

NOMENCLATURAL AND SYSTEMATIC STATUS OF *BARBUS MUSSULLAH* SYKES, 1839¹

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(With one plate and one text-figure)

INTRODUCTION

Sykes (1839) described *Barbus mussullah* collected from Ghod river near Sirur (18° 50' N 74° 23' E) Maharashtra. He illustrated his species in colour (Fig. 1B) and gave a description as below:

"Pectoral fins of 16 rays; ventral of 9 rays; dorsal fin of 12 rays, including the first double ray; tail forked, of 24 rays, including the short rays at each exterior side of the insertion of the tail: a remarkable projecting prominence between the upper lip and nostrils, giving the fish an appearance of being Roman-nosed: the eyes are situated far back, and between the eyes and the corners of the mouth there are a number of circular, rough, prominent papillae, but these are not constant: corners of the mouth furnished with a short feeler, and the base of the nasal prominence, near the tip, also with one on each side: dorsal fin in the centre of the back, on a prominence which slopes suddenly behind; ventral fins on the centre of the belly, on a perpendicular from the first dorsal ray: tail suddenly narrows below, after the anal fin; anal fin with the posterior angle bluntly rounded off. The lateral line is slightly arched at the shoulder, then falls, and runs straight to the anal fin; over this it rises a little, and then runs straight to the centre of the fork of the tail. The whole of the upper parts of the fish are covered with large, coarse silvery scales, having blue and red reflections, and on the under parts a yellow tinge prevails; it is very bony, and its length, to the end of the fork of the tail, is 30 cm, and height, 7.5 cm; but its greatest growth

is 150 cm. When small this species resembles the *Kolus*, but in the latter the colour is more reddish-silvery: the fins are reddish, and the *Mussullah* is a much coarser, and larger fish. A male brought to me at Seroor, from the Goreh river, measured in length 102.5 cm, and in height 30 cm, and weighed nearly 15 kg. The flesh wanted flavour. The *mussullah* differs from the *mosal* of Dr. Hamilton, in having 1 ray less in the dorsal and pectoral fins, and in the first rays of these fins being double instead of quadruple; in the latter respect, and indeed in many others, resembling the *C. putitora*: it also differs in having the nose and upper lip tuberculated, and in colour. The prominence on the nose is also marked. Russell describes three Barbels, calling them *Cyprini*, but none of them are identical with the present fish."

It is clear at the outset that the description and figure do not tally in many respects. The fin ray and scale counts do not agree. Sykes cites that the upper part of the fish is covered with large, coarse silvery scales whereas the figure shows a larger number of medium sized scales. The shape of the anal fin is highly unnatural and is more of an artist's contrivance. The nomenclature and taxonomy of the species is in confusion and they are clarified in this paper.

NOMENCLATURE

There is confusion in the generic position of *Barbus mussullah* Sykes. For many years the species has been included under *Tor* Gray following Hora (1943a). However, recently this species has been referred to under *Hypselobarbus* Bleeker by Menon (1992). The name *Hypselobarbus* was cited by Bleeker (1859) in a key without included species.

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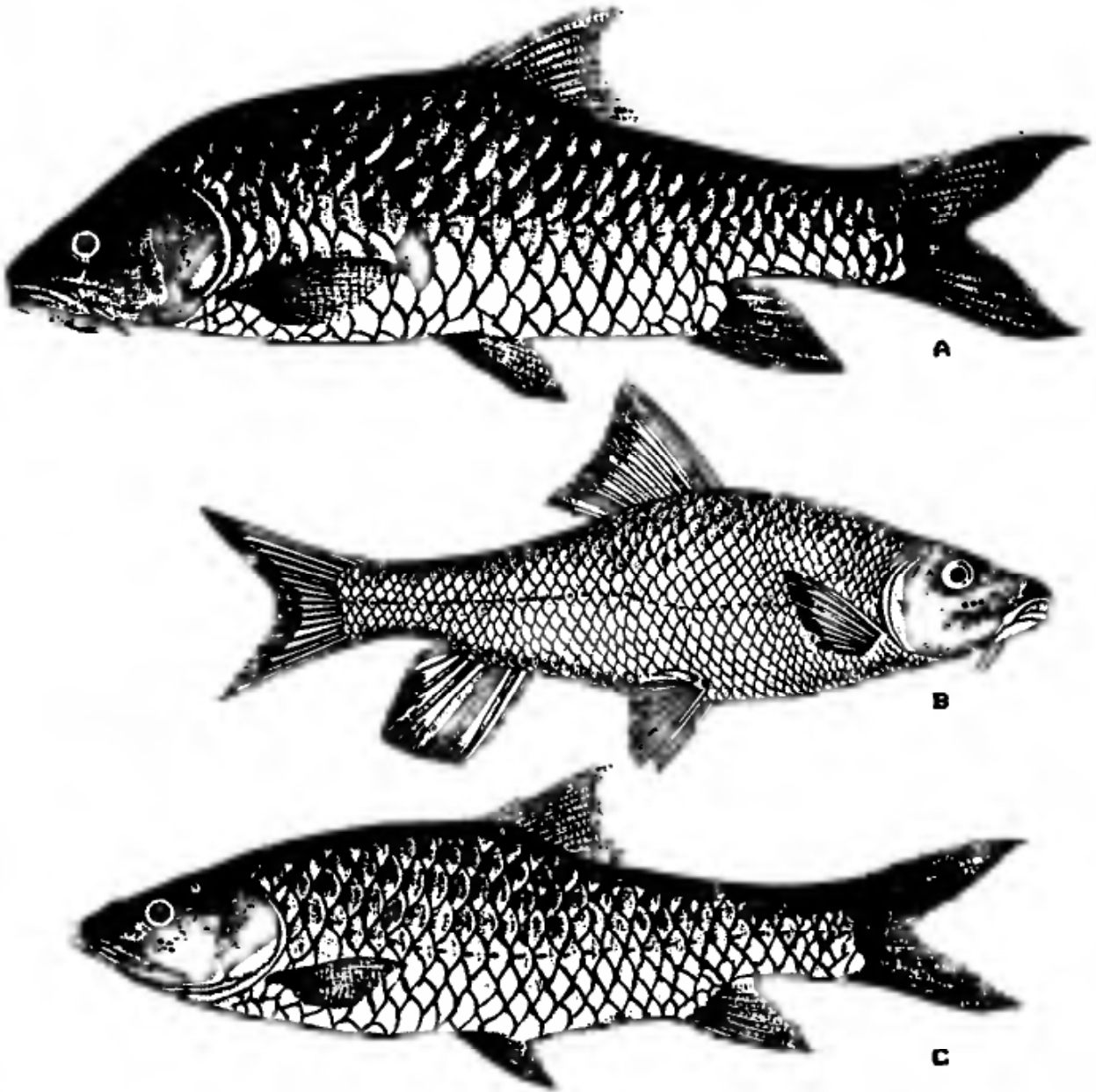


Fig. 1. A. *Barbus (Tor) mussullah* Sykes x Ca. $\frac{1}{4}$ drawing was made from colour sketch sent by Dr. M. Suter. B. Original sketch of *Barbus mussullah* as given by Sykes (1839). C. *Barbus (Tor) khudree* Sykes x Ca. $\frac{1}{2}$ drawing was made from colour sketch sent by Dr. M. Suter.

In 1860 two species *mussullah* and *nancar* were apparently added. *Barbus mussullah* was designated as type subsequently in 1863a or 1863b. It looks like Bleeker had no specimen of *B. mussullah* which is known only from India. Day (1878) placed it in the synonymy of *Labeo* and *Barbus* and no species of *Hypselobarbus* has been placed in the synonymy of any Indian *Labeo* species.

Rainboth (1986) correctly observed that "Bleeker probably based his image of *Barbus mussullah* on the illustration by Sykes (1841)" which is now known to be not truly representative. Earlier Annandale (1919) rescued the species from the synonymy of *Barbus* and later Hora (1943a) ratified it. Thus, the only generic name applicable to *B. mussullah* is *Tor* Gray, 1834 which is also earlier to Bleeker (1859).

TAXONOMY

For a number of years *Barbus mussullah* was not reported or recorded mainly because of the zoologically poor description of the species by Sykes, confusing illustration and also because of its isolated distribution and rarity.

Jerdon (1849) in his account on the freshwater fishes of southern India records *Barbus megalepis* from the Cauvery at Srirangapatnam. This species is a synonym of *Barbus mussullah*. He also lists *Barbus mussullah* though he did not collect any specimens.

Gunther (1868) regarded it as *species inquirendum* and Day (1878, 1889) synonymised it under his composite *Barbus tor*. After a gap of 30 years Annandale (1919) recorded the species, perhaps for the first time after Sykes, from "streams of Bombay presidency" and based his identity on the presence of tubercles on the cheek. He identified certain other characters such as the structure of the lip differentiating it from *B. tor*. Annandale found the species common in the upper Krishna where it is reported to occur along with *B. tor*. He also recorded a specimen appr. 9.5 kg in weight caught by Mr. McIver. Annandale clearly indicated that

mussullah and *putitora* should not be referred to under *Barbus* and stated that they belonged to the Mahseer group (= *Tor*).

Hora and Law (1941), reporting on a collection of fishes made by Mr. S. Jones and Dr. C.C. John from the then Travancore state, recorded *Barbus (Tor) mussullah* on the basis of 13 young and half-grown specimens. They were collected from Pampadampara and Kallar stream. These specimens are now not traceable. It was stated that "this is the commonest species of these parts." Hora (1942) examined Annandale's specimens of *B. mussullah* (local name: *Masundi*) collected from Krishna river by McIver and concluded that they are *Barbus khudree* and not *mussullah*. He based his conclusion on the basis of presence or absence of tubercles which is now known as a variable, undependable character. I have now examined the same material seen by Hora and I am convinced that they are *mussullah* for reasons discussed later. Hora (1942) also discussed elaborately the status of *mussullah* and after comparing it with *Cyprinus curmuca* concluded hastily that *mussullah* is a synonym of *C. curmuca*. His contention was that *curmuca* also has four barbels and that Hamilton's figure of *curmuca* erroneously depicted only two barbels.

It is intriguing that Hora did not compare his specimens with the collection from Travancore (Hora & Law, 1941) which were identified by himself as *Barbus (Tor) mussullah*. However, in 1943 he changed his opinion, after Dr. M. Suter provided first-hand details of the provenance of *B. mussullah*, the local knowledge about the fish thus confirming the existence of the species. In the same paper, Hora synonymised Thomas' (1897) *Barbus tor* from Bhavani river under *mussullah* based on the figure only. Hora gave for the first time a good description of *mussullah* with data of five specimens. He also gave figures of *Tor mussullah* and *Tor khudree* (Fig. 1.A & C) drawn from specimens which were sent to him by Suter. This figure represents the true *T. mussullah*. In a later article (Hora 1943b) he synonymised *Barbus megalepis* Jerdon with *B. mussullah*.

Subsequent to Hora, Silas (1953) recorded five examples of *Tor mussullah* from Mahabaleshwar lake and Krishna river at Wai. These specimens are also not traceable either in the Bombay Natural History Society or in the Zoological Survey of India, Western Regional Station, Pune. Chacko (1952) recorded the species from Hogenakal and stated it as of rare occurrence. No material seems to have been preserved. David (1963) listed the species as occurring in Krishna and Godavary rivers. Though he stated that the species was recorded by him in his collections, the whereabouts of the material is unknown.

Menon (1992) on the basis of comparison of standard deviations and standard errors erroneously concluded that *Tor mussullah* is the same as *Tor khudree*. The differences between the two species are obvious and have been elaborated elsewhere.

From the above it appears that the number of ichthyologists who have seen and examined the true *mussullah* are very few and the species is also very rare. It is poorly represented in the National Zoological collection in ZSI Calcutta. The records of specimens are as below:

Tor mussullah (Sykes)

1. No locality	Coll. F. Day 1878	One specimen in ZSI No. 2176 (missing)
2. Deccan	Coll. F. Day 1878	Two specimens in ZSI No. 1338-39
3. Deolali, R. Darna Maharashtra	Coll. A.G.L. Fraser 1935	One specimen in ZSI each under No.F. 12528/1 and F. 12529/1 (both missing)
4. R. Krishna, Satara Dist. Maharashtra	Coll. C.D. McIver	Four specimens in ZSI under No. F.9578/1
5. Panchganga river system, Maharashtra	ZSI WRS 1334 4.8.1987	One specimen
6. Meenmutty, Malappuram, Kozhikode	Coll. P.M. Suresh, Feb. 1992	Four specimens ZSI WGRS 5946

1839. *Barbus mussullah* Sykes, *Trans. Zool. Soc. London.* 2, pp. 356-358 (type-locality, Ghod river, Sirur, Maharashtra).
1849. *Barbus megalepis* Jerdon, *Madras J. Lit. Sci.*, 15; 311 (Cauvery river, Srirangapatnam).
1849. *Barbus mussullah* Jerdon, *Madras J. Lit. Sci.*, 15; 313 (name only).
1864. *Barbus mussullah*, Gunther, *Cat. Fish. Brit Mus.*, 7; 83 (as species *inquirande*).
1878. *Barbus mussullah*. Day, *Fish India*, p. 573 (as a synonym of *B. tor* Hamilton).
1919. *Barbus mussullah*, Annandale, *Rec. Indian Mus.*, 16, p. 135 (Krishna river, Satara dist.).
1932. *Barbus mussullah*, Spence & Prater, *J. Bombay nat. Hist. Soc.*, 36: 46 (brief account).
1941. *Barbus (Tor) mussullah*, Hora & Law, *Rec. Indian Mus.*, 43 (far 2): 237, 241 (13 exs. recorded from Kallar and Pampadampara, Kerala).
1942. *Barbus mussullah*, Hora, *J. Bombay nat. Hist. Soc.*, 43 (2): 164 (considered as a synonym of *Barbus curmuca* Sykes).
1943. *Barbus mussullah*, Hora, *J. Bombay nat. Hist. Soc.*, 44 (1): 5, pl. (considered as a valid species of *Tor*).
1943. *Barbus mussullah*, Hora, *J. Bombay nat. Hist. Soc.*, 44 (2): 166 (*B. megalepis* Jerdon *nec* McClelland synonymised).
1951. *Barbus (Tor) mussullah*, Hora, *J. Asiat. Soc., Letters*, 27 (2): 157, 164 (reference in *Manasallosa* 1127 A.D.).
1951. *Tor mussullah*, Silas, *J. Bombay nat. Hist. Soc.*, 51 (3): 581 (Mahabaleshwar lake, Krishna river at Wai).
1953. *Tor mussullah*, Chacko, *Contrib. Madras Freshw. Fish. Biol. Sta.*, 4: 1-18 (Hogenakal).
1963. *Tor mussullah*, David, *Proc. Nat. Acad. Sci. India*. 33 (2): 280 (Krishna & Godavary rivers).
1992. *Hypselobarbus mussullah*, Menon, *J. Bombay nat. Hist. Soc.*, 89 (2): 210 (considered as synonym of *T. khudree*).

Specimens Studied:

ZSI 1339/2.12.519, 1 ex.*, 157.5 mm SL, Deccan, F.Day.

ZSI 9578/1, 2 exs.*, 134 & 153 mm SL, Krishna river, Satara district, Bombay Pres., C.D. McIver.

ZSI WRS P. 1334, 1 ex., 197 mm SL, Panchganga river system, Maharashtra, 4.8.1987. (Labelled as *Tor khudree mussullah*)

ZSI WGRS 5946, 4 ex., 153 to 215 mm SL, Meenmutti, Malappuram district, Kerala, P.M. Suresh, 26.2.1992. (Labelled as *Tor khudree malabaricus*)

DESCRIPTION

D. II, 8-9; P_i, 11-14; V_{i-ii}, 7-8; A_{i-ii}, 5-6; C₆₋₉ + 7-9

Dorsal profile steep with a hump at the occiput and running up to dorsal fin base, thereafter sloping gently. The hump is prominent and noticeable. Head small, length 3.6(3.4 - 3.9), body depth 3.7(3.3-4.2) in standard length. Width of head 2.0(1.6-2.3), height at occiput 1.3(1.2-1.4), snout 2.7(2.1-3.0), width of gape of mouth 4.4(3.9-5.3), eye diameter 4.8(4.4-5.5) in head length. Eye 4.8(4.4-5.5) in standard length, 1.7(1.5-1.9) in interorbital width, 1.7(1.6-1.9) in snout length. Snout obtuse, may be slightly conical in some. Mouth narrow, lips thick, with a continuous labial fold, lower lip forming a median lobe (mentum). Two pairs of short barbels, maxillary and rostral.

Dorsal fin inserted nearer tip of snout than caudal base or may be equidistant, concave in shape, anteriormost first branched ray and spine may be produced as a filament. Dorsal fin shorter than body depth. Dorsal spine strong, smooth, non-flexible. Pectoral fin concave in shape, its rays progressively shorter towards inner side. Outermost simple ray three or four times in the length of innermost first ray. Pectoral fins not reaching pelvic fin. Pelvic fin

occasionally with an axillary scale, concave in shape, innermost ray nearly half the length of outermost ray. Pelvic fins not reaching anal fin. Anal fin cut straight, last simple ray may be produced as a conical tip, fin just reaching caudal fin base. Least depth of caudal peduncle 1.4(1.2-1.7) in its length. Lateral line complete, with 21 to 25 scales (24 or 25 common), not running in to the tail. Caudal fin deeply forked, its ray not produced.

Distribution.- South India: Canvery, Godavary, Krishna river systems in the states of Karnataka, Kerala and Maharashtra along the Western Ghats. Distribution sporadic in isolated pockets.

Scales:

Lateral line	21 - 25
Predorsal	4 - 6
Preanal	12 - 15
Dorsal fin /Lateral line	3 1/2 - 4 1/2
Pelvic fin /Lateral line	2 1/2 - 3 1/2
Anal fin /Lateral line	2 1/2
Circumpeduncular	9 - 11

Gill Rakers: 4 - 7 + 16 - 21.

Colour: Brown to dark brown in preserved specimens, abdomen pale, fin tips may be dark.

Relationship: It can be seen from the review that earlier workers considered *Tor mussullah* as allied to *Barbus curmuca* (Hora, 1942) and *Tor khudree* (Menon, 1992). In the course of my studies, I visited several localities in Karnataka and Kerala in search of *Tor mussullah*. This facilitated first hand observation of the populations of *Tor khudree* at many congregations in the different river sanctuaries in Karnataka. Eleven specimens of different sizes were selectively collected and their morphometric and meristic data have been recorded. In respect of *Tor mussullah* the holdings in the ZSI were borrowed and data obtained, I have seen specimens of *Barbus curmuca* also and the reference of this species under *Gonoproktopterus* Bleeker is justified. The species lacks a mentum or a continuous labial fold.

* one ex under 1338 (ZSI) and two under 9578/1 (ZSI) have not been examined so far

TABLE I
FREQUENCY DISTRIBUTION OF SOME MERISTIC
CHARACTERS IN *T. khudree* AND
T. mussullah

1.1 Lateral line scales								
Species	N	21	22	23	24	25	26	27
<i>T. khudree</i>	11	—	2	3	1	1	2	2
<i>T. mussullah</i>	8	1	1	1	2	3	—	—
1.2 Predorsal scales								
Species	N	4	5	6				
<i>T. khudree</i>	11	1	5	5				
<i>T. mussullah</i>	8	1	4	3				
1.3 Preanal scales								
Species	N	12	13	14	15	16		
<i>T. khudree</i>	11	3	2	3	2	1		
<i>T. mussullah</i>	8	3	—	1	4	—		
1.4 Prepelvic scales								
Species	N	5	6	7	8	9		
<i>T. khudree</i>	11	—	5	5	1	—		
<i>T. mussullah</i>	8	1	3	3	—	1		
1.5 Circumpeduncular scales								
Species	N	9	10	11	12			
<i>T. khudree</i>	11	—	3	6	2			
<i>T. mussullah</i>	8	3	3	2	—			
1.6 Gillrakers (upper limb)								
Species	N	3	4	5	6	7		
<i>T. khudree</i>	11	1	3	1	5	1		
<i>T. mussullah</i>	8	—	2	2	2	2		
1.7 Gillrakers (lower limb)								
Species	N	15	16	17	18	19	20	
<i>T. khudree</i>	11	2	2	2	1	1	3	
<i>T. mussullah</i>	7	—	3	1	2	1	—	
1.8 Mentum (length / width)								
Species	N	<1.5	1.5-1.9	2.0-2.5				
<i>T. khudree</i>	11	1	7	3				
<i>T. mussullah</i>	8	1	1	6				

Tor mussullah is easily distinguished from *T. khudree* by the characteristic hump at the occiput, though it may be very pronounced (Fig. 2, Pl. I), or slight as in Day's specimen (Fig. 3, Pl. I).

The scale counts also differ. It is seen that *T. mussullah* generally has 24 or 25 lateral line scales unlike *T. khudree* which has 22 or 23 (Table 1.1). The circumpeduncular scales also tend to be 9 or 10 in *T. mussullah* unlike 11 or 12 in *T. khudree* (Table 1.5).

The length/width ratio of the mentum in *T. mussullah* is generally more than 2.0 and in *T. khudree* it is less than 2.0 (Table 1.8).

The dorsal fin is inserted nearer the tip of the snout than caudal fin base in *T. mussullah* unlike in *T. khudree*. The two species differ markedly in body contour, shape of scales etc. as can be seen from photographs in Plate I, Figs. 1 to 3 and 4.

The frequency distribution of some of the meristic characters is presented in Table 1. The morphometric data in ratios and as percentages are given in Table 2.

It is thus clear that *T. mussullah* is a distinct species, different from *T. khudree*.

Ecotatus: From my field studies, it appears that *T. mussullah* is not as widely prevalent as *T. khudree* in the Western Ghats

T. khudree is established mainly because of its introduction by the state fishery departments by releasing fingerlings obtained from the Tata Electric Company's Fish Farm at Lonavla. Even then, this species is also seen in disjointed locations and in protected habitats only. Whether it has spread further into the riverine habitats is still to be ascertained. In the Gangawali river at Oonchahalli, Uttara Kannada I collected a juvenile (55 mm SL, 31st May, 1996) which may be one such example of a natural stock.

In respect of *T. mussullah*, it is obvious that the species lives in very isolated pockets, uninhabited jungle areas and is very rare, but vulnerable. Fishermen are aware of the species and at the same time are categorical about its rarity.

TABLE 2
MORPHOMETRIC DATA OF *T. mussullah*. N=8 SL. 134-215 mm

	Ratio	Mean	SD	Percent	Mean
1. SL/Body depth	3.3 to 4.2	3.7	±0.29	23.8 to 30.3	27.0
2. SL/LH	3.4 to 3.9	3.6	±0.16	25.6 to 29.4	27.8
3. Snout/Eye	1.6 to 1.9	1.7	±0.11	52.6 to 62.5	58.8
4. IOW/Eye	1.5 to 1.9	1.7	±0.14	52.6 to 66.7	58.8
5. LH/Eye	4.4 to 5.5	4.8	±0.36	18.2 to 22.7	20.8
6. LH/Snout	2.1 to 3.0	2.7	±0.26	30.3 to 47.6	37.0
7. LH/Head Width	1.6 to 2.3	2.0	±0.19	43.5 to 62.5	50.0
8. LH/Ht. at occiput	1.2 to 1.4	1.3	±0.08	71.4 to 83.3	76.9
9. LH/Width of mouth	3.9 to 5.3	4.4	±0.40	18.9 to 25.6	22.7
10. LH/LCPD	1.4 to 1.9	1.6	±0.18	52.6 to 71.4	62.5
11. LH/HCPD	2.1 to 2.3	2.2	±0.07	43.5 to 47.6	45.5
12. LCPD/HCPD	1.2 to 1.7	1.4	±0.16	58.8 to 83.3	71.4
13. LH/Post-orbital length	1.9 to 2.7	2.2	±0.23	37.0 to 52.6	45.5
14. Mentum L/W	1.4 to 2.2	1.9	±0.25	45.5 to 71.4	52.6

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Kannada due to the help of Prof. Madhav Gadgil of the Centre for Ecological Sciences, Bangalore and his team of Western Ghat Biodiversity Programme investigators. My grateful thanks are due to all of them.

AUTHOR'S NOTE:

After this paper was sent for publication I was able to survey parts of Karimpuzha, Maancherry river in Nilambur district, Kerala. Specimens collected by Kerala Forest Research Institute from Chaliyar drainage, Chinnar and Periyar Lake were also examined. *Tor khudree* is found naturally in these drainages. *Tor mussullah* remains elusive. However, a single specimens (259 mm sl) of this species collected from Thengumarda near Bhavanisagar, Moyar river, at present preserved in the Sálím Ali Centre for Ornithology & Natural History (SACON), Coimbatore, indicates its presence in the Moyar drainage.

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