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Garra binduensis, a new species of cyprinid fish (Teleostei: Cypriniformes) from North Bengal, India

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ABSTRACT

Garra binduensis, a new species of labeonine cyprinid fish is described from the Jaldhaka River, Brahmaputra River drainage in North Bengal, India. *Gara binduensis* is distinguished from all its congeners. The new species can be easily distinguished from *G. gotyla, G. arunachalensis, G. birostris, G. quadratrirostris and G. tamangi* in having single lobe monocuspid tuberculated proboscis due to absence of transverse groove. Other distinguishing combinations of characters are given against its respective congeners in the discussion section.

Keywords: *North Bengal, Labeoninae, taxonomy, Brahmaputra River Basin, Jaldhaka River*

INTRODUCTION

Species of cyprinid genus *Garra* are elongate, small- to medium-sized, bottom-dwelling fishes usually found in fast flowing waters, where they adhere to the surface of the rocks using the highly modified lower lip which act as a sucker (Zi-ming *et al*., 2009). Garra also known as Doctor fish, the majority of the more than 120 species of Garras are native to Asia. There are currently 17 species of *Garra* recognized from the upper Brahmaputra River basin, viz., *G. lamta* (Hamilton 1822), *G. nasuta* (McClelland 1838), *G. rupecula* (McClelland 1839), *G. lissorhynchus* (McClelland 1842), *G. annandalei* Hora 1921, *G. kempi* Hora, 1921, *G. naganensis* Hora 1921, *G. arupi* Nebeshwar *et al*., 2009,*G. kalpangi* Nebeshwar *et al.* 2011, *G. magnidiscus* Tamang, 2013, *G. alticaputus* Arunachalm *et al.* 2013, *G. kimini* Arunachalam *et al.*, 2013, *G. minimus* Arunachalam *et al*., 2013, *G. nigricauda* Arunachalam *et al*., 2013, *G. arunachalensis* Nebeshwar & Vishwanath, 2013, *G. birostris* Nebeshwar & Vishwanath, 2013 and *G. quadratirostris* Nebeshwar & Vishwanath, 2013, *Garra tamangi* Gurumayum & Kosygin, 2016.

While conducting an ichthyological survey in the Brahmaputra River basin in Darjeeling district, North Bengal, India, ten specimens of an unnamed *Garra* were collected from the Jaldhaka River, which are described here as *G. binduensis.*

MATERIALS AND METHODS

Samplings of fish were carried out using a castnet and gill net, in shallow to moderate running water. The specimens were preserved in 5% formalin in the site and later transferred to 70% ethanol for preservation. Measurements were made point to point with slide callipers and data recorded to tenths of a millimeter. Counts and measurements were made on the left side of specimens whenever possible, following Nebeshwar & Vishwanath (2013). Head length (HL) and the measurements of body parts were taken as proportions of standard length (SL) and the subunits of the head as proportions of HL. Fin rays were counted under a stereo-zoom binocular microscope. Number in parenthesis following a count indicates the frequency of that count.

RESULTS AND DISCUSSION

New Species

***Garra binduensis*,** new species (Fig. 1)

Fig. 1: *Garra Binduensis*, ZSI FF 5623, Holotype, 87.2 mm SL, India: North Bengal: Jaldhaka River at Bindu; dorsal, lateral and ventral views

Type material

Holotype:

ZSI/ FF 5623, 87.2 mm SL; India: North Bengal Darjeeling district, Jaldhaka River at Bindu near Jaldhaka Hydel complex, a tributary of Brahmaputra River basin; Collector Ujjal Das 22 August 2016 (Fig. 1 & 2)

Paratypes:

ZSI FF 5624; same data as holotype. 9 examples.

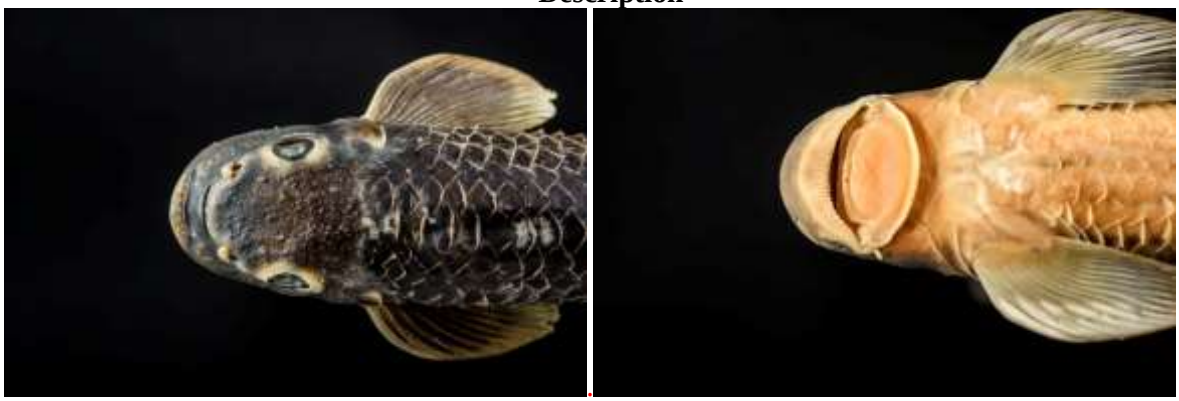
Diagnosis-

Garra binduensis is distinguished from all congeners in the Ganga-Brahmaputra River drainage in having roughly a rounded single lobed proboscis, monocuspid tubercles on snout. Pectoral –fin branched rays 13-14, lateral line scales 35-37, predorsal scales 10-11 in regular or irregular distribution, head length 23.7 – 26.3 % SL, snout length 44.3 -53.3% HL, eye diameter 14.9 – 20.6 % HL, central callous pad length 10.6 – 14.4 % SL and width 9 – 13.2 % SL, transverse scale rows above lateral line 3-4, transverse scales rows between lateral line and pelvic- fin origin $2^1/_2$.

Table 1
Morphometric data of holotype and 9 paratype of *Garra binduensis*

	Holotype	Range	Mean ± SD
Standard length (mm)	87.2	60.1 -126.5	79.94 ±18.56
In persent of Standard Length			
Head Length	24.6	23.7 – 26.3	24.61 ±0.7
Body Depth at Dorsal Fin Origin	21.2	18.4 – 21.4	20.04 ±0.98
Body Depth at Anus	17.1	12.3 - 18.2	16.46 ±1.58
Length of Peduncle	16	13.3 – 16.4	15.38 ±0.91
Height of Caudal Peduncle	12.8	12.4 – 14.1	13.04 ±0.44
Pre-dorsal Length	47	42.4 – 48.3	45.95 ±1.76
Pre-pectoral Length	22.5	22.2 – 23.3	22.72 ±0.42
Pre-pelvic Length	51.6	50.1 – 53.2	51.94 ±1.04
Pre-anal Length	78	73.7 – 78.0	75.85 ±1.48
Dorsal Fin base Length	16.6	15.7 – 17.9	21.816.65 ±0.74
Body Width at Anal Fin Origin	10.3	8.8 – 10.3	9.39 ±0.59
Height of Dorsal Fin	23.5	21.8 – 24.8	23.79 ±0.9
Length of Pectoral Fin	24.6	22.8 – 25.0	23.92 ±0.87
Length of Pelvic Fin	22.4	20.3 – 23.6	21.87 ±1.02
Anal Fin Base Length	7.1	7 – 8.6	7.71 ±0.60
Height of Anal Fin	20.6	19 – 23.9	20.69 ±1.38
Caudal fin length U	25.2	23.6 – 26.7	25.36 ±0.98
Caudal fin length L	26.4	24.7 – 27.7	26.2 ±0.99
Adhesive Apparatus Width	14.4	9 – 13.2	10.48 ±1.11
Adhesive Apparatus Length	9.7	10.6 – 14.4	13.49 ±1.12
In % Head Length			
Head Height at Occiput	65.1	60.1 – 67.4	63.78 ±2.93
Head Width	81.9	74 – 84.1	79.54 ±2.98
Eye Diameter	19	14.9 – 20.6	19.14 ±1.61
Snout Length	51.2	44.3 -53.3	48.46 ±2.74
Inter Orbital Space	46.5	41.1 – 48.2	46.42 ±2.04
Mouth Width	53.5	47.5 – 56.3	52.46 ±2.43
Rostal Barbel Length	13.9	11.7 – 16.8	14.86 ±1.58
Maxillary Barbel Length	6.5	3.3 – 7	5.06 ±1.19
In % Caudal Peduncle Length			
Caudal Peduncle height	80	78.1 – 98.1	85.13 ±6.36
In % Length of Adhesive Apparatus			
Adhesive Apparatus Width	148.2	80.4 – 157.9	130.58 ±20.37

Description



A B

Fig. 2: (A & B Probosis and Callous pad of *Garra binduensis*, ZSI/FF5623, holotype, 87.2 mm SL, North Bengal, India

Morphmetric data in Table 1. Bodies elongate, slightly broad laterally and compressed in caudal peduncle region. Dorsal head profile rising abruptly over snout, rounded above the orbit, then dorsal body profile rising gradually to dorsal fin origin. Ventral profile more or less straight to anal-fin origin. Head moderately large and flatted interorbital distance, height less than length; width greater than height. Eyes placed dorsolaterally in posterior of head. Snout rounded with well-developed transverse lobe cover with 24-38 monocuspid tubercles. Proboscis single-lobe, straight to forwards. Transverse groove not present. Barbels in two pairs: rostral barbell anterolaterally located, shorter than eye diameter, maxillary barbel at corner of mouth, shorter than rostral barbell. Papilate ventral surface moderately wide. Upper lip in the form of a thin band of moderately develops papillae in one row. Except median margin, upper jaw covered by rostral cap. Disc well developed broad with head, elliptrical, and length shorter than width, groove of central callous- pad slightly deep.papillae on inner half of whole length of lateroposterior flap larger and coarsely arranged; anterior marginal surface of central callous-pad witg coarsely arranged small elongated papillae; posteriomost margin of lateroposterior flap extending slightly beyond vertically to posterior margin of eye. Dorsal fin with 1-2 simple rays and 8-9 branched rays, last simple ray almost equals head length.

Colour:

In formalin, head dorsal and side dark brown or blacks. Mouth chest and abdomen dark yellow. Anal, pelvic and pectoral fins light yellowish white. Dorsal and caudal- fins dark blacks yellow. Upper position of branched dorsal fin rays faintly spotted.

Distribution and habitat:

Garra binduensis presently known only from the Jaldhaka River (a tributary of the Brahmaputra river basin) at Bindu North Bengal near jaldhaka hyderl project about 105 km from new jalpaiguri. The habitat mostly consists of medium to large dark to greyish brown boulders irregular placed with pebbles, cobbles and concrete in certain places and heavy send deposits somewhere nearby bank. The river water was clear and cool. The river's bank is situated in between India and Bhutan, makes a natural boundary for the two countries. The river banks consist of shrub, small to big trees.

Etymology:

The species is named as a new one after identification at the base on its type's locality place name.

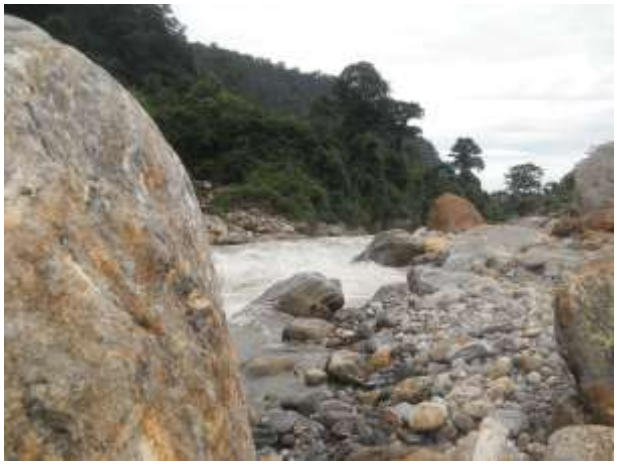


Fig.3: Type locality of *Garra binduensis*, Jaldhaka River, Bindu, Darjeeling, North Bengal, India

Nebeshwar and Vishwanath (2013) considered *Garra* specimens in different river systems having black spots on the base of dorsal fin rays but with various shapes of prominent proboscis, different shapes and distribution of tubercles, varying oral morphology and morphometric and meristic characters as different species. *G. binduensis,* is having a prominent proboscis with distinct tubercles on the snout, our comparisons of the new species is therefore restricted to congeners having proboscis on snout from the upper Brahmaputra River drainage viz., *G.gotyla, G. arunachalensis, G.birostris, G.quadratrirostris and G. tamangi* is also compared with other morphologically similar congeners from neighbouring drainages, viz., *G. elongata* and *G. litanensis* (Chindwin river drainages) and *G. salweenica* (Salween river system) and *G. stenorhynchus* from southern India (Nilgiri Hills, Tamil Nadu).

Garra binduensis the new species can be easily distinguished from G. arunachalensis, differs from shorter body width at dorsal fin origin (18.4-21.4% SL vs. 16.4-19.9), lower caudal peduncle depth (12.4 -14.1% vs 11.7-12.9), shorter dorsal fin length (21.8-24.8% SL vs. 16.4-20.1) and also differ from by the predorsal length (42.4-48.3%9 S L - 49.2-51). Prepectoal length of *G.binduensis* grater than *G. arunachalensis* (22.2-23.3% SL vs 21.4-21.9).

Garra binduensis is differs from *G. gotyla* in the Brahmaputra River drainage by having a tri-lobe proboscis. However *G. gotyla* in having shorter pelvic fin length (22.8-25.0 % SL vs. 17.8-20.8),shorter prepectoral length (22.2-23.3% SL vs.19.1-22.6),

Garra binduensis differs from *G. birostris* by its prominent bi-lobed proboscis, shorter body width at dorsal fin origin (18.4-21.4%SL vs 15.8-18.0) and higher dorsal fin base length (15.7-17.9 % SL vs 17.5-19.7) , eye diameter also differ due to long diameter of *G.birostris* (14.9-20.6 % HL vs 21.0-25.0)

Garra binduensis differs from *G. quadratirostris* in having (vs. lacking) proboscis on snout. It can be further differentiated by having lateral line scales (35-37 vs 37), unbranched dorsal fin rays (1 vs 3), *G.binduensis* also differs by shorter body width at anal fin origin then *G. quadratirostris* (8.8-10.3% SL vs 11.0-12.5), dorsal fin length (21.8-24.8% SL vs 24.1-27.1), predorsal length (42.4-48.3% SL vs 48.4-52.8) and branched pectoral-fin rays (8-9 vs 14-15).

Garra binduensis differs from *G. tamangi* in having a shallower body width at anal-fin origin (8.8-10.3% SL vs.11.0–12.9), shorter dorsal-fin length (21.8–24.8% SL vs.24.5-29.1), higher anal fin-base length (7-8.6 % SL vs. 6.2-7.6) shorter prepelvic length (50.1-53.2% SL vs. 21.8-78.0), smaller snout length (44.3-53.3%HL vs. 56-98). *Garra binduensis* easily differs from *G. tamangi* by number of lateral line scales (35-37 vs. 33-34), and absence (vs. presence) of di- tri and tetra cuspid tubercles on snout, *G. binduensis* having only moncuspid. Predorsal scales arranged irregular for some example of paratype where predorsal scales of G. tamangi regularly arranged.

Garra binduensis easily differs from *G. cyrano* by its deeply notched slender long proboscis with large tubercles where G.binduensis having single lobe, rounded, small proboscis with small fewer tubercles and also differs by total no (branched & unbranched) of dorsal fin rays (10 vs 8).

Garra binduensis differs from *G. elongata* in lacking (vs. having) a transverse black band on dorsal fin, lateral line scales - (36-37 vs. 39–40) and predorsal scales arranged some time irregular (10–12 vs. 13), more branched pectoral-fin rays (12–14 vs. 11–12). It also differs by transverse groove on snout due to absence (vs. presence).

Garra binduensis can be further distinguished by having a well developed (vs. weakly developed) proboscis on snout; from *G. litanensis* in having longer head (23.7-26.3% SL vs. 19.9–23.5), deeper caudal peduncle depth (12.4–14.1% SL vs. 11.9–12.2), longer prepectoral - (22.2–23.3% SL vs. 18.4–22.3) and preanal length (73.7–78.0% SL vs. 65.3–67.5), longer pectoral-fin -(22.8–25.0% SL vs. 18.5–20.0) and anal-fin length (19.0–23.9% SL vs.16.2–17.9).

Garra binduensis differ from *G.arupi* in having higher number of tubercles on transverse lobe (6-14 vs 6-9), smaller eye diameter (14.9-20.6 % HL vs 20.7-27.0), number of branched pectoral fin rays (12-14 vs. 10-12),

Garra binduensis differ from *G. stenorhynchus* in having a forwared projection of the proboscis not reaching (vs. reaching beyond) the transverse groove on the snout absent (vs present) and shorter predorsal length (42.4-48.3% SL vs. 62.9).

Garra binduensis differ from *G. magnidiscus* in having (vs.lacking) proboscis on snout. It can be further differentiated in having fewer lateral line scales (35-37 vs. 40-42) and transverse scale rows between lateral line and pelvic fin origin ($2^1/_2$vs.3-$3^1/_2$), deeper caudal peduncale (12.4-14.1% SLvs. 10-11), shorter predorsal (42.4-48.3 % SLvs.50-54) .

Garra binduensis easily differs from *G.montisalsi* in having moderately (vs. strongly) projecting proboscis, not extending (vs. extending) forward to the level of the tip of the snout.

Gara binduensis differs from *G. lamta* in lacking (vs. having) a broad mid-lateral stripe on the body. Further, it is distinguished from *G. lamta* in having less predorsal scales (10-12 vs. 8-10).

Garra binduensis can be differentiated from *G. fuliginosa* (vs. having) a black blotch on the caudal-fin base, and having (vs. lacking) a series of black spots at the base of the dorsal fin rays.

Comparative material

Garra arunachalensis: MUMF 4304 (holotype), 121.0 mm. SL; India: Arunachal Pradesh: Lower Divang valley district: Deopani River at Roing (Brahmaputra basin). Additional data from Nebeshwar & Vishwanath (2013).

Garra birostris: MUMF 4302, holotype, 102.0 mm. SL; India: Arunachal Pradesh: Papum Pare district: Dikrong River at Doimukh (Brahmaputra basin). Additional data from Nebeshwar & Vishwanath (2013).

Garra quadratirostris: MUMF 4306, holotype, 108.0 mm. SL; India: Sikkim: Tista River at Rangpo. Additional data from Nebeshwar & Vishwanath (2013).

Garra gotyla: MUMF 4300, neotype, 104.3 mm. SL; India: Sikkim: Tista River at Rangpo. Additional data from Nebeshwar & Vishwanath (2013).

G. gotyla stenorhynchus: ZSI/F-1748/1; India: Tamil Nadu: Nilgiri Hills. Additional data from Menon (1964).

Garra lamta: ZSI F 9971/1, India: Uttar Pradesh: A small Stream lowing near Matwatal.

Garra montisalsi: ZSI F 9953/1, type, 106.7 mm. SL; India: Punjab: Nilwan ravine near Shapur salt ranges. Additional data from Nebeshwar & Vishwanath (2013).

Garra nasuta: ZSI F 8120/1, 8121/1, 8123/1 & 8124/1, (type of *Garra arabica*), 4, 61.0-130.0 mm SL,Yemen: Lahej near Aden.

Garra salweenica: ZSI F 11602/1, holotype, 98.0 mm. SL; Myanmar: S. Shan States: Salween River at Takaw Keng. Additional data from Hora & Mukerji (1934).

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