NOTES ON FISHES IN THE INDIAN MUSEUM.

XXVIII.—On Three Collections of Fish from Mysore and Coorg, South India.

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

The three collections of fish which form the subject matter of this note were made by three different collectors from varied types of habitats. Mr. B. S. Bhimachar's material was collected mainly from the Tunga river at Shimoga, but he also obtained specimens from tanks, other rivers and torrential streams in the Mysore State. Dr. H. S. Rao's collection mainly consists of pool-, surface- and mud-living species from the Shimoga and Kadur Districts, whereas Prof. C. R. Narayan Rao's material was obtained from the headwaters of the Cauvery river in Coorg where it is a sluggish stream with a sandy or muddy bed.

From a zoo-geographical point of view the Mysore plateau is of exceptional interest, as it is on the borderland between the 'Deccan tract' and the 'Carnatic or the Madras tract' of Blanford. Blanford included it in the Carnatic tract but remarked: "Perhaps the Mysore plateau, from Bellary to Bangalore and the Nilgiris, should have been included in this tract [Deccan] rather than in the Carnatic."[1] It is fortunate, therefore, that I have been afforded an opportunity to examine extensive material from this region.

Our knowledge of the freshwater fishes of South India is mainly derived from the works of Jerdon[2] and Day,[3] but unfortunately Jerdon was not quite familiar with the specific limits of the species described by Hamilton[4] from the Ganges and, in consequence, the correct definition of the species recorded by him is a matter of considerable difficulty, and in the absence of the type material his species can only be identified by studying fresh collections made from type localities. In his earlier work, such as on the "Fishes of Malabar", Day also suffered from precisely the same handicap as Jerdon and later, when he became familiar with the fishes of other parts of India, he changed his views regarding taxonomy of a number of species so radically that only a confusing mass of literature is left behind which can only be sorted and sifted by an examination of material from type localities.

The earlier naturalists, such as Bloch,[5] Cuvier and Valenciennes[6] described a large number of Indian species from specimens collected in Malabar. Some of these species have now proved to be widely distributed, while others are restricted to the Peninsula. The fauna of

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[1] Blanford, *Phil. Trans. Roy. Soc. London* (B), CXCIV, p. 345 (1901).
[2] Jerdon, *Madras Journ. Litt. & Sci.*, XV, pp. 139-149, 302-346 (1848).
[3] Day, *Faun. Brit. Ind. Fish.* 2 vols. (1889).
[4] Hamilton, *Fish. Ganges* (1822).
[5] Bloch, *Naturges. ausländ. Fische*, 3 vols. (1784-95).
[6] Cuvier & Valenciennes, *Hist. Nat. Poiss.*, 22 vols. (1828-49).

the Western Ghats extends not only all along the range but spreads over to the hills of the Peninsula. In consequence, several species described by Sykes[1] from Poona and the adjoining country have been found in the Mysore plateau ; the material under report has thus enabled me to define the precise specific limits of some of Sykes' species.

In recent years Prof. C. R. Narayan Rao[2] contributed two papers on the fish of Mysore and last year I[3] reported on a small collection of fish from the Chitaldrug District. Here I propose to describe the three collections of fish separately, noting in each case the ecological conditions under which the specimens were collected. Three new species are described, while notes are added on a number of rare forms. As the taxonomy of the large-scaled Barbels of South India (fish of the *Mahseer* or *Barbus tor* type) is considerably involved, the treatment of the few specimens of this type in the collections under report is deferred till a monographic study of these fishes is undertaken.

My grateful thanks are due to Prof. C. R. Narayan Rao and Mr. B. S. Bhimachar for their kindness in presenting very valuable collections to the Zoological Survey of India.

1. MR. B. S. BHIMACHAR'S COLLECTION FROM THE MYSORE STATE.

Mr. B. S. Bhimachar of the Zoology Department, Intermediate College, Bangalore, made a collection of fish in the Tunga River at Shimoga (December, 1935), in the Western Ghats (May, 1936) and several other places in the Mysore State. The material, which contains a number of rare forms and a new species of *Nemachilus*, has now been presented to the Zoological Survey of India. At my request Mr. Bhimachar has very kindly sent to me the following observations on the ecology and bionomics of some of the species represented in his collection :—

" The majority of forms in my present collection were obtained from the Tunga river, about half a mile from the railway bridge upwards, near Shimoga. The Tunga River takes its origin in the Western Ghats and flows north-east till it joins the Bhadra at Kudali, a village 9 miles from Shimoga. The Tungabhadra, thus formed, is the main tributary of the river Krishna.

The Tunga River has a wide bed with perennial water and mostly flows over a rocky basin. It is a fast flowing stream like the other South Indian rivers. In the rainy season the river swells up considerably and the water is then muddy. In all other parts of the year the water is crystal clear and is well known for its sweet taste. Though there are some shrubs on the sandy islands in the bed of the river there is really no vegetation in the river itself, except for a good growth of algae on the rocks over which a strong current of water flows.

I have observed *Garra* attached to these rocks. They move very slowly on the rocks without completely detaching themselves from the substratum. As they move they scrape the surface of the rock and devour the algae which form their main food. *Glyptothorax* is scarce in number and is occasionally seen attached to the rocks. Both *Garra* and *Glyptothorax* are difficult to spot out since their upper surface is dark like the rocks. The loaches (*Nemachilus* and *Nemachilichthys*) are found on gravelly bed in shallow water. They do not swim about like other fishes and it is rather difficult to observe them even in clear, shallow water, unless disturbed. The stripes on the body, no doubt, make them conspicuous from the side but viewed from above these

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[1] Sykes, *Trans. Zool. Soc. London*, II, pp. 349-378 (1841).

[2] Rao, *Ann. Mag. Nat. Hist.*, (9) VI, pp. 45-64 (1920) ; Rao & Seshachar, *Half-yearly Journ. Mysore Univ.*, I, No. 2, pp. 1-29 (1927).

[3] Hora, *Rec. Ind. Mus.*, XXXVIII, pp. 1-7 (1936).

fishes are difficult to make out because the colour matches with the gravelly bed of the river. The other forms, particularly the Cyprinoids, are confined to the deeper pools in the bed of the river and avoid the rapid current of water.

The western part of the Mysore State is known as ' Malnád ', which means hilly-country. The hills of this region form the spurs of the Western Ghats. There are thick forests in this area, with a number of rapidly flowing streams, the smaller ones of which dry up in summer. The physical conditions of the country (the slopes of the hills and the climate) are well suited for the growth of coffee and cardamom. In one of the streams flowing in a coffee plantation I have collected *Bhavania annandalei* and *Nemachilus striatus*. This particular stream is on the road-side between Kottigehar and Balehonnur."

Mr. B. S. Bhimachar's material contains a specimen of *Ophicephalus gachua* with an abnormal dorsal fin collected by Dr. B. Thirumálachar in a tank near Mysore and a specimen of *O. punctatus* without the ventral fins. The latter abnormality was noticed in the practical classes by Mr. T. Ramachandra Rao.

Besides the two localities mentioned in Mr. Bhimachar's note fishes were also collected from (i) stream near Kottigehar village, (ii) a tank at Taluguppe village near Sagar, Shimoga District, (iii) Bangalore, (iv) Bhadra river, (v) Bethmangala tank, and (vi) Sulekere tank. The entire collection is listed below according to the localities.

Tunga River at Shimoga.

1. *Mastacembelus armatus* (Lacép.)	2 specimens.
2. *Garra bicornuta* Rao	3 specimens.
3. *Garra jerdonii* (Day)	6 specimens.
4. *Labeo porcellus* (Heckel)	4 specimens.
5. *Barbus pinnauratus* (Day)	2 specimens.
6. *Barbus* sp. (Large-scaled Barbel)	1 specimen.
7. *Barbus dorsalis* (Jerdon)	2 specimens.
8. *Barbus kolus* Sykes	1 specimen.
9. *Barbus ticto* (Ham.)	1 specimen.
10. *Barbus sophore* (Ham.)	1 specimen.
11. *Cirrhina fulungee* (Sykes)	4 specimens.
12. *Scaphiodon nashii* (Day)	4 specimens.
13. *Rasbora daniconius* (Ham.)	3 specimens.
14. *Esomus barbatus* (Jerdon)	3 specimens.
15. *Danio strigillifer Myers*	5 specimens.
16. *Danio malabaricus* (Jerdon)	1 specimen.
17. *Barilius bendelisis* Ham.	2 specimens.
18. *Barilius barila* Ham.	1 specimen.
19. *Barilius barna* Ham.	6 specimens.
20. *Labauca atpar* (Ham.)	4 specimens.
21. *Chela argentea* Day	9 specimens.
22. *Nemachilus bhimachari*, sp. nov.	1 specimen.
23. *Nemachilus anguilla* Annandale	1 specimen.
24. *Nemachilus denisonii* Day	2 specimens.
25. *Nemachilichthys shimogensis* Rao	5 specimens.
26. *Lepidocephalichthys thermalis* (C. & V.)	9 specimens.
27. *Glyptothorax dekkanensis* (Günther)	1 specimen.
28. *Xenentodon cancila* (Ham.)	1 specimen.
29. *Ophicephalus gachua* Ham.	4 specimens.
30. *Ambassis ranga* (Ham.)	5 specimens.
31. *Glossogobius giuris* (Ham.)	2 specimens.

A stream on the road-side between Kottigehar and Balehonnur, Western Ghats.

1. *Bhavania annandalei* Hora	4 specimens.
2. *Nemachilus striatus* Day	10 specimens.

A stream near Kottigehar Village, Western Ghats.

1. *Barbus ticto* (Ham.)	11 specimens.
2. *Barbus melanampyx* Day	6 specimens.
3. *Brachydanio rerio* (Ham.)	6 specimens.

A tank at Taluguppe Village near Sagar, Shimoga District.

1. *Nemachilus dayi* Hora	3 specimens.
2. *Lepidocephalichthys thermalis* (C. & V.)	5 specimens.
3. *Panchax lineatus* C. & V.	2 specimens.

Round about Bangalore.

1. *Barbus kolus* Sykes	1 specimen.
2. *Chela clupeoides* (Bloch).	2 specimens.
3. *Nemachilus denisonii* Day	1 specimen.
4. *Nemachilus striatus* Day	9 specimens.

Sulekere tank.

1. *Barbus ticto* (Ham.)	1 specimen.
2. *Chela clupeoides* (Bloch)	1 specimen.

Bethmangala tank.

1. *Nemachilus denisonii* Day	13 specimens.

Bhadra river.

1. *Barbus sophore* (Ham.)	1 specimen.
2. *Rasbora daniconius* (Ham.)	1 specimen.
3. *Esomus barbatus* (Jerdon)	1 specimen.
4. *Barilius bendelisis* (Ham.)	2 specimens.

As has been indicated above there is only one new species in Mr. Bhimachar's collection, but the material has enabled me to add notes on a few rare and interesting forms, such as *Labeo porcellus*, *Barbus pinnauratus*, *Scaphiodon nashii*, *Danio strigillifer*, *Bhavania annandalei*, *Nemachilus striatus*, *N. anguilla*, *Glyptothorax dekkanensis* and two abnormal specimens of *Ophicephalus*. Attention may specially be directed to the nature of the gill-openings in *Bhavania* which are small and restricted above the base of the pectoral fins. Among the Homalopterinae, as a rule, the gill-openings are fairly wide; but in *Bhavania* the form of these structures corresponds with that found in several genera of the Gastromyzoninae, such as *Gastromyzon*, *Neogastromyzon*, *Beaufortia*, *Sewellia*, and *Pseudogastromyzon*. The discovery of *Danio strigillifer* from S. India deserves special mention, as the species was only recently described by Myers from Upper Burma and has not so far been found in India proper. The occurrence of abnormal forms among the Ophicephalidae is not rare, but the two cases reported here

are of exceptional interest, firstly because the abnormality of the dorsal fin is rare and secondly because the absence of the ventral fins, though common in *O. gachua,* is of rare occurrence in the other species.

Labeo porcellus (Heckel).

1877. *Labeo porcellus,* Day, *Fish. India,* p. 539, pl. cxxviii, fig. 1.

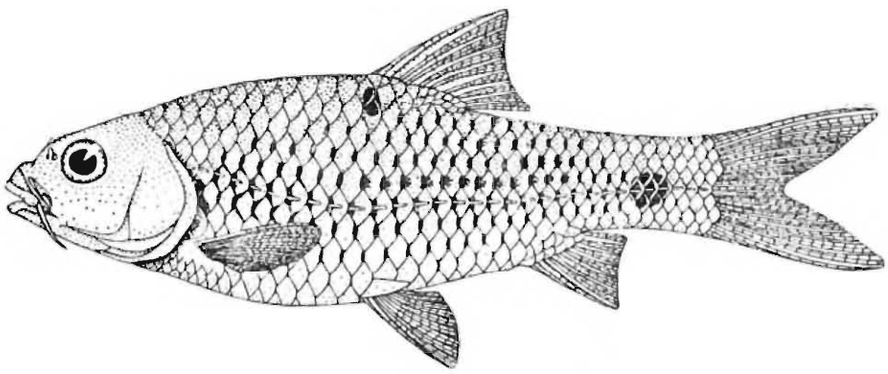
Labeo porcellus has hitherto been known from Bombay and Poona. Mr. Bhimachar obtained 4 specimens, 92-119 mm. in total length, from the Tunga river at Shimoga. It is evidently a small species, as no specimen over 7 inches in length has been found so far.

The upper lip and the rostral fold are slightly fimbriated, whereas the lower lip is strongly papillated. The papillae are long and slender and cover the entire exposed part of the lip. Such a condition of the lip seems to be antecedent to that found in *Labeo dero* (Ham.)[1] and some other Himalayan species. A transverse groove and a number of open pores on the snout are also present in *L. porcellus.*

Barbus pinnauratus (Day).

1877. *Barbus pinnauratus,* Day, *Fish. India,* p. 561, pl. cxxxix, fig. 3.

Barbus pinnauratus is represented by two young specimens, 85 and 94 mm. in total length respectively, collected from the Tunga river



Text-fig. 1.—Lateral view of a specimen of *Barbus pinnauratus* (Day) from the Tunga River. Nat. Size.

at Shimoga. Besides the characteristic colouration of the species as described by Day, in the specimens under report there is a short, somewhat oblique, deep black mark below the dorsal spine.

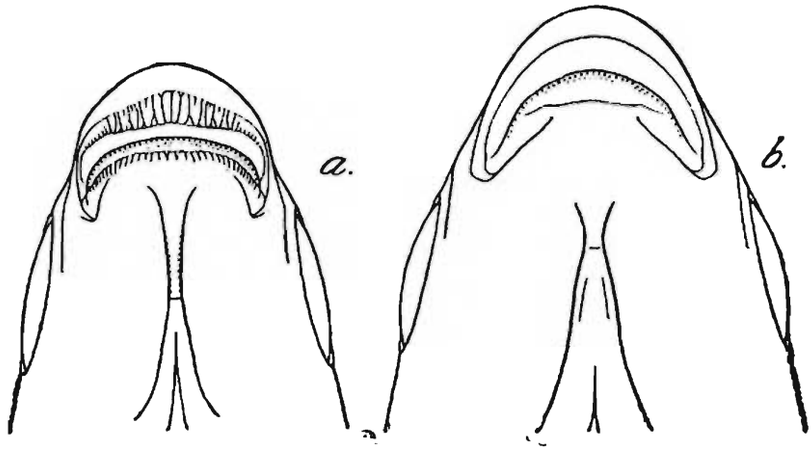
Scaphiodon nashii (Day).

1931. *Scaphiodon nashii,* Mukerji, *Journ. Bombay Nat. Hist. Soc.,* XXXV, p. 169, fig. 3.

Mr. B. S. Bhimachar collected 4 specimens of *Scaphiodon nashii* from the Tunga river at Shimoga; they are from 84 to 104 mm. in total length. The structure of the mouth, lips and jaws is more or less similar to that described and figured by Mukerji in 3 specimens, 92, 95 and 104 mm. in length respectively; while in the smallest specimen

[1] Hora & Mukerji, *Rec. Ind. Mus.,* XXXVIII, p. 142 (1936); Hora, *ibid.,* p. 320.

the mouth is broad and is very much like that of an *Osteochilus*. According to Day " In the young the jaws are compressed, each with a cartilaginous covering : the lips at the angle are thick and continuous, not



TEXT-FIG. 2.—Ventral surface of head of a young and a half-grown specimen of *Scaphiodon nashii* (Day), showing changes in the nature of mouth, jaws and lips. ×3½.

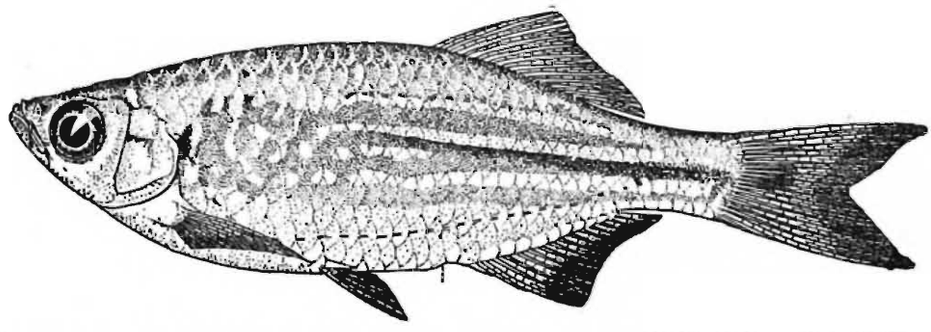
a. From a specimen 65 mm. in length without the caudal.
b. From a specimen 82 mm. in length without the caudal.

continued across the chin. As age increases the mouth widens, the cartilaginous covering becomes more horny, and the colours of the fish alter." It seems probable that in writing up his note Day erroneously attributed the structure of the young to the adult specimen. One of the specimens of *Scaphiodon nashii* examined by Day is stated to have been 4 inches (approximately 100 mm.) in length. The other two specimens noted to have been collected in South Canara were probably smaller as they showed characters of " *Osteochilus malabaricus* " The structure of the mouth and associated parts of the two stages is figured here for future reference.

Danio strigillifer Myers.

1924. *Danio strigillifer*, Myers, *Amer. Mus. Novitates*, No. 150, p. 1.

Danio strigillifer was described by Myers from two specimens collected at Myaing in Upper Burma. The South Indian specimens, which I now



TEXT-FIG. 3.—Lateral view of a specimen of *Danio strigillifer* Myers from the Tunga river. ×1⅓.

refer to this species, agreed so closely with Myers' description that they could not be separated from it by any well marked character. Since the occurrence of precisely the same form in such widely separated

localities was a matter of cosiderable significance I sent a specimen to Dr. J. T. Nichols, Curator of Recent Fishes at the American Museum of Natural History, and requested him to compare it with the type-specimen of Myers' species. He has replied as follows :—

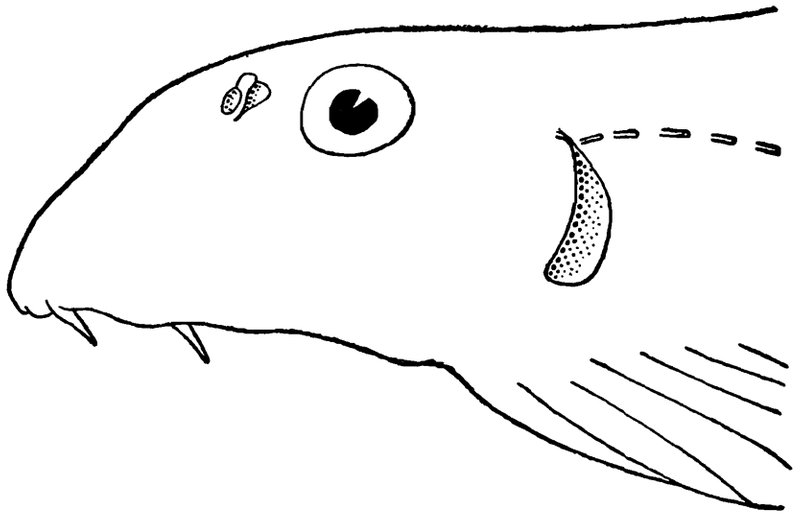
" I have just compared the specimen that you sent with Myers' *D. strigillifer*, American Museum No. 8351, and believe they are the same thing. The specimens are not in a very good state of preservation with colour almost entirely faded out, and I was unable to make out the barbels satisfactorily, but notice that Myers described them as in your fish."

There are a number of genera, such as *Silurus*, *Thynnichthys* and *Homaloptera* (*s. l.*), which are common to Burma, Assam Hills, Eastern Himalayas and South India, but, so far as I am aware, there is no record of any Indian species with such a discontinuous range of distribution.

Bhavania[1] **annandalei** Hora.

1920. *Bhavania annandalei*, Hora, *Rec. Ind. Mus.*, XIX, p. 203, pl. x, figs. 1-3; pl. xi, figs. 5-7.

The South Indian members of the family Homalopteridae had been so much confused with those occurring in the Darjeeling Himalayas and the hill ranges of Assam that considerable difficulty was experienced in separating them. Finally, however, Homalopteridae of India[2] were grouped into three genera, *viz.*, *Balitora* Gray from the Darjeeling Himalayas, the Assam hill ranges and Upper Burma, *Homaloptera* van Hasselt from Tenasserim and *Bhavania* Hora from the hill ranges of the Peninsula. The description of the last genus was based on immature specimens of two species which differed from *Balitora* in the form of the pectoral



TEXT-FIG. 4.—Lateral view of head and anterior part of body of *Bhavania annandalei* Hora, showing the position and extent of its gill-opening. ×4⅓.

fins and the number of rays in them. When material of extra Indian species of *Homaloptera* became available in the Indian Museum for

[1] Prashad & Mukerji (*Rec. Ind. Mus.*, XXXI, p. 186, footnote, 1929) have already pointed out that my choice of the name *Bhavania* was rather unfortunate, for a similar name had been used by Schmarda for a Polychaete *Bhawania* in *Neue Wirbellose Thiere*, I, ii, p. 164, 1861. The different spellings of the two names, however, permit of *Bhavania* being retained as a valid genus.

[2] Hora, *Rec. Ind. Mus.*, XIX, pp. 195-215 (1920).

examination, it was found that in this genus the snout is either broad and rounded, as in *Bhavania,* or long and pointed, as in the Tenasserim species of *Homaloptera.* The great variation in form and structure of the pectoral fins in different species of *Homaloptera* made me[1] abandon the genus *Bhavania,* unfortunately without a careful study of the poor material even then available from S. India.

In Mr. B. S. Bhimachar's collection there are four well preserved specimens of *Bhavania annandalei* from 35 to 83 mm. in length. They agree with my description, but I omitted to record in the original account that in *Bhavania* the gill-openings are small and are situated entirely above the base of the pectoral fins. This feature is of exceptional interest, for in no other genus of the Homalopterinae the gill-openings are restricted above the base of the pectoral fins. This feature alone is of sufficient merit to distinguish *Bhavania* from the rest of the Homalopterinae.

In the Gastromyzoninae,[2] however, the gill-openings are restricted in quite a number of genera—*Pseudogastromyzon, Sewellia, Beaufortia, Neogastromyzon* and *Gastromyzon.* It was indicated by me[3] that though the specialisation of form shows parallel evolution in the two subfamilies of the Homalopteridae, the modification of the gill-openings had not undergone similar changes in the two series, although they are used for the same purpose in a similar environment. The discovery of small gill-openings in *Bhavania* supplies a further proof of the parallelism in evolution, and shows that the causes that brought about this condition were probably the results of some divergent modifications in the original stock.

Nemachilus striatus Day.

1877. *Nemachilus striatus,* Day, *Fish. India,* p. 617, pl. cliii, fig. 8.

Mr. Bhimachar collected a fine series of 10 specimens of *Nemachilus striatus* from a rapid stream in a Coffee Plantation, Western Ghats. These specimens vary in length from 25—50 mm., while Day's largest specimen was $2\frac{1}{2}$ inches. The form and colouration shown in Day's figure probably represent these features in an adult specimen. In the young individuals before me colouration varies considerably. In a specimen about 25 mm. in length there are only 8 vertical bands on the body, some of which show clear indications of splitting up vertically. These bands go on increasing in number and in a specimen about 50 mm. in length there are 12 bands. The bands in the anterior region become indistinct but the increase in their number continues behind the dorsal fin. According to Day the number of bands is from 12—16 in the part of the body behind the commencement of the dorsal fin.

One constant feature of colouration, to which Day makes no reference, is the presence at the base of the anterior dorsal rays of a jet black spot; this is very prominent in the young individuals.

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[1] Hora, *Rec. Ind. Mus.,* XXXIII, pp. 67-69 (1931); *Mem. Ind. Mus.,* XII, p. 274 (1932).

[2] Hora, *Mem. Ind. Mus.,* XII, p. 304 (1932).

[3] Hora. *Mem. Ind. Mus.,* XII, p. 326 (1932).

According to Day the lateral line passes direct from the centre of the orbit to the middle of the base of the caudal fin. In the specimens before me the lateral line is marked only for a short distance in the anterior region.

Both Day and Mr. B. S. Bhimachar collected specimens of *N. striatus* in association with *Bhavania annandalei.*

Nemachilus anguilla Annandale.

1919. *Nemachilus anguilla,* Annandale, *Rec. Ind. Mus.*, XVI, p. 127, pl. i, fig. 3 ; pl. iii, fig. 1.

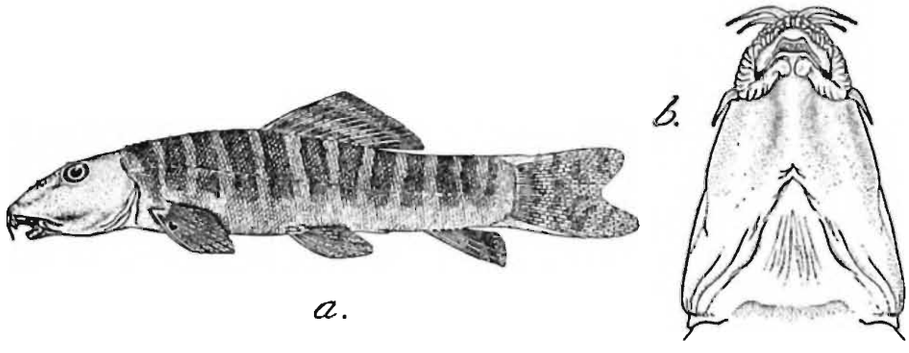
Nemachilus anguilla was described from 3 specimens collected in the Yenna River at Medha, Satara District, Bombay Presidency. Mr. Bhimachar obtained a young specimen, about 42 mm. in total length, from the Tunga River at Shimoga. This species can be readily distinguished by the presence of two short, stout, digitiform processes in front of the upper lip.

In the specimen under report the row of large, rectangular spots running along the mid-lateral line is more prominently marked.

Nemachilus bhimachari, sp. nov.

D. 2/12 ; A. 2/5 ; P. 11 ; V 7 ; C. 18.

Nemachilus bhimachari is a stoutly built species in which the dorsal profile is moderately arched while the ventral profile is straight and horizontal throughout. The head is pointed ; its length is equal to the length of the caudal fin and is contained about 5 times in the total length of the fish. The width of the head is slightly greater than its height at the occiput which is about half the length of the head. The eyes are situated in the posterior half of the head and are placed dorso-laterally ; they are not visible from the ventral surface and are one



TEXT-FIG. 5.—*Nemachilus bhimachari,* sp. nov.

a. Lateral view of type-specimen Nat. Size. *b.* Ventral surface of head of same. ×2½.

diameter apart. The diameter of the eye is contained about 5 times in the length of the head and 2·5 times in the length of the snout. The mouth opening is small, crescentic and horizontal. The lips are fleshy and fimbriated ; they are continuous at the angles of the mouth, but the lower lip is interrupted in the middle. The lips do not cover the anterior portion of the jaws which are sharp and horny. The upper jaw is produced into a beak-like process in the middle while the lower jaw has a broad, rasping edge. The barbels are small ; the inner rostrals

and maxillaries are subequal and are as long as the diameter of the eye while the outer rostrals are considerably shorter. The gill-openings are mostly lateral and extend to just below the base of the pectoral fin.

The depth of the body is contained about 6·5 times in the total length of the fish. The caudal peduncle is considerably higher than long. The body is covered throughout with small distinct scales which are somewhat faintly marked on the ventral surface. The lateral line is distinctly marked up to the base of the anal fin. There are small fleshy appendages at the bases of the paired fins.

The dorsal fin commences considerably in advance of the ventrals and its commencement is equally distant from the tip of the snout and the base of the caudal fin ; its base is slightly shorter than the head and its upper border is truncate. The longest ray of the dorsal is not as high as the depth of the body below it. The pectoral fin is pointed in the middle ; its length equals the head in front of the posterior margin of the orbit ; it is separated from the ventral by a distance equal to about half of its length. The ventral fin is almost as long as the pectoral and is similarly pointed in the middle ; it just misses the anal opening. The anal fin, when laid flat, reaches the base of the caudal fin which is emarginate with rounded lobes ; the lower lobe is longer than the upper.

The colouration is very characteristic of the species. There are about a dozen black bands which are vertical in the posterior region and obliquely directed forward in the anterior region ; these bands are wider than the pale-olivaceous interspaces between them. The dorsal fin is marked with three broad bands, the outermost forms a black edge to the fin. The caudal fin is marked with a number of incomplete bands. A black streak runs from the eye to the tip of the snout.

Locality.—Tunga River at Shimoga (December, 1935).

Type-specimen.—F12178/1, *Zoological Survey of India* (*Ind. Mus.*), *Calcutta.*

Remarks.—*Nemachilus bhimachari* represents an intermediate form between *Nemachilus* and *Nemachilichthys*, and it seems questionable whether the latter genus, which is distinguished from the former by the length of its dorsal fin and the elongated snout, is really distinct from *Nemachilus*. Attention may here be directed to the fact that in several species of *Barbus*, such as *B. curmuca*, *B. dobsoni*, *B. kolus*, etc., occurring in the Western Ghats and the hill ranges of the Peninsula the snout is also somewhat cylindrical and elongated.

In its general facies *N. bhimachari* is abundantly distinct from all other species of *Nemachilus* known from India ; its most salient features are (i) elongated snout, (ii) fimbriated lips, (iii) oblique, vertical bands ; (iv) colouration of dorsal and caudal fins and (v) form of caudal fin.

Glyptothorax dekkanensis (Günther).

1923. *Glyptothorax dekkanensis*, Hora, *Rec. Ind. Mus.*, XXV, p. 24, text-fig. 3

In Mr. Bhimachar's collection there is a fine example of *Glyptothorax dekkanensis*, about 140 mm. in total length. The specimen agrees with Günther's description and my observations on this species.

The body is covered with small, longitudinally arranged tubercles of unequal size ; those along the lateral line are of a somewhat larger size and form a regular series. These tubercles are absent along the dorsal surface, at the base of the dorsal fin and on the head.

Two abnormal specimens of *Ophicephalus* spp.

The absence of the ventral fins is a fairly common abnormality in the members of the genus *Ophicephalus* but amongst Indian species such a condition is usually associated with *O. gachua*.[1] Mr. B. S. Bhimachar has sent an undoubted specimen of *O. punctatus* Bloch, about 169 mm. in total length, in which both the ventral fins are wanting. Unfortunately there is an incision in the mid-ventral line, but, so far as can be ascertained, there does not seem to be any abnormality in lepidosis in the region of the ventral fins. In all other respects the specimen is quite normal.

Of unusual interest is the abnormal condition of the dorsal fin in a young specimen of *O. gachua* Ham., 93 mm. in total length. The dorsal fin is divided into two portions, the anterior smaller, consisting of 2 or 3 rays and commencing about the 6th scale behind the upper angle of the gill-opening. This portion is separated from the normal fin by a distance almost equal to twice the diameter of the eye and the intervening space is covered by about 5 scales. In other respects the specimen is quite normal.

2. Dr. H. S. Rao's Collection from the Mysore State.

In November-December 1928, Dr. H. S. Rao of the Zoological Survey of India collected fishes in the Shimoga and Kadur Districts of the Mysore State. I give below a short description of the localities based on Dr. Rao's notes, with lists of species collected therefrom :

Sharavati River below the Jog Falls, 2 miles below the Mysore Bungalow. 26.xi.1928.

" The stream is over 500 feet below the point at which the falls begin and is strewn with huge granite boulders. In the course of the stream there are shallow pools with sandy bottom."

1. *Barbus* sp. (Large-scaled Barbel) — 1 specimen.
2. *Barbus filamentosus* (C. & V.) — 1 specimen.

A hill-stream on the Jog-Sagar Road near the junction of the road leading to the ferry. 30.xi.1928.

" Bed strewn with large stones and boulders ; in places with gravel."

1. *Brachydanio rerio* (Ham.) — 1 specimen.
2. *Panchax lineatus* C. & V. — 1 specimen.

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[1] Hora & Mukerji, *Rec. Ind. Mus.*, XXXVI, p. 137 (1934).

Stream north of Sagar Rest House, Shimoga Dist. 1-2.xii.1928.

" Full of weeds and algae. Bed sandy in some parts, gravelly in others."

1. *Mastacembelus armatus* (Lacép.)	1 specimen.
2. *Garra jerdoni* (Day)	1 specimen.
3. *Barbus ticto* (*Ham.*)	55 specimens.
4. *Rasbora daniconius* (Ham.)	11 specimens.
5. *Danio strigillifer* Myers	1 specimen.
6. *Brachydanio rerio* (Ham.)	87 specimens.
7. *Nemachilus denisonii* Day	1 specimen.
8. *Nemachilus sinuatus* Day	1 specimen.
9. *Lepidocephalichthys thermalis* (C. & V.)	72 specimens.
10. *Panchax lineatus* C. & V.	14 specimens.
11. *Macropodus cupanus* (C. & V.)	30 specimens.
12. *Ophicephalus gachua* Ham.	2 specimens.

Streams and pools on the Kalurkatte Road near Sagar, Shimoga Dist. 3.xii.1928.

" Bottom covered with gravel in some parts and with sand and mud in other parts."

1. *Barbus ticto* (Ham.)	7 specimens.
2. *Barbus vittatus* Day	2 specimens.
3. *Barbus cosuatus* (Ham.)	1 specimen.
4. *Rasbora daniconius* (Ham.)	1 specimen.
5. *Esomus barbatus* (Jerdon).	2 specimens.
6. *Brachydanio rerio* (Ham.)	59 specimens.
7. *Lepidocephalichthys thermalis* (C. & V.)	3 specimens.
8. *Panchax lineatus* C. & V.	52 specimens.
9. *Macropodus cupanus* (C. & V.)	19 specimens.

Tank near Sagar Rest House, Shimoga Dist. 3-5.xii.1928.

" Surface covered with abundant growth of aquatic vegetation."

1. *Rasbora daniconius* (Ham.)	4 specimens.
2. *Panchax lineatus* C. & V.	23 specimens.
3. *Macropodus cupanus* (C. & V.)	4 specimens.

Stream near Kugve, 4 miles west of Sagar, Shimoga Dist. 4.xii.1928.

" Muddy with lot of vegetation."

1. *Mastacembelus armatus* (Lacép.)	1 specimen.
2. *Barbus dorsalis* (Jerdon)	4 specimens.
3. *Rasbora daniconius* (Ham.)	4 specimens.
4. *Esomus barbatus* (Jerdon)	1 specimen.
5. *Ophicephalus gachua* Ham.	4 specimens.

Streams on the Sagar-Shimoga Road, Shimoga Dist. 5.xii.1928.

1. *Garra jerdoni* (Day)	2 specimens.
2. *Rasbora daniconius* (Ham.)	1 specimen.
3. *Labauca atpar* (Ham.)	3 specimens.
4. *Nemachilus denisonii* Day	2 specimens.

Tunga River at Shimoga. 8-10.xii.1928.

" Rocky in the middle, sandy or full of gravel near the banks. Mostly shallow, but with deep pools in the middle. Small, sandy pools near the bank overgrown with weeds."

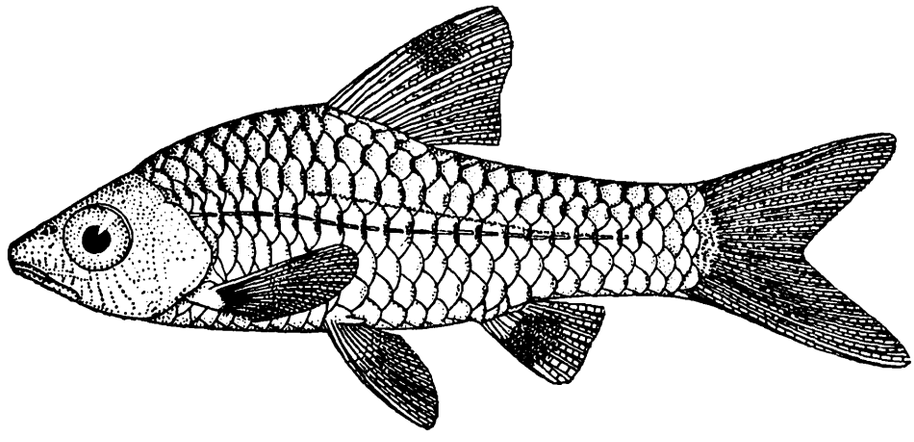
1. *Garra jerdoni* (Day)	2 specimens.
2. *Barbus pinnauratus* (Day)	2 specimens.
3. *Barbus sophore* (Ham.)	7 specimens.
4. *Barbus dorsalis* (Jerdon)	2 specimens.
5. *Barbus pulchellus* (Day)	1 specimen.
6. *Cirrhina fulungee* (Sykes)	2 specimens.
7. *Rasbora daniconius* (Ham.)	8 specimens.
8. *Esomus barbatus* (Jerdon)	3 specimens.
9. *Rohtee duvaucelli* (C. & V.)	1 specimen.
10. *Labauca atpar* (Ham.)	1 specimen.
11. *Nemachilichthys shimogensis* Rao.	1 specimen.
12. *Mystus cavasius* (Ham.)	11 specimens.
13. *Ophicephalus punctatus* Bloch.	1 specimen.
14. *Ambassis ranga* (Ham.)	1 specimen.

Bhadra River at Bhadravati, Shimoga Dist. 12-14.xii.1928.

" Bottom rocky in places but mostly covered with thick layer of silt. At the sides the bed consists of large gravel or coarse sand. Vegetation rather scanty, except for small shrubs in sandy part. Filamentous and other algae in abundance."

1. *Barbus dorsalis* (Jerdon)	2 specimens.
2. *Barbus ticto* (Ham.)	13 specimens.
3. *Rasbora daniconius* (Ham.)	20 specimens.
4. *Esomus barbatus* (Jerdon)	28 specimens.
5. *Danio strigillifer* Myers	1 specimen.
6. *Labauca atpar* (Ham.)	43 specimens.
7. *Lepidocephalichthys thermalis* (C. & V.)	15 specimens.
8. *Panchax lineatus* C. & V.	15 specimens.
9. *Macropodus cupanus* (C. & V.)	3 specimens.

From the description of the localities it is clear that Dr. Rao collected fishes from pools and puddles and, in consequence, the fish-association in this lot mostly consists of small, surface-living or mud-living species. Only a few rapid-water forms are present and the larger species are represented by young specimens only.



TEXT-FIG. 6.—Lateral view of a specimen of *Barbus cosuatus* (Ham.), to show the colour spots on the dorsal and anal fins and sensory folds on the head. $\times 3\frac{2}{3}$.

Most of the species represented in this lot do not call for any comments, but attention may here be directed to the presence of an apodal

specimen of *Ophicephalus gachua*, 63 mm. in total length, and of specimens of *Danio strigillifer* Myers. In the specimen of *Barbus cosuatus* the lateral line is only absent on the last 3 or 4 scales and the black bands on the dorsal and anal fins are represented by well defined patches which become diffuse on the neighbouring rays. The most remarkable feature of this species appears to be the presence of numerous, fine, parallel sensory folds on the sides of the head. This feature it shares with the fishes of the genus *Cyclocheilichthys* Bleeker, but in other respects it is quite different.

3. PROFESSOR C. R. NARAYAN RAO'S COLLECTION FROM THE CAUVERY RIVER IN THE COORG STATE.

Professor C. R. Narayan Rao of the Central College, Bangalore (University of Mysore) has presented to the Zoological Survey of India 211 specimens of fish collected over 10 years ago from the headwaters of the Cauvery River in the Coorg State. Unfortunately the locality labels have been destroyed by the formalin solution in which the specimens had been kept, and the collection also has suffered considerably by a long immersion in this fluid.

Professor Narayan Rao informs me that the fish were collected at 4 places along the Cauvery River—Bhagamandla, Siddapur, Fraserpet, and Dubari. Of these places he writes :—

" The Cauvery takes its source in Bhagamandla where it is a narrow stream with even current of water flowing over soft earth—mostly loamy soil. At Siddapur the stream is still slender and sluggish and there is not much difference in the character of the soil. At Dubari, the river widens out into a fast stream flowing over small boulders and sand. It is still wider at Fraserpet but the current is slow, flowing over a sandy bed."

Of the 54 species represented in this collection, 33 belong to the Cyprinidae, 11 to the Siluroidea (families : Heteropneustidae, Bagridae, Sisoridae, Schilbeidae, and Clariidae), 1 to the Mastacembelidae, 2 to the Cyprinodontidae, 1 to the Xenentodontidae, 3 to the Ophicephalidae, 1 to the Osphronemidae, 1 to the Ambassidae and 1 to the Gobiidae. The fish association fully bears out the nature of the localities as described in Professor Narayan Rao's note ; most of the species are sluggish-water forms.

Besides the two new species of *Barbus*, which belong to the group *Puntius*, there are representatives of several rare forms. Special mention may be made of the fact that *B. filamentosus* and *B. mahecola* are definitely proved to be conspecific, the former represents male individuals and the latter either young or female specimens. *Rasbora caverii* (Jerdon) is redescribed from a large number of specimens ; this species was imperfectly known and had not been recognised as distinct from *B. daniconius*. The precise generic and specific limits of *Pseudeutropius taakree* (Sykes) will be discussed elsewhere.

The following is a complete list of the species represented in Professor Narayan Rao's collection. Most of the forms do not call for any

comments, but the two new species are described below and notes are added on *Barbus filamentosus* and *Rasbora caverii*.

	No. of specimens.
MASTACEMBELIDAE.	
1. *Mastacembelus armatus* (Lacép.)	2
CYPRINIDAE.	
2. *Carassius vulgaris* Nilsson	1
3. *Garra mullya* (Sykes)	8
4. *Garra jerdonii* Day	1
5. *Garra stenorhynchus* (Jerdon)	2
6. *Labeo bogut* (Sykes)	3
7. *Labeo dussumieri* (C. & V.)	3
8. *Barbus chrysopoma* C. & V.	3
9. *Barbus pinnauratus* Day	7
10. *Barbus dubius* Day	1
11. *Barbus micropogon* C. & V.	2
12. *Barbus cauveriensis*, sp. nov.	2
13. *Barbus sophore* (Ham.)	5
14. *Barbus lithopidos* Day	2
15. *Barbus dorsalis* (Jerdon)	17
16. *Barbus kolus* Sykes	2
17. *Barbus filamentosus* (C. & V.)	2
18. *Barbus ticto* (Ham.)	1
19. *Barbus melanampyx* Day	1
20. *Barbus narayani*, sp. nov.	2
21. *Cirrhina fulungee* (Sykes)	1
22. *Cirrhina reba* (Ham.)	2
23. *Scaphiodon thomasii* (Day)	1
24. *Aspidoparia morar* (Ham.)	1
25. *Rohtee ogilbii* Sykes	1
26. *Rohtee neilli* Day	?
27. *Amblypharyngodon microlepis* (Bleeker)	4
28. *Rasbora daniconius* (Ham.)	3
29. *Rasbora caverii* (Jerdon)	21
30. *Esomus barbatus* (Jerdon)	1
31. *Danio malabaricus* (Jerdon)	8
32. *Barilius gatensis* (C. & V.)	7
33. *Nemachilus denisonii* Day	9
34. *Nemachilus dayi* Hora	3
HETEROPNEUSTIDAE.	
35. *Heteropneustes fossilis* (Bloch)	12
BAGRIDAE.	
36. *Mystus aor* (Ham.)	2
37. *Mystus punctatus* (Jerdon)	1
38. *Mystus cavasius* (Ham.)	10
39. *Mystus vittatus* (Bloch)	12
40. *Mystus montanus* (Jerdon)	9
41. *Mystus malabaricus* (Jerdon)	4
SISORIDAE.	
42. *Nangra viridescens* (Ham.)	1
43. *Glyptothorax madraspatanus* (Day)	1

	No. of specimens.
SCHILBEIDAE.	
44. *Pseudeutropius taakree* (Sykes)	1
CLARIIDAE.	
45. *Clarias batrachus* (Linn.)	2
CYPRINODONTIDAE.	
46. *Panchax blochii* (Arnold)	5
47. *Panchax lineatus* C. & V.	1
XENENTODONTIDAE.	
48. *Xenentodon cancila* (Ham.)	4
OPHICEPHALIDAE.	
49. *Ophicephalus marulius* Bloch.	1
50. *Ophicephalus punctatus* Bloch.	2
51. *Ophicephalus gachua* Ham.	4
OSPHRONEMIDAE.	
52. *Macropodus cupanus* (C. & V.)	2
AMBASSIDAE.	
53. *Ambassis ranga* (Ham.)	2
GOBIIDAE.	
54. *Glossogobius giuris* (Ham.)	3

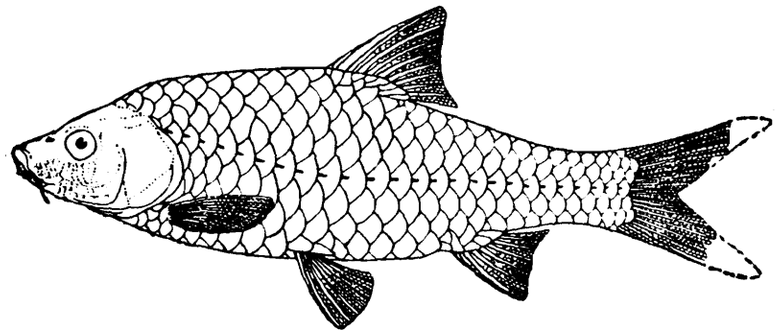
Barbus cauveriensis, sp. nov.

D. 3/8-9 ; A. 2/5-6 ; P. 15-16 ; V 7 ; C. 18.

In *Barbus cauveriensis* the dorsal profile of the head rises sharply from the tip of the snout to the occiput and thereafter gently to the dorsal fin beyond which it gradually slopes down to the base of the caudal fin. The ventral profile is evenly arched throughout. The head is somewhat pointed and the snout considerably produced. In these respects the species corresponds very closely with forms like *B. dubius*, *B. thomassi*, *B. curmuca* and *B. kolus*, all of which are found in South India.

In the two specimens before me the head is proportionately larger in the smaller individual ; it is contained from 3·6 to 3·8 times in the length without the caudal, its width is contained 1·7 times and its height at occiput 1·4 times in its length. The greatest depth of the body is contained from 2·8 to 3·2 times in the length without the caudal ; the body is considerably deeper in the smaller specimen and is almost as thick as the width of the head. The eyes are small and situated almost entirely in the anterior half of the head ; the diameter of the eye is contained from 4·6 to 4·8 times in the length of the head, 1·6 times in the length of the snout and from 1·6 to 1·8 times in the interorbital width. The mouth is small, somewhat oblique, sub-inferior and horse-shoe-shaped ; the maxilla does not extend to the anterior border of the orbit ; the lips are thick, somewhat papillated, and continuous. The post-labial groove is interrupted in the middle. There is a pair of small maxillary barbels which are as long as the diameter of the eye. On the sides of the head there are numerous, fine, parallel sensory folds similar

to those present in fishes of the genus *Cyclocheilichthys* Bleeker. The suborbital ring of bones is narrow.



TEXT-FIG. 7.—Lateral view of the type-specimen of *Barbus cauveriensis*, sp. nov. $\times \frac{1}{2}$.

The scales are large and firmly fixed ; there are from 25 to 26 scales along the lateral line and 9 longitudinal series between the bases of the dorsal and ventral fins. Between the lateral line and the base of the ventral fin there are $3\frac{1}{2}$ rows of scales. The number of scales round the caudal peduncle is 12 and in front of the dorsal fin 9. The scales at the base of the dorsal fin form a tile-like row. The lateral line is complete. The caudal peduncle is from 1·3 to 1·4 times as long as high.

The dorsal fin commences almost midway between the tip of the snout and the base of the caudal fin ; its free border is slightly concave. The dorsal spine is osseous and smooth ; it is three-fourths of the length of the head. The pectorals are considerably shorter than the head and do not extend to the bases of the ventrals which are separated from the anal-opening by a distance almost equal to half of their length. The body between the ventrals and the anal is somewhat keeled. The anal fin is short and is separated from the caudal by a considerable distance. The caudal fin is deeply forked.

The specimens under report are greyish brown, but on account of long immersion in a formalin solution appear to have lost all natural colour.

Locality.—Cauvery River, Coorg State.

Type-specimen.—F 12179/1, *Zoological Survey of India* (*Ind. Mus.*), *Calcutta.*

Remarks.—This is a remarkable species of the genus *Barbus* and can be distinguished by (i) two barbels, (ii) osseous, smooth spine, (iii) large scales, (iv) small eyes, (v) greatly produced snout, (vi) nature of dorsal profile, and (vii) sensory folds on the head. I am not aware of any other species of the genus *Barbus* in any way closely allied to this species, unless any of Jerdon's species, which are very little known, may prove to be this form.

Measurements in millimetres.

Total length without caudal	105·0	124·0
Length of head	28·9	32·5
Width of head	17·0	19·0
Height of head at occiput	20·0	22·5
Depth of body	37·0	39·0
Width of body	16·0	19·0
Diameter of eye	6·0	7·0
Interorbital width	11·0	11·3

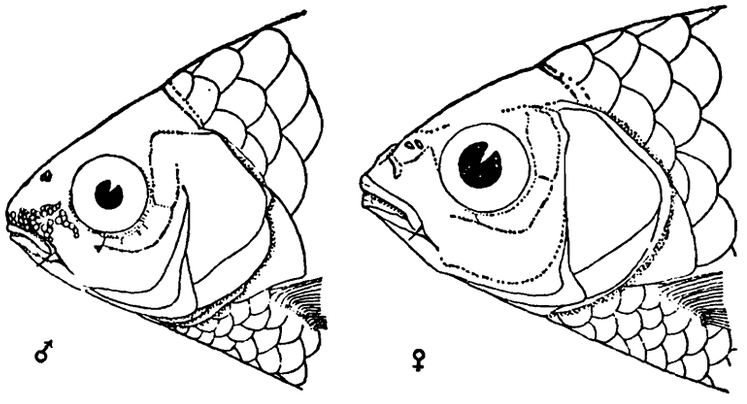
Length of snout	10·0	11·0
Length of dorsal spine	22·0	24·0
Longest ray of anal	14·0	16·5
Length of pectoral	21·0	22·5
Length of caudal peduncle	18·0	22·0
Least height of caudal peduncle	14·0	15·2

Barbus filamentosus (Cuv. & Val.).

1844. *Leuciscus filamentosus*, Cuvier and Valenciennes, *Hist. Nat. Poiss.*, XVII, p. 96, pl. ccccxcii.

Of the very large number of species of the genus *Barbus* (*s. l.*) known from India, *B. filamentosus* can be readily distinguished by its large scales and characteristic colouration. Identically the same features distinguish *B. mahecola* (C. & V.).[1] In his account of the former species Day[2] stated that " It is so similar to *B. Mahecola* (except in wanting barbels) that I have not figured it." When considering the utility of barbels in separating species of *Barbus* Day (*op. cit.*, p. 556) remarked :

" It is remarkable how very similar the *Barbus Mahicola*, C. V which has two barbels, is to the *B. filamentosus*, C. V with none. If a number of examples are examined it will be found that in some these appendages are very minute, the barbels being, as a rule, smallest in specimens obtained furthest from the hills. In South Canara, the Wynaad, and base of the Neilgherries, where the barbels are large, the *B. Mahicola* abounds : towards Cochin and up the Coromandel coast as far as Madras they are small or absent, and *B. filamentosus* is the type. Here, undoubtedly, the question must force itself on one's notice, are we dealing with two distinct species, or one in a state of transition ? If the latter, which is the original form ?"

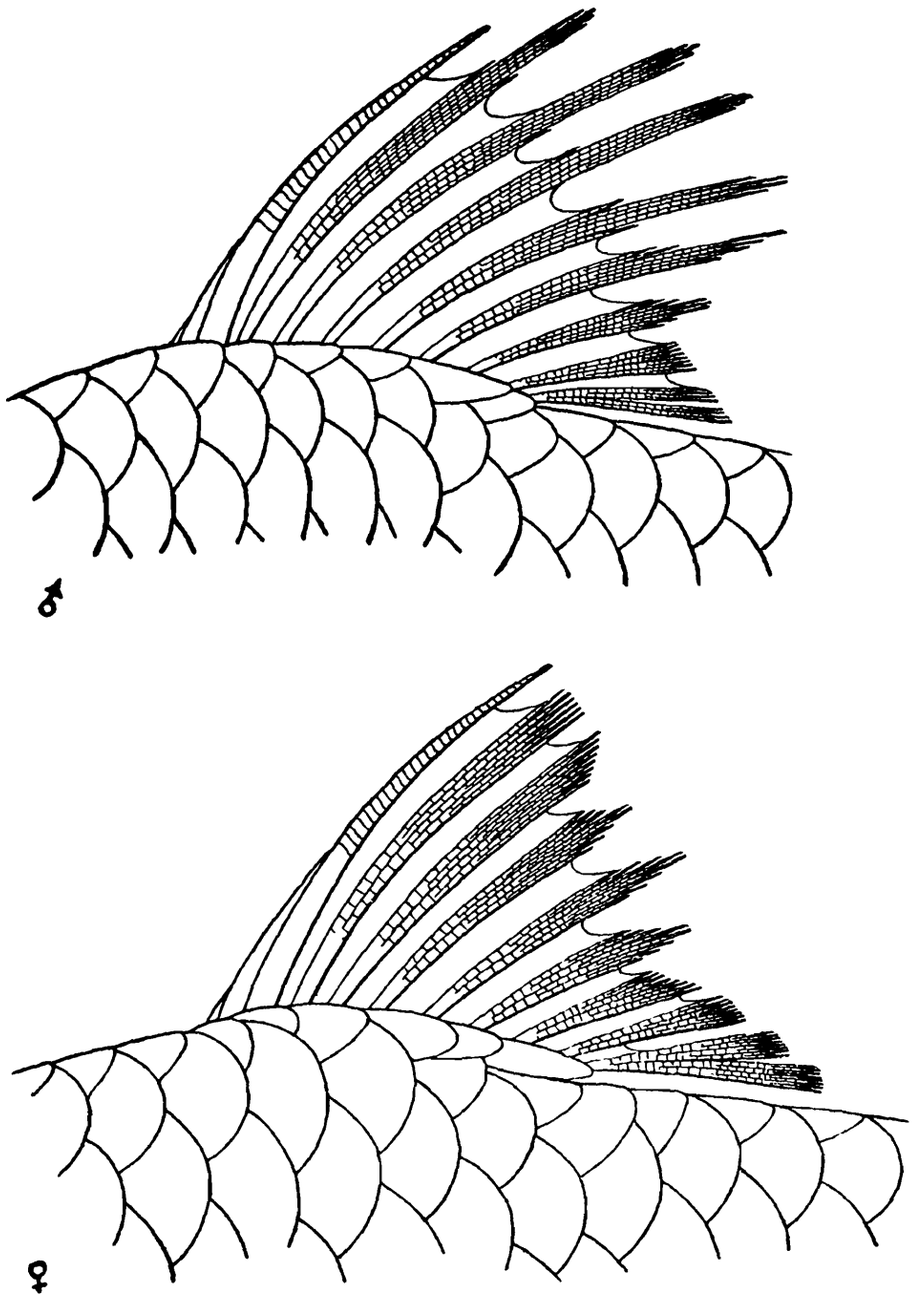


TEXT-FIG. 8.—Lateral view of head and anterior part of body of a male and a female specimen of *Barbus filamentosus* (C. & V.). Nat. Size.

In his " Fishes of Malabar " Day had considered *Puntius filamentosus* as the adult of *P. mahecola*, but Günther[3] did not agree with his view and remarked, " I hesitate to adopt this opinion, because the black caudal spot is more advanced in *B. filamentosus* than in the figure of *L. mahecola*." From an examination of the material in the collection of

[1] Cuvier & Valenciennes, *Hist. Nat. Poiss.*, XVII, p. 305. pl. 502 (1842).
[2] Day, *Fish. India*, pp. 582, 556 (1877).
[3] Günther, *Cat. Fish. Brit. Mus.*, VII, p. 146 (1868).

the Indian Museum I am convinced that Day was fully justified in his views regarding the identity of the two species referred to above. In



TEXT-FIG. 9.—Lateral view of dorsal fin of a male and a female specimen of *Barbus filamentosus* (C. & V.). ×1⅔.

the adult condition, especially at breeding time, secondary sexual characters appear so that in the males the anterior 4 or 5 branched rays of the dorsal fin are prolonged and the snout is covered by a patch of large tubercles on either side in front of the eyes. The male in this condition represents the *filamentosus*-type and the female *mahecola*-type. It was pointed out by Mukerji and myself[1] that more or less similar sexual differences were responsible for *Barbus chagunio* and *B. spilopholus* being recognised as two distinct species. Quite recently Misra and I[2]

[1] Hora & Mukerji, *Journ. As. Soc. Bengal* (N. S.) XXVII 1931, p. 137 (1933).
[2] Hora & Misra, *Rec. Ind. Mus.*, XXXVIII, p. 341 (1936).

described the sexual differences in *Labeo dero*. From the above it is abundantly clear that *B. filamentosus* and *B. mahecola* cannot be regarded as distinct species ; the former name has page priority over the latter.

Attention may here be directed to the fact that Jerdon[1] described this species under three names—*Systomus filamentosus*, *S. assimilis* and *S. madraspatensis*, and the descriptions show that he must have had specimens of different sizes and sexes before him. He also included *Leuciscus mahecola* in his list but had no specimen of the species for examination. Day[2] also described the young of this species as *Puntius (Capoeta) lepidus*, but in his " Fishes of India " he included it in the synonymy of *Barbus mahecola*. Sundara Raj[3] in his account of the freshwater fish of Madras listed both the species but remarked as follows under *B. filamentosus :*

" It is very doubtful if the present species is really distinct from *B. mahecola* (C. & V.). Both forms, those with a pair of minute maxillary barbels (*B. mahecola*) and those without them (*B. filamentosus*), occur in Madras and are identical in all other respects."

I have found minute barbels even in the specimens referred by Day to *mahecola*. On account of their small size, however, they are liable to be overlooked sometimes.

Barbus narayani, sp. nov.

D. 3/9 ; A. 3/6 ; P. 14 ; V 9 ; C. 18.

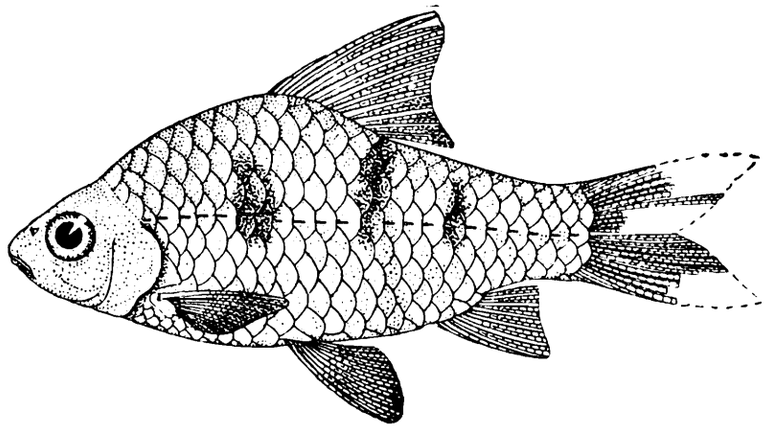
Barbus narayani is a small, well-built species in which both the dorsal and the ventral profiles are greatly arched, the former more so than the latter. The head is short and blunt ; its length is contained about 4 times in the total length without the caudal. The head is almost as high at the occiput as its length, while its width is about two-thirds of the length. The depth of the body is contained about 2·5 times in the length without the caudal while its width is somewhat less than that of the head. The eyes are large and are situated considerably nearer to the tip of the snout than to the posterior border of the operculum. The diameter of the eye is contained about 2·9 times in the length of the head. The snout is shorter than the diameter of the eye while the interorbital width is almost equal to it. The mouth is small and somewhat oblique. The lips are fleshy and continuous ; they are studded with minute spines. The labial groove is interrupted in the middle. The barbels are totally absent.

The scales are well developed ; there are about 22 scales along the lateral line and 9 rows between the bases of the dorsal and ventral fins, 4 rows above the lateral line and 4 rows below it. There are 12 scales round the caudal peduncle and 8 before the dorsal fin. The caudal peduncle is almost as high as long.

The dorsal fin commences slightly in advance of the ventral ; its commencement is nearer the tip of the snout than the base of the caudal. It possesses a feeble and articulated spine which is considerably longer

[1] Jerdon, *Madras Journ. Lit. Sci.*, XV, pp. 318, 319, 322 (1848).
[2] Day, *Proc. Zool. Soc. London*, p. 196 (1868).
[3] Sundara Raj, *Rec. Ind. Mus.*, XII, p. 258 (1916).

than the head ; its free border is slightly concave though rounded at the top. The pectoral fin is slightly shorter than the head, but it extends



TEXT-FIG. 10.—Lateral view of the type-specimen of *Barbus narayani*, sp. nov. $\times 1\frac{1}{4}$.

to the commencement of the ventral fin which is as long as the pectoral. The ventrals just reach the anal-opening. The anal fin is short. The caudal fin is forked.

Due to a long immersion in a formalin solution the original colour has disappeared in the specimens before me ; the general colour at present is greyish-brown. Three vertical black marks on the body are faintly indicated, the first below the commencement of the dorsal, the second below or just behind the dorsal and the third above the posterior half of the anal.

Locality.—Cauvery River, Coorg State.

Type-specimen.—F 12180/1, *Zoological Survey of India* (*Ind. Mus.*), *Calcutta.*

Remarks.—This small species may be distinguished by the following combination of characters : (i) absence of barbels, (ii) smooth, articulated dorsal ray longer than the head, (iii) complete lateral line ; (iv) 22 scales along lateral line and 9 rows between the bases of dorsal and ventral fins, and (v) three vertical marks on the body.

I have great pleasure in associating the name of this species with that of Professor C. R. Narayan Rao through whose generosity the Zoological Survey has received a valuable collection from the Cauvery River.

Measurements in millimetres.

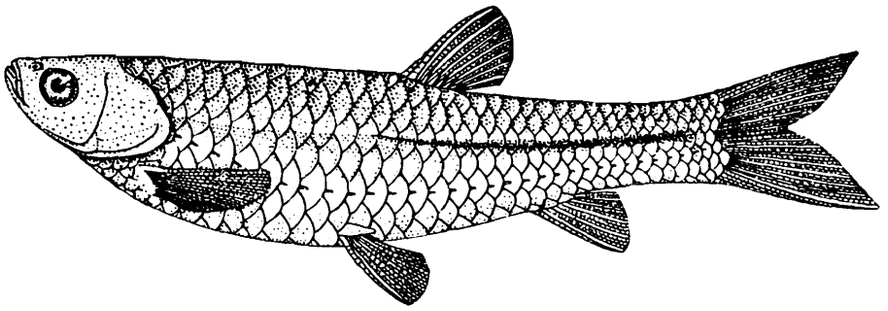
Total length without caudal	46·0	47·0
Length of head	11·5	11·5
Width of head	8·0	8·0
Height of head at occiput	11·3	11·4
Depth of body	18·0	19·0
Width of body	7·0	7·0
Diameter of eye	4·0	4·0
Interorbital width	4·0	4·3
Length of snout	3·6	3·6
Length of dorsal spine	13·5	13·6
Longest ray of anal	9·0	9·0
Length of pectoral	11·0	11·0
Length of caudal peduncle	8·0	8·0
Least height of caudal peduncle . .	7·5	7·6

Rasbora caverii (Jerdon).

1848. *Leuciscus Caverii*, Jerdon, *Madras Journ. Lit. & Sci.*, XV, p. 320.

Jerdon's *Leuciscus caverii* has not been recognised as a distinct species both by Günther[1] and Day[2], the former listed it among the species insufficiently described for their systematic position to be ascertained from the accounts given, while Day included it in the synonymy of *Rasbora daniconius* (Ham.) without any comments. In Professor C. R. Narayan Rao's collection there are 21 specimens of a species of *Rasbora*, which are abundantly distinct from *R. daniconius* and *R. rasbora*, and seem to agree with the meagre and inadequate description of *Leuciscus caverii*, which, according to Jerdon, is very common in the Cauvery and all its branches. Jerdon's description of *L. caverii* is as follows :—

" Head about one-fourth length of body ; height one-fifth of length ; eye nearly one-fifth of length of head ; dorsal placed a little behind the middle of back, nearly opposite to anal ; 30 scales along the side in 7 rows—D. 9, A. 6—green above, silvery beneath ; cheeks golden ; a blue stripe from operculum to tail, with a narrow yellow one above it ; lateral line concave—usually about 3 inches long."



TEXT-FIG. 11.—Lateral view of an adult specimen of *Rasbora caverii* (Jerdon). Approximately natural size.

The above description agrees more particularly with the smaller individuals before me, while the proportions, etc., of the adult specimens are quite different. Jerdon also noted that—

" I possess a sketch of another *Leuciscus* from the Cauvery of which I have lost my specimen, which appears to differ from any of these. It is nearly allied to *L. Caverii* in form, but has a much larger eye, and the depression in the crown more marked, muzzle in front of the depression continuing straight, parallel with the back ; profile of abdomen good deal arched ; lateral line much curved. I am unable to give the number of rays or scales."

In the case of Jerdon it is known that he very often recognised the young and adult specimens of a fish as distinct species and the above two descriptions seem to refer to the different stages of growth of the same species. The description of the dorsal and the ventral profiles as also of the lateral line agree with the same features in the adult specimens before me.

As to the precise systematic position of Jerdon's *Leuciscus malabaricus*, and *L. flavus*, which Day included in the synonymy of *Rasbora daniconius* along with *L. caverii*, it is very difficult to express an opinion without examining fresh material from the type-localities.

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[1] Günther, *Cat. Fish. Brit. Mus.*, VII, p. 5 (1868).
[2] Day, *Fish. India*, p. 584 (1877).

Rasbora caverii may now be redescribed as follows :—

D. 2/7 ; A. 1/5 ; P. 14 ; V 7 ; C. 19.

In the adult specimens the dorsal profile is almost straight and horizontal while the ventral profile is greatly arched. In the young individuals, however, both the dorsal and the ventral profiles are only slightly arched. The head is bluntly pointed ; it is relatively large in young individuals, its length being contained from 5·1 to 5·6 times in the total length and from 4·2 to 4·6 times in the length without the caudal. The width and height of head increase with growth, the former is contained from 1·9 to 2·6 times and the latter from 1·4 to 1·8 times in the length of the head. The depth of the body is contained about 5 times in the total length and from 3·9 to 4·2 times in the length without the caudal. The eye is situated entirely in the anterior half of the head ; its diameter is contained from 3·5 to 3·6 times in the length of the head. The snout is somewhat shorter than the diameter of the eye. The interorbital space is narrower in the young individuals, being less than the diameter of the eye. In adults the space between the orbits is flat and about $1\frac{1}{3}$ times the diameter of the eye. The mouth is small and obliquely directed upwards ; the maxilla does not extend to below the anterior margin of the orbit. The lower jaw bears a prominent knob in the middle and there is a corresponding emargination in the upper jaw. The lips are moderately fleshy and continuous ; the post-labial groove is interrupted in the middle. The pharyngeal teeth are curved and sharp ; they are situated in 3 rows : 4, 3, 2. The barbels are totally absent. The gill-membrane is well developed.

The scales are thin but firmly adherent ; their exposed portions are marked with a large number of radii. The lateral line is complete and curved ; there are about 32 perforated scales. The number of scales from the upper angle of the gill-opening to the base of the caudal is about 36-37 There are 7 series of scales between the bases of the dorsal and ventral fins and $1\frac{1}{2}$ to 2 between the lateral line and the base of the ventral fin. The number of predorsal scales is 16-17, while there are 14 scales round the caudal peduncle, which is almost twice as long as high. There is a scaly appendage in the axil of the ventral fin.

The dorsal fin commences considerably behind the commencement of the ventral but does not extend over the anal fin. Its longest ray is equal to the head behind the middle of the eyes, and its free border is rounded ; its commencement is considerably nearer to the base of the caudal than to the tip of the snout. The pectorals are small and do not extend to the ventrals, which are separated from the anal-opening by a distance equal to three-fourths of their own length. The anal fin is small and commences midway between the base of the caudal and the commencement of the ventrals. The caudal fin is forked with both the lobes pointed ; the lower lobe is longer and better developed than the upper.

The general colour of the spirit specimens before me is olivaceous with a faintly marked lateral streak on the sides ; this lateral band is more prominent in the posterior half of the body.

Locality.—Cauvery River, Coorg State.

Measurements in millimetres.

Total length excluding caudal	54·0	71·0	79·0
Length of caudal	12·0	20·0	17·0
Length of head	13·0	16·5	17·0
Width of head	5·0	7·5	8·8
Height of head at occiput	7·2	10·8	11·5
Depth of body	13·0	18·0	19·0
Width of body	6·0	8·6	10·0
Diameter of eye	3·7	4·5	4·7
Length of snout	3·3	4·4	4·3
Interorbital width	3·0	5·7	5·8
Longest rays of dorsal	9·8	14·0	12·0
Longest ray of anal	9·2	11·0	11·0
Length of pectoral	9·8	13·0	13·0
Length of ventral	8·0	11·0	11·8
Length of caudal peduncle	13·0	15·0	19·0
Least height of caudal peduncle	7·0	8·0	9·0