

THE FRESHWATER FISH OF TRAVANCORE.

By SUNDER LAL HORA, *D.Sc., F.R.S.E., F.N.I., Assistant Superintendent, Zoological Survey of India, Calcutta, and* NIRMAL CHANDRA LAW, *M.Sc.*

(Plate IX.)

CONTENTS.

	PAGE.
Introduction	233
List of the Freshwater Fish of Travancore with their Geographical Range ..	236
Zoogeographical Remarks	239
Systematic Account	243

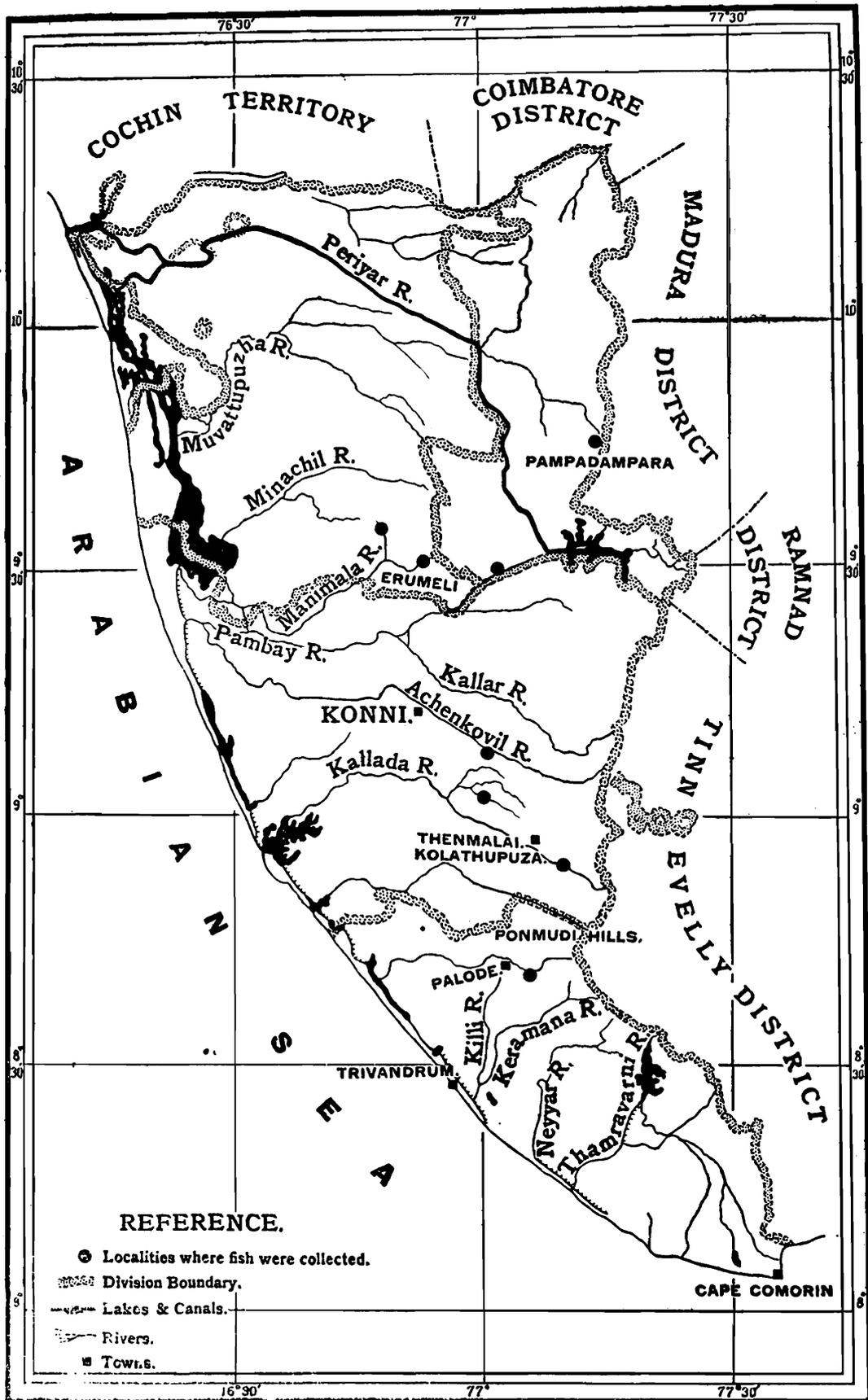
INTRODUCTION.

The freshwater fish of Travancore are particularly interesting on account of the zoogeographical peculiarities of some of the forms. An account of the geography of the country, in so far as it affects the aquatic fauna, will be found in John's¹ account of 'Freshwater Fish and Fisheries of Travancore'. It may be well, however, to reiterate here that Travancore lies in the extreme southwest of Peninsular India between 8° 4' and 10° 21' N. and 76° 14' and 77° 73' E., and that its eastern boundary is formed by a continuous range of hills. The total area of the State is 7,625 square miles, of which 3,547 square miles comprise the up-country reaching an altitude ranging from 4,000 to 8,000 feet above sea level, 2,707 square miles comprise mid-country and the remaining 1,371 square miles constitute the low-country. The hill ranges of Travancore are in reality spurs of the Western Ghats and as they stand like a wall behind the narrow coastal plains they obstruct the south-west monsoon and in consequence the rainfall is heavy between the months of May and August. There is a certain amount of rainfall during the north-east monsoon also. The maximum annual rainfall is about 200 inches.

Owing to the mountainous character of the country and the heavy rainfall, both during the summer and winter months, there is a large number of perennial torrential streams harbouring remarkable forms adapted for life in swift currents. With a view to study the fish-fauna of such waters, one of us requested Mr. S. Jones and Dr. C. C. John to collect for the Zoological Survey of India a representative lot of hill-stream fishes from different parts of the State. They very kindly undertook the work and the collection under report was made by them from the following localities :—

1. Pampadampara Tank, North Travancore.
2. Streams within a radius of about 5 miles round Pampadampara, North Travancore.
3. Dhobikana, a small stream close to Pampadampara, North Travancore.
4. Sannyasa-ode, near Pampadampara, North Travancore.

¹ John, C. C., *Journ. Bombay Nat. Hist. Soc.* XXXVIII, pp. 702-733 (1936).



TEXT-FIG. 1.—Map of Travancore showing localities in which the fish were collected by Mr. S. Jones and Dr. C. C. John,

5. Manimala R., near Kangirappally, Central Travancore.
6. A tributary of Manimala R., Erumeli, Central Travancore.
7. Pool at the foot of the largest fall of Peruntenuarivi, a tributary of Pamba R., at Edakadathy, Central Travancore.
8. Achenkovil R., 7 miles south-east of Konni, Central Travancore.
9. Near the source of Kallada R., 4 miles east of Thenmalai, Central Travancore
10. Kulathupuzha, a tributary of Kallada R., Central Travancore.
11. Kallar stream at the foot of Ponmudi Hills, South Travancore.
12. Chittar stream at Palode, South Travancore.
13. Trivandrum, South Travancore.

With the exception of the Kallar stream, Mr. Jones's collection was made from streams in North Travancore, while Dr. John sent the material from the southern and central parts of the State. The collection under report is, therefore, fairly representative of the hill-stream fish-fauna of the State. Further search is, however, likely to reveal more forms from similar habitats. As one new genus and two new species have been found in the material collected by Mr. Jones and Dr. John there is every likelihood of more new species being found among the smaller forms that live under rocks and stones in torrential streams. Attention may also be directed to the fact that recently Raj¹ has described a new genus of Schizothoracine fishes from the Periyar Lake, Travancore.

The material is in an excellent state of preservation which shows that great care must have been taken in handling the specimens in the field. We wish to express here our great indebtedness to Mr. S. Jones and Dr. C. C. John for making the collection and presenting it to the Zoological Survey of India. A duplicate set of the material has been sent to the Government Museum, Trivandrum.

In January 1941, Dr. A. W. C. T. Herre of the Stanford University, California, visited Travancore and made a collection of fish. He presented to the Zoological Survey of India a few specimens obtained by him from the Kallar stream, 30 miles north-east of Trivandrum. The following species are represented in this lot:—

- | | |
|---|---|
| 1. <i>Barilius galensis</i> (Cuv. & Val.). | 4. <i>Garra mullya</i> (Sykes). |
| 2. <i>Barbus (Puntius) amphibius</i> (Cuv. & Val.). | 5. <i>Bhavana australis</i> (Jerdon). |
| 3. <i>Barbus (Puntius) melanampyx</i> (Day). | 6. <i>Nemachilus triangularis</i> (Day). |
| | 7. <i>Mastacembelus armatus</i> (Lacép.). |

The first comprehensive list of 369 species of the fishes of Travancore was published by Pillay², but he remarked that the list would probably be greatly augmented if the marine, brackish and fresh waters of the State could be systematically investigated. His list contains 72 freshwater species. John (*loc. cit.*) gave a list of 73 species but though he had included practically all the freshwater fishes listed by Pillay, he omitted to include, without comments, *Barilius bakeri*, *Barbus malabaricus* and *B. wynaadensis* which had already been recorded by Pillay from Travancore. However, he added to the previous list *Anguilla vulgaris*, *Barbus filamentosus*, *B. punctatus* and *B. sarana*. We have not been able to find any reference to the first of these species and presumably the author has confused his determination with the marine

¹ Raj, B. Sundara, *Rec. Ind. Mus.* XLIII, pp. 209-214 (1941).

² Pillay, R. S. N., *Journ. Bombay Nat. Hist. Soc.* XXXIII, pp. 347-379 (1929).

fish *Conger vulgaris* Cuvier which is a synonym of *Conger conger* (Linn.). Leaving this species out of consideration and combining the two lists, we have in all 75 species of freshwater fishes recorded from Travancore. Of these *Barbus filamentosus* and *B. mahecola* are synonymous¹ as they represent male and female sexes respectively of the same species (*vide infra*, p. 245). Similarly, *Haplochilus lineatus* and *H. rubrostigma* represent the two sexes of the same species. One of us² has shown that *Callichrous malabaricus* is a synonym of *C. bimaculatus*. *Rasbora nilgheriensis*, as noted by Day,³ is only a colour variety of the widely distributed *R. daniconius*. Thus the total number of freshwater species is reduced to 71. Of these, *Megalops cyprinoides*, *Hemirhamphus xanthopterus*, *Ambassis gymnocephalus*, *Gerres limbatus* and *Gobius striatus* (= *Awaous stamineus*) are mainly marine and brackish water species, though they may frequent fresh waters also. For this reason, it is advisable to exclude them from a list of purely freshwater fishes, the number of which will thus be reduced to 66.

We⁴ have described from Dr. John's collection a new Catfish, *Batasio travancoria*, from Central and Southern Travancore, while Raj⁵ has more recently described a small-scaled Barbel, *Lepidopygopsis typus*, from the Periyar Lake, and Hora⁶ has described from Mr. Jones's collection a Homalopterid loach, *Travancoria jonesi*, from Northern Travancore. Among the material under report we have further found representatives of the following species which were not recorded by Pillay and John: *Barilius gatensis*, *Danio aequipinnatus*, *Rasbora rasbora*, *Barbus mussullah*, *Barbus ticto*, *Garra mullya*, *Lepidocephalus thermalis*, *Nemachilus evezardi*, *N. guentheri*, *Bhavana australis*, *Mystus cavasius* and *Glyptothorax madraspaianus*. Of these, *B. mussullah* probably corresponds to *B. tor* of the lists of Pillay and John; *D. aequipinnatus* to *D. malabaricus*; *B. ticto* to *B. punctatus*; *G. mullya* to *Discoganthus lamta* and *B. australis* to *Homaloptera maculata*. Thus, excluding these five species, only 7 additional species are added to the list as a result of our present study. The total number of species now known from the fresh waters of Travancore is 76. As the nomenclature of a number of species is changed, we give below a complete systematic list of the freshwater fishes of Travancore with their up-to-date scientific names and geographical range. For vernacular names reference may be made to the lists published by Pillay and John respectively.

LIST OF THE FRESHWATER FISH OF TRAVANCORE WITH THEIR GEOGRAPHICAL RANGE.

The general classification of fishes adopted in the list is that proposed by Dr. C. Tate Regan, F.R.S., in his article on 'Fishes' in the Fourteenth Edition of the *Encyclopaedia Britannica* (1929). The genera under their respective families and the species under each genus are alpha-

¹ Hora, S. L., *Rec. Ind. Mus.* XXXIX, p. 22 (1937).

² Hora, S. L., *Rec. Ind. Mus.* XXXVIII, pp. 356-361 (1936).

³ Day, F., *Fish. India*, p. 584 (1878).

⁴ Hora, S. L., and Law N. C., *Rec. Ind. Mus.* XLIII, pp. 40-42 (1941).

⁵ Raj, B. Sundara, *Rec. Ind. Mus.* XLIII, p. 209 (1941).

⁶ Hora, S. L., *Rec. Ind. Mus.* XLIII, p. 230 (1941).

betically arranged. The species whose name is marked with an asterisk (*) is represented in the collection under report.

List of Species.

Geographical Range.

Order : OSTARIOPHYSI.

Suborder : CYPRINOIDEA.

Family : CYPRINIDAE.

Subfamily : ABRAMADINAE.

1. *Chela boopis* Day Travancore and South Canara.
2. *Laubuca laubuca* (Ham.) .. Ceylon, India, Burma and Sumatra.

Subfamily : BASBORINAE.

3. *Barilius bakeri* Day Travancore.
*4. *Barilius gatensis* (C. V.) .. Western Ghats, Nilgiris and Coorg.
*5. *Danio aequipinnatus* (McClell.) .. Ceylon, India, Burma and Siam.
*6. *Rasbora daniconius* (Ham.) .. Ceylon, India, Burma, Siam, Malaya, etc.
*7. *Rasbora rasbora* (Ham.) .. India, Burma, Siam and Malaya.

Subfamily : CYPRININAE.

8. *Amblypharyngodon melettina* (C. V.) Ceylon, Peninsular India and Deccan.
9. *Amblypharyngodon microlepis* (Blkr.) Peninsular India, through Orissa to Hooghly.
10. *Amblypharyngodon mola* (Ham.) .. India and Burma.
*11. *Barbus (Puntius) amphibius* (C. V.) Ceylon and Peninsular India.
12. *Barbus (Puntius) arulius* (Jerd.) .. Peninsular India.
13. *Barbus (Puntius) burmanicus* (Day) Travancore, Burma and Malaya.
14. *Barbus (Puntius) conchoniis* Ham. India (generally Northern India).
*15. *Barbus (Puntius) curmuca* (Ham.) Western Ghats.
16. *Barbus (Puntius) denisoni* (Day) Travancore.
*17. *Barbus (Puntius) filamentosus* (C. V.) Ceylon and Peninsular India.
18. *Barbus (Puntius) lithopidos* Day Travancore, South Canara and Coorg.
19. *Barbus (Tor) malabaricus* Jerd. Travancore and South Canara.
*20. *Barbus (Puntius) melanampyx* (Day) Peninsular India.
21. *Barbus (Puntius) melanostigma* (Day) Travancore, Wynaad and Nilgiris.
*22. *Barbus (Tor) mussullah* Sykes .. Peninsular India, and Deccan.
23. *Barbus (Puntius) parrah* (Day) .. Peninsular India.
*24. *Barbus (Puntius) pinnauratus* (Day) Ceylon, Peninsular India, Satpuras, Burma and Siam.
25. *Barbus (Puntius) sarana* (Ham.) .. India and Burma.
26. *Barbus (Puntius) sophore* Ham.¹ India, Burma and Yunnan.
*27. *Barbus (Puntius) ticto* Ham. .. Ceylon, India, Burma and Siam.
28. *Barbus (Puntius) vittatus* (Day) .. Ceylon, Peninsular India and Cutch.
29. *Barbus (Puntius) wynaadensis* Day Travancore and Wynaad.
30. *Garra jerdoni* (Day) Peninsular India.
*31. *Garra mullya* (Sykes) .. Peninsular India, Satpuras and Kathiawar.
32. *Labeo dussumieri* (C. V.) .. Ceylon, Peninsular India and Gujarat.
33. *Rohtee bakeri* Day Travancore.

Subfamily : SCHIZOTHORACINAE.

34. *Lepidopygopsis typus* Raj. .. Travancore.

¹This is the same species as *Barbus stigma* (Cuv. & Val.) of the earlier lists. For nomenclatorial change see Chaudhuri, *Mem. Ind. Mus.* V, p. 436 (1916).

List of Species.	Geographical Range.
Family : HOMALOPTERIDAE.	
Subfamily : HOMALOPTERINAE.	
*35. <i>Bhavana australis</i> (Jerd.)	.. Travancore, Nilgiris, Wynaad and Mysore.
*36. <i>Travancoria jonesi</i> Hora	.. Travancore.
Family : COBITIDAE.	
*37. <i>Lepidocephalus thermalis</i> (C. V.)	.. Ceylon and Peninsular India.
38. <i>Nemachilus botia</i> (Ham.)	.. Ceylon, India and Burma.
*39. <i>Nemachilus evezardi</i> Day	.. Peninsular India and Deccan.
*40. <i>Nemachilus guentheri</i> Day	.. Travancore and Nilgiri Hills.
*41. <i>Nemachilus triangularis</i> Day	.. Travancore.
Suborder : SILUROIDEA.	
Family : CLARIIDAE.	
42. <i>Clarias batrachus</i> (Linn.)	.. India, Burma, Siam, Malaya and further east.
Family : HETEROPNEUSTIDAE.	
43. <i>Heteropneustes fossilis</i> (Bloch)	.. Ceylon, India, Burma, Siam and Cochin-China.
Family : SILURIDAE.	
*44. <i>Callichrous bimaculatus</i> (Bloch)	.. Ceylon, India, Burma and further east.
45. <i>Wallagonia attu</i> (Bloch)	.. Ceylon, India, Burma, Siam, Malay Peninsula and Western Yunnan.
Family : SCHILBEIDAE.	
46. <i>Pseudeutropius sykesi</i> (Jerd.)	.. Peninsular India.
Family : BAGRIDAE.	
*47. <i>Batasio travancoria</i> Hora & Law	.. Travancore.
*48. <i>Mystus cavasius</i> (Ham.)	.. India, Burma and Siam.
49. <i>Mystus chryseus</i> (Day)	.. Travancore, Canara and Malabar.
50. <i>Mystus gulio</i> (Ham.)	.. Ceylon, India, Burma and Malaya.
*51. <i>Mystus malabaricus</i> (Jerd.)	.. Travancore, Malabar and Wynaad.
52. <i>Mystus montanus</i> (Jerd.)	.. Travancore, Wynaad and Cauvery R.
53. <i>Mystus oculatus</i> (C. V.)	.. Travancore, Malabar and Nilgiris.
54. <i>Mystus vittatus</i> (Bloch)	.. Ceylon, India, Burma and Siam.
Family : SISORIDAE.	
*55. <i>Glyptothorax madraspatanus</i> (Day)	Travancore, Nilgiris, and Mysore.
Order : APODES.	
Family : ANGUILLIDAE.	
56. <i>Anguilla bicolor</i> McClelland	.. Africa, India and further east.
Order : SYNENTOGNATHI.	
Suborder : SCOMBRESOCOIDEA.	
Family : XENENTODONTIDAE or BELONIDAE.	
*57. <i>Xenentodon cancila</i> (Ham.)	.. Ceylon, India, Burma, Malaya and Siam.
Order : MICROCYPRINI.	
Family : CYPRINODONTIDAE.	
58. <i>Aplochilus lineatus</i> (C. V.)	.. Ceylon, Peninsular India and Deccan.
Order : PERCOMORPHI.	
Suborder : PERCOIDEA.	
Family : AMBASSIDAE.	
59. <i>Ambassis dayi</i> Blkr.	.. Travancore and Malabar.
60. <i>Ambassis nalu</i> (Ham.)	.. Travancore, Malabar, Calcutta, Andamans and Malay Archipelago.
61. <i>Ambassis thomassi</i> Day	.. Travancore, Malabar, Siam and Malaya.

List of Species.	Geographical Range.
Family : NANDIDAE.	
62. <i>Nandus nandus</i> (Ham.)	.. India, Burma, Siam and Malaya.
Family : PRISTOLEPIDAE.	
63. <i>Pristolepis fasciata</i> (Blkr.)	.. Travancore, Burma, Siam, Malay Archipelago and Cochin-China.
64. <i>Pristolepis malabarica</i> (Gthr.)	.. Southern part of Western Ghats.
Family : CICHLIDAE.	
65. <i>Etroplus maculatus</i> (Bloch)	.. Ceylon and Peninsular India.
66. <i>Etroplus suratensis</i> (Bloch)	.. Ceylon, Peninsular India and Deccan.
Suborder : GOBIOIDEA.	
Family : GOBIIDAE.	
67. <i>Glossogobius giuris</i> (Ham.)	.. Ceylon, India, Burma and further east.
Suborder : ANABANTOIDEA.	
Family : ANABANTIDAE.	
68. <i>Anabas testudineus</i> (Bloch)	.. Ceylon, India, Burma and further east.
Family : POLYCANTHIDAE.	
69. <i>Macropodus cupanus</i> C. V.	.. South India, Malay Peninsula and Sumatra.
Suborder : OPHICEPHALOIDEA.	
Family : OPHICEPHALIDAE.	
*70. <i>Ophicephalus gachua</i> Ham.	.. Ceylon, India, Burma and further east.
71. <i>Ophicephalus leucopunctatus</i> Sykes	Peninsular India and Deccan.
72. <i>Ophicephalus marulius</i> Ham.	.. Ceylon, India, Burma to China.
73. <i>Ophicephalus micropeltes</i> (K. & V. Hass.) C. V.	.. Western Coast of India, Malay Archipelago, Siam and Indo-China.
74. <i>Ophicephalus striatus</i> Bloch	.. Ceylon, India, Burma and further east.
Order : OPISTHOMI.	
Family : MASTACEMBELIDAE.	
*75. <i>Mastacembelus armatus</i> (Lacép.)	.. Ceylon, India, Burma and further east.
76. <i>Mastacembelus quentheri</i> Day	.. Travancore, Malabar and Malaya.

As is to be expected, a great majority of the species belong to the Ostariophysi, 41 to the Suborder Cyprinoidea and 14 to the Suborder Siluroidea. Of the remaining 21 species, 1 belongs to Apodes (Anguillidae), 1 to Syntentognathi (Belonidae), 1 to Microcyprini (Cyprinodontidae), 16 to Percomorphi (Ambassidae 3; Nandidae 1; Pristolepidae 2; Cichlidae 2; Gobiidae 1; Anabantidae 1; Polycanthidae 1; Ophicephalidae 5) and 2 to Opisthomi (Mastacembelidae).

ZOOGEOGRAPHICAL REMARKS.

With the exception of the Cichlidae, which are confined to Peninsular India and Ceylon, the remaining families listed above are widely distributed in the Oriental Region and even further afield. The Cichlidae represent the Ethiopian element in the fish-fauna of India¹. The Schizothoracinae, which are the dominant fish of the streams, marshes and lakes of the high plateau of Central Asia, represent the Palaearctic

¹ Hora, S. L., *Curr. Sci.* V, p. 354 (1937).

element in the fauna of Peninsular India. Two genera of the Schizothoracinae, *Schizothorax* Heckel and *Oreinus* McClelland, are found in torrential streams along the southern slopes of the Himalayas, but nowhere else in India. The occurrence of *Lepidopygopsis* in the Periyar Lake is, therefore, of special zoogeographical significance. Similarly the Homalopteridae, which are represented in Travancore by two genera of the Homalopterinae are of particular interest. The Homalopteridae are represented by a number of genera in south-eastern Asia and in India proper their range extends up to the hill ranges of Assam and Chittagong, and the Eastern Himalayas; they are absent from the rest of India with the exception of the southern parts of the Western Ghats. The same can be said with regard to the distribution of *Batasio* Blyth. The genera *Macropodus* Lacépède and *Pristolepis* Jerdon are either found in Peninsular India or in the Far East. There are species in the fauna of Travancore, such as *Mastacembelus guentheri*, *Barbus (Puntius) burmanicus*, *Ambassis thomassi*, and *Ophicephalus micropeltes*, which show a similar discontinuity in the respective ranges of their distribution. Even if individuals of a single species are considered, we find that specimens of *Barbus (Puntius) ticto* with the lateral line complete are either found in Peninsular India or in Burma and Siam. There is thus a great deal of evidence to show the close relationship of the Malayan fauna with that of Peninsular India.

The freshwater fish-fauna of Travancore can be divided into the following groups from a zoogeographical point of view :

Group I.—*Species distributed throughout India, Burma and further east.*

- | | |
|---|--|
| 1. <i>Laubuca laubuca</i> (Ham.). | 14. <i>Wallagonia attu</i> (Bloch). |
| 2. <i>Danio aequipinnatus</i> (McClell.). | 15. <i>Mystus cavasius</i> (Ham.). |
| 3. <i>Rasbora daniconius</i> (Ham.). | 16. <i>Mystus gulio</i> (Ham.). |
| 4. <i>Rasbora rasbora</i> (Ham.). | 17. <i>Mystus vittatus</i> (Bloch). |
| 5. <i>Amblypharyngodon mola</i> (Ham.). | 18. <i>Anguilla bicolor</i> McClell. |
| 6. <i>Barbus (Puntius) pinnauratus</i> (Day). | 19. <i>Xenentodon cancila</i> (Ham.). |
| 7. <i>Barbus (Puntius) sarana</i> (Ham.). | 20. <i>Ambassis nalua</i> (Ham.). |
| 8. <i>Barbus (Puntius) sophore</i> Ham. | 21. <i>Nandus nandus</i> (Ham.). |
| 9. <i>Barbus (Puntius) ticto</i> Ham. | 22. <i>Anabas testudineus</i> (Bloch). |
| 10. <i>Nemachilus botia</i> (Ham.). | 23. <i>Glossogobius giuris</i> (Ham.). |
| 11. <i>Clarias batrachus</i> (Linn.). | 24. <i>Ophicephalus gachua</i> Ham. |
| 12. <i>Heteropneustes fossilis</i> (Bloch). | 25. <i>Ophicephalus marulius</i> Ham. |
| 13. <i>Callichrous bimaculatus</i> (Bloch). | 26. <i>Ophicephalus striatus</i> Bloch. |
| | 27. <i>Mastacembelus armatus</i> (Lacép.). |

Group II.—*Species distributed in Peninsular India, Malay Peninsula etc.*

- | | |
|--|---|
| 1. <i>Barbus (Puntius) burmanicus</i> Day. | 4. <i>Pristolepis fasciata</i> (Blkr.). |
| 2. <i>Ambassis thomassi</i> Day. | 5. <i>Macropodus cupanus</i> C. V. |
| 3. <i>Ophicephalus micropeltes</i> C. V. | 6. <i>Mastacembelus guentheri</i> Day. |

Group III.—*Species distributed throughout India.*

1. *Barbus (Puntius) conchoniensis* Ham.

Group IV.—*Species with restricted distribution in India.*

- | | |
|--|---|
| 1. <i>Amblypharyngodon microlepis</i> (Blkr.). | 2. <i>Barbus (Tor) mussullah</i> Sykes. |
| 3. <i>Garra mullya</i> (Sykes). | 4. <i>Nemachilus evezardi</i> Day. |

Group V.—*Species common to Peninsular India and Ceylon.*

- | | |
|--|---|
| 1. <i>Amblypharyngodon melettina</i> (C. V.). | 5. <i>Labeo dussumieri</i> (C. V.). |
| 2. <i>Barbus (Puntius) amphibius</i> (C. V.). | 6. <i>Lepidocephalus thermalis</i> (C. V.). |
| 3. <i>Barbus (Puntius) filamentosus</i> (C. V.). | 7. <i>Aplochilus lineatus</i> (C. V.). |
| 4. <i>Barbus (Puntius) vittatus</i> (Day). | 8. <i>Etroplus maculatus</i> (Bloch). |
| 9. <i>Etroplus suratensis</i> (Bloch). | |

Group VI.—*Species distributed throughout Peninsular India.*

- | | |
|--|--|
| 1. <i>Barbus (Puntius) arulius</i> (Jerd.). | 4. <i>Garra jerdoni</i> (Day). |
| 2. <i>Barbus (Puntius) melanampyx</i> (Day). | 5. <i>Pseudeutropius sykesi</i> (Jerd.). |
| 3. <i>Barbus (Puntius) parrah</i> (Day). | 6. <i>Ophicephalus leucopunctatus</i> Sykes. |

Group VII.—*Species found in the Western Ghats and associated hills.*

- | | |
|--|--|
| 1. <i>Chela boopis</i> Day. | 9. <i>Nemachilus guentheri</i> Day. |
| 2. <i>Barilius gatensis</i> (C. V.). | 10. <i>Mystus chryseus</i> (Day). |
| 3. <i>Barbus (Puntius) curmuca</i> (Ham.). | 11. <i>Mystus malabaricus</i> (Jerd.). |
| 4. <i>Barbus (Puntius) lithopidos</i> Day. | 12. <i>Mystus montanus</i> (Jerd.). |
| 5. <i>Barbus (Tor) malabaricus</i> Jerd. | 13. <i>Mystus oculatus</i> (C. V.). |
| 6. <i>Barbus (Puntius) melanostigma</i> (Day). | 14. <i>Glyptothorax madraspatanus</i> (Day). |
| 7. <i>Barbus (Puntius) wynaadensis</i> Day. | 15. <i>Ambassis dayi</i> Blkr. |
| 8. <i>Bhavana australis</i> (Jerd.). | 16. <i>Pristolepis malabarica</i> (Gthr.). |

Group VIII.—*Species endemic in Travancore.*

- | | |
|---|--|
| 1. <i>Barilius bakeri</i> Day. | 4. <i>Lepidopygopsis typus</i> Raj. |
| 2. <i>Barbus (Puntius) denisoni</i> Day. | 5. <i>Travancoria jonesi</i> Hora. |
| 3. <i>Rohtee bakeri</i> Day. | 6. <i>Nemachilus triangularis</i> Day. |
| 7. <i>Batasio travancoria</i> Hora & Law. | |

Of the 76 species listed above, 27 are widely distributed in India, Burma and further east; 6 are found in Peninsular India on the one hand and in Burma and further east on the other, but nowhere else in India; 1 is distributed all over India proper but is not found in Burma; 4 have a restricted distribution in India, mainly in Peninsular India and along the Satpura Trend of mountains; 9 are found in Peninsular India and Ceylon, while the remaining 29 are restricted to Peninsular India and of these 7 are endemic in Travancore. Of the 29 species only known from Peninsular India, as many as 23 are found only in the Western Ghats and the associated hills. If Ceylon and Peninsular India be regarded as one zoogeographical region and the forms, which are found either in Peninsular India or further east but not in other parts of India, be grouped along with the species restricted to Ceylon and Peninsular India, it becomes apparent that about 60 per cent of the species are peculiar to Southern India and are found nowhere else in India proper. This high endemism of the fauna of this region has been noticed by previous workers also in the case of other groups of animals.

From a zoogeographical point of view, the freshwater fish-fauna of Travancore presents two special features, the marked Malayan element

and the preponderance of endemic forms. The former, according to Blanford¹, dates in India from the Miocene times. We have indicated above the occurrence of the Homalopteridae and of the genus *Batasio* in the hills of Assam and the Eastern Himalayas which indicates the probable route along which the Malayan fauna migrated to Peninsular India. Regarding the Himalayan fauna, Blanford stated that :

“ . . . The Indo-Malay element in the fauna is very richly represented in the Eastern Himalayas, and gradually diminishes to the westward, until in Kashmir and further west it ceases to be the principal constituent. Almost all the Indo-Malay genera, and a very large proportion of the species, are identical with Assamese or Burmese forms. These facts are consistent with the theory that the Indo-Malay part of the Himalayan fauna, or the greater portion of it, has migrated into the mountains from the eastward at a comparatively recent period. *It is an important fact that this migration appears to have been from Assam and not from the Peninsula of India.*” (Italics are ours.)

One of us² has explained the presence of the Indo-Malayan element in the fauna of the Eastern Himalayas and Peninsular India by postulating that the uplift movement of the Himalayas was probably most active in the region of the Assam Himalayas as practically all the highest peaks are clustered round this area. It was argued that

“ This differential movement, which probably occurred late in the Miocene period, must have obliterated all traces of the eastward extension of the Indobrahm and also acted as a barrier between the eastern and western Himalayan fishes. The new stocks of specialised hill-stream fishes from the east, not finding means to cross this barrier, were deflected towards south-west along the Satpura Trend which probably at this period stretched across India as a pronounced range from Gujarat to the Assam Himalayas. From Gujarat the hill-stream fauna migrated towards the south along the Western Ghats and spread to the hills of the Peninsula in the extreme south.”

To account for the anomalies of distribution referred to above, Blanford (*loc. cit.*, p. 435) postulated the diminution of temperature as the cause for the dispersal of animals from the north to the south and stated :

“ . . . Unless the temperature of India and Burma generally underwent a considerable diminution, it is not easy to understand how plants and animals of temperate Himalayan types succeeded in reaching the hills of Southern India and Ceylon, as well as those of Burma and Malay Peninsula.”

Temperature is undoubtedly a great factor in the dispersal of animals and probably has very great influence on the terrestrial fauna but in the case of aquatic animals the presence of water connections is also an important factor. Moreover, in the case of torrential fishes, such as the Homalopteridae, a rocky substratum and a swift current are also essential for their very existence. In view of these ecological considerations, it seems probable that the Satpura Trend may have acted as a highway for the migration of this fauna from the late Miocene period to the time of formation of the Rajmahal-Garro Hill gap. This movement may have been facilitated by the diminution of temperature if the earth movements of the glacial period provided necessary water connections for the transference of the fauna from the north-east to the south-west.

The high endemicity of the Travancore fauna is an evidence of its antiquity and long isolation from the fauna of the mainland of India and of the adjacent countries. After migrating from north-east to

¹ Blanford, W. T., *Phil. Trans. Roy. Soc. London* (B) CXCIV, pp. 433, 434 (1921).

² Hora, S. L., *Rec. Ind. Mus.* XXXIX, p. 255 (1937).

south-west, the fauna came to a blind end in the Peninsular region and when, with the formation of the Rajmahal-Garo Hill gap and due to other causes, it became isolated, it had sufficient time to blossom out into distinct species, while still retaining its family affinities with the parent stock.

SYSTEMATIC ACCOUNT.

Barilius gatensis (Cuv. & Val.).

1878. *Barilius gatensis*, Day, *Fish. India*, p. 592, pl. cxlix, fig. 2.

- 4 specimens, 52 to 108 mm. in length. Streams within a radius of about 5 miles of Pampadampara, Western Ghats, North Travancore. S. Jones, April 1941.
- 3 specimens, 30 to 39 mm. in length. Manimala R., near Kangirappally, Central Travancore. C. C. John, 26.iii.1940.
- 2 specimens, 78 and 97 mm. in length respectively. Pool at the foot of the largest fall of Peruntenuvi, a tributary of Pamba R., at Edakadathy, Central Travancore. C. C. John, 11.ii.1940.
- 1 specimen, 72 mm. long. Chittar stream at Palode, South Travancore. C. C. John, 10.ii.1940.

According to Day, *Barilius gatensis* is known from "Western Ghats of Malabar and Neilgherry hills", but since then its range has been extended to other parts of the Western Ghats also. In some of the specimens under report, the lateral bars are short and form a series of oblong spots along the sides. On the whole it is a brightly coloured species.

Danio aequipinnatus (McClelland).

1878. *Danio aequipinnatus*, Day, *Fish. India*, p. 596, pl. cl, fig. 6.

- 19 specimens, 28 to 101 mm. in length. Streams within a radius of about 5 miles round Pampadampara, Western Ghats, North Travancore. S. Jones, 12.iv.1940 and April 1941.
- 2 specimens, 45 and 80 mm. in length. Sannyasa-ode, near Pampadampara, Western Ghats, North Travancore. S. Jones, April 1940.
- 2 specimens, 44 and 59 mm. in length. Manimala R., near Kangirappally, Central Travancore. C. C. John, 26.iii.1940.
- 2 specimens, 68 and 75 mm. in length. A tributary of Manimala R., Erumeli, Central Travancore. C. C. John, 20.ii.1940.
- 1 specimen, 91 mm. long. Pool at the foot of the largest fall of Peruntenuvi, a tributary of Pamba R., at Edakadathy, Central Travancore. C. C. John, 11.ii.1940.
- 19 specimens, 18 to 74 mm. in length. Achenkovil R., 7 miles south-east of Konni, Central Travancore. C. C. John, 17.ii.1940.
- 2 specimens, 66 and 68 mm. in length. Kulathupuzha, a tributary of Kallada R., Central Travancore. (Collected from a pond-like accumulation of water surrounded by big boulders.) C. C. John, 14.ii.1940.
- 3 specimens, 46 to 67 mm. in length. Chittar stream at Palode, South Travancore. C. C. John, 9.ii.1940.

The large number of young, half-grown and adult specimens referred by us to *Danio aequipinnatus* show variation in colouration and scale counts. It seems to us probable that *D. malabaricus* (Jerdon) of Peninsular India and Ceylon, and *D. strigillifer* Myers of North Burma and Peninsular India are synonymous with the North Indian *D. aequipinnatus*. The three forms, as known at present, are rather difficult to distinguish from one another and the material under report helps to bridge over the differences between them.

Rasbora daniconius (Ham.).

1878. *Rasbora daniconius*, Day, *Fish. India*, P. 584, pl. cxlvi, figs. 2, 3.

7 specimens, 33 to 82 mm. in standard length. Pampadampara Tank, Western Ghats, North Travancore. S. Jones, September 1938 and March 1940.

42 specimens, 21 to 102 mm. in length. Streams within a radius of about 5 miles round Pampadampara, Western Ghats, North Travancore. S. Jones, 12.iv.1940, and April 1941.

2 specimens, longer one 78 mm. in length. Manimala R., near Kangirappally, Central Travancore. C. C. John, 26.iii.1940.

The specimens of *Rasbora daniconius* correspond with Day's variety *neilgherriensis* which is stated to grow to a large size and to possess 34 scales along the lateral line. In all the specimens the lateral band is broad and well marked.

Rasbora rasbora (Ham.).

1878. *Rasbora buchanani*, Day, *Fish. India*, p. 584, pl. cxlv, fig. 10.

2 specimens, 77 and 83 mm. in length. Streams within a radius of about 5 miles round Pampadampara, Western Ghats, North Travancore. S. Jones, April 1941.

2 specimens, 50 and 65 mm. A tributary of Manimala R., Erumeli, Central Travancore. C. C. John, 20.ii.1940.

2 specimens, 82 and 94 mm. in length. Kulathupuzha, a tributary of Kallada R., Central Travancore. (Collected from a pond-like accumulation of water surrounded by big boulders.) C. C. John, 14.ii.1940.

1 specimen, 84 mm. long. Chittar stream at Palode, South Travancore. C. C. John, 10.ii.1940.

Rasbora rasbora is represented by a number of badly preserved specimens in which the scales have fallen off. The species is widely distributed in India and Burma, though in the fauna of South India it is less common than *R. daniconius*.

Barbus (Puntius) amphibius (Cuv. & Val.).

1878. *Barbus amphibius*, Day, *Fish. India*, p. 574, pl. cxlii, fig. 8.

2 specimens, 36 and 77 mm. in length. Manimala R., near Kangirappally, Central Travancore. C. C. John, 26.iii.1940.

8 specimens, 62 to 70 mm. in length. A tributary of Manimala R., Erumeli, Central Travancore. C. C. John, 20.ii.1940.

1 specimen, 88 mm. long. Pool at the foot of the largest fall of Peruntenuaruvu, a tributary of Pamba R., at Edakadathy, Central Travancore. C. C. John, 11.ii.1940.

3 specimens, 60 to 80 mm. in length. Near the source of Kallada R., 4 miles east of Thenmalai, Central Travancore. C. C. John, 9.ii.1940.

4 specimens, 57 to 74 mm. in length. Kulathupuzha, a tributary of Kallada R., Central Travancore. (Collected from a pond-like accumulation of water surrounded by big boulders.) C. C. John, 14.ii.1940.

4 specimens, 59 to 70 mm. in length. Chittar stream at Palode, South Travancore. C. C. John, 10.ii.1940.

All the specimens of *Barbus amphibius* listed above are characterised by the possession of a large, well-marked black spot before the base of the caudal fin; in this respect they agree with Day's description of the Malabar examples. According to Day, this species is found in "Central India, Deccan, Bombay and the Western coast of India, Madras and up to the coast as high as Orissa."

B. amphibius is liable to be confused with *B. dorsalis*¹ but the prominent caudal spot and the absence of dorsal and anal spots in *B. amphibius* enable the two species to be distinguished from each other.

***Barbus (Puntius) curmuca* (Hamilton).**

(Plate IX, fig. 1.)

1878. *Barbus curmuca*, Day, *Fish. India*, p. 566, pl. cxli, fig. 1.

3 specimens, 37 to 97 mm. in length. A tributary of Manimala R., Erumeli, Central Travancore. C. C. John, 20.ii.1940.

1 specimen, 148 mm. long. Pool at the foot of the largest fall of Peruntenuvi, a tributary of Pamba R., at Edakadathy, Central Travancore. C. C. John, 11.ii.1940.

3 specimens, 89 to 110 mm. in length. Near the source of Kallada R., 4 miles east of Thenmalai, Central Travancore. C. C. John, 9.ii.1940.

2 specimens, 106 and 113 mm. in length. Kulathupuzha, a tributary of Kallada R., Central Travancore. (Collected from a pond-like accumulation of water surrounded by big boulders.) C. C. John, 14.ii.1940.

Barbus curmuca is represented in the collection by a number of young, and half-grown specimens. In the largest example under report, the tips of the caudal fin are deep black in colour and proximal to them there are areas of a light colour. The rest of the fin is somewhat grayish. There is a deep black bar behind the gill-opening and in the dorsal half of the body the scales are grayish with lighter margins. The bases of the scales above and below the lateral line are provided with dark spots. The ventral surface is pale olivaceous.

***Barbus (Puntius) filamentosus* (Cuv. & Val.).**

1937. *Barbus filamentosus*, Hora, *Rec. Ind. Mus.* XXXIX, pp. 22-24, text-figs. 8, 9.

6 specimens, 65 to 87 mm. in length. A tributary of Manimala R., Erumeli, Central Travancore. C. C. John, 20.ii.1940.

12 specimens, 77 to 109 mm. in length. Pool at the foot of the largest fall of Peruntenuvi, a tributary of Pamba R., at Edakadathy, Central Travancore. C. C. John, 11.ii.1940.

4 specimens, 63 to 84 mm. in length. Near the source of Kallada R., 4 miles east of Thenmalai, Central Travancore. C. C. John, 9.ii.1940.

3 specimens, 75 to 128 mm. in length. Kulathupuzha, a tributary of Kallada R., Central Travancore. C. C. John, 20.ii.1940.

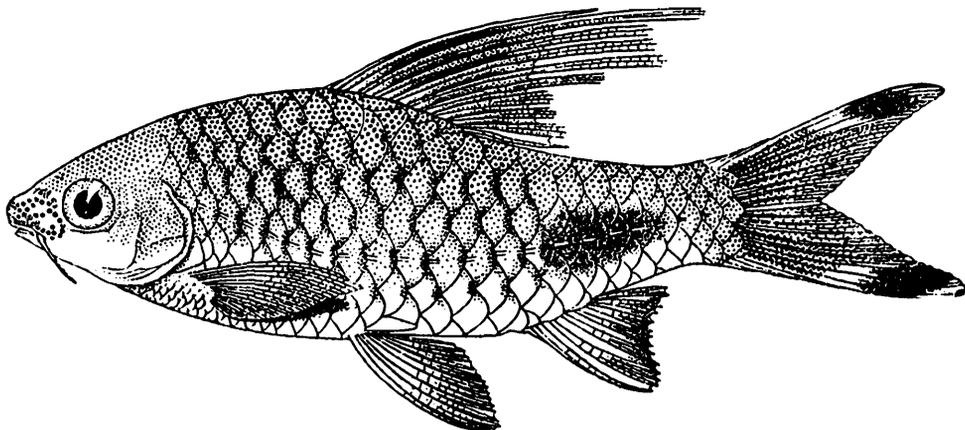
4 specimens, 70 to 82 mm. in length. Chittar stream at Palode, South Travancore. C. C. John, 10.ii.1940.

Of the 29 specimens of *Barbus filamentosus* collected by Dr. C. C. John from different localities in Travancore as listed above, there are only 6 fully developed males while the remaining examples are either females or juveniles. In the males the number of prolonged filiform rays varies from 3 to 5 and in one specimen the last unbranched ray is also greatly elongated (text-fig. 2). All the males are provided with patches of large tubercles on either side of the snout. These secondary sexual characters are very characteristic features of the species.

As already pointed out by one of us, considerable importance has been attached to the presence or absence of barbels in the individuals of this species. Small barbels, sometimes hidden in the grooves round

¹ Hora, S. L., *Rec. Ind. Mus.* XXXVIII, pp. 2-5 (1936).

the corners of the mouth, are invariably present in all the specimens, but they seem to vary considerably in length. In smaller individuals



TEXT-FIG. 2.—Lateral view of a mature male specimen of *Barbus (Puntius) filamentosus* (Cuv. & Val.), showing secondary sexual characters. Nat. Size.

they are relatively larger. In one of the male specimens (text-fig. 2) the barbels extend as far back as the posterior border of the eye. In one of the female specimens also the barbels are of the same length, while in two others they extend up to the middle of the eye. One specimen is still more remarkable, for in it the barbel of one side reaches the posterior border of the orbit while that of the other side is very small.

The colour varies considerably with age. In the young specimens the colour marks are not so prominent; the large lateral blotch is, however, fairly well marked and the fins are somewhat dusky. Some of the outer rays of the caudal fin in both the lobes are dark in colour. The bases of the scales are also faintly marked with dark spots. In larger specimens the lateral blotches as also the caudal blotches are intensely black and are surrounded by whitish areas. The black spots at the bases of the scales become somewhat darker, and in males (text-fig. 2) these markings become very prominent. Usually in the males a dark mark is also present behind the gill-opening. The last undivided ray is white in the males and the filamentous prolongations of the rays are somewhat dusky.

Barbus filamentosus is a South Indian species, having been recorded so far from "Canara down the Western coast and along the base of the Neilgherries, and Travancore hills, also Ceylon." It is said to attain at least 6 inches in length.

***Barbus (Puntius) melanampyx* (Day).**

1938. *Barbus melanampyx*, Misra, *Rec. Ind. Mus.* XL, pp. 258-260, 1 text-fig.

30 specimens, 23 to 57 mm. in length. Pampadampara Tank, Western Ghats, North Travancore. S. Jones, September 1938 and March 1940.

52 specimens, 19 to 64 mm. in length. Streams within a radius of about 5 miles round Pampadampara, Western Ghats, North Travancore. S. Jones, 12.iv.1940 and April 1941.

4 specimens, 21 to 37 mm. in length. Manimala R., near Kangirappally, Central Travancore. C. C. John, 26.iii.1940.

1 specimen, 52 mm. long. A tributary of Manimala R., Erumelj, Central Travancore, C. C. John, 20.ii.1940.

- 20 specimens, 22 to 45 mm. in length. Achenkovil R., 7 miles south-east of Konni, Central Travancore. C. C. John, 17.ii.1940.
 1 specimen, 58 mm. long. Kulathupuzha, a tributary of Kallada R., Central Travancore. (Collected from a pond-like accumulation of water surrounded by big boulders.) C. C. John, 14.ii.1940.
 6 specimens, 25 to 57 mm. in length. Chittar stream at Palode, South Travancore. C. C. John, 10.ii.1940.

Misra (*loc. cit.*) showed that the sexes of *Barbus melanampyx* can be distinguished by their respective colouration. From the large series of fresh specimens examined by us from Travancore we are able to confirm Misra's account, but find that the colouration of the sexes varies to a certain extent. In some of the female specimens the dorsal fin is not stained with black while in some of the smaller examples the three lateral bands are only faintly marked. In a number of male specimens the entire body is dark so that the two broad lateral bands cannot be differentiated from each other. The tips of the caudal fin may be devoid of the usual black colour, and in certain examples the opercular spot is also indistinguishable. In fully mature specimens the tubercles on the snout extend in a broad patch all round the front border of the snout.

Barbus (Tor) mussullah Sykes.

1841. *Barbus mussullah*, Sykes, *Trans. Zool. Soc. London* II, p. 356, pl. lxi, fig 4.
 11 specimens, 60 to 260 mm. in length. Streams within a radius of 5 miles round Pampadampara, Western Ghats, North Travancore. S. Jones, 12.iv.1940 and April 1941.
 2 specimens, 42 and 53 mm. in length. Kallar stream at the foot of Ponmudi Hills, Western Ghats, South Travancore. S. Jones, April 1939.

Though Hora in his series of articles on the Game Fishes of India has not yet dealt with the Large-scaled Barbels of Peninsular India, the number of young and half-grown specimens under report seem to belong to *Barbus mussullah*. From a preliminary examination of the material from Peninsular India, Hora has found that this is the commonest species of these parts and that its range extends along the Satpura Trend to the Central Provinces.

Barbus (Puntius) pinnauratus (Day).

1877. *Barbus pinnauratus*, Day, *Fish. India*, p. 561, pl. cxxxix, fig. 3.
 1936. *Barbus pinnauratus*, John, *Journ. Bombay Nat. Hist. Soc.* XXXVIII, p. 711.
 1937. *Barbus pinnauratus*, Hora, *Rec. Ind. Mus.* XXXIX, p. 336.
 1938. *Barbus pinnauratus*, Hora, *Rec. Ind. Mus.* XL, p. 239.
 1939. *Barbus pinnauratus*, Das, *Rec. Ind. Mus.* XLI, pp. 440, 441.
 1 specimen, 85 mm. long. Kulathupuzha, a tributary of Kallada R., Central Travancore. (Collected from a pond-like accumulation of water surrounded by big boulders.) C. C. John, 14.ii.1940.
 1 specimen, 111 mm. long. Chittar stream at Palode, South Travancore. C. C. John, 10.ii.1940.

In his recent publications, Hora has referred to the remarkable distribution of *Barbus pinnauratus* and indicated its close similarity to several species known from India and Burma. The specimens under report possess the characteristic colouration of the species and in other respects also represent the typical form,

Barbus (Puntius) ticto Hamilton.

1939. *Barbus (Puntius) ticto*, Hora, Misra & Malik, *Rec. Ind. Mus.* XLI, pp. 263-279.

1 specimen, 32 mm. long. Achenkovil R., 7 miles south-east of Konni, Central Travancore. C. C. John, 17.ii.1940.

In the paper referred to above, Hora, Misra and Malik adduced evidence to show that Day's *Barbus punctatus* from Peninsular India, characterized by the possession of a complete lateral line, is synonymous with *B. ticto*. In the specimen under report, the lateral line is more or less complete. It is worthwhile to mention here once again that examples of *B. ticto* with complete lateral line have so far been found both in Burma and Siam and in Peninsular India.

Garra mullya (Sykes).

1921. *Garra mullya*, Hora, *Rec. Ind. Mus.* XXII, pp. 658-660.

28 specimens, 63 to 186 mm. in length. Streams within a radius of about 5 miles round Pampadampara, Western Ghats, North Travancore. S. Jones, 12.iv.1940 and April 1941.

10 specimens, 61 to 121 mm. in length. A tributary of Manimala R., Erumeli, Central Travancore. C. C. John, 20.ii.1940.

2 specimens, 77 and 87 mm. in length. Pool at the foot of the largest fall of Peruntenuvi, a tributary of Pamba R., at Edakadathy, Central Travancore. C. C. John, 11.ii.1940.

1 specimen, 45 mm. long. Achenkovil R., 7 miles south-east of Konni, Central Travancore. C. C. John, 17.ii.1940.

12 specimens, 72 to 114 mm. in length. Near the source of Kallada R., 4 miles east of Thenmalai, Central Travancore. C. C. John, 9.ii.1940.

9 specimens, 71 to 105 mm. in length. Kulathupuzha, a tributary of Kallada R., Central Travancore. (Collected from a pond-like accumulation of water surrounded by big boulders.) C. C. John, 14.ii.1940.

2 specimens, 43 and 55 mm. in length. Kallar stream at the foot of Ponmudi Hills, Western Ghats, South Travancore. S. Jones, April 1939.

Garra mullya is the most widely distributed hill-stream fish of the Western Ghats and is represented by a large number of young, half-grown and adult specimens in the collection under report. It has been found to be equally abundant along the western portion of the Satpura Trend of mountains. The species can readily be distinguished by the absence of a proboscis on the snout, by the presence of tubercular areas, and by the fact that the tip of the snout is marked off by two short lateral grooves. In certain examples the tubercles are few and not well marked.

Bhavana australis (Jerdon).

1941. *Bhavana australis*, Hora, *Rec. Ind. Mus.* XLIII, p. 225, pl. viii, figs. 1-3.

12 specimens, 40 to 111 mm. in length. Streams within a radius of about 5 miles round Pampadampara, Western Ghats, North Travancore. S. Jones, 12.iv.1940 and April 1941.

1 specimen, 94.5 mm. long. Kallar stream at the foot of Ponmudi Hills, Western Ghats, South Travancore. S. Jones, April 1939.

Hora (*loc. cit.*) has given a detailed account of *Bhavana australis* and discussed its affinities with other genera of the Homalopterinae. The species seems to be fairly common in the southern portion of the Western Ghats.

Travancoria jonesi Hora.

1941. *Travancoria jonesi*, Hora, *Rec. Ind. Mus.* XLIII, p. 230, pl. viii, figs. 5-9.

20 specimens, 22 to 100 mm. in length. Streams within a radius of about 5 miles round Pampadampara, Western Ghats, North Travancore. S. Jones, 12.iv.1940 and April 1941.

An account of *Travancoria jonesi* was recently published by Hora (*loc. cit.*) in his paper on the Homalopterid fishes from Peninsular India. The genus *Travancoria* is very closely allied to *Bhavana*, but differs in having more extensive gill-openings and a larger number of rostral barbels. The species is known only from Travancore.

Lepidocephalus thermalis (Cuv. & Val.).

1878. *Lepidocephalichthys thermalis*, Day, *Fish. India*, p. 610, pl. clv, fig. 3.

20 specimens, 29 to 33 mm. in length. Pampadampara Tank, Western Ghats, North Travancore. S. Jones, March 1940.

42 specimens, 33.5 to 70 mm. in length. Streams within a radius of about 5 miles round Pampadampara, Western Ghats, North Travancore. S. Jones, 12.iv.1940 and April 1941.

Lepidocephalus thermalis is known from Peninsular India and Ceylon. In general facies, it is closely allied to *L. guntea* of northern India, but Day distinguished the two species by the size of the head and the number of transverse rows of scales on the body. It is likely that when large series of specimens from different localities are carefully examined, the two forms may prove to be local races of the same species.

Nemachilus evezardi Day.

1878. *Nemachilus evezardi*, Day, *Fish India*, p. 613, pl. cliii, fig. 11.

1919. *Nemachilus evezardi*, Annandale, *Rec. Ind. Mus.* XVI, p. 126, pl. i, figs. 2, 2a.

1938. *Nemachilus evezardi*, Hora, *Rec. Ind. Mus.* XL, p. 241.

42 specimens, about 25 mm. in length. Streams within a radius of about 5 miles round Pampadampara, Western Ghats, North Travancore. S. Jones, April 1941.

43 specimens, 13 to 56 mm. long. Dhobikana, a small stream close to Pampadampara, Western Ghats, North Travancore. S. Jones, March 1940.

8 specimens, 31 to 41 mm. in length. Sannyasa-ode, near Pampadampara, Western Ghats, North Travancore. S. Jones, April 1940.

Nemachilus evezardi was hitherto known from the Western Ghats, near Bombay, the Pachmarhi hills, Central Provinces, and the Bailadila range, Bastar State, Central Provinces. It is recorded here from the Travancore hills for the first time. The distribution of the species is of some interest as indicating the continuity of these hills at some earlier period.

N. evezardi is readily distinguished from other Indian species of the genus by the possession of well-marked nasal barbels. The colouration is very variable, but is quite characteristic of the species.

Nemachilus guentheri Day.

(Plate IX, figs. 2-5.)

1867. *Nemacheilus guentheri*, Day, *Proc. Zool. Soc. London*, p. 285.
 1868. *Nemachilus guentheri*, Günther, *Cat. Fish. Brit. Mus.* VII, p. 361.
 1872. *Nemacheilus guentheri*, Day, *Journ. As. Soc. Bengal* XLI, p. 195.
 1878. *Nemacheilus guentheri*, Day, *Fish. India*, p. 615, pl. clvi, fig. 10.
 1889. *Nemachilus guentheri*, Day, *Faun. Brit. Ind. Fish.* I, p. 228.

2 specimens, 27 and 51.2 mm. in length. Streams within a radius of 5 miles round Pampadampara Western Ghats, North Travancore. S. Jones, April 1941.

Since the discovery of *Nemachilus guentheri* by Day about 74 years ago in the "Rivers along the lower slopes and base of the Neilgherry hills", no other worker seems to have collected further material of this species. Günther's description is based on a typical specimen from Day's collection. Besides the two specimens collected by Mr. S. Jones as noted above, we have examined 3 specimens from the Dhoni forest in South Malabar collected by Mr. E. Burnes in May 1923, and 8 specimens collected by the late Dr. N. Annandale from the Nierolay stream, a tributary of the Bhavani river at the base of the Nilgiri Hills. These records show that the species is distributed probably all over the southern parts of the Western Ghats and the associated hill ranges.

In the specimens under report, the length of the head is contained from 5.10 to 5.69 times in the total length and from 4.16 to 4.49 times in the standard length. The head is broader than its height; its width is contained from 1.56 to 1.86 times and its height from 1.80 to 2.04 times in its length. The eyes are situated almost in the middle of the head or slightly nearer to the tip of the snout than to the end of the opercular border; the diameter of the eye is contained from 3.90 to 5.30 times in the length of the head, from 1.43 to 2.25 times in the length of the snout and from 0.83 to 1.40 times in the interorbital width. The head and the anterior part of the body are somewhat flattened while the tail is compressed from side to side. The depth of the body is contained from 8.68 to 9.79 times in the total length and from 6.85 to 7.72 times in the standard length. The caudal peduncle is almost as long as high or may be slightly longer.

From the material before us, it seems that the colouration is very variable. In a specimen from the Dhoni forest, the dorsal surface is uniformly dark with faint indications of the pale bands in the tail region. As pointed out by Day, there are usually three rows of pale spots (Pl. IX, fig. 2) but their extent varies practically with each individual. A black mark is invariably present in the axil of the pectoral fin and the caudal fin is provided with three W-shaped bands across it. There is a deep, short, vertical bar at the base of the caudal fin.

The specimens from the Nierolay stream (Pl. IX, fig. 4) and Pampadampara are much lighter in colour. The general colour of the body is pale olivaceous; the dorsal surface of the head is grayish, while the entire ventral surface is much lighter. The body is marked with 3 rows of spots of different sizes and form; they impart a very characteristic appearance to the species.

Measurements in millimetres.

			Dhoni Forest, S. Malabar.			Pampadam- para.		Nierolay Stream, Nilgiris.	
Total length .. .. .	..	..	45.6	51.8	52.0	51.2	40.8	56.8
Length of caudal .. .. .	..	..	9.1	10.6	10.4	10.8	7.2	12.0
Length of head .. .. .	..	..	8.2	9.5	10.0	9.0	8.0	10.6
Height of head .. .. .	..	..	4.1	4.9	4.9	5.0	4.0	5.5
Width of head .. .. .	..	..	5.2	5.1	5.8	5.3	5.0	6.8
Depth of body .. .. .	..	..	5.2	5.6	5.9	5.9	4.9	5.8
Diameter of eye .. .. .	..	..	2.1	2.1	2.4	2.0	1.8	2.0
Length of snout .. .. .	..	..	3.0	3.4	3.9	3.9	2.6	4.5
Interorbital distance .. .. .	..	..	2.0	2.5	2.6	2.4	1.5	2.8
Length of dorsal .. .. .	..	..	7.2	9.0	9.8	8.0	7.0	8.5
Length of pectoral .. .. .	..	..	7.2	9.1	9.9	8.9	7.8	10.0
Length of ventral .. .. .	..	..	6.7	8.1	9.0	7.7	6.0	8.9
Length of anal .. .. .	..	..	6.1	7.2	8.1	7.0	5.2	7.7
Length of caudal peduncle .. .. .	..	..	4.6	5.8	5.5	5.0	4.2	5.0
Least height of caudal peduncle .. .. .	..	..	4.6	5.0	5.5	4.6	3.8	5.0

Nemachilus triangularis Day.

1865. *Nemacheilus triangularis*, Day, *Proc. Zool. Soc. London*, p. 295.
 1865. *Nemacheilus triangularis*, Day, *Fish. Malabar*, p. 203, pl. xiv, fig. 1.
 1868. *Nemachilus triangularis*, Günther, *Cat. Fish. Brit. Mus.* VII, p. 352.
 1872. *Nemacheilus triangularis*, Day, *Journ. As. Soc. Bengal* XLI, p. 194.
 1878. *Nemacheilus triangularis*, Day, *Fish. India*, p. 619, pl. cliii, fig. 10.
 1889. *Nemachilus triangularis*, Day, *Faun. Brit. Ind. Fish.* I, p. 234.
 1909. *Nemachilus triangularis*, Jenkins, *Rec. Ind. Mus.* III, p. 289.
 1929. *Nemachilus triangularis*, Pillay, *Journ. Bombay Nat. Hist. Soc.* XXXIII, p. 710.
 1936. *Nemachilus triangularis*, John, *Journ. Bombay Nat. Hist. Soc.* XXXVIII, p. 710.
- 6 specimens, 45 to 73 mm. in length. Streams within a radius of about 5 miles round Pampadampara. Western Ghats, North Travancore. S. Jones, 12.iv.1940, and April 1941.
- 4 specimens, 42 to 49 mm. in length. Manimala R., near Kangirappally, Central Travancore. C. C. John, 26.iii.1940.
- 6 specimens, 38 to 56 mm. in length. Achenkovil R., 7 miles south-east of Konni, Central Travancore. C. C. John, 17.ii.1940.
- 1 specimen, 52 mm. long. Kulathupuzha, a tributary of Kallada R., Central Travancore. C. C. John, 14.ii.1940.
- 8 specimens, 42 to 64 mm. in length. Kallar stream at the foot of Ponmudi Hills, Western Ghats, South Travancore. S. Jones, April 1939.

Day described *Nemachilus triangularis* from two specimens collected at Mundikyum, Travancore. The type-specimens are now preserved in the collection of the British Museum and, according to Day, the longer of the two is 2.1 inches in total length. There appears to be considerable inconsistency in Day's earlier and later accounts of the species regarding the proportions of the various parts of the body to the total length and, moreover, Day's illustration of the fish, as has already been pointed out by Günther, is not satisfactory. In view of this, we give below a complete description of the species and figures from fresh specimens.

D.2/8 ; A.2/5 ; P.11 ; V.8.

Nemachilus triangularis is a pretty loach with a very characteristic colouration ; it is almost subcylindrical with the head and anterior

part of body slightly depressed. The head is conical and bluntly pointed anteriorly; its length is contained from 4.09 to 5.32 times in the standard length and from 5.13 to 7.11 times in the total length. The height of the head is contained from 1.45 to 1.88 times and its width from 1.28 to 1.55 times in its length. The eyes are of moderate size, are situated almost in the middle of the length of the head, and are not visible from below; the diameter of the eye is contained from 3.60 to 5.00 times in the length of the head, from 1.33 to 2.14 times in the length of the snout and from 0.80 to 1.57 times in the interorbital width. In the males there is a small, obtuse projection of the preorbital below the anterior corner of the eye. The nostrils are situated considerably nearer to the anterior border of the eye than to the tip of the snout; they are separated by a prominent flap. There are six moderately long barbels. The lips are thick, fimbriated and continuous at the angles of the mouth; the lower lip is interrupted in the middle. The inter-maxillaries form a beak-shaped, median projection, which, when the mouth is closed, lies in front of the lower jaw.

The depth of the body is contained from 6.28 to 9.17 times in the total length and from 5.06 to 7.70 times in the standard length. The caudal peduncle is well formed and is generally somewhat higher than long. The body is covered with small distinct scales and the lateral line is fairly extensive and generally complete.

The dorsal fin originates slightly in advance of the pelvics and its commencement is almost equidistant from the tip of the snout and the base of the caudal fin. Its margin is straight and oblique, except at the anterior end where it is rounded. The pectoral is generally somewhat shorter than the head, but may be equal to it or even slightly longer; it is broadly pointed in the middle and is separated from the pelvics by a distance equal to a third of its length. The pelvics are distinctly pointed in the middle and bear a fleshy appendage in the axil; they do not extend as far as the anal opening. The caudal fin is deeply bifurcate.

The colour pattern varies considerably with age. In a young specimen, 35 mm. in total length, the ground colour is pale-olivaceous and there are about 7 dark bands descending from above to the sides; they are angularly directed backwards and some of the anterior ones are united by narrow longitudinal streaks. Most of the bands are edged with madder brown, and rounded yellow spots are present in the angular parts of some of the anterior bands. There are four bands on the head, one on the snout, one below the eye and two behind it in the opercular region. The dorsal fin is provided with two bands and there are indications of two bands on the caudal. The anal and the pelvic fins are also provided with one band each. There is a black blotch at the base of the caudal.

Day¹ described the colouration of a specimen, 52.5 mm. in total length, as: "Yellowish-banded, each band being edged with black; seven along the body, which pass backwards towards the lateral line, and consequently are disposed in a V-shaped manner; one band passes over the operculum, a second through the eye and a third from the

¹ Day, F., *Proc. Zool. Soc. London*, p. 295 (1865).

orbit to the angle of the mouth. Dorsal with three irregular rows of black spots. Pectoral, ventral and anal unspotted, but darkest at their margins. Three black bands on the caudal, which has also a black base."

In a specimen, 72 mm. in total length, the colour pattern is still further modified. The ground colour of the head and the body is grayish and the pale bands on the body are broken up. There are seven bands, the anterior five are directed backwards, while the last two are vertical and are conspicuously edged with madder brown. There are a number of yellowish patches of different sizes and patterns above the lateral line. Five yellowish bands are present on the head and the colouration of the fins is similar to that described by Day.

Distribution.—Travancore. The specimens figured here were collected by the late Dr. N. Annandale at Courtallum, Travancore.

Measurements in millimetres.

	Pampadam-para.		Kallar Stream.			Achenkovil R.			Kulathupuzha.	Manimala R.		
Total length ..	55.0	70.5	42.0	57.0	67.5	38.5	53.2	56.5	51.5	42.5	48.0	49.2
Length of caudal ..	8.8	12.0	9.0	11.0	15.0	7.8	11.5	11.0	11.2	8.5	9.5	10.5
Length of head ..	9.0	11.0	7.0	9.0	11.5	7.5	10.0	10.0	9.0	7.8	8.5	8.0
Height of head ..	5.5	7.0	4.0	5.5	7.0	4.0	5.5	6.0	5.5	4.5	5.0	5.5
Width of head ..	6.5	8.0	5.0	7.0	8.0	5.0	7.0	7.0	6.5	5.5	5.5	5.8
Depth of body ..	6.0	8.0	5.0	7.0	9.0	5.0	7.5	9.0	6.5	5.8	6.0	6.0
Diameter of eye ..	2.0	2.5	1.4	2.5	2.5	1.8	2.2	2.5	2.0	2.0	2.2	2.2
Length of snout ..	3.5	4.2	3.0	3.5	4.5	2.4	4.0	4.0	3.5	3.2	3.5	3.2
Interorbital distance	2.5	3.8	2.2	2.5	3.0	2.0	2.5	2.0	2.5	2.0	2.0	2.0
Length of dorsal ...	8.5	10.0	5.8	9.0	9.5	5.8	8.0	9.0	7.8	7.2	7.5	7.5
Length of pectoral	8.5	11.2	6.5	9.0	12.0	7.0	9.0	9.0	8.0	7.0	9.0	8.0
Length of ventral	7.8	9.2	6.0	8.5	10.0	5.8	7.0	8.5	7.5	5.5	7.5	6.2
Length of anal ..	7.0	9.2	5.0	7.0	8.5	5.0	7.0	7.0	6.0	5.8	7.0	6.2
Length of caudal peduncle.	5.0	8.0	4.0	5.8	5.8	3.5	5.0	5.5	4.0	4.0	4.0	4.5
Least height of caudal peduncle.	5.0	7.0	4.5	6.5	8.0	4.0	6.5	6.0	5.0	5.0	5.0	5.2

***Callichrous bimaculatus* (Bloch).**

1936. *Callichrous bimaculatus*, Hora, *Rec. Ind. Mus.* XXXVIII, pp. 356-361.
2 specimens, 144 and 149 mm. in length. Near the source of Kallada R., 4 miles east of Thenmalai, Central Travancore. C. C. John, 9.ii.1940.

1 specimen, 162 mm. long. Kulathupuzha, a tributary of Kallada R., Central Travancore. C. C. John, 14.ii.1940.

Recently one of us (Hora, *loc. cit.*) discussed the specific limits of *Callichrous bimaculatus*, and referred to the great range of variation exhibited by the species. In the specimens under report, the colouration varies considerably; one of the specimens is very dark all over, while the others are much lighter.

***Batasio travancoria* Hora & Law.**

1941. *Batasio travancoria*, Hora and Law, *Rec. Ind. Mus.* XLIII, pp. 40-42, pl. ii, figs. 7-9, text-fig. 3.

1 specimen, 95 mm. long. Pool at the foot of the largest fall of Peruntaruvu, a tributary of Pamba R., at Edakadathy, Central Travancore. C. C. John, 11.ii.1940.

1 specimen, 85 mm. long. Near the source of Kallada R., 4 miles east of Thenmalai, Central Travancore. C. C. John, 9.ii.1940.

2 specimens, 78 and 105 mm. in length. Kulathupuzha, a tributary of Kallada R., Central Travancore. C. C. John, 14.ii.1940.

1 specimen, 75 mm. long. Chittar Stream at Palode, South Travancore. C. C. John, 10.ii.1940.

Batasio travancoria was recently described by us and remarks were made on the remarkable discontinuous distribution of the genus. It is known so far from the central and southern parts of Travancore.

***Mystus cavasius* (Ham.).**

1877. *Macrones cavasius*, Day, *Fish. India*, p. 447, pl. c, fig. 1.

1 specimen, 103 mm. long. Kulathupuzha, a tributary of Kallada R., Central Travancore. (Collected from a pond-like accumulation of water surrounded by big boulders.) C. C. John, 14.ii.1940.

Mystus cavasius is widely distributed in the fresh waters of India and Burma. The specimen under report is a male with a well-developed urinogenital papilla; the free portion of the papilla being almost as long as the diameter of the eye. The testes are lobulated as in *M. malabaricus* (*vide infra*, p. 255).

***Mystus malabaricus* (Jerdon).**

1877. *Macrones malabaricus*, Day, *Fish. India*, p. 450, pl. ci, fig. 2.

1936. *Macrones malabaricus*, John, *Journ. Bombay Nat. Hist. Soc.* XXXVIII, p. 709.

2 specimens, 89 and 111 mm. in length. A tributary of Manimala R., Erumeli, Central Travancore. C. C. John, 20.ii.1940.

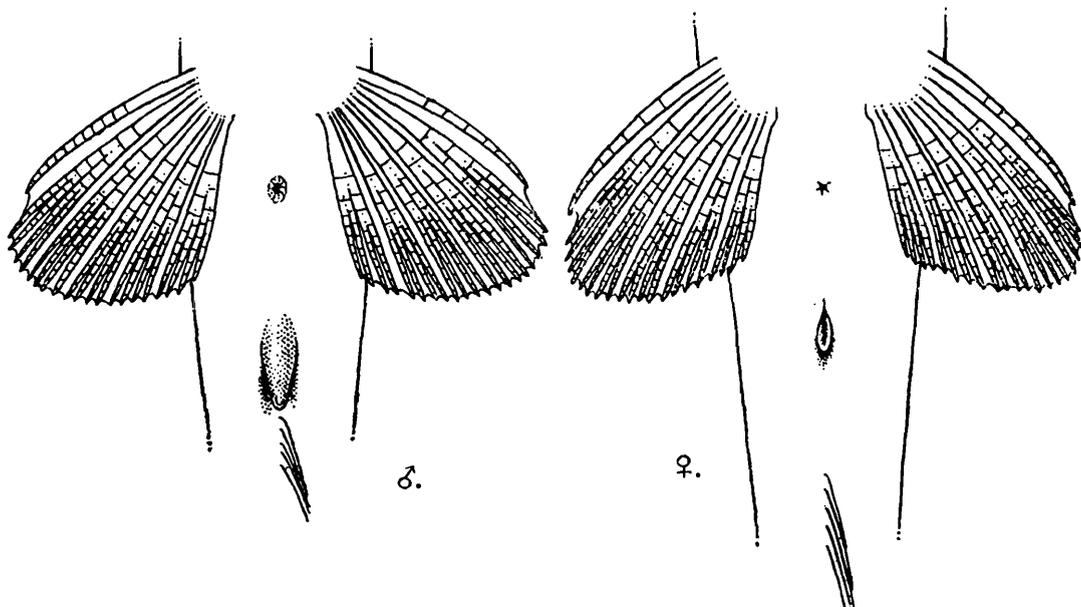
6 specimens, 95 to 119 mm. in length. Kulathupuzha, a tributary of Kallada R., Central Travancore. (Collected from a pond-like accumulation of water surrounded by big boulders.) C. C. John, 14.ii.1940.

1 specimen, 117 mm. long. Achenkovil R., 7 miles south-east of Konni, Central Travancore. C. C. John, 17.ii.1940.

3 specimens, 99 to 118 mm. in length. Near the source of Kallada R., 4 miles east of Thenmalai, Central Travancore. C. C. John, 9.ii.1940.

3 specimens, 91 to 113 mm. in length. Chittar stream at Palode, South Travancore. C. C. John, 10.ii.1940.

In Dr. C. C. John's collection there are 15 male specimens from 5 localities, as listed above, which we refer to *Mystus malabaricus* (Jerdon).



TEXT-FIG. 3.—External urinogenital structures in the male and female of *Mystus malabaricus* (Jerdon). Male: $\times 2$; Female: $\times 2\frac{1}{2}$.

The males are provided with a urinogenital papilla, the size of which depends upon the sexual maturity of the individual irrespective of its

length. In immature specimens the testes are ribbon-like structures but become greatly enlarged and highly lobulated in adult males. The urinogenital duct opens at the extremity of the papilla. In the females the urinogenital opening is a slit-like aperture bordered by thickened lips. On account of these secondary sexual characters, the males and females can be distinguished readily. The anal opening is situated at a considerable distance in front of the urinogenital opening.

The presence of a urinogenital papilla is a fairly common occurrence among Siluroid fishes. Mukerji¹ recorded it in the case of *Glyptosternum reticulatum* McClelland. Day (*loc. cit.*, pp. 449, 450) referred to the presence of an anal papilla (=urinogenital papilla) in the case of two species of *Macrones* described and figured by him, *viz.*, *M. keletius* (Cuv. & Val.) and *M. armatus* Day. From among the specimens referred by Day to *M. malabaricus*, two are now preserved in the collection of Indian Museum; one (No. 721) is a male with a well developed papilla and the second is a female (No. 504). The former is the original of his figure in the *Fishes of India* and it seems that the presence of the papilla was overlooked. *M. malabaricus* differs from *M. keletius* and *M. armatus* by its smooth head and other characters of minor importance.

Recently Mookerjee, Mazumdar and Das Gupta² described similar urinogenital structures in *Mystus gulio* (Ham.), but used for them anthropomorphic terms and by implication assumed for them copulatory functions without giving reasons for their views. We found similar organs in all the species of *Gagata* and *Batasio* studied by us³.

M. malabaricus is known from the Malabar Coast, Wynaad Hills and the hill ranges of Travancore.

***Glyptothorax madraspatanus* (Day).**

1938. *Glyptothorax madraspatanus*, Hora, *Rec. Ind. Mus.* XL, p. 370.

- 1 specimen, 101 mm. long. Pampadampara, Western Ghats, North Travancore. S. Jones, 12.iv.1940.
- 2 specimens, 67 and 110 mm. in length. Streams within a radius of 5 miles round Pampadampara, Western Ghats, North Travancore. S. Jones, April 1941.
- 1 specimen, 173 mm. long. Pool at the foot of the largest fall of Peruntenuvi, a tributary of Pamba R., at Edakadathy, Central Travancore. C. C. John, 11.ii.1940.

In his key to the Indian species of the genus *Glyptothorax*, Hora⁴ included *G. madraspatanus* in the group in which the ventral surface of the outer rays of the paired fins is not plaited. In the larger specimen under report, the skin on the ventral surface of the pectoral spine and that of the two outer rays of the pelvic fins form an adhesive pad of longitudinal grooves and ridges similar to those of the thoracic adhesive apparatus. It seems probable that this character, which is directly correlated with the rapidity of the current, is of little taxonomic value.

¹ Mukerji, D. D., *Mem. Conn. Acad.* X, art. xviii, p. 329 (1936).

² Mookerjee, H. K., Mazumdar, S. R. and Das Gupta, B., *Ind. Journ. Vet. Sci. Animal Husb.* X, p. 295 (1940).

³ Hora, S. L. and Law, N. C., *Rec. Ind. Mus.* XLIII, pp. 9-42 (1941).

⁴ Hora, S. L., *Rec. Ind. Mus.* XXV, p. 12 (1923).

The lower lobe of the caudal fin of the larger specimen is abnormal ; it is rounded instead of being pointed and has a Y-shaped whitish area in its distal portion.

Xenentodon cancila (Ham.).

1877. *Belone cancila*, Day, *Fish. India*, p. 511, pl. cxviii, fig. 5.

1 specimen, 222 mm. long. Pool at the foot of the largest fall of Peruntenaruvi, a tributary of Pamba R., at Edakadathy, Central Travancore. C. C. John, 11.ii.1940.

Xenentodon cancila is widely distributed in the fresh waters of India and on account of its characteristic beak can be readily distinguished from other kinds of fish.

Ophicephalus gachua Ham.

1876. *Ophiocephalus gachua*, Day, *Fish. India*, p. 367.

5 specimens, 82 to 123 mm. in length. Streams within a radius of about 5 miles round Pampadampara, Western Ghats, North Travancore. S. Jones, 12.iv.1940 and April 1941.

1 specimen, 18 mm. long. Manimala R., near Kangirappally, Central Travancore. C. C. John, 26.iii.1940.

6 specimens, 36 to 51 mm. in length. Achenkovil R., 7 miles south-east of Konni, Central Travancore. C. C. John, 17.ii.1940.

1 specimen, 47 mm. long. Kulathupuzha, a tributary of Kallada R., Central Travancore. (Collected from a pond-like accumulation of water surrounded by big boulders.) C. C. John, 14.ii.1940.

Ophicephalus gachua is represented in the collection by several young and half-grown specimens. This species is widely distributed throughout the Oriental Region.

Mastacembelus armatus (Lacép.).

1876. *Mastacembelus armatus*, Day, *Fish. India*, p. 340, pl. lxxiii, fig. 2.

1 specimen, 225 mm. long. Pool at the foot of the largest fall of Peruntenaruvi, a tributary of Pamba R., at Edakadathy, Central Travancore. C. C. John, 11.ii.1940.

2 specimens, 64 and 257 mm. in length. Achenkovil R., 7 miles south-east of Konni, Central Travancore. C. C. John, 17.ii.1940.

Mastacembelus armatus is a widely distributed Indian fish ; its range extends as far as China. As has already been noted by Day and other workers, the colouration of the species varies considerably with growth, and very young specimens¹ of about 2 to 3 inches in length look quite different from the adult.

¹ Hora, S. L. and Mukerji, D. D., *Rec. Ind. Mus* XXXVIII, p. 145 (1936).