



## First report of the genus *Neonoemacheilus* Zhu & Guo (Cobitidae: Nemacheilidae) from rivers of Mizoram, northeastern India with a note on *N. assamensis* Menon

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### ABSTRACT

The study, for the first time, reports the occurrence of the genus *Neonoemacheilus* from rivers of Mizoram, namely Langkaih and Tlawng rivers. The study provides descriptions of *N. assamensis* giving additional characters other than outlined in the original description, such as, number of unbranched dorsal and anal fin rays; intestine arrangement and numbers of vertebrae.

**Key words:** *Neonoemacheilus assamensis*; ichthyofauna; nemacheilidae; threatened.

### INTRODUCTION

Fishes of the family Nemacheilidae are one of the most widespread freshwater fauna distributed throughout the fresh and well oxygenated rivers of Asia, Europe and parts of Ethiopia. The family comprises 46 genera<sup>1</sup> of which the genus *Neonoemacheilus* Zhu & Guo is characterized by the presence of hypertrophied lips forming a pre-oral cavity; nostrils close together, anterior one not barbel like; scales present, usually imbricate, with a moderately wide focal area; lateral line complete; caudal fin emarginated; suborbital

flap present in males.<sup>2</sup> There are currently 4 or 5 valid species viz. *Neonoemacheilus assamensis* (Menon), *N. labeosus* (Kottelat), *N. mengdingensis* (Zhu & Guo), *N. moorehensis* (?) (Arunkumar) and *N. peguensis* (Hora).

Recent taxonomic and revisionary work in ichthyology of Mizoram results in documentation, new description and/or redescription of nemacheiline species.<sup>3-12</sup> However, there are no reports on the genus and species occurrence of *Neonoemacheilus assamensis* in rivers of Mizoram. Collections from Langkaih and Tlawng rivers, a tributary of Barak river, Mizoram, northeastern India, included a nemacheiline species identified to *N. assamensis*, and its description and biology form the basis of this study.

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## MATERIAL AND METHODS

Fishes were collected from Langkaih and Tlawng rivers, both of which run northerly and join Barak river in Assam. The specimens were fixed in 10% formalin and later transferred to 70% alcohol. Counts and measurements were made on the left side of specimens following Kottelat,<sup>2</sup> with the exclusion of total length and the addition of body depth taken in front of anal fin. Measurements were made point to point with digital callipers to the nearest 0.1 mm. Measurements, except standard length, are given as proportions of standard length (SL). Sub-units of the head are presented as proportions of dorsal head length (DHL). Fin rays were counted under a stereo microscope, with small posterior-most ray of the dorsal and anal fins, articulating with the same pterygiophore as the preceding ray, counted as ½. For vertebral counts, two specimens were cleared and stained in alizarin. Vertebral count includes the first four vertebrae of the Weberian apparatus. Numbers in parentheses after a meristic value indicate the frequency of that value. Abbreviation: PUCMF, Pachhunga University College Museum of Fishes, Mizoram; SD, standard deviation.

### *Neonoemacheilus* Zhu & Guo

**Type species:** *Noemacheilus labeosus* Kottelat, by original designation; masculine.

**Synonym:** *Infundibulatus* Menon, type species: *Nemacheilus peguensis* Hora, by original designation; masculine.

### Diagnosis

*Neonoemacheilus* is distinguished from other nemacheilinae in having hypertrophied lips forming a preoral cavity; nostrils close together, anterior one not barbel like; scales present, usually imbricate, with a moderately wide focal area; lateral line complete; caudal fin emarginated; suborbital flap present in males.<sup>2</sup> Dorsal fin with 8 or 9 branched rays; its distal edge

slightly notched. No adipose keel or crest on the caudal peduncle; posterior chamber of air bladder well developed and free (contrary to all species of *Nemacheilus*).<sup>13</sup>

### *Neonoemacheilus assamensis* (Menon)

Figures 1 & 2

#### Specimens examined

PUCMF 15004, 10, 39.3–47.8 mm SL; India: Mizoram: Mamit district: Langkaih river, near Tumpanglui village, 23°55'48" N & 92°18'52" E; coll. Lalhlimpaia *et al.*, 25 March 2015. PUCMF 15005, 3, 37.9–42.7 mm SL; India: Mizoram: Mamit district: Tlawng river, near Bairabi village, 24°08'33" N & 92°32'42" E; coll. Lalhlimpaia *et al.*, 22 February 2015. PUCMF 15006, 2, 39.1–39.3 mm SL; same data as PUCMF 15005; cleared and stained.

### Diagnosis

*Neonoemacheilus assamensis* is distinguished from other congeners in having the following combination of characters: presence of suborbital flaps in males; lateral line complete with 78–85 pores; 16–21 dark vertical bars across body; basicaudal bar interrupted, fins color hyaline without any markings; 8½ branched dorsal fin rays.

## DESCRIPTION

Biometric data are given in Table 1. Body elongate; dorsal profile rising evenly from tip of snout to head, slowly increasing from head upto dorsal-fin origin, sloping gently to end of caudal peduncle. Body cylindrical anteriorly to dorsal-fin origin, compressed posteriorly thereafter. Head depressed, snout rounded. Eyes large, near top of head, slightly nearer to snout tip than end of opercle, not visible from ventral view.

Anterior nostril pierced in front side of a short flap-like tube, not reaching eye. Nostrils nearer to eye than snout tip. Mouth sub-terminal, large and moderately arched. Mouth



Figure 1. Lateral, dorsal and ventral view of male *Neonoemacheilus assamensis*, 45.3 mm SL, PUCMF 15004.



Figure 2. **A.** Female *Neonoemacheilus assamensis*, 47.8 mm SL, PUCMF 15004; **B.** Digestive tract of *N. assamensis*. Scale bar 5 mm.

Table 1. Biometric data for *Neonoemacheilus assamensis* (n=15)

Standard length (mm)	37.9 - 47.8			
	Mean	SD	Min.	Max.
In % standard length				
Dorsal head length	20.6	1.0	19.7	22.9
Lateral head length	23.3	0.7	22.6	24.4
Pre-dorsal length	51.0	0.9	50	52.4
Pre-pelvic length	22.7	0.6	21.5	23.9
Pre-anus length	68.4	1.7	66.9	72.8
Pre-anal length	76.9	1.1	75.3	78.3
Head depth at occiput	14.0	0.5	13.2	14.9
Body depth at dorsal fin	18.9	1.7	16.4	21.1
Body depth at anal fin	13.5	0.6	12.3	14.4
Depth of caudal peduncle	9.7	0.4	9.1	10.2
Length of caudal peduncle	15.5	1.1	14	17.5
Head width at eye	13.0	1.1	11.4	15.3
Maximum head width	15.3	0.8	14.4	16.7
Body width at dorsal fin origin	15.2	1.4	12.8	17.3
Body width at anal fin origin	10.3	0.8	8.8	11.2
Height of dorsal fin	18.7	0.6	17.8	19.6
Length of upper caudal fin rays	24.1	0.9	22.7	25.4
Length of lower caudal fin rays	24.2	0.7	22.7	25
Length of median caudal fin rays	18.5	1.6	16.5	21.9
Length of anal fin	16.5	0.7	15.7	17.5
Length of pelvic fin	16.4	0.6	15.7	17.9
Length of pectoral fin	19.9	0.8	18.1	21.1
In % dorsal head length				
Snout length	47	2.2	44	49
Eye diameter	25	2.4	21	29
Interorbital width	32	1.8	31	36

gape about 1.5–2.0 times wider than long. Lip thick. Upper lip without a median incision, hypertrophied, pad-like structure medially. Lower lip with a median interruption. Processus denticiformis present. No median notch in lower jaw. Barbel three pairs. Inner rostral barbel not reaching corner of mouth, outer rostral barbel almost reaching vertical through anterior rim of orbit, maxillary barbel extending to vertical through posterior rim of orbit. Barbels covered with unculi.

Dorsal-fin with 4 simple and 8½ (11) or 8 (4) branched rays, origin slightly anterior through origin of pelvic fin. Distal margin of dorsal fin

slightly convex. Last unbranched ray shorter than first branched ray. Pectoral fin shorter than head, with 1 simple and 9 (5) or 10 (10) branched rays, its origin vertical through posterior edge of opercle, tip of adpressed fin reaching midway between its origin and origin of pelvic-fin. Pelvic fin shorter than head, with 2 simple and 6 (1) or 7 (14) rays, its origin slightly posterior through origin of dorsal fin, tip of adpressed fin reaching beyond anus. Axillary pelvic lobe present and short. Anal fin with 3 simple and 5½ (15) branched rays, closer to caudal-fin base than to origin of pelvic fin. Caudal fin with 9 + 7 (1) or 9 + 8 (14) branched rays, slightly forked,

lower lobe slightly longer. Caudal peduncle 1.3–1.6 times longer than deep, with no adipose crest.

Whole body covered by minute cycloid scales, deeply embedded, sparse on anterior portion; belly between pectoral fin scaleless. Lateral line complete with 78–85 pores, extending up to caudal fin base. Cephalic lateralis system with 6 supraorbital, 4 + 9 infraorbital, 9/10 preoperculo-mandibular and 3 supratemporal pores. Intestine bent some distance behind stomach (Fig. 2B).

Vertebrae: 23 + 12 = 35 (2).

#### Coloration

In 70% alcohol: Body light yellowish brown with 16–21 thin black bars; bars narrower than

interspace, almost reaching base of pelvic fin. Black basal caudal bar dissociated. Interorbital and supratemporal region dark. Dorsal aspect of head with five black spots or blotches; one pair just in front of internasal space, another pair in front of interorbital region and a single spot on interorbital space. All fins hyaline without any spots or marking.

#### Sexual dimorphism

Presence of breeding tubercles in pectoral fin and suborbital flap in males.

#### Note on biology

Four ripe females (44.8 – 47.8 mm SL), with extended belly, carried eggs (Fig. 2A).

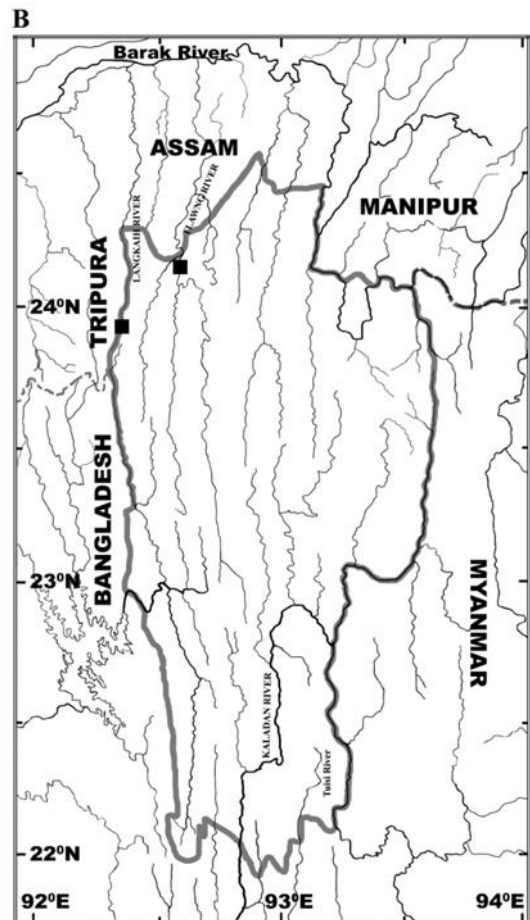


Figure 3. **A.** Langkaih river, habitat of *Neonoemacheilus assamensis*; **B.** Mizoram map showing collection site (shaded rectangular box).

### Habitat

*Neonoemacheilus assamensis* was collected from Langkaih and Terei rivers of Mizoram (Barak river drainage). It was collected from a sandy bed of slow moving, clean and well oxygenated rivers (Fig. 3).

### DISCUSSION

The genus *Neonoemacheilus* is erected by Zhu & Guo (as cited by Banarescu and Nalbant<sup>13</sup>) based on morphological characters such as possessing hypertrophied lips forming a preoral cavity. Menon<sup>14</sup> erected a new subgenus *Infundibulatus* without mentioning the work of Zhu and Guo and put *Nemacheilus peguensis* and his new description *N. assamensis* under the subgenus. However, since the diagnostic characters of *Neonoemacheilus* by Zhu & Guo (as cited by Banarescu and Nalbant<sup>13</sup>) and the subgenus *Infundibulatus* by Menon<sup>14</sup> are similar and therefore concluded as synonym.<sup>2</sup> *N. assamensis* is described based on a single specimen collected from Pagladia river of Assam (Brahmaputra basin).<sup>14</sup> It is further reported from Jiri river (a tributary of Barak river) of Manipur<sup>15</sup> and lower Subansiri drainage of Assam.<sup>16</sup> However, there were no reports of the species, even the genus, from rivers of Mizoram and this study being the first to report the occurrence of the genus *Neonoemacheilus*, particularly *N. assamensis* from rivers of Mizoram. Among the described species of *Neonoemacheilus*, *N. assamensis* is the only species distributed in Brahmaputra basin. The identity of *N. assamensis* led confusion to Talwar and Jhingran<sup>17</sup> where they synonymised *N. assamensis* to *N. labeosus* without a detail comparison. However, other subsequent studies treated the species as valid.<sup>1,18</sup> *N. assamensis* is compared with its congeners and differs from *N. peguensis* in having less number of branched dorsal fin ray (8½ vs. 9½) and shallower caudal peduncle (9.1–10.2% SL vs. 13.2); from *N. labeosus* in having body bars extending from back to beyond mid-ventral line (vs. not reaching mid-ventral line)

and bars narrower than interspace (vs. as wide as interspace, the anterior ones being somewhat wider and the posterior one somewhat thinner); from *N. mengdingensis* in having all body bars extending from back to beyond mid-ventral line (vs. the anterior bars reaching only to or slightly below the lateral line and the posterior bars reaching almost to the ventral side); and from *N. moorehensis* in having more number of unbranched rays of dorsal and anal fin, absence (vs. present) of a distinct dark patch at the base of caudal fin, beside some morphological measurement.

In contrast to the original description of *N. assamensis*, we herein reported that the species possess 4 (vs. 3) and 3 (vs. 2) unbranched rays of dorsal and anal fin respectively. These contrasting characters are attributed to that the first and/or the second un-branched ray of dorsal and anal fin usually lie sub-dermal which can only be visualised through cleared and stain specimens or radiograph.

The species is evaluated as Near Threatened in IUCN red list of Threatened Species.<sup>19</sup> The near threatened taxa are likely or nearly to meet reduction in numbers or range. They are dependent on conservation efforts to prevent their becoming threatened. Attempt on conservation of plants or animals usually failed due to lack of scientific data which plays an important role in making conservation plans. The present report on the knowledge of distribution and their biology of *N. assamensis* will help in their future conservation plan.

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