



## *Garra kalpangi*, a new cyprinid fish species (Pisces: Teleostei) from upper Brahmaputra basin in Arunachal Pradesh, India

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**Abstract:** A new cyprinid species, *Garra kalpangi* is described from the Kalpangi River (Brahmaputra basin) in Arunachal Pradesh, India. The species is closely similar to *G. gravelyi*, *G. rotundinasus* and *G. elongata* in having a shared character i.e. a weakly developed proboscis. It is distinguishable from *G. gravelyi* for the absence of indistinct black spot at the bases of branched dorsal fin rays and lateral stripes on the side of the body. However, *G. rotundinasus* possesses lateral stripe along the lateral line. Further, the absence of transverse groove at the tip of snout and longitudinal black band in medial caudal fin differentiated it from *G. elongata*. The detail comparative account of the 16 available species of northeastern India confirmed its distinct diagnosis as a new species under the genus. Accordingly, after thorough investigation, the taxonomic keys for all the available species under the genus from the region have also been erected in this article.

**Keywords:** Freshwater fish, Himalayan foot hill, Kalpangi River, new description.

## INTRODUCTION

The cyprinid fish genus *Garra* Hamilton, 1822, is a bottom dwelling fish. The genus consists of approximately 70 species in the region from Borneo, southern China and southern Asia through Middle East Asia, Arabian Peninsula and East Africa to West Africa (Zhang & Chen 2002). In the first revision of the genus, adopting *Garra* Hamilton as the generic name, Hora (1921) described seven new species from the Himalayan foothill drainages, viz. *G. annandalei* from Assam and streams at the base of the Darjeeling Himalaya, *G. abhoyai* from neighborhood hill streams of Ukhrul District in Manipur, *G. naganensis* from Senapati stream in Naga Hills, Assam (now in Manipur), *G. prashadi* from Malwa Tal, Uttar Pradesh (now in Uttarakhand), *G. chaudhurii* from Darjeeling District in northern Bengal, *G. jenkinsonianum* from Sita Nullah, Paresnath Hills in Bengal and *G. kempi* from Abor Hills, Assam (now in Arunachal Pradesh). Menon (1964) recognized 38 species and kept the species status of *G. abhoyai*, *G. chaudhurii*, *G. prashadi* and *G. jenkinsonianum* as junior synonyms of *G. rupecula*, *G. annandalei*, *G. lamta* and *G. mullya*, respectively. Other known species in the Himalayan foothills and the adjoining regions draining into the Brahmaputra and Ganga basins include *G. rupecula*, *G. lissorhynchus*, *G. lamta*, *G. gotyla*, and *G. nasuta* (Hora



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**Abbreviation:** RGUMF – Rajiv Gandhi University Museum of Fishes; MUMF – Manipur University Museum of Fishes; SL – Standard Length; vs. – Versus

1921; Menon 1964).

In subsequent publications (Vishwanath & Sarojnalini 1988; Vishwanath 1993; Kosygin & Vishwanath 1998; Vishwanath & Kosygin 2000; Zhang & Chen 2002; Kullander & Fang 2004; Vishwanath & Shanta 2005; Zhang 2006; Vishwanath & Linthoingambi 2008; Nebeshwar et al. 2009) have also described or revalidated or reviewed several species from the Brahmaputra and Chindwin basins in northeastern region, Irrawaddy basin in Myanmar and China. Vishwanath & Linthoingambi (2008) revalidated the species, *G. abhoyai* from being a junior synonym of *G. rupecula*.

There are seven species of *Garra*, namely, *G. lissorhynchus*, *G. annandalei*, *G. gotyla*, *G. kempi*, *G. lamta*, *G. mccllellandi* and *G. naganensis* reported from Arunachal Pradesh (Nath & Dey 2000). Comparison of a species population of the genus *Garra* having a weakly developed proboscis, collected from the Kalpangi River in Arunachal Pradesh with the species distributed in the Himalayan foothill drainages of northeastern India and the species from the upper Irrawaddy basin in China and the Rakhine states in Myanmar reveals that the species represents an undescribed species, herein described as *Garra kalpangi* sp. nov. (Fig. 1).

## MATERIAL AND METHODS

The descriptions are based on formalin preserved specimens. Counts, measurements and terminology follow Kullander & Fang (2004) and measurements were taken from point to point with digital calipers to 0.1mm. Fin rays and numbers of scales were counted under a zoom stereoscopic microscope. Lateral line scales counted from the anterior most scale in contact with the shoulder girdle to the last scale on the caudal fin; lateral transverse scales above lateral line counted from dorsal-fin origin to lateral line obliquely ventrad and caudad and scales below lateral line counted from anal-fin origin to lateral line obliquely dorsad and rostrad. Additional terminology used for description of disc follows Zhang et al. (2002). Other additional measurement techniques are as follows: disc width is the widest portion of the lower lip, and disc length is taken from anterior mid-point of the anterior papillate skin fold to the posterior mid-point of the posterior margin of the mental disc. Lateral line scales were counted from the anterior most scale in contact with the shoulder girdle to the last scale on the caudal fin. Measurements of different morphometric parameters are given in percentages of standard length. For vertebral count, two specimens were dissected and

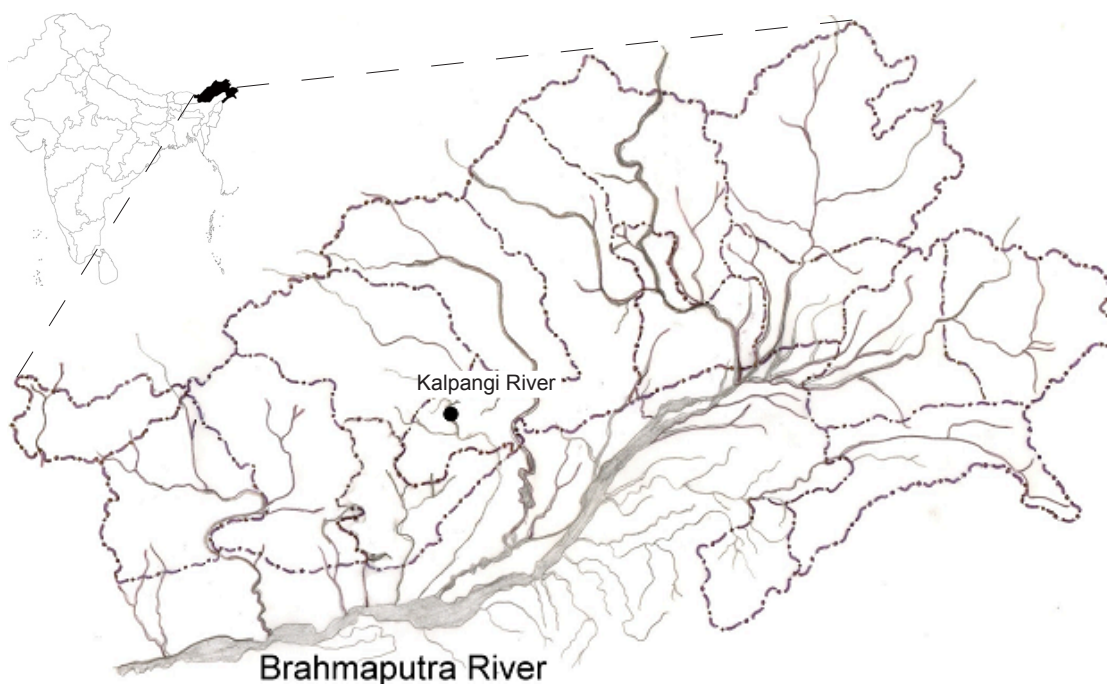


Figure 1. Collection site (marked as black spot) of *Garra kalpangi* sp. nov. in Kalpangi River, Lower Subansiri District, Arunachal Pradesh, India

stained with alizarin S. Abdominal vertebrae were counted from the first four vertebrae of the weberian apparatus to the last vertebra bearing pleural rib and caudal vertebrae were counted from the vertebra immediately posterior to anal fin pterygiophore. Some snout structures are addressed here with uniform terminology. The sublachrymal groove originates from the base of the rostral barbel and usually extends horizontally above the level of the groove of the rostral cap.

Comparison of the present material with *G. rotundinanus*, *G. gravelyi*, *G. rupecula*, *G. lamta* and other known species distributed in China and Myanmar are made on published description, while for comparison with other congeners, their holotype and paratype are personally examined and measured. Specimens are deposited in the Rajiv Gandhi University Museum of Fishes (RGUMF).

***Garra kalpangi* sp. nov.**  
(Image 1)

**Material examined**

Holotype: 18.vii.2005, 60.0mm SL, location 27°25'54"N & 93°46'42"E, altitude 843m, Kalpangi River at Yachuli (Brahmaputra River system), Lower Subansiri District, Arunachal Pradesh, India, coll. Kenjum Bagra, RGUMF-0006.

Paratype: 9 exs., same data as holotype, RGUMF-0007, 50.0–72.4 mm SL,

**Diagnosis**

*Garra kalpangi* sp. nov. is characterized from

its congeners of the Himalayan foothills by the combination of characters: two pairs of barbels, a poorly developed proboscis represented by a squarish area in front of the nostrils and 16 circumpeduncular scales. It is closely similar to *G. gravelyi*, *G. rotundinanus* and *G. elongata* in having a weakly developed proboscis on the snout. *Garra kalpangi* sp. nov. can be differentiated from *G. gravelyi* in having branched dorsal-fin rays 8 (vs. 7), branched pectoral-fin rays 10–12 (vs. 13), predorsal scales 10–11 (vs. 8–9), absence (vs. presence) of indistinct black spots at the bases of the branched dorsal-fin rays, absence (vs. presence) of lateral stripes on side of body. *Garra kalpangi* sp. nov. can be differentiated from *G. rotundinanus* in having branched pectoral-fin rays 10–12 (vs. 13–15), lateral line scales 32–33 (vs. 36–37), scales between vent and anal-fin origin 3 (vs. 5), transverse scale rows above lateral line 3½ (vs. 2½), transverse scale rows below lateral line 3½–4 (vs. 2½–3), circumpeduncular scales 16 (vs. 12), absence (vs. subtle presence) of lateral stripe along lateral line. *Garra kalpangi* sp. nov. can be differentiated from *G. elongata* in having lateral line scales 32–33 (vs. 40–41), predorsal scales 10–11 (vs. 14–15), branched dorsal-fin rays 8 (vs. 7), absence (vs. presence) of transverse groove at tip of snout, absence (vs. presence) of pleated papilliferous fold at corner of mouth, absence (vs. presence) of a wide submarginal band on dorsal fin, absence (vs. presence) of a longitudinal median black band on caudal fin.

**Description**

Measurements and counts taken from 10 specimens, 50.0–72.4 mm SL are given in Table 1. General body



Image 1. *Garra kalpangi* sp. nov., holotype, RGUMF-0006, 60mm SL.; Lateral view



Image 2. *Garra kalpangi* sp. nov., holotype. a - ventral view of disc; b - dorsal view of head.

appearance in Image 1 and morphology of the mental adhesive disc and head dorsum are shown in Images 2a–b respectively.

Body elongate, compressed laterally, more on caudal peduncle region; dorsal profile smoothly arched to dorsal-fin origin, then straight from posterior end of dorsal-fin base to caudal-fin base; ventral profile flat from head to chest, then more or less round up to pelvic-fin origin, and straight from pelvic to caudal-fin base. Head small, more or less depressed with a convex interorbital space; height less than length; width greater than height. Snout blunt, without transverse groove on tip, with a few minute to large tubercles across its tip and lateral sides anterior to nostrils; sublachrymal groove free from lateral groove of rostral cap; a poorly developed proboscis represented by a squarish area in the front of the nostrils; rostral lobe absent. Eyes placed dorsolaterally in middle of head.

Two pairs of barbels; rostral ones anteroventrally located, shorter than eye diameter; maxillary ones at corner of mouth, shorter than rostral ones. Rostral cap well developed, moderately crenulated, and with a wide papillate margin; separated from the upper jaw by a deep groove and laterally continuous with lower lip by a flat papillate connective tissue. No upper lip in the form of papillose tissue and no papillose fold in the corner of mouth. Upper jaw entirely covered by rostral cap. Lower lip modified into a mental adhesive

disc. Disc elliptical, shorter than wide; anterior margin modified to form a transverse, flat, fleshy and crescentic skin fold covered by numerous tiny papillae; anteriorly separated from lower jaw by a deep groove running along lower jaw and posteriorly bordered in a deep groove with central callous pad; lateral and posterior margin surrounding central callous pad papillate and free; posteriormost margin not reaching vertical from posterior margin of eye.

Dorsal fin with 2(4), 3(5) simple and 8(9) branched rays; last simple ray shorter than or equal to HL; distal margin slightly concave; originated closer to snout tip than to caudal-fin base, inserted anterior to pelvic fin; first and second branched rays longest, last branched ray not extending to vertical from anal-fin origin. Pectoral fin with one simple and 10(3), 11(3), 12(3) branched rays, reaching beyond midway to pelvic-fin origin; its length less than or equal to HL; subacuminate margin; fourth branched ray longest. Pelvic fin with one simple and 7(3), 8(6) branched rays, reaching beyond midway to anal-fin origin, surpassing the vent; its outer margin blunt; second branched ray longest. Anal fin short with 2(6), 3(3) simple and 5(9) branched rays; first branched ray longest, straight posterior margin; tip extending to base of caudal fin or slightly shorter; origin of anal fin closer to caudal-fin base than to pelvic-fin origin. Caudal fin deeply emarginate; lobe tips pointed, 10<sup>th</sup> ray shortest; lobes

Table 1. Morphometric characters of *G. kalpangi* sp. nov.

Morphometrics	Holotype	10 specimens including holotype	
		Min-Max	Mean±SD
Standard length	60.4	50.0-72.4	
<b>In % SL</b>			
body depth	21.8	18.9–23.8	21.4±1.63
head length	24.3	21.1–24.7	22.9±1.24
head height at nape	14.8	14.6–16.7	15.8±0.83
head width at opercle	18.9	17.3–19.3	18.6±0.78
snout length	12.0	9.1–11.6	10.4±1.05
eye diameter	5.8	5.1–6.7	5.8±0.54
inter-orbital space	10.0	8.7–10.1	9.5±0.55
body width at anal fin	10.2	8.6–10.3	9.9±1.13
body width at dorsal fin	16.5	16.3–18.1	17.1±0.61
caudal peduncle length	16.5	16.0–17.5	16.9±0.59
caudal peduncle height	13.6	12.8–15.2	13.6±0.93
dorsal-fin length	22.6	21.9–25.7	23.1±0.75
dorsal-fin base length	14.6	14.5–16.2	15.4±0.73
pectoral-fin length	20.7	20.4–24.5	21.5±1.35
ventral-fin length	18.0	17.8–21.3	18.8±1.19
anal-fin length	18.2	17.9–20.0	19.0±0.82
anal-fin base length	6.8	6.7–7.7	7.4±0.47
upper caudal-fin lobe length	26.4	26.0–30.0	27.7±1.34
lower caudal-fin lobe length	27.3	26.3–31.4	28.6±1.64
median caudal-fin rays length	18.2	17.8–20.9	19.2±1.10
pre-anal length	78.8	74.4–80.4	76.9±2.21
pre-anus length	70.2	69.5–74.9	72.9±3.58
pre-ventral length	52.7	51.1–56.1	54.1±1.71
pre-dorsal length	49.3	43.9–50.2	47.5±2.54
ventral-anal distance	22.1	21.3–24.5	23.5±1.22
vent-anal distance	5.6	4.4–6.2	5.3±0.73
disc length	9.2	8.3–9.9	9.2±0.52
disc width	11.8	10.5–12.1	11.3±0.70
callous pad length	5.3	4.8–5.5	5.1±0.26
callous pad width	7.5	7.3–8.1	7.7±0.29
<b>In % HL</b>			
snout length	44.6	41.3–49.3	44.6±2.05
eye diameter	23.2	23.1–27.8	25.4±1.45
inter-orbital space	37.3	38.7–43.4	41.2±1.81
disc length	25.2	34.6–38.1	36.5±1.44
disc width	48.1	46.0–54.4	49.4±3.45
callous pad length	19.9	19.5–24.4	22.0±1.71
callous pad width	26.9	32.9–35.0	33.5±1.19

equally long or lower slightly longer.

Lateral line complete with 32(2), 33(7) scales. Scales in transverse row above lateral line 3½(9) and below lateral line 3½(8), 4(1). Circumpeduncular scales 16(9). Predorsal scales 10(6), 11(3); scales arranged regularly. Long axillary scale at base of pelvic fin reaching beyond its base. A row of 3 scales between vent and anal-fin base.

Total vertebrae 31(2); abdominal vertebrae 16(2); caudal vertebrae 12(2). Gill rakers thin and weakly developed 11(1), 12(1). Air chamber bipartite; anterior chamber oval; posterior one small and conical, about ⅔ length of anterior chamber.

### Colour in preservative

Dorsum and sides of head dark gray; head, chest, and abdomen yellowish. Dorsal, anal, pelvic, and pectoral fins grayish-white. Caudal fin light grayish with a thin, short marginal stripe each on tip of upper lobe dorsally and on tip of lower lobe ventrally; in three specimens, with more or less indistinct grayish wide band along middle rays. A black spot at the upper angle of gill opening.

### Etymology

Name is given as noun in apposition after the name of the River Kalpangi in Yazali, Lower Subansiri District, Arunachal Pradesh from where the specimen was first collected.

### DISCUSSION AND CONCLUSIONS

There are altogether 15 valid species of *Garra* known from the Himalayan foothills and distributed in the Ganga, Brahmaputra and Chindwin basins in northeastern India. The species are *G. kemp* Hora, *G. annandalei* Hora, *G. naganensis* Hora, *G. rupecula* (McClelland), *G. abhoyai* Hora, *G. lamta* Hamilton, *G. arupi* Nebeshwar, Vishwanath & Das, *G. lissorhynchus* (McClelland), *G. manipurensis* Vishwanath & Sarojnalini, *G. paralissorhynchus* Vishwanath & Santa, *G. compressus* Kosygin, & Vishwanath, *G. elongata* Vishwanath & Kosygin, *G. gotyla* Gray, *G. nasuta* (McClelland), and *G. litanensis* Vishwanath. Within these 15 species of the genus, former 11 species depict distinction of either absence of proboscis or weakly developed proboscis compared

to *Garra kalpangi* sp. nov. whereas, later 4 species show the presence of strong proboscis.

When *Garra kalpangi* sp. nov. is further compared with the most similar species: the Salween form, *G. graveleyi*, the Irrawaddy form, *G. rotundinasus*, and the Chindwin form, *G. elongata*, it also differs from *G. graveleyi* in having a wider head (1.18–1.28 in HL vs. 1.39–1.48); from *G. rotundinasus* in having a deeper head (14.6–16.7 % SL vs. 12.5–14.4), and caudal peduncle (12.8–15.2 % SL vs. 10.8–11.8); larger eye (23.1–27.8 % HL vs. 13.8–18.6); narrower disc (46.0–54.4 % HL vs. 68.8–82.3), and interorbital space (38.1–43.4 % HL vs. 44.8–56.9); and shorter disc (34.6–38.1 % HL vs. 46.8–60.8); from *G. elongata* in having longer dorsal-fin base (14.5–16.2 % SL vs. 11.2–12.6), pectoral fin (20.4–24.5 % SL vs. 18.2–19.9), pre-pelvic distance (51.1–56.1 % SL vs. 46.9–49.7), and pre-anal distance (69.5–74.9 % SL vs. 60.2–64.3); shorter central callous pad (4.8–5.5 % SL vs. 7.2–8.1), and caudal peduncle (16.0–17.5 % SL vs. 19.2–20.7).

Comparison in morphometric data and meristic count of *Garra kalpangi* sp. nov. with other known valid species of Himalayan foothill regions and its ranges is shown in the Table 2 and Appendix 1. *G. kalpangi* sp. nov. further differs from *G. annandalei* in having absence (vs. presence) of upper lip and a pleated papilliferous fold in the corner of mouth; rostral cap groove shallow, short, not extending up to base of rostral barbel (vs. deep, long, extending up to base of rostral barbel); from *G. abhoyai* in having absence (vs. presence) of w-shaped band on caudal fin; from *G. arupi* in the absence (vs. presence) of a submarginal black band of dorsal fin and thin stripes on caudal peduncle.

*Garra lissorhynchus*, *G. paralissorhynchus* and *G. manipurensis* have a rostral lobe on tip of the snout, which can easily differentiate the three species from *G. kalpangi* sp. nov. Rostral lobe is a triangular section of the snout anterodorsal to the base of the anterior barbel; well demarcated but not elevated from the rest of the snout (Kullander & Fang 2004). *G. kalpangi* sp. nov. further differs from *G. lissorhynchus* and *G. paralissorhynchus* in the absence (vs. presence) of w-shaped band on caudal fin.

*Garra kalpangi* sp. nov. further differs from *G. rupecula* in having less lateral line scales (32–33 vs. 35); absence (vs. presence) of two rows of open pores,

each on interorbital and internarial region; from *G. lamta* in having absence (vs. presence) of broad lateral band from gill-opening to base of caudal fin with incomplete dark narrow stripes above and below it, especially in the posterior half of body; absence (vs. presence) of a black spot at the base of the caudal fin and a deep transverse groove at the tip of the snout.

*Garra gotyla*, *G. nasuta* and *G. litanensis* are characteristic in having a prominent proboscis with large tubercles, a distinct transverse lobe at the tip of the snout with large tubercles, black spots at the bases of branched dorsal-fin rays (Menon 1964; Vishwanath 1993). Only these characters can easily differentiate the three species from *G. kalpangi* sp. nov.

When Nath & Day (2000) reported seven species of *Garra* in Arunachal Pradesh, a peninsular form, *G. mccllellandi* was also included. His identification of *G. mccllellandi* in the Himalayan foothill region is ambiguous. However, *G. kalpangi* sp. nov. differs from *G. mccllellandi* in the absence (vs. presence) of a distinct dark midlateral stripe from the gill opening to the base of the caudal fin; snout moderately rounded (vs. conical); absence (vs. presence) of a transverse groove at the tip of the snout; less lateral line scales (31–32 vs. 35–38); more predorsal scales (10–12 vs. 8–10).

Kullander & Fang (2004) described seven new species found in different streams of the Rakhine state in Myanmar. The species are *Garra propulvinus*, *G. vittatula*, *G. rakhinica*, *G. flavatra*, *G. nigricollis*, *G. spilota* and *G. poecilura*. Most species except (*G. spilota*) have a distinct rostral lobe on snout. Only this character can easily differentiate the above six species from *G. kalpangi* sp. nov. *G. kalpangi* sp. nov. differs from *G. spilota* in the absence (vs. presence) of blotches on the body; absence (vs. presence) of pleated papilliferous fold at the corner of mouth between exposed lower jaw and lower lip; less transverse scale rows above lateral line (3½ vs. 4½), scale rows below lateral line (3½ vs. 4½).

The other known congeners above *Garra graveleyi* and *G. rotundinasus* distributed in China are *G. orientalis* Nichols, *G. qiaojiensis* Wu & Yao, *G. tengchongensis* Zhang & Chen in the upper Irrawaddy basin and *G. nujiangensis* Chen, Zhao & Yang in Salween basin (Zhang & Chen 2002; Zhang 2006; Chen et al. 2009). All the species (except *G. tengchongensis* and *G. nujiangensis*) have prominent proboscis on the

snout, which is also a differentiating character from the present new species. *G. kalpangi* sp. nov. differs from the latter two species in having less lateral line scales (32–33 vs. 37–38 in *G. tengchongensis*; 48–50 in *G. nujiangensis*); more circumpeduncular scales (16 vs. 12 in *G. tengchongensis*; 12–14 in *G. nujiangensis*).

There is a nominal species distributed in northeastern India, viz., *Garra chaudhuri* Hora considered as a junior synonym of *G. annandalei* (Menon 1964). In the original description of *G. chaudhuri*, the characters i.e. variation in the shape of disc among specimens, presence of 32–33 lateral line scales are mentioned. However, variation of disc is not observed among different sizes of 25 specimens of *G. annandalei* deposited in the RGUMF. The differentiating characters and geographical distribution of *G. gotyla* and *G. nasuta* are also very ambiguous. So, a review of the species based on the materials collected from their respective type localities is highly needed. In most *Garra* species, the lateral deep groove of the rostral cap is continuous to the shallow sublachrymal groove extending from the base of the rostral barbel (Fig. 2a–d). In *G. kalpangi* sp. nov. and *G. paralissorhynchus*, the grooves are not connected free from each other. In the former species, the sublachrymal groove runs horizontally above the level of the groove of the rostral cap and in the latter, the sublachrymal groove runs horizontally below the level of the groove of rostral cap. In *G. annandalei*,

the rostral cap groove is deep and runs upto the base of rostral barbel. So, no two different grooves can be seen. The groove of the rostral cap extends to the base of the rostral barbel. In *G. naganensis*, *G. lissorhynchus* and *G. elongata*, the rostral cap groove continues to the shallow sublachrymal groove. In *G. abhoyai* the sublachrymal is absent or present as an indistinct line and continuous to the groove of rostral cap.

### Comparative material

*Garra elongata*: MUMF 2311, holotype, 86.2 mm SL; MUMF 2308-2310, paratype, 3 exs., 72.0–80.8 mm SL, a small stream near Tolloi, Ukhrul district, Manipur (Chindwin basin), coll. L. Kosygin, 12.xi.1997. – uncatalogued specimens, 4 exs. 63.2–112.5 mm SL, Challou River at Challou, Ukhrul district, Manipur (Chindwin basin), coll. Kingson, May 2005. *Garra annandalei*: RGUMF-0074, 15 exs., 55.3–99.0 mm SL, Kameng river, Balukpung, West Kameng District, Arunachal Pradesh (Brahmaputra basin), coll. Karsen Nyori & Mrinali Choudhuri, 20.viii.2005; RGUMF-0075, 10 exs., 65.0–85.0 mm SL, Panye River, Tamen, Lower Subansiri District, 17.vii.2005. *Garra lissorhynchus*: MUMF 4163–4166, 6 exs., 67.1–86.2 mm SL, Iyei River at Noney, Tamenglong district (Brahmaputra basin), coll. K. Nebeshwar, 2.ix.2000. *Garra naganensis*: MUMF 4156-4159, 4 exs. 92.3–106.9 mm SL, Barak River, Vanchengphai Village, Tamenglong District, Manipur (Brahmaputra basin), coll. K. Nebeshwar, 20.xi.1999; uncatalogued specimen, 2 exs., 77.8–84.4 mm SL, Tuivai River, Churachandpur District, Manipur (Brahmaputra basin), coll. K. Shanta Devi, March 2003. *Garra abhoyai*: uncatalogued specimen, 6 exs., 45.2–47.0 mm SL, Khujailok stream at Nambol, Bishnupur district, Manipur (Chindwin basin), coll. Vishwanath et al., April 2001; uncatalogued specimen, 6 exs., 49.3–54.9 mm SL, Iiril River at Phungthar, Ukhrul district, Manipur (Chindwin basin), coll. I. Linthoi et al., 17.i.2003; uncatalogued specimen, 5 exs., 45.0–53.0 mm SL, Nambol River at Singda, Imphal district, Manipur (Chindwin basin), coll. Joyshree, 3.iii.2004. *Garra compressus*: MUMF 2316, holotype, 68.1mm SL ; MUMF 2314-2315, paratype, 2exs., 78.6–83.2 mm SL, Wanze stream at Khamson, Ukhrul District, Manipur (Chindwin basin), coll. L. Kosygin, 17.iii.1998. *Garra paralissorhynchus*:

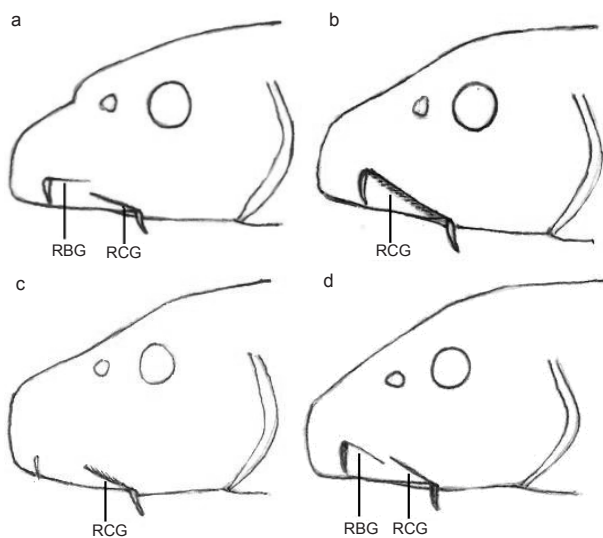


Figure 2. a - *Garra kalpangi* sp. nov.; b - *Garra annandalei*; c - *Garra abhoyai*; d - *Garra paralissorhynchus*. RCG - Rostral cap groove; RBG - Rostral barbel groove

**Table 2. Comparative morphometric data and meristic count of *Garra kalpangi* sp. nov. from its nine congeners.**

In % SL	Gka	Gar	Gma	Gke	Gann	Gna	Gli	Gpa	Gab	Gco
Body depth	18.9–23.8							23.7–26.7	16.2–18.3	16.9–18.2
Head height	14.6–16.7				16.4–18.2			18.1–21.0		12.0–12.9
Head width	17.3–19.3	19.3–21.2	20.2–22.8	20.0–20.8				20.0–21.3	13.8–15.9	
Snout length	12.9–16.4					11.1–12.6		10.6–12.5	10.8–11.3	10.3–11.2
Interorbital space	8.7–10.1	10.9–13.2	11.1–12.0	12.0–13.1	11.5–11.9		11.5–12.7			
Dorsal-fin base length	14.5–16.2		11.0–13.0				10.5–12.2		10.6–12.7	
Dorsal-fin height	21.9–25.7						18.6–19.7	18.6–21.2	17.0–18.8	
Anal-fin base length	6.7–7.7						5.6–6.0			7.8–8.2
Predorsal length	43.9–50.2							50.2–54.0	51.5–55.1	
Pre-anus length	69.5–74.9	62.4–65.6		62.8–65.0						61.3–63.6
Disc width	10.3–12.1	14.4–15.4		14.3–15.4			13.4–14.0	12.0–13.0	12.5–13.2	
Disc length	8.3–9.9			10.7–11.9	6.1–7.1	6.1–7.5	10.0–10.7			10.6–11.7
Callous pad width	7.3–8.1	9.0–10.1		8.9–9.6			9.5–10.3			8.1–8.8
Callous pad length	4.8–5.5	6.3–7.7		6.5–7.4		2.9–3.8	6.4–7.7			7.0–7.8
<b>In % pelvic-anal</b>										
Vent-anal distance	19.9–27.7	32.6–60.0		50.0–52.9	30.0–33.6	40.6–44.2	37.3–40.2	31.7–35.2	38.2–46.5	48.5–51.5
<b>Meristic count</b>										
Lateral line scales	32–33	35–36	34–35	40–42	34–35	36–38	34–35		34–36	40
Predorsal scales	10–11			13		13–14	14–15		18–29	13–14
Circumpeduncular scales	16			12						12–14
Dorsal-fin rays	ii–iii, 8	ii, 7	ii, 7				ii, 6	ii, 6	ii, 6	ii, 7
Anal-fin rays	ii–iii, 5		ii, 4				ii, 4	ii, 4	ii, 4	
Transverse scales	3 ½ / 3 ½		4 ½ / 4 ½	4 ½–5 / 2 ½		4 ½ / 4 ½			4 ½–5 ½ / 4 ½–5 ½	

Gka - *G. kalpangi* sp. nov.; Gar - *G. arupi*; Gma - *G. manipurensis*; Gke - *G. kempfi*; Gan - *G. annandalei*; Gna - *G. naganensis*; Gli - *G. lissorhynchus*; Gpa - *G. paralissorhynchus*; Gab - *G. abhoyai*; Gco - *G. compressus*

MUMF 5054, holotype, 65.9mm SL, Khuga River, Churachandpur District, Manipur (Chindwin basin), coll. L. Shanta Devi; Paratype: MUMF 5094, 1 ex., 60.9mm SL, 10.iv.2000; MUMF 5041, 1 ex., 58.0mm SL, 03.v.2000; MUMF 5104-5106, 3 exs., 49.6–59.6 mm SL, 21.viii.2002, same collection data as holotype. –*Garra manipurensis*: MU/LSD/F-130, holotype, 59.8mm SL, Manipur River, Sherou, Manipur (Chindwin basin); MUMF 4160-4162, 3 exs. 41.9–68.3 mm SL, Iyei River, Noney, Tamenglong District (Brahmaputra basin), coll. K. Nebeshwar, 27.xii.2000. *Garra kempfi*: RGUMF-0184, 3 exs., 52.0–56.0 mm SL, Egar stream, Rottung, East Siang District, Arunachal Pradesh (Brahmaputra basin), coll. K. Nebeshwar & Party, 12. i. 2007; MUMF 4314/2, 2 ex., 64.5-65.0 mm SL, Demwe stream, Tezu, Lohit District, Arunachal Pradesh (Brahmaputra basin), coll. K. Nebeshwar & Party, 1.i.2007. *Garra arupi*:

RGUMF-0184, holotype, 60.0 mm SL; RGUMF-0185, Paratype, 15 exs., 50.0–72.4 mm SL, Deopani River at Roing, Lower Divang Valley, Arunachal Pradesh, coll. K. Nebeshwar & party, 7–18.ii.2007. *Garra litanensis*: MUMF-68/1, holotype, 92.5mm SL, Litan stream at Litan, Manipur, coll. W. Vishwanath, 16.iii.1986; MUMF-69/1-5, Paratypes, 5 exs., 69.0–74.0 mm SL, same data as holotype, coll. W. Vishwanath, 12.ii.1988. *Garra cf. gotyla*: MUMF 4300, 4301/9, 68.8–104.3 mm SL, Tista R., Sikkim (Brahmaputra basin), coll. W. Vishwanath and party, 2–9.ii.2006. *Garra* sp.: uncatalogued specimens, 2 exs., 81.2–100.3 mm SL, Khasi hills, Meghalaya (Brahmaputra basin), coll. Manichandra, August 2009; uncatalogued specimens, 12 exs., 66.4–122.0 mm SL, Tuirial River, Aizwal, Mizoram (Brahmaputra basin), coll. K. Nebeshwar & A. Darshan, 24.xi.–1.xii. 2008.



**The taxonomic keys to the sixteen species of *Garra* distributed in the northeastern states of India**

1.	Proboscis absent .....	2
	Proboscis present .....	12
2.	Snout tip with a transverse groove or band of tubercles .....	3
	Snout tip smooth, without a transverse groove or band of tubercles .....	4
3.	Lateral line with 35-36 pored scales; No lateral longitudinal band from gill opening to caudal base .....	<i>Garra arupi</i>
	Lateral band with 31-34 pored scales; A longitudinal Band from gill opening to caudal base .....	<i>Garra lamta</i>
4.	Rostral lobe on snout present .....	5
	Rostral lobe on snout absent .....	7
5.	W-shaped band on caudal fin absent .....	<i>Garra manipurensis</i>
	W-shaped band on caudal fin present .....	6
6.	Lateral line with 32-33 pored scales; 11-12 predorsal scales .....	<i>G. paralissorhynchus</i>
	Lateral line with 34-35 pored scales; 14-15 predorsal scales .....	<i>Garra lissorhynchus</i>
7.	W-shaped band on caudal fin present .....	<i>Garra abhoyai</i>
	W-shaped band on caudal fin absent .....	8
8.	Rostral cap groove deep, long, extending to base of rostral barbel .....	<i>Garra annandalei</i>
	Rostral cap groove shallow, short, not extending to base of rostral barbel .....	9
9.	Lateral line less than 39 pored scales .....	10
	Lateral line more than 39 pored scales .....	11
10.	Lateral line with 35 pored scales; Rows of open pores on dorsum of head present .....	<i>Garra rupecula</i>
	Lateral line with 36-38 pored scales; Rows of open pores on dorsum of head absent .....	<i>Garra naganensis</i>
11.	Black dark spot at upper angle of gill opening and median longitudinal black band on caudal fin present .....	<i>Garra compressus</i>
	Dark spot at upper angle of gill opening and median longitudinal black band on caudal fin absent .....	<i>Garra kempi</i>
12.	Proboscis weakly developed .....	13
	Proboscis well developed .....	14
13.	Lateral line with 40-41 pored scales; 14-15 predorsal scales .....	<i>Garra elongata</i>
	Lateral line with 32-33 pored scales; 10-11 predorsal scales .....	<b><i>Garra kalpangi</i> sp. nov.</b>
14.	Tubercles of proboscis multicuspid; Proboscis trilobed .....	<i>Garra nasuta</i>
	Tubercles of Proboscis unicuspid; proboscis uni- or bilobed proboscis .....	15
15.	Proboscis unilobed .....	<i>Garra gotyla</i>
	Proboscis bilobed .....	<i>Garra litanensis</i>

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**Author Contribution:** The study: DND exploration of fish species in the region. KB collection and habitat description of the fish species from different rivers of Arunachal Pradesh. KN morphometric study and confirmation of the identity of the species. **Current paper:** DND supervised the work and interpreted the taxonomic information gathered by the fellow researcher. KB collected the specimens, helped in comparative studies of the species and incorporated several revision of the research paper. KN examined the specimen and compared with closely related species to establish identity of the new species.

**Appendix I . Morphometric characters of *G. kalpangi* sp. nov.**

Parameters	Holotype	Paratypes									
		50.0	52.0	52.2	52.7	56.3	62.3	63.3	68.4	72.4	
Standard length	60.4	50.0	52.0	52.2	52.7	56.3	62.3	63.3	68.4	72.4	
In % SL											
body depth	21.8	18.9	21.1	22.1	20.0	21.3	21.7	21.9	21.8	23.8	
head length	24.3	21.1	21.9	22.0	21.8	23.2	23.7	22.6	24.0	24.7	
head height at nape	14.8	14.6	15.7	15.3	15.6	15.7	16.6	16.6	16.6	16.7	
head width at opercle	18.9	17.3	18.8	18.4	18.6	18.5	18.9	19.0	18.0	19.3	
snout length	12.0	10.3	10.2	10.2	9.1	10.5	11.4	9.2	10.2	11.6	
eye diameter	5.8	5.1	6.4	6.3	5.2	5.1	5.5	5.9	5.8	6.7	
interorbital space	10.0	9.5	9.5	9.7	9.7	9.2	9.5	8.7	9.4	10.1	
body width at anal fin	10.2	8.6	10.3	10.2	10.5	10.1	9.8	9.2	10.1	10.3	
body width at dorsal fin	16.5	16.3	17.8	16.4	16.4	18.0	17.0	17.2	17.4	18.1	
caudal peduncle length	16.5	16.0	16.8	16.8	16.9	17.2	17.0	16.4	17.4	17.5	
caudal peduncle height	13.6	12.8	12.9	13.8	13.9	13.0	13.8	13.0	14.3	15.2	
dorsal-fin length	22.6	21.9	22.3	22.2	22.1	22.0	23.6	24.1	24.0	25.7	
dorsal-fin base length	14.6	14.5	15.3	15.3	16.2	15.6	14.9	14.5	16.1	16.2	
pectoral-fin length	20.7	20.4	20.8	21.8	21.1	20.5	22.0	22.0	21.5	24.5	
ventral-fin length	18.0	18.5	17.8	18.2	18.5	18.8	18.7	18.5	19.5	21.3	
anal-fin length	18.2	17.9	18.6	18.9	19.2	18.6	18.8	19.6	19.9	20.0	
anal-fin base length	6.8	6.7	7.6	7.5	7.6	7.5	7.5	7.4	7.3	7.7	
upper caudal-fin lobe length	26.4	26.0	26.8	26.6	26.4	27.8	29.3	28.2	29.6	30.0	
lower caudal-fin lobe length	27.3	26.3	27.5	28.5	28.1	28.6	28.0	29.6	30.5	31.4	
median caudal-fin rays length	18.2	18.9	17.8	18.5	18.9	19.7	19.7	19.8	19.3	20.9	
pre-anal length	78.8	75.8	75.9	75.6	76.8	74.4	75.9	77.1	78.6	80.4	
pre-anus length	70.2	69.5	73.3	72.8	72.6	72.9	73.4	74.6	74.9	74.5	
pre-ventral length	52.7	51.1	53.0	53.5	54.2	54.7	54.8	55.7	55.2	56.1	
predorsal length	49.3	43.9	44.4	45.2	47.4	49.7	48.1	48.2	48.9	50.2	
ventral-anal distance	22.1	21.3	23.9	24.4	23.8	23.4	24.5	23.8	23.3	24.5	
anus-anal distance	5.6	4.5	5.0	5.3	4.4	4.8	5.5	5.8	5.9	6.2	
disc length	9.2	8.3	9.4	9.9	8.6	8.8	9.1	9.4	9.7	9.9	
disc width	11.8	10.5	11.1	10.6	10.8	11.0	11.3	11.6	12.0	12.1	
callous pad length	5.3	4.8	4.9	5.0	5.4	4.8	5.1	4.9	4.9	5.5	
callous pad width	7.5	7.3	7.8	7.9	7.4	7.6	8.1	7.8	8.0	7.4	
In % HL											
snout length	44.6	41.3	42.5	42.6	42.2	44.1	46.1	46.3	47.1	49.3	
eye diameter	23.2	23.1	25.5	24.7	25.6	24.6	25.8	26.9	26.4	27.8	
interorbital space	37.3	39.6	42.7	43.4	39.4	38.7	42.0	40.8	43.4	42.4	
disc length	25.2	34.6	35.4	34.6	36.3	36.5	37.8	38.1	37.2	37.9	
disc width	48.1	48.7	46.0	48.7	50.3	47.5	48.7	50.6	50.8	54.4	
callous pad length	19.9	19.5	21.9	21.6	22.8	22.1	22.4	22.7	23.0	24.4	
callous pad width	33.9	33.5	32.8	32.5	32.9	33.4	33.5	33.9	33.2	35.0	

