E-ISSN: 2347-5129
P-ISSN: 2394-0506
(ICV-Poland) Impact Value: 5.62
(GIF) Impact Factor: 0.549
IJFAS 2018; 6(5): 107-115

www.fisheriesjournal.com
Received: 15-07-2018
Accepted: 16-08-2018

Wanglar Alphonsa Moyon
Department of Zoology, South East Manipur College, Komlathabi, Manipur, India

L Arunkumar
Department of Zoology, Mayai Lambi College, Yumnam Huidrom, Manipur, India

Correspondence
Wanglar Alphonsa Moyon
Department of Zoology, South East Manipur College, Komlathabi, Manipur, India

Garra moyonkhulleni, a new labeonine species (Cyprinidae: Labeoninae) from Manipur, Northeastern India

Wanglar Alphonsa Moyon and L Arunkumar

Abstract
Garra moyonkhulleni, a new labonine species, is described from the Chindwin drainage in Manipur, India. It is distinguished from its congeners by the combination of the following characters: a weakly developed bilobe antrose proboscis, 1 acanthoid tubercle on each lobe of proboscis, 8 to 11 tubercles on transverse lobe, 3 to 6 tiny to medium tubercles on sublachrymal groove, distinct transverse groove and depressed rostral surface, base of the 2nd, 3rd, 4th, 5th and 6th branched dorsal fin rays spotted with black; 5-6 narrow black stripes on lateral side of body and more distinct towards caudal fin.

Keywords: *garra*, new species; lokchao river; manipur

1. Introduction
Labioninae, the subfamily of Cyprinidae is one of the most diverse freshwater fish group with around 400 species and 40 genera distributed in Asia and Africa (Yang & Mayden, 2010 [51] and Yang *et al*., 2012 [52]). They are primarily adapted to high gradient and fast flowing water. The genus *Garra* is one of the most genera in Labeoninae, harbors about 200 recognised species (Yu *et al*., 2016 [53].and Roni & Vishwanath, 2018 [34]), has a geographical distribution from China, Borneo and Southern Asia, through the Middle East, Arabian Peninsula and East Africa to West Africa (Menon, 1964 [23]; Banister, 1987 [5]; Talwar & Jhingran, 1991 [41]; Jayaram, 1999 [14]; Zhang *et al*., 2000 [60]; Kottelat, 2000 [17]; Kullander & Fang, 2004 [19]; Zhou *et al*.,2005 [64]; Stiassy & Getahun, 2007[39]; Esmaeili *et al*., 2016 [9]; Mousavi-Sabet & Eagderi, 2016 [24]; Yu *et al*., 2016 [53]; Rahman *et al*., 2016 [31]; Rayamajhi & Arunchalam, 2017 [32]; and Roni & Vishwanath, 2018 [34]). The genus *Placocheilus* was erected by Wu; tentatively recognized as valid by Kottelat, 2013 [18]; and a junior synonym of *Garra* by Lothangkham *et al*., 2014 [22]. The genus *Garra* is characterized by an elongate, cylindrical body, a crenulated rostral fold, lower lip expanded posteriorly to form an ovoid or circular callus pad, sectorial disc with a crescentic anteromedian fold, curved rostral cap ventrally and connected with the lower lip at the corners of mouth (Lothangkham *et al*., 2014 [22]; Stianssy & Getahun, 2007 [39]., Zhou *et al*., 2005 [64]; and Zhang *et al*., 2002 [59]). They live in the swiftly-flowing waters of mountain streams and rivers, where they commonly adhere to the surface of rocks on the bottom by the oral sectorial disc or the highly modified lower lip and horizontally pectoral and ventral fins (Li *et al*., 2008 [21] and Zi-Ming *et al*., 2009 [65]). Menon (1964) [23] revised the genus *Garra* with description of 37 species of which 8 species were from Africa, divided 4 groups and 9 complexes. Zhang *et al.*, (2000) [60] reported that Labeonini exhibits a high degree of morphological modification in its oromandibular structures. Kullander & Fang (2004) [19]. Reported that lip and mouth structures were important diagnostic tools for phylogenetic analysis of this genus. Stiassy & Getahun (2007) [39].diagonosed the African species of *Garra* based on rostral fold, breast with many or scattered scales, asquamate, presence and absence of scales on post-pelvic region, and divided 3 types based on the mental disc viz., weakly, moderately and well developed. Nebeshwar & Vishwanath (2017) [27] stated that the members of the genus *Garra* were divided into 5 species group based on snout morphology. Sun *et al.*, (2018) [40]. Also divided it into 4 groups. The sectorial disc structures vary greatly, and used to distinguish the genera of *Labeoninae* (Zhang, 1998) [54]. Talwar & Jhingran (1991) [41], Jayaram (1999) [14], Kottelat (2013) [18] reported 19, 23 (24 in the key), 46 species of *Garra* from the inland fishes of India and adjacent countries,

the Indian region and the inland waters of Southeast Asia. Hora (1921) [13]. Firstly described two new species viz., *Garra abhoyai* and *G. naganensis* from Manipur and also recorded *G. nasuta* (McClelland). Roni & Vishwanath (2007) [33] reported 25 valid Species of *Garra* from the northeast India of which 15 species are from the Brahmaputra river drainage and 10 species from the Chindwin River drainage.

A collection of fishes from the Lokchao River near Moyon Khullen, a head water tributary of the Chindwin River drainage in Chandel District of Manipur, included an undescribed species of *Garra*, which is described herein as *Garra moyonkhulleni*.

2. Materials and Methods

All specimens were preserved in 10% buffered formalin and deposited in the Manipur University Central Museum with Accession no. 100/NH/MUM. General measurements were made point to point with dial-caliper and data recorded to nearest 0.1 mm. Count and measurements were carried out on left side of specimens whenever possible. Subunits of head are presented as percentages of head length (%HL). Head length itself and measurements of the body parts are given percentages of Standard length (%SL). Methods of counts, measurements and terminology follow Kottelat (2000) [17], Kullander and Fang (2004) [19] and Zhang (2005) [55].

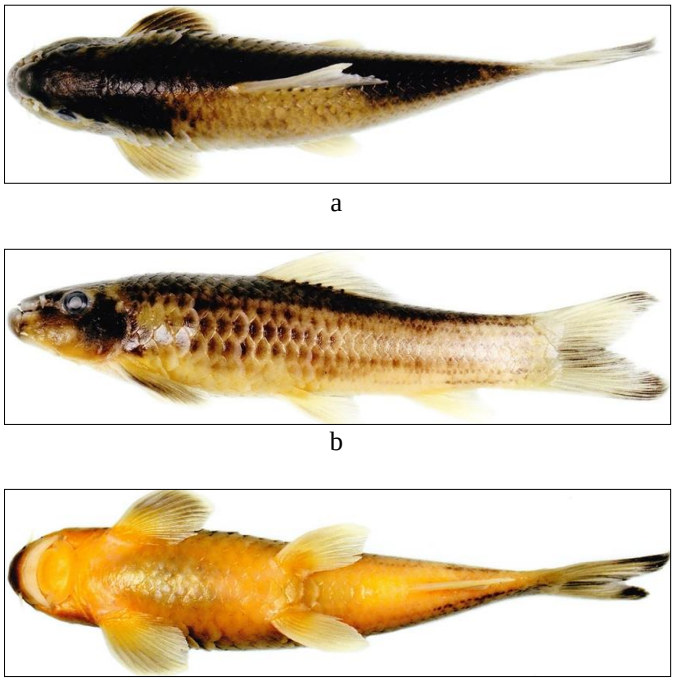

Fig 1: *Garra moyonkhulleni*. Sp. nov.

a. dorsal, b. lateral and c. ventral views, India: Manipur: Chandel District, Lokchao River, un upper tributary of Chindwin River (Chindwin River drainage)

3. *Garra moyonkhulleni* sp.nov. (Figure 1, 2, 3 and 4. Table.1)

3.1. Holotype: 100/NH/MUM, 99.00 mm SL; 120 mm TL; Manipur, Chandel District, Moyon Khullen, 10 km. from North-Eastern side of Lokchao bridge, Latitude 24º15′-24º30′N and Longitude 94º0′- 94º15′E, collected by W. A. Moyon and her party, 28th July, 2018.

3.2. Paratypes: 100/NH/MUM. 84.7- 93.5 mm SL; 109-117.2 mm TL; All other details same as holotype.

3.3. Diagnosis: *Garra moyonkhulleni* is distinguished from congeners in the Chindwin- Irrawaddy and Ganga-Brahmaputra river systems by the following combination of characters: weakly developed bilobed proboscis; 34 lateral-line scales; 5-6 faint blackish lateral stripes which is mainly distinct at caudal region, 14 circumpeduncular scales; width and length central calloues pad of adhesive disc 31.1-35.8% HL and 19.7-26.3% HL, depth of head at occiput 64.0-71.4% HL, snout length 44.0-49.1% HL, eye diameter 19.6-23.2% HL, eye diameter 19.6-23.2% HL, interorbital distance 39.6-43.8% HL, disc length 38.2- 43.9% HL, vent to anal distance 26.3- 32.5% pelvic to anal distance, chest and belly scaled, 2 unbranched dorsal and anal fin rays, base of the 2nd, 3rd, 4th, 5th and 6th branched dorsal fin rays distinctly spotted with black.

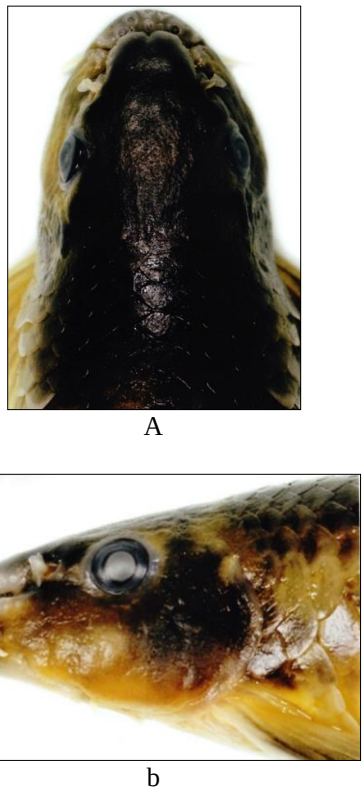

Fig 2: Head of *Garra moyonkhullensis* sp. nov.

a. Dorsal view showing bilobed proboscis, transverse lobe, depresses rostral surface and lateral surface. b. Lateral view showing proboscis with acanthoid tubercle, sublachrymal groove and rostral cap groove.

Fig 3: Oromandibular structure of *Garra moyonkhulleni*, sp. nov.

3.5. Description: Morphometric data is shown in Table 1. Body elongate, more or less cylindrical, compressed laterally in caudal peduncle region. Dorsal head profile rising gently, lightly convex, less contiguous with dorsal body profile to the origin of dorsal fin. Ventral profile more or less straight. Head slightly depressed with slightly convex interorbital distance, height less than length; lesser width than length; wider than height.

Snout obtusely pointed with distinct transverse lobe with 9-12 small to medium size tubercles, demarcated posteriorly by deep transverse groove, rostral depressed surface with a single ridge. Prominently blunt bilobe proboscis, with shallow depression in the middle, each lobe have single or unicupsid acanthoid tubercle, 2 to 3 tubercles on each sides, lateral surface with 2 to 4 tubercles. Depressed rostral surface flat. Sublachrymal groove deep, long, shallow and connected to rostral cap groove. Eye placed dorso-laterally in posterior half of head, closed to tip of snout. Snout pointed. Rostral cap well developed, entirely covering upper lip, connected with lower lip around corners of mouth. Ventral margin of rostral cap crenulated, densely papillated with many short tiny projections at margin. Antero-median fold of lower lip crescent, densely papillated. Antero- lateral lobe of lower lip moderately developed, slightly squarish and fully covered by papillae. Front surface of latero-posterior flap of lower lip entirely covered by numerous tiny buds or papillae. Barbels in two pairs; rostral barbel anterolaterally located; shorter than eye diameter, maxillary barbel at the corner of mouth and shorter than roatral barbel. Suctoral disc of lower lip well developed. Disc oval or elliptical shaped, shorter than wide, narrower than head width, through roots of maxillary barbel. Papillae on anteromedian fold are of same size, regularly arranged; groove between anteromedian fold and central callus pad narrow and deep; papillae of whole lateroposterior flap coarsely arranged; posteriormost margin of lateroposterior flap extending vertically to posterior margin of eye.

Fig 4: Distinct black spots at the base of branched dorsal- fin rays (i, e. 2nd, 3rd, 4th, 5th and 6th ray) of *Garra moyonkhulleni*, sp. nov.

Dorsal-fin with 2 simple and 7 branched rays; last simple ray shorter than head length; distal margin concave; origin close to tip of snout than to caudal-fin base, advancely anterior to pelvic-fin insertion; last unbranched dorsal-fin ray not ossified, last dorsal-fin ray not reaching anal-fin origin or last branched ray not extending vertically to anal-fin origin. Pectoral-fin with 1 simple and 14 branched rays, reaching midway to pelvic-fin origin; shorter than head length, inserted horizontally somewhat ascending upwardly at the ventral level of body. Pelvic-fin with 1 simple and 7 branched rays, inserted at vertical through base of third branched dorsal-fin ray; extending midway to anal-fin origin, surpassing vent, second branched ray longest, not reaching the base of anal-fin, origin closer to anal-fin origin than to pectoral-fin origin, and distal margin straight. Anal-fin with 2 unbranched and 5 branched rays; first branched ray longest, reaching base of caudal-fin; distal margin posteriorly light concave; origin mid to pelvic origin and base of caudal-fin. Anus closer to anal-fin origin than to pelvic-fin origin. Caudal-fin forked, 20 rays and lower lobe slightly longer upper lobe. Lateral line scales complete and 34. Predorsal scales 8. Lateral line transverse scale 4 ½ /3 ½. Scales regularly arranged. Chest and belly scaled. 7 to 8, 4 and 3 scales at the dorsal-fin base, anal-fin base and anus to anal-fin respectively. Axillary scales are distinct at the base of pelvic-fin.

3.6. Sexual dimorphism. No evident sexual dimorphism.

3.7. Colour: In formalin: head, dorsum and side dark brown or dark grey. Mouth, chest and abdomen yellowish white. Dorsal more greyish than anal, pelvic and pectoral-fins. Distal margins of above and below fork caudal-fin lobes faintly blackish. 5 to 6 narrow black stripes on lateral side of body and more distinct towards caudal-fin. Base of the 2nd, 3rd, 4th, 5th and 6th branched dorsal- fin rays with black spots. Median ray of caudal-fin horizontally blackish.

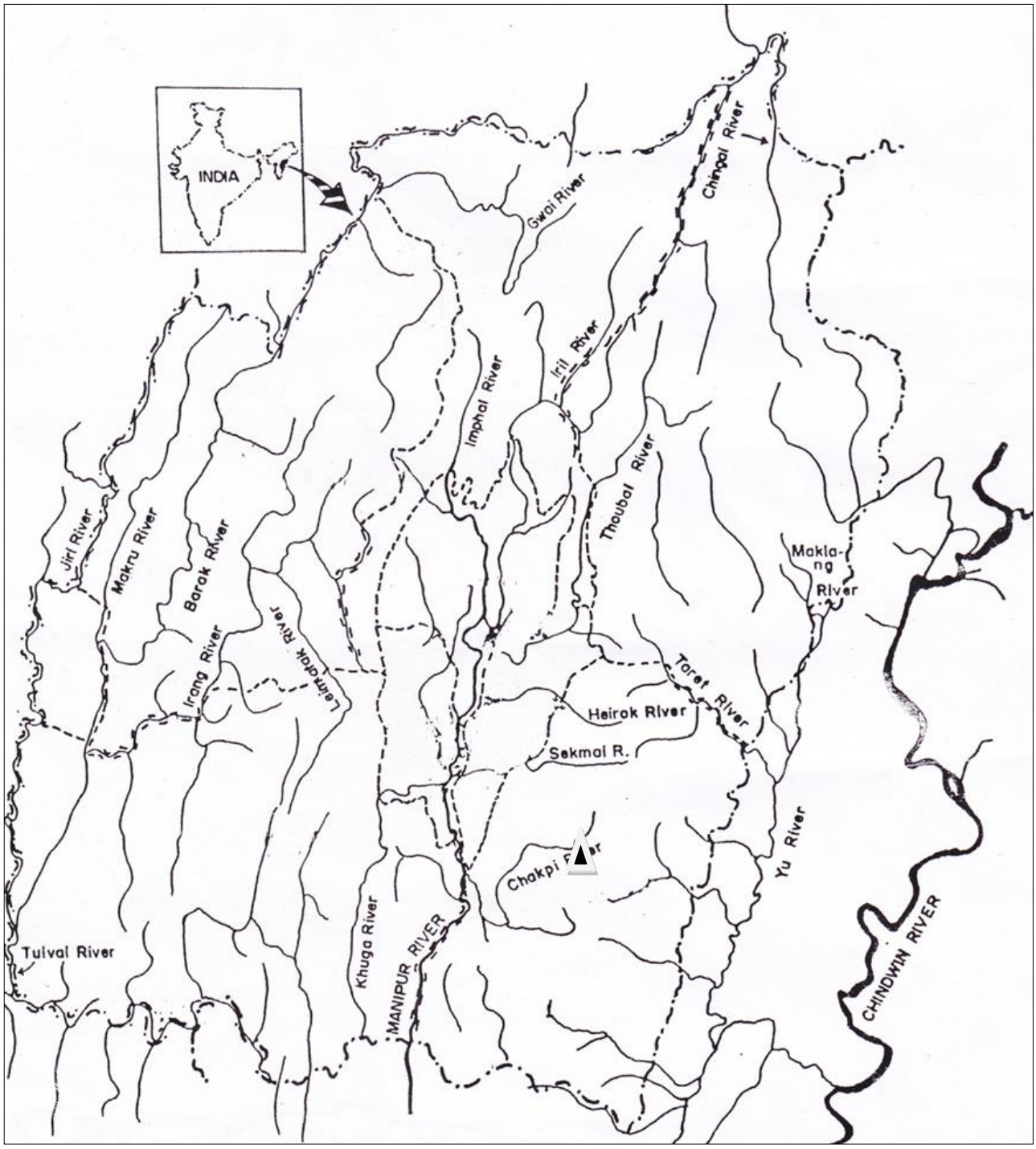

Fig 5: Map of Manipur showing the type locality of *Garra moyonkhulleni*, sp. nov.indicated by (▲) symbol**.**

3.8. Distribution: *Garra moyonhkulleni* is presently known from the Moyon Khullen village, Chindwin drainage, Chandel District of Manipur, northeastern India. (Figure 5). It inhabits medium to fast flowing clear water hill streams with a gravelly substrate covered in algae growth and cobble bottoms.

3.9. Etymology: The specific epithet *moyonkhulleni* is a noun in apposition in reference to the name of the village Moyon Khullen in Chandel District, Manipur, India, where the first specimens were collected.

4. Discussion

48 valid species of *Garra* are consisted in the different river drainage of northeast India as shown in Table 2. 13 species of this genus are recorded from the Chindwin basin of Manipur viz., *G. abhoya*i Hora, 1921 [13]; *G. chakpiensis* Nebeshwar & Vishwanath, 2015 [26]; *G. chindwinensis* Premananda *et al*., 2017 [30]; *G. compressa* Kosygin & Vishwanath, 1998 [16]; *G. cornigera* Shangningam & Vishwanath, 2015 [38]; *G. elongata* Vishwanath & Kosygin, 2000 [46]; *G. gravelyi* (Annandale, 1919) [1]; *G. litanensis* Vishwanath, 1993 [44]; *G. nambulica* Vishwanath & Joyshree, 2005 [45]; *G. namyaensis* Shangningam & Vishwanath, 2012 [37]; *G. paralissorhynchus* Vishwanath & Devi, 2005 [49]; *G. trilobata* Shangningam & Vishwanath, 2015 [38]; and *G. ukhrulensis* Nebeshwar & Vishwanath, 2015 [26] respectively. The new species, *Garra moyonkhulleni* is easily distinguished from *G. abhoyai*, *G. chakpiensis*, *G. compressa*, *G. nambulica*, *G. namyaensis*, *G. paralissorhynchus* and *G. ukhrulensis* in having the presence of proboscis vs. absence. It also differs from *G. elongata*, *G. gravelyi* & *G. litanensis* in having bilobed proboscis vs.

unilobed or incipient proboscis. *Garra trilobata* is the only species having trilobed proboscis. *Garra moyonkhulleni* sp. nov. is only closed to *G. chindwinensis* and *G. cornigera* due to the presence of bilobed proboscis and their distribution to the Chindwin basin. *Garra moyonkhulleni* sp. nov. differs from *G. chindwinensis* in having less branched dorsal-fin rays (7 vs. 8 ½), less predorsal scales (8 vs. 10), more dorsal-fin base scales (7-8 vs. 6), shorter predorsal (44.1- 48.1% SL vs. 49.6- 50.0), longer dorsal-fin base (16.3- 21.7% SL vs. 14.3- 15.9), longer dorsal-fin (26.8- 28.7% SL vs. 20.0- 22.6), longer anal-fin (18.4- 20.8% SL vs. 16.7- 17.3), shorter callus pad (4.5- 5.9% SL vs. 6.7- 6.8), narrower callus pad (7.1- 8.0% SL vs. 9.1- 10.4), shorter distance of anus to anal-fin origin (5.7- 7.8% SL vs. 9.6- 10.1), deeper head (64.0- 71.4% HL vs. 55- 58), shorter snout (44.0- 49.1% HL vs. 52- 53), narrower interorbital (39.6- 45.2% HL vs. 66), larger eye (19.6- 23.2% HL vs. 14- 19) and lesser caudal peduncle depth (77.2- 85.5% of its length vs. 89.2- 100.0) respectively.

Garra moyonkhulleni sp. nov differs from *G. cornigera* in having less unbranched and branched dorsal- fin rays (2 vs. 3 and 7 vs. 8 ½), less branched pectoral-fin rays (14 vs. 13), less unbranched and more branched anal- fin rays (2 vs. 3 and 6 vs. 5 ½), more lateral line scales (34 vs. 33), more transverse scales (4 ½ / 3 ½ vs. 3 ½ / 4), less predorsal scales (8 vs. 9- 11), shorter head (22.4 - 25.9% SL vs. 25.2- 32.1), shorter pectoral-fin (18.9 - 23.5% SL vs. 23.0 - 29.3), shorter pelvic-fin (15.4- 19.7% SL VS. 21.0 - 24.3), narrower disc (49.1- 52.6% HL vs. 55-60), deeper body (132.0 - 156.8% in head depth vs. 118- 127), slender depth of caudal peduncle (77.2- 85.4% in its length vs. 83 - 102), and 5 dark spots at the base of dorsal-fin base (present vs. absent) respectively.

Garra moyonkhulleni sp. nov. have five distinct black spots at the base of branched dorsal fin rays from the 2nd to 6th rays. Therefore, it is closed to *G. gravelyi* which have a series of indistinct black spots at the base of the branched dorsal- fin rays and a snout with a poorly developed proboscis. *Garra moyonkhulleni* sp. nov. differs from *G. gravelyi* in having less unbranched dorsal-fin rays (2 vs. 4), less unbranched anal-fin rays (2 vs. 3), more branched pectoral- fin rays (14 vs. 13), less branched pelvic- fin rays (7 vs. 8), shorter disc (68.3- 86.1% of its width vs. 77.5- 92.5), longer distance of anus to anal-fin origin (26.3- 32.5% of distance between pelvic to anal-fin origin vs. 20.8- 28.5), shorter caudal peduncle (55.6- 67.6% HL vs. 75.1- 86.9), shorter pectoral- fin (82.1- 94.7% HL vs. 97.0- 105.2), wider head (72.8- 81.9% HL vs. 67.1- 71.9), slender head (64.0- 74.7% HL vs. 68.0- 79.3), longer head (22.4- 25.9% SL vs. 19.7- 21.7), wider head (16.5- 19.7% SL vs. 12.5- 14.4), absence (vs. presence) of a black spot at the dorsal opening of the gill respectively [base on Menon (1964) [23], Zhang (2006) [57] and Yu *et al.* (2016) [53]]. The new species *Garra moyonkhulleni* differs from *G. gravelyi* in having fewer lateral line scales (34 vs. 36- 37), more circumpeduncular scales (14 vs. 12) and smaller disc (length 38.2- 43.9% HL vs. 48- 57 and width 49.0- 54.8% HL vs. 68- 74) respectively [base on Shangningam & Vishwanath (2015)]. *Garra moyonkhulleni* sp. nov. differs from *G. gravelyi* in having shorter snout (44.0- 49.1% HL vs. 46.1- 56.1), longer disc (38.2- 43.9% HL vs. 28.2- 39.5), and longer anus to anal (26.3- 32.5% of pelvic to anal distance vs. 20.8- 28.6) respectively [base on Vishwanath (1993) [44] and Vishwanath & Kosygin (2000) [46]]. Vishwanath (1993) [44] reported the occurrence of *Garra gravelyi* from the Chindwin basin of Manipur. Roni & Vishwanath (2018) [34] reported 4 specimens of *Garra* from the Lokchao stream at Moreh, Indo-Myanmar border, Chindwin River drainage and kept it into *G. gravelyi*. They show an incipient proboscis and a notched in the mid-posterior edge of the papillate ventral surface of rostral cap. The new species, *Garra moyonkhulleni* is distinct from it due to the presence of distinct transverse groove, bilobed proboscis and absence of a notched in the papillate ventral surface of rostral cap. According to Sun *et al.* (2008) [40], *Garra gravelyi, G. elongata, G. gotyla, G. litanensis, G. qiaojiensis* and *G. rotundinasus* belongs to a unilobed proboscis group; *Garra fuliginosa, G. salweenica* and *G. surgifrons* belongs to tri-lobed proboscis group. *Garra longchuanensis* is the junior synonym of *G. qiaojiensis* and *G. nujiangensis* belongs to the absence of the transverse lobe and proboscis. *Garra moyonkhulleni* sp. nov. differs from *G. bispinosa* in having less number of branched dorsal-fin rays (7 vs. 8), branched pelvic- fin rays (7 vs. 8), less predorsal scales (8 vs. 9- 11), less circumpeduncular scales (14 vs. 16), longer dorsal-fin (26.8- 28.7% SL vs. 24.8- 26.8), shorter pelvic-fin (15.4- 19.7% SL vs. 20.2- 22.3), smaller eye (19.6- 23.2% HL vs. 20.1- 28.0) and narrower interorbital (39.6- 45.2% HL vs. 41.0- 50.8) respectively. *Garra moyonkhulleni* sp. nov. differs fom *G. biloborostris* in having less unbranched and branched dorsal-fin rays (2 vs. 3 and 7 vs. 8 ½), more branched rays of pectoral-fin (14 vs. 12-13), less unbranched pelvic-fin rays (1 vs. 2), less unbranched anal-fin rays (2 vs. 3), more lateral line scales (34 vs. 33), less predorsal scales (8 vs.9- 10), longer distance between anus to anal-fin origin (26.3- 32.5% of distance between pelvic to anal- fin origin vs. 17.8- 26.2), narrower disc (49.0- 54.8% HL vs. 52.5- 60.5), shorter disc (38.2- 43.9% HL vs. 43.2- 57.2), deeper head at nape (14.7- 17.7% SL vs. 8.7- 12.1), wider body at anal-fin origin (10.1- 12.2% SL vs. 8.0- 10.6), wider body at dorsal-fin origin (15.7- 21.6% SL vs. 14.0- 17.5), longer dorsal-fin base (16.3- 21.7% SL vs. 9.9- 17.1), longer dorsal-fin (26.8- 28.7% SL vs. 22.3- 26.7), absence vs. presence of a black spot at upper angle of the gill opening and presence of 5 black spots at the base of dorsal-fin base vs. absence respectively. *Garra moyonkhulleni* sp. nov. also differs from *G. birostris* in having less unbranched and branched dorsal-fin rays (2 vs. 3 and 7 vs. 8 ½), less branched pelvic- fin rays (7 vs. 8), less unbranched anal-fin rays (2 vs. 3), less circumpeduncular scales (14 vs. 16), less predorsal scales (8 vs. 10-11), more dorsal- fin scales (7- 8 vs. 6- 7), shorter snout (44.0- 49.1% HL vs. 55- 60), narrower disc (49.0- 54.8% HL vs. 57- 66), narrower central callus pad (31.1- 35.8% HL vs. 32- 41), shorter snout (10.1- 12.7% SL vs. 13.1- 15.3), shorter pelvic to anal distance (21.1- 23.5% SL vs. 25.7- 30.0), shorter preanal (75.1- 77.1% SL vs. 77.2- 82.1), shorter pre-anus (67.3- 71.1% SL vs. 71.1- 73.0) and absence (vs. presence) of a black spot at upper angle of gill opening respectively.

Garra alticaputus, G. kalapangi, G. kimini and *G. minima* are incipient proboscis group. *Garraabhoyai, G. annaldeli, G. arupi, G. chaudhurii, G. chakpiensis, G. kempi, G. khawbungi, G. lissorhynchus, G. magnidiscus, G. manipurensis, G. matensis, G. mini, G. nambulica, G. namyaensis, G. nepalensis, G. paralissorhynchus, G. rupecula, G. tyao* and *G. ukhrulensis* are proboscis less group. *Garra arunachalensis, G. binduensis, G. clavirostris, G. elongata, G. gotyla, G.lamta, G. litanensis, G. parastenorhynchus, G. quadratirostris* and *G. substrictorostris* are belongs to unilobed proboscis group. *Garra biloborostris, G. birostris, G. chindwinensis, G. cornigera* are belongs to bilobed proboscis group. *Garra*

koladynensis, *G. nasuta*, *G. tamangi* and *G. trilobata* are three Paratypes (101, 102, 103/ NH/MUM) of *Garra moyonkhulleni* sp. nov.

Table 1. Morphometric data of holotype (100/NH/MUM) and

Table 1: Morphometric data of holotype (100/NH/MUM) and three paratypes (101, 102, 103/ NH/MUM) of *Garra moyonkhulleni* sp. nov.

Morphometric characters	Holotype	Paratypes Range	Mean	± SD
(1)	(2)	(3)	(4)	(5)
Standard length (SL)(mm)	99.0	84.7- 93.5		
In % of Standard length (SL)				
Body depth at dorsal- fin origin	20.8	20.4- 25.8	22.5	1.6
Head length	23.0	23.0- 25.9	23.5	1.6
Head depth at nape	15.6	14.7- 17.7	16.0	1.3
Head depth at eye	14.3	13.7- 14.8	14.2	1.3
Head width at nape	16.5	16.8- 19.7	17.8	1.4
Head width at nare	13.3	13.6- 14.0	13.6	1.2
Dorsal- fin length	28.7	26.8- 28.3	27.9	1.7
Dorsal- fin base length	20.3	16.3- 21.7	19.3	1.4
Body width at dorsal- fin length	18.5	15.7- 21.6	19.0	1.4
Body width at anal- fin length	10.1	10.8- 12.2	11.2	1.1
Pectoral- fin length	18.9	21.1- 23.5	21.1	1.5
Pelvic- fin length	15.4	18.7- 19.7	18.1	1.4
Anal- fin length	18.4	18.6- 20.8	19.1	1.4
Anal- fin base length	8.5	7.7- 8.0	8	0.9
Caudal peduncle length	17.1	14.4- 17.7	16.0	1.3
Caudal peduncle depth	13.2	11.5- 12.4	12.0	1.1
Predorsal length	45.4	44.1- 48.1	45.5	2.2
Prepectoral length	21.4	20.7- 23.5	21.6	1.5
Prepelvic length	51.0	51.6- 54.5	52.8	2.4
Preanal length	75.1	75.2- 77.1	75.8	2.9
Preanus (prevent) length	67.3	68.7- 71.1	69.3	2.7
Pelvic to anal distance	21.1	21.9- 23.5	23	1.5
Snout length	10.3	10.1- 12.7	10.9	1.1
Interorbital distance	10.1	9.9- 10.2	10.0	1.0
Eye diameter	5.0	4.6- 5.0	4.8	0.7
Anus to anal distance	7.8	5.7- 6.4	6.4	0.8
Disc length	8.6	9.8- 9.9	9.5	1.0
Disc width	12.6	9.8- 12.7	11.6	1.1
Callus pad length	4.5	5.2- 5.9	5.2	0.7
Callus pad width	7.3	7.1- 8.0	7.6	0.9
In % of Head length (HL)				
Head depth at nape	68.0	64.0- 71.4	67.8	2.7
Head depth at eye	62.2	59.5- 63.5	60.5	2.5
Snout length	44.7	44.0- 49.1	46.5	2.2
Eye diameter	23.3	19.6- 21.0	20.9	1.5
Interorbital width	43.8	39.6- 45.2	42.9	2.1
Disc length	40.7	38.2- 43.9	41.3	2.1
Disc width	54.8	49.0- 52.5	51.3	2.3
Callus pad length	19.7	20.5- 26.3	22.2	1.5
Callus pad width	32.0	31.1- 35.8	32.5	1.8
In % of Head depth				
Head width at nape	107.1	111.6- 114.6	111.8	3.5
Body depth at dorsal- fin length	132.9	132.0- 156.8	139.9	3.9
In % of caudal depth				
Caudal peduncle length	129.3	117.1- 125.9	124.1	3.7
In % of caudal peduncle length				
Caudal peduncle depth	77.2	79.3- 85.4	80.5	2.9
In % Pelvic to anal distance				
Anus to anal distance	32.5	26.3- 27.4	28.2	1.7

Table 2: Distribution pattern of *Garra* species in the different drainages of northeastern India. A= Barak, B= Brahmaputra, C= Chindwin, D= Karnaphuli, E= Koladyne, F= Kaligandaki and G= Tista. + = present

S. No.	Name	A	B	C	D	E	F	G
1	*G. abhoyai* Hora, 1921			+				
2	*G. alticaputus* Arunachalam *et al*. 2013		+					
3	*G. annandeli* Hora, 1921		+					
4	*G. arunachalensis* Nabeshwar & Vishwanath, 2013		+					
5	*G. arupi* Nebeshwar *et al*. 2009		+					
6	*G. biloborostris* Roni & Vishwanath, 2017		+					

7	*G. bimaculacauda* Thoni *et al.* 2016		+					
8	*G. binduensis* Das *et al.* 2016		+					
9	*G. birostris* Nebeshwar & Vishwanath, 2013		+					
10	*G. chaudhurii* Hora, 1921							+
11	*G. chakpiensis* Nebeshwar & Vishwanath, 2015			+				
12	*G. chindwinensis* Premananda *et al.* 2017			+				
13	*G. clavirostris* Roni *et al.* 2017		+					
14	*G. compressa* Kosygin & Vishwanath, 1998			+				
15	*G. cornigera* Shangningam & Vishwanath, 2015			+				
16	*G. dampaensis* Lalronunga *et al.* 2013				+			
17	*G. elongata* Vishwanath & Kosygin, 2000			+				
18	*G. gravelyi* (Annadale, 1919)			+				
19	*G. gotyla* (Gray, 1830)							+
20	*G. kalapangi* Nebeshwar *et al.* 2011		+					
21	*G. kempi* Hora, 1921		+					
22	*G. khawbungi* Arunachalam *et al.* 2014					+		
23	*G. kimini* Arunachalam *et al.* 2013		+					
24	*G. koladynensis* Nebeshwar & Vishwanath, 2017					+		
25	*G. lamta* (Hamilton, 1822)		+					
26	*G. lissorhynchus* (McClelland & Griffith, 1842)		+					
27	*G. litanensis* Vishwanath, 1993			+				
28	*G. magnidiscus* Tamang, 2013		+					
29	*G. manipurensis* Vishwanath & Sarojnalini, 1988	+						
30	*G. mcclelandi* (Jerdon, 1849)		+					
31	*G. mini* Rahman *et al.* 2016				+			
32	*G. minima* Arunachalam *et al.* 2013		+					
33	*G. naganensis* Hora, 1921		+					
34	*G. nambulica* Vishwanath & Joyshree, 2005			+				
35	G. *namyaensis* Shangningam & Vishwanath, 2012			+				
36	*G. nasuta* (McClelland, 1838)		+					
37	*G. nepalensis* Rayamajhi & Arunachalam, 2017						+	
38	*G. nigricauda* Arunachalam *et al.* 2013		+					
39	*G. paralissorhynchus* Vishwanath & Devi, 2005			+				
40	*G. parastenorhynchus* Thoni *et al.* 2016		+					
41	*G. quadratirostris* Nebeshwar & Vishwanath, 2013		+					
42	*G. rupecula* (McClelland, 1839)		+					
43	*G. substrictorostris* Roni & Vishwanath, 2018	+						
44	*G. tamangi* Gurumayum & Kosygin, 2016		+					
45	*G. trilobata* Shangningam & Vishwanath, 2015			+				
46	*G. tyao* Arunachalam *et al.* 2014					+		
47	*G. ukhrulensis* Nebeshwar & Vishwanath, 2015			+				
48	*G. matensis* Nebeshwar & Vishwanath, 2017					+		
49	*G. moyonkhulleni* sp. nov.			+				

5. Comparative Material

Data from the following references were used as sources of *Garra* in the northeastern India. Published information used for comparison are:

1. *Garra biloborostris*: data from Roni & Vishwanath (2017)
2. *Garra birostris;* data from Nebeshwar & Vishwanath (2013)
3. *Garra bispinosa:* data from Zhang (2005) and Sun *et al.* (2018)
4. *Garra chindwinensis*: data from Premananda *et al.* (2017)
5. *Garra cornigera:* data from Shangningam & Vishwanath (2015)
6. *Garra gravelyi*: data from Menon (1964), Talwar & Jhingran (1991), Vishwanath (1993), Jayaram (1999), Zhang (2006), Shangnigam & Vishwanath (2015), and Roni & Vishwanath (2018).

6. Acknowledgement

The authors are grateful to Dr. B. Shangningam, Zoological Survey of India, Freshwater Fish Section, Kolkata, Dr. K. Nebeshwar Singh, Manipur University and Dr. Premananda Singh, Presidency College, Motbung for their help in availing the needful literatures. Our appreciation to the curator of Natural History Section, Manipur University Museum for providing Museum Accession Number.

7. References

1. Annandale N. The fauna of certain small streams in Bombay Presidency. Records of the Indian Museum. 1919; 16:125-138.
2. Arunachalam M, Nand agopal S, Mayden RL. Morphological diagnosis of *Garra* (Cypriniformes: Cyprinidae) from northeastern India with four new species description from Brahmaputra river. Journal of Fisheries and Aquaculture. 2013; 4 (3):121-138.
3. Arunachalam M, Nanda gopal S, Mayden RL. Two new species of *Garra* from Mizoram, India (Cypriniformes: Cyprinidae) and a general comparative analysis of Indian *Garra*. Species, the International Daily Journal for Species. 2014; 10(24):58-78.
4. Arunachalam M, Raja M, Nanda gopal S, Mayden RL. *Garra palaruvica*, a new cyprinid fish (Cypriniformes: Cyprinidae) from Kerela, Western Ghats, Peninsular India.
5. Banister KE. Two new species of *Garra* (Teleostei:

Cyprinidae) from the Arabian Peninsula. Bulletin of the British Museum (Natural History) Zoology. 1987; 52 (1):59-70.
6. Chen Z, Zhao S, Yang J. A new species of the genus *Garra* from Nujiang River Basin, Yunnan China (Teleostei: Cyprinidae). Zoological Research. 2009; 30 (4):434-444.
7. Das U, Kosygin L, Panigraha. *Garra binduensia*, a new species of cyprinid fish (Teleostei: Cypriniformes) from North Bengal, India. Bioglobia. 2016; 3(1):52-58.
8. Das BK, Saikia HC. Ichthyofauna of the genus: *Garra* Hamilton- Buchanan 1922, recorded in River Siang of Arunachal Pradesh, India. International Journal of Fisheries and Aquatic Studies. 2015; 3(1):423-426.
9. Esmaeili HR, Sayyadzadeh G, Coad BW, Eagderi S. Review of the genus *Garra* Hamilton, 1822 in Iran with description of a new species: a morpho- molecular approach (Teleostei: Cyprinidae). Iranian Journal of Ichthyology. 2016; 3(2): 82-121.
10. Gurumayum SD, Kosygin L. *Garra tamangi*, a new species of cyprinid fish (Teleostei: Cypriniformes) from Arunachal Pradesh, northeastern India. Species. 2016; 17 (55):84-93.
11. Gurumayum SD, Kosygin L, Tamang L. Ichthyofaunal diversity of Arunachal Pradesh, India: A part of Himalaya biodiversity hotspot. International Journal of Fisheries and Aquatic studies. 2016; 4(2):337-346.
12. Hamilton F. An account of the fishes found in the river Ganges and its branches. Edinburgh & London. 1822, + 405 Pp. pls. 39.
13. Hora, SL. Indian cyprinoid fishes belonging to the genus *Garra*, with notes on related species from other countries. Records of Indian Museum. 1921; 22:633-687.
14. Jayaram, KC. The Freshwater fishes of the Indian region. Narendra Publishing House, Delhi. 1999; 55: 18.
15. Kar D, Sen N. Systematic list and distribution of Fishes in Mizoram, Tripura and Barak drainage of northeastern India. Zoo's Print Journal. 2007; 22 (3):2599-2607.
16. Kosygin L, Vishwanath WA new cyprinid fish *Garra compressa* from Manipur, India. Journal of Freshwater Biology. 1998; 10(1-2)45-58.
17. Kottelat M. Diagnosis of a new genus and 64 new species of Fishes from Laos (Teleostei: Cyprinidae, Balitoridae, Bagridae, Syngnathidae, Chaudhuriidae and Tetraodontidae). Journal of South Asian Natural History. 2000; 5:37-82.
18. Kottelat M. The Fishes of the inland waters of Southeast Asia: A catalogue and Core Binliography of the Fishes known to occur in Freshwaters, Mangroves and Estuaries. The Raffles Bulletin of Zoology, Supplement. 2013; 27: 1-663.
19. Kullander SO, Fang F. Seven new species of *Garra* (Cyprinidae: Cyprininae) from the Rakhine Yoma, Southern Myanmar. *Ichthyological Exploration of Freshwaters*. 2004; 15:257-278.
20. Lalronunga S, Lalnuntluanga, Lalramliana. *Garra dampaensis*, a new ray- finned Fish species (Cypriniformes: Cyprinidae) from Mizoram, northeastern India. Journal of threatened Taxa. 2013; 5(9):4368-4377.
21. Li FL, Zhou W, Fu Q. Garra findolabium, a new species of cyprinid fish (Teleostei: Cypriniformes) from the red River drainage in Yunnan China. *Zootaxa.* 2008; 1743: 62-68.
22. Lothongknam A, Arbsuwan S, Musikasinhorn P. *Garra waensis*, a new cyprinid fish (Actinopterygei Cypriniformes) from the Nam River basin of the Chao Phraya River System, Northern Thailand. *Zootaxa*, 2014; 3790(4):543-554.
23. Menon, AGK. Monograph of the cyprinid fishes of the *Garra* Hamilton. Memoirs of the Indian Museum. 1964; 14:173-260.
24. Mousavi- Sabet H, Eagderi S. *Garra lorestanensis*, a new cave fish from the Tigris River drainage with remarks on the Subterranean fishes in Iran (Teleoatei: Cyprinidae). *Fish Taxa.* 2016; 1(1):45-54.
25. Nebeshwar K, Vishwanath W. Three new species of *Garra* (Pisces: Cyprinidae) from northeastern India and redescription of *G. gotyla.* Ichthyological Exploration of Freshwatesrs. 2013; 24(2):97-120.
26. Nebeshwar K, Vishwanath W. Two new species of *Garra* (Pisces: Cyprinidae) from the Chiver River basin in Manipur, India, with a note on some nominal *Garra* species of the Himalayan foothills. Ichthyological Exploration Freshwaters. 2015; 25:305-321.
27. Nebeshwar K, Vishwanath W. On the snout and oromandibular morphology of genus *Garra*, description of two new species from the Koladyne River basin in Mizoram, India, and redescription of *G. manipurensis* (Teleostei: Cyprinidae). Ichthyological Exploration of Freshwaters. 2017; 28(1):17-53.
28. Nebeshwar K, Vishwanath W, Das DN. *Garra arupi*, a new cyprinid fish species (Cypriniformes: Cyprinidae) from upper Brahmaputra basin Arunachal Pradesh, India. Journal of Threatened Taxa. 2009; 1(4):197-201.
29. Nebeshwar K, Bagra K, Das DN. *Garra kalapangi*, a new cyprinid fish (Pisces: Teleostei) from upper Brahmaputra basin in Arunachal Pradesh, India. Journal of the Threatened Taxa. 2012; 4(2):2353-2362.
30. Premanada N, Kosygin L, Saidullah. Garra chindwinensis, a nea species of cyprinid fish (Teleostei: Cypriniformes) from Manipur, Northeastern India. Records of the Zoological Survey of India. 2017; 117(3): 191-197.
31. Rahman Md M, Mollah AR, Noren M, Kullander SO. *Garra mini*, a new small species of rheophilic cyprinid fish (Teleostei: Cyprinidae) from Southern hilly areas of Bangladesh. Ichthyological Exploration of Freshwaters. 2016; 27(2):173-181.
32. Rayamajhi A, Arunachalam M. A new species of *Garra* (Cyprinidae: Cypriniformes) from Western Nepal. International Journal of Fisheries and Aquatic studies. 2017; 5(5):402-407.
33. Roni N, Vishwanath W. *Garra biloborostris*, a new labeonine species from north- eastern India (Teleostei: Cyprinidae). *Vertebrate Zoology.* 2017; 67(2):133-137.
34. Roni N, Vishwanath W. A new species of the genus *Garra* (Teleostei: Cyprinidae) from the Barak River drainage, Manipur, India. *Zootaxa*. 2018; 4374(2):263-272.
35. Roni N, Saborjit T, Vishwanath W. *Garra clavirostris*, a new cyprinid fish (Teleostei: Cyprinidae: Labeoninae) from the Brahmaputra drainage, India. *Zootaxa*. 2017; 4244(3):367-376.
36. Shangningam B, Vishwanath W. A new species of the genus *Garra* Hamilton, 1822 from the Chindwin basin of Manipur, India (Teleostei: Cyprinidae: Labeoninae). International Scholarly Research Network Zoology. 2012, 1-6.

37. Shangningam B, Vishwanath W. Validation of *Garra namyaensis* Shangningam & Vishwanath, (Teleostei: Cyprinidae: Labeoninae). Ichthyological Exploration of Freshwaters. 2012; 23(1):10.
38. Shangningam B, Vishwanath W. Two new species of *Garra* from the Chindwin basin, India (Teleostei: Cyprinidae). Ichthyological Exploration of Freshwaters. 2015; 26(3):263-272.
39. Stiassny MLJ, Getahun A. An overview of the labeonine relationships and a phylogenetic placement of the Afro-Asian genus *Garra* Hamilton, 1822 (Teleostei: Cyprinidae), with the description of five new species of *Garra* from Ethiopia, and a key to all African species. Zoological Journal of the Linnean Society. 2007; 150:41-83.
40. Sun C, Li X, Zhou W, Li F. A review of *Garra* (Teleostei: Cypriniformes) from two rivers in West Yunnan, China with description of a new species. *Zootaxa*. 2018; 4378(1):49-70.
41. Talwar PK, Jhingran AG. Inland Fishes of India and Adjacent Countries- Vol.1. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi. 1991; 2:433.
42. Tamang L. *Garra magnidiscus*, a new species of cyprinid fish (Teleostei: Cypriniformes) from Arunachal Pradesh, northeastern, India. *Ichthyological Exploration of Freshwaters*. 2013; 24(1):31-40.
43. Thoni RJ, Gurung DB, Mayden RL. A review of the genus *Garra* Hamilton, 1822 of Bhutan, including the descriptions of two new species and three additional records (Cypriniformes: Cyprinidae). *Zootaxa.* 2016; 4169(1):115-132.
44. Vishwanath W. On a collection of the fishes of the genus *Garra* Hamilton from Manipur, India, with description of a new species. Journal of Freshwater Biology. 1993; 5 (1)59-68.
45. Vishwanath W, Joyshree H. A new species of the genus *Garra* Hamilton- Buchanan (Teleostei: Cyprinidae) from Manipur, India. Zoo's Print Journal. 2005; 20(4):1832-1834.
46. Vishwanath W, Kosygin. *Garra elongata*, a new species of the Subfamily Garrinae from Manipur, India (Cyprinidae: Cypriniformes). Journal of the Bombay Natural Society. 2000; 97(3)408-414.
47. Vishwanath W, Linthoingambi I. Redescription of *Garra abhoyai* Hora (Teleostei: Cyprinidae: Garrinae) with a note on *Garra rupecula* from Manipur, India. Journal of the Bombay Natural Society. 2008; 105(1):101-104.
48. Vishwanath W, Saronalini Ch. A new cyprinid fish *Garra manipurensis* from Manipur, India. Japanese Journal of Ichthyology. 1988; 35(2):124-126.
49. Vishwanath W, Devi K Shanta. A new fish of the genus *Garra* Hamilton- Buchanan (Cypriniformes: Cyprinidae) from Manipur, India. Journal of the Bombay Natural Society. 2005; 102(1):86-88.
50. Vishwanath W, Singh HT, Shashikumar O, Gonchandra M. First record of freshwater fishes, *Garra gravelyi* and *G. kempi* in Manipur. Indian Journal of Fisheries. 1987; 34(3):362-364.
51. Yang L, Mayden RL. Phylogenetic relationships, subdivision, and biogeography of the cyprinid tribe Labeonini (sensu Rainboth, 1991) (Teleostei: Cypriniformes), with comments on the implications of lips and associated structures in the labeonin classification. Molecular Phylogenetics and Evolution. 2010; 54:254-265.
52. Yang L, Arunachalam M, Sado T, Levin BA, Golubtsov AS, Freyhof J *et al*. Molecular Phylogeny of the cyprinid tribe Labeonini (Teleostei: Cypriniformes). Molecular Phylogenetics and Evolution. 2012; 65:362-379.
53. Yu Q, Wang X, Xiong H, He S. *Garra longchuanensis*, a new cyprinid (Teleostei: Cypriniformes) from Southern China. *Zootaxa*. 2016; 4126(2):295-300.
54. Zhang E. Studies on the morphology of lips and associated structures among the Labeonine Fishes with a prebuccal Cavity (Cyprinidae) in China. Zoological Research. 1998; 3:230-236.
55. Zhang E. Phylogenetic relationship of Labeonine cyprinids of the disc- bearing group (Pisces: Teleostei). Zoological Studies. 2005; 44(1):130-143.
56. Zhang E. *Garra bispinosa*, a new species of the cyprinid fish (Teleostei: Cypriniformes) from Yunnan, Southwest China. *The Raffles Bulletin of Zoology*, Supplement. 2005; 13:9-15.
57. Zhang E. *Garra rotundinasus*, a new cyprinid species from the upper Irrawady river basin in Yunnan, China (Pisces: Teleostei). *The Raffles Bulletin of Zoology*, Supplement. 2006; 54:447-453.
58. Zhang E, Chen YY. *Garra tengchongensis*, a new cyprinid species of the upper Irrawady river basin in Yunnan, China (Pisces: Teleostei). *The Raffles Bulletin of Zoology*. 2002; 50:459-464.
59. Zhang E, He SP, Chen YY. Revision of the cyprinid genus *Placocheilus* Wu, 1977 in China, with description of a new species from Yunnan. *Hydrobiologia*. 2002; 487:207-217.
60. Zhang E, Yue PQ, Chen JX. Labeoninae. In: Yue PQ (Eds.), Fauna Sinica Osteichthyes: Cypriniformes III. Science Press, Beijing, 2000, Pp171- 272.
61. Zhang E, Zhou W. *Sinigara naponense*, a new genus and species of *Labeonin* Fish (Teleostei: Cyprinidae) from Guangxi Province, South China. *Zootaxa*. 2012; 3586:17-25.
62. Zheng L, Yang J, Chen X. Phylogeny of the Labeoninae (Teleostei: Cypriniformes) based on nuclear DNA sequences and implications on character evolution and bibliography. Current Zoology. 2012; 58(6):837-850.
63. Zheng L-P, Yang X-Y, Chen X-Y. *Garra incisorbis*, a new species of labeonine from Pearl River basin in Guangxi, China (Teleostei: Cyprinidae). Ichthyological Exploration of Freshwaters. 2016; 26(4):299-303.
64. Zhou W, Pan XF, Kottelat M. Species of *Garra* and *Discogobio* (Teleostei: Cyprinidae) in Yuanjiang (upper Red River) drainage of Yunnan Province, China with description of a new species. Zoological Studies. 2005; 44(4):445-453.
65. Zi-ming Ch, Sheng Z, Jun-xing Y. A new species of the genus *Garra* from Nujiang River Basin, Yunnan, China (Teleostei: Cypriniformes). Zoological Research. 2009; 30(4):438-444.