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Physoschistura ranikhetensis, A NEW LOACH (CYPRINIFORMES: NEMACHEILIDAE) FROM UTTARAKHAND, INDIA

PRATIMA SINGH[1*] AND UJJAL DAS[1]

[1]Zoological Survey of India, Freshwater Fish Section, 27 J.L. Nehru Road, Kolkata-700016, India.

AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration between both authors. Author PS performed field sampling, designed the study, performed the data analysis and finalized the manuscript. Authors UD managed the literature searches, data collection and wrote the first draft of the manuscript. Both the authors read and approved the final manuscript.

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Original Research Article

ABSTRACT

A new loach, *Physoschistura ranikhetensis*, is described from the Ganga River basin near Ranikhet, Uttarakhand, India. It is distinguished from all other known species of *Physoschistura* by the following combination of characters: elongate body (depth at dorsal-fin origin 12.0–13.4% SL), an incomplete lateral line extending slightly beyond posterior base of anal-fin, 14–15 oblique black bars on the body, no suborbital flap, short caudal peduncle (39.5–60.0% HL), no axillary lobe on pelvic fin base, and an emarginate caudal fin. The genus *Physoschistura* is reported here for the first time from Ganga River drainage.

Keywords: Nemacheilid loach; *Physoschistura;* new species; Uttarakhand.

1. INTRODUCTION

The nemacheilid genus *Physoschistura* was created by Banarescu & Nalbant in Singh et al. [1], with *Nemacheilus brunneanus* Annandale, 1918 as type species [2]. They are small benthic hill stream fishes distributed in China, India, Myanmar, and Thailand. They are characterized by having the two halves of the air bladder capsule joined medially without manubrium, the posterior chamber free, well developed and in direct contact with the capsule; and a medially interrupted lower lip forming two lateral broadly triangular cushions with the two halves forming an acute angle, separated by a wide interruption, partly free from lower jaw with a long postlabial groove, and each half with median frenum [2]. Currently, eight species of *Physochistura* viz., *P. absumbra* Endruweit, *P. brunneana* (Annandale), *P. chulabhornae* Suvarnaraksha, *P.elongata* Sen & Nalbant, *P. pseudobrunneana* Kottelat, *P. raoi* (Hora), *P. rivulicola* (Hora), *P. shuanjiangensis* (Zhu & Wang) are considered valid [3]. During ichthyological surveys conducted in the Ganga River basin near Ranikhet, Almora district, Uttarakhand, India (Fig. 1), six specimens of an unnamed *Physoschistura* from the Dhobighat stream were collected, which represent a new species described herein as *Physoschistura ranikhetensis.*

2. MATERIALS AND METHODS

Live specimens were collected and fixed in 10% formalin and later transferred to 70% alcohol. Measurements and counts follow Kottelat [4]. The

**Corresponding author: Email: singhpratimakol@gmail.com;*

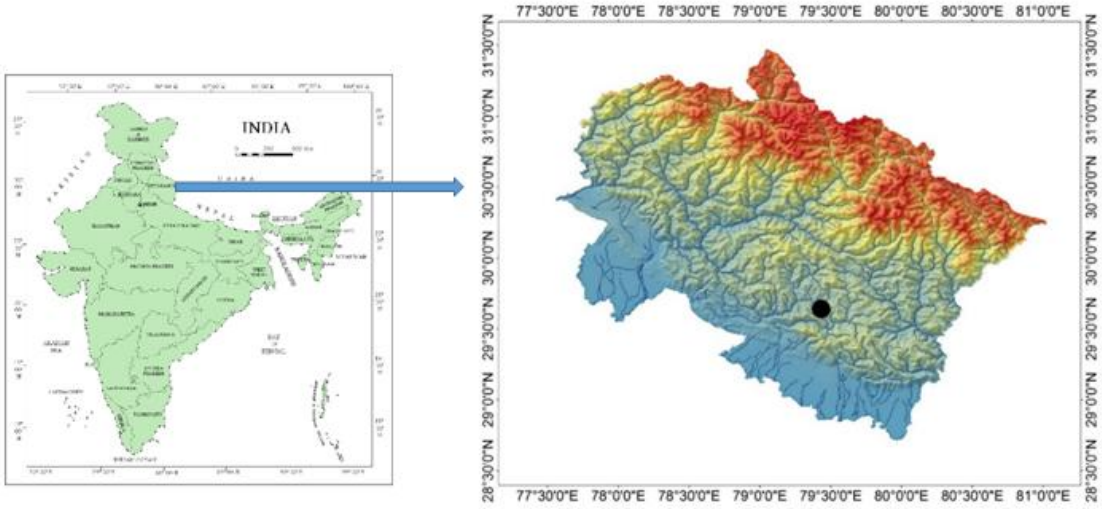

Fig. 1. Map of Uttarkhand, India, showing type locality of *Physoschistura ranikhetensis*

type specimens are deposited in the Zoological Survey of India (ZSI), Kolkata. Fin rays were counted under a stereoscopic zoom microscope. Measurements were made point-to-point with dial callipers and data recorded to the nearest tenth of a millimetre. Measurements are given as proportions of standard length (SL). Sub-units of the head are presented as proportions of lateral head length (HL).

3. RESULTS

Physochistura ranikhetensis sp. nov. (Fig. 2)

Holotype. ZSI FF 7930, 34.7 mm SL, India: Uttarakhand, Almora district, a stream at Dhobighat near Ranikhet, Ganga River basin, 29°38' 28″N; 79°25'56″E, Pratima Singh, 6 May, 2018.

Paratypes. ZSI FF 7931, 5 ex., 65.2 -98.3 mm SL, collected with the holotype.

Diagnosis. *Physoschistura ranikhetensis* can be distinguished from congeners in having a combination of the following characters: elongate body (depth at dorsal-fin origin 12.0–13.4% SL), an incomplete lateral line extending slightly beyond posterior base of anal-fin, 14-15 oblique black bars on the body, no suborbital flap, short caudal peduncle (39.5–60.0% HL), no axillary lobe on pelvic fin base, and emarginate caudal fin.

Description. General appearance as in Fig. 1. Morphometric data are in Table 1. Body elongate, subcyclindrical in cross section anteriorly and laterally compressed posteriorly. Dorsal profile of body elevated from tip of snout to nape or slight beyond then slightly decline to dorsal-fin posterior base, then almost straight up to end of caudal-fin base. Ventral profile of body more or less straight. Head slightly depressed, short and triangular. Snout rounded, greater than eye diameter. Body entirely covered with embedded scales. Lateral line incomplete, slightly exceeding posterior base of anal-fin. Unculi are present on lips and barbels. Lips fleshy and finely pleated. Lower lip with deep median interruption, forming lateral triangular pads (Fig. 3). Upper lip with small median incision. Processus dentiformis prominent, with median notch. Lower jaw with shallow median notch. Barbels moderately long; inner rostral barbel reaching posterior margin of corner of lip; outer one much longer, reaching to vertical of anterior rim of orbit; maxillary barbel reaches beyond to vertical from posterior rim of orbit. Air bladder in two halves, spherical, joined medially, not connected by a manubrium; the posterior chamber free, well developed, rounded, in direct contact with the capsule (Fig. 4).

Dorsal-fin with 2 simple and 7½ branched rays, origin midway between tip of snout and caudal fin base, slightly in advance of pelvic-fin origin. Anterior margin of dorsal fin slightly convex, posterior margin almost straight. Anal-fin with one simple and 5 branched rays, not reaching base of caudal fin. Pectoral-fin elongate with one simple and 10 or 11 branched rays. Pelvic-fin elongate with one simple and 6 branched rays, almost touching the vent when adpressed. Caudal-fin with 18 branched rays, slightly emarginate, lobes of more or less equal. Caudal peduncle longer than deep, with adipose crest on posterior half of it on both dorsal and ventral sides.

Table 1. Biometric data of holotype and six paratypes of *Physoschistura ranikhetensis*

In % of SL	Holotype	Range	Mean± SD
Body depth at dorsal-fin origin	12.4	12.0–13.4	12.6 ± 0.5
Head depth at nape	11.5	11.2–13.5	11.8 ± 0.9
Lateral head length	23.0	22.6–24.8	23.5 ± 0.8
Dorsal head length	19.0	19.0–22.7	20.5 ± 1.6
Head depth at eye	9.5	8.1–10.4	9.3 ± 0.8
Caudal peduncle Length	13.8	9.8–13.8	12.0 ± 1.6
Caudal peduncle depth	8.9	8.8–10.4	9.2 ± 0.7
Predorsal length	45.5	45.5–51.3	49.2 ± 2.2
Prepelvic length	48.1	48.1–55.0	51.0 ± 2.5
Preanus length	62.2	62.2–76.5	71.4 ± 5.5
Preanal length	76.7	76.7–83.1	78.8 ± 2.6
Dorsal-fin height	21.0	18.1–21.0	19.8 ± 1.3
Pelvic-fin length	17.6	17.2–20.1	18.6 ± 1.2
Anal-fin length	18.7	16.9–20.8	18.6 ± 1.4
Pectoral-fin length	18.4	18.4–21.8	20.0 ± 1.3
Maximum head width at cheek	15.8	13.9–16.8	15.2 ± 1.1
Head width at nares	9.5	9.5–10.5	9.9 ± 0.5
Body width at anal fin origin	4.9	4.3–6.4	5.6 ± 1.0
Body width at dorsal fin origin	9.8	9.5–10.2	9.9 ± 0.3
In % HL			
Snout length	38.7	36.5–38.7	37.3 ± 0.8
Interorbital distance	27.5	25.9–34.3	30.0 ± 3.8
Eye diameter	23.7	19.7–23.7	21.3 ± 1.8
Mouth gap width	41.2	29.6–41.4	36.3 ± 5.2
Head depth at eye	41.2	34.3–42.0	39.6 ± 3.1
Head depth at nape	50.0	46.9–59.5	50.4 ± 5.2
Body depth at dorsal-fin origin	53.7	48.1–57.1	53.5 ± 3.4
Caudal peduncle depth	38.7	37.0–44.3	39.3 ± 2.9
Caudal peduncle length	60.0	39.5–60.0	51.3 ± 7.7
Maximum head width	68.7	58.02–71.43	64.6 ± 6.0
Body width at dorsal-fin origin	42.5	38.3–44.6	41.9 ± 2.3
Body width at anal-fin origin	21.2	17.3–28.4	23.9 ± 4.6

Colour: In 70% alcohol: Body with 14-15 regularly arranged black bars, obliquely placed on creamy-white background: 5-6 bars in predorsal region, 3 under dorsal fin, and 6 between base sof last dorsal-fin ray and caudal-fin base. Bar width equal to inter bars space. Head dark olive above, becoming lighter ventrolaterally and much lighter on ventral. Creamy white on the ventral side of the body. Dorsal-fin with two black bands, one near the base and another near the distal half. Base of dorsal-in ray is marked with black spot. Pectoral, pelvic, anal and caudal-fins dusky. Prominent, complete vertical black bar present at base of caudal-fin.

Etymology: The species is named after Ranikhet, the type locality.

Distribution: Presently known from a stream at Dhobighat near Ranikhet, Almora district, Uttarakhand, India (Figs. 1 and 5).

4. DISCUSSION

Physoschistura was diagnosed mainly by the morphology of the bony capsules of the air bladder [1] to which other characters, especially the morphology of the lower lip, have been added later [4]. About sixteen species were described under the genus, most of them in the last decade from north-eastern India, Myanmar, Thailand and China [5–8]. Kottelat [2] remarked that the morphology of the air bladder and its capsule was ignored or misunderstood. He diagnosed *Physoschistura* by having the two halves of the air bladder capsule joined medially (without manubrium) and the posterior chamber free, well developed and in direct contact with the capsule and considered most species earlier placed in *Physoschistura* belong to the new genus *Mustura*. Currently, eight species of *Physoschistura* are vaild: *P. elongata* from the Brahmaputra River drainage in India; *P. absumbra, P. brunneana, P. raoe,* and *P.*

Fig. 2. *Physoschistura ranikhetensis*, ZSI FF 7930, holotype, 34.7 mm SL; dorsal, lateral and ventral views

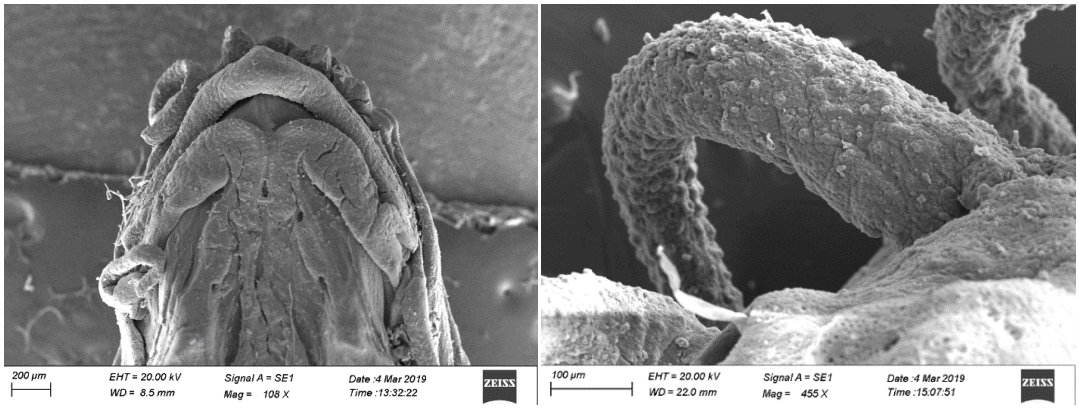

Fig. 3. Oromandibular structures of *Physoschistura ranikhetensis*. A. Ventral surface of head showing lip structures. B. Rostral barbel showing taste buds

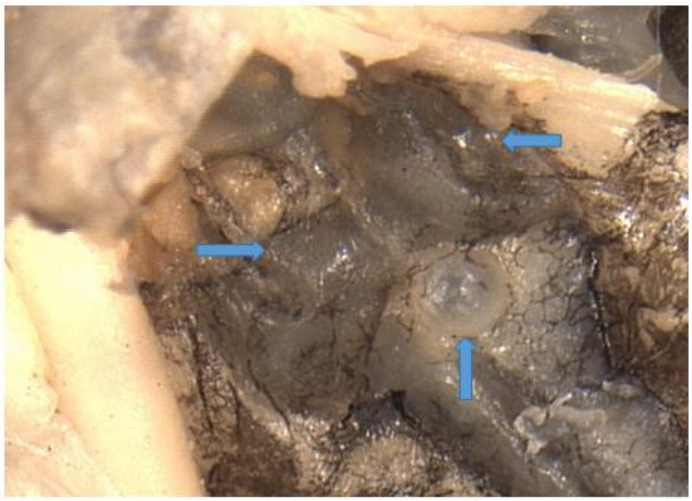

Fig. 4. Air bladder of *Physoschistura ranikhetensis*

Fig. 5. A stream at Dhobighat near Ranikhet, Almora district, Uttarakhand, India, the type locality of *Physoschistura ranikhetensis*

rivulicola, from the Salween River basin in China and Myanmar; *P. pseudobrunneana,* and *P. shuangjiangensis* from Mekong basin in China and Thailand, and *P. chulabhornae* from the Maechaem River basin in Thailand [3].

Physoschistura ranikhetensis is distinguished from *P. elongata* in having 14–15 vertical bars (vs. seven irregular dark brown bars vertical in front of the vent and those in caudal peduncle region fragmented into blotches), slender body (12.0–13.4% SL vs.14.8), and

longer snout (36.5–38.7% HL vs. 35.0). It differs from *P. absumbra* in having a shorter dorsal head length (19.0–22.7% SL vs. 23.0–25.0), slender caudal peduncle (8.8–10.4% SL vs. 12.5–13.8), incomplete (vs. complete) lateral line, emarginate (vs. forked) caudal fin, 14–15 (vs. 9–12) vertical bars on body, and absence (vs. presence) of axillary pelvic lobe and from *P. brunneana* in having a slender body (12.0–13.4% SL vs.19.1–20.3), greater interorbital space (26.0–34.3% SL vs.15.7–23), smaller eye (19.7–23.7% HL vs. 28.7–33.3) and emarginate (vs. forked) caudal fin. It is distinguished from *P. raoe* in having a slender body (12.0–13.4% SL vs.16.7–19.4), shorter head (19.0–22.7% SL vs. 23.3–25.2), fewer bars on body (14–15 vs. 22), and emarginate (vs. forked) caudal fin. The new species differs from *P. revulicola* in having a shorter caudal peduncle (39.5–60% HL vs 60.7–66.8), a shorter head (19–22.7% SL vs.23.0–26.7), a slender body (12.0–13.4% SL vs.18.7–19.5) and emarginate (vs. forked) caudal fin.

The new species is distinguished from *P. pseudobrunneana* in having smaller eye diameter (19.7–23.7% HL vs. 27–33), a slender head at nape (11.2–13.4% SL vs.14.5–17.1), lateral line that reaches anal fin vs. at most extending to the middle of the pelvic fin, absence (vs.presence) of suborbital lobe, and emarginate (vs. forked) caudal fin. It differs from *P. shaungjiangensis* in having 14–15 vertical bars (vs. mottled) on the body, incomplete (vs. complete) lateral line, absence (vs. presence) of a suborbital lobe, and slender body (12.0–13.4% SL 18.0–18-21).

Physoschistura ranikhetensis is distinguished from *P. chulabhornae* in having a slender body (12–13.4% SL vs.15.6–23.2), a longer snout (36.5–38.7% HL vs.32.2–35.9), 14–15 vertical bars (vs. 8–10 blotches) on body, an emarginate (vs. forked) caudal fin, and absence (vs. presence) of suborbital lobe.

Currently, the distribution of fishes the genus *Physoschistura* is restricted in China, India, Myanmar, and Thailand. In India, it is so far reported from the Brahmaputra River drainage. It is reported here for the first time from Ganga River drainage.

5. COMPARATIVE MATERIAL AND SOURCES

Physoschistura rivulicola ZSI F 11060/1, 49.3 mm SL, holotype; He-Ho plain, southern Shan States, Myanmar. Additional data from Hora [9].

Physoschistura raoe, ZSI F 11062/1, 33.5 mm SL, one Type; A large tank near Inspection Bungalow at Mongyai, N. Shan States, Myanmar. ZSI F 11063/1, 27.8, 30.6 mm SL, 2 Cotype; same data as type. Additional data from Hora [9].

P. absumbra: Data from Endruweit [10]

P. brunneana: Data from Hora [9].

P. chulabhornae: Data from Suvarnaraksha [11].

P. elongata: Data from Lokeshwor &Vishwanath [8].

P. pseudobrunneana: Data from Kottelat [4].

P. shuangjiangensis: Data from Endruweit [10].

6. CONCLUSION

A new loach, *Physoschistura ranikhetensis*, is described from the Ganga River basin near Ranikhet Uttarakhand, India. It characterized by having an elongate body, an incomplete lateral line extending slightly beyond the posterior base of anal-fin, 14–15 oblique black bars on the body, no suborbital flap and an emarginate caudal fin. The genus *Physoschistura* is reported here for the first time from Ganga River basin, and nine species are currently included in it.

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COMPETING INTERESTS

Authors have declared that no competing interests exist. The fishes used for this research are commonly available in Himachal Pradesh and use for research in our country. There is absolutely no conflict of interest between the authors and local communities because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge.

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