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Physoschistura dikrongensis, a new loach from Arunachal Pradesh, India (Teleostei: Nemacheilidae)

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Abstract

A new species of nemacheilid, *Physoschistura dikrongensis*, is described from the Brahmaputra basin in Arunachal Pradesh, India. It is easily distinguishable from congeners in having two V-shaped dark brown bars across the caudal fin towards the distal end; 11–15 irregular bars on the body; dark brown mottled markings on the head; 4 simple and 8½ branched dorsal-fin rays; 4 simple anal-fin rays; an incomplete lateral line; a forked caudal fin with 8+7 branched rays; a well-developed axillary pelvic lobe; suborbital flap in males, and nine preoperculo-mandibular sensory canal pores.

Key words: Dikrong River, Doimukh, Brahmaputra basin, New nemacheilid

Introduction

Banarescu & Nalbant (in Singh *et al.* 1982) described the genus *Physoschistura* designating *Nemacheilus brunneana* Annandale (1918) from Yawnghwe Valley and Inle Lake, Myanmar, as its type species. Kottelat (1990, 2001) and Lokeshwor & Vishwanth (2012) diagnosed the genus in having a small body (less than 60 mm SL), strongly arched mouth, medially interrupted lower lip forming two lateral broadly triangular pads with deep furrows and irregularly shaped bars on the body. Chen *et al*. (2011) recognized seven species in the genus, which are distributed in the Brahmaputra, Irrawaddy, Salween and upper Mekong drainages, and described *P. yunnnaniloides*, a new species from the Chindwin River drainage of Myanmar. Bohlen & Šlechtová (2011) described the new genus, *Pteronemacheilus*, and placed *Physoschistura meridionalis* (Zhu 1982) in it. Lokeshwor *et al*. (2012) described *Physoschistura tuivaiensis* from the Tuivai River (Brahmaputra basin), Manipur, India, and placed *Physoschistura elongata* in *Schistura* on the basis of its lip morphology. Lokeshwor & Vishwanath (2012) recently described *Physoschistura chindwinensis* from the Lokchao River (Chindwin basin). Thus eight species are currently included in *Physoschistura*. This paper describes *P. dikrongensis*, a new species from the Dikrong River (a tributary of the Brahmaputra River) at Doimukh, Arunachal Pradesh, India.

Materials and methods

Measurements and counts followed Kottelat (1990) or are self-explanatory. Measurements were made on the left side of the specimens with dial calipers to the nearest 0.1 mm. Anatomical measurements are given as proportions of standard length (SL) and head length (HL). Meristic counts were performed under a stereo-zoom light microscope. Type specimens are deposited in the Manipur University Museum of Fishes (MUMF) and the Zoological Survey of India (ZSI), Kolkata. One paratopotype (MUMF 11091/4, 51.7 mm SL) was dissected for study of intestinal coiling and morphology of the air bladder. Data from Kottelat (1990) for *Physoschistura brunneana* (Annandale 1918), *P. pseudobrunneana* Kottelat 1990, *P. shanensis* (Hora 1929) and from Chen *et al*. (2011) for *P. yunnaniloides* were used in the absence of comparative material.

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FIGURE 1. *Physoschistura dikrongensis*, sp. nov. : Lateral views of (A) holotype, MUMF 11091/3, 44.6 mm SL, male; (B) paratype, MUMF 11090/1, 40.1 mm SL, female. Dorsal view of (C) holotype.

***Physoschistura dikrongensis* sp. nov.**
(Fig. 1)

Type material. Holotype. MUMF 11091/3, 44.6 mm SL, male; India: Arunachal Pradesh: from Dikarong river at Doimukh (Brahmaputra basin); 27°08'19"N, 93°44'51"E, 120 m above sea level, K. Nebeshwar *et al*., 8 April 2007.

Paratopotypes. MUMF 11090/2, 2 specimens, 40.1–46.8 mm SL, females. MUMF 11091/4, 4 specimens, 41.4–51.7 mm SL, males. ZSI FF 423, 2 specimens, 41.0 mm SL, male; 41.5 mm SL, female.

Diagnosis. A *Physoschistura* distinguished from its congeners in having the following combination of characters: two V-shaped dark brown bars across caudal fin; 11–15 irregular dark brown bars on body; dorsolateral and dorsal portion of head mottled dark brown; incomplete lateral line with 70–85 pores; 4 simple and 8½ branched dorsal-fin rays; 4 simple anal-fin rays; caudal fin with 8+7 branched rays; large axillary pelvic-fin lobe; suborbital flap in male; 9 pores in preoperculo-mandibular canal.

Description. Morphometric data are given in Table 1. Body moderately elongate and stout. Dorsal profile elevating evenly from tip of snout to origin of dorsal fin, then slanting gently ventrally to the vertical level of anal-fin origin, continuing horizontally to caudal base. Anterior portion of body cylindrical in cross section, posterior portion compressed laterally from anal-fin base to caudal-fin base. Ventral profile almost flat from tip of snout to caudal base. Head slightly depressed, almost as broad as high at eye and supraoccipital region. Snout rounded.

Dorsal fin with 4 simple and 8½ branched rays, articulated in advance of pelvic fin. Distal margin of dorsal fin slightly convex. Anal fin with 4 simple and 5½ branched rays, its distal margin reaching two-thirds distance from anal-fin origin to caudal peduncle. Pectoral fin with 1 simple and 9 branched rays, reaching two-thirds distance to pelvic-fin base. Pelvic fin with 1 simple and 7 branched rays, origin at vertical from 2nd or 3rd branched dorsal-fin rays. Distal margin of pelvic fin not reaching vent when adpressed, leaving a distance of half eye diameter. Axillary pelvic-fin lobe large. Caudal fin with 8 upper and 7 lower branched rays, forked, lobes equal in length. Caudal peduncle 1.2–1.4 times longer than deep, with low dorsal and ventral adipose crests on posterior half. Largest recorded size: 51.7 mm SL male (MUMF 11091/4).

TABLE 1. Morphometric data of holotype and eight paratypes of *Physoschistura dikrongensis* sp. nov.

	holotype	range	mean	SD
Standard length (mm)	51.4	40.1–51.7		
% SL				
Total length	125.0	121.0–126.5	124.8	1.6
Body depth	14.5	14.5–18.6	16.4	1.3
Head depth at nape	12.6	12.2–13.9	13.1	0.5
Head depth at eye	11.0	10.3–11.6	11.2	0.3
Dorsal head length	18.9	18.8–21.4	20.5	0.7
Lateral head length	22.9	22.0–23.7	22.9	0.6
Caudal-peduncle length	14.5	14.5–16.6	15.3	0.7
Caudal-peduncle depth	11.2	10.9–11.8	11.4	0.3
Predorsal length	49.2	48.5–51.9	50.3	1.1
Prepelvic length	55.6	52.3–55.6	53.3	1.0
Preanus length	73.7	71.5–73.9	72.8	0.9
Preanal length	78.1	76.3–78.1	77.1	0.6
Dorsal-fin height	14.8	13.8–17.7	15.5	1.1
Anal-fin depth	16.7	14.9–16.7	15.7	0.6
Pectoral-fin length	20.5	18.5–23.5	21.2	1.7
Pelvicfin length	16.7	14.9–17.1	16.0	0.7
Maximum head width	12.8	11.6–14.5	13.4	0.9
Head width at nares	7.1	7.1–9.0	8.2	0.6
Body width at dorsal-fin origin	11.0	10.6–12.1	11.2	0.4
Body width at anal-fin origin	7.1	6.5–7.3	6.8	0.6
% HL				
Snout length	48.7	44.1–53.9	47.4	2.8
Interorbital distance	28.1	25.1–35.3	29.9	2.9
Eye diameter	26.9	18.9–26.8	22.1	2.4
Mouth gape width	30.8	24.1–31.7	26.9	2.5
Maximum head width	67.8	54.7–70.7	65.5	4.7
Head width at nares	37.6	36.9–43.9	40.1	2.5
Ratio				
Lateral/dorsal head depth	1.1	1.0–1.2	1.1	0.1
Body depth/width	1.5	1.3–1.7	1.5	0.1
Head width/depth	1.0	0.9–1.1	1.0	0.1
Caudal-peduncle length/depth	1.3	1.2–1.4	1.3	0.1

Body covered by partly overlapping embedded minute scales. No scales present on ventral surface anterior to pelvic fin origin. Lateral line incomplete, reaching vertical to anal-fin origin and straight with 70–85 pores. Cephalic lateralis system with 9 supraorbital, 3+9 infraorbital, 9 preoperculo-mandibular and 3 supratemporal pores. Unculi present on lips, barbels, and pectoral fin rays.

Anterior nostril pierced on anterior side of a low flaplike pointed tube. Mouth arched, 1.6–1.8 times wider than long. Upper lip finely and regularly pleated with a median incision. Lower lip with a median interruption, forming two lateral broadly triangular pads with a wide median furrow between them (Fig. 2). Processus dentiformis prominent. No median notch on lower jaw. Inner rostral barbel reaching to maxillary barbel; outer barbel reaching vertically to posterior orbital rim. Maxillary barbel extends slightly beyond posterior orbital rim. Free posterior chamber of air bladder well formed, spherical, and not encapsulated. Intestine with a bend, a bit distant behind the stomach and forming a loop (Fig. 3).

FIGURE 2. Lip structure of *Physoschistura dikrongensis*, MUMF 11091/3. Scale bar = 1 mm.

Sexual dimorphism. Male with prominent spoon-shaped suborbital flap (Fig. 4).

Color. In 10% formalin: yellowish cream background with 11–15 irregular dark brown bars on body. Color is darker on dorsal surface and lighter on ventral surface. Bars are variable in shape, complete on back or with 3–4 small saddles between them. Predorsal bars numerous, small, and appear as split large bars. Bars behind dorsal fin meet or nearly so on ventral surface, while those anterior to dorsal-fin origin end at level of pectoral-fin insertion. Anteriormost bar may be fragmented dorsolaterally. Bars become fainter and narrower towards venter. Interspace between bars thinner than bars. Caudal-peduncle bars usually interrupted into small saddles on dorsal midline and appear as blotches midlaterally. Dorsal and dorsolateral portions of head mottled with dark brown spots, which become fainter towards ventral surface. Conspicuous black spot at dorsal-fin origin. Dorsal fin with three bands, rest of fin hyaline. Caudal-fin base with irregular black bar extending from dorsal to ventral midlines. Caudal fin hyaline with two V-shaped bars pointing anteriorly; first bar at first branching point of rays and second bar midway between first bar and posterior margin of branched rays; rest of fin hyaline. Entire length of first branched pectoral-fin ray dusky.

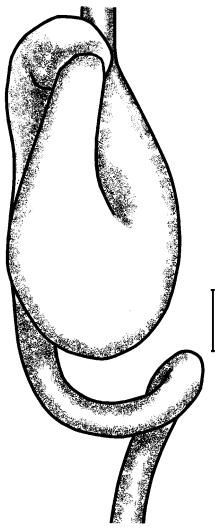

FIGURE 3. Coiling pattern of intestine of *Physoschistura dikrongensis*, MUMF 11091/4. Scale bar = 1mm.

FIGURE 4. Suborbital flap in male *Physoschistura dikrongensis*, MUMF 11091/3.

Distribution. India: Arunachal Pradesh: Dikrong River at Doimukh, Brahmaputra basin (Fig. 5).
Etymology. The species is named after its type locality, *Dikrong* River.

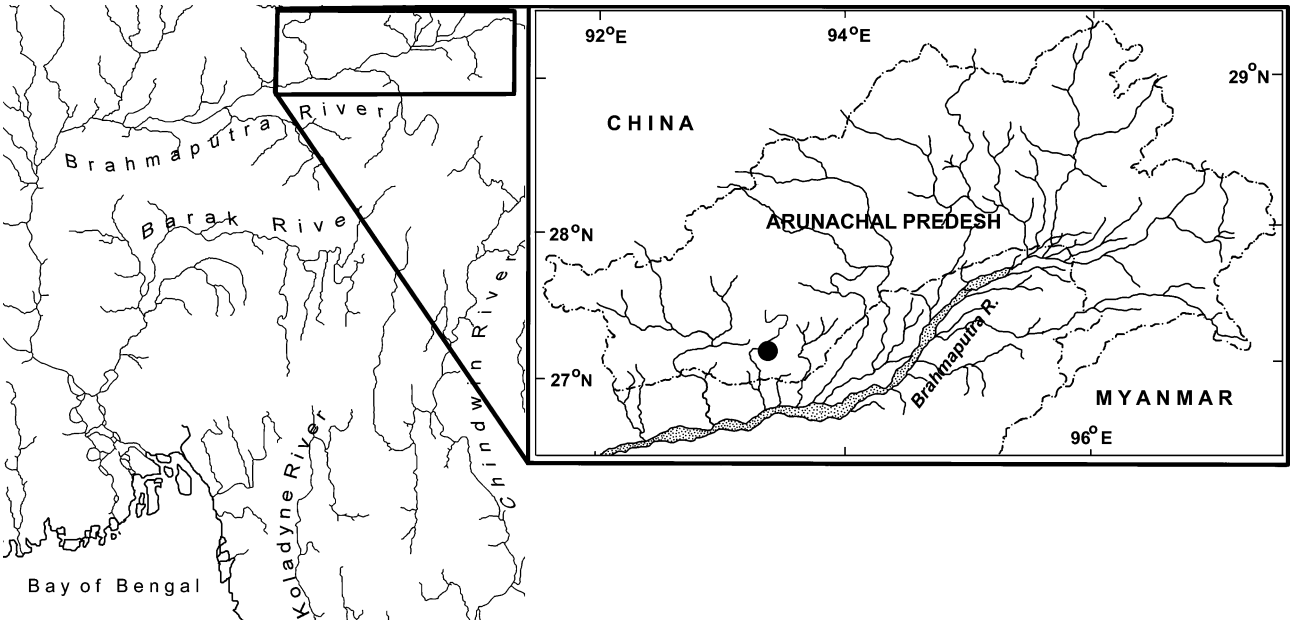

FIGURE 5. Map showing type locality of *Physoschistura dikrongensis*.

Discussion

Physoschistura dikrongensis is most similar to *P. brunneana, P. pseudobrunneana, P. rivulicola* (Hora 1929), and *P. raoi* (Hora 1929) in having an incomplete lateral line. It is distinguished from *P. brunneana* in having 8½ (vs. 9½) branched dorsal-fin rays, 4 (vs. 3) simple anal-fin rays, 8+7 (vs. 9+8) branched caudal-fin rays, and presence (vs. absence) of an axillary pelvic lobe. It is distinguished from *P. pseudobrunneana* in having 4 (vs. 3) simple anal-fin rays, 10 (vs. 11) pectoral-fin rays, 8+7 (vs. 8+8) branched caudal-fin rays, 9 (vs. 6) supraorbital canal pores, and 9 (vs. 7) preoperculo-mandibular canal pores. It differs from *P. rivulicola* in having 4 (vs. 3) simple anal-fin rays, 10 (vs. 11) pectoral-fin rays, 8+7 (vs. 8–9 + 8) branched caudal-fin rays, 9 (vs. 7) supraorbital canal pores, longer predorsal distance (48.5–51.9% SL vs. 44.2), longer preanus distance (71.5–73.9% SL vs. 66.7), and longer snout (44.1–53.9% HL vs. 29.1). It is distinguished from *P. raoi* in having 11–15 (vs. 22) bars on the body, 4 (vs. 3) simple anal-fin rays, 10 (vs. 11) pectoral-fin rays, 8+7 (vs. 9+8) branched caudal-fin rays, 9 (vs. 6) supraorbital canal pores, 3+9 (vs. 4+11) infraorbital canal pores, 9 (vs. 8) preoperculo-mandibular canal pores, shallower head at nape (12.2–13.9% SL vs. 15.4), and narrower eye diameter (18.9–26.8% HL vs. 29.1).

Physoschistura dikrongensis, besides having an incomplete lateral line, can easily be distinguished from *P. shanensis* in having 11–15 dark brown bars (vs. 8 dark blotches) along the lateral line, 8½ (vs. 9½) branched dorsal-fin rays, 4 (vs. 3) simple anal-fin rays, 10 (vs. 12) pectoral-fin rays, and 8+7 (vs. 8+8) branched caudal-fin rays; from *P. tuivaiensis* in having 4 (vs. 3) simple anal-fin rays, shorter pelvic fin (14.9–17.1% SL vs. 18.3–20.9), free posterior chamber of air bladder spherical (vs. conical), lower jaw without (vs. with) median notch, and basicaudal bar complete (vs. interrupted); and from *P. yunnaniloides* in having 11–15 (vs. 18–20) bars on body, presence (vs. absence) of free posterior air chamber, and 8+7 (vs. 8+8) branched caudal-fin rays. The new species is further distinguished for *P. chindwinensis* in having 3–4 (vs. 11–16) saddles on body, 4 (vs. 3) simple dorsal fin and anal-fin rays, 8+7 (vs. 8+8) branched caudal-fin rays, and 9 (vs. 7) preoperculo-mandibular canal pores.

Comparative materials

Physoschistura rivulicola, ZSI F 11060/1, 48 mm SL, holotype; Burma: Southern Shan states: Yawnghwe Valley and He-Ho Plain (poor state of preservation).

Physoschistura raoi, ZSI F 11062/1, 28.3 mm SL, holotype; Burma: Northern Shan States: Mongyai.

Physoschistura tuivaiensis, MUMF 5089, 46.0 mm SL, holotype; India: Manipur: Churchandpur district: Tuivai River at Likhailok (Brahmaputra basin); Lokeshwor and party, 20 December 2011. MUMF 5082–88, 7 exs., 37.4–45.2 mm SL, paratypes; India: Manipur: Churchandpur district: Tuivai River; K. Shanta Devi, 5 May 2004.

Physoschistura chindwinensis, MUMF 11077, 43.3 mm SL, holotype; MUMF 11073–1084, 13 exs., 40.3–44.5 mm SL, paratypes; India: Manipur: Chandel district: Lokchao River at Moreh (Chindwin basin); Vishwanath *et al*., 4 April 2004.

Repeated attempts were made to examine holotypes of *P. brunneana* and *P. shanensis* in ZSI, Kolkata but failed. The types are probably lost. Thus, comparisons were made with the data from Kottelat (1990).

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