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## REDESCRIPTION OF THE STRIPED CATFISH *MYSTUS TENGARA* (HAMILTON, 1822) (SILURIFORMES: BAGRIDAE), INDIA

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**Abstract:** The Bagrid Catfish *Mystus tengara* was described from a pond located in India under the genus *Pimelodus*. The validity of the fish has been confused and has frequently been treated as a synonym of *Mystus vittatus*. In this study, the species is rediagnosed and redescribed on the basis of fresh material collected from the Ganga-Brahmaputra drainage. *M. tengara* is diagnosed from congeners in having a unique combination of the following characters: body with a distinct tympanic spot and four brown stripes which are separated by a pale narrow interspace; origin of adipose-fin not reaching the base of the last dorsal-fin ray, 31–42 gill rakers on first branchial arch, eye rounded with a diameter 19.0–23.8 % HL and dorsal spine length 12.3–17.2 % SL, maxillary barbel length 254.5–360.5 % HL. A key for the identification of *Mystus* species from Ganga-Brahmaputra drainage is also provided.

**Keywords:** Francis Hamilton, Ganga-Brahmaputra basin, *Pimelodus tengara*, redescription.

Hamilton (1822) described *Pimelodus tengara* (now *Mystus*) from a pond located in India. The identity of the fish is based solely on his description and drawings as he did not preserve any type specimens. The fish has often been treated as a synonym of *Mystus vittatus* (Bloch) (Venkateswarlu & Menon 1979; Sharma & Dutt 1983; Roberts 1992; Menon 1999).

Drashan et al. (2010) redescribed and revalidated *Mystus carcio* (Hamilton) which had previously been considered as a synonym of either *M. tengara* or *M. vittatus*. They also treated the latter two species as

valid. However, a detailed description of *M. tengara* is lacking.

In the present study, several fish specimens consistent with Hamilton's (1822) description of *Mystus tengara* were examined. Here we redescribe *M. tengara* and distinguish it from its closest congener, *M. vittatus* and other striped *Mystus* of the Ganga-Brahmaputra drainage, viz., *M. dibrugarensis* (Chaudhuri), *M. cavasius* (Hamilton), *M. carcio* (Hamilton), *M. gulio* (Hamilton) and *M. bleekeri* (Day).

### Materials and Methods

Measurements were made with a dial caliper to the nearest 0.1mm. Subunits of the head are presented as proportions of head length (HL). Head length and measurements of body parts are given as proportions of standard length (SL). Methods for counts and measurements follow Ng & Dodson (1999). Numbers in parentheses following a count are the number of specimens with that count. Dorsal fin height is measured from the base of spinelet to the highest point of the dorsal fin. Twenty specimens were dissected and cleared for osteological studies. Clearing and staining of specimens follow Hollister (1934) and osteological nomenclature follows Mo (1991) and Darshan et al. (2010). Gill rakers were counted on the first left branchial

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**Competing Interest:** None.

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arch in 17 specimens. Methods for counting gill rakers and vertebrae follow Roberts (1992) and Roberts (1994) respectively. The examined materials are deposited in the Manipur University Museum of Fishes (MUMF) and Directorate of Coldwater Fisheries Research (DCFR) fish Museum.

***Mystus tengara* (Hamilton, 1822)**

(Fig. 1; Images 1 & 2b)

*Pimelodus tengara* Hamilton, 1822: 183, Pl.3, fig. 61 (type locality: Ponds of India).

*Bagrus tengara* Valenciennes, in Cuvier & Valenciennes, 1840: 414.

*Macrones tengara* Day, 1877: 447, Pl. Cl, fig. 5 (in parts, description).

*Mystus tengara* Misra, 1976: 104; Jayaram & Singh, 1977: 263 (name only); Talwar & Jhingran, 1991: 571, fig. 189 (in part); Jayaram & Sanyal, 2003: 107, fig. 25; Jayaram, 2006: 54, fig. 21 (in part); Vishwanath et al., 2007: 135, fig. 174 (description and figure); Shrestha, 2008: 151, pl. 39, fig. 131 (description and figure); Darshan et al., 2010: 51–53, fig. 2, 4d & b (description and fig.); Darshan et al. 2011: 2182 (comparative description).

*Mystus vittatus* Shrestha, 2008: 151, pl. 40, fig. 132 (description and figure); Shaw & Shebbeare, 1937: 94 (in parts); Roberts, 1992: 81, fig.2.

**Material examined:** 1 ex., v.2009, 74.6mm SL, Brahmaputra River at Goalpara, Assam, India 26°11'46"N & 90°38'04"E, coll. A. Darshan (MUMF 9535); 20 ex., 24.v.2007, 67.9–75.7 mm SL, Kolkata, West Bengal, India, coll. A. Darshan (MUMF 9520/1 - MUMF 9520/20); 15 ex., 30.xii.2008, 52.1–77.5 mm SL, Brahmaputra River at Guwahati, India (MUMF 9523/1 - MUMF 9523/15); 8 ex., 12.x.2009, 67–86 mm SL, wetlands of Comilla District, Bangladesh, purchased in Agartala fish market, Tripura, India, coll. W. Vishwanath (Unregistered); 2 ex., 16.vii.2008, 75.8–85.6 mm SL; Ganga River at Patna,

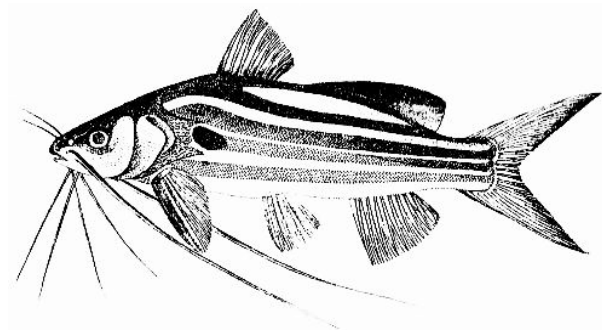


Figure 1. *Mystus tengara*: illustration from Hamilton, 1822 (Pl. 3, Fig. 61).

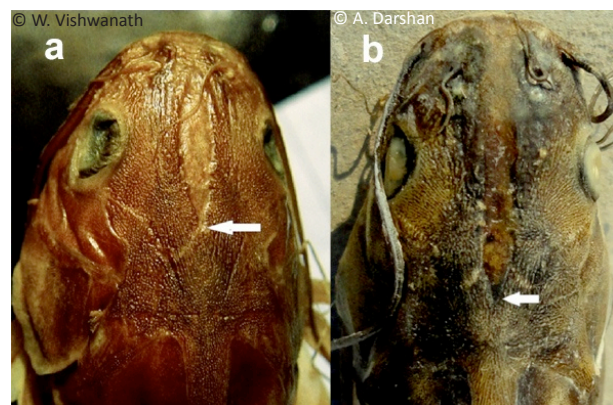


Image 2. Dorsal view of head showing the posterior extremity of posterior fontanel.

a - *Mystus vittatus* (Bloch), MUMF 9527, 72.7mm SL;

b - *Mystus tengara* (Hamilton), MUMF 9523, 73.5mm SL

India, coll. R.K. Sinha (MUMF 9534/1 - MUMF 9534/2); 23 ex., 14–15.v.2010, 58.5–88.4 mm SL, Ganga River at Gai-Ghat, Patna, India, coll. A. Darshan & Rajesh Sinha (MUMF 9539/1 - MUMF 9539/23); 15 ex., 17–18.iii.2011, 76–95 mm SL, Sarada Sagar reservoir situated at the border of Uttarakhand and Uttar Pradesh states, India, 28°40'N & 80°2'E, coll. A. Darshan and party (DCFR Unregistered).

**Diagnosis:** *Mystus tengara* differs from its congeners



Image 1. *Mystus tengara* (Hamilton), MUMF 9535, 74.6mm SL, lateral view

by a unique combination of the following characters: body with a distinct tympanic spot and four brown stripes which are separated by pale narrow interspaces; origin of adipose-fin not reaching the base of last dorsal-fin ray, 31–42 gill rakers on first branchial arch, eye rounded with a diameter 19.0–23.8 % HL and dorsal spine length 12.3–17.2 % SL, maxillary barbel length 254.5–360.5 % HL.

**Description:** Morphometric data are given in Table 1. Dorsal profile rising evenly from tip of snout to origin of dorsal fin then sloping gradually ventrally from there to the end of caudal peduncle. Ventral profile roughly straight up to the end of anal fin base, then sloping gently dorsally to the end of the caudal peduncle.

Head depressed. Skin covering dorsal surface of head thin. Anterior cranial fontanel extends from the level of posterior nasal opening to posterior orbital margins, separated from posterior fontanel by a narrow epiphyseal bar. Posterior fontanel extends to base of occipital process in juvenile and upto anterior one-third of supraoccipital bone in adult. Supraoccipital process long, wide at base about one-fifth of its length, reaching basal bone of dorsal fin, tapering distally. Eye rounded, located entirely in dorsal half of head.

Mouth sub-terminal. Oral teeth small and villiform, arranged in irregular rows. Premaxillary tooth band slightly curved backward, of equal width throughout. Tooth band on vomer continuous across midline and crescentic, band width about one-third of premaxillary with equal width throughout, extending to the level of lateral end of premaxillary tooth band. Dentary tooth band separated in the middle by thick skin, slightly broader than premaxillary tooth band at symphysis, tapering posterolaterally. Gill openings wide and free from isthmus. First branchial arch with 8+23 = 31(4) or 9+24 = 33(2) or 9+25 = 34(3) or 8+27 = 35(2) or 8+31 = 39(3) or 9+32 = 41(2) or 10+32 = 42(1) gill rakers.

Barbels in four pairs, maxillary pair reaching at least posterior end of anal fin base in adult and frequently reaching distal tip of caudal fin or beyond in juvenile specimens, nasal reaching base of occipital process, outer mandibular reaching distal tip of pectoral fin and inner mandibular barbel extend upto base of pectoral fin. Skin smooth. Lateral line complete and midlateral in position.

Dorsal-fin with spinelet, spine and seven branched rays. The spine is serrated anteriorly near the distal tip with 2–4 serrations and posteriorly with 8–10. Adipose fin long, origin not reaching base of last dorsal fin ray and deeply incised at posterior end. Pectoral fin with a backwardly curved stout spine and 7–8 branched

**Table 1. Morphometric data of *Mystus tengara* (n=36).**

In % of SL	Range	Mean±SD
Predorsal length	37.6–40.8	40.2±1.5
Preanal length	71.2–72.6	71.9±0.7
Prepelvic length	49.1–55.4	52.2±1.9
Prepectoral length	22.3–25.4	23.6±0.8
Height of dorsal fin	20.9–26.5	23.5±1.7
Length of dorsal-fin base	12.2–15.2	13.9±1.2
Dorsal spine length	12.3–17.2	14.1±1.8
Anal-fin length	16.9–20.4	18.2±1.0
Pelvic-fin length	13.9–17.8	15.7±1.0
Pectoral-fin length	17.9–23.2	20.1±1.4
Pectoral-spine length	15.0–20.4	17.6±1.6
Caudal-fin length	26.6–30.7	28.3±1.5
Length of adipose-fin base	24.0–31.7	28.8±2.2
Adipose maximum height	4.0–5.7	5.3±0.5
Post-adipose distance	13.6–17.1	15.4±1.0
Caudal peduncle length	16.3–19.9	17.9±1.2
Caudal peduncle depth	9.8–11.6	10.8±0.6
Body depth at anus	20.7–24.3	21.6±1.4
Head length	26.9–28.9	28.0±0.7
Head width	16.5–19.6	17.9±0.9
Head depth	16.2–19.8	17.9±2.4
In % of HL		
Snout length	32.7–36.5	34.8±1.6
Eye diameter	19.0–23.8	21.1±1.4
Interorbital distance	32.3–37.5	35.5±1.7
Nasal barbel length	55.3–84.8	66.1±7.9
Maxillary barbel length	254.5–360.5	297.6±37.8
Inner mandibular barbel length	62.3–94.9	79.1±11.2
Outer mandibular barbel length	110.4–151.3	135.3±10.7

rays. Spine with 11–16 large posterior serrations and anteriorly rough. Posterior fin margin almost straight. Pelvic fin short with i,5 rays. Anal fin with ii-iii, 7–10 rays. Caudal fin deeply forked with i,7,7,i or i,7,8,i or i,8,8,i rays, upper lobe longer.

**Osteological character:** Branchiostegal with 9(20) rays. Ribs with 8-9, attached from 6<sup>th</sup> to 13<sup>th</sup> or 14<sup>th</sup> vertebra. Vertebrae with 18+16 = 34(1) or 19+15 = 34(1) or 19+16 = 35(3) or 20+15 = 35(2) or 19+17 = 36(6) or 20+16 = 36(6) or 20+17 = 37(1). Closed haemal canal appears from 11<sup>th</sup> (20) vertebra onwards. Caudal fin with five hypural plates (20), three on the upper and two on the lower lobe. Parhypural free from first hypural plate. Hypurapophysis and secondary hypurapophysis fused. Procurrent rays respectively with 12 and 13 on upper

and lower lobe of caudal fin. Epural: single, laterally flattened and curved backward.

**Colouration:** Specimens preserved in 10% formalin have a body with a distinct oval dark brown tympanic spot and four brown stripes (a mid-dorsal and three lateral stripes), all the stripes are separated by pale longitudinal lines of equal wide. The pale longitudinal lines separating the mid-dorsal and lateral stripes originate from below the middle of the base dorsal fin and extend up to the posterior portion of adipose fin base. Lateral lines appear as thin pale lines in the middle of the midlateral stripe.

**Distribution:** Ganga and Brahmaputra drainage in India, Bangladesh and Nepal. The species is also recorded from Narmada and Mahanadi basins in northern India, Indus River drainage of Pakistan (Talwar & Jhingran 1991; Mirza 2003) and Afghanistan (Coad 1981).

### Discussion

Roberts (1998) reported that Francis Hamilton made all his drawings from fresh specimens and discarded them after completing the drawing and did not preserve any type specimen. He also reported that the description of the fishes were written later (sometimes much later) from the drawings. Robert's (1998) assumption might be partly correct. But Francis Hamilton must have certainly noted some important points about the fishes, without which he would not have been able to write detailed descriptions of all the 271 species in his book on Gangetic fishes. Mukherji (1931), on the basis of the manuscript of Hamilton's Gangetic fishes, reported that *Mystus tengara* was collected from Brahmaputra River at Goalpara, on 29 July 1808. Goalpara was the place where Francis Hamilton stayed as the rainy season station in 1808 during his Bengal survey. The name 'tengara' is in fact a Bengali or Assamese local name of *Pimelodus tengara* (now *Mystus*). Hamilton (1822) usually used

local names in naming a fish.

Hamilton (1822) mentioned that 'tengara' was very common in the ponds of India. Subsequent workers felt the type locality mentioned in the original description may not be correct and modified it without giving any reason (examples: lower Bengal: Sharma & Dutt 1983; India: Roberts 1992; northern parts of Bengal: Talwar & Jhingran 1991; Jayaram 2006, Jayaram & Sanyal 2003). It can be assumed that the type locality of *Mystus tengara* is in the Ganga-Brahmaputra basin on the basis of Mukerji's (1931) report of its collection and also the fact that Hamilton's (1822) work on Gangetic fishes was confined to this basin. Thus, striped catfishes of the genus *Mystus* from the Ganga-Brahmaputra basin have been made in order to redescribe *M. tengara* and to clarify its type locality.

Hamilton (1822) shows two figures (plate 3, fig. 61) of *Mystus tengara* along with the description of the fish. One of his figures shows the lateral view, showing the striped pattern of the fish (see fig. 1) and another the dorsal view showing the extent of the cranial fontanel invading the supraoccipital region. A cleared and stained mature specimen of *M. tengara* clearly shows that half of the posterior fontanel is located at the posterior portion of frontal and the remaining portion at the supraoccipital bone. In the case of *M. vittatus*, posterior fontanel tapers posteriorly to a point at the anterior border of the supraoccipital bone, not invading the supraoccipital region. The same structure can also be observed in the formalin preserved specimens after drying for some time (Image 2). Moreover, *Mystus tengara* differs from *M. vittatus* (Image 3) in having a longer maxillary barbel length (254.5–360.5 % HL vs. 214.3–244.9) and dorsal spine length (12.3–17.2 % SL vs. 10.7–12.2); body colour pattern consisting of a dark brown oval tympanic spot with distinct margin (vs. diffuse tympanic spot); four brown stripes (for details see description) separated



Image 3. *Mystus vittatus* (Bloch, 1794), EBS/ZSI/F-6140, 94.3mm SL, lateral view.

by the three pale interspace lines (vs. three brown stripes separated by two pale interspace lines of equal width, one above and another below the mid-lateral stripe). Moreover, *M. vittatus* has a diffused dark spot at the base of caudal fin, sometimes indistinct in some specimens (vs. no such spot in *M. tengara*). Day (1877) also observed this black spot in *M. vittatus* collected from Madras (southern India), though Bloch (1794) did not mention it.

Our extensive surveys of the Ganga and Brahmaputra River drainage have not encountered any species of *Mystus* with a short posterior fontanel (not invading the supraoccipital region) as in *Mystus vittatus*. Several records of *M. vittatus* from northeastern India and Gangetic basin were found to be misidentifications of either *M. tengara* or *M. carcio* (Darshan et al. 2010; above list of synonymy). For easy identification the species has also been incorporated in the given artificial key.

*Mystus tengara* differs from *M. bleekeri* in having a shorter adipose-fin base (24.0–31.7 % SL vs. 42.0–47.2); adipose-fin origin not in contact with the base of last dorsal fin ray (vs. in contact), more gill rakers on the first branchial arch (31–42 vs. 11–15) and fewer vertebrae (34–37 vs. 38–40). It differs from *M. dibrugarensis* in having more number of gill rakers (31–42 vs. 28) on the first arch and also in the absence of a thin black mid-lateral line and the black spot at the base of the caudal fin (vs. presence). *M. tengara* differs from *M. carcio* in having a smaller eye (diameter: 19.0–23.8 % HL vs. 39.3–42.3), wider interorbital (32.3–37.5 % HL vs. 25.6–30.7), adipose-fin base (24.0–31.7 % SL vs. 8.5–11.9), maxillary barbel (254.5–360.5 % HL vs. 151.9–195.8); shallower head (16.2–19.7 % SL vs. 21.9–25.9) and body depth

at anus (20.7–24.3 % SL vs. 24.4–28.2); shorter post-adipose distance (13.6–17.1 % SL vs. 17.9–20.5), pectoral spine length (15.0–20.4 % SL vs. 22.1–31.1); absence of coracoid shield (vs. presence) and continuous vomerine tooth band (vs. separated).

#### Comparative material and sources:

*Mystus vittatus*: EBS/ZSI/F-6140, 4 ex., 73.9–94.3 mm SL, India: Tamil Nadu, Cauvery River near Kumbakonam. MUMF 9527–9528, 2 ex., 72.7–76.8 mm SL, India: Tamil Nadu Tranquebar; ZSI Unregistered, 10 ex., 69.1–80.1 mm SL, southern India: freshwater pond at Tranquebar, coll. by Prof. R. Natarajan, 06.iv.1985.

*Mystus bleekeri*: ZSI 1076, (lectotype), 101.5 mm SL, India: Yamuna River, date unknown. MUMF 9521, 10 ex., 85.6–108.3 mm SL, India: Ganga River at Patna, 16.vii.2008. MUMF 9522, 10 ex. 74.2–98.8 mm SL, India: Brahmaputra River at Guwahati, 30.xii.2008.

*Mystus gulio*: Data from Jayaram & Sanyal (2003).

*Mystus carcio*: ZSI FF4081 (1), 47.9 mm SL, India: Assam: Brahmaputra River at Guwahati. ZSI FF4080 (1), 42.9 mm SL, same data as above. MUMF 9518/1 (1), 39.0 mm SL, India: Assam: Brahmaputra River at Guwahati. MUMF 9518/3-9518/10 (8), 30.2–47.9 mm SL; same data as above. MUMF 9519/1-9519/17 (17), 39.0–47.0 mm SL, same data as above. MUMF 9531 (1), 36 mm SL; India: Assam: Ujan Bazar, Guwahati.

*Mystus dibrugarensis*: Unregistered (5), 68.5–78.1 mm SL, India: Assam: Dibru River at Tinsukia.

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#### Artificial key to the identification of *Mystus* species distributed in Ganga Brahmaputra drainage

- 1a. Adipose fin origin in contact with the base of last dorsal fin ray ..... 2
- 1b. Adipose fin origin not in contact with the base of last dorsal fin ray ..... 3
- 2a. Body without lateral stripe but distinct humeral mark and nuchal spot present ..... *M. cavasius*
- 2b. Body with distinct lateral stripe but lacking both the humeral mark and nuchal spot ..... *M. bleekeri*
- 3a. Supra occipital process not in contact with the basal bone dorsal fin ..... *M. gulio*
- 3b. Supraoccipital process in contact with the basal bone of dorsal fin ..... 4
- 4a. A thin dark grey midlateral stripe running along the lateral line ending on a black spot located at the base of caudal fin ..... *M. dibrugarensis*
- 4b. Lacking both the dark grey thin mid-lateral stripe running on the lateral line and the black spot at the base of caudal fin ..... 5
- 5a. Adipose fin base length equal to or shorter than that of the dorsal fin base length, coracoid shield present, vomerine tooth band separated in the middle ..... *M. carcio*
- 5b. Adipose fin base length 2 to 2.5 times longer than that of the dorsal fin base, coracoid shield absent and vomerine tooth band continuous ..... 6
- 6a. Posterior fontanel long, extended into the supra occipital region reaching upto the middle of supra occipital bone (in mature specimens) ..... *M. tengara*
- 6b. Posterior fontanel short, ending at the anterior tip the supraoccipital bone (in mature specimens) ..... *M. vittatus*

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