



Mystus ngasep, a new catfish species (Teleostei: Bagridae) from the headwaters of Chindwin drainage in Manipur, India

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Abstract: *Mystus ngasep*, a new species of bagrid catfish from the headwaters of Chindwin drainage in Manipur, India, is described here. It is distinguished from its congeners in having a unique combination of the following characters: a colour pattern of the body consisting of a distinct dark tympanic spot and three brown stripes separated by pale narrow longitudinal lines, cranial fontanel reaching the base of the occipital process, a long-based adipose fin contacting the base of the last dorsal-fin ray anteriorly, 16–19 gill rakers on the first branchial arch, a slender cleithral process, pectoral spine with 9–11 serrations on the posterior edge, eye with a diameter of 16.5–19.8 % HL and prepectoral length 22.2–26.0 % SL. The new species has been compared with its congeners from Myanmar and also from northeastern India.

Keywords: Chindwin headwater, *Mystus*, new catfish.

INTRODUCTION

Fishes of the genus *Mystus* Scopoli are small to medium-sized bagrid catfishes occurring in South Asia. Roberts (1994) recognized *Mystus* to have an elongate cranial fontanel reaching up to the base of the occipital process, long maxillary barbel, very long adipose fin, 11–30 gill rakers on the first gill arch and 37–46 total vertebrae, about equally divided between abdominal and caudal regions. He included only eight species under the genus. Mo (1991) characterized the genus to have a thin needle-like first infraorbital, twisted and thickened metapterygoid loosely attached to the quadrate by means of ligament or a small extent of cartilage. Jayaram & Sanyal (2003) and Ferraris (2007) respectively listed 44 and 33 species of *Mystus* as valid.

Manipur State in the northeastern corner of India has two headwaters: that of the Brahmaputra basin in the west and of the Chindwin in the east. Hora (1921) reported *Mystus bleekeri* from the lakes and streams of Manipur Valley, including the Loktak Lake (all headwaters of the Chindwin River drainage). Hora (1936) also collected the species from the Brahmaputra basin in Nagaland and Menon (1954) from Manipur. The species was also reported from the Chindwin basin of Manipur by Menon (1953, 1954), Singh & Singh (1985), Vishwanath et al. (1998), Arunkumar & Singh (1997) and Vishwanath (2000).

Other known species of *Mystus* from the neighboring Myanmar, also drained by the Chindwin-Irrawaddy are: *Mystus cineraceus*, *M. gulio*, *M. falcarius*, *M. leucophasis*, *M. pulcher* and *M. rufescens* (Ng & Kottelat 2009). The Ganga-Brahmaputra basin in northeastern India has *M. bleekeri*, *M. dibrugarensis*, *M. tengara*, *M. cavasius* and *M. carcio*



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(Vishwanath et al. 2007; Darshan et al. 2010).

Present studies reveal that the species of *Mystus* occurring abundantly in the streams, rivers and lakes (all belonging to the Chindwin drainage) in the valley of Manipur are without a name and the species has been misidentified as *M. bleekeri* after Hora (1921). The species is herein described as *Mystus ngasep* sp. nov.

MATERIAL AND METHODS

Materials examined are deposited in the Manipur University Museum of Fishes (MUMF). Measurements were made with a dial caliper to the nearest 0.1mm. Body proportions were expressed in percentage of SL and HL. Counts and measurements follow those of Ng & Dodson (1999). Dorsal fin height was measured from the base of the spinelet to the highest point of the dorsal fin. For osteological studies, clearing and staining techniques follow Hollister (1934). Methods for counting gill rakers and vertebrae follow Roberts (1992) and Roberts (1994), respectively.

***Mystus ngasep* sp. nov.**
(Image 1, Fig. 1, Table 1)

Macrones bleekeri Hora, 1921: 165–214 (brief description of specimens from Manipur valley, Chindwin basin).

Mystus bleekeri Menon, 1953: 266 (listed from Manipur valley); Menon, 1954: 22 (in part, listed from Manipur valley); Singh & Singh, 1985: 87 (reported from Sekmai & Chakpi Rivers, Manipur); Vishwanath et al. 1998: 323 (reported from Chatrikong River,

Manipur); Arunkumar & Singh, 1997: 131 (reported from Yu-River in Manipur); Jayaram & Sanyal, 2003: 42 (in part, synonymy and description).

Material examined:

Holotype: 10.xii.2007, 98.3mm SL, 24°48'N 93°55'E, Nambul River at Bijoygovinda-Polemleikai Bridge, Chindwin-Irrawaddy drainage, Manipur State, India, A. Darshan (MUMF 9500).

Paratypes: 4 ex., ii.2008, 96.5–103.0 mm SL; data as for holotype (MUMF 9501/1-9501/4); 12.viii.2000, 7ex., 87.0–71.6 mm SL, Wangoi-Ngarian Lake, (Chindwin drainage), A. Drashan (MUMF 9502/1-9502/7); 08.ix.2000, 4 ex., 79.9–108.7 mm SL, Khuga River (Chindwin drainage), Churanchanpur District, K. Santa Devi (MUMF 9503/1-9503/4); 02.xi.2006, 14 ex., 60.5–86.3 mm SL, Nambul River at Naoremthong, Imphal-west District, H. Joyshree Devi, (MUMF 9504/1-9504/14).

Non-type material: 16.v.2001, 22 ex., 70.2–96.2

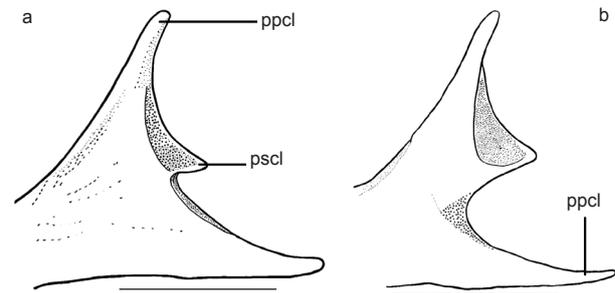


Figure 1. Lateral views of cleithral process.
a - *Mystus bleekeri* (MUMF 9521) 90.8mm SL; b - *Mystus ngasep* sp. nov. (MUMF 9501) paratype, 98.5mm SL.
dpcl - dorsal process of cleithrum for articulation with posttemporal; pscl - posterodorsal spine of cleithrum; ppcl - posterior process of cleithrum. scale bar = 5mm



Image 1. *Mystus ngasep* sp. nov. (MUMF 9501/1) paratype, 96.5mm SL.

Table 1. Morphometric data of *Mystus ngasep* sp. nov.

	Holotype	Range	Mean±SD
in % SL			
Predorsal length	37.7	37.0–41.4	39.0±1.2
Preanal length	71.1	68.3–73.3	70.4±1.3
Prepelvic length	48.3	47.1–51.9	49.3±1.4
Prepectoral length	22.3	22.2–26.0	23.3±1.2
Height of dorsal fin	20.8	20.8–21.8	21.3±0.7
Length of dorsal-fin base	13.1	12.4–14.5	13.2±0.7
Dorsal-spine length	13.3	12.2–15.5	13.5±0.9
Anal-fin length	16.9	16.9–19.3	18.2±0.9
Pelvic-fin length	13.9	13.0–16.3	15.1±1.1
Pectoral-fin length	13.9	13.9–19.8	17.6±1.9
Pectoral-spine length	13.4	11.8–15.3	13.5±1.0
Caudal-fin length	25.9	23.0–26.9	25.2±1.2
Length of adipose-fin base	41.2	37.1–44.5	41.0±1.8
Adipose maximum height	6.2	4.4–7.0	5.9±0.7
Post-adipose distance	9.9	8.9–10.9	9.7±0.6
Caudal-peduncle length	19.5	17.9–21.4	19.4±1.1
Caudal-peduncle depth	10.8	9.2–10.8	10.1±0.5
Body depth at anus	21.9	19.2–23.2	20.8±1.2
Head length	25.1	24.6–28.6	26.4±1.3
Head width	16.3	15.7–18.3	16.9±0.8
Head depth	17.3	16.7–18.4	17.6±0.6
In % HL			
Snout length	39.7	33.8–40.7	37.8±1.6
Eye diameter	19.8	16.2–19.8	18.2±1.3
Interorbital distance	30.7	30.3–31.8	30.9±0.6
Nasal-barbel length	51.4	32.8–51.4	45.5±6.2
Maxillary-barbel length	200.0	200.0–235.0	215.4±9.7
Inner mandibular-barbel length	66.4	58.6–76.0	67.5±5.8
Outer mandibular-barbel length	101.2	94.7–118.6	106.3±8.6

mm SL, Iril River at Keibi (Chindwin River drainage), I. Linthoingambi, (MUMF 9505/1-9505/22); 06.vi.1996, 4 ex., 83.1–104.7 mm SL, Chatrickong River at Sanalok (Chindwin River drainage), Ukhrul District, K. Selim (MUMF 1096–1099).

Diagnosis

Mystus ngasep sp. nov. can be distinguished from congeners in having a unique combination of the following characters: a colour pattern consisting of a distinct dark tympanic spot and three brown stripes separated by pale narrow longitudinal lines on the sides

of the body, cranial fontanel reaching the base of the occipital process, a long-based adipose fin contacting the base of the last dorsal-fin ray anteriorly, 16–19 gill rakers on the first branchial arch, a slender cleithral process (Fig. 1), pectoral spine with 9–11 serrations on the posterior edge, eye small with its diameter 16.5–19.8 % HL, pectoral and anal fins with 9–10 and 8–9 branched rays respectively and short maxillary barbel (200.0–235.0 % HL).

Description

Morphometric data are shown in Table 1. Dorsal profile rising evenly (at an angle of 20–25° to the horizontal) from tip of snout to origin of dorsal fin then goes almost horizontal to anterior third of adipose fin, then sloping gradually ventrally from there to end of caudal peduncle. Ventral profile roughly straight to end of anal-fin base, then sloping gently dorsally to the end of caudal peduncle.

Head depressed. Skin covering on dorsal surface of head thin. Anterior cranial fontanel extending from level of posterior nasal opening to posterior orbital margins, separated from posterior fontanel by epiphyseal bar. Posterior fontanel extends to the base of the supraoccipital process. Supraoccipital process long, reaching basal bone of dorsal fin, its base narrow with about one-fifth of its length, distally tapered. Eye ovoid, horizontal axis longest, located entirely in the dorsal half of the 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, slightly broader than premaxillary in middle, tapering posterolaterally, extending to level of lateral end of premaxillary tooth band. Dentary tooth band separated in the middle by thick skin, tapering laterally on each side, broader than premaxillary and vomerine tooth band at symphysis, length of one side equals lateral span of vomerine tooth band. Gill openings wide, free from isthmus. First branchial arch has 16–19 gill rakers.

Barbels in four pairs, maxillary barbel not reaching anal-fin origin, nasal reaching posterior rim of eye, outer mandibular barbel reaching base of pectoral fin and inner mandibular barbel slightly shorter. Skin smooth. Lateral line complete and midlateral in position.

Dorsal-fin origin slightly anterior to the middle of the body, with spinelet, spine, and seven branched rays. Dorsal spine three-fifths to three-fourths of dorsal-fin height, smooth on both edges. Adipose fin long, spanning most of postdorsal distance, its origin in contact with base of last dorsal-fin ray and deeply incised posterior portion. Pectoral fin with I, 9–10 rays, fin margin straight posteriorly. Pectoral spine backwardly curved with 9–11 large posterior serrations and anteriorly rough. Pelvic fin short with i,5 rays. Anal-fin origin inserted at vertical through middle of adipose-fin base, with iii-v, 8–9 rays, anterior two simple rays minute, visible in alizarin stained specimens. Caudal fin deeply forked with i,7,8,i rays, upper lobe longer.

Osteological characters: Ribs: commonly 12, rarely 11; vertebra with 40–41 (21+19=40 or 22+18=40 or 23+18=41). Haemal arches closed to form haemal canal from the 12th–14th vertebrae onwards. Branchiostegal with nine rays. Caudal skeleton composed of five hypural plates (two on lower and three on upper lobe). Parhypural free from first hypural plate. Hypurapophysis and secondary hypurapophysis fused. Epural laterally flattened and curved backward. Dorsal and ventral lobes of caudal fin with 10 and 11 Procurent rays, respectively.

Sexual dimorphism: Males with long genital papilla reaching to the base of the second branched anal-fin ray. Females with rounded genital opening.

Colour: In life or freshly dead: dorsal portion of the head and body brownish-grey with greenish reflection; tympanic spot without distinct margin, with greenish reflection that is more pronounced in the middle; lateral surface of body silvery with brownish-golden reflection without prominent stripes, ventrally dull white.

In 10% formalin: dorsal portion of the head and body brownish-gray, tympanic spot with distinct margin, three brown lateral stripes on body separated by pale longitudinal lines, lower pale longitudinal line about twice as wide as the upper. Caudal-fin base without dark spot.

Etymology

The specific epithet is derived from the Manipuri local name of the fish: 'Ngasep'.

Distribution

Presently known from the Loktak Lake, Nambul, Manipur, Iril, Imphal, Thoubal, Khuga rivers and the tributaries of the Yu river (all belonging to the Chindwin River drainage) in Manipur.

DISCUSSION

Ng & Kottelat (2009) clarified the identity of *Mystus bleekeri* and restricted its distribution to the Ganga-Brahmaputra basin while *M. rufescens* was found to be limited to the Irrawaddy basin. Their conclusion was based on the very distant geographical origins of the type series of *M. bleekeri* (Sind, Yamuna, upper waters of Ganga and Burma) which predicted involvement of more than one species; Day's (1877) observation of a black spot at the base of the caudal fin in the Burmese specimens and Roberts's (1994) reference of Day's type material from Burma as *M. rufescens*.

As mentioned earlier, six congeners of *Mystus ngasep* sp. nov. are known from Myanmar. Among those, *M. cineraceus*, *M. rufescens* and *M. falcarius* are very similar to the new species in having a long-based adipose fin that contacts the base of the last dorsal-fin ray anteriorly and cranial fontanel reaching to the base of the occipital process. A diagnostic summary of the species of *Mystus* from the Chindwin-Irrawaddy and Ganga-Brahmaputra River drainages is given in Table 2.

The new species differs from *Mystus cineraceus* in having three brown stripes on the body separated by pale narrow longitudinal lines above and below the lateral line (vs. a brownish body with a midlateral stripe lacking the pale longitudinal lines). It further differs from *M. cineraceus* in having more gill rakers on the first branchial arch (16–19 vs. 13–15; Table 3), more pectoral-fin rays (9–10 vs. 7–8), more anal-fin rays (8–9 vs. 6–7) and a shorter maxillary barbel (200.0–235.0 % HL vs. 247.4–345.0).

Specimens of *Mystus rufescens* collected from the Chindwin basin in the Indo-Burma border in Manipur were examined and found to have a long-based adipose fin contacting the base of the last dorsal-fin ray anteriorly, a cranial fontanel reaching the base of the occipital process and a black spot at the base of the caudal fin. Vinciguerra's (1890) description of the species clearly states the presence of a black spot at

Table 2. Key diagnostic characters of *Mystus* with a long adipose-fin base, distributed in the Chindwin-Irrawaddy and Ganga-Brahmaputra River drainage.

	<i>M. cineraceus</i>	<i>M. ngasep</i> sp. nov.	<i>M. falcarius</i>	<i>M. rufescens</i>	<i>M. bleekeri</i>	<i>M. cavasius</i>
Pectoral-fin rays	7–8	9–10	7–10	7–9	9–10	6–10
Gill rakers	13–15	16–19	22–29	14–18	11–15	13–22
Anal-fin rays	6–7	8–9	6–9	7–9	8–9	6–9
Anal-fin length *	10–13.4	16.9–19.3	9.8–11.5	-	15.7–19.7	9.3–12.4
Eye diameter **	19.2–25.4	16.2–19.8	22.4–30.2	20.8–23.5	20.2–25.9	21.2–32.7
Maxillary-barbel length**	247.4–345	200–235	435.6–538	255.3–290.2	241.3–330	355.8–504.9
Humeral spot	absent	absent	present as crescent shape	absent	absent	present as ovoid shape
Black spot at caudal-fin base	absent	absent	absent	present	absent	absent
Nuchal spot	absent	absent	present very prominently	absent	absent	present but faint

* - as % SL; ** - as % HL

Table 3. Frequencies of gill rakers count in four species of *Mystus* with a long adipose fin distributed in the Chindwin-Irrawaddy River drainage.

	Total numbers of gill rakers on the first branchial arch																
	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Species																	
<i>M. cineraceus</i>	6	3	3														
<i>M. ngasep</i> sp. nov.				5	21	18	11										
<i>M. rufescens</i>		1	2	1		1											
<i>M. falcarius</i>										9	7	5	5	1	1		1

the base of the caudal fin. We have also examined a syntype of *M. bleekeri*, labelled as ZSI 781, collected from Prome (=Pyay), Myanmar. The ZSI specimen has all the diagnostic characters of *M. rufescens* and also bears a noticeably darker region at the base of the caudal fin. The new species can be easily differentiated from *M. rufescens* by the absence of a black or dark brown spot at the base of the caudal fin (vs. spot present; Image 2), shorter maxillary barbel (200.0–235.0 % HL vs. 255.3–290.2) and smaller eye (eye diameter: 16.2–19.8 % HL vs. 20.8–23.5).

Mystus ngasep sp. nov. differs from *M. falcarius* and *M. cavasius* in having (vs. lacking) brown lateral stripes on the body, a shorter maxillary barbel (200.0–235.0 % HL vs. 355.8–538.0), a lower dorsal fin (dorsal-fin height: 20.8–21.8 % SL vs. 25.7–33.6) and lacking the black spot in front of dorsal spine (vs. spot present).

Mystus ngasep sp. nov. differs from *M. leucophasis* and *M. pulcher* in having a longer cranial fontanel reaching the base of the occipital process (vs. not reaching, but extending up to half the length of

supraoccipital bone); adipose-fin base in contact (vs. not in contact) with the base of the last dorsal-fin ray anteriorly, and a smooth (vs. serrated) dorsal spine. *Mystus leucophasis* further differs from the new species in having (vs. lacking) a filamentous extension of the upper principle-ray of the caudal fin. *M. ngasep* sp. nov. further differs from *M. pulcher* in having a wider vomerine tooth-band (as wide as the premaxillary tooth-band vs. about one-third of the premaxillary tooth-band), fewer vertebrae (41–42 vs. 35) and lacking (vs. having) a black spot at the base of the caudal fin.

Jayaram & Sanyal (2003) reported *Mystus armatus* from Manipur based on five specimens (92.2–125.6 mm SL), but they did not provide the exact collection site of the specimens. Ng & Kottelat (2009) found no evidence that *M. armatus* is known from the Irrawaddy River drainage and also suggested that Jayaram & Sanyal’s (2003) specimens of *M. armatus* from Manipur might be a misidentification of *M. cineraceus*. We feel that Jayaram & Sanyal (2003) might have misidentified specimens of *M. rufescens* as



Image 2. *Mystus rufescens* (MUMF 9530) 101.1mm SL.

M. armatus, because *M. armatus* also possess a black spot at the base of the caudal fin also present in *M. rufescens*. We have also not encountered any species of *Mystus* with a black spot at the base of the caudal fin from our extensive surveys of the Brahmaputra River drainage in Manipur. However, we were unable to verify the identity of Jayaram & Sanyal's (2003) material, as we were unable to locate this material for study in the collections of the Zoological Survey of India in Kolkata. Jayaram & Sanyal (2003) also misidentified several specimens collected from the Chindwin River drainage in Manipur (ZSI 4236/2, ZSI F 4293/2, ZSI F 4346/2) as *M. bleekeri*. *Mystus ngasep* sp. nov. is very similar in colouration and meristic counts to *M. bleekeri*. However, the new species differs from *M. bleekeri* in having a slender (vs. broad) cleithral process, smaller eye (diameter 16.2–19.8 % HL vs. 20.2–25.9), shorter maxillary barbel (200.0–235.0 % HL vs. 241.3–330.0), more gill rakers on the first branchial arch (16–19 vs. 11–15), fewer pectoral spine serrations on the posterior edge (9–11 vs. 11–16) and longer prepectoral length (22.2–26.0 % SL vs. 19.5–21.8) and dorsal spine that extends to about three-fifths to three-quarters (vs. nearly half) of the fin height. It further differs from *M. bleekeri* in having a narrower base of the supraoccipital process, its width at the base being about one-fifth of its length (vs. two-fifths to half of its length); more vertebrae (40–41 vs. 37–40), with the closure of the haemal arches appearing from the 12th–14th (vs. commonly 11th or rarely 12th) vertebra onwards.

Mystus ngasep differs from *M. dibrugarensis* in having fewer gill rakers (16–19 vs. 28) on the first arch, more vertebrae (40–41 vs. 36), the absence (vs. presence) of a thin black mid-lateral line connecting the tympanic spot and the black spot at the base of the caudal fin. It differs from *M. tengara* in having a smooth (vs. with 8–9 serrations posteriorly) dorsal

spine, longer adipose-fin base (37.1–44.5% SL vs. 24.0–31.7), fewer gill rakers on the first arch (16–19 vs. 31–42), 11–12 (vs. 8–9) ribs and 40–41 (vs. 34–37) vertebrae.

Mystus ngasep sp. nov. differs from *M. carcio* in having more vertebrae (40–41 vs. 32), a longer adipose-fin base (37.1–44.5 % SL vs. 8.5–11.9), vomerine tooth-band continuous (vs. interrupted in the middle), fewer gill rakers on the first arch (16–19 vs. 23–24) and lacking (vs. having) the coracoid shield below the pectoral fin. It differs from *M. gulio* in having a longer occipital process (reaching to the basal bone of dorsal fin vs. not reaching), origin of adipose-fin base in contact (vs. not in contact) with the base of the last dorsal-fin ray, and a smooth (vs. posteriorly serrated) dorsal spine.

Comparative material

Mystus bleekeri: ZSI Kolkata 1076 (lectotype), 101.5mm SL; India: Yamuna River.

MUMF 9521 (10), 85.6–108.3 mm SL; India: Ganga River at Patna. MUMF 9522 (10), 74.2–98.8 mm SL; India: Guwahati: Brahmaputra River.

Mystus rufescens: ZSI Kolkata 781 (1) [syntype of *M. bleekeri*], 95mm SL; Burma: Prome. MUMF 9530 (5), 84.5–101.1 mm SL; India: Manipur: Chandel district, Moreh market.

Mystus cavasius: MUMF 9513 (10), 74.8–109.7 mm SL; India: Guwahati: Brahmaputra River.

Mystus falcarius: MUMF 9514 and 9517 (9), 96.5–206 mm SL; India: Manipur: Lokchao River. Data of Chakrabarty & Ng (2005) are also used for comparison.

Mystus pulcher: ZSI Kolkata F 4716-19/1 (4 syntypes), 51.7–55.5 mm SL; Burma: Bhamo. MUMF 1100–1105 (6), 55.8–69.9 mm SL; India: Manipur: Ukhrul District: Chatrikong River (headwater of Chindwin River drainage).

Mystus tengara: MUMF 9520/1-9520/20 (20), 67.9–75.7 mm SL; India: West Bengal: Kolkata. MUMF 9523 (15), 52.1–77.5 mm SL; India: Brahmaputra River at Guwahati.

Mystus carcio: ZSI FF4081 (1), 47.9mm SL; India: Assam: Brahmaputra River at Guwahati. ZSI FF4080 (1), 42.9mm SL; same data as above. MUMF 9518/1 (1), 39.0mm 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 leucophasis and *M. gulio*: Data of Jayaram & Sanyal (2003).

M. cineraceus: Data of Ng & Kottelat (2009).

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Author Contribution: The study: AD survey, collection, morphometric and anatomic study and phylogeny of catfishes of northeastern India; WV supervision of taxonomy and phylogeny of freshwater fishes of northeastern India; PCM Inventory and cataloguing of coldwater fishes of India; AB Supervise phylogenetic study of coldwater fishes. **Current paper:** AD detailed examination of *Mystus* species of northeastern India and comparison with specimens in ZSI and in other museums and preparation of drawings; WV supervision in establishing new species and discuss taxonomic status; PCM supervision in identification of coldwater fish species interpretation of the result, and discuss taxonomic status; AB Differential diagnosis, interpretation of the results, comparison with available literature and discuss taxonomic status.