

# A New Species of the Genus *Garra* from Nujiang River Basin, Yunnan, China (Teleostei: Cyprinidae)

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**Abstract:** A new species of the subfamily Labeoninae, *Garra nujiangensis* Chen and Yang, sp. nov. is recognized from a secondary branch of Nujiang River (upper Salween) in Zhenkang county, Yunnan province, China. It can be distinguished from other beardless *Garra* species by the following combination of characters: 12 – 14 circumpeduncle scales; 48 – 50 lateral-line scales; a pair of rudimentary rostral barbels present in little individuals; 8 – 9 branched dorsal-fin rays; 5 – 6 scales between dorsal-fin origin and lateral line and 3 – 4 scales between pelvic-fin origin and lateral line; caudal peduncle relatively stouter; length between snout tip to posterior margin of eye longer than body depth at anal fin origin; head length longer than body depth at dorsal fin origin; prepelvic length 50.0% – 53.7% of standard length; pre-anus length 58.9% – 63.9% of standard length; body width 16.7% – 19.6% of standard length; body depth at dorsal fin 19.2% – 22.6% of standard length. The present study also verified that the presence of tiny barbells is a juvenile character in some beardless *Garra* species, such as *G. nujiangensis* and *G. alticorpora*.

**Key words:** *Garra*; Cyprinid; New species; Yunnan

## 中国怒江流域墨头鱼属鱼类一新种（鲤形目：鲤科）

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**摘要:** 2003年4月, 于怒江二级支流镇康县境内的大叉河中采获一批墨头鱼属(*Garra*)鱼类标本, 经鉴定为一新种, 命名为怒江墨头鱼(*G. nujiangensis* Chen and Yang, sp. nov.)。该新种主要鉴别特征: 围尾柄鳞12~14; 侧线鳞48~50; 在小个体中有一对微小的吻须; 背鳍分支鳍条8~9; 侧线上鳞5~6, 侧线下鳞3~4; 体高小于头长; 臀鳍起点处的小于眼后至吻端的距离; 腹鳍前长为体长的50.0%~53.7%; 肛门前长为体长的58.9%~63.9%; 体宽为体长的16.7%~19.6%; 体高为体长的19.2%~22.6%。本研究证实, 在缺须的墨头鱼属的一些物种中, 如高体墨头鱼(*G. alticorpora*)和怒江墨头鱼(*G. nujiangensis*), 其幼体中往往具有一对很小的吻须。

**关键词:** 墨头鱼属; 鲤科; 新种; 中国

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Species of cyprinid genus *Garra* (Hamilton, 1822) are elongate, small- to medium-sized, bottom-dwelling fishes usually found in fast flowing waters, where they adhere to the surface of the rocks using the highly modified lower lip which act as a sucker. The genus occurs widely from south China, Borneo and south Asia through Burma, India, the Middle East, Arabian

Peninsula and East Africa to West Africa (Menon, 1964). Hora (1921) first revised the genus and adopted *Garra* as the generic name. The latest revision (Menon, 1964) recognized 38 species. Getahun (1999) reviewed 17 African *Garra* species. More than 10 species from Asia were described or revalidated in recent papers (Kottelat, 1998; Kottelat, 2000; Kottelat, 2001a; Rainboth, 1996;

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Vishwanath & Sarojnalini, 1988; Vishwanath, 1993; Kosygin & Vishwanath, 1998; Gopi, 2001; Zhang & Chen, 2002; Kullander & Fang, 2004). By now, genus *Garra* may consist of more than 85 described species, among them, 68 species are from Asia (Kullander & Fang, 2004; Zhang, 2005).

The species of the imberbis complex (or beardless group) are distributed in Burma, South-China and Indo-China (Menon, 1964). The taxonomy of beardless *Garra* is a little confusing around the Vietnamese border with China (Kottelat, 2001a). This confusion created difficulty in determining accurate species numbers of beardless *Garra* in China and Vietnam. Presently, the number of beardless *Garra* species in China, although requiring further study in comparing different populations of river basins named under one specific name, is relatively clear. There are four species and subspecies of beardless *Garra* occurring in China, namely, *G. pingi pingi*, *G. pingi yiliangensis*, *G. pingi hainanensis*, *G. alticorpora* (Zhang et al, 2000; Zhu, 1995). Almost all the Chinese authors (e. g., Wu et al, 1977; Chu & Cui, 1987; 1989; Zhu, 1995; Chen, 1998) used *G. pingi* as valid specific name, but according to priority law, *G. imberba* should be valid to substitute *G. pingi* (Kottelat, 1998; Kottelat, 2001a). Subsequent authors (e. g., Kottelat, 1998; Kottelat, 2001a; Zhang & Chen, 2005) elevated all the three subspecies as valid species. There are four beardless *Garra* species in China altogether, *G. imberba*, *G. yiliangensis*, *G. hainanensis* and *G. alticorpora*. In April 2003, the authors collected beardless specimens of genus *Garra* representing an undescribed species, from a secondary branch of Nujiang River (upper Salween) in Zhenkang County bordered by Burma, of Yunnan province, China. We herein provide a description of the new species and compare it to other beardless *Garra* species.

## 1 Materials and Methods

### 1.1 Methods

Measurements were taken point to point with digital calipers measuring to 0.01mm, and data are recorded to nearest 0.1mm. All counts and measurements were taken following Chu & Chen (1989). Measurements of disc width, disc length, predorsal, prepectoral, prepelvic and preanal length were taken following Kottelat (2001) and Zhang et al (2002).

The described specimens are formalin-preserved. Abbreviations are listed as following: LP-P, horizontal length between origins of pectoral fin and pelvic fin;

LP-A, horizontal length between origins of pelvic fin and anal fin; LP-AN, Horizontal length between pelvic origin and anus; LS-E, length between snout tip to posterior margin of eye; AO, anal fin origin; CPL, caudal peduncle length; CPD, Caudal peduncle depth; DO, dorsal fin origin; LLS, lateral line scales; D-LL, scales between dorsal-fin origin and lateral line; V-LL, scales between pelvic-fin origin and lateral line; SL, standard length; TL, total length; HL, head length; UCL, upper caudal-fin lobe; MCR, middle caudal-fin rays; LCL, lower caudal-fin lob; DB, dorsal-fin base.

### 1.2 Materials examined

1.2.1 *Garra nujiangensis* sp. nov. Twelve specimens including one holotype, 9 paratypes and two juvenile non-types listed as following:

Holotype: KIZ200304184, 183.9mm SL; Dachaha River, Altitude: 893m, Locality: N: 23°57.824' E: 98°54.337', Fengwei Town of Zhenkang County, Yunnan, China.

Paratype: KIZ200304184, 183.9 mm SL; KIZ200304197, 154.3 mm SL; KIZ200304202, 106.2 mm SL; KIZ200304186, 94.2mm SL; KIZ200304179, 106.4 mm SL; KIZ200304196, 112.3 mm SL; KIZ200304189, 98.9mm SL; KIZ200304187, 99.2mm SL; KIZ200304190, 83.9mm SL; KIZ200304199, 81.6 mm SL; Dachaha River, Altitude: 893m, Locality: N: 23°57.824' E: 98°54.337', Fengwei Town of Zhenkang County, Yunnan, China.

Non-type: KIZ200304185, 37.0 mm SL (with one pair of rudimentary rostral barbels); KIZ200304181, 48.4 mm SL; Dachaha River, Altitude: 893m, Locality: N: 23°57.824' E: 98°54.337', Fengwei Town of Zhenkang County, Yunnan, China.

1.2.2 *G. alticorpora*. 4 specimens. KIZ8540266, 167.7 mm SL; KIZ8540265, 168.2mm SL; KIZ8540276, 50.7 mm SL (with 2 pairs of rudimentary barbells); KIZ8540202, 53.6mm SL (with 2 pairs of rudimentary barbells); Pingbian County, Yunnan, China.

1.2.3 *G. yiliangensis*. 6 specimens. KIZ8811402, 181.7 mm SL; KIZ8811401, 180.8mm SL; KIZ8811399, 224.6 mm SL; KIZ8811398, 203.2mm SL; two specimens with blurred catalogs, 167.3 mm SL and 153.8 mm SL respectively; Guanling County, Guizhou, China.

1.2.4 *G. imberba*. 6 specimens. KIZ82110103, 199.8 mm SL; KIZ110107, 187.4mm SL; KIZ110096, 171.0 mm SL; KIZ110102, 147.9mm SL; KIZ110099, 194.1 mm SL; one specimen with no catalog, 78.0 mm SL; Suijiang County, Yunnan, China.

All specimens examined belong to the collection of

Kunming Institute of Zoology (KIZ), the Chinese Academic of Sciences.

## 2 Results

*Garra nujiangensis* Chen and Yang, sp. nov. (Fig.

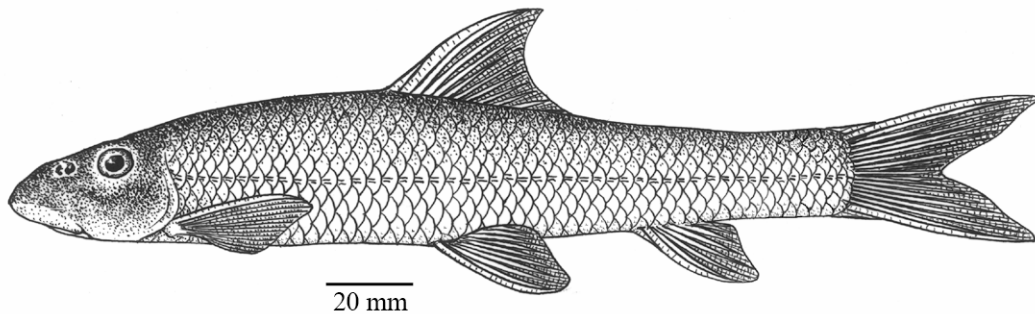


Fig. 1 *Garra nujiangensis* sp. nov., Holotype KIZ200304184, Zhenkang, Yunnan, China

48 – 50 LLS; D-LL: 5 – 6, V-LL: 3 – 4; a pair of rudimentary rostral barbels present in little individuals;  $8\frac{1}{2}$  –  $9\frac{1}{2}$  branched dorsal-fin rays; caudal peduncle relatively stouter; length between snout tip to posterior margin of eye longer than body depth at anal fin origin; head length longer than body depth at dorsal fin origin; prepelvic length 50.0% – 53.7% of standard length; pre-anus length 58.9% – 63.9% of standard length; body width 16.7% – 19.6% of standard length; body depth at dorsal fin 19.2% – 22.6% of standard length.

### 2.2 Description

Counts and proportional measurements are shown in Tab. 1 and Tab. 2.

Body elongate; slightly cylindrical anteriorly and compressed posteriorly; dorsal profile slightly convex and ventral surface flattened on head, chest and belly. Head small, depressed with a slightly convex interorbital space. Orbit in the middle-posterior part of head length. Snout round, without transverse groove and having a furrow extending obliquely to lateral extremity of rostral fold; without lateral rostral lobes. Numerous fine tubercles along base of snout before noses. No independent upper lip separating from upper jaw. No barbells present, but a pair of rudimentary rostral barbells present in one small specimen (KIZ200304185, 37.0 mm SL), all the other larger ones without barbells (including a little larger one of 48.5 mm SL). Mental adhesive disc in lower lip elliptical, slightly wider than long. Rostral fold coarsely crenulated, with indentations on its distal margin, covered by numerous papillae. Predorsal mid-line scales reduced and embedded beneath skin. Scales on breast and belly embedded beneath skin. Circumpeduncular scale rows 12 – 14, and 4 specimens with 14 scales, 6

1).

### 2.1 Diagnosis

This new species can be distinguished from other beardless *Garra* species by the unique combination of the following features: 12 – 14 circumpeduncle scales;

specimens with 12 scales. Pharyngeal teeth triserial,  $2\cdot4\cdot5$  -  $5\cdot4\cdot2$ .

Dorsal fin inserted anterior to pelvic fin, dorsal fin with a concave distal margin, last simple ray about equal to head length, origin about halfway between snout tip and caudal fin base. Pectoral fin rhomb-shaped, reaching beyond halfway to pelvic-fin origin. Pelvic fin rhomb-shaped, reaching beyond midway to anal-fin origin, inserted vertically below base of 2 – 3h branched dorsal-fin rays. Pelvic fin with an elongate auxiliary scale at its outer base. Auxiliary scale long, reaching beyond base of the last ray. Anal fin with a distally truncate margin. Anus located much nearer to pelvic fin origin than to anal fin origin. Caudal fin forked, lobes about equally long.

Coloration-body, head dark brown to black, small individuals fading slightly, body flank with 4 – 5 faint, indistinct, longitudinal stripes. Belly white in live specimens, slightly brown pale in preserved ones. Dorsal and caudal fins gray; dorsal faces of pectoral and pelvic fins gray, ventral faces whitish; anal fin hyaline.

### 2.3 Habitat description and propagation time

This species was collected from shallow water along the bank of the main course and the branches (altitude: 893 – 909m) of Nanpenghe River (which flows into the Fengwei River, then Nanting River, and finally Salween River in Burma) beside Fengwei Town of Zhenkang County, Yunnan Province. The water is a little turbid black resulted from the wastewater discharged from a sugar refinery. Water temperature was 19.7°C, and pH was 8.17 (9:20 AM). The river bed is full of large boulders, cobbles, gravel and little sand. The wet rocks are covered with many diatoms. The propagation

time is around April to May from the observation that the ovary is at stage IV and the abdomen is filled with large eggs in all the female individuals. Related species: *Barbodes baoshanensis*, *Scaphiodonichthys acanthopterus*, *Carassius carassius auratus*, *Schistura fasciolatus*, *Schistura vinciguerrae*, *Glyptothorax zainaensis*, *Pseudecheneis sulcatus*, *Channa gachua*, *Bagarius yarrelli*.

## 2.4 Distribution

**Tab. 1** Proportional measurements comparisons among *G. nujiangensis* sp. nov., *G. theunensis*, *G. alticorpora*, *G. yiliangensis* and *G. imberba*

Species	<i>G. nujiangensis</i>	<i>G. theunensis</i> *	<i>G. alticorpora</i>	<i>G. yiliangensis</i>	<i>G. imberba</i>
Number of individuals	10	5	4	6	6
Total length	106.8 - 246.5	-	66.4-224.2	196.5 -271.4	104.1-266.7
Standard length	81.6 - 183.9 (112.1)	102.9 - 175 (136.5)	50.7-168.2 (110.0)	165.7-203.2 (175.4)	78.0-199.8 (163.0)
Percentage of SL					
Head length	21.7 - 24.7(23.1; 0.8)	23.5 - 25.9 (24.7; 1.0)	22.2 - 25.3 (24.5; 1.5)	20.8 - 23.7 (22.1; 0.9)	21.9 - 26.1 (23.3; 1.6)
Predorsal length	45.5 - 50.2 (47.9; 1.6)	44.7 - 49.1 (46.7; 2.0)	46.2 - 48.7 (47.7; 1.1)	42.2 - 46.2 (44.9; 1.6)	46.2 - 49.1 (47.3; 1.2)
Prepelvic length	50.0 - 53.7 (52.1; 1.1)	48.4 - 50.0 (49.4; 0.7)	53.1 - 56.1 (54.4; 1.5)	47.4 - 49.3 (48.5; 0.9)	50.9 - 54.7 (52.2; 1.5)
Pre-anus length	58.9 - 63.9 (60.9; 1.4)	54.2 - 57.8 (56.1; 1.4)	60.8 - 63.5 (62.0; 1.3)	55.4 - 57.7 (56.7; 0.7)	57.5 - 62.8 (59.2; 2.0)
Preanal length	74.8 - 79.7 (77.7; 1.7)	73.3 - 78.1 (76.5; 1.9)	77.3 - 79.1 (78.4; 0.8)	75.2 - 78.1 (76.4; 1.0)	75.7 - 80.1 (77.4; 1.7)
Body width	16.7 - 19.6 (17.8; 1.0)	12.5 - 16.2 (13.9; 1.5)	15.9 - 21.5 (19.5; 2.6)	14.4 - 17.3 (16.0; 1.1)	16.3 - 19.7 (17.2; 1.3)
Body depth at DO	19.2 - 22.6 (21.4; 1.2)	16.1 - 18.7 (17.6; 1.0)	22.6 - 26.0 (24.0; 1.4)	17.8 - 20.0 (18.9; 1.0)	19.1 - 21.3 (20.4; 0.9)
Caudal peduncle length	14.1 - 17.4 (16.1; 1.1)	17.5 - 19.3 (18.1; 0.7)	12.1 - 14.0 (13.3; 0.8)	15.6 - 18.0 (16.8; 0.9)	14.8 - 16.9 (15.9; 0.8)
Caudal peduncle depth	10.5 - 11.5 (11.0; 0.4)	8.3 - 9.6 (8.9; 0.6)	11.1 - 13.1 (11.9; 0.8)	9.2 - 10.5 (9.9; 0.6)	11.5 - 12.0 (11.7; 0.2)
Length of DB	15.1 - 18.4 (16.6; 1.0)	14.2 - 15.4 (15.0; 0.5)	15.7 - 18.6 (16.7; 1.3)	13.4 - 17.1 (15.6; 1.4)	15.7 - 17.3 (16.4; 0.7)
Length of dorsal fin	20.4 - 24.9 (22.8; 1.3)	20.9 - 30.0 (24.5; 3.7)	22.8 - 25.4 (23.7; 1.2)	22.5 - 25.4 (24.2; 1.1)	25.1 - 27.0 (25.7; 0.7)
Length of anal fin	16.2 - 19.7 (18.1; 1.0)	15.8 - 19.5 (17.5; 1.6)	17.9 - 19.4 (18.7; 0.7)	17.4 - 19.9 (18.7; 1.1)	19.3 - 21.0 (20.1; 0.6)
Length of pectoral fin	17.6 - 24.5 (21.8; 1.9)	18.2 - 19.6 (18.8; 0.6)	19.9 - 22.4 (21.1; 1.4)	19.6 - 22.3 (20.9; 0.9)	20.4 - 23.2 (21.4; 1.1)
Length of pelvic fin	17.8 - 21.2 (19.5; 1.1)	16.3 - 18.1 (17.7; 0.8)	18.9 - 19.5 (19.2; 0.3)	19.5 - 22.4 (20.4; 1.0)	19.8 - 21.2 (20.4; 0.6)
Length of UCL	23.2 - 27.1 (24.9; 1.2)	25.6 - 31.1 (28.6; 2.0)	24.7 - 26.9 (25.9; 1.0)	25.1 - 29.9 (27.9; 1.8)	28.4 - 29.5 (28.8; 0.4)
Length of MCR	8.5 - 15.1 (10.6; 1.8)	12.2 - 14.0 (12.9; 0.7)	9.9 - 12.8 (11.0; 1.2)	9.0 - 12.2 (10.3; 1.0)	9.4 - 12.1 (10.5; 1.0)
Length of LCL	23.1 - 26.6 (24.7; 1.3)	25.1 - 30.7 (28.1; 2.7)	23.9 - 29.3 (27.3; 2.6)	27.2 - 33.1 (29.9; 2.2)	29.4 - 31.0 (30.0; 0.6)
Percentage of HL					
Snout length	49.5 - 59.7 (55.0; 2.8)	57.0 - 61.0 (58.8; 1.6)	50.1 - 57.2 (54.1; 3.1)	55.8 - 59.3 (57.5; 1.4)	52.2 - 62.3 (58.5; 4.2)
Body depth at DO	85.3 - 99.3 (92.8; 4.8)	64.4 - 77.0 (71.3; 5.4)	90.1-107.7 (98.5; 8.3)	81.2 - 91.5 (85.5; 3.5)	81.6 - 92.0 (87.7; 3.8)
Eye diameter	18.5 - 23.6 (21.0; 1.9)	18.0 - 21.0 (20.0; 1.4)	17.3 - 22.5 (20.0; 2.8)	17.4 - 21.0 (19.1; 1.3)	15.3- 23.7 (17.7; 3.1)
Interorbital width	47.8 - 55.1 (51.9; 2.0)	40.0 - 44.0 (42.4; 1.8)	47.6 - 55.4 (51.3; 3.2)	46.6 - 53.4 (50.0; 2.6)	49.1 - 53.9 (51.5; 2.2)
Disc width	50.9 - 56.4 (53.1; 1.9)	55.0 - 60.0 (57.4; 1.9)	52.2 - 59.3 (55.3; 3.4)	56.4 - 60.0 (58.3; 1.3)	55.4 - 64.5 (60.4; 3.8)
Disc length	35.4 - 39.0 (37.5; 1.0)	35.0 - 39.0 (36.8; 1.5)	38.4 - 43.0 (41.3; 2.2)	36.6 - 40.6 (38.3; 1.8)	34.1 - 44.6 (40.0; 3.5)
Percentage of CPL					
CPD	62.2 - 80.7 (68.6; 5.6)	46.1 - 54.9 (49.0; 3.5)	88.2-93.6 (89.3; 4.4)	54.8 - 67.5 (59.2; 4.8)	69.8 - 81.1 (74.1; 4.2)
Percentage of disc width					
Disc length	67.0 - 73.3 (70.6; 2.1)	60.3 - 70.9 (64.2; 4.3)	72.5 - 78.4 (74.8; 2.8)	62.4 - 69.5 (65.7; 3.1)	55.0 - 71.3 (66.4; 6.3)
Percent of LP-P					
Pectoral fin length	53.4 - 81.6 (68.3; 8.1)	-	59.6 - 69.4 (64.5; 4.3)	67.6 - 81.8 (73.5; 5.4)	69.5 - 81.3 (73.9; 4.3)
Percent of LP-A					
Pelvic fin length	66.7 - 85.9 (74.5; 6.6)	-	75.4 - 80.5 (77.9; 2.5)	66.6 - 81.4 (72.5; 5.7)	72.6 - 84.2 (78.4; 4.3)
LP-AN	29.3 - 39.3 (33.5; 2.9)	-	29.4 - 33.8 (32.3; 2.0)	23.9 - 37.7 (29.7; 5.3)	27.9 - 33.5 (30.4; 2.3)
Percent of LS-E					
Body depth at AO	80.6 - 94.9 (85.6; 3.7)	-	83.7 - 101.8 (91.3; 73.1 - 86.1 (79.2; 6.2)	83.7 - 92.7 (87.3; 5.5)	8.4)

\*From Kottelat (1998).

The first number is mean value in parentheses, and the second one is SD (standard deviation).

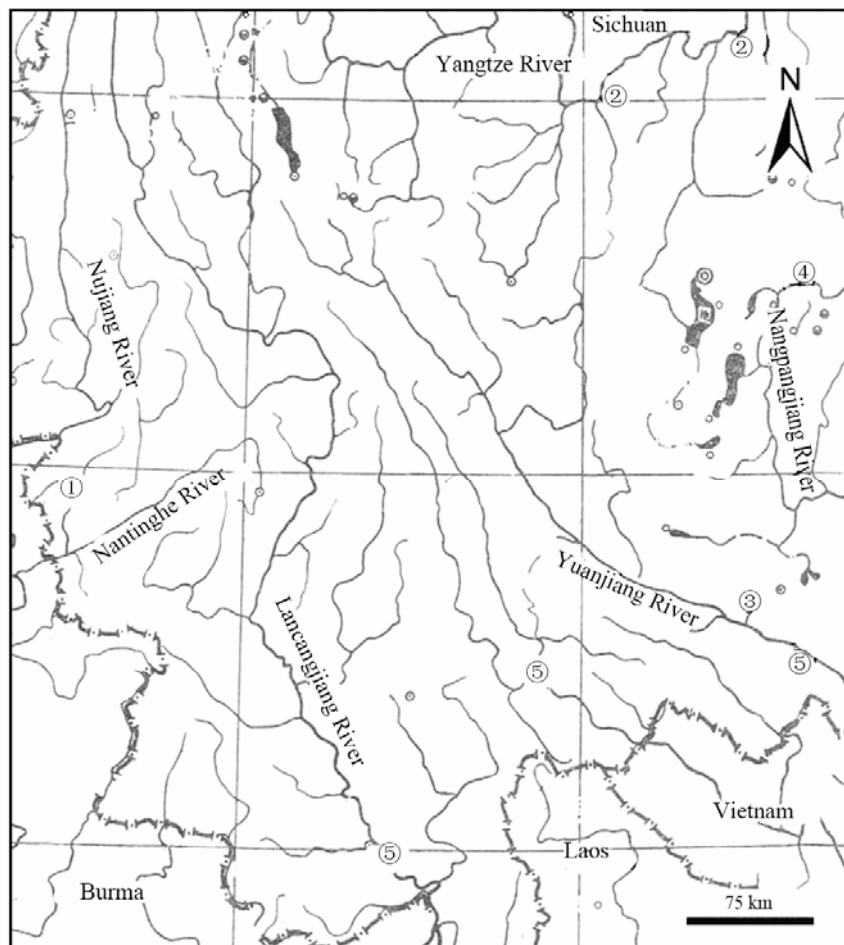
So far, this species is known in the Nanpenghe River beside Fengwei Town of Zhenkang County, Yunnan Province (Fig. 2). It is possible that the species also inhabits other tributaries of the Salween in northern Burma and Lower Nujiang River.

## 2.5 Etymology

The specific name, *nujiangensis*, refers to its type locality in Nujiang River basin, Yunnan Province, China.

**Tab. 2** Counts comparisons among among *G. nujiangensis* sp. nov., *G. theunensis*, *G. alticorpora*, *G. yiliangensis* and *G. imberba*

Species	<i>G. nujiangensis</i>		<i>G. theunensis</i>	<i>G. alticorpora</i>	<i>G. yiliangensis</i>		<i>G. imberba</i>
Number of individuals	9	1	5	4	5	1	6
Dorsal-fin rays	iv, 9 <sup>1</sup> / <sub>2</sub>	iv, 8 <sup>1</sup> / <sub>2</sub>	iv, 8 <sup>1</sup> / <sub>2</sub>	iv, 9 <sup>1</sup> / <sub>2</sub>	iv, 10 <sup>1</sup> / <sub>2</sub>	iv, 9 <sup>1</sup> / <sub>2</sub>	iv, 9 <sup>1</sup> / <sub>2</sub>
Anal-fin rays	iii, 5		iii, 5	iii, 5	iii, 5		iii, 5
Pectoral-fin rays	i, 16 - 17		i, 15 - 16	i, 16 - 17	i, 16 - 17		i, 16 - 17
Pelvic-fin rays	i, 9		i, 8	i, 9	i, 8 - 9		i, 9
Lateral-line scales	48 - 50		48 - 50	49	51 - 52		50 - 52
D-LL	5 - 6		5 - 6	6	6.5		6 - 6.5
V-LL	3 - 4		3 - 3.5	3.5 - 4	3.5 - 4		4
Circumpeduncle scales	12 - 14		16	16	16		16



**Fig. 2** Map of most portions of Yunnan and partial Sichuan China showing the distributing locality of beardless *Garra* species in southwest China

① *Garra nujiangensis* sp. nov.; ② *Garra imberba*; ③ *Garra alticorpora*; ④ *Garra yiliangensis*. ⑤ the populations of *Garra imberba* need more and detailed comparisons with each other and other beardless *Garra* species for confirmation.

### 3 Discussion

Two species of the *imberbis* complex (or beardless group), which occur in Burma, South-China and Indo-China, are revised by Menon (1964). Presently, the number of beardless *Garra* species in China has

increased to 4 species, namely, *G. imberba*, *G. yiliangensis*, *G. hainanensis* and *G. alticorpora*. Beardless *Garra* species have never been recorded in Nujiang River basin (upper Salween). This new species can be distinguished from all the other beardless *Garra* by the unique character of 12 – 14 circumpeduncular

scales (vs. 16). Additionally, other meristic and proportional characters can also differentiate *G. nujiangensis* from other beardless *Garra*. *G. nujiangensis* can be distinguished from *G. imberba* by the combination of the following characters: less LLS (48 – 50 vs. 50 – 52), less D-LL and V-LL (5 – 6 and 3 – 4 vs. 6 – 6.5 and 4 – 4.5), less dorsal fin length (20.4% – 24.9% SL vs. 25.1% – 27.0% SL), less lengths of UCL and LCL (23.2% – 27.1% SL and 23.1% – 26.6% SL vs. 28.4% – 29.5% SL and 29.4% – 31.0% SL), less disc width (50.9% – 56.4% HL vs. 55.4% – 64.5% SL). *G. nujiangensis* can be distinguished from *G. alticorpora* by

the combination of the following characters: less prepelvic length (50.0% – 53.7% SL vs. 53.1% – 56.1% SL), less body depth at dorsal fin origin (19.2% – 22.6% SL vs. 22.6% – 26.0% SL), greater caudal peduncle length (14.1% – 17.4% SL vs. 12.1% – 14.0% SL), less caudal peduncle depth (10.5% – 11.5% SL and 62.2% – 80.7% CPL vs. 11.1% – 13.1% SL and 88.2% – 93.6% CPL), body depth less than body depth at dorsal fin origin (vs. body depth greater than body depth at dorsal fin origin in *G. alticorpora*, this character may vary in little individuals, as showing in Tab. 3).

**Tab. 3 Some meristic and proportional measurements of *G. alticorpora***

Catalog number	KIZ8540266	KIZ8540265	KIZ8404276	KIZ8540202	Mean value	Standard deviation
Total length (mm)	224.2	222.2	66.4	69.1		
Standard length (mm)	167.7	168.2	50.7	53.6	110.0	
Percentage of HL						
Body depth at DO	107.7	103.1	93.1	90.1	98.5	8.3
Percent of LS-E						
Body depth at AO	94.5%	101.8%	85.4%	83.7%	91.3	8.4
Barbels	absent	absent	2 pairs	2 pairs		

The new species can be distinguished from *G. yiliangensis* by the following characters: less branched dorsal fin rays ( $8\frac{1}{2}$  –  $9\frac{1}{2}$  vs.  $10\frac{1}{2}$  in most individuals as showing in Tab. 2), less LLS and D-LL (48 – 50 and 5 – 6 vs. 51 – 52 and 6.5), greater prepelvic length (50.0% – 53.7% SL vs. 47.4% – 49.3% SL), greater pre-anus length (58.9% – 63.9% SL vs. 55.4% – 57.7% SL), greater caudal peduncle depth (10.5% – 11.5% SL and 62.2% – 80.7% CPL vs. 9.2% – 10.5% SL and 54.8% – 67.5% CPL), less length of lower caudal fin lobe (23.1% – 26.6% SL vs. 27.2% – 33.1% SL), less disc width (50.9% – 56.4% HL vs. 56.4% – 60.0% SL). It can also be distinguished from *G. hainanensis* by the following characters: 12 – 14 circumpeduncular scales (vs. 14 – 16), 48 – 50 lateral line scales (vs. 46 – 47), less caudal peduncle depth (62.2% – 80.7% CPL vs. 83.3% – 90.9% CPL).

Kottelat (1998) described a new beardless *Garra*, *G. theunensis* from the Mekong River in Laos. *G. nujiangensis* can be distinguished from this species by the following characters: 12 – 14 circumpeduncular scales (vs. 16), greater prepelvic length (50.0% – 53.7% SL vs. 48.4% – 50.0% SL), greater pre-anus length (58.9% – 63.9% SL vs. 54.2% – 57.8% SL), greater body width (16.7% – 19.6% SL vs. 12.5% – 16.2% SL), greater body depth at dorsal fin origin (19.2% – 22.6% SL and 85.3% – 99.3% HL vs. 16.1% – 18.7% SL and 64.4% – 77.0%

HL), less caudal peduncle length (14.1% – 17.4% SL vs. 17.5% – 19.3% SL), greater caudal peduncle depth (10.5% – 11.5% SL and 62.2% – 80.7% CPL vs. 8.3% – 9.6% SL and 46.1% – 54.9% CPL).

According to description of *G. imberbis* (Kullander & Fang, 2004; Menon, 1964; Talwa & Jhingran, 1991.), *G. nujiangensis* is distinct in having 48 – 50 lateral line scales (vs. 44 – 45), in having more transverse scale-rows (5 – 6/3 – 4 vs. 4.5/2.5 – 3), in having fine tubercles along base of snout (vs. without tubercles). Compared to questionable *G. poilanei*, *G. cyclostomata* (Kottelat, 1998; Kottelat, 2001a), *G. nujiangensis* can be distinguished by its slender caudal peduncle (CPD 62.2% – 80.7% CPL vs. CPD 45.5% – 55.6% CPL). *G. apogon* (Norman, 1925) described from “Ngoi - Tio, Col des Nuages, Tonkin” can be distinguished from *G. nujiangensis* in having 40 – 42 “scales in longitudinal series” (vs. 48 – 50).

The taxonomy of beardless *Garra* is considerably confusing. This may result from different descriptions based on specimens of different development stages (tiny barbells may be present as juvenile character in some species). Proportional measurement characters may also vary in considerably in individuals of different sizes of the same species, as seen in Tab. 1 and Tab. 3. Descriptions based on individuals of different trophic conditions, wide distribution in different nations that can

be described using different methods, descriptions based on limited specimens, no exchange for specimens for comparisons, literatures in different languages (Chinese, English, Vietnamese, Lao and etc) can all influence current species knowledge. The present research verified that tiny barbels is a juvenile character in small specimens of *G. nujiangensis* (less than or equal to 37.0mm SL individuals with a pair of barbels), *G. alticorpora* (less than or equal to 69.1 mm SL individuals with two pairs of barbels as showing in Tab. 3). This juvenile character may also appear in other beardless *Garra* species (Kottelat, 2001a).

*G. imberba* is widely occurring in Yangtze River, Lancangjiang River (upper reach of Mekong), Yuanjiang River (upper reach of Red River) (Chu & Cui, 1987; Chu & Cui, 1989; Zhang et al, 2000; Zhu, 1995) in China. Specific status of the three allopatric populations need more detailed comparisons and of complexity beyond the scope of this paper, here we tentatively treat them all as

*G. imberba*.

In the Chinese beardless *Garra* species keys (Chu & Cui, 1987; Chu & Cui, 1989; Zhang et al, 2000; Zhu, 1995), two proportional characters, body depth at dorsal fin origin greater than or equal to head length and body depth at anal fin origin equal to length from snout tip to posterior margin of eye, can differentiate *G. alticorpora* from all the other beardless species. But this does not always work when smaller individuals are included (Tab. 3). Other characters that can distinguish it from related species include a stouter caudal peduncle (CPD 88.2% – 93.6% CPL), or greater body depth at dorsal fin origin (22.6% – 26.0% SL). Although its relationship with the sympatric populations of *G. imberba* need further study, here we temporally treat it as a valid species and distinct with *G. imberba*.

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