

# *Acrossocheilus malacopterus*, a new non-barred species of cyprinid from South China

by

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**ABSTRACT.** - *Acrossocheilus malacopterus* n. sp. is described from the Yuan Jiang (Red River) and Zhu Jiang basins in South China. It is separated from other congeners by a combination of the following characters: an inconspicuously stripped body, 16 circumpeduncular scales, 47-49 lateral line scales, depth of caudal peduncle 7.8-9.3% SL, snout length 37.9-41.7% SL, dorsal-fin length 18.7-21.0% SL and last simple dorsal-fin ray slender with 8-10 fine serrations along posterior margin.

**RÉSUMÉ.** - *Acrossocheilus malacopterus*, nouvelle espèce de cyprinidés du sud de la Chine.

*Acrossocheilus malacopterus* n. sp. est décrit des bassins de Yuan Jiang (fleuve Rouge) et de Zhu Jiang (rivière des Perles), du sud de la Chine. Il se différencie des autres cyprinidés par la combinaison des caractères suivants : un corps légèrement plus étroit, 16 écailles circumpédunculaires, 47-49 écailles à la ligne latérale, hauteur du pédoncule caudal, longueur du museau et longueur de base de la nageoire dorsale représentant respectivement 7,8-9,3%, 37,9-41,7% et 18,7-21,0% de la longueur standard, dernier rayon non branchu de la nageoire dorsale mince présentant 8-10 fines dentelures le long de son bord postérieur.

Key words. - Cyprinidae - *Acrossocheilus malacopterus* - South China - Red River - Pearl River - New species - Taxonomy.

*Acrossocheilus* Oshima, 1919 is an exclusive Southeast and East Asian cyprinid genus broadly known from South China, Vietnam and Laos. It has been placed either in the subfamily Barbinae (Wu *et al.*, 1977; Chen *et al.*, 1984; Chu, 1984; Chu and Cui, 1989; Shan *et al.*, 2000) or in the subfamily Cyprininae comprising four subfamilies traditionally recognized by Chinese authors, viz. Barbinae, Cyprininae, Labeoninae and Schizothoracinae (Howes, 1991; Rainboth, 1991; Cavender and Coburn, 1992). According to Rainboth's (1991) system for Asian cyprinid fishes, this genus is referred to the tribe Poropuntii (= Poropuntini) of the subfamily Cyprininae. It can be distinguished from all other genera of this tribe in having the following combination of characters: a rostral fold present; lips fleshy, continuous around corner of mouth; lower lip with a median interruption; mouth inferior; horny sheath on lower jaw; two pairs of barbels; last simple ray of dorsal fin osseous, with a serrated or smooth posterior margin (Kottelat, 2000a).

About 22 nominal species or subspecies are described in *Acrossocheilus*. Wu *et al.* (1977) revised the Chinese *Acrossocheilus* species and identified 19 species or subspecies. Later, Chu and Cui (1989) described *A. stenotaeniatus* from the Nanpan Jiang of the upper Zhu Jiang (Pearl River) basin, Chen *et al.* (1991) validated *Barbus rendahli* Lin, 1931 and transferred it to *Acrossocheilus*, and Zhao *et al.* (1997) described *A. jishouensis* from the Yuan Jiang (not to be confused with its homonym [Red River] in Yunnan); this Yuan

Jiang is a tributary draining to the Dongting Lake, connected to the middle reach of the Chang Jiang (Yangtze River)] basin in Jishou, Hunan. Oddly, *A. rendahli* and *A. jishouensis* were missing in the review of this genus by Shan *et al.* (2000), who followed Wu *et al.* (1977) and recognized nineteen species or subspecies from China. Outside China, Kottelat (2000a) described *A. xamensis* from the Nam Xam basin in Laos, pointing out that it is the very species formerly misidentified by Chinese authors as *Barbus krempfi* Pellegrin & Chevey, 1934 and that the real *B. krempfi* is a species of *Poropuntius* Smith, 1931 (see Kottelat, 1998). Mai (1978) discussed the Vietnamese species of *Acrossocheilus* from the Red River basin. His work, however, is a controversial work of very limited use. So, Kottelat (2001a) provided a preliminary check-list of the fishes from northern Vietnam and provisionally treated *Lissochilus lamus* Mai, 1978 as valid.

Presently, *Acrossocheilus elongatus* (Pellegrin & Chevey, 1934) is considered as valid by Chinese authors (Shan *et al.*, 2000), but the species remains poorly known. The materials from the Yuan Jiang (Red River) basin in Yunnan and Bei Jiang of the Zhu Jiang basin in Guangdong were described by Wu *et al.* (1977) as *A. elongatus*. It has since been documented from the Zhu Jiang basin in Yunnan, Guangxi, Guizhou and Guangdong, and Yuan Jiang (Dongting drainage) basin in Guizhou (Wu, 1989; Chen *et al.*, 1991; Shan *et al.*, 2000). But the Yuan Jiang (Dongting drainage) form had already been described by Zhao *et al.*

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(1997) as *A. jishouensis*. Wu's (1989) material of *A. elongatus* from the Xiongtao He (a tributary of the Yuan Jiang basin) in Guizhou in fact belongs to this species. Additionally, Kottelat's (2000b) examination of the holotype of *C. elongatus* showed that it is a misidentified species of *Onychostoma* Günther, 1896. Accordingly, the material previously identified by Chinese authors as *A. elongatus* from the Yuan Jiang (Red River) and Zhu Jiang basin represents an undescribed species, herein named as *A. malacopterus*.

## MATERIAL AND METHODS

Measurements were taken point to point with digital readout callipers and data recorded to 0.1 mm. Counts and measurements were taken on the left side of individual whenever possible. Methods of counts and measurements follow those of Kottelat (2001b) with the exception of the lateral line scales. Its count includes scales on the caudal-fin base. Additional measurements are: predorsal, prepectoral, prepelvic and preanal length. All these lengths are the body lengths made from the anterior tip of the snout to the dorsal-, pectoral-, pelvic- and anal-fin origin, respectively. Subunits of the head are presented as proportions of the head length (HL). Head length itself and measurements of body parts are expressed as percentages of the standard length (SL). Statistics 5.0 (Wilkinson *et al.*, 1992) was utilized for the basic statistic analysis on morphometric data and also for the principal component analysis that was conducted on the variance-covariance matrix of the log-transformed measurements.

Toponymy utilized for distribution data in the present paper follows local Chinese usage. The Chinese portion of the Red River is known locally as the Yuan Jiang. The Pearl and Yangtze Rivers are the English names for the Zhu Jiang and Chang Jiang in Chinese.

The examined specimens are housed in the collection of the Freshwater Fish Museum of the Institute of Hydrobiology (IHB), Chinese Academy of Sciences, Wuhan, Hubei Province, P. R. China.

### Comparative material

*Acrossocheilus ikedai* (Harada, 1943): IHB 76V5087-88 76V9249, 76V9251-53, 76V9256-58, 76V9260, 10 specimens, 75.3-107.2 mm SL, Chang Jiang basin in Qiongzong, Hainan Island, coll. Y.L. Luo, 1976.

*Acrossocheilus xamensis* Kottelat, 2000: IHB 642149, 6440085, 6440397, 6440407, 640410, 6440417, 6440441, 6440450, 6440452, 6440463, 6440560, 6440563, 6440568-69, 6450174, 6450178, 6450209, 6450344, 6450620, 6450629, 20 spms, 75.3-107.0 mm SL, Yuan Jiang (Red River) basin in Yunnan, coll. G.R. Yang, 1964; IHB 634040-

43, 4 spms, 200.0-235.3 mm SL, Luosuo Jiang (a tributary flowing to the Lancang Jiang basin) in Mengla, Yunnan, coll. P.Q. Yue, 1963.

*Acrossocheilus yunnanensis* (Regan, 1904): IHB 636428-30, 636434-35, 636494, 636498, 636566, 636568, 636574, 636582-84, 636588, 15 spms, 100.5-169.0 mm SL, Huxian Lake, Yunnan, coll. G.R. Yang, 1964; IHB 6650234, 6650237-38, 6650253-54, 6650258, 6650622, 6650625, 6660777, 6660783, 10 spms, 100.2-215.5 mm SL, Wu Jiang (a tributary flowing to the upper Chang Jiang) basin in Zunyi, Guizhou, coll. Y.D. Lin, 1966.

### ACROSSOCHEILUS MALACOPTERUS N. SP.

(Figs 1-4, 6-7, Tabs I-III)

*Acrossocheilus (Acrossocheilus) elongatus* (Pellegrin & Chevey, 1934): Wu *et al.*, 1977: 285; Wu, 1989: 137 (in part).

*Acrossocheilus elongatus*: Fang, 1981: 77; Pan and Li, 1981: 5; Zheng, 1989: 182; Chu and Cui, 1989: 204; Chen *et al.*, 1991: 149; Shan *et al.*, 2000: 110.

### Material examined

*Holotype*. - IHB 660286, 125.1 mm SL, Lian Jiang (a tributary flowing to the Bei Jiang of the Zhu Jiang basin) in Yangshan, Guangdong, coll. Y.H. Chen, 1966.

*Paratypes*. - IHB 6440303-4, 2 spms, 133.1-152.9 mm SL, Yuan Jiang (Red River) in Hekou, Yunnan, coll. G.R. Yang, 1964; IHB 660288, 1 spms, 131.9 mm SL, same data as holotype; IHB 74XII1413, 73X2142, 2 spms, 129.7-136.4 mm SL, Rong Jiang (a tributary flowing to the Liu Jiang of the Zhu Jiang basin) in Rong'an, Guangxi, coll. P.Q. Yue, 1974; IHB 660067-8, 2 spms, 122.2-131.1 mm SL, Lian Jiang (a tributary draining to the Bei Jiang of the Zhu Jiang basin) in Liangxian, Guangdong, coll. Q.J. Wu, 1966.

### Diagnosis

*Acrossocheilus malacopterus* is separated from all other congeners by a combination of the following characters: an inconspicuously stripped body, 16 circumpeduncular scales, 47-49 lateral line scales, depth of caudal peduncle 7.8-9.3% SL, snout length 37.9-41.7% SL, dorsal-fin length 18.7-21.0% SL and last simple dorsal-fin ray slender with 8-10 fine serrations along posterior margin. The most similar species, *A. yunnanensis*, has a stout last simple dorsal-fin ray with 16-24 thick serrations along posterior margin, a long snout (length 37.9-41.7% HL) and a long dorsal fin (length 22.1-26.2% SL).

### Description

See figure 1 for general appearance and table I for mor-

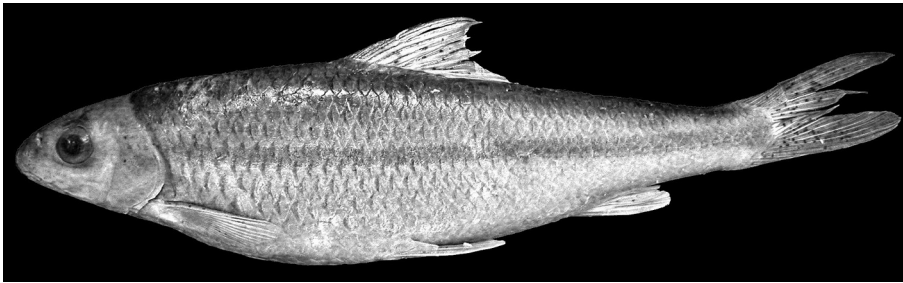


Figure 1. - *Acrossocheilus malacopterus* n. sp., lateral view of the holotype (IHB 660286, 125.1 mm SL; China: Guangdong: Yangshan). [Vue latérale de l'holotype.]

phometric and meristic data of the holotype and 7 paratypes.

Body elongate and compressed; dorsal profile somewhat convex and ventral one round. Head moderately large; interorbital space slightly convex. Snout obtuse and protruding, with a lateral deep groove running along anteroventral margin of lachrymal, confluent with postlabial groove and without tubercle. Mouth subterminal and horse-shoe shaped. Rostral fold pendulous, overlying base of upper lip. Upper lip thick, fully adnate to upper jaw, continuous with lower lip at corner of mouth. Lower lip smooth, confined to side of lower jaw, with a broad interruption, greater than half of mouth opening. Postlabial groove anteromedially extended. A straight and sharp horny sheath on lower jaw. Two pairs of barbels, rostral pair extremely tiny and maxillary pair slightly longer, approximately equal to half of eye diameter. Naris closer to anterior margin of eye than to tip of snout. Eye moderately large, laterodorsally positioned. Air bladder bipartite, anterior chamber round and posterior chamber slender, twice as long as anterior one. Gill rakers sparse, short and small.

Dorsal fin with 3 simple and 8 branched rays, last one split to base; last simple ray slender with 8-10 thin serrations along posterior margin (Fig. 2B); origin closer to snout tip than base of to caudal fin; distal margin slightly concave. Pectoral fin with 1 simple ray and 15-16 branched rays, reaching somewhat beyond halfway to pelvic-fin origin. Pelvic fin with 1 simple ray and 8-9 branched rays, reaching somewhat beyond midway to anal-fin origin but not as far as to anus; origin somewhat behind dorsal-fin origin; axillary scales present, long, reaching beyond basis of last ray. Anal fin with 3 simple and 5 branched rays; origin in midway between pelvic-fin origin and caudal-fin base; distal margin truncate. Anus located immediately anterior to anal-fin origin. Caudal deeply forked, longest ray more than 2 times as long as shortest ray.

Body scales moderately large dorsally and laterally, and slightly reduced ventrally. Lateral line complete, with 47-49 perforated scales, extending medially along caudal peduncle, 6-7<sup>1/2</sup> scale rows above lateral line; 4 or 5<sup>1/2</sup> scale rows below. 14-16 predorsal mid-line scales, almost of same size as flank scales and not embedded in skin. 16 circumpeduncular scales.

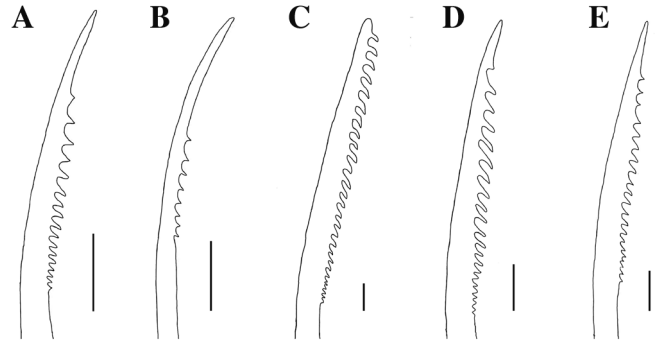


Figure 2. - Schematic illustration of serrations along posterior margin of last simple dorsal-fin ray in five Chinese non-barred species of *Acrossocheilus*. A: *A. ikedai* (IHB 76V9253, 93.1 mm SL); B: *A. malacopterus* (IHB 73X2142, 129.7 mm SL); C: *A. cf. xamensis* (IHB 634040, 200.2 mm SL, Lancang Jiang basin); D: *A. xamensis* (IHB 645629, 137.8 mm SL, Yuan Jiang basin); E: *A. yunnanensis* (IHB 636494, 157.2 mm SL). Scale bars = 5 mm. [Illustration schématique des dentelures le long du bord postérieur du dernier rayon non branchu de la nageoire dorsale chez cinq espèces chinoises d'*Acrossocheilus*. Échelles = 5 mm.]

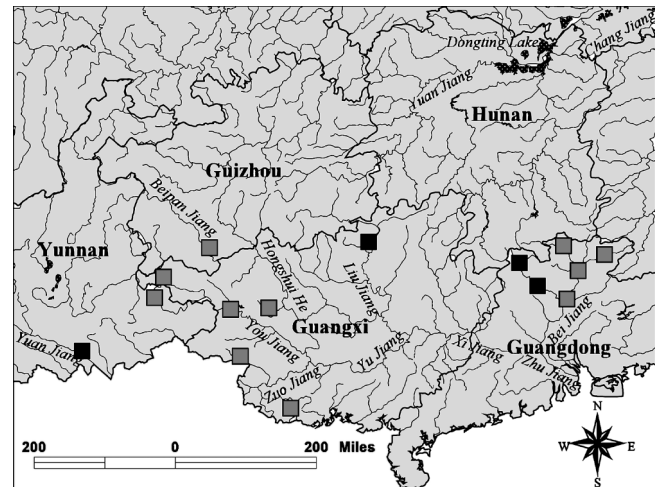


Figure 3. - Distribution of *Acrossocheilus malacopterus* in China. Grey symbols indicate localities based on previous literature and black symbols localities of examined materials. [Distribution d'*Acrossocheilus malacopterus* en Chine. Les symboles gris indiquent des localités repérées dans la littérature et les symboles noirs celles qui correspondent aux matériels examinés.]

**Colour in preservation**

Body pale brown dorsally, yellowish ventrally, with an inconspicuous dark grey stripe along lateral line. Dorsal fin

Table I. - Comparison of morphometric measurements for five Chinese non-barred species of *Acrossocheilus*. [Comparaison des mesures morphométriques de cinq espèces chinoises d'*Acrossocheilus*.]

Morphometric measurements	<i>A. ikedai</i> (n = 10)				<i>A. malacopterus</i> n. sp. (n = 8)				<i>A. cf. xamensis</i> (n = 4)				<i>A. xamensis</i> (n = 20)				<i>A. yunnanensis</i> (n = 25)						
	Min	Max	Mean		SD	Holotype	Paratypes		Min	Max	Mean		SD	Min	Max	Mean		SD	Min	Max	Mean		SD
			Min	Max			Min	Max			Min	Max				Min	Max				Min	Max	
SL (mm)	75.3	107.0	88.7	10.0	125.1	122.2	152.9	132.8	9.3	200.0	235.3	214.4	16.2	87.1	142.9	140.6	19.7	100.2	215.5	140.6	24.0		
	In % standard length																						
Body depth	26.8	31.5	28.3	1.3	27.6	22.9	27.9	25.9	1.7	32.1	33.3	32.4	0.6	29.1	35.7	32.1	1.6	21.3	30.9	25.8	2.2		
Head length	21.6	24.9	23.5	1.1	22.6	21.3	22.8	22.1	0.5	20.3	21.1	20.6	0.4	21.9	25.0	23.3	0.9	20.0	26.1	22.7	1.4		
Dorsal-fin length	19.5	23.3	21.8	1.3	19.0	18.7	21.0	19.9	0.8	24.9	28.5	27.0	1.7	20.7	27.1	24.0	1.5	22.1	26.2	23.9	1.2		
Pectoral-fin length	20.4	22.6	21.3	0.7	16.3	15.6	19.2	17.2	1.1	18.5	20.7	19.8	0.9	20.6	23.4	21.7	0.8	17.5	23.2	19.7	1.2		
Pelvic-fin length	18.6	21.1	20.0	0.9	15.2	14.2	17.6	15.8	1.2	18.1	19.4	18.9	0.6	18.7	21.4	20.1	0.8	13.4	19.6	16.3	1.9		
Anal-fin length	17.0	21.0	19.2	1.2	14.9	14.7	16.8	15.6	0.8	15.0	17.4	16.7	1.1	15.9	19.8	18.5	0.9	11.7	20.6	17.0	2.4		
Length of caudal peduncle	17.4	19.9	18.7	0.7	15.9	14.7	17.5	15.7	0.9	18.7	21.8	19.6	1.5	16.2	21.2	19.4	1.2	15.9	20.2	17.7	1.1		
Depth of caudal peduncle	10.4	11.7	11.0	0.5	9.1	7.8	9.3	8.5	0.5	11.5	12.2	11.9	0.3	11.1	13.4	12.5	0.5	8.2	10.2	9.4	0.8		
Predorsal length	49.1	53.6	51.5	1.4	46.5	46.3	48.8	47.7	1.0	51.0	53.0	52.0	0.8	52.8	56.5	54.0	1.0	48.0	53.1	50.3	1.4		
Prepectoral length	22.1	25.6	24.1	1.2	23.4	21.8	24.0	23.0	0.7	20.2	22.0	21.0	0.7	21.3	26.7	24.0	1.6	20.2	26.6	23.3	1.7		
Prepelvic length	48.1	51.2	50.1	0.9	52.9	51.1	54.4	53.3	1.2	44.2	46.1	45.2	0.8	46.9	51.6	48.9	1.1	48.8	53.0	50.5	1.1		
Preanal length	69.4	75.2	73.4	1.5	76.3	75.4	79.6	77.6	1.6	70.4	74.0	72.8	1.6	70.7	76.6	72.5	1.3	73.6	78.0	75.8	1.2		
	In % head length																						
Snout length	24.9	32.9	30.6	2.4	39.6	37.9	41.7	39.7	1.4	32.0	39.2	34.3	3.3	25.9	35.3	31.5	2.5	27.5	37.3	33.8	2.6		
Eye diameter	27.0	31.7	28.9	1.5	22.8	21.8	24.1	23.0	0.7	22.1	23.2	22.8	0.5	26.8	31.8	29.1	1.3	22.7	29.0	25.7	1.7		
Interorbital width	32.5	37.7	35.0	1.7	36.9	34.4	40.4	38.3	2.1	41.1	46.1	44.0	2.5	34.7	43.4	38.0	1.8	30.9	45.2	37.6	3.4		
Meristic counts																							
Dorsal-fin rays	iv, 8 <sup>1/2</sup>				iv, 8 <sup>1/2</sup>					iv, 8 <sup>1/2</sup>				iv, 8 <sup>1/2</sup>					iv, 8 <sup>1/2</sup>				
Pectoral-fin rays	i, 14-15				i, 15-16					i, 15-16				i, 15-16					i, 16-17				
Pelvic-fin rays	i, 8				i, 8-9					i, 8				i, 8					i, 8				
Anal-fin rays	iii, 5 <sup>1/2</sup>				iii, 5 <sup>1/2</sup>					iii, 5 <sup>1/2</sup>				iii, 5 <sup>1/2</sup>					iii, 5 <sup>1/2</sup>				
Lateral line scales	32-35				47					47-49				35-39					44-47				
Scales above lateral line	6				6 <sup>1/2</sup>					6				6-7					6-8				
Scales below lateral line	2 <sup>1/2</sup> +3				5					3				3					4 <sup>1/2</sup> -5				
Predorsal scales	12-15				16					14-16				14-15					14-18				
Circumpeduncular scales	14				16					14				14					16				
Serrae along posterior margin of last simple dorsal-fin ray	17-22, thick				10, fine					8-12, fine				25-28, thick					25-28, thick				

with dark grey streaks on interradiar membranes of submargin and some irregular spots on lower half of branched rays. Pectoral, pelvic and anal fins yellowish. Caudal fin plain greyish, sometimes with many irregular spots on rays.

**Distribution**

*Acrossocheilus malacopterus* is known from the Yuan Jiang (Red River) in Yunnan and the Zhu Jiang basin in Guangdong, Guangxi and Guizhou, South China (Wu, 1989; Zheng, 1989; Chen *et al.*, 1991; Shan *et al.*, 2000) (Fig. 3).

**Etymology**

The name is derived from the Greek *malacos* (soft) and *pteryx* (fin), in allusion to a spinous but slender last simple dorsal-fin ray.

**DISCUSSION**

The systematics of *Acrossocheilus* is confused and in need of revision. Some confusion of the identifications of the species so far described in *Acrossocheilus* has been clarified by Kottelat (1998, 2000a, 2001a). Kottelat (2001a) recognized two species-groups of *Acrossocheilus* on the basis of colour pattern. The first is the barred group including species with 5-8 vertical black bars on the side of the body. The second is the non-barred group consisting of species with a plain or inconspicuously striped body. Tentatively, *A. malacopterus* is assigned to the non-barred group.

As herein understood, there are five non-barred species of *Acrossocheilus* in China, viz. *A. ikedai* from river basins in Hainan Island, *A. malacopterus* from the Yuan Jiang (Red River) and Zhu Jiang basins, *A. cf. xamensis* from the Lancang Jiang (Mekong River) basin, *A. xamensis* from the Yuan Jiang (Red River) and *A. yunnanensis* from the Zhu Jiang and Chang Jiang basins. Both *A. cf. xamensis* and *A. xamensis* were previously recognized as *A. krempfi* (Wu *et al.*, 1977; Chu and Cui, 1989). Kottelat (2000a) commented that the *A. krempfi* of Chinese authors from the Red River basin is possibly conspecific with *A. xamensis*, a species that was simultaneously described by him from the Nam Xam of the Ma basin in Laos and that the *A. krempfi* of Chinese authors from the Lancang Jiang basin perhaps represents other unnamed species. I agree that the Yuan Jiang basin form is identical to *A. xamensis*, but cannot be absolutely sure that the Lancang Jiang basin form is distinct from *A. xamensis*.

Based on examination of available materials, marked differences were found between the Yuan Jiang and Lancang Jiang basin forms in the number of serrations along the posterior edge of the last simple dorsal-fin ray (17-22 vs 24-28) and also in such morphometric measurements as the head

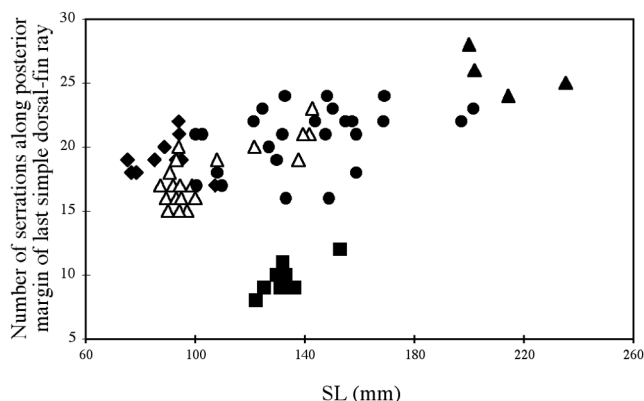


Figure 4. - Scatterplot of the number of serrations along posterior margin of the last simple ray of the dorsal fin against SL for four Chinese non-barred species of: *A. ikedai* (◆); *A. malacopterus* (■); *A. cf. xamensis* (▲); *A. xamensis* (△); *A. yunnanensis* (●). [Répartition du nombre de dentelures le long du bord postérieur du dernier rayon branchu de la nageoire dorsale en fonction de la longueur standard chez quatre espèces d'*Acrossocheilus*.]

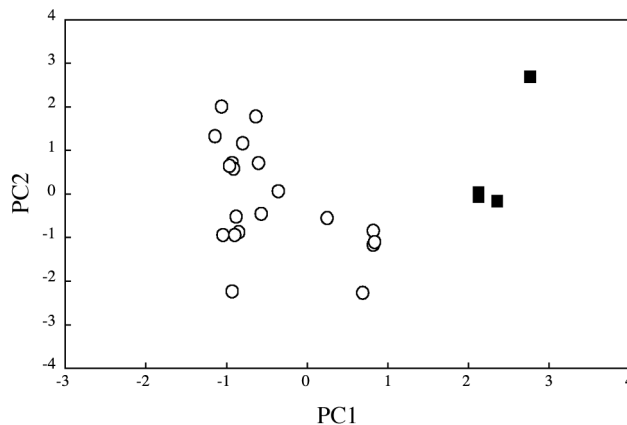


Figure 5. - Scatterplot of the first two principle components for *Acrossocheilus cf. xamensis* (■) and *A. xamensis* (○). [Répartition des deux premières composantes principales d'*Acrossocheilus cf. xamensis* (■) et de *A. xamensis* (○)].

length (21.9-25.0% SL vs 20.3-21.1), eye diameter (26.8-31.8% HL vs 22.1-23.2) and prepelvic length (46.9-51.6% SL vs 44.2-46.1) (Tab. I). However, there is a difference in the size of the studied specimens as the Lancang Jiang basin material was 200.0-235.5 mm SL and the Yuan Jiang basin material 87.1-142.6 mm SL. The observed differences might be related to size difference. The number of serrations along the posterior edge of the last simple dorsal-fin ray from the Yuan Jiang and Lancang Jiang basin materials was revealed in the present analysis to be size-related (Fig. 4); the same applies to the other three species: *A. ikedai*, *A. malacopterus* and *A. yunnanensis*. In the principle component analysis run on the variance-covariance matrix of log-transformed measurements for the studied specimens (Tab. II, Fig. 5), PC1 (the first principal component), which is considered as the

Table II. - Loading on the first three principle components for each morphometric measurement respectively for *A. malacopterus* n. sp. and *A. yunnanensis* and for *A. cf. xamensis* and *A. xamensis*. [Trois principales composantes pour chaque mesure morphométrique de *A. malacopterus* n. sp. et *A. yunnanensis* et de *A. cf. xamensis* et *A. xamensis*.]

	<i>A. malacopterus</i> and <i>A. yunnanensis</i>			<i>A. cf. xamensis</i> and <i>A. xamensis</i>		
	PC1	PC2	PC3	PC1	PC2	PC3
Standard length	0.219	-0.039	-0.223	0.250	-0.004	0.052
Body depth	0.285	0.152	-0.046	0.261	-0.036	-0.127
Head length	0.196	-0.057	-0.156	0.211	0.093	-0.127
Snout length	0.212	0.430	-0.148	0.216	0.104	0.064
Eye diameter	0.173	-0.361	0.064	0.141	-0.163	-0.260
Interorbital space	0.265	0.130	-0.046	0.256	-0.093	0.039
Dorsal-fin length	0.252	-0.344	0.130	0.285	-0.135	0.603
Pectoral-fin length	0.236	-0.229	0.262	0.232	-0.268	-0.272
Pelvic-fin length	0.232	0.169	0.438	0.242	-0.192	-0.176
Anal-fin length	0.317	0.052	0.519	0.288	-0.387	-0.060
Length of caudal peduncle	0.208	-0.447	-0.375	0.247	0.312	0.513
Depth of caudal peduncle	0.282	-0.026	0.123	0.236	-0.116	0.049
Predorsal length	0.226	-0.128	-0.010	0.238	-0.034	0.001
Prepectoral length	0.188	-0.021	-0.162	0.201	0.115	-0.181
Prepelvic length	0.207	0.055	-0.330	0.228	0.046	-0.170
Preanal length	0.217	0.025	-0.191	0.252	-0.048	-0.018

general size factor (Schaefer, 1991), separates the Lancang Jiang basin form from the Yuan Jiang basin form. But PC 2, the main shape factor (James and McCulloch, 1990), does not allow this separation, indicating that the differences in the above-mentioned morphometric measurements between the Lancang Jiang and Yuan Jiang basin form are size-related. Consequently, the identification of the Lancang Jiang basin material as *A. cf. xamensis* remains tentative.

*Acrossocheilus rendahli* is provisionally recognized as a synonym of *A. yunnanensis* here. Lin (1931) described *Barbus rendahli* based on a single 143.0 mm SL specimen from Shaoguan, northern Guangdong (in the Bei Jiang of the Zhu Jiang basin), China. The original description of the species stated that the type material was stored in Sun Yat-Sen University, Guangzhou, South China, but it has been misplaced or lost. Although Wu *et al.* (1977) pointed out that *B. rendahli* possibly belongs to a species closely allied to *A. elongatus* (here recognized as *A. malacopterus*), the validity of *A. rendahli* still remained unsettled because they had access to neither the type nor topotypes. Chen *et al.* (1991) validated *A. rendahli* on the basis of material from the Bei Jiang of the Zhu Jiang basin. In terms of Chen *et al.*'s description, *A. rendahli* is similar to *A. yunnanensis* in the presence of a spinous and stout last simple dorsal-fin ray, a character used with confidence to distinguish both from *A. malacopterus* having a slender last simple dorsal-fin ray. In the figure of *A. rendahli* by Chen *et al.* (1991), it has 48 lateral line scales, as recorded by Lin (1931) from the holotype (48-49 on the two sides). This number lies outside the range they listed (43-46). This variation could be

better explained by the use of a different method to count lateral line scales. Scales on the caudal-fin base were not included in Chen *et al.*'s count. In this case, no distinct variation in the number of the lateral line scales can be found between *A. rendahli* and *A. yunnanensis* (44-47, Tab. III). In addition, other morphometric and meristic data for *A. rendahli* provided by Chen *et al.* (1991) are not quite different from those for *A. yunnanensis* done in the present study

	<i>A. rendahli</i>		<i>A. malacopterus</i>	<i>A. yunnanensis</i>
	Lin (1931)	Chen <i>et al.</i> (1991)	Present study	Present study
SL (mm)	143.0 (n = 1)	92.0-173.0 (n = 12)	122.2-152.9 (n = 8)	100.2-215.5 (n = 25)
	In % standard length			
Body depth	4.1	3.1-4.5	3.6-4.4	3.3-4.7
Head length	4.6	2.1-5.1	4.4-4.7	3.8-5
Depth of caudal peduncle	12.9	10.8-12.4	10.8-12.8	8.7-12.9
Length of caudal peduncle	6.9	5.1-8.2	5.7-6.8	4.8-6.3
Pectoral-fin length	6.9	-	3.4-5.2	4.3-5.7
Dorsal-fin length	6.0	-	4.8-5.4	3.8-4.9
Pelvic-fin length	6.9	-	5.7-7.0	5.1-7.5
Anal-fin length	7.3	-	6.0-6.8	4.9-8.6
	In % head length			
Snout length	2.5	2.7-3.2	2.4-2.6	2.7-3.6
Eye diameter	4.4	3.2-4.8	4.2-4.6	3.5-4.4
Introrbital width	3.1	2.5-3.1	2.5-2.9	2.2-3.2

Table III. - Comparison of some morphometric measurements among *Acrossocheilus rendahli*, *A. malacopterus* n. sp. and *A. yunnanensis*. [Comparaison de certaines mesures morphométriques chez *Acrossocheilus rendahli*, *A. malacopterus* n. sp. et *A. yunnanensis*.]

(Tab. III). Apparently, *A. rendahli* is conspecific with *A. yunnanensis*.

*Acrossocheilus yunnanensis* is the species most similar to *A. malacopterus*. Both have 16 circumpeduncular scales, 45-49 lateral line scales and a shallow caudal peduncle (depth 7.8-10.2% SL; Fig. 6), a combination segregating them from *A. ikedai*, *A. cf. xamensis* and *A. xamensis*. In contrast, these three species possess 25-39 lateral line scales, 14 circumpeduncular scales and a deep caudal peduncle (depth 10.4-13.4% SL). In the principle component analysis conducted on the variance-covariance matrix of log-transformed measurements for the studied specimens (Tab. II, Fig. 7), PC 2 distinguishes clearly *A. malacopterus* from *A. yunnanensis*. There are four measurements with main loadings on PC2: snout length, eye diameter, dorsal-fin length and length of the caudal peduncle, of which the snout and

dorsal-fin lengths are characters that can be used with confidence to separate *A. malacopterus* from *A. yunnanensis*. The snout length % SL is 37.9-41.7 in *A. malacopterus*, but 27.5-37.3 in *A. yunnanensis*. The dorsal-fin length % SL is 18.7-21.0 in *A. malacopterus*, but 22.1-26.2 in *A. yunnanensis*. *Acrossocheilus malacopterus* is further distinguished from *A. yunnanensis* in the presence of a slender (*vs* strong) last simple dorsal-fin ray, with 8-10 (*vs* 16-24, Fig. 4) fine (*vs* thick) serrations along its posterior margin.

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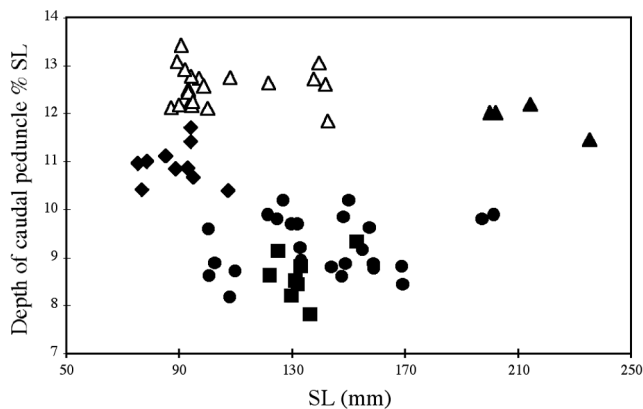


Figure 6. - Scatterplot of the depth of the caudal peduncle % SL against SL for four Chinese non-barred species of *Acrossocheilus*. *A. ikedai* (◆); *A. cf. xamensis* (▲); *A. xamensis* (△); *A. malacopterus* (■); *A. yunnanensis* (●). [Répartition de la hauteur du pédoncule caudal en % de la longueur standard en fonction de la longueur totale pour quatre espèces chinoises d'*Acrossocheilus*.]

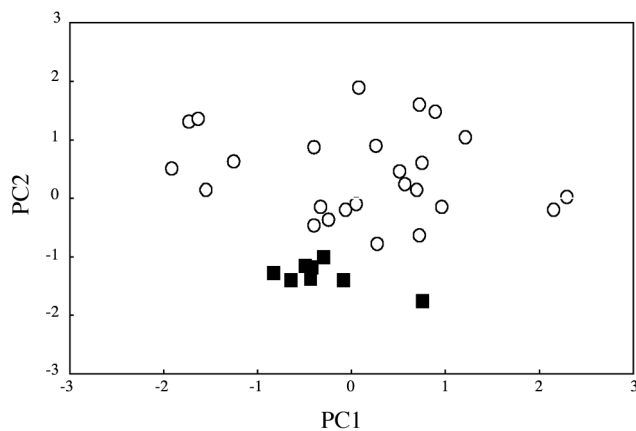


Figure 7. - Scatterplot of the first two principle components for *Acrossocheilus malacopterus* (■) and *A. yunnanensis* (○). [Répartition des deux premières composantes principales d'*Acrossocheilus malacopterus* (■) et de *A. yunnanensis* (○).]

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