NOTES ON FISHES IN THE INDIAN MUSEUM.

XXVI.—On a small collection of Fish from the Chitaldrug District, Mysore.

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While engaged in a general study of the flora and fauna of the step-wells in the Chitaldrug District, Mysore, in connection with investigations on the biological method of control of dracontiasis, Dr. V N. Moorthy made a small collection of fish which he sent to the Zoological Survey of India for identification. It contained 185 specimens belonging to the following 16 species :—

1.	*Mystus cavasius* (Ham.)	1 specimen.
2.	*Cirrhina fulungee* (Sykes)	1 specimen.
3.	*Barbus sarana* (Ham.)	1 specimen.
4.	*Barbus* (*Puntius*) *sophore* (Ham.)	8 specimens.
5.	*Barbus* (*Puntius*) *chola* (Ham.)	2 specimens.
6.	*Barbus* (*Puntius*) *dorsalis* (Jerdon)	74 specimens.
7.	*Barbus* (*Puntius*) *ticto* (Ham.)	15 specimens.
8.	*Barbus* (*Puntius*) *parrah* Day	3 specimens.
9.	*Rasbora daniconius* (Ham.).	20 specimens.
10.	*Danio malabaricus* (Jerdon)	5 specimens.
11.	*Chela clupeoides* (Bloch.)	3 specimens.
12.	*Nemachilus denisonii* Day	5 specimens.
13.	*Lepidocephalichthys thermalis* (C. V.)	27 specimens.
14.	*Panchax lineatum* C. V.	5 specimens.
15.	*Mastacembelus pancalus* (Ham.)	2 specimens.
16.	*Ophicephalus gachua* Ham.	13 specimens.

Dr. Moorthy observes that *B. dorsalis, B. ticto, R. daniconius* and *L. thermalis* are the species that have proved useful in guinea-worm control measures. With the exception of *Mystus cavasius, Cirrhina fulungee, Barbus sarana, Mastacembelus pancalus* and *Ophicephalus gachua*, which grow to a fairly big size, all the other smaller species should prove helpful in the biological control of the guinea-worm disease. It should be noted, however, that in the step-wells of the Chitaldrug District *B. dorsalis* is commonly met with—it was collected at 19 of the 38 localities investigated—and as the species has already proved useful, its cultivation for stocking other pieces of water should be encouraged.

In 1927, Narayan Rao and Seshachar [1] published a list of the fresh-water fishes of Mysore. In Dr. Moorthy's collection there are specimens of the following six species, *viz., Cirrhina fulungee* (Sykes), *B.* (*Puntius*) *chola* (Ham.), *B.* (*Puntius*) *sophore* (Ham.), *B.* (*Puntius*) *dorsalis* (Jerdon), *B.* (*Puntius*) *ticto* (Ham.), and *Danio malabaricus* (Jerdon), which are not included in that list.

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[1] Narayan Rao and Seshachar, *Half-yearly Journ. Mysore University* I, No. 2, pp. 1-29 (1927).

The study of the material collected by Dr. Moorthy has enabled me to show that *Leuciscus binotatus* Blyth[1] and *Puntius (Capoeta) puckelli* Day [2] are juvenile forms of *Systomus dorsalis* Jerdon [3]. It is also clear that *Barbus tetraspilus* Günther [4] is a synonym of *B. dorsalis* (Jerdon). So far as I am aware, *Cirrhina fulungee* (Sykes) [5] is a very rare species in museum collections and its specific limits are not properly defined. I, therefore, give below a description of a fresh specimen of *Cirrhina fulungee* (Sykes) and also discuss briefly the synonymy of *Barbus (Puntius) dorsalis* (Jerdon).

Barbus (Puntius) dorsalis (Jerdon).

1849. *Systomus dorsalis*, Jerdon, *Madras Journ. Lit. & Sci.*, XV, p. 314.
1858. *Leuciscus binotatus*, Blyth, *Journ. As. Soc. Bengal*, XXVII, p. 290.
1868. *Barbus dorsalis*, Günther, *Cat. Fish. Brit. Mus.*, VII, p. 142.
1868. *Barbus tetraspilus*, Günther, *ibid.*, p. 142.
1868. *Puntius (Capoeta) Puckelli*, Day, *Proc. Zool. Soc. London*, p. 197.
1878. *Barbus dorsalis*, Day, *Fish. India*, p. 573, pl. cxlii, fig. 2.
1878. *Barbus Puckelli*, Day, *ibid.*, p. 574, pl. cxliii, fig. 5.
1889. *Barbus dorsalis*, Day, *Faun. Brit. Ind. Fish.*, I, p. 319.
1889. *Barbus puckelli*, Day, *ibid.*, p. 321.
1911. *Barbus dorsalis*, Willey, *Spolia Zeylanica*, VII, p. 103.
1916. *Barbus dorsalis*, Raj, *Rec. Ind. Mus.*, XII, p. 255.
1930. *Puntius dorsalis*, Deraniyagala, *Spolia Zeylanica*, XVI, p. 12.

In 1849, Jerdon described a small species of *Barbus* under the name *Systomus dorsalis* from " the tanks and rivers in the neighbourhood of Madras " and characterised it as follows :—

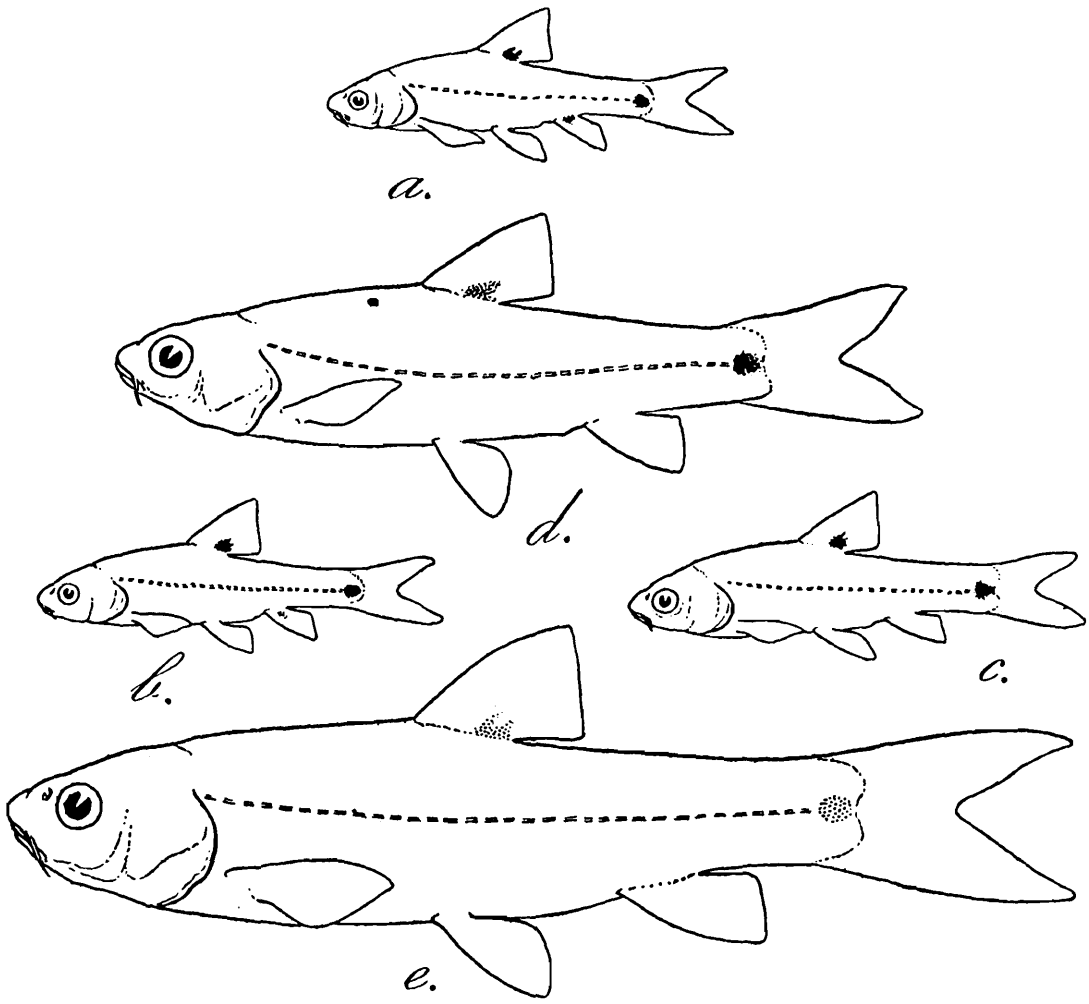
" Head is 3½ times in total length ; height is 3 times in the same ; snout irregular ; 26 scales along the sides in 8 rows ; 2 labial cirri ; profile rising to dorsal and descending rapidly to the end of that fin ; thence nearly straight ; bluish above, yellowish on the sides, silvery beneath, a black spot on each side of the tail occasionally ; fins with a yellowish tinge ; D. 3-8, A.7, etc. Dorsal fin with a black spot on its base behind ; 4 to 5 inches long."

B. dorsalis is a well known South Indian fish and, according to Day (1878), it is found in " Kurnool, Mysore, throughout Madras as low as the Cauvery and Coleroon rivers and Ceylon." In Dr. Moorthy's collection there are several young, half-grown and adult specimens of *B. dorsalis*. The colouration of the species differs at various stages of its growth. Further, in the young the last dorsal spine is weak and flexible but in specimens over four inches in length it becomes hard and bony. In differentiating small species of *Barbus*, considerable reliance is placed on the structure of the last dorsal spine and on the nature of the colour markings and it is no wonder, therefore, that *B. dorsalis* has been described under different names at various stages of its growth.

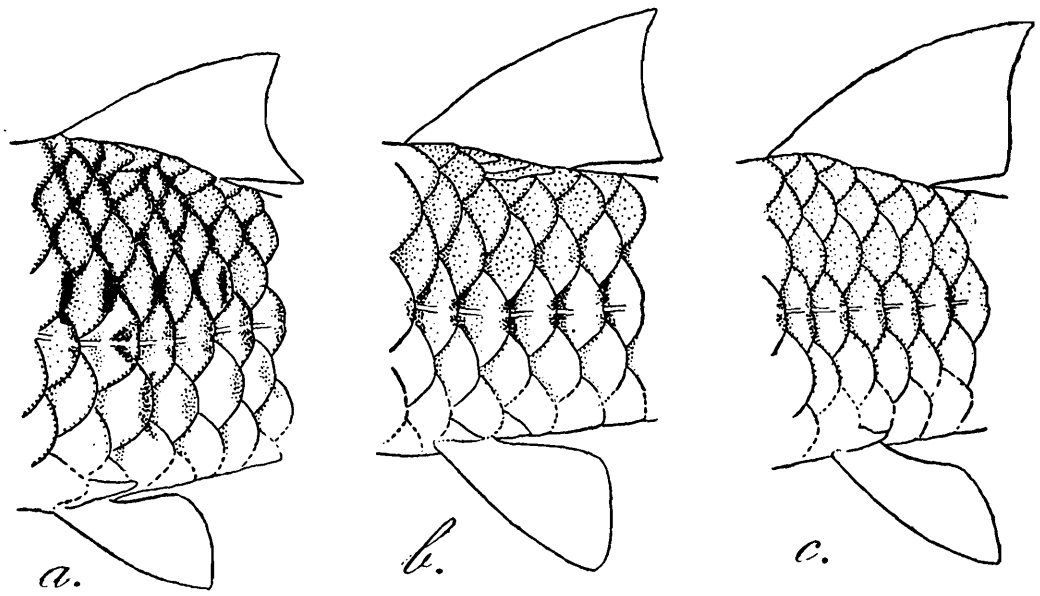
In very young specimens about 23 mm. in total length (text-fig. 1*a*) there is a deep, black spot on the basal portion of the posterior dorsal rays, a second similar spot at the centre of the base of the caudal fin on each side and a smaller spot at the base of the posterior anal rays

[1] Blyth, *Journ. As. Soc. Bengal*, XXVII, p. 290 (1858).
[2] Day, *Proc. Zool. Soc. London*, p. 197 (1868).
[3] Jerdon, *Madras Journ. Lit. & Sci.*, XV, p. 314 (1849).
[4] Günther, *Cat. Fish. Brit. Mus.*, VII, p. 142 (1868).
[5] Skyes, *Trans. Zool. Soc. London*, II, p. 358 (1841).

The bases and margins of the scales, especially in the dorsal region, are covered with minute, irregularly scattered, small, black dots (text-



TEXT-FIG. 1.—Growth stages of *Barbus* (*Puntius*) *dorsalis* (Jerdon), showing the gradual disappearance of anal, dorsal and caudal spots. × *ca.* 1⅓.



TEXT-FIG. 2.—Portion of body in the region of dorsal fin, showing gradual appearance of colour markings on scales in three growth stages of *Barbus* (*Puntius*) *dorsalis* (Jerdon).

a. From a specimen 144 mm. in total length. × ⅞.
b. „ „ 63 „ „ × 2½.
c. „ „ 34 „ „ × 4½.

fig. 2*c*). The last dorsal spine is very weak at this stage. With the growth of the fish, the anal spot disappears (text-fig. 1,*b* and *c*), the markings on the scales become more prominent (text-fig. 2*b*) while the dorsal and the caudal spots persist in a fairly well-marked condition in specimens up to 83 mm. in length, though they are sometimes reduced and become lighter in colour (text-fig. 1,*d* and *e*). The dorsal spine is still very weak.

Attention may be directed here to *Barbus puckelli* (Day) described from a single specimen, 3 inches long, collected at Bangalore. The species is characterised, among other peculiarities, by the presence of a " deep-black mark on the dorsal fin from the base of the third to the base of the sixth branched ray. Very fine dark dots over scales, especially at their bases. An indistinct black mark on lateral line from nineteenth to twenty-first scale." No other author seems to have recorded this species though it is stated by Day (1878) to be very common at Bangalore. I have several examples in Dr. Moorthy's collection which agree with Day's description in almost every respect, but from the series of specimens before me it is certain that *B. puckelli* is only a juvenile form of *B. dorsalis*. A very characteristic feature of the species at this stage is, as already noted by Day, that the extremity of the lower jaw is not covered by the lip.

In describing the colouration of the Ceylonese specimens of *Puntius dorsalis*, Deraniyagala says that " In immature specimens from localities such as Jaffna, Mankulam (N. P.) and Kahavatta (Sab. P.) there is a well marked lateral band extending from the shoulder along the lateral line to the caudal blotch ; while the posterior half of the basal sheath of the dorsal is also black, and often the upper and lower margins of the caudal are dark. These marks usually persist until the fish is 90 mm. long"

The description of the colour of *Leuciscus binotatus* Blyth, based on a specimen 1·5 inches in length from Ceylon, agrees with what is stated above by Deraniyagala and there seems to me no doubt that Blyth's species has also to be regarded as a juvenile form of *B. dorsalis*.

In Indian specimens there is no lateral band and the margins of the caudal fin are not stained black.

Under the synonomy of *B. dorsalis*, Day (1878) included *Systomus tristis* Jerdon, with a querry, *B. tetraspilus* Günther and *B. layardi* Günther. He, however, remarked that " *B. tetraspilus* differs from *B. dorsalis* in having a dark spot before the base of the caudal fin" As regards the persistence of caudal and dorsal spots, it may be noted that in specimens up to 80 mm. the former is sometimes fainter than the latter (text-fig. 1*d*) or *vice versâ*, but on the whole the caudal spot disappears earlier. In an old specimen from Day's collection 117 mm. in total length, there is an indication of the dorsal spot whereas the caudal spot is altogether faded. In describing *B. tetraspilus*, Günther had one adult, 7·5 inches in length, and one young specimen before him. There can be no doubt that his young specimen had the spots prominently marked, while they may have been faintly represented in the adult I agree with Day in regarding *B. tetraspilus* as a synonym of *B. dorsalis*

B. layardi Günther lacks all the colour markings of *B. dorsalis* and besides has only 23 scales along the lateral line. I have examined a specimen of *B. dorsalis*, 142 mm. in total length, in which though the dorsal and the caudal spots are absent, but the black markings at the bases of the scales are very prominent (text-fig. 2*a*). Without an examination of the types, it is very difficult to be certain about the systematic position of *B. layardi*, but I am inclined to regard it, for the time being, as a distinct species.

The description of *Systomus tristis* Jerdon is inadequate for judging its precise specific limits. The species was based on a single specimen, 3 inches long. In the description of its colour there is neither any reference to the characteristic dorsal and caudal spots, nor to the markings on the scales. In all probability, *B. tristis* is not conspecific with *B. dorsalis*.

According to Willey's[1] observations the spawning season of *B. dorsalis* in Ceylon is about August, but Dr. Moorthy collected a large number of young specimens during March and April.

Cirrhina fulungee (Sykes).

1841. *Chondrostoma Fulungee*, Sykes, *Trans. Zool. Soc. London*, II, p. 358.
1868. *Gymnostomus fulungee*, Günther, *Cat. Fish. Brit. Mus.*, VII, p. 76.
1878. *Cirrhina fulungee*, Day, *Fish. India*, p. 549, pl. cxxxii, fig. 1.
1889. *Cirrhina fulungee*, Day, *Faun. Brit. Ind. Fish.*, II, p. 280.

In describing *Chondrostoma fulungee*, Sykes indicated that the species " would be referred to Dr. Hamilton's third subgenus of *Cyprinus* " *Bangana* ", but it is not to be identified with any of the species, although in outline it has a close resemblance to the figure of *Cyprinus Mrigala*, and has other general points of resemblance " Unfortunately the species was not illustrated and, judged by modern standards, the description is very inadequate. Günther included this species in the composite genus *Gymnostomus* and made no reference to its distinguishing features. Day recognised the species but remarked that " *Cirrhina fulungee*, Sykes, is very closely allied to *C. mrigala*, but its barbels are shorter " In making this statement Day seems to have been influenced by the observations of Sykes, for even according to Day's descrptions the two species differ in *lepidosis* and in the number of branched rays in the dorsal fin (12 to 13 in *C. mrigala* and 8 in. *C. fulungee*). There are in addition marked differences in the body proportions also.

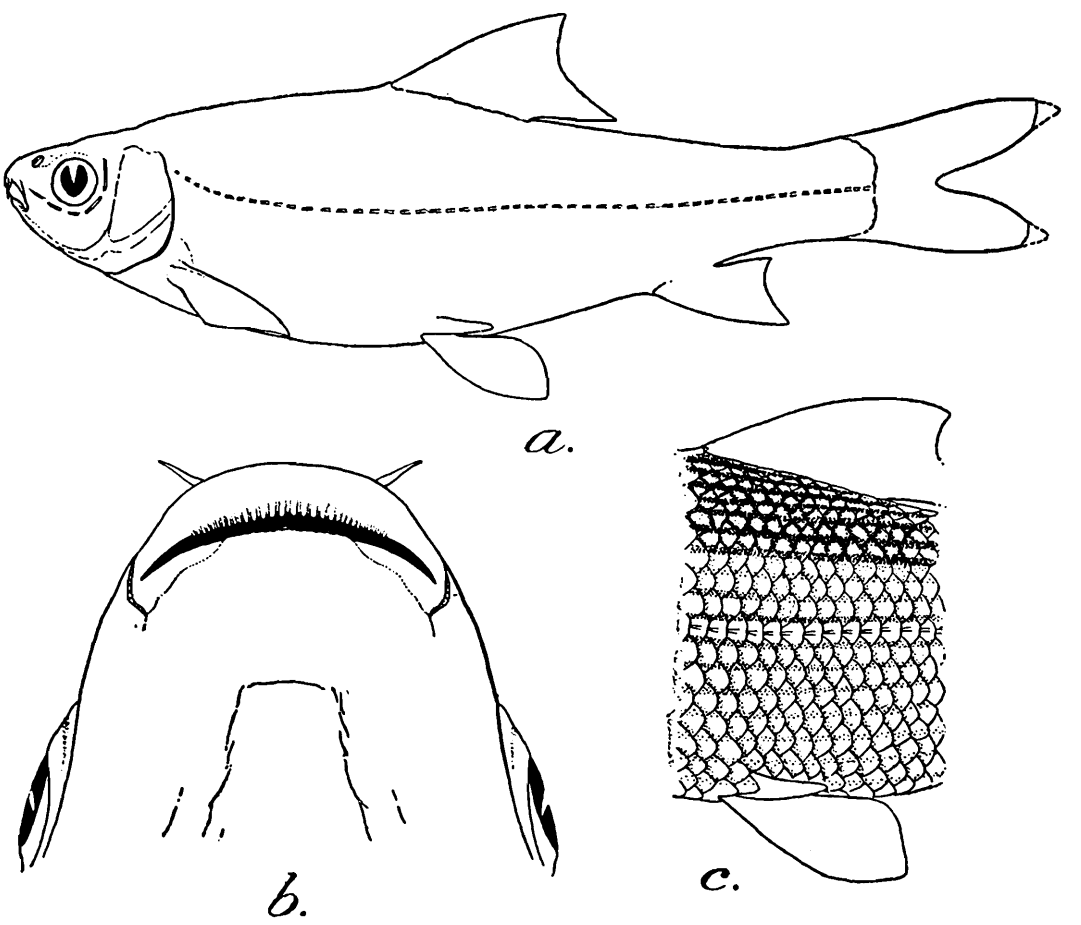
The original of Day's description and figure in the *Fishes of India* is now preserved in the collection of the Indian Museum ; it is 92 mm. in total length without the caudal and is in a tolerably good state of preservation. The locality label is faded but with proper illumination and magnification the locality can be made out as " Poonna " In the fish register of presentations to the Indian Museum it is numbered 2360 and is noted to have been purchased from Day in 1879 ; but its locality is given as " Burma " This is obviously wrong for Day never had a specimen of this species from Burma. In fact, it seems probable that Day had examined only one specimen of the species which is now preserved in the Indian Museum.

[1] Willey, *Spolia Zeylanica*, VII, p. 103 (1911).

In Dr. Moorthy's collection there is a fully mature female specimen with ripe gonads ; it is 123 mm. in total length without the caudal and on account of its large size it differs in proportions from the specimen described by Day. It may be described as follows :—

D. 3/8 ; A. 3/5 ; P. 15 ; V. 9 ; C. 19 ; L. I. 53.

The dorsal profile is slightly convex but the ventral profile is greatly arched. The body is deepest between the commencements of the dorsal and ventral fins and thence it tapers towards both ends. The head is small and bluntly pointed ; its length is contained 4·8 times in the total length without the caudal. The width of the head is contained 1·3 times and height of the head 1·1 times in its length. The eyes are lateral and are situated mostly in the anterior half of the head ; the diameter of the eye is contained 3·6 times in the length of the head, 1·2 times in the length of the snout and 1·8 times in the interorbital width. The



TEXT-FIG. 3.—*Cirrhina fulungee* (Sykes). *a*. Lateral view. × $\frac{2}{3}$; *b*. Ventral surface of head and anterior part of body. × $3\frac{1}{3}$; *c*. Portion of body in the region of dorsal fin, showing leipdosis and colour markings. Nat. size.

interorbital space is slightly convex. There is only one pair of small rostral barbels which are about one-third the diameter of the eye. The mouth is distinctly inferior and is overhung by a rostral fold which is slightly fimbriated. The two lips are continuous at the angles. The lower lip is free from the jaw anteriorly ; the lower jaw has a sharp margin. There are shallow grooves at the sides of the snout which commence round the angles of the mouth.

The depth of the body is contained 3·6 times in the total length without the caudal. The scales are small but firmly set; there are 53 scales along the lateral line, which is complete, 10 transverse series of scales between the lateral line and the commencement of the dorsal and $6\frac{1}{2}$ series between the former and the base of the ventral fin. There are 17 predorsal scales and about 22-23 scales round the caudal peduncle. There are well-developed scaly sheaths in the axils of the ventral fins. The least height of the caudal peduncle is contained 1·8 times in its length.

The commencement of the dorsal fin is slightly in advance of that of the ventral and is much nearer to the tip of the snout than to the base of the caudal; the free border of the fin is concave and its longest ray is almost equal to the length of the head and considerably shorter than the depth of the body below it. The anal fin is similar to the dorsal in form but it is much shorter. The pectoral fins are pointed in the middle and are shorter than the head; they are separated from the ventrals by a distance equal to their length. The ventral fins are not so pointed as the pectorals and, when spread out, appear rounded; they are separated from the anal opening by a distance equal to the postorbital part of the head. The caudal fin is deeply bifurcate and has pointed lobes.

The colouration is spirit in dark above and very pale olivaceous below. The borders of the scales are marked with fine black spots and the general impression they give is that the body is marked with a series of longitudinal bands. The dorsal fin and the basal half of the caudal fin is gray.

Dr. Moorthy has kindly presented this specimen[1] to the Zoological Survey of India.

Measurements in millimetres.

Total length excluding caudal	123·0
Depth of body	36·0
Length of head	25·5
Width of head	19·5
Height of head	22·4
Length of snout	8·5
Diameter of eye	7·0
Interorbital width	12·5
Length of rostral barbel	2·5
Longest ray of dorsal	26·0
Longest ray of anal	18·8
Length of pectoral	21·0
Length of ventral	20·0
Length of caudal peduncle	22·0
Least height of caudal peduncle	14·0

[1] Dr. Moorthy has since sent 3 more specimens of *Cirrhina fulungee* from Mysore.