis*, Hafiz & Mathai, *Rec. Ind. Mus.* XL, p. 209.

We refer to this species four specimens from the following localities in the Santal Parganas:—Two specimens from Karla River, about two miles north of Litipara Inspection Bungalow (4.xi.1938); one specimen from Bansloi River, near Amrapara (11.xi.1938); one specimen from a stream, near Masanjor Inspection Bungalow (2.xii.1938).

The species is represented in the collections of the Zoological Survey of India from Bihar: Pusa.

Ranatra longipes Stål.

1910. *Ranatra longipes*, Distant, *Faun. Brit. Ind., Rhyn.* V (Appendix), pp. 315, 316.
1913. ? *Ranatra maculipes*, Matsumura, *Thousand Insects of Japan* I, p. 93.
1924. ? *Ranatra longipes*, Hale, *Rec. S. Austral. Mus.* II, pp. 518-520, fig. 386*a*, pl. xxxiv, fig. 8.
1926. ? *Ranatra longipes*, Esaki, *Ann. Hist.-nat. Mus. Nat. Hungar.* XXIV, p. 186.
1928. *Ranatra longipes*, Dover, *Treubia*, X, p. 70.
1934. *Ranatra longipes*, Lundblad, *Arch. Hydrobiol. u. Plankton* XII (Supplement), pp. 30-34, text-fig. 5.

We refer to this species two specimens collected from the following localities in the Santal Parganas :—One specimen from Ajay River, near Sarath (1.xii.1938) ; one specimen from Nunbil River, near Kendghata (3.xii.1938).

The species is recorded from Lucknow, United Provinces ; Calcutta and Rajshahi, Bengal ; Malay Peninsula ; Java ; Borneo ; China ; Fiji Islands ; Australia.

Family NAUCORIDAE.

Heleocoris vicinus Montandon.

1910. *Heleocoris vicinus*, Distant, *Faun. Brit. Ind., Rhyn.* V (Appendix), pp. 322-323, fig. 183.
1938. *Heleocoris vicinus*, Hafiz & Mathai, *Rec. Ind. Mus.* XL, pp. 209, 210, text-fig. nymph.

We refer to this species four adults and two nymphs collected from the following localities in the Santal Parganas :—One nymph from Gukulpur River, near Kunjbona Inspection Bungalow (1.xi.1938) ; two adults and one nymph from Bansloi River, near Amrapara (10.xi. 1938) ; one adult from Gumra River, about four miles north of Katikund Inspection Bungalow (23.xi.1938) ; one adult from Dwarka River, near Sikaripara (4.xii.1938).

Family BELOSTOMATIDAE.

Sphaerodema annulatum (Fabricius).

1906. *Sphaerodema annulatum*, Distant, *Faun. Brit. Ind., Rhyn.* III, pp. 35, 36.
1934. *Sphaerodema annulatum*, Lundblad, *Arch. Hydrobiol. u. Plankton* XII (Supplement), p. 62.
1938. *Sphaerodema annulatum*, Hafiz & Mathai, *Rec. Ind. Mus.* XL, p. 210.

We refer to this rather common species seven specimens from the following localities in the Santal Parganas :—Four specimens from a stream, about three and a half miles east of Pakur Inspection Bungalow (25.x.1938) ; one specimen from Harinduba-Jharna Stream, about six and a half miles south-west of Pakur Inspection Bungalow (27.x.1938) ; two specimens from Karla River, about two miles north of Litipara Inspection Bungalow (4.xi.1938).

The species is represented in the collections of the Zoological Survey of India from Bengal : Burdwan ; Bihar : Pusa.

Lethocerus indicus (Lepeletier & Serville).

1906. *Belostoma indicum*, Distant, *Faun. Brit. Ind., Rhyn.* III, pp. 38, 39, fig. 24.
1909. *Lethocerus indicus*, Montandon, *Bull. Soc. Sci. Bucharest* XVII, p. 138.
1909. *Belostoma indicum*, Lefroy, *Rec. Ind. Mus.* III, p. 336.
1910. *Belostoma indica*, D'Abreu, *Journ. Bombay Nat. Hist. Soc.* XX, p. 883.
1934. *Lethocerus indicus*, Lundblad, *Arch. Hydrobiol. u. Plankton* XII (Supplement), pp. 52-55, text-fig. 15, pl. xvi, fig. 3, 4.

We refer to this species two specimens collected from the following localities in the Santal Parganas :—One specimen from a stream, about three and a half miles east of Pakur Inspection Bungalow (25.x.1938) ; one specimen from Darua River, about half a mile from Deoghar Inspection Bungalow (30.xi.1938).

It is recorded from Kurseong, 6,000 ft., Darjeeling district, Eastern Himalayas ; Mokameh and Pusa, Bihar ; Asansol, Bengal ; Trivandrum, Travancore ; Bombay and Bhowani River, Malabar Coast, Bombay Presidency ; Sind ; North-West district, North Chin Hills and Karennee Teinzo, Burma ; Malewoon, Tenasserim ; Ceylon ; Province Wellesley, Malay Peninsula ; Sumatra ; Java ; Philippines.

The species is represented in the collections of the Zoological Survey of India from the United Provinces : Hamirpur Road ; Bengal : Calcutta and Serampore ; Assam : Nazeerahi and Silchar ; Orissa : Barkul, Puri district and Satpara, Chilka Lake, Ganjam district ; Madras Presidency : Bangalore and Madras ; Seistan ; Burma : Tharrawaddy division ; Upper Tenasserim ; Ceylon : Kandy ; Sinkip Island.

Family NOTONECTIDAE.

Subfamily *NOTONECTINAE*.

Anisops (Anisops) sardea (Herrich-Schäffer).

1906. *Anisops sardea*, Distant, *Faun. Brit. Ind., Rhyn.* III, p. 45, fig. 27.
1929. *Anisops (Anisops) sardea*, Hutchinson, *Ann. South Afric. Mus.* XXV, pp. 381-384.
1938. *Anisops sardea*, Hafiz & Mathai, *Rec. Ind. Mus.* XL, p. 210.

We refer to this species twenty-seven specimens (5♂ and 22♀) collected from the following localities in the Santal Parganas :—One ♀ specimen from Harinduba-Jharna Stream, about six and a half miles south-west of Pakur Inspection Bungalow (27.x.1938) ; one ♀ specimen from tank used as fish hatchery, Taljhari Village, about five miles east of Litipara (6.xi.1938) ; two ♂ and four ♀ specimens from Bansloi River, Amrapara [11.xi.1938, collected along with three ♂ examples of *Anisops (Anisops) varia* Fieb.]; one ♂ and two ♀ specimens from a dirty muddy drying-up pond, about three miles west of Katikund Inspection Bungalow [25.xi.1938, collected along with one adult and three nymphs of *Anisops (Anisops) nivea* (Fabr.)] ; two ♂ and three ♀ specimens from Yarow River, about one and a half miles due south of Katikund, on the road to Jhilimili (26.xi.1938) ; ten ♀ specimens from a stream, near Masanjor Inspection Bungalow [2.xii.1938, collected along with two examples of *Anisops (Anisops) breddini* Kirk.] ; one ♀ specimen from Bhamri River, about three miles south-west of Dumka Inspection Bungalow (5.xii.1938),

This species appears to be very common in the Santal Parganas. It is recorded by Hutchinson (1929, pp. 382-384) from the Cape, Natal, Transvaal and South-West Africa. According to the same author the species is also found in Mediterranean countries and in Western Asia.

Anisops (Anisops) nivea (Fabricius).

1906. *Anisops niveus,* Distant, *Faun. Brit. Ind., Rhyn.* III, p. 46.
1908. *Anisops nivea,* Kirkaldy, *Sjostedt: Wissenschaftl. Ergebn. der schwed. zool. Exped. nach dem Kilimandjaro etc.* XII, *Hemiptera, Upsala,* p. 24.
1926. *Anisops niveus,* Esaki, *Ann. Hist.-nat. Mus. Nat. Hungar.* XXIV, p. 187.
1927. ? *Anisops niveus,* Bueno, *Bull. Brooklyn Ent. Soc.* (N. S.) XXII, p. 30.
1928. *Anisops niveus,* Esaki, *Insects of Samoa and other terrestrial Arthropoda* II, London, p. 76, footnote 2.
1929. *Anisops (Anisops) nivea,* Hutchinson, *Ann. South Afric. Mus.* XXV, p. 385.
1934. *Anisops nivea,* Lundblad, *Arch. Hydrobiol. u. Plankton* XII (Supplement), pp. 163-166, fig. 56.

We refer to this species seven adults and three nymphs collected from the following localities in the Santal Parganas :—six adults from a tank used as fish hatchery, Taljhari Village, about five miles east of Litipara (6.xi.1938) ; one adult and three nymphs from a dirty muddy drying-up pond, about three miles west of Katikund Inspection Bungalow [25.xi.1938, collected along with three examples of *Anisops (Anisops) sardea* (Herr.-Schäff)].

This species is recorded here for the first time from the Santal Parganas and does not appear to be common in this area.

Distant recorded it from Bombay and from Bhamo in Burma. He remarked that it is probably generally distributed throughout British India and widely distributed in the Ethiopian Region but Lundblad (1934, p. 166) remarked that all these localities were doubtful and gave for the habitat of the species " India " and Sumatra.

The species is represented in the collections of the Zoological Survey of India from Bengal : Calcutta (tanks) ; Orissa : Barkuda Island, Chilka Lake, Ganjam district ; Burma : Heho, 3,800 ft., Yawnghwe State, Southern Shan States.

Anisops (Anisops) varia Fieber.

1910. *Anisops varius,* Distant, *Faun. Brit. Ind., Rhyn. V* (Appendix), pp. 332, 333, fig. 193.
1913. *Anisops varius,* Distant, *Trans. Linn. Soc. London* XVI (2), p. 189.
1928. *Anisops varius,* Dover, *Treubia* X, p. 71.
1929. *Anisops (Anisops) varia,* and varieties, Hutchinson, *Ann. South Afric. Mus.* XXV, pp. 393-399.

We refer to this species five male specimens from the following localities in the Santal Parganas :—Three specimens from Bansloi River, Amrapara [11.xi.1938, collected along with four ♀ examples of *Anisops (Anisops) sardea* (Herr.-Schäff.)] ; and two specimens from a rocky hill-stream, south-west of Amrapara (14.xi.1938).

It is recorded from Travancore ; West Java ; Seychelles ; North Africa ; Eastern Palaearctic Region ; Philippines.

Remarks.—The species is very variable in colour, and detailed study of material from different localities is necessary for defining the range

of variation. In the specimens before us the markings on the scutellum are not so prominent as shown in the figure given by Distant (1910, p. 332, fig. 193). Moreover, the hemelytra in these specimens are transparent and shining greyish-white in colour ; the black dorsal surface of the abdomen giving one the impression of the hemelytra (which are folded over it) being blackish-grey in colour.

Anisops (Anisops) breddini Kirkaldy.

1910. *Anisops ? breddini*, Distant, *Faun. Brit. Ind., Rhyn.* V (Appendix), p. 333, fig. 194.
1928. *Anisops breddini*, Dover, *Treubia* X, p. 71.
1929. *Anisops (Anisops) breddini*, Hutchinson, *Ann. South Afric. Mus.* XXV, pp. 376 and 380.

We refer to this species two specimens collected from a stream, near Masanjor Inspection Bungalow, Santal Parganas [2.xii.1938, collected along with ten examples of *Anisops (Anisops) sardea* (Herr.-Schäff.)].

Anisops (Anisops) breddini Kirk. is recorded here for the first time from this area.

It is recorded from Port Canning, Dhappa and Calcutta, Bengal ; Malay Peninsula ; Java ; Celebes.

The species is represented in the collections of the Zoological Survey of India from Orissa : Rambha and Chilka Lake, Ganjam district.

Subfamily *PLEINAE*.

Plea (Paraplea) pallescens Distant.

1906. *Plea pallescens*, Distant, *Faun. Brit. Ind., Rhyn.* III, p. 48.
1910. *Plea pallescens*, Distant, *Faun. Brit. Ind., Rhyn.* V (Appendix), p. 336, fig. 196.
1928. *Plea (Paraplea) pallescens*, Esaki & China, *Eos* IV, p. 166.[1]

We refer to this species one specimen from a stream, near Masanjor Inspection Bungalow, Santal Parganas [2.xii.1938, collected along with an example of *Plea (Paraplea) frontalis* (Fieb.)].

It is recorded from Lucknow, United Provinces ; Calcutta and Rajshahi, Bengal ; Ernakulam, Cochin State.

This species is represented in the collections of the Zoological Survey of India from the United Provinces : Bhim Tal, 4,450 ft., Kumaon ; Orissa : Barkuda Id., Chilka Lake, Ganjam district.

Plea (Paraplea) frontalis (Fieber).

1910. *Plea pelopea*, Distant, *Faun. Brit. Ind., Rhyn.* V (Appendix), pp. 336, 337, fig. 197.
1934. *Plea (Paraplea) frontalis*, Lundblad, *Arch. Hydrobiol. u. Plankton* XII (Supplement), pp. 138-140, text-fig. 44.

We refer to this species three examples from the following localities in the Santal Parganas :—One specimen from a stream, near Masanjor Inspection Bungalow [2.xii.1938, collected along with an example of *Plea (Paraplea) pallescens* Dist.] ; two specimens from Nunbil River, near Kendghata (3.xii.1938).

[1] This publication is unfortunately not available in Calcutta.

Lundblad, in the work referred to above, considers *Plea pelopea* Dist. as a synonym of *Plea frontalis* Fieb[1].

It was previously known from Calcutta, Bengal ; Madhupur, Bihar ; Pondicherry, Madras Presidency ; Burma ; Cochin China ; Java ; Sumatra ; Formosa.

The species is represented in the collections of the Zoological Survey of India from the United Provinces : Malwa Tal, 3,600 ft., Bhim Tal, 4,400 ft., Sat Tal, 4,500 ft. and Kathgodam, 1,200 ft., Kumaon and Hazratgunj, Lucknow.

Family CORIXIDAE.

Micronecta quadristrigata Breddin.

1910. *Micronecta minthe*, Distant, *Faun. Brit. Ind., Rhyn.* V (Appendix), pp. 347, 348, fig. 208.

1934. *Micronecta quadristrigata*, Lundblad, *Arch. Hydrobiol. u. Plankton* XII (Supplement), pp. 87-91, text-figs. 26, 27, pl. xix, fig. 1.

We refer to this species thirty-seven examples from the following localities in the Santal Parganas :—Two specimens from Gukulpur River, near Kunjbona Inspection Bungalow (1.xi.1938) ; sixteen specimens from Jhobbo Stream, about one mile north of Litipara Inspection Bungalow (4.xi.1938) ; one specimen from Mondhaboun Stream, about two miles south-west of Litipara Inspection Bungalow (5.xi.1938) ; one specimen from Bansloi River, Amrapara (11.xi.1938) ; five specimens from Ikri River, very near its source, close to Dumarchir (15.xi.1938) ; one specimen from Yarow River, about two miles from Katikund Inspection Bungalow (26.xi.1938) ; three specimens from a stream, near Masanjor Inspection Bungalow [2.xii.1938, collected along with an example of *Micronecta haliploides* (Horv.)] ; eight specimens from Nunbil River, near Kendghata (3.xii.1938).

Lundblad has considered *Micronecta minthe* Distant as a synonym of *Micronecta quadristrigata* Breddin[2].

The species is recorded from Calcutta, Rajshahi, Sara Ghat and Tinpahar near Rajmahal, Bengal ; Puri district, Orissa ; Western Ghats, Vembanaad Lake and Quilon, Travancore ; Dikwela, Hambantola, Peradeniya, Tangalle and Weligama ; Ceylon ; Java ; Sumatra ; Philippines.

Micronecta haliploides Horváth.

1910. *Micronecta merope*, Distant, *Faun. Brit. Ind., Rhyn.* V (Appendix), pp. 351, 352, fig. 213.

1917. *Micronecta merope*, Paiva, *Mem. Asiat. Soc. Bengal* VI, p. 82.

1934. *Micronecta haliploides*, Lundblad, *Arch. Hydrobiol. u. Plankton* XII (Supplement), pp. 104-109, text-fig. 35, pl. iv and pl. xviii, fig. 3.

We refer to this species a single specimen from a stream, near Masanjor Inspection Bungalow (2.xii.1938, collected along with three examples of *Micronecta quadristrigata* Bredd.).

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[1] Fieber, F. X., *Entom. Monog. Leipzig*, p. 18, pl. i, figs. 36-39 (1844).

[2] Breddin, G., *Soc. Entom. Zurich* XX, p. 57 (1905). This publication is unfortunately not available in Calcutta.

Lundblad (1934, p. 104) considers *Micronecta merope* Dist. as a synonym of *Micronecta haliploides* Horv[1].

The species is recorded from Port Canning and Rajshahi, Bengal; Colombo, Ceylon; Patalung River, Lampam, Talé Ṣap, Siam; Java; Sumatra.

It is represented in the collections of the Zoological Survey of India from Bengal: Calcutta; Orissa: Puri; Lower Burma; Kawkareik, Amherst district; Malay Peninsula: Selangor.

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[1] Horváth, G., *Ann. Hist.-nat. Mus. Nat. Hungar* II, pp. 594, 595 (1904).

ON A COLLECTION OF FISH FROM THE HAZARIBAGH DISTRICT, BIHAR.

By K. N. Das, *M.Sc., Assistant, Zoological Survey of India, Calcutta.*

Hora[1] in the introduction to his account of the fishes of the Rajmahal Hills explained the zoogeographical importance of studying the fish-fauna of the series of hills which once comprised the Satpura trend of mountains stretching between the Assam Himalayas on the east to Gujrat on the west. The occurrence in the Rajmahal Hills of such forms as *Laguvia*, *Amblyceps*, *Garra gotyla* and *Botia dario* has already lent considerable support to the continuity of the fauna of these hills with that of the hills of Assam. With a view to studying the extension of the range of the Assamese fauna westwards two parties of the Zoological Survey of India made collections during 1938 in the western part of the Santal Parganas and in the district of Hazaribagh respectively. In this article I give an account of an extensive collection of fishes made by Dr. H. S. Rao in the Hazaribagh District during September-October 1938. The area investigated extends 25 miles north, 32 miles south and 12 miles east of the town of Hazaribagh. The collections were made from hill-streams of various types, all of which finally drain into the Damodar River, a tributary of the Hooghly.

The collection under report (*vide* list given below) comprises 26 species, which are distributed among 18 genera and 9 families. As is to be expected, 17 species belong to the order Cyprinoidea, Cyprinidae (12) and Cobitidae (5); and 4 to the Siluroidea, Clariidae (1), Amblycepidae (1) and Sisoridae (2); while the remaining 5 species represent the families Mastacembelidae (1), Nandidae (1), Gobiidae (1) and Ophicephalidae (2). Most of the species are widely distributed in India and do not call for any special comments. The occurrence of *Barbus pinnauratus* and *Amblyceps mangois* in the Hazaribagh District is, however, of special significance from a zoogeographical point of view. *B. pinnauratus*, a form hitherto believed to be confined to Peninsular India, was recently recorded by Hora[2] from the Chindwin Drainage, and the Bailadila Range in Central Provinces, and its present record from an intermediate region clearly shows the route of migration followed by the north-eastern fishes to the peninsula of India. *Amblyceps mangois*, a small loach-like Siluroid fish confined to rocky streams at the bases of hills, is of special importance for zoogeographical studies; the extension of its range westwards along the old Satpura trend is significant. Dr. Hora informs me that he has recently obtained specimens of this species from Perak which extend its range to as far as the Malay Peninsula. The examination of the Hazaribagh material has also enabled me to define the specific limits of Hamilton's little-known Minnow, *Cyprinus guganio*.

I am grateful to Dr. B. Prashad, Director, Zoological Survey of India, for allowing me to work out the collection and for going through the

[1] Hora, S. L., *Rec. Ind. Mus.* XL, pp. 169-171 (1938).

[2] Hora, S. L., *Rec. Ind. Mus.* XXXIX, pp. 336, 337 (1937); *ibid.* XL, pp. 239-240 (1938).

manuscript. I express my great indebtedness to Rai Bahadur Dr. S. L. Hora for critically examining my identifications and for constant help and guidance. Babu A. K. Mondul and Babu B. N. Bagchi have executed the figures for the text under my supervision and for this my thanks are due to them.

LIST OF SPECIES.

Family MASTACEMBELIDAE.

1. *Mastacembelus armatus* (Lacép.).

Family CYPRINIDAE.

2. *Barilius bendelisis* Ham.
3. *Danio (Brachydanio) rerio* (Ham.).
4. *Laubuca laubuca* (Ham.).
5. *Esomus danricus* (Ham.).
6. *Rasbora daniconius* (Ham.).
7. *Barbus pinnauratus* (Day).
8. *Barbus tetrarupagus* (Ham.).
9. *Barbus ticto* (Ham.).
10. *Barbus sophore* (Ham.).
11. *Barbus guganio* (Ham.).
12. *Garra mullya* (Sykes).
13. *Crossochilus latius* (Ham.).

Family COBITIDAE.

14. *Lepidocephalichthys guntea* (Ham.).
15. *Nemachilus denisonii* Day.
16. *Nemachilus zonatus* (McClell.).
17. *Nemachilus botia* (Ham.).
18. *Nemachilus dayi* Hora.

Family CLARIIDAE.

19. *Clarius batrachus* (Linn.).

Family AMBLYCEPIDAE.

20. *Amblyceps mangois* (Ham.).

Family SISORIDAE.

21. *Glyptothorax botia* (Ham.).
22. *Gagata cenia* (Ham.).

Family NANDIDAE.

23. *Nandus nandus* (Ham.).

Family GOBIIDAE.

24. *Glossogobius giuris* (Ham.).

Family OPHICEPHALIDAE.

25. *Ophicephalus gachua* Ham.
26. *Ophicephalus punctatus* Bloch.

SYSTEMATIC ACCOUNT.

Family MASTACEMBELIDAE.

Mastacembelus armatus (Lacépède).

1938. *Mastacembelus armatus*, Hora, *Rec. Ind. Mus.* XL, p. 172.

A tributary stream of the Barakar River, south of Surjpura on the Barhi Road, about 16 miles from Hazaribagh. 4.x.1938.—6 specimens.

Damodar River near Ramgarh town, 32 miles from Hazaribagh on the Ranchi Road. 8.x.1938.—1 specimen.

A stream north of Canary Hill, Hazaribagh, 25.ix.1938.—1 specimen.

Mastacembelus armatus is distributed throughout India, Burma and Ceylon.

Family CYPRINIDAE.

Barilius bendelisis Hamilton.

1938. *Barilius bendelisis*, Hora, *Rec. Ind. Mus.* XL, p. 173.

Siwane River, 4 miles north-west of Hazaribagh on the Barhi Road. 24.ix.1938.—6 specimens.

A stream north of Canary Hill, Hazaribagh. 25.ix.1938.—5 specimens.

Barakar River about 2 miles from Barhi on G. T. Road. 15.x.1938.—1 specimen.

A tributary of the Barakar River south of Surjpura on the Barhi Road, about 16 miles from Hazaribagh. 4.x.1938.—25 young.

Siwane River, east of Hazaribagh Barhi Road. 14.x.1938.—5 specimens.

Barilius bendelisis is a widely distributed species, and is represented in the collection by a large number of specimens.

Danio (Brachydanio) rerio (Hamilton).

1938. *Brachydanio rerio,* Hora, *Rec. Ind. Mus.* XL, p. 173.

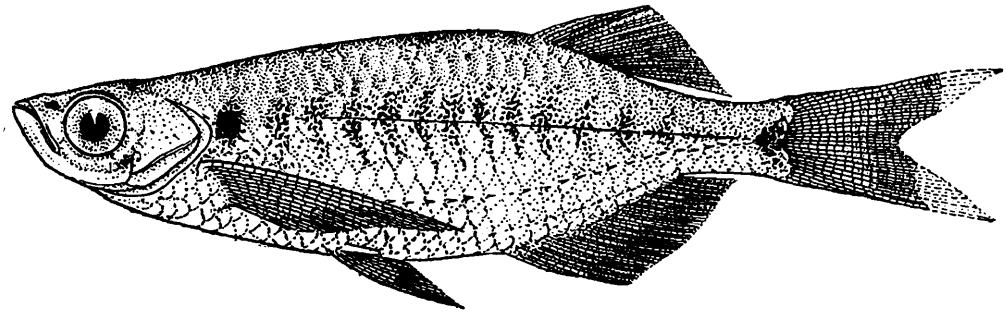
Brachydanio rerio is represented by a large number of examples collected from almost all the localities visited by the party. It is widely distributed throughout India and Burma.

Laubuca laubuca (Hamilton).

1878. *Perilampus laubuca,* Day, *Fish. India* II, pp. 598, 599.

Barakar River, about 3 miles from Barhi on the G. T. Road, Hazaribagh District. 15.x.1938.—12 specimens.

Laubuca laubuca is represented in the collection by 12 examples ranging from 18 mm. to 33 mm. in standard length. The cutting edge of the abdomen starts from below the pelvics and extends to the anal, the abdomen below the pectoral in Hazaribagh examples is rather rounded. Two black spots, one at the root of the caudal and another above the base of the pectoral, are very prominent. There



Text-fig. 1.—Lateral view of *Laubuca laubuca* (Ham.): $\times 2\frac{2}{5}$.

are 8 to 10 irregular blotches on the body along the middle line, in the youngest example these blotches are, however, very indistinct.

Day (*loc. cit.*) gives the distribution of the species as " Ganjam, Orissa, Bengal, Central India, Assam and Burma "

Esomus danricus (Hamilton).

1938. *Esomus danricus,* Hora, *Rec. Ind. Mus.* XL, p. 173.

Esomus danricus is represented in the collection by a very large number of examples collected from different localities.

E. danricus is one of the most widely distributed Indian species. It is very common in Bengal, Bihar, United Provinces, Punjab, Sind and South India. It grows to a length of 4 to 5 inches.

Rasbora daniconius (Hamilton).

1938. *Rasbora daniconius,* Hora, *Rec. Ind. Mus.* XL, p. 173.

Bokharo River, about 2 miles east of Hazaribagh-Ranchi Road, at mile $14\frac{1}{2}$. 2.x.1938.—2 specimens.

Junction of Dudhi and Bokharo Rivers about half a mile east of bridge at mile $15\frac{1}{2}$ on Hazaribagh-Ranchi Road. 28.ix.1938.—2 specimens.

Upad stream, a tributary of the Bokharo River, near the mica mines 2 miles from 5th milestone of Ranchi Road. 13.x.1938—4 specimens

Siwane River, 4 miles north-west of Hazaribagh on the Barhi Road. 24.ix.1938.—2 specimens.
Barakar River about 3 miles from Barhi on the G. T. Road, Hazaribagh District. 15.x.1938.—1 specimen.
Bokharo falls and river about 12 miles from Hazaribagh. 5.x.1938.—4 specimens.
A hot spring, a few yards west of the bank of the Bokharo River, 2 miles east of Hazaribagh-Ranchi Road. 2.x.1938.—2 specimens.

There are 17 examples, mostly young, of the species in the collection; the largest example measures 46 mm. in length without the caudal. *Rasbora daniconius* is found throughout India, Burma and Ceylon.

Barbus pinnauratus (Day).

1937. *Barbus pinnauratus*, Hora, *Rec. Ind. Mus.* XXXIX, p. 336.
1938. *Barbus pinnauratus*, Hora, *Rec. Ind. Mus.* XL, pp. 239, 240.

Tributary of the Barakar River, south of Surajpura on the Barhi Road, about 16 miles from Hazaribagh. 4.x.1938.—1 specimen.
Siwane River, 4 miles north-west of Hazaribagh on the Barhi Road. 24.ix.1938.—1 specimen.
Barakar River, about 3 miles from Barhi on the G. T. Road, Hazaribagh District. 15.x.1938.—1 specimen.
Bokharo falls and river, about 12 miles from Hazaribagh. 5.x.1938.—1 specimen.

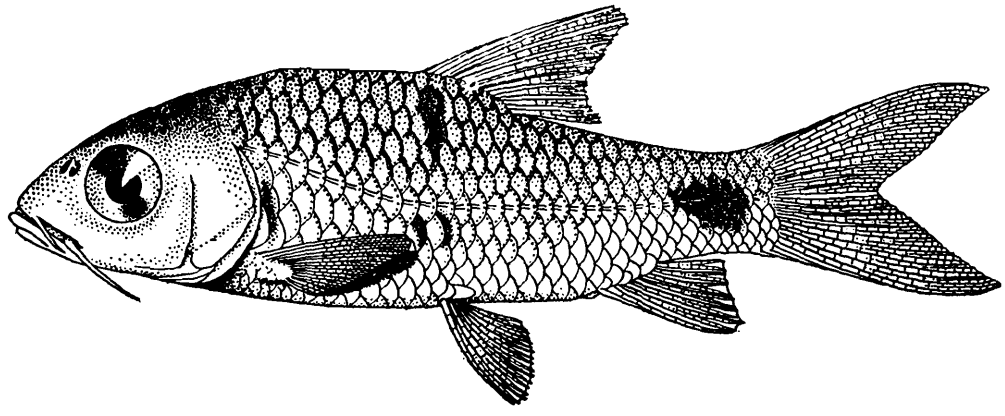
Barbus pinnauratus is represented in the collection by 4 young examples, the largest measures 57 mm. in length without the caudal. In the youngest example, about 25 mm. in the standard length, the characteristic markings on the body, *viz.* the black spots at the bases of scales, a vertical blotch below the commencement of the dorsal fin and a dark band just behind the gill-opening, are rather well developed. The dorsal spine is very weak and a few scattered serrations are only observed under high magnification.

In working out a small collection of fish from the Chindwin Drainage, Hora (*loc. cit.*, 1937) came across a few examples of *Barbus*, which he assigned to *B. pinnauratus*, a form that had hitherto been known from "fresh waters at Coconada down the east coast of India to Ceylon, and inland as far as Neilgherries, also along the Western Ghats and rivers at their bases"[1]. In 1938, Hora (*loc. cit.*) recorded one specimen of *pinnauratus* from a stream at the foot of the Bailadila Range, Bastar State, Central Provinces. Its occurrence in an intermediate region like Hazaribagh is of special interest and lends support to Hora's views regarding the route of migration of the north-eastern fishes towards Peninsular India.

Dr. Hora has very kindly directed my attention to a specimen of *Barbus* recently received by the Zoological Survey of India from Prof. M. A. Moghe of Nagpur for identification. The specimen (text-fig. 2) is young, measuring 22·8 mm. in standard length, and agrees in all essential characters with the smallest example of *B. pinnauratus* described above. The vertical blotch below the commencement of the dorsal fin runs down further and there is indication on one side that it extends to below the lateral line. The dorsal spine seems to be un-

[1] Day, F., *Fish. India*, p. 562 (1878).

serrated. The presence of bright large blotches on either side of the tail and the unserrated ray of the dorsal fin are undoubtedly juvenile charac-



Text-fig. 2.—Lateral view of *Barbus pinnauratus* (Day) from Nagpur: ×3¼.

ters. However, should the unserrated condition of the dorsal spine prove to be a specific character in the adult, the two specimens regarded here as the young *B. pinnauratus* will have to be given a specific status.

Barbus tetrarupagus (McClelland).

1878. *Barbus tetrarupagus*, Day, *Fish. India*, p. 572, pl. cxlii, fig. 6.

Siwane River, east of Hazaribagh-Barhi Road, at mile 19½. 14.x.1938.—1 specimen.

Among weeds in rice fields and lotus tank near Hearngunge, Hazaribagh Extension. 11.x.1938.—1 specimen.

The precaudal spot near the base of the caudal covers the 21st to the 23rd scales on the lateral line. The black spot on the lateral line just behind the opercle, as mentioned by Day, is not very clear in the younger example measuring 27 mm. in standard length, but is represented by a number of black dots; the spot in the larger example is very characteristic. The dorsal and anal fins are tipped with black bands; the one on the dorsal runs posteriorly at a distance of about a third from base.

B. tetrarupagus is very closely related to *B. sophore* (Ham.) with regard to the body proportion and colouration and may be confused with it. The former can, however, be readily distinguished by the possession of a pair of barbels and a black spot on the lateral line just behind the gill-opening.

Barbus ticto (Hamilton).

1938. *Barbus ticto*, Hora, *Rec. Ind. Mus.* XL, p. 175.

1939. *Barbus ticto*, Hora, Misra & Malik, *Rec. Ind. Mus.* XLI, pp. 263-279.

Siwane River, east of Hazaribagh-Barhi Road, at 19th milestone. 14.x.1938.—2 specimens.

A tributary of Barakar River, south of Surjpura on the Barhi Road. 4.x.1938.—2 specimens.

Barakar River, about 3 miles from Barhi on the G. T. Road, Hazaribagh District. 15.x.1938.—Numerous specimens.

Tributary stream of the Konar River about 1 mile from Hazaribagh. 27.ix.1938.—3 specimens.

Rice field and lotus tank near Hearngunge, Hazaribagh. 11.x.1938.—3 specimens.

Siwane River, 4 miles north-west of Hazaribagh on the Barhi Road. 24.ix.1938.—1 specimen.
Siwane River, east of Hazaribagh-Barhi Road at 19th milestone. 14.x.1938.—Numerous young specimens.
Ricefield and connected channel near Hearngunge, Hazaribagh. 9.x.1938. —1 specimen.
Damodar River near Ramgarh town. 8.x.1938.—1 specimen.

The collection contains a very large number of specimens, mostly, young, from different localities; all of them agree well with the recently published account of Hora, Misra and Malik[1] of *Barbus ticto*. The incomplete lateral line never extends beyond 8 scales in the Hazaribagh specimens and the black spots on the body are comparatively larger.

Barbus ticto has a very wide range of distribution in India, Burma, Ceylon and Siam.

Barbus sophore (Hamilton).

1878. *Barbus stigma*, Day, *Fish. India*, p. 579, pl. cxli, fig. 5.
1916. *Barbus sophore*, Chaudhuri, *Mem. Ind. Mus.* V, p. 436.
1938. *Barbus sophore*, Misra, *Rec. Ind. Mus.* XL, p. 260.

Siwane River, 4 miles north-west of Hazaribagh on the Barhi Road. 24.ix.1938.—4 specimens.
Tributary on the Barakar River, south of Surjpura on the Barhi Road, about 16 miles from Hazaribagh. 4.x.1938.—3 specimens.
A stream north of Canary Hill, Hazaribagh. 25.ix.1938.—1 specimen.
Damodar River near Ramgarh town. 8.x.1938.—1 specimen.
Barakar River, about 3 miles from Barhi on the G. T. Road, Hazaribagh District. 15.x.1938.—9 specimens.
Siwane River, east of Hazaribagh-Barhi Road. 14.x.1938.—4 specimens.
A tributary stream of the Konar River about 1 mile from Hazaribagh. 27.ix.1938.—2 specimens.
Konar River about 2 miles from Hazaribagh on the Barhi Road. 23.ix. 1938.—2 specimens.

Hora[2] directed the attention of ichthyologists to the unpublished manuscript of Dr. Francis Buchanan (afterwards Francis Hamilton) prepared by him while stationed at Baruipur, Lower Bengal, from 1794 to 1798. Among the 78 species described in the manuscript, *Cyprinus crysopareius* (No. 71) is reported to be known as " Sophori " in Sanskrit and " Punti " in Bengali; this is undoubtedly the same fish which Hamilton later on designated as *Cyprinus sophore*[3] " a beautiful little fish very common in ponds " of Bengal.

Barbus sophore is represented by 26 examples in the collection; they are mostly young, the largest measuring about 40 mm. in length without caudal. It is a widely distributed species throughout India and Burma.

Barbus guganio (Hamilton).

1822. *Cyprinus (Cabdio) guganio*, Hamilton, *Fish. Ganges*, pp. 338, 392, (MS. drawing No. 101).
1878. *Barbus ambassis*, Day, *Fish. India*, p. 576, pl. cxlv, fig. 1.
1878. *Barbus guganio*, Day, *Fish. India*, p. 579, fig.

Barakar River, about 2 miles from Barhi on the G. T. Road, Hazaribagh District. 15.x.1938.—9 specimens.

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[1] Hora, S. L., Misra, K. S. and Malik, G. M., *Rec. Ind. Mus.* XLI, pp. 263-279 (1939).
[2] Hora, S. L., *Journ. Asiat. Soc. Bengal* XXVII, pp. 123-135 (1931).
[3] Hamilton, F., *Fish. Ganges*, p. 310, pl. xix, fig. 86 (1822).

Though, according to Hamilton, " The *Guganio* (Gugani) is probably found in most of the rivers and ponds of the Gangetic provinces," its systematic position has hitherto been in doubt. Day (*loc. cit.*) based his brief description of the species on Hamilton's account and published his manuscript drawing, but noted that " This species is evidently allied to *Barbus ambassis* " Recently Hora[1] stated that " *B. guganio* is known only from Hamilton's original description and figure and so far as I am aware no specimen of the species is at present available in any museum collection " The material from Hazaribagh, as also a few specimens collected by Dr. S. L. Hora at Maltipur on the Hooghly River and provisionally referred by him to *B. ambassis*, have made it possible now to elucidate the precise specific limits of this species.

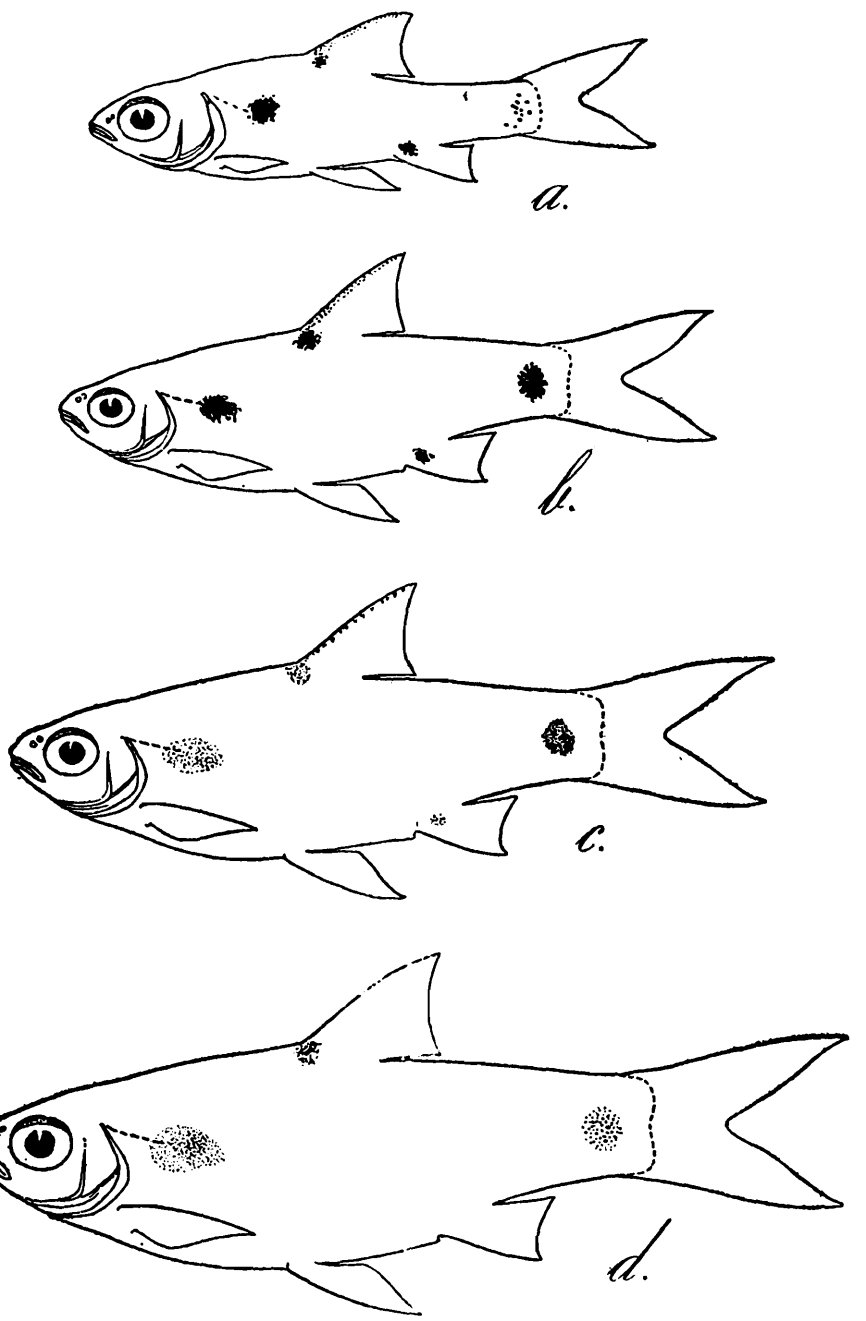
Hamilton described *guganio* in his eighth division of the genus *Cyprinus* which he termed *Cabdio.* The fishes of this division are characterised by small size, absence of spots, stripes, or other remarkable distinction of colour, considerably compressed form and absence of barbels. The most salient features of *guganio*, as given in Hamilton's description, are :—

(i) The second dorsal ray is " strong, and undivided, and indented behind "
(ii) " The *lateral line*, if any exists, is very faint "
(iii) " The *scales* are large in proportion, and adhere firmly "
(iv) " The *dorsal* fin is near the middle " and the " vent is behind the middle "
(v) The fore part of the dorsal and the back are dotted, while the rest of the body is silvery.
(vi) The fish " scarcely exceeds an inch and a half in length ", and has considerable superficial resemblance to *Amblypharyngodon mola* (Ham.).

Though Hamilton's descriptions are, as a rule, meagre and inadequate, the above noted features of the species, as reported by him, make it easy to distinguish this form. In the specimens before me there are a few which agree very closely with Hamilton's description, while there are some others which in their general facies, proportions and colouration agree with Day's description of *B. ambassis.* Day noted that his *B. ambassis* grows to a size of about 3 inches and described the colouration as " light greenish, with a silvery band along the sides. A small black spot at the base of the anterior dorsal rays, and a black blotch at the side of the tail " In very young specimens the dorsal spine is black throughout its length and a black spot is also present at the base of the anterior rays of the anal fin. The ventral surface between the anal and the caudal fins is also streaked with black. In the accompanying figure (text-fig. 3) a few stages in the growth of the species are figured to show the changes undergone in colouration during development to the adult size. Hora[2] showed similar colour changes in the case of *Barbus* (*Puntius*) *dorsalis* (Jerdon) and *Oreichthys cosuatis*

[1] Hora, S. L., *Rec. Ind. Mus.* XXXIX, p. 321 (1937).
[2] Hora, S. L., *Rec. Ind. Mus.* XXXVIII, pp. 2-5, text-figs. 1, 2 (1936) ; *Rec. Ind. Mus.* XXXIX, pp. 321-323, text-fig. 1 (1937).

(Ham.). From the above it would seem that both Hamilton and Day had half-grown or adult specimens of the species.



TEXT-FIG. 3.—Outline drawings of *Barbus guganio* (Ham.) showing changes in colour spots during growth.

a. Specimen from Hazaribagh, 14 mm. in length without caudal; *b*. Specimen from Hazaribagh, 18·5 mm. in length without caudal; *c*. Specimen from Maltipur, 23 mm. in length without caudal; *d*. Specimen from Maltipur, 32 mm. in length without caudal.

Hamilton found the species common in the districts between the Brahmaputra and the Jumna Rivers, while Day recorded his *B. ambassis* from " Madras, Orissa, Bengal, and Assam at least as high as Suddya ".

Garra mullya (Sykes).

1921. *Garra mullya*, Hora, *Rec. Ind. Mus.* XXII, pp. 658-660.

Upad stream, a tributary of the Bokharo River near the mica mines 2 miles from the 5th milestone on Ranchi Road. 13.x.1938.—10 specimens.

Chota River on Hazaribagh-Ranchi Road at mile 22. 12.x.1938.—2 specimens.
Bokharo falls and river about 12 miles from Hazaribagh. 5.x.1938.—15 specimens.
A tributary of the Barakar River, south of Surjpura on the Barhi Road, about 16 miles from Hazaribagh. 4.x.1938.—2 specimens.
A tributary stream of the Ketwa River about 1½ miles north-west of Khutra village in the Ichak sub-division. 21.ix.1938.—2 specimens.
A tributary stream of the Siwane River flowing through Sal jungle south of Kanary Hill, Hazaribagh. 7.x.1938.—2 specimens.
Junction of the Dudhi and Bokharo rivers about half a mile east of the bridge at mile 15½ on the Hazaribagh-Ranchi Road. 28.ix.1938.—1 specimen.
A stream north of Canary Hill, Hazaribagh. 25.ix.1938.—2 specimens.
A tributary stream of the Siwane River, south of Canary Hill, Hazaribagh. 1.x.1938.—1 specimen.

In the large number of young specimens, ranging from 18·5 mm. to 64 mm. in total length, there is a prominent lateral black band, which in very young specimens, terminates in a black precaudal spot.

Garra mullya is the most widely distributed species of the genus; it is known from the whole length of the Western Ghats, the hills of the Central Provinces, Orissa and Chhota Nagpur.

Crossochilus latius (Hamilton).

1934. *Crossochilus latius*, Mukerji, *Journ. Bombay Nat. Hist. Soc.* XXXVII, p. 50.
1938. *Crossochilus latius*, Hora and Misra, *Journ. Bombay Nat. Hist. Soc.* XL, pp. 31, 32, pl. ii, figs. 2, 3 and 5.

Siwane River, east of Hazaribagh-Barhi Road. 14.x.1938.—1 specimen.

Recent works of Mukerji (*loc. cit.*) and Hora[1] have shown that *Crossochilus latius* of authors is composed of three distinct species, *viz. Crossochilus latius* (Ham.), *C. punjabensis* Mukerji and *C. burmanicus* Hora. Hora and Misra (*loc. cit.*) assigned the specimens from Deolali to this species and remarked that South Indian forms " are of a considerably smaller size than those found in north India, but morphologically they seem to represent the typical *C. latius*. In the Deccan specimens, however, the eyes are relatively smaller and in this respect they agree with the Burmese examples " It is of interest to note that the specimen found at Hazaribagh is closely allied to the typical form found in the Brahmaputra and Ganges systems.

Crossochilus latius is represented in the collection by a single example, 57 mm. in length without caudal. It is distributed in Penninsular India, and in the rivers and tributaries of the Ganges and Brahmaputra.

Family Cobitidae.

Lepidocephalichthys guntea (Hamilton).

1938. *Lepidocephalichthys guntea*, Hora, *Rec. Ind. Mus.* XL, p. 177.

A tributary stream of the Barakar River, south of Surjpura on the Barhi Road about 16 miles from Hazaribagh. 4.x.1938.—33 specimens.
Junction of Dudhi and Bokharo Rivers about half a mile east of the bridge at mile 15½ on the Hazaribagh-Ranchi Road. 28.ix.1938.—21 specimens.
Siwane River west of Hazaribagh-Barhi Road about 4 miles from Hazaribagh town. 14.x.1938.—1 specimen.

[1] Hora, S. L., *Rec. Ind. Mus.* XXXVIII, p. 319 (1936).

A small tributary stream of the Konar River joining it on its left bank about a mile from the camp. 27.ix.1938.—4 specimens.
Konar River under bridge on Ranchi Road at mile 2½. 23.ix.1938.—6 specimens.
Upad stream, a tributary of the Bokharo River, about 2 miles west of Hazaribagh-Ranchi Road at mile 5. 13.x.1938.—9 specimens.
Rice fields and connected channels near Hearngunge, Hazaribagh Extension. 9.x.1938.—5 specimens.
Barakar River, about 3 miles from Barhi on the G. T. Road, Hazaribagh District. 15.x.1938.—11 specimens.
A tributary stream of the Siwane River flowing through the Sal jungle, south of the Canary Hill, Hazaribagh. 7.x.1938.—31 specimens.
Chotta River at mile 22 on the Hazaribagh-Ranchi Road. 12.x.1938.—1 specimen.
A tributary stream of the Konar River joining it on its right bank. 26.ix.1938.—2 specimens.
Siwane River, east of Hazaribagh-Barhi Road at mile 19. 14.x.1938.—23 specimens.
Damodar River near Ramgarh town, 32 miles from Hazaribagh on the Ranchi Road. 8.x.1938.—3 specimens.
A tributary stream of the Siwane River, south of the Canary Hill, Hazaribagh. 1.x.1938.—21 specimens.
Konar River, about 2 miles from Hazaribagh on the Ranchi Road. 3.x.1938.—14 specimens.
A stream north of Canary Hill, Hazaribagh and the scrub jungle near the hill. 25.ix.1938.—12 specimens.
Bokharo River, about 2 miles east of Hazaribagh-Ranchi Road at mile 14½. 2.x.1938.—24 specimens.

In the large number of specimens of *Lepidocephalichthys guntea* under report the colouration, as pointed out by several previous workers, is very variable. The constant feature in the colouration of the species is the lateral band on each side of the fish, the ocellus on the tail and bands on the caudal fin. The mottled colour on the body is sometimes entirely lacking.

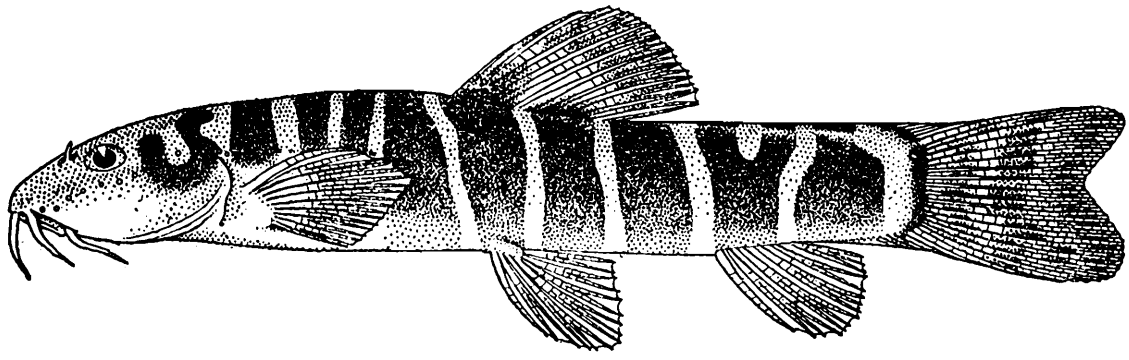
L. guntea is distributed throughout India, except the Malabar Coast and the regions to the south of the Kistna River.

Nemachilus ? denisonii Day.

1878. *Nemacheilus Denisonii*, Day, *Fish. India*, p. 617, pl. cliii, fig. 5.

Stream near Keke Basaudi in the Mandu Thana, Hazaribagh District. 28.ix.1938.—3 specimens.
Bokharo falls and river about 12 miles from Hazaribagh. 5.x.1938.—28 specimens.

It is with considerable hesitation that I refer a large number of young, half-grown and adult specimens to *Nemachilus denisonii*, which has so



TEXT-FIG. 4.—Lateral view of *Nemachilus ? denisonii* (Ham.): × *ca.* 2½.

far been known from "Neilgherry and Coorg hills, and rivers at their bases; Mysore and the Deccan" This species seems to replace *N. rupi-*

cola of the Himalayan streams in the streams of Southern India. The specimens exhibit considerable variation in colour. In very young specimens the body colour is brownish with 10 to 11 irregular interrupted bands; the dorsal fin is without any colour bands. The lateral line in the Hazaribagh specimens is incomplete and extends as far back as the commencement of the dorsal fin.

Nemachilus zonatus (McClelland).

1938. *Nemachilus zonatus*, Hora, *Rec. Ind. Mus.* XL, p. 178.

Barakar River, about 3 miles from Barhi on the G. T. Road, Hazaribagh District. 15.x.1938.—1 specimen.

The single specimen in the collection, 27·5 mm. in standard length, agrees closely with Day's[1] description and figure. *N. zonatus* is distributed in Birbhum, Assam, Orissa and rivers and tributaries of the Ganges and the Jumna.

Nemachilus botia (Hamilton).

1878. *Nemachilus botia*, Day, *Fish. India*, pp. 614, 615, pl. clvi, fig. 5.

Barakar River, about 3 miles from Barhi on the G. T. Road, Hazaribagh District. 15.x.1938.—8 specimens.

The collection contains 8 young examples ranging from 19 mm. to 28 mm. in length without the caudal. The base of the dorsal fin is considerably shorter than the length of the head. The lateral line is complete in the larger examples.

N. botia is distributed throughout India, except the Malabar Coast and to the south of the Kistna River.

Nemachilus dayi Hora.

1878. *Nemacheilus savona*, Day (*nec* Hamilton), *Fish. India*, p. 619, pl. clv, fig. 8.

1935. *Nemachilus dayi*, Hora, *Rec. Ind. Mus.* XXXVII, p. 57.

Upad stream, a tributary of the Bokharo River near the mica mines, 2 miles from 5th milestone on the Ranchi Road. 13.x.1938.—1 specimen.

Hora in the paper referred to above, showed that Hamilton's[2] *Cobitis savona* is not conspecific with Day's *Nemacheilus savona* and, therefore, proposed a new name for the latter form. Day's *savona* was stated by him to occur in "Bengal and N. W. Provinces" Day specially mentioned that he received specimens of *N. savona* from the hills near Ranigunj. In the collection of the Indian Museum the species is represented from the Western Ghats, the Central Provinces and Chhota Nagpur.

Family Clariidae.

Clarius batrachus (Linnaeus).

1936. *Clarius batrachus*, Hora, *Rec. Ind. Mus.* XXXVIII, pp. 347-351.

A small stream near the camp, Hazaribagh town. 5.x.1938.—9 specimens.

Clarius batrachus is a widely distributed species of the Oriental Region.

[1] Day, F., *Fish. India*, p. 618, pl. clvi, fig. 2 (1878).

[2] Hamilton, F., *Fish. Ganges*, p. 357 (1822).

Family AMBLYCEPIDAE.

Amblyceps mangois (Hamilton).

1933. *Amblyceps mangois*, Hora, *Rec. Ind. Mus.* XXXV, pp. 607-621.
1938. *Amblyceps mangois*, Hora, *Rec. Ind. Mus.* XL, pp. 178, 179.

Tributary of the Barakar River, south of Surjpura on the Barhi Road, about 16 miles from Hazaribagh. 4.x.1938.—3 specimens.
Siwane River, east of Hazaribagh-Barhi Road. 14.x.1938.—2 specimens.

Hora (*loc. cit.*, 1938, p. 179) in extending the range of the species up to the Santal Parganas stated that " its occurrence in the Rajmahal Hills to the west of the Ganges is of special interest as it shows that the Assam Hills and the Rajmahal Hills must have been continuous at not a very remote period of earth's history " The occurrence of *A. mangois* in the Hazaribagh District lends further support to Hora's observation and extends the range of the species further westwards. In all the 5 examples in the collection, ranging from 16·5 mm. to 34 mm. in length without the caudal, the adipose dorsal is distinct and not continuous with the caudal[1]; the caudal fin is also furcate and is contained from 4·1 to 5 times in the total length.

Amblyceps mangois is a hill-stream fish and is widely distributed in northern India, northern Burma and Siam. Dr. Hora informs me that he has recently received examples of this species from Perak in the Federated Malay States.

Family SISORIDAE.

Glyptothorax botia (Hamilton).

1877. *Glyptosternum botia*, Day, *Fish. India*, p. 497, pl. cxiii, fig. 4.
1923. *Glyptothorax botia*, Hora, *Rec. Ind. Mus.* XXV, p. 27.

Damodar River near Ramgarh town. 8.x.1938.—4 specimens.

In the four young specimens, ranging in total length from 42 mm. to 55 mm., assigned to *Glyptothorax botia* the head and body are covered all over with well defined spinous tubercles. The colour is dark above and greyish below. The base and a few anterior rays of the dorsal and the anterior part of the adipose dorsal are stained with black. The body is intensely black at the base of the caudal fin and fairly broad longitudinal dark markings are continued along the outer edges of its two lobes.

G. botia, as recognised by Day, has so far been known from Delhi and Bara-Banki in Northern India; its record from the Hazaribagh District is of considerable interest.

Gagata cenia (Hamilton).

1938. *Gagata cenia*, Hora, *Rec. Ind. Mus.* XL, p. 180.

Damodar River near Ramgarh town. 8.x.1938.—1 specimen.

Gagata cenia is distributed in the rivers and tributaries of the Indus, Jumna, Ganges, Damodar and Irrawadi.

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[1] Hora, S. L., *Rec. Ind. Mus.* XXXV, pp. 618, 619 (1933).

Family Nandidae.

Nandus nandus (Hamilton).

1938. *Nandus nandus*, Hora, *Rec. Ind. Mus.* XL, p. 181.

Barakar River, about 2 miles from Barhi on the G. T. Road, Hazaribagh District. 15.x.1938.—1 specimen.

Nandus nandus is represented in the collection by one example, 48 mm. in length without the caudal. The species is found in fresh and slightly brackish waters throughout India and Burma.

Family Gobiidae.

Glossogobius giuris (Hamilton).

1938. *Glossogobius giuris*, Hora, *Rec. Ind. Mus.* XL, p. 181.

A small tributary stream of the Konar River, about a mile from Hazaribagh. 27.ix.1938.—1 specimen.

Siwane River, east of Hazaribagh Road. 14.x.1938.—1 specimen.

Glossogobius giuris is represented in the collection by 2 young examples. It is widely distributed in India and occurs in fresh and brackish waters.

Family Ophicephalidae.

Ophicephalus gachua Hamilton.

1922. *Ophiocephalus gachua*, Weber & de Beaufort, *Fish. Indo-Austral. Archipel.* IV, p. 321.

1938. *Ophicephalus gachua*, Hora, *Rec. Ind. Mus.* XL, p. 180.

Rice fields and connected channels near Hearngunge, Hazaribagh District. 9.x.1938.—2 specimens.

Dudhi River, east of the bridge at mile 15½ on the Hazaribagh-Ranchi Road, 28.ix.1938.—4 specimens.

Siwane River, 4 miles north-west of Hazaribagh on the Barhi Road. 24.ix.1938.—6 specimens.

Siwane River, east of Hazaribagh-Barhi Road. 14.x.1938.—3 specimens.

Junction of Dudhi and Bokharo Rivers, about half a mile east of the bridge at mile 15½ on the Hazaribagh-Ranchi Road. 28.ix.1938.—4 specimens.

Damodar River near Ramgarh town. 8.x.1938.—2 specimens.

A tributary of the Bokharo River, south of Surjpura on the Barhi Road about 16 miles from Hazaribagh. 4.x.1938.—9 specimens.

Barakar River, about 3 miles from Barhi on the G. T. Road, Hazaribagh District. 15.x.1938.—1 specimen.

A stream north of Canary Hill, Hazaribagh. 25.ix.1938.—1 specimen.

Chotta River on Hazaribagh-Ranchi Road at mile 22. 12.x.1938.—1 specimen.

Ophicephalus gachua has a very wide range of distribution in the whole of the Oriental Region.

Ophicephalus punctatus Bloch.

1917. *Ophiocephalus punctatus*, Chaudhuri, *Mem Ind. Mus.* V, pp. 504, 505.

Rice fields and connected channels near Hearngunge, Hazaribagh District. 9.x.1938.—2 specimens.

Dudhi River east of the bridge at mile 15½ on the Hazaribagh-Ranchi Road. 28.ix.1938.—2 specimens.

Siwane River, 4 miles north-west of Hazaribagh on the Barhi Road. 24.xi.1938.—1 specimen.

Siwane River, east of Hazaribagh-Barhi Road. 14.x.1938.—1 specimen.
Barakar River, about 3 miles from Barhi on the G. T. Road, Hazaribagh District. 15.x.1938.—1 specimen.
Konar River among grass near the bank. 20.ix.1938.—1 specimen.
Among weeds in rice fields and lotus tank near Hearngunge. 11.x.1938.—8 specimens.

Chaudhuri (*loc. cit.*) gives the distribution of *O. punctatus* as " Fresh waters of the East Indian continent and of Ceylon. Yunnan ". Weber and de Beaufort[1] doubtfully included the species in the list of Indo-Australian fishes.

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[1] Weber and de Beaufort, *Fish. Indo-Austral. Archipel.* IV, p. 330 (1922).

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