

Species of *Garra* and *Discogobio* (Teleostei: Cyprinidae) in Yuanjiang (Upper Red River) Drainage of Yunnan Province, China with Description of a New Species

Wei Zhou^{1,2,*}, Xiao-Fu Pan¹, and Maurice Kottelat³

¹Faculty of Conservation Biology, Southwest Forestry College, Kunming, Yunnan 650224, China. Tel: 86-871-3862458.

Fax: 86-871-3863635. E-mail: weizhou@public.km.yn.cn

²Faculty of Life Science, Yunnan University, Kunming, Yunnan 650091, China

³Route de la Baroche 12, Case postale 57, CH-2952 Cornol, Switzerland (permanent address); Research Associate, Raffles Museum of Biodiversity Research, National University of Singapore, Kent Ridge 119260, Singapore. E-mail: mkottelat@dplanet.ch

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Wei Zhou, Xiao-Fu Pan, and Maurice Kottelat (2005) Species of *Garra* and *Discogobio* (Teleostei: Cyprinidae) in the Yuanjiang (Upper Red River) drainage of Yunnan Province, China with a description of a new species. *Zoological Studies* 44(4): 445-453. The species of *Garra* Hamilton and *Discogobio* Lin from the Yuanjiang (Red River) drainage in Yunnan Province, China are reviewed. Six species are recorded. *Placocheilus* Wu is a synonym of *Garra*. *Garra alticorpora* Chu and Cui is a synonym of *G. imberba* Garman (the *G. pingi* Tchang of earlier authors). *Garra micropulvinus*, a new species, is unique among *Garra* in having a median notch in the posterior margin of the oral sucking disc and 2-7 small fleshy buds between the skin fold and the side of the median pad. <http://zoolstud.sinica.edu.tw/Journals/44.4/445.pdf>

Key words: *Discogobio*, *Garra micropulvinus*, *Garra*, *Placocheilus*, Red River.

Three nominal genera of the Labeoinae (family Cyprinidae) (*Garra* Hamilton, *Placocheilus* Wu, *Discogobio* Lin) are characterized by the lower lip which is modified into an adhesive disk. They are collectively called below the *Garra* group. Six species are known in the Yuanjiang (also known as Hong He, the Red River in English, and the Song Hong in Vietnamese) drainage in Yunnan Province, China: *G. imberba* Garman, *G. orientalis* Nichols, *G. alticorpora* Chu and Cui, *P. caudofasciatus* (Pellegrin and Chevey), *D. yunnanensis* (Regan), and *D. brachyphysallidos* Huang (see Chu 1987, Chu and Cui 1987, Chu and Chen 1989, Chu et al. 1993).

Most members of the *Garra* group are small-to medium-sized fish with a rounded, cylindrical body, usually with a flat belly. The paired fins extend horizontally. The mouth is inferior, trans-

verse, and semicircular. The rostral cap and lower lip are continuous at the mouth corner, but without lateral lobes. The lower lip is thick and fleshy and forms an oral sucking disc on the chin, which is of variable shape but usually rounded. This oral sucking disc allows these fishes to adhere to the surface of rocks or stones and to maintain their position in rapidly flowing waters.

Since 1996, the authors have surveyed the ichthyofauna of the Yuanjiang drainage in Yunnan Province and have collected various material of the *Garra* group from the tributaries, including the Lixianjiang, Tentiaohe, Xinxianhe, Nanxihe, Panlonghe, and Luzhijiang (the suffixes “-jiang” and “-he” mean “river” in Chinese) (Fig. 1). Some specimens from the Panlonghe were found to differ from all known members of the *Garra* group. They represent a new species described below, in

*To whom all correspondence and reprint requests should be addressed.

the context of a review of the members of the *Garra* group in the Yuanjiang drainage of Yunnan Province.

MATERIALS AND METHODS

The examined materials are deposited in the collections of the Museum of the Southwest Forestry College (SWFC), Kunming Institute of Zoology, Chinese Academy of Sciences (KIZ), and of the 3rd author (CMK). The method for obtaining counts and measurements followed Hubbs and Lagler (1947), except that the count of lateral line scales includes the scales on the caudal-fin base. Abbreviations used in the text are: m asl, meters above sea level; co., county; prov., province; r., river; and SL, standard length.

RESULTS

Morphological comparison of the oral sucking disc

Members of the *Garra* group share the follow-

ing characters of the oral sucking disc. The rostral cap is curved ventrally and connected with the lower lip at the corners of the mouth. The edge of the rostral cap is fringed or crenulated, and covered with papillae. The upper and lower jaws have a cutting horny sheath. The upper lip is missing. The lower lip extends backwards and forms a round to elliptical oral sucking disc on the chin. The lateral and posterior edges are free, around a median, fleshy pad whose shape is variable (and often diagnostic for species).

In the genus *Discogobio* (Fig. 2E-F), the median pad is rounded, its transverse diameter is equal to or somewhat larger than half of the mouth width, and it is surrounded laterally and anteriorly by a horseshoe-shaped swelling, which is separated from the median pad by a groove. The swelling, the lateral and posterior fields of the oral sucking disc, and part or all of the median pad are covered by papillae. The anterior edge of the oral sucking disc is made by a narrow skin flange between the lower jaw and the swelling.

In the genus *Garra* (Fig. 2A-C), the fleshy median pad is larger, and its transverse diameter is about equal to the width of the mouth. The median pad is margined anteriorly and anterolater-

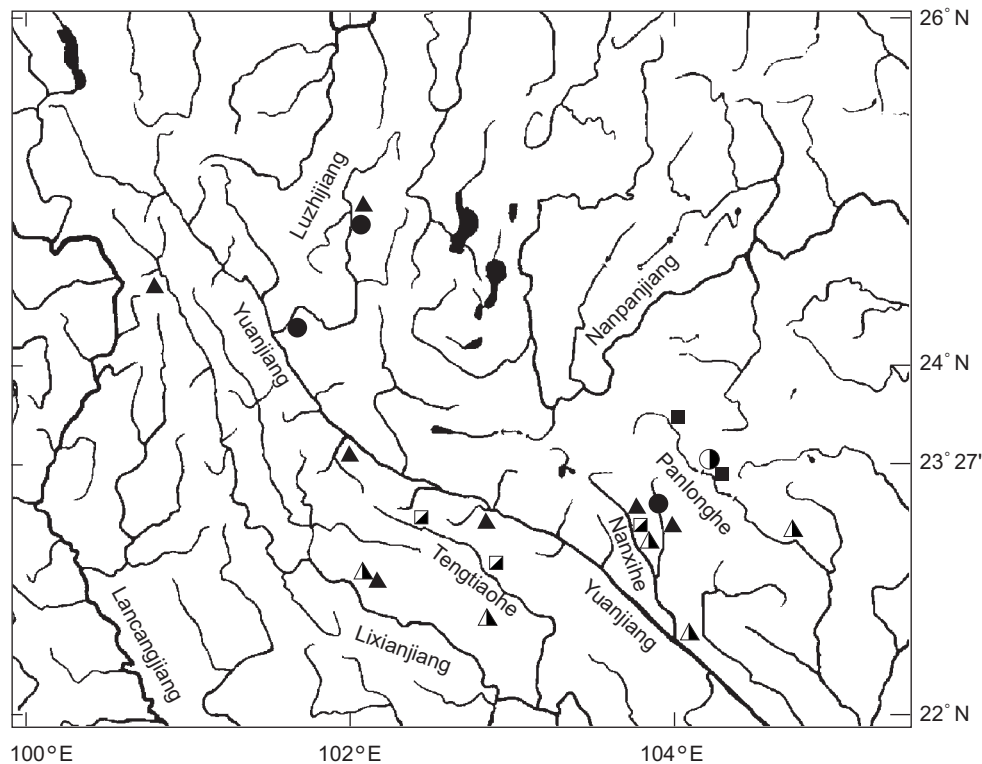


Fig. 1. Distribution of the *Garra* group in southern Yunnan. *Discogobio yunnanensis* (solid circle), *D. brachyphysallidos* (solid square), *Garra micropulvinus* (half-solid circle), *G. imberba* (solid triangle), *G. orientalis* (half-solid triangle), and *G. caudofasciata* (half-solid square). Based on examined material and reliable records.

ally by a narrow, arched skin fold; the pad and the fold are separated by a groove. Papillae are present on the free part of the oral sucking disc and on the fold; they are absent from the median pad. There is no narrow skin flange between the lower jaw and the arched skin fold.

In *G. micropulvinus* (Fig. 2D), the fleshy median pad is smaller, and its transverse diameter is almost equal to half the mouth width. The median pad is almost entirely surrounded by a skin fold, and there is only a narrow posterior interruption in

the groove around it. On both sides of the median pad there are 2-7 small fleshy buds between the skin fold and the median pad. The part of the skin fold anterior to the median pad is wider than the posterior part. The median pad is divided into two parts by a shallow groove: the anterior part is semicircular and entirely covered by flat and low papillae, while the posterior part is triangular and its surface is smooth (without papillae). There are densely set papillae on the skin fold. There is no narrow skin flange between the lower jaw and the

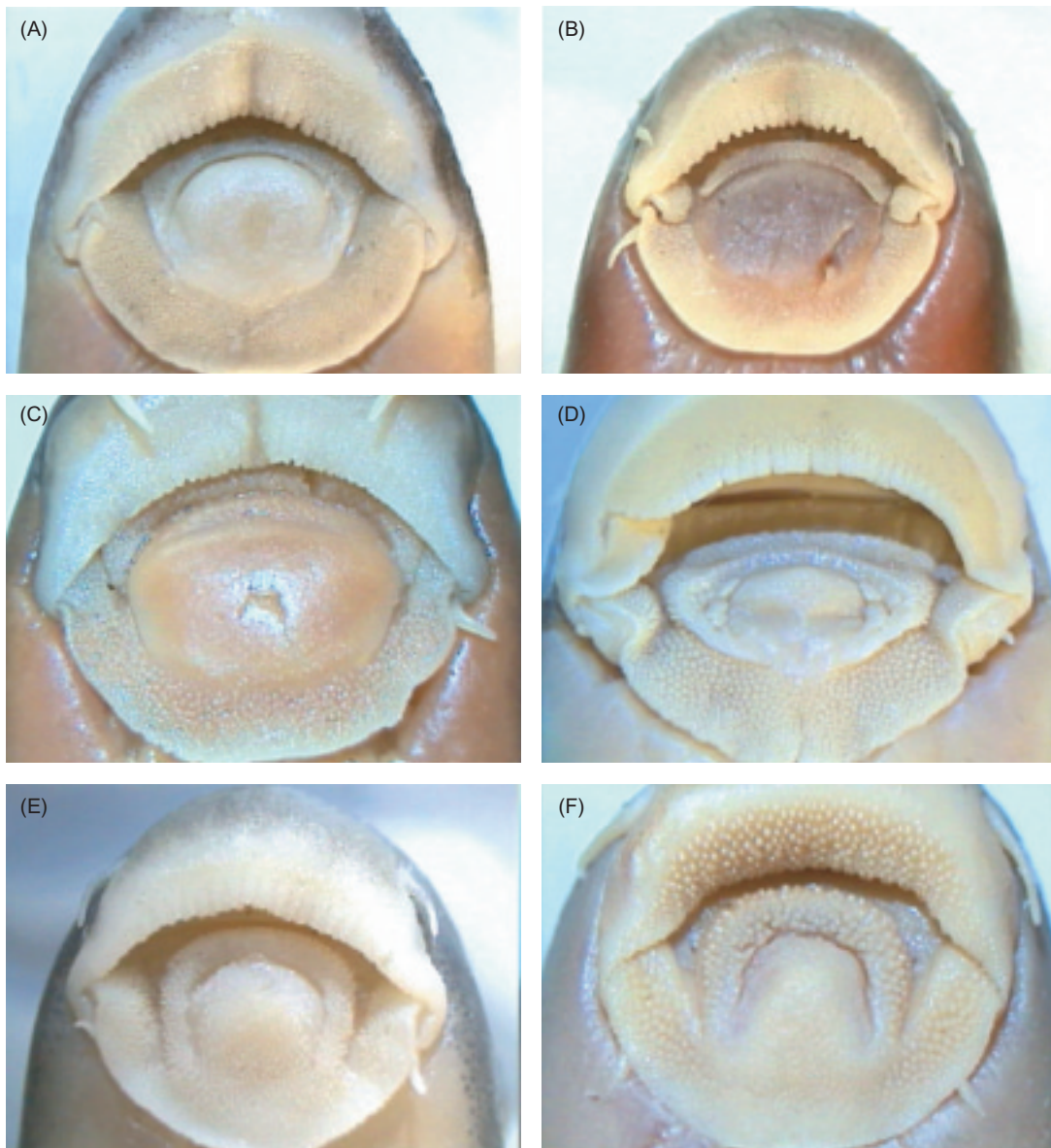


Fig. 2. Oral sucking discs of (A) *Garra imberba*, SWFC0111233, Namoguo, Wenshan Co., Yunnan; (B) *G. caudofasciata*, SWFC9712992, Baiheqiao, Pinbian Co., Yunnan; (C) *G. orientalis*, SWFC97121423, Hekou, Hekou Co., Yunnan; (D) *G. micropulvinus*, paratype, SWFC0111008, Gaji, Wenshan Co., Yunnan; (E) *Discogobio yunnanensis*, SWFC0111317, Yaodian, Wenshan Co., Yunnan; (F) *D. brachyphysallidos*, SWFC0111031, Gaji, Wenshan Co., Yunnan.

skin fold.

We considered the possibility that *G. micropulvinus* could represent a distinct genus. The reduced and divided central pad, the presence of lateral buds, and the posterior notch are very distinctive, and they constitute good diagnostic characters. But the general structure of the disc remains the same as in other *Garra*. To treat *G. micropulvinus* as a distinct genus would require demonstrating that the remaining species of *Garra* form a monophyletic lineage and that *G. micropulvinus* is the sister species of that lineage, or that several lineages can be diagnosed and named within *Garra*. While it cannot be excluded that *Garra* is a polyphyletic genus, without a proper phylogenetic analysis (which should also include *Discogobio* and similar-looking labeonine genera), such a decision is not possible.

Key to the species of the *Garra* Group in the Yuanjiang drainage of Yunnan Province

- 1a. A horseshoe-shaped swelling in front and on sides of median pad; a dark submarginal stripe along each caudal fin lobe (*Discogobio*)..... 2
- 1b. Median pad not surrounded by a horseshoe-shaped swelling; no dark submarginal stripe along each caudal fin lobe (*Garra*)..... 3
- 2a. Scales on breast and belly extending forward at least to posterior extremity of pectoral-fin base..... *D. yunnanensis*
- 2b. Scales on belly extending forward at most to midlength of pectoral fin, naked area sometimes with a few isolated scales..... *D. brachyphysallidos*
- 3a. Two to seven small fleshy buds between skin fold and side of median pad; posterior edge of oral sucking disc with an obvious notch..... *G. micropulvinus*
- 3b. No fleshy buds between median pad and skin fold; posterior edge of oral sucking disc without a notch..... 4
- 4a. Two pairs of barbels; 32-45 lateral line scales; anus slightly in front of anal fin..... 5
- 4b. No barbels; 46-52 lateral line scales; anus close to pelvic-fin base..... *G. imberba*
- 5a. Snout with a conspicuous longitudinal notch; 32-35 lateral line scales; no marks on caudal-fin lobes..... *G. orientalis*
- 5b. Snout without a notch; 37-39 lateral line scales; a dark semicircular mark on middle of each caudal-fin lobe. *G. caudofasciata*

Discogobio brachyphysallidos Huang (Fig. 3)

Discogobio brachyphysallidos Huang 1989: 358 (Yiliang and Luoping); Chu et al. 1993: 243 (Nanpanjiang, Yuanjiang, and Jinshajiang).

Material examined: All from China, Yunnan: SWFC 0111030-0111035, 0111105-0111108, 10, 93.0-119.0 mm SL; Gaji (23°09'13"N, 104°27'23"E) in Xichou Co.; 885 m asl. - SWFC 0111075,

0112086-0112089, 0201001-0201036, 41, 29.0-94.0 mm SL; Shundianhe (23°22.915'N, 104°06.171'E) in Wenshan Co.; 1378 m asl.

Diagnosis: See under *D. yunnanensis* for characters distinguishing the two species.

Distribution: In Yunnan, *D. brachyphysallidos* is known from the Panlonghe drainage, a small tributary of the Yuanjiang (Fig. 1). It also occurs in the Nanpanjiang drainage.

Remarks: *Discogobio brachyphysallidos* was originally described on the basis of material from Yiliang and Luoping (Huang 1989). Chu et al. (1993) reexamined this material and showed that the specimens from Yiliang in fact belong to *D. yunnanensis*. The original description (Huang 1989) does not mention the dark midlateral stripe which we observe in our material. The caudal fin is dark gray in specimens from Shundianhe (29-94 mm SL), while it is red or orange in those from Gaji (93-119 mm SL). It is presently impossible to determine whether this is due to inter-population variability or size difference, or if it has taxonomic significance.

Discogobio yunnanensis (Regan) (Fig. 4)

Discognathus yunnanensis Regan 1907: 63 (type locality: Dianchi Lake, Yunnan Prov., China).

Discogobio yunnanensis: Wu, in Wu et al. 1977: 386 (Yiliang, Yunnan Prov.); Chu and Cui 1989: 284 (Dianchi Lake and Nanpanjiang); Chu et al. 1993: 243 (Jinshajiang, Pearl R., and Yuanjiang).

Material examined: All from China, Yunnan: SWFC 0111128-0111135, 0111188-0111195, 0111278-0111282, 0111286-0111288, 0111309-0111311, 27, 45.0-84.0 mm SL; Namoguo (23°08.628'N, 103°56.350'E) from Namoguohe (a small branch of the Nanxihe) in Wenshan Co.; 765 m asl. - SWFC 0111005-0111009, 0111316, 0111317, 7, 39.0-79.0 mm SL; Yaodian (23°17.73'N, 103°55.63'E) from the Namoguohe in Wenshan Co.; 1500 m asl.

Diagnosis: Distinguished from *D. brachyphysallidos*, the only other species of the genus in the Yuanjiang drainage in China, by scales on breast and belly extending forward at least to posterior extremity of pectoral-fin base (vs. at most to midlength of pectoral fin, except sometimes for a few isolated scales in naked area); an irregular and faint stripe along flank from anal-fin origin backwards, darker posteriorly, and with contrasting edges on caudal peduncle (vs. stripe irregular, conspicuous on entire flank).

Distribution: In the Yuanjiang drainage, *D.*

yunnanensis has been collected in the Namoguohu and Luzhijiang (Fig. 1). It also occurs in the Jinshajiang (upper Yangtze R.) and Nanpanjiang (upper Pearl R.) drainages.

***Garra caudofasciata* (Pellegrin and Chevey)**
(Fig. 5)

Discognathus caudofasciatus Pellegrin and Chevey 1936: 223 (Lai Chau, Vietnam).

Placocheilus caudofasciatus: Wu, in Wu et al. 1977: 382 (Yuanjiang); Chu and Cui 1989: 278 (Yuanjiang, Jinping).

Garra caudofasciatus: Kottelat 2001a: 24, 2001b: 50 (Nam Ma, Laos).

Material examined: All from China, Yunnan: SWFC 9712992, 1, 77 mm SL; Baiheqiao (22°58.49'N, 103°47.94'E) in Pinbian Co.; 300 m asl. - SWFC 9902004, 1, 64 mm SL; Nansha (23°15.76'N, 102°50.20'E) in Yuanyan Co.; 300 m asl.

Diagnosis: *Garra caudofasciata* is distinguished from all other species of *Garra* and *Discogobio* by the presence of two dark, semicircular marks on the middle of each lobe of the caudal fin (vs. absence). The following characters (none of which is unique to the species) further help to distinguish it from the other species of *Garra* in the Yuanjiang drainage in Yunnan: two pairs of barbels (vs. none in *G. imberba*); 37-39 lateral line scales (vs. 46-52 in *G. imberba*, 40-42 in *G. micropulvinus*, and 32-35 in *G. orientalis*); 14-16 circumpeduncular scales (vs. 12 in *G. micropulvinus*); pharyngeal teeth in 2 rows, 3.5-5.3 (vs. 3 rows in *G. orientalis* and *G. imberba*); snout rounded, without a groove in front of nostrils (vs. with a groove in *G. orientalis*); and anus separated from anal-fin origin by 3 or 4 scales (vs. 2 in *G. orientalis* and close to pelvic-fin base in *G. imberba*).

Remarks: Wu (in Wu et al. 1977) established the genus *Placocheilus*, with *G. caudofasciata* as

the type species. It was diagnosed as having two (vs. three) rows of pharyngeal teeth and a different structure of the oral sucking disc. We have not observed significant differences in the oral sucking disc morphology (see Fig. 2). All species of *Garra* in China have three rows of pharyngeal teeth (Wu et al. 1977, Chu 1987, Chu and Cui 1987, Chu and Chen 1989), but we collected material of a still unidentified *Garra* species from the Nu Jiang (the upper Salween River) in Yunnan which has two rows of pharyngeal teeth, suggesting that variation in the number of rows of pharyngeal teeth occurs in the genus. Kottelat (2001a) already commented that a reduced number of teeth rows is a reductive character very difficult to interpret in a phylogenetic context and cannot be used to define genera. Several cyprinid genera are known in which most species have three rows of pharyngeal teeth except for a few species that have only two rows (e.g., *Chela*, *Telestes*). Therefore *Placocheilus* is treated here as a synonym of *Garra*.



Fig. 4. *Discogobio yunnanensis*, SWFC0111316, 78 mm SL, Yaodian, Wenshan Co., Yunnan.



Fig. 3. *Discogobio brachyphysallidos*, SWFC0112087, 74 mm SL, Shundianhe, Wenshan Co., Yunnan.



Fig. 5. *Garra caudofasciata*, SWFC9712992, 77 mm SL, Baiheqiao, Pinbian Co., Yunnan.

***Garra imberba* Garman**
(Fig. 6)

Garra (Ageneiogarra) imberba Garman 1912: 114 (Kiating [Loshan], Minjiang, Sichuan Prov.).

Discognathus pingi Tchang 1929: 241 (Kiating, Sichuan).

Garra pingi pingi: Wu et al. 1977: 373 (Jinshajiang, Yuanjiang, and Lancangjiang); Chu and Chen 1989: 270 (Hekou, Pinbian, Luchun, and Yuanyan).

Garra alticorpora Chu and Cui 1987: 96 (Pinbian).

Material examined: All from China, Yunnan: SWFC 97121150-97121157, 8, 91-220 mm SL; Xinxian (21°08.63'N, 103°32.86'E) in Pinbian Co.; 1400 m asl. - SWFC 97121301-97121308, 8, 84-178 mm SL; Baizhai (23°02.04'N, 103°45.59'E) in Pinbian Co.; 480 m asl. - SWFC 97120989-97120991, 9812024, 4, 71-110 mm SL; Baiheqiao (22°58.49'N, 103°47.94'E) in Pinbian Co.; 300 m asl. - SWFC 0111136-0111148, 0111233-0111241, 0111297, 23, 77.5-132 mm SL; Namoguo (23°08.628'N, 103°56.350'E) in Wenshan Co.; 765 m asl. - SWFC 0109001-0109008, 8, 45-97 mm SL; Xiaoluzhi (24°40.62'N, 102°57.77'E) in Yimen Co.; 1300 m asl. - KIZ 8540265, 8540266, 2, holotype and paratype of *G. alticorpora*, 173.5-174.0 mm SL; Baiheqiao (22°58.49'N, 103°47.49'E) in Pinbian Co.; 300 m asl.

Diagnosis: *Garra imberba* is distinguished from the species of *Garra* in the Yuanjiang drainage in Yunnan Province by the combination of the following characters: no barbels (vs. two pairs); 46-52 lateral line scales (vs. 32-35 in *G. orientalis*, 40-42 in *G. micropulvinus*, and 37-39 in *G. caudofasciata*), 16 circumpeduncular scales (vs. 12 in *G. micropulvinus*); pharyngeal teeth in 3 rows, 2.4-5.4.2 (vs. in 2 rows in *G. caudofasciata* and *G. micropulvinus*); snout rounded, no secondary rostrum, no longitudinal groove in front of nostrils (vs. with a groove forming a conspicuous notch and

secondary rostrum); anus close to pelvic-fin base (vs slightly in front of anal fin in *G. orientalis* and *G. caudofasciata*).

Remarks: The descriptions of both *G. imberba* and *G. pingi* are based on material from the Yangtze R. drainage in Kiating, Sichuan Province, and they are synonyms. *Garra imberba* Garman (1912: 114) was long erroneously considered to be an invalid name because it was thought to be a junior homonym of *G. imberbis* (Vinciguerra 1890: 277), a species from Myanmar (formerly Burma); therefore Chinese ichthyologists have treated *G. pingi* as the valid name. As discussed by Kottelat (2001a), although *imberba* and *imberbis* are both words with the same meaning and etymology, they are distinct words (in the sense of the International Code of Zoological Nomenclature) and *G. imberba* cannot be treated as a homonym of *G. imberbis*. Thus, *G. imberba* is valid and *G. pingi* is a junior synonym.

Wu et al. (1977), Chu and Cui (1987), and Chu and Cui (in Chu and Chen 1989) compared material of *G. imberba* from the Yangtze and Yuanjiang drainages and concluded that they are conspecific.

Garra alticorpora was described by Chu and Cui (1987) on the basis of 2 specimens from the Pinbian (Nanxihe, a tributary of the Yuanjiang). It was distinguished from *G. imberba* in that the body depth was equal to or longer than the head length (vs. shorter) and the body depth at anal-fin origin was equal to the distance from the tip of the snout to the posterior margin of the eye (vs. shorter). In fact, we observe that the body depth at the dorsal- and anal-fin origins shows intra- and inter-population variability (Table 1), and therefore we are unable to distinguish *G. alticorpora* from *G. imberba* by the above characters. Examination of the types of *G. alticorpora* revealed that their body



Fig. 6. *Garra imberba*, SWFC0111237, 85 mm SL, Namoguo, Wenshan Co., Yunnan.



Fig. 7. *Garra micropulvinus*, holotype, SWFC0111011, 107 mm SL, Gaji, Wenshan Co., Yunnan.

depth is greater than that of *G. imberba* collected at the same locality because they are gravid females and therefore we treat *G. alticorpora* as a synonym of *G. imberba*.

***Garra micropulvinus* Zhou,
Pan and Kottelat, sp. nov.**
(Fig. 7)

Holotype: SWFC 0111011, 107 mm. SL, China: Yunnan: Gaji (23°09.216'N, 104°27.383'E) from Panlonghe (a small branch of the Yuanjiang) in Xichou Co.; 885 m asl; W. Zhou and X. F. Pan, 23 Nov. 2001.

Paratypes: SWFC 0111001-0111010, 0111012-0111029, 26, 63.5-133.0 mm SL; same data as for holotype.

Diagnosis: *Garra micropulvinus* is distinguished from all species of *Garra* and *Discogobio* by having a median notch in the posterior margin of the posterior free fold of the oral sucking disc (vs. no notch), and 2-7 small fleshy buds between the skin fold and sides of the median pad (vs.

none).

Description: Dorsal fin iii, 7-8¹/₂; anal fin iii, 5¹/₂; pectoral fin i, 11; pelvic fin i, 8; branched caudal rays 9+8. Lateral line scales 40-42 (including scales on caudal-fin base), 5 scales from lateral line to dorsal-fin origin, 3 to pelvic-fin origin, 12 circumpeduncular scales. Gill rakers on outer side of 1st gill arch 9 or 10, on inner side 11 or 12. Pharyngeal teeth in 2 rows, 3.5-5.3, 2.4-4.2, or 2.3-3.2 (Fig. 6C). Counts and proportional measurements shown in table 1.

Body relatively elongate; cylindrical anteriorly, gradually compressed behind dorsal-fin base, abdomen smooth before pelvic-fin origin. Head moderately compressed, longer than wide. Interorbital area convex, snout rounded without depression in front of nostril or secondary rostrum. Tip of snout with numerous, small, irregularly distributed tubercles. Gill opening extending to ventral surface of head. Nostrils closer to anterior margin of eye than to tip of snout. Two pairs of barbels, rostral pair longer than or equal to half of eye diameter, maxillary pair shorter than rostral

Table 1. Counts and proportional measurements of *Garra micropulvinus*, *G. imberba*, and *G. alticorpora*

n	<i>G. micropulvinus</i>			<i>G. imberba</i>			<i>G. alticorpora</i>						
	29	8		8+4	23	2							
Locality	Gaji		Xinxian	Baizhai and Baiheqiao		Namoguo	Baiheqiao						
Drainage	Panlong River		Xinxian River	Nanxi River		Namoguo River	Nanxi River						
Dorsal fin rays	iii, 7-8 ¹ / ₂		iii, 9 ¹ / ₂	iii, 9 ¹ / ₂		iii, 9	iii, 8-9 ¹ / ₂						
Pectoral fin rays	i, 14		i, 15-16	i, 15-16		i, 15-16	i, 16						
Lateral line scales	40-42		49-50	48-50		48-50	48-49						
Predorsal scales	14		15	15		15	15						
Circumpeduncular scales	12		16	16		16	16						
In percent of standard length	mean	range	S.D.	mean	range	S.D.	mean	range	S.D.	range			
Predorsal length	46.5	41.0-51.2	2.16	45.9	42.3-48.4	1.65	46.3	41.8-50.0	2.10	48.0	45.5-51.6	1.55	47.3-48.9
Body depth	22.7	19.0-26.2	1.54	18.1	15.9-20.1	1.28	18.2	15.2-25.1	2.21	19.5	17.6-22.1	1.04	23.6-24.2
Head length	24.0	19.0-27.3	1.63	22.9	21.3-24.2	0.82	23.7	18.3-25.6	1.36	24.3	22.6-25.5	0.76	22.5-23.0
Caudal peduncle length	23.8	22.0-25.5	0.97	16.7	15.7-17.7	0.69	16.7	13.6-18.6	1.48	17.2	15.3-18.6	0.91	17.8-17.9
Caudal peduncle depth	12.4	10.0-14.0	0.75	10.5	9.8-11.3	0.57	10.8	9.6-12.7	0.94	11.2	10.3-12.6	0.54	11.5-11.8
In percent of head length													
Snout length	53.4	46.0-66.7	3.79	57.0	53.2-61.1	2.25	59.6	54.9-80.8	2.23	58.4	55.6-61.7	1.91	55.0-56.4
Eye diameter	12.4	9.1-16.3	1.63	22.2	19.6-23.4	1.16	22.8	20.6-36.9	1.69	23.9	21.5-25.9	1.34	18.8-20.5
Interorbital width	48.4	45.0-57.1	2.36	45.4	42.7-49.6	2.04	46.0	42.2-53.4	2.93	48.0	44.4-52.9	2.28	50.0-51.3
Body depth	95.1	83.0-117.0	7.71	79.4	68.2-87.2	6.19	77.0	65.6-90.5	7.16	80.6	71.7-96.7	5.34	102.5-107.7
In percent of body depth in front anal fin													
Distance between snout and postorbital	72.1	51.0-86.4	6.92	124.8	112.3-139.7	8.56	129.8	114.8-148.1	10.08	121.8	112.7-129.7	4.94	107.1-110.7
In percent of length of caudal peduncle													
Depth of caudal peduncle	52.2	45.0-59.4	3.45	63.1	55.1-68.8	4.52	65.2	54.5-80.9	8.75	65.3	56.7-76.9	4.56	64.5-66.1

pair. Eye moderately large, in posterior half of head, lateral, not visible in ventral view. Postorbital length of head shorter than snout length.

Mouth inferior, transverse, semicircular. Lower jaw covered with sharp horny edge. Rostral cap curved ventrally, covering upper jaw and continuous with lower lip at corner of mouth. Edge of rostral cap with small crenulations. Oral sucking disk with a notch in posterior margin, width equal to head width at level of mouth, posterior edge reaching to or beyond vertical through middle of eye. Gill rakers short, small, and widely set. Pharyngeal teeth small, surface smooth with sharp point at tip; pharyngeal bone thin and narrow (Fig. 8C). Swimbladder with 2 chambers (Fig. 8B), anterior chamber ovoid, covered by a membrane, posterior chamber very thin, length equal to or smaller than length of anterior chamber. Total length of gas bladder equal to or greater than postorbital length of head. Intestine long and coiled (Fig. 8A). Peritoneum brown and black.

Dorsal-fin origin near middle of body, slightly closer to snout tip than to caudal-fin base, in front of vertical through pelvic-fin origin, posterodorsal margin slightly concave. Distance between anal-fin origin and pelvic-fin base about half of distance

between anal-fin origin and caudal-fin base. Distal margin of anal-fin slightly concave. Tip of pectoral fin rounded, not reaching pelvic-fin origin, separated from it by 4 or 5 scales. Pelvic fin reaching to or beyond anal-fin origin. Caudal fin deeply forked, tip slightly pointed.

Lateral line complete and almost straight, with 40-42 scales. Scales on isthmus small, embedded in skin, gradually increasing in size until pelvic-fin base. Scales on breast and belly smaller than those on flank. Pelvic-fin base with axillary scales. Anus immediately in front of anal-fin origin.

Color pattern: Body brown and yellow, suffused with blue and black. Dorsum relatively dark and belly grayish. Scales on flank with bronze spots. Dorsal and caudal fins grayish black; pectoral and pelvic fins grayish black with light yellow hue; anal fin gray.

Distribution: *Garra micropulvinus* is presently only known from Panlonghe (a tributary of the upper Yuanjiang), Yunnan Province.

Habitat and ecology: *Garra micropulvinus* prefers stream stretches with a rapid current and stony substrate. They feed mainly on algae, occasionally on aquatic plants and larvae of aquatic insects. According to villagers, adults swim upstream in Sept.-Dec. and spawn in pools of clear water.

Etymology: *Micropulvinus* is derived from the latinized Greek prefix *micro* (small) and *pulvinus* (cushion or small pillow), alluding to the small central pad of the oral sucking disc. It is a noun in apposition.

***Garra orientalis* Nichols** (Fig. 9)

Garra orientalis: Nichols 1925: 4 (Fujian); Wu et al. 1977: 379 (Pearl R., Hang R., Min R., and Yuanjiang); Chu and

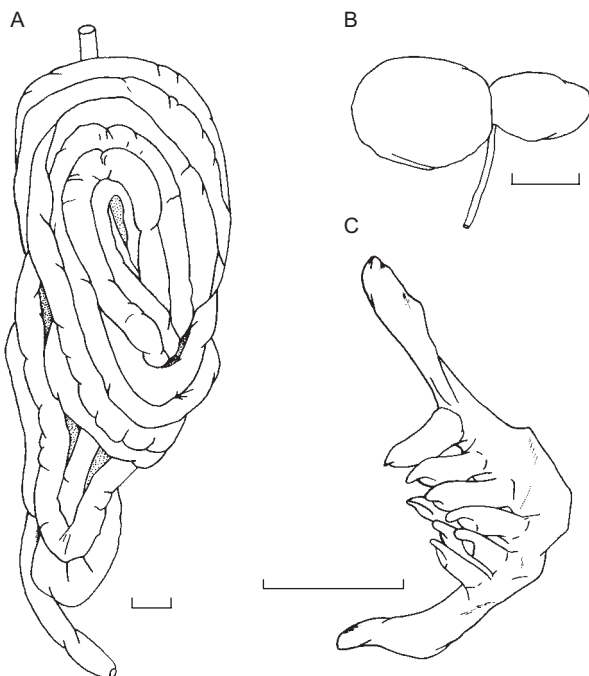


Fig. 8. *Garra micropulvinus*, paratype, SWFC0111021, 96 mm SL. (A) ventral view of digestive tract; (B) left lateral view of air bladder; (C) inner ventral view of left pharyngeal bone. Scale bars = 2 mm.



Fig. 9. *Garra orientalis*, SWFC97121423, 97 mm SL, Hekou, Hekou Co., Yunnan.

Chen 1989: 275 (Pinbian, Luchun, and Hekou).

Material examined: All from China, Yunnan: SWFC 9812024, 1, 75 mm SL; Baiheqiao (22°58.49'N, 103°47.94'E) in Pinbian Co.; 300 m asl. - SWFC 97121423-97121434, 12, 93~136 mm SL; Hekou (22°30.41'N, 103°58.16'E) in Hekou Co.; 80 m asl. - SWFC 0112001, 1, 69 mm SL; Chuantou (22°56.226'N, 104°50.904'E) in Malipo Co.; 175 m asl. - SWFC 0010021-0010023, 3, 82.0-110.0 mm SL; Jinshuihe (22°36.203'N, 103°09.546'E) in Jinping Co.; 284 m asl.

Diagnosis: *Garra orientalis* is distinguished from the species of *Garra* in the Yuanjiang drainage in the Yunnan by the following combination of characters: two pairs of barbels (vs. none in *G. imberba*); 32-35 lateral line scales (vs. 46-52 in *G. imberba*, 40-42 in *G. micropulvinus*, and 37-39 in *G. caudofasciata*); 16 circumpeduncular scales (vs. 12 in *G. micropulvinus*); pharyngeal teeth in 3 rows, 2.4.5-5.4.2 (vs. in 2 rows in *G. caudofasciata* and *G. micropulvinus*); snout rounded, with a groove in front of nostrils (vs. without groove in *G. micropulvinus*, *G. imberba*, and *G. caudofasciata*); and anus slightly in front of anal-fin origin, separated by 2 scales (vs. close to pelvic-fin base in *G. imberba*).

Remarks: In his synopsis of the freshwater fishes of northern Vietnam, Kottelat (2001a) considered that former records of *G. orientalis* from the Yuanjiang drainage in Vietnam probably referred to *G. bourreti* (Pellegrin, 1928). The *G. bourreti* he observed in northern Vietnam (in the Song Lo [Panlong in China]) had a conspicuous notch and a well-developed secondary rostrum (see Kottelat 2001a: fig. 22). This notch and the secondary rostrum were present in all (about 200) examined specimens and were already fully developed in specimens at only 70 mm SL and apparently in both sexes. Specimens from the Yuanjiang drainage in Yunnan include individuals up to 136 mm SL; they only have a groove across the snout, without a secondary rostrum and correspond to *G. orientalis* as recognized, e.g., by Wu et al. (1977). The observed differences in snout structure suggest that they probably represent dif-

ferent species. It cannot be excluded that *G. bourreti* could also be present in Yunnan.

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