



Redescription of a labeonid fish *Garra nasuta* (McClelland, 1838) from its type locality in Meghalaya India

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Abstract

Garra nasuta (McClelland, 1838) is redescribed based on the specimens collected from two river basins in the Khasi Hills, Meghalaya. It was described as *Platycaera nasuta* by McClelland in 1828 from Kasya mountains, Assam (now Khasi Hills, Meghalaya). The type specimens of *G. nasuta* do not exist, and its identity is not yet clear. The study has been based on morphological, anatomical, and osteological characteristics. A neotype has been designated to solve the taxonomic ambiguities of *Garra nasuta*. It is distinguished from other congeners in having a trilobed proboscis, a pit-like crease between nares, 33–34 lateral line scales, 9–10 pre-dorsal scales, and 16 circumpeduncular scales.

Keywords: *Platycaera nasuta*, *Garra*, Khasi Hills, redescription, neotype

Introduction

The labeonine genus *Garra* Hamilton is a highly diversified bottom-dwelling rheophilic cyprinid with modified body features, viz. slender and sub-cylindrical body, a mental adhesive disc and horizontally extended paired fins. They are dispersed from Borneo and Southern China to Sub-Saharan Africa and the Southwest, Southeast and East Asia Arabian Peninsula (Zhang & Chen, 2002). There are 261 species of the genus *Garra* all around the world, 85 species from India and 61 species from eastern Himalaya, including neighbouring countries like Bhutan, Nepal, Tibet, and Myanmar (Fricke *et al.*, 2023). The development of the proboscis, the distribution pattern of the tubercles and the transverse lobe on the snout are of taxonomic significance in unique species of the genus (Nebeshwar & Vishwanath, 2013). The species of *Garra* found in southern and south-eastern Asia is divided into five groups based on snout morphology: smooth, transverse lobe, proboscis, rostral flap, and the rostral lobe (Nebeshwar & Vishwanath, 2017). The freshwater bodies of Northeastern India harboured 18 species of *Garra* with proboscis; *G.*

nasuta is one of them, a unique species that inhabit only in the hill streams.

The type species of *Garra nasuta* (McClelland, 1838), described from “Kasya mountains”, Assam (now Khasi Hills, Meghalaya), does not exist. Significant diagnostic information of the species is available in neither McClelland’s (1838) text nor the accompanying illustration, except mentioning only the presence of a pit between the nares. Menon (1964) attempted to redescribe this stenotopic species based on the specimens from Assam, India; Sittang drainage in southern Shan State Myanmar and from parts of China and had mentioned the presence of a prominent trilobed proboscis which is not mentioned in McClelland (1838). Thus, the identity of *Garra nasuta* is not yet clear. Given this taxonomic ambiguity, *Garra nasuta* is redescribed and revalidated here with freshly collected specimens from Khasi Hills (original collection site of McClelland, 1838) and Jaintia Hills Meghalaya.

Materials and Methods

The specimens were fixed in 10% buffer formalin and then transferred to 70% ethanol. Measurements were made point to point with a dial calliper (Mitutoyo) to the nearest 0.1 mm on the left side of the specimens whenever possible. Count, measurements and terminology follow Nebeshwar & Vishwanath (2013). Head length and body part measurements are given as proportions of standard length (SL). Subunits of the head are presented as proportions of both dorsal (DHL) and lateral head length (LHL). Fin rays were counted under stereozoom microscope and were confirmed through a cleared and stained specimens following Taylor & Van Dike (1985). Numbers in parentheses following a meristic value indicates the number of species with that particular count. Vertebral count and the identification of bones were done from cleared and stained specimens following Sawada (1982). The neotype is deposited in the Zoological Survey of India, Kolkata. Other specimens were deposited in the Assam Don Bosco University Museum of Fish (ADBU-MF). Gill rakers were counted from the first left side of gill arch.

Garra nasuta (McClelland, 1838)

Figure 1 (A-D)

Platycaera nasuta McClelland, 1838: 947, pl. 55, Figure 2 (type locality: Khasi Hills, Meghalaya, India).

Local name: Doh trun (in khasi dialect)

Type materials

Neotype: Male, 115.6 mm SL; India: Meghalaya, Ri-bhoi district, Ñiangdai River near Ñiangdai village (Brahmaputra drainage system), 25°40'13"N 91°49'27"E, altitude 856 m ASL, 20.iv.2022, coll. Batnenglang Mawlong and N. Myllichem Umlong (Reg. No. ZSI FF 9809).

Material examined: Syntypes: 11 exs., 65.0–119.1 mm SL; data as for neotype (Reg. No. ADBU-FM/5088/2–12). Syntypes: 6 exs., 51.0–119.3 mm SL; India, Meghalaya, West Jaintia hills, Amtyrngui River at Amdoh (Barak-Surma-Meghna drainage system), 25°11'30.49"N 92°03'45.79"E, Altitude 216 m ALS, 6.vi.2020, coll. Mardikordor Pohchen (Reg. No. ADBU-FM/5088/13–18).

Two specimens viz. Syntype: Male, 106.7 mm SL (Reg. No. ADBU-FM/5088/5) and Syntype: Female, 91.5 mm SL (Reg. No. ADBU-FM/5088/9) were cleared and stained for osteology.

Diagnosis. *Garra nasuta* (McClelland, 1839) is distinguished from its congeners in the Brahmaputra River basin in having trilobed proboscis with anteriorly truncated margin in the median lobe and a transverse lobe, a head deeply depressed at the snout; lateral line with 33–34 pore scales, 10 predorsal scales and 16 circumpeduncular scales row; dorsal fin higher than body depth at dorsal-origin; mouth inferior, semicircular; a fainted blackish spot at the upper angle of gill opening.

Description. General body shape as in Figure 1. Morphometric data in Table 1. Body elongated, dorsal profile rising abruptly from base of medial proboscis forming a convex internares then evenly to supraoccipital process. Dorsal profile of body gently convex to dorsal-fin origin, slightly compressed laterally, more compressed in caudal peduncle region. Ventral profile flat to pelvic-fin origin and straight till anal-fin base. Dorsal head profile rising abruptly just before anterior nostril and forming somewhat convex at internares. Head moderately large and depressed, mouth inferior, semi-circular, lower lip forms a suctorial disc on chin consist of semi-cartilaginous pad, abstemiously convex interorbital distance; height less than length; width greater than height. Snout slightly protruding with transverse lobe of 13-19 small- to large-sized uni- to tetracuspoid acanthoid tubercles; 3-9 small tubercles on lateral margin of proboscis, lobe isolated posteriorly by a profound or narrow transverse groove; a pit or groove at on proboscis between nares, just anterior to anterior nostril on each side (Figure 2 A-E). Proboscis well developed protruding forward with 3-9 uni- to tetracuspoid tubercles, 7-12 uni- to tetracuspoid tubercles on anteroventral margin; an unicuspid tubercles between eye and posterior nares at ventral fringe of later.

Barbels two pairs; rostral barbel anteroventrally located, shorter than eye diameter; maxillary barbel at corner of mouth, shorter than rostral barbel. Rostral cap well developed, moderately fimbriate, about one sixth of length of its distal margin on each lateral extremity smooth; papillate ventral surface moderately wide (Figure 2 C). Anteromedian fold transverse and slightly arched, densely covered by numerous small and round papillae, arched groove between anteromedian fold and central callous pad sparingly papillated. Mental disc well developed, wider than length; central callous pad elliptical width, wider than length, extending beyond posterior margin of eye, but not reaching level of pectoral-fin origin. Anterolateral lobe well developed, slightly elliptical, densely papillated, and about one-third

part covered by rostral fold. Gill opening moderate, origin posterior to eye, almost straight to superior margin of eye, and extending just below pectoral-fin origin not reaching posterior fringe of mental disc; ventral preopercle groove, more inclined, and reaching callous pad base below mental disc. Nostril closer to anterior margin of eye than to tip of snout, anterior nares parted by a large rounded membrane flap from posterior, posterior nares slightly larger than anterior.

Dorsal fin with ii (18) simple and $8\frac{1}{2}$ (18) branched rays, last simple ray longer than both dorsal and lateral head length, first branched ray longest, last branched ray not extending vertical to anal-fin origin; distal margin convex; origin closer to snout tip than to caudal-fin base, inserted in anterior to vertical from pelvic-fin origin. Pectoral fin with i (18) simple and 15 (18) branched rays, reaching two third distance to pelvic-fin origin; length shorter than head length; fifth branched ray longest, not reaching pelvic-fin base; distal margin sub acuminate. Pelvic fin with i (18) simple and 8 (18) branched rays; second branched ray longest, reaching beyond midway to anal-fin origin, surpassing anus when adpressed; origin closer to anal-fin origin than to pectoral-fin origin; distal margin sub acuminate. Anal fin with ii (18) simple and $5\frac{1}{2}$ (18) branched rays; first branched ray longest, reaching caudal-fin base when adpressed; distal margin slightly concave; origin closer to caudal-fin base than to pelvic-fin origin. Vent closer to anal-fin origin than to pelvic-fin origin. Caudal fin forked with 10+9 (18) principal caudal rays and 7 (18) procurrent rays in both upper and lower lobe; lower lobe longer than upper lob and caudal-fin forked.

Lateral line complete, nearly straight, with 30+3 (15), 31+3 (3) pored cycloid scales, scale size decreasing towards caudal-fin base except last 2 larger scales. Transverse scale rows above lateral line $4\frac{1}{2}$ (18); between lateral line and pelvic-fin origin $3\frac{1}{2}$ (18) and between lateral line and anal-fin origin $4\frac{1}{2}$ (18). Predorsal scales 9 (2) & 10 (16); regularly arranged same size as verge scales. Circumpeduncular scales 16 (18). Scales from anus to anal-fin origin 3 (15) – 4 (3). Dorsal-fin base scales 6 (18), last scale connected to base of dorsal fin. Anal-fin base scales 5, last scale connected to base of anal fin. Chest and belly scaled and embedded in skin. One long axillary scale at pelvic-fin base, its tip reaching to posterior end of pelvic-fin base.

Osteological features. Total vertebrae 32 (2); abdominal 17 (2); caudal 15 (2); predorsal 9 (2) vertebrae; dorsal-fin insertion between 9th and 10th vertebrae; anal fin insertion

between 21st and 22nd vertebrae; pelvic fin insertion vertical to 10th vertebrae. 5th ceratobranchial with 13 (2) teeth in three rows. First branchial arch with 22 (2) gill rakers viz. 18 (2) in hypobranchial and 4 (2) in epi-branchial.

Sexual dimorphism. Males with more large tubercles on transverse lobe, proboscis and anterolateral snout. Females are distinguished from males in having a longer snout (15.0–16.5% SL vs. 12.9–15.4), wider central callous pad (9.2–11.3% SL vs. 7.8–9.8), longer pre pectoral length (24.0–27.0% SL vs. 21.6–24.4), and shorter pelvic-fin length (16.0–21.9% SL vs. 21.4–25.5).

Colour. In 10% buffer formalin, the body is dark brown or grey on the head, dorsum, and flank. Mouth, chest, and abdomen yellowish. Distal margin of the anal, pelvic, and pectoral fins greyish white. Dorsal fin is greyish brown; pectoral and pelvic-fins origin yellowish and greyish cream till the edge of the rays. Caudal fin greyish hyaline with a dusky to brown streak on a distal region of each lobe and median rays. Eye pupil greyish with a black circle. A faint blackish spot immediately anterior to the upper angle of the gill opening. Tubercles on the transverse lobe and proboscis are light brown.

Distribution and habitat. *Garra nasuta* is presently found in N'iangdai River near N'iangdai village (Brahmaputra drainage system) Khasi Hills and Amtyrngui River at Amdoh (Barak-Surma-Meghna drainage system), West Jaintia hills, Meghalaya (Figure 3).

Discussion

Garra nasuta is characteristic in having a snout with a trilobed proboscis protruding downward above the transverse groove and tuberculated transverse lobe, and the presence of pit between nares. It belongs to the snout with proboscis and transverse lobe species group (Nebeshwar & Vishwanath, 2017). There are 21 valid species of *Garra* having proboscis and transverse lobe in the snout. Of these 15 species occur in the Brahmaputra and the Barak-Surma-Meghna drainage systems, viz. *Garra arunachalensis* Nebeshwar & Vishwanath 2013, *G. biloboristris* Roni & Vishwanath 2017, *G. bimaculacauda* Thoni *et al.* 2016, *G. birostris* Nebeshwar & Vishwanath 2013, *G. chathensis* Ezung *et al.* 2020, *G. clavirostris* Roni *et al.* 2017, *G. gotyla* (Gray 1830), *G. jaldhakaensis* Kosygin *et al.* 2021, *G. parastenorhynchus* Thoni *et al.* 2016, *G. paratrilocata* Roni *et al.* 2019, *G. quadritrostris* Nebeshwar & Vishwanath 2013, *G. ranganensis*

Tamang *et al.* 2019, *G. subtrictorostris* Roni & Vishwanath 2018, and *G. tamangi* Gurumayum & Kosygin 2016; 5 species from the Chindwin-Irrawaddy drainage system viz. *G. chindwinensis* Premananda *et al.* 2017, *G. cornigera* Shangningam & Vishwanath 2015, *G. litanensis* Vishwanath 1993, *G. moyonkhulleni* Moyon & Arunkumar 2018, and *G. trilobata* Shangningam & Vishwanath 2015; and a single species viz. *G. koladyensis* Nebeshwar & Vishwanath 2017 from the Kaladan drainage system.

Garra nasuta is distinguished from all the congeners (having snout with proboscis and transverse lobe) viz. *G. arunachalensis*, *G. birostris*, *G. biloboristris*, *G. bimaculacauda*, *G. chathensis*, *G. clavirostris*, *G. gotyla*, *G. jaldhakaensis*, *G. ranganenis*, *G. tamangi*, *G. quadritirostris*, *G. paratrilobata*, *G. parastenorhynchus* and *G. subtrictorostris* by presence (vs. absence) of a pit between nares. It further distinguished from the *G. arunachalensis* in its number of lateral line scales (33–34 vs. 35), circumpeduncular scales (16 vs. 12), anal-fin base scales (5 vs. 3–4), simple dorsal- and anal-fin ray (ii vs. iii), number of vertebrae (32 vs. 33–34), mental-disc length (38.5–49.5% HL vs. 59.0–66.0), callous-pad length (25.1–38.5% HL vs. 14.3–16.3), callous-pad width (33.2–38.9% HL vs. 39.0–48.0), and dorsal-fin length (24.2–31.6% SL vs. 16.4–20.1); from *G. birostris* in its number of circumpeduncular scales (16 vs. 12), anal-fin base scales (5 vs. 3–4), simple dorsal-fin rays (ii vs. iii), simple anal-fin ray (ii vs. iii), and caudal peduncle length (11.4–14.0% SL vs. 14.5–17.5); from *G. biloboristris* in the absence (vs. presence) of two separate arch-shaped lobes in the proboscis, number of dorsal-fin base scales (6 vs. 7), dorsal- and anal-fin simple rays (ii vs. iii), pectoral-fin rays (i,14 vs. i,12–13), pelvic-fin rays (i,8 vs. ii,7), and number of vertebrae (32 vs. 31); from *G. bimaculacauda* in its number of circumpeduncular scales (16 vs. 12), pre dorsal length (10 vs. 8), simple anal-fin rays (ii vs. i), and caudal peduncle length (11.4–14.0% SL vs. 14.6–15.7); from *G. chathensis* in its caudal peduncle length (11.4–14.0% SL vs. 16.9–18.2), snout length (52.5–62.1% HL vs. 35.9–49.7), mental-disc width (49.7–66.9% HL vs. 44.4–50.3), number of transverse scales row ($4\frac{1}{2}/3\frac{1}{2}/4\frac{1}{2}$ vs. $3\frac{1}{2}/3\frac{1}{2}$), and dorsal- and anal-fin simple rays (ii vs. iii); from *G. clavirostris* in its trilobed (vs. unilobed) proboscis, and mental-disc length (38.5–49.5% HL vs. 50.9–65.7); from *G. gotyla* in its number of lateral line scales (33–34 vs. 42), caudal-peduncle length (11.4–14.0% SL vs. 14.7–17.7), callous-pad length (25.1–38.5% HL vs. 20.0–24.0), and number of anal-fin base scales (5 vs. 3–4); from *G. jaldhakaensis* in its caudal-peduncle length (11.4–

14.0% SL vs. 15.2–17.0), mental-disc length (38.5–49.5% HL vs. 34.6–37.2), callous-pad length (25.1–38.5% HL vs. 20.0–21.3), callous-pad width (33.2–38.9% HL vs. 27.1–30.4), number of transverse scales rows between lateral line and anal-fin origin ($4\frac{1}{2}$ vs. 3), dorsal-fin base scales (6 vs. 7), and anal-fin rays (ii,5½ vs ii,4); from *G. ranganenis* in its caudal-peduncle length (11.4–14.0% SL vs. 14.0–17.1), eye diameter (18.1–27.1% HL vs. 15.0–18.0), number of circumpeduncular scales row (16 vs. 12), predorsal scales (10 vs. 11), transverse scales above and below lateral line ($4\frac{1}{2}/3\frac{1}{2}/4\frac{1}{2}$ vs. $3\frac{1}{2}/2\frac{1}{2}-3\frac{1}{2}$), and pectoral-fin rays (i,14 vs. i,13); from *G. tamangi* in its caudal-peduncle length (11.4–14.0% SL vs. 14.7–16.5), and number of transverse scale row between lateral line and pelvic-fin origin ($3\frac{1}{2}$ vs. $2\frac{1}{2}$); from *G. quadritirostris* in its caudal-peduncle length (11.4–14.0% SL vs. 14.2–17.7), number of lateral line scales (33–34 vs. 37), circumpeduncular scales (16 vs. 12), transverse scales above and below lateral line ($4\frac{1}{2}/3\frac{1}{2}/4\frac{1}{2}$ vs. $3\frac{1}{2}-4\frac{1}{2}/3\frac{1}{2}$), and the number of anal-fin base scales (6 vs. 2–5); from *G. paratrilobata* in its number of branched pectoral-fin rays (8 vs. 9), abdominal + caudal vertebrae (17+15 vs. 21+11), and head depth at eyes (11.6–14.3% SL vs. 14.4–16.3); from *G. parastenorhynchus* in its number of lateral line scales (33–34 vs. 31–32), anal-fin rays (ii,5½ vs. i,5), length of caudal peduncle (11.4–13.9% SL vs. 14.8–16.6), snout length (52.5–62.1% HL vs. 44.6–51.2), interorbital distance (40.7–47.2% HL vs. 34.7–39.5), mental disc length (41.7–50.7% HL vs. 32.6–37.2), callous pad length (25.1–38.5% HL vs. 15.7–21.1), and callous pad width (33.2–38.9% HL vs. 24.4–27.4); and from *G. subtrictorostris* in its trilobed proboscis (vs. narrow antrorse unilobed), eye diameter (18.1–27.1% HL vs. 13–16), number of branched pectoral-fin rays (14 vs. 15), and number of transverse scale rows between dorsal-fin origin to lateral line ($4\frac{1}{2}$ vs. $5\frac{1}{2}$).

Garra nasuta is further distinguished from all the congeners from the Chindwin-Irrawaddy drainage system, viz. *G. chindwinensis*, *G. cornigera*, *G. litanensis*, *G. moyonkhulleni*, and *G. trilobata*, in its number of circumpeduncular scales row (16 vs. 12 in *G. chindwinensis*, 14 in *G. cornigera*, *G. moyonkhulleni* and *G. trilobata*), and both dorsal- and anal-fin simple rays (ii vs. iii) except *G. moyonkhulleni*. It further distinguished from *G. chindwinensis* in its dorsal-fin length (24.2–31.6% SL vs. 20.0–22.6), eye diameter (18.1–27.1% HL vs. 14.0–15.0), and the number of transverse scales between lateral line; from *G. cornigera* in its number of transverse scales above and below lateral line ($4\frac{1}{2}/3\frac{1}{2}/4\frac{1}{2}$ vs. $3\frac{1}{2}/4\frac{1}{2}$), pectoral-fin rays (i,14 vs. i,13), vertebrae number (32 vs. 34),

and anal-fin base scales (5 vs. 3–4); from *G. litanensis* in its number of lateral-line scale rows (33–34 vs. 32); from *G. moyonkhulleni* in its caudal peduncle length (11.4–14.0% SL vs. 14.4–17.7), pelvic-anal distance (24.0–29.0% SL vs. 21.9–23.5), snout length (52.5–62.1% HL vs. 44.0–49.1), and the number of predorsal scales (10 vs. 8); and from *G. trilobata* in its mental disc length (38.5–49.5% HL vs. 20.0–34.0), and the number of lateral line scales (33–34 vs. 31–32).

Garra nasuta is further distinguished from its only congener from the Kaladan drainage system *G. koladynensis* in its number of both dorsal- and anal-fin simple rays (ii vs. iii), the presence of a black spot posterior (vs. anterior) to gill opening, and the presence (vs. absent) of the upper lip.

While redescribing *Garra nasuta*, Menon (1964) used specimens from Assam, Sittang drainage in southern Shan State, Myanmar and from parts of China (without mentioning catalogue or types) which is out of the range of Brahmaputra River basin of the type species mentioned by McClelland. It might be another species whose validity is still needed to ascertain. Thus, Menon's description of *Garra nasuta* is not worthy of validating its status. Vishwanath (2021) observed that a stenotopic *Garra* species is not supposed to be widely distributed in different drainages of the northeastern India, Myanmar, and China. The present study was conducted on fishes collected from the streams and rivers in and around Khasi Hills and Jaintia Hills of Meghalaya to validate the identity of *G. nasuta*. We have collected two populations, one at the upper reach of Umiam reservoir (Brahmaputra drainage system) and the other in Amtyrngui River, West Jaintia hills (Barak-Surma-Meghana drainage system) Meghalaya. Both populations conform to important characters given by McClelland. It is validated here as *Garra nasuta*.

Comparative materials and data

Garra arunachalensis: Holotype: 121.0 mm SL; India, Arunachal Pradesh, Lower Devang valley district, Deopani River at Roing (Brahmaputra River basin), 29°09'35"N 95°54'08"E (Reg. No. MUMF 4304),

Garra birostris: Holotype: 102.0 mm SL; India, Arunachal Pradesh, Papum Pare district, Dikrong River at Doimukh (Brahmaputra River basin), 27°08'19"N 93°44'51"E (Reg. No. MUMF 4302),

Garra biloboristris: Holotype: 92.3 mm SL; India, Assam, Chirang district, Kanamakra River (Brahmaputra River basin), 26°45'0.59"N 90°39'17.36"E, Altitude 191 m ASL (Reg. No. MUMF 22017),

Garra clavirostris: Holotype: 117.5 mm SL; India, Assam, Dima Hasao district, Dilaima River at Boro Chenam (Brahmaputra River basin), 25°18'03"N 92°52'05"E, Altitude 401 m ASL (Reg. No. MUMF 22004).

Garra cornigera: Holotype: 76.0 mm SL; India, Manipur, Ukhrul district, Sanalok River (Chindwin River basin), 24°52'N 94°39'E (Reg. No. MUMF 12061).

Garra gotyla: Neotype: 104.3 mm SL; India, Sikkim, Tista River at Rangpo (Ganga River basin), 27°10'43"N 88°32'10"E (Reg. No. MUMF 4300).

Garra koladynensis: Holotype: 130.6 mm SL; India, Mizoram, Lawtlai district, Koladyne River at Kawlchaw (Kaladan River basin), 22°23'N 92°57'E (Reg. No. MUMF 4313).

Garra litanensis: Holotype: 92.5 mm SL; India, Manipur, Ukhrul district, Litan stream at Litan (Chidwin River basin) (Reg. No. MUMF 68/1).

Garra paratrilobata: Holotype: 137.0 mm SL; India, Manipur, Noney district, Leimatak River at Awangkhu village (Barak-Surma-Meghna River basin), 24°49'07.20"N 92°57'00.60"E (Reg. No. MUMF 22050). Syntype: 86.9–100.0 mm SL; India, Meghalaya, South Garo Hills, Simsang River (Barak-Surma-Meghna River basin) (Reg. No. ADBU-MF/5088/19-20).

Garra substrictorostris: Holotype: 173.0 mm SL; India, Manipur, Churachandpur district, Leimatak River at Leimatak village (Barak-Surma-Meghna River basin), 24°34'33"N 93°40'01"E (Reg. No. MUMF 22034).

Garra quadratorostris: Holotype: 108.0 mm SL; India, Sikkim, Tista River at Rangpo (Ganga River basin), 27°10'43"N 88°32'10"E (Reg. No. MUMF 4306).

Published information used for comparison: Ezung *et al.* (2020) for *Garra chathensis*; Gurumayum & Kosygin (2016) for *G. tamangi*; Kosygin *et al.* (2021) for *G. jaldhakaensis*; Moyon & Arunkumar (2018) *G. moyonkhulleni*; Shangningam & Vishwanath (2015) for *Garra trilobata*; Premananda *et al.* (2017) for *G. chindwinensis*; Thoni *et al.* (2016) for *G. bimacuculacauda* and *G. parastenorhynchus*; ang Tamang *et al.* (2019) for *G. ranganensis*.

FIGURES

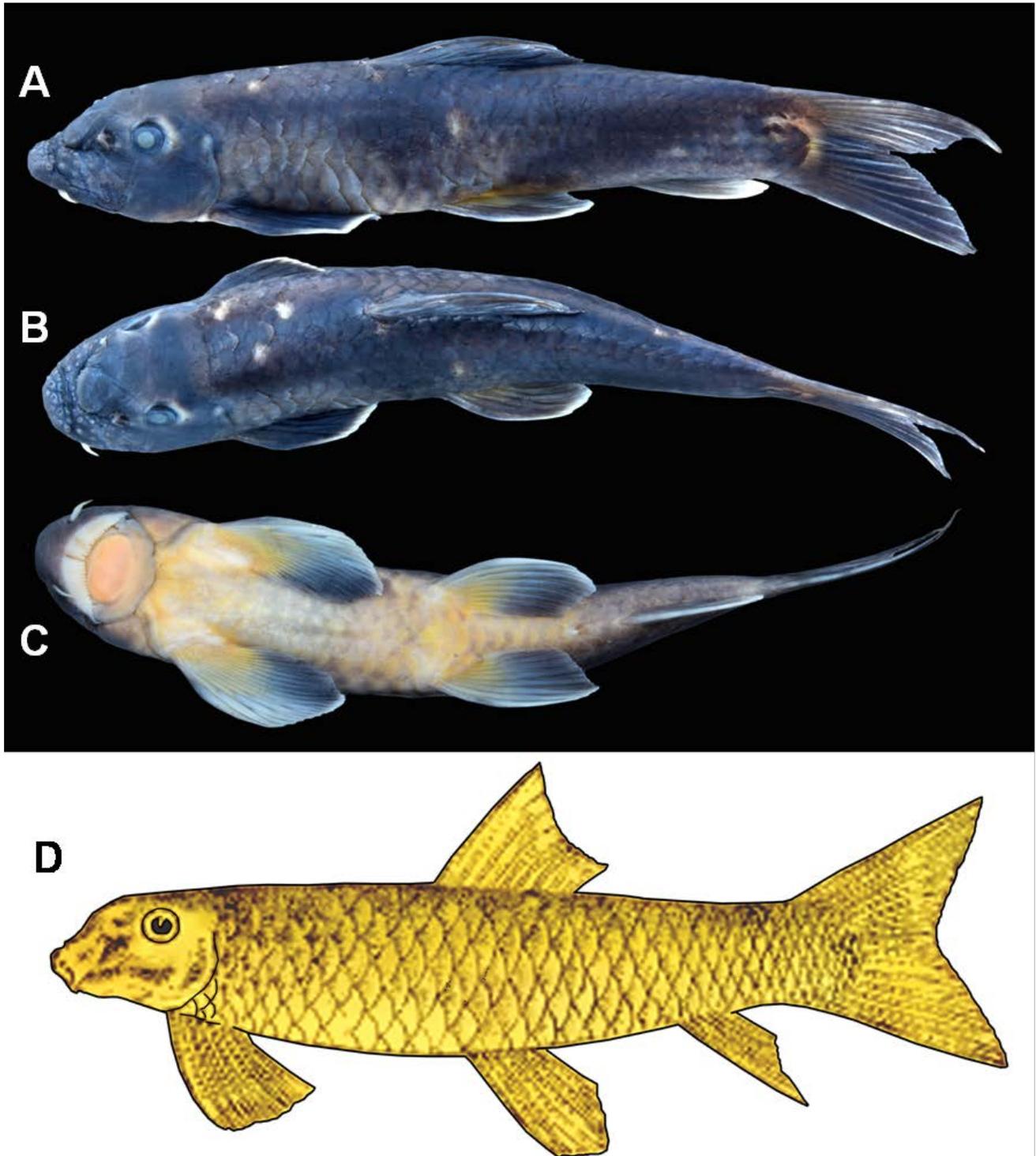


Figure 1. *Gara nasuta*, ADBU-FM/5088/1, neotype, 115.6 mm SL, male (A) lateral, (B) dorsal, (C) ventral, (D) Illustrated image (redrawn) from Plate 55 (Figure 2) of McClelland (1838).

Figure 2. *Garra nasuta* A. Illustrated image of dorsal head (redrawn) from Plate 55 (Figure 2a) of McClelland (1838); B. Dorsal head of neotype (ADBU-FM/5088/1, 115.6 mm SL, male); C. Ventral head of neotype (ADBU-FM/5088/1, 115.6 mm SL, male) showing oromandibular structure; D. Illustrated image of lateral head (redrawn) from Plate 55 (Figure 2b) of McClelland (1838); E. Lateral head of neotype (ADBU-FM/5088/1, 115.6 mm SL, male) showing oromandibular structure.

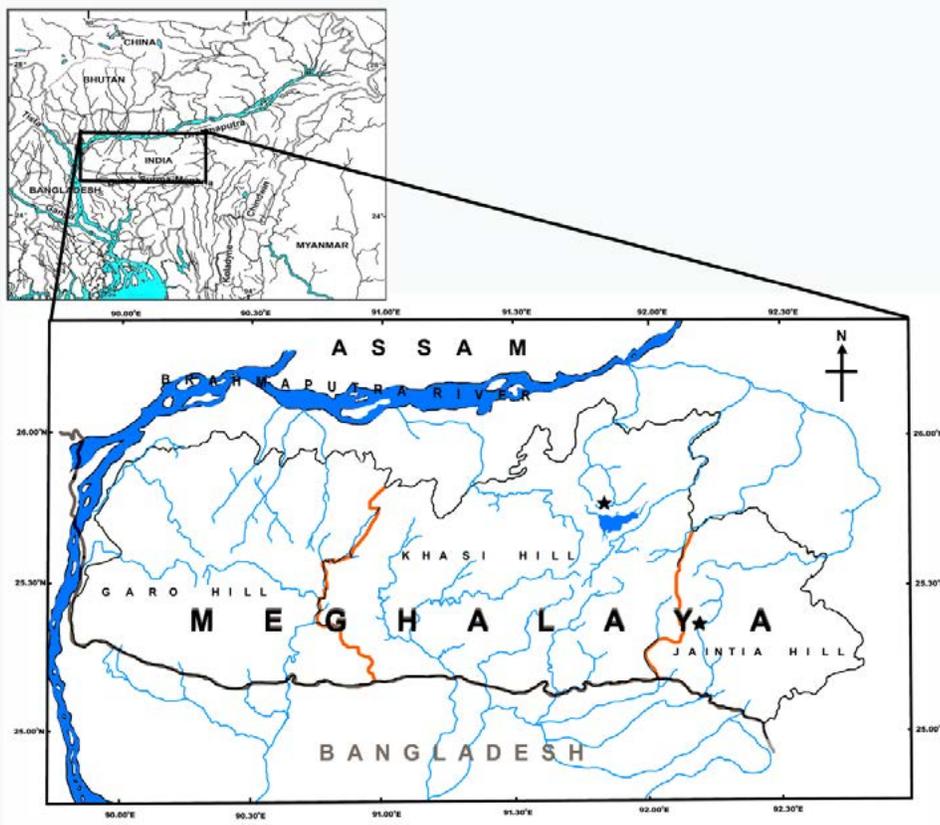
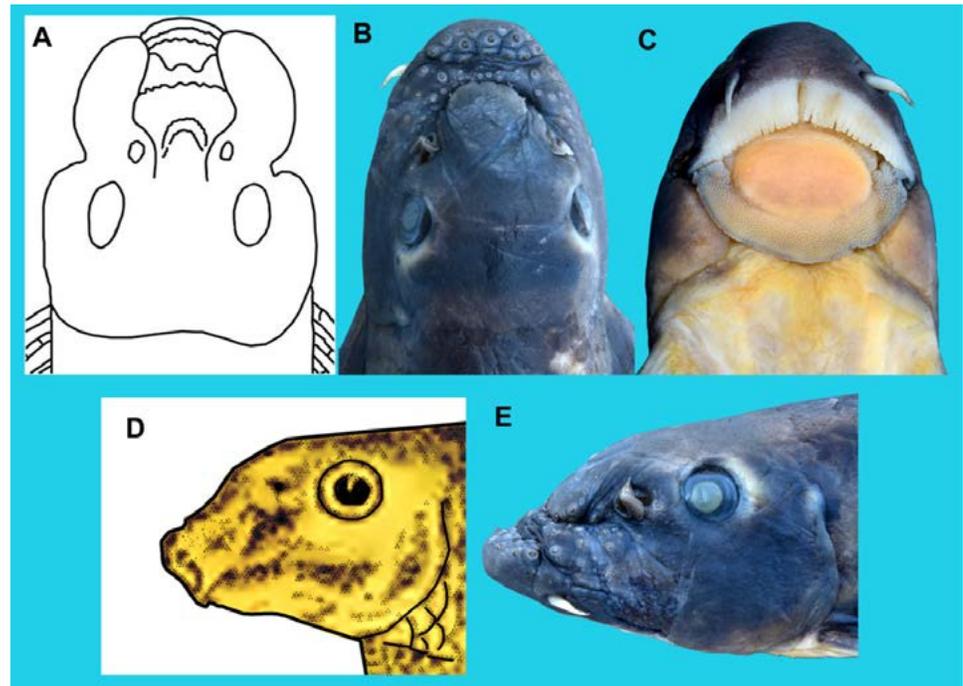


Figure 3. A map of Northeastern India and magnified drainage map of Meghalaya showing collection site of *Garra nasuta* (solid black stars) in Meghalaya.

Table 1. Biometric data of *Garra nasuta* (McClelland, 1838) (n = 18); range and mean ± SD includes Neotype.

	Neotype ZSI FF 9809	Syntypes (ADBU-FM/5088/2-18)		
		Range	Mean	S.D.
Standard length (mm)	115.6	51.1–119.1		
% in Standard length				
Body depth	20.6	17.7–23.2	20.8	1.5
Head length (dorsal)	25.8	23.2–28.9	26.3	1.5
Head length (lateral)	25.6	23.7–28.2	26.6	1.5
Head depth at nape	16.9	15.2–18.9	17.4	1.1
Head depth at eye	13.5	11.6–15.2	13.5	1.1
Caudal peduncle length	12.7	11.4–14.0	12.7	0.8
Caudal peduncle depth	14.0	11.2–14.2	13.1	0.7
Predorsal length	46.7	45.3– 51.1	48.5	1.8
Prepectoral length	24.4	14.1–27.0	23.7	2.8
Prepelvic length	53.6	50.5–56.6	53.2	1.7
Preanus length	72.4	68.2–75.7	71.3	1.9
Preanal length	79.9	75.2–82.4	78.8	1.9
Dorsal-fin length	26.0	24.2–31.6	27.2	1.6
Dorsal-fin base length	18.3	14.7–19.2	17.0	1.5
Pectoral-fin length	25.0	19.2–25.9	23.9	1.7
Pelvic-fin length	21.7	19.2–25.9	23.9	1.7
Anal-fin length	20.4	18.3–21.6	20.4	1.1
Anal-fin base length	8.1	6.8–9.1	8.0	0.7
Snout length	14.9	12.9–16.9	15.3	1.2
Eyes diameter	4.8	4.5–7.5	5.6	0.8
Interorbital distance	11.0	10.1–12.7	11.6	0.7
Callous-pad width	9.8	8.5–10.5	9.5	0.8
Callous-pad length	7.6	6.2–10.5	7.8	1.2
Mental-disc width	15.1	12.5–18.2	14.5	1.3
Mental-disc length	11.4	9.8–13.8	11.6	1.0
Mouth-gap width	16.2	13.6–19.2	16.6	1.4
Body width (anal origin)	10.0	6.9–13.7	9.4	1.6
Body width (dorsal origin)	16.7	15.1–19.0	17.1	1.5
Distance from anus to anal distance	6.4	5.1–8.6	6.8	1.4

	Neotype ZSI FF 9809	Syntypes (ADBU-FM/5088/2-18)		
		Range	Mean	S.D.
Pelvic-anal distance	25.8	24.0–29.0	26.4	1.6
Max. head width at cheek	17.7	15.6–21.4	18.6	1.6
Head width (at anterior nares)	15.2	13.8–19.2	16.6	1.6
% in Head length (dorsal)				
Snout length	57.7	52.5–62.1	58.3	2.7
Eye diameter	18.5	18.1–27.1	21.7	2.6
Interorbital distance	42.6	40.7–47.2	44.1	2.1
Mental-disc length	44.3	38.5–49.5	43.5	2.6
Mental-disc width	58.7	49.7–66.9	55.1	4.2
Callous-pad length	29.5	25.1–38.5	29.7	3.5
Callous-pad width	37.9	33.2–38.9	35.8	1.8
% in Head length (lateral)				
Snout length	58.1	51.9–60.5	57.6	2.7
Eye diameter	28.2	25.5–36.2	32.5	3.0
Interorbital distance	81.4	80.0–96.2	85.9	6.0
Mental disc length	15.8	13.8–19.1	16.2	1.3
Mental disc width	74.1	60.4–87.2	70.9	6.8
Callous pad length	30.7	24.0–43.5	33.1	6.1
Callous pad width	58.6	33.2–49.2	41.5	4.2
Scales counts				
Lateral line scales	30+3=33	30+3–31+3		
Transverse scales	4½/3½/4½	4½/3½/4½		
Circumpeduncle scales row	16	16		
Predorsal scales	10	10		
Anus to anal fin scales	4	3-4		
Anal-fin base scales	5	5		
Dorsal-fin base scales	6	6		
Meristic counts				
Dorsal-fin rays	ii,8½	ii,8½		
Pectoral-fins rays	i,14	i,14		
Pelvic-fin rays	i,8	i,8		
Anal-fin rays	ii,5½	ii,5½		
Caudal-fin rays	9+8	9+8		

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