

The Hypogean fishes of China

Aldemaro Romero · Yahui Zhao · Xiaoyong Chen

Received: 7 October 2008 / Accepted: 6 January 2009 / Published online: 15 April 2009
© Springer Science + Business Media B.V. 2009

Abstract China has 92 described species of hypogean (cave and artesian) fishes. That is nearly one third of all the described hypogean fish species (299), more than any other country. Of all Chinese hypogean fishes 56 species show troglomorphisms, i.e., adaptations that have been correlated to the hypogean environment such as reduction and/or loss of eyes, pigmentation, and the gas bladder. Additionally, two other characters seem to be unique to some Chinese hypogean species: presence of a horn-like structure and hyperdevelopment of the dorsal protuberance

similar to a humpback. Despite the fact that the first written account of a cave fish was for species found in China in 1540 (Romero 2001; and Introduction to this special volume), almost all the new descriptions have taken place in the last 20 years mostly in papers written in Chinese and/or in journals of difficult access outside China. This paper summarizes all the knowledge we have on the hypogean fishes of China and puts them in context regarding all the hypogean fishes in the world.

Keywords Hypogean fishes · Biodiversity · Systematics · Taxonomy · Geographical distribution; convergent evolution

Aldemaro Romero and Yahui Zhao have contributed equally to this article.

A. Romero (✉)
Department of Biological Sciences,
Arkansas State University,
P.O. Box 599, Jonesboro, AR 72467, USA
e-mail: aromero@astate.edu

Y. Zhao
Key Laboratory of Zoological Systematics and Evolution,
Institute of Zoology,
Chinese Academy of Sciences,
Datun Road, Chaoyang District,
Beijing 100101, People's Republic of China

X. Chen
Kunming Institute of Zoology, Chinese Academy of
Sciences,
No.32 Jiaochang Donglu,
Kunming 650223 Yunnan, People's Republic of China

Introduction

There are about 28,000 fish species in the world (Nelson 2006). More than 4,600 species have been reported for China (including Taiwan) (Wu et al. 1999). Of all fish species 299 have been reported for the hypogean (cave, phreatic) environment. Of those, 92 species belonging to three families are found in China. Furthermore, most of the hypogean fishes that have been described in the last two decade are from Asia, particularly from China. However, most of the literature on those species has been published in Chinese language in Chinese journals, with limited availability in western libraries, making access to that

information difficult for many international researchers. This paper summarizes all known information about Chinese hypogean species whether they show troglomorphisms or not.

Troglomorphism is a term proposed by Christiansen (1962) to indicate the presence (or lack thereof) of a character that is considered related to the hypogean environment, such as the reduction or loss of the visual apparatus and pigmentation. Romero and Green (2005) listed other characters considered as troglomorphisms, including reduction or total loss in the number of scales and gas (swim) bladder. We have included the horn-like found among some hypogean Chinese fish species as a possible troglomorphic characteristic. Although the function of this structure is still unknown, it is found only among some hypogean species of the genus *Sinocyclocheilus*. An analogous structure has been reported for *Kustus gulliveri* (Perciformes: Kurtidae). In that species this structure called a ‘hook’ is found only on males and is used to carry fertilized eggs (Berra and Humphrey 2002). The horn we report for some species of *Sinocyclocheilus* is found in both sexes. Li et al. (1997) hypothesized that this structure could function as a protective organ but there is as yet no confirmation of this. The humpback profile found among some hypogean *Sinocyclocheilus* species also has an unknown function. However, it is interesting to note that both characters may have a similar function because some species present a horn-like appearance formed by the humpback.

Methods

We collected all available information on hypogean fishes published up to September 2008 following the methodology described in Romero and Paulson (2001). We grouped the species by family following Nelson’s (2006) systematic order, with a general summary of their biology. Given that the phylogenetic relationships with the rest of the family are uncertain for most genera and species, we list genera within families, as well as species within genera, alphabetically. We numbered the species to facilitate the reading of the maps (Fig. 1). Most of the information for each species comes from the original description; however, in the case of *Sinocyclocheilus* species one of us rechecked the original information for accuracy

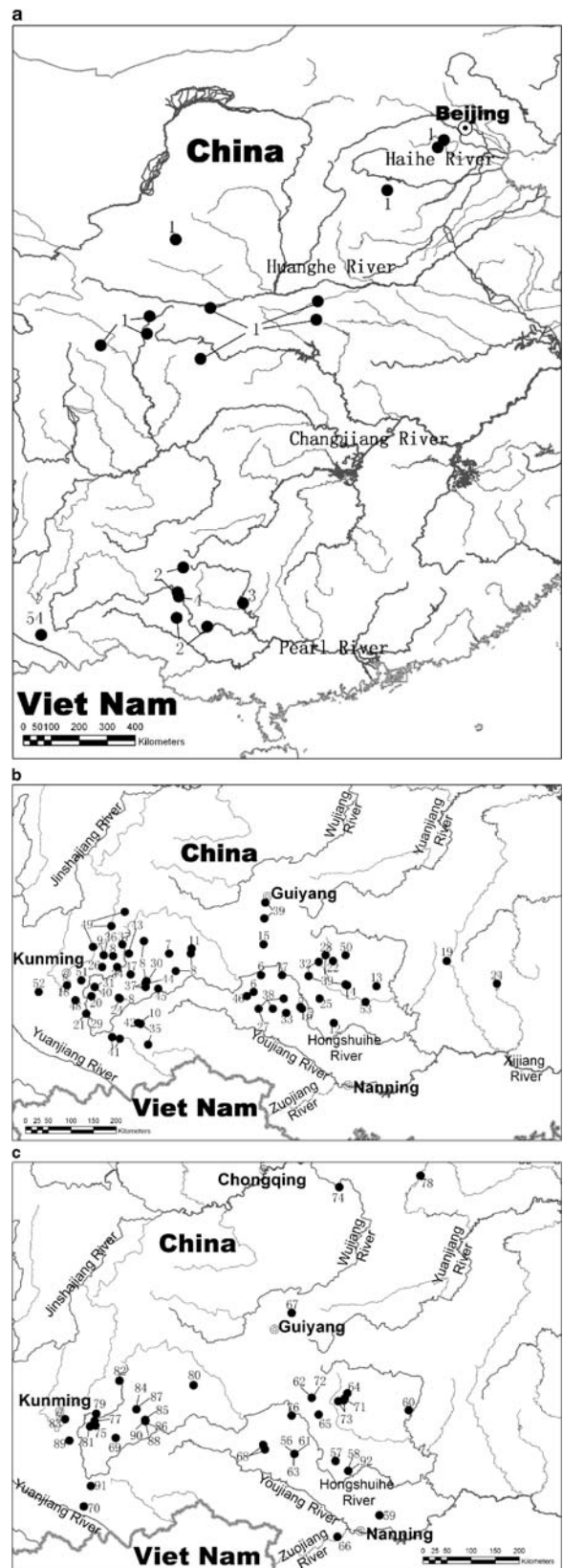


Fig. 1 Distribution map of all Chinese hypogean fishes. (a) Distribution of hypogean fishes from Cyprinidae (excluding the genus *Sinocyclocheilus*). (b) Distribution of the species from the genus *Sinocyclocheilus*. (c) Distribution of hypogean fishes from Cobitidae and Balitoridae

(Zhao 2006). Common name(s) are based on Wu et al. (1999) or from the original description. Etymology is given only for those names that were created to identify the hypogean and/or troglomorphic species and/or populations. Style for referring to etymologies follows Brown (1956) and Gotch (1995). Major synonyms are given only if they represent, might represent, or have represented a source of confusion. Historical information for species found both in the hypogean and the epigeal environment refers only to hypogean populations. The remarks section aims to summarize information about troglomorphic features (reduction in eyes, pigmentation, and scales), behavioral features and phylogenetic relationships.

We created the maps accompanying this article with Arc View software, with the Mercator projection, which does create some distortion in the area of landmasses towards the poles. Since these maps exclude much of the polar landmasses and since troglomorphic fishes are not found at high latitudes, this is not much of an issue. We determined latitudes and longitudes of troglomorphic fish distributions using one of several methods: sometimes latitude and longitude information was found in the article describing the species; sometimes a description of the location was given (with varying degrees of accuracy and reproducibility), and latitude and longitude were determined using atlases and other sources. Some articles gave no more than a sketchy description of the location making the latitudes and longitudes for these few species rather vague. The latitude and longitude information included in the article is the same as that used in the creation of the maps. Where ‘ca.’ appears before the latitude and longitude, it means that it was determined using an atlas and thus reflects a lesser degree of accuracy. The reader should, therefore, take several things into consideration when using these maps. The maps are on a national scale and are intended to do little more than provide a general idea of where these species are located while giving a reference to the species numbers as described in the article. Some GIS information was directly from GPS by authors in the

field. That is also one way to get latitudes and longitudes in the paper. The nature of the methods used and the scale of the maps mean that the dots are not always (though in some cases are accurate to the tenth of a second) on the *exact* location.

Results

Family: Cyprinidae—minnows or carps

The Cyprinidae is the largest family of freshwater fishes with nearly 2,500 species distributed throughout Eurasia, Africa, and North America. This overall number of cyprinid species may be artificially high due to lack of clarity in species status of many populations (Nelson 2006). Even among the hypogean species the phylogenetic distinctions may be exaggerated. For example, it is quite possible that *Barbopsis devechii*, *Phreatichthys andruzzii*, *Caecobarbus geertsi* and *Iranocypris typhlops* should all be assigned to the genus *Barbus* (Ercolini et al. 1982). A very close genetic relationship between the first two is further supported by allozyme studies (Sbordoni et al. 1996). There are 96 species of hypogean cyprinids worldwide and 54 hypogean species have been reported for China.

Most cyprinids have scales to some degree. Nothing in their morphology, physiology or behavior seems to support the idea of a family being ‘preadapted’ to the hypogean environment. Thus, the large number of hypogean representatives for the family (96) seems to be just the result of the fact that this is a highly speciose family.

The vast majority of the 54 species of Chinese hypogean cyprinids have been discovered in since the 1980’s. Of all the Chinese hypogean cyprinid species, 34 show one or more troglomorphisms. The presence of hypogean cyprinids that are hypogean but non-troglomorphic is not unusual. For example, Burr et al. (2001) reported normally eyed and pigmented individuals of *Cyprinus carpio* and *Pimephales promelas* for Mystery Cave, Perry County, Missouri. Trajano et al. (2002) found several individuals of epigeal cyprinid species of the genera *Danio*, *Tor*, *Garra*, and *Propuntius* in caves in Thailand.

There are 51 species of the genus *Sinocyclocheilus* associated with the hypogean environment (this paper), 32 of them show troglomorphisms. Due to

the isolation by different caves and subterranean rivers, the genus *Sinocyclocheilus* represents very high species diversity and suggests rapid speciation (Zhao and Zhang 2006).

Genus: *Onychostoma* Günther, 1896

Of the 16 recognized species of this Asian genus, only one (*O. macrolepis*) is found in caves where it is reported to hibernate (sic) during winter. This is the only hypogean species in China found north of the Changjiang River (Zhang 1986).

1. *Onychostoma macrolepis* (Bleeker, 1871) (Fig. 2). **Common name:** Multi-scaled sharp-jaw barbel (E, translation from Chinese); Taishan red scale fish (E, translation from Chinese). **Etymology:** *Onycho* (Gr) claw, hoof, after the sharp lower jaw; *stoma* (Gr) mouth in reference to the genus having sharp lower jaw; *macro* (Gr) huge, big; *lepis* (Gr) scale, after its large scales. **Major synonyms:** *Barbus tamusuiensis shansiensis*; *Gymnostomus macrolepis* (original combination); *Scaphesthes macrolepis*; *Varicorhinus shansiensis*; *Varicorhinus macrolepis*. **Ecological classification:** Troglophile. **History:** The cave-dwelling behavior of this species has been known for centuries by local people. For instance, every year many people will wait at the spring of the subterranean water where this fish hibernates to catch the fish during the night of Grain Rain (April 20th), one of 24 solar terms in China. The fish will always come out from the cave and look for the food at these days of Grain Rain period (April 20th–May 5th). **Morphological characteristics:** Mouth ventral, transverse; snout with lateral grooves extending to corners of mouth; lower lip separated from lower jaw, anterior border of lower jaw exposed, with a sharp horny



Fig. 2 *Onychostoma macrolepis*, collected in Heihe River, Shanxi Province in 2004. (Photo by Zhao, Y.)

sheath; branched dorsal ray 8; last dorsal ray slender, not serrated; lateral line scales more than 50, predorsal scales more than 18. Maximum standard length: 156 mm; **Trogomorphic characters:** None known. **Distribution:** Beijing City: Fangshan District: Jumahe River (ca. 39°34' N, 115°42' E); Hebei Province: Yixian County (ca. 39°20' N, 115°30' E); Shanxi Province: Niangziguan (ca. 37°57' N, 113°53' E); Shaanxi Province: Lueyang County (ca. 33°20' N, 106°10' E); Zhouzhi County (ca. 34°10' N, 108°12' E); Zhenba County (ca. 32°32' N, 107°53' E); Gansu Province: Wenxian County (ca. 32°58' N, 104°41' E); Liangdang County (ca. 33°54' N, 106°15' E); Henan Province: Luanchuan (ca. 33°47' N, 111°36' E), Luoning (ca. 34°23' N, 111°39' E); Shandong Province: Tai'an city (ca. 36°22' N, 117°05' E) (Fig. 3). **Habitat and ecology:** This species has been observed entering springs of karstic caves during winter. This hibernation-like activity lasts from late October until late April, spanning, thus, about 6 months. **Food and feeding:** Algae (mostly diatoms such as *Cymbella*, *Synedra*, *Fragilaria*, *Gomphonema*, and *Micrasterias*), insect larvae of Trichoptera, Plecoptera, Chironomidae, and Simuliidae, and organic material. **Reproduction and development:** Their reproductive activities start within 2–4 weeks after the fish come out of caves and continue for about 2 months with about 1 month of peak activities. According to measurements in the Hei He Basin, the

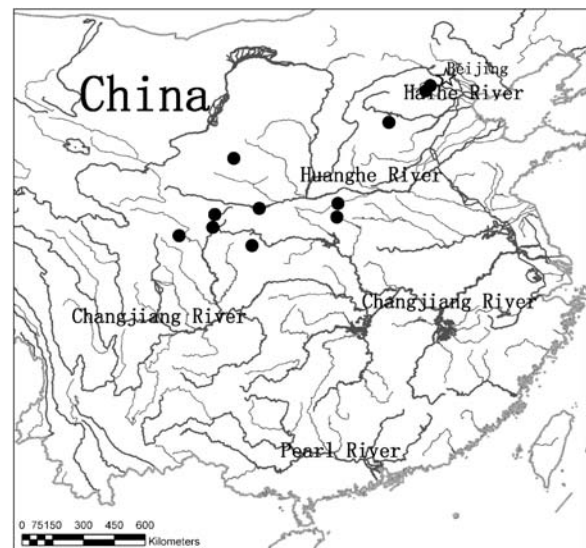


Fig. 3 The distribution of *Onychostoma macrolepis*

minimum water temperature for spawning is 16°C (Zhang 1986). **Other behavior:** The fish feed on algae on the surface of the gravel using their sharp lower jaw. **Conservation status:** It is classified as ‘protected’ in Hubei Province (Institute of Hydrobiology 2002, p. 90).¹ **Major threats:** Environmental impacts due to road construction and pollution; Excessive collecting for commercial purposes. **Conservation plans:** No governmental plan is directed to this species. **Phylogenetic relationships:** Individuals found in the hypogean environment do not seem to differ morphologically from the epigean form. Genetic analyses are yet to be conducted to see if there is any other differentiation. **Additional remarks:** The fish has been recorded as one of five best delicious fish from as early as the Tang Dynasty (618–907). The Chinese poet, Li Bai (701–762), even mentioned this fish in one of his poems. The fish has been produced by aquaculture in Shandong Province in recent years.

Genus *Sinocrossocheilus* Wu, 1977

The ten species of *Sinocrossocheilus* are endemic to the central and eastern Yunnan-Guizhou Plateau of southern China, in both the Pearl River drainage and the Yangtze River System. These fishes are found in both epigean and hypogean waters although the three species reported for hypogean environments show no troglomorphic characters (Su et al. 2003; Chen et al. 2006).

2. *Sinocrossocheilus bamaensis* (Fang, 1981) (Fig. 4). **Common name:** Bama tassel-lip barbel (E, translation from Chinese). **Etymology:** *Sino* (L) from China; *krossoi* (Gr) tassel; *chelos* (Gr) lips; *bamaensis* (L) after one locality of its distribution, Bama County in the Guangxi Zhuang Autonomous Region. **Major synonyms:** *Crossocheilus bamaensis*, original combination (Fang 1981); *Pseudocrossocheilus bamaensis* (Zhang and Chen 1997, Zhu 2006). **Ecological classification:** Troglophile. **History:** Type specimens were collected in 1974 (Fang 1981). **Morphological characteristics:** D iii, 8 A iii, 5 P i, 13–15 V i, 8. Body elongated; prefringe of rostral cap split into 5–6 fimbriations with fleshy papillae; papillate band very narrow; 2–3 rows horny tubercles confined to snout tip and never reaching nostril; fleshy papilla sparsely



Fig. 4 *Sinocrossocheilus bamaensis*, holotype. (Photo by Ye, E. and Zhao, Y.)

arranged in rostral cap and lower lip; ventral fin not reaching anus; intestine very slender; interorbital wide; calvaria high, a deep groove between snout tip and calvaria; maxillary barbels longer than eye diameter; vertebrae 39–40. Maximum standard length: 116 mm (Fang 1981). Upper part of sides and dorsum of body brown and black; lower part of sides and ventral part of body yellow and brown; sides with a conspicuous black blotch on upper part of pectoral fin origin; prefringe of rostral cap and lower lip gray and white; outer margin of dorsal fin with a black band, two lateral margins of caudal fin black (Su et al. 2003). **Troglomorphic characters:** None known. **Distribution:** China: Guangxi Zhuang Autonomous Region: Bama County: Jiazhuan town (ca. 24°12' N, 107°07' E); Tian'e County (ca. 25°01' N, 107°09' E); Du'an County (ca. 23°55' N, 108°06' E); Guizhou Province: Pingtang County (ca. 25°49' N, 107°20' E) (Fig. 5). **Habitat and ecology:** It inhabits

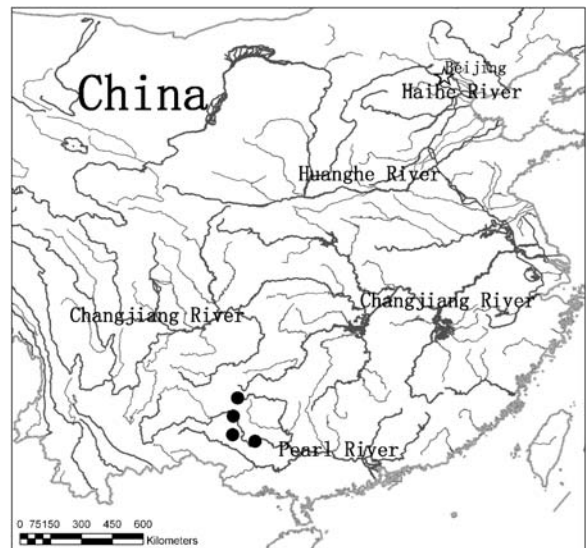


Fig. 5 Distribution of *Sinocrossocheilus bamaensis*

¹ [http://www-wds.worldbank.org/servlet/WDSContentServer/WDSPIB/2002/06/12/000094946_02](http://www-wds.worldbank.org/servlet/WDSContentServer?WDSPIB/2002/06/12/000094946_02)

clefts between rocks in fast-flowing sections of streams. During spring and summer, it leaves the caves to find food at both dawn and dusk. In winter, it spends all the time in caves (Su et al. 2003). **Food and feeding:** Algae (Fang 1981). **Reproduction and development:** Between May and June, the species moves out into the floodwaters to reproduce (Fang 1981). **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** The genus belongs to the subfamily Labeoninae.

3. *Sinocrossocheilus liuchengensis* (Liang et al. 1987) (Fig. 6). **Common name:** Liucheng tassel-lip barbel (E, translation from Chinese). **Etymology:** *liuchengensis* (L) after one locality of its distribution, Liucheng County in Guangxi, Zhuang Autonomous Region. **Major synonyms:** *Crossocheilus liuchenensis*, original combination (Liang et al. 1987); *Pseudocrossocheilus liuchengensis* (Zhang and Chen 1997). **Ecological classification:** Troglophile. **History:** Type specimens were collected in 1982 (Liang et al. 1987). **Morphological characteristics:** D iii, 8 A iii, 5 P i, 13–15 V i, 8. Body elongated; mouth cap deeply arched; rostral cap split into 11–13 fimbriations with fleshy papillae; horny tubercles absent from snout tip and sides; maxillary barbels much longer than rostral ones and eye diameter; predorsal scales irregularly arranged; ventral fin never reaching anus; vertebrae 40. Maximum standard length: 119 mm (Zhu 2006). Coloration of preserved specimens (in alcohol) is yellowish, ventral whitish gray; a row of black blotches (9–10) along lateral line; all fins without pigment, translucent (Su et al. 2003). **Trog-lomorphic characters:** None known. **Distribution:** China: Guangxi Zhuang Autonomous Region: Liu-



Fig. 6 *Sinocrossocheilus liuchengensis*. Cited from Zhou and Zhang, 2006. (Photo by Lan, J.)



Fig. 7 Distribution of *Sinocrossocheilus liuchengensis*

cheng County (ca. 24°40' N, 109°15' E) (Fig. 7). **Habitat and ecology:** Subterranean stream. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** None known. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** The genus belongs to the subfamily Labeoninae.

4. *Sinocrossocheilus megalophthalmus* (Chen et al. 2006) (Fig. 8). **Common name:** Big eye tassel-lip barbel (E, translation from Chinese). **Etymology:** *megas* (Gr) big; *ophthalmus* (Gr) eyes. **Major synonyms:** None. **Ecological classification:** Troglo-



Fig. 8 *Sinocrossocheilus megalophthalmus*, holotype, standard length 49.1 mm. (Photo by He, M.)

phile. **History:** Type specimens were collected in 1993 (Chen et al. 2006). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 12–13 V i, 7. Two rows of pharyngeal teeth, no black spot above midpoint of pectoral fin; predorsal scales 15–16; bigger eye, eye diameter 2.5–3.1 in head length; rostral barbel reaching between anterior and posterior nostrils or reaching anterior edge of eye; maxillary barbel reaching between anterior edge of eye and midpoint of eye or reaching between midpoint of eye and posterior edge of eye; gill rakers 13; pelvic fin reach anus. Maximum standard length: 49 mm (Chen et al. 2006). Coloration of preserved specimens (in alcohol) is light brownish, ventral light yellowish, with a black stripe above lateral line, but not very clear; dorsal fin brownish, other fins light yellowish with no spot (Chen et al. 2006). **Troglophic characters:** None known. **Distribution:** China: Guangxi Zhuang Autonomous Region: Tian'e County: Banmo town (ca. 24°53' N, 107°11' E) (Fig. 9). **Habitat and ecology:** Subterranean stream. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** None known. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** The species has close relationships with *Sinocrossocheilus microstomatus* and *S. labiatus* by having two rows of pharyngeal teeth (Chen et al. 2006).

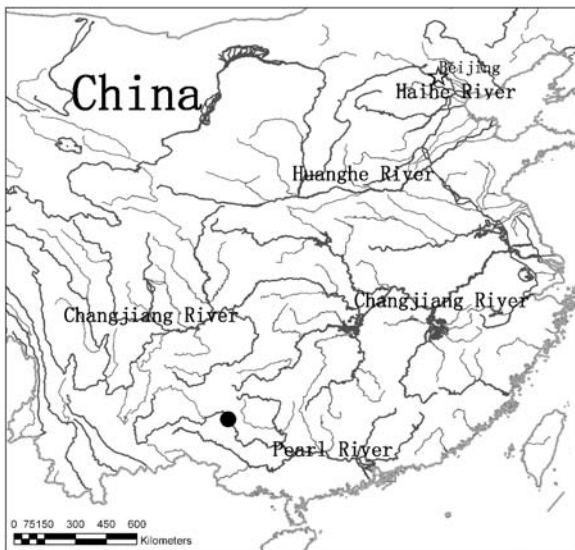


Fig. 9 Distribution of *Sinocrossocheilus megalophthalmus*

Genus: *Sinocyclocheilus* Fang, 1936

Sinocyclocheilus is a highly diversified cyprinid genus with more than 50 species described so far. This genus is endemic to the provinces of Guizhou and Yunan and the Guangxi Zhuang Autonomous Region and is always found in karstic areas rich in caves and groundwater systems. Some of the hypogean species show clear troglomorphisms while others do not. Some of the morphological characters associated with species found in caves are quite unusual such as a horn on the nape and a humpbacked profile. The adaptive significance of such features is unknown. Molecular genetic data, complemented with morphological information, was utilized to construct a phylogenetic tree incorporating all known species (Zhao 2006). *Sinocyclocheilus* was found to be a monophyletic group with four clades, given the appellations *jii*, *angularis*, *cyphotergous* and *tingi*, from the four representative species respectively.

5. *Sinocyclocheilus altishoulderus* (Li and Lan, 1992) (Fig. 10). **Common name:** High-shoulder golden-line barbel (E, translation from Chinese). **Etymology:** *Sino* (L) from China; *cyclo* (Gr) circle; *cheilus* (Gr) lip; *alti* (L) high depth; *shoulder* (L) shoulder. **Major synonyms:** *Anchicyclocheilus altishoulderus*, original combination. **Ecological classification:** Troglobite. **History:** First collected on 8 April 1989 by Li. **Morphological characteristics:** D: iii, 8; A: iii, 5; P: i, 13–16; V: i, 7–8. Body humpbacked; mouth sub-inferior and arched; eye small; pectoral fin long beyond pelvic fin insertion; lateral scale not very obviously larger than neighbor scales; lateral line complete and almost straight, possessing 42–52 scales; scale rows above and below lateral line 16–



Fig. 10 *Sinocyclocheilus altishoulderus*, one of type specimens, Li number lost, standard length 96.7 mm. (Photo by Zhao, Y.)

17, 10–11 respectively; caudal vertebrae 20–21. Maximum standard length: 96.7 mm (Zhao et al. 2006b). Live coloration is whitish and semi-transparent. Coloration of preserved specimens (in alcohol) is light yellowish, back darker, all fins light yellowish. **Troglo-morphic characters:** Microphthalmic, depigmented, humpbacked. **Distribution:** China: Guangxi Zhuang Autonomous Region: Donglan County: Taiping Town (ca 24°22' N, 107°22' E, 550 m above sea level or meters above sea level) (Fig. 11). **Habitat and ecology:** A subterranean stream at about 10 to 20 m inside the mouth of a small cave located around 50 to 100 m up from the bottom of a 4 km² lowland depression in a mountainous region. During the rainy season the subterranean water will flow out and make the lower depression look like a small lake. The species is sympatric with *Sinocyclocheilus donglanensis* (Zhao et al. 2006b). **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. One of us (YZ) thinks that it should be categorized as VU (Vulnerable). **Major threats:** Exploitation of the underground water resource, solid waste and pesticide pollution, and general landscape alterations. **Conservation plans:** The Agriculture Ministry of China is organizing the new List of National Protected Aquatic Animals. One of us (YZ) participated in that plan and recommended that the entire genus be included.

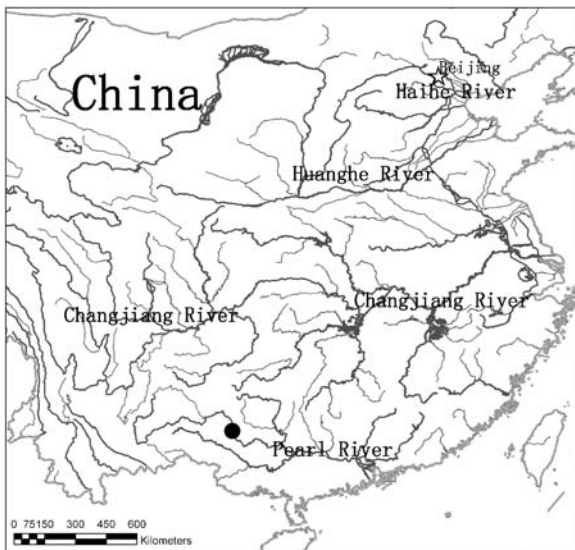


Fig. 11 Distribution of *Sinocyclocheilus altishoulderus*

Phylogenetic relationships: This species belongs to the *cyphotergous* lineage.

6. *Sinocyclocheilus anatirostris* Lin and Luo, 1986 (Fig. 12). **Common name:** Duck-billed golden-line barbel (E, translation from Chinese). **Etiymology:** *anatis* (L) duck-like; *rostris* (L) beak. **Major synonyms:** *Sinocyclocheilus guangxiensis* (Zhou and Li 1998a), *S. albeoguttatus* (Zhou and Li 1998b). **Ecological classification:** Troglolite. **History:** First collect in March 1983 (Lin and Luo 1986). **Morphological characteristics:** D: iii, 8; A: iii, 5; P: i, 12–13; V: i, 6–8. Body naked; snout duckbilled; blind; mouth sub-inferior and curved; lateral line almost straight, lateral line pores 33–42; pectoral fin long, beyond pelvic fin insertion. Maximum standard length: 129 mm (Shi et al. 1994). Living individuals lack pigmentation, being semi-transparent. **Troglo-morphic characters:** No externally visible eyes, depigmented, scaleless, reduced gas bladder. **Distribution:** China: Guangxi Zhuang Autonomous Region: Lingyun and Leye counties. The fish is distributed in different branches of Bailang Subterranean River (ca. 24°40'–25°00' N, 106°26'–106°35' E) (Fig. 13). **Habitat and ecology:** First found in two caves at about 30 m from their entrance at 1.5 m in depth. Water temperature 17.1–18.5°C, pH 6.0–6.4 (Shi et al. 1994). **Food and feeding:** Stomach contents include plant and insect remains (Shi et al. 1994). **Reproduction and development:** External fertilization and are non-guarder (Riehl and Baensch 1991). **Other behavior:** Unknown. **Conservation status:** VU in IUCN RL 2003; VU in China's Species Red List (Wang and Xie 2004). **Major threats:** Environmental degradation and Excessive collecting (Wang and Xie 2004). **Conservation plans:** None exist for this species. **Phylogenetic relationships:** It belongs to the *angularis* lineage.



Fig. 12 *Sinocyclocheilus anatirostris*, holotype, IHB 84VII225, standard length 88.4 mm. (Photo by Zhao, Y.)



Fig. 13 Distribution of *Sinocyclocheilus anatirostris*

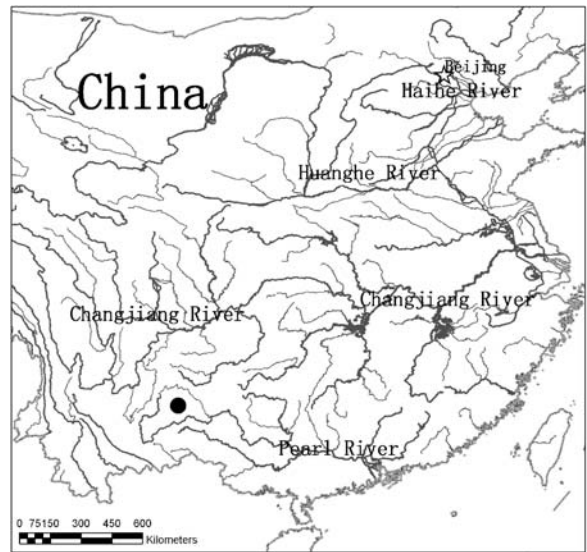


Fig. 15 Distribution of *Sinocyclocheilus angularis*

7. *Sinocyclocheilus angularis* Zheng and Wang, 1990 (Fig. 14). **Common name:** Angled golden-line barbel (E, translation from Chinese). **Etymology:** *angularis* (L) because at the end of the posterior portion of the head there is a horn forming an angle. **Major synonyms:** None. **Ecological classification:** Troglomite. **History:** First collected in June 1986 (Zheng and Wang 1990). **Morphological characteristics:** D: iii, 7 A: iii, 5 P: i, 15–18 V: i, 8–10. Simple horn on nape, not forked; snout duckbilled; mouth sub-inferior and curved; eye small; 2 pairs of barbels, short; pectoral fin long, reaching beyond pelvic fin insertion; scales small, embedded; lateral line complete, possessing 37–42 scales. Maximum standard length: 60.1 mm (Zhao 2006). Coloration of preserved specimens (in alcohol) light brownish, dorsum darker, many small black spots above lateral line; a



Fig. 14 *Sinocyclocheilus angularis*, paratype, IHB 12209032-860219, standard length 59.8 mm. (Photo by Zhao, Y.)

black speckle on the dorsal fin base; all fins gray-whitish. **Trogomorphic characters:** Microphthalmic, scales embedded. **Distribution:** China: Guizhou Province: Panxian County: Cave located at 25°26' N, 104°45' E, at 1,540 m above sea level (Fig. 15). **Habitat and ecology:** Karst cave. **Food and feeding:** Unknown. **Reproduction and development:** Reproductive period is from June to July. **Other behavior:** Unknown. **Conservation status:** VU in IUCN RL 2003; VU in China's Species Red List (Wang and Xie 2004). **Major threats:** Environment disturbances and Excessive collecting (Wang and Xie 2004). **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *angularis* lineage.

8. *Sinocyclocheilus angustiporus* Zheng and Xie, 1985 (Fig. 16). **Common name:** Small gill-opening



Fig. 16 *Sinocyclocheilus angustiporus*, holotype, IHB12209016-81X2001, standard length 104.0 mm. (Photo by Zhao, Y.)

golden-line barbel (E, translation from Chinese). **Etymology:** *angust* (L) narrow, small; *porus* (L), hole, opening. **Major synonyms:** *Sinocyclocheilus aluensis* (Li et al. 2005a). **Ecological classification:** Troglophile. **History:** Type specimens were collected in 1981 (Zheng and Xie 1985). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 13–16, i, 7–8. Body elongated, scaled; mouth sub-inferior; 2 pairs of barbels, moderate long, rictal barbel beyond posterior edge of eye; dorsal-fin insertion opposite to anal-fin; upper corner of gill opening under horizontal line of superior edge of eye. Maximum standard length: 138.1 mm (Zhao 2006). Live coloration is gold. Coloration of preserved specimens (in alcohol) is yellow-brownish, back darker, many spots on sides, all fins light brownish. **Troglomorphic characters:** None known. **Distribution:** China: Guizhou Province: Xingyi (ca. 25°05' N, 104°53' E) city, Xingren (ca. 25°26' N, 105°11' E) and Zhenfeng (ca. 25°23' N, 103°38' E) counties; Yunnan Province: Luoping (ca. 24°53' N, 104°18' E), Fuyuan (ca. 25°41' N, 104°15' E) and Luxi (ca. 24°32' N, 103°46' E) counties (Fig. 17). **Habitat and ecology:** Karstic cave. The fish has been captured from the body of water around the cave exit. **Food and feeding:** Unknown. It can be fed in captivity with pet fish food. **Reproduction and development:** Unknown. **Other behavior:** In aquaria individuals hide in a small artificial cave (dark

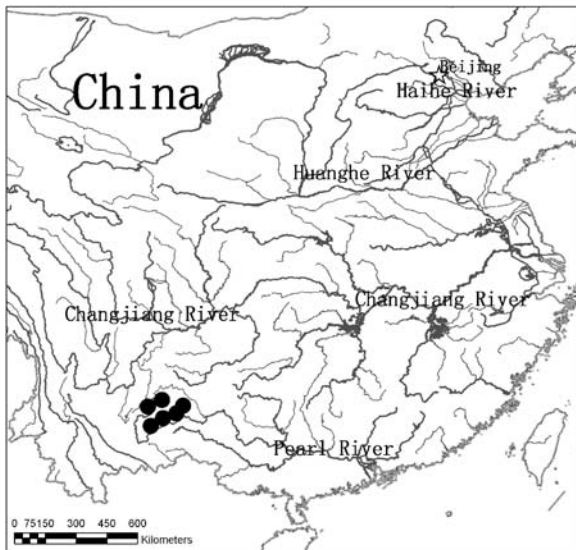


Fig. 17 Distribution of *Sinocyclocheilus angustiporus*



Fig. 18 *Sinocyclocheilus anophthalmus*, holotype, KIZ865949, standard length 99.8 mm. (Photo by Zhao, Y.)

environment) (observation by YZ). **Conservation status:** Undetermined. **Major threats:** Extraction of water from the cave by the locals. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *tingi* lineage.

9. *Sinocyclocheilus anophthalmus* Chen and Chu, 1988 (in Chen et al. 1988b) (Fig. 18). **Common name:** Blind golden-line barbel (E, translation from Chinese). **Etymology:** *an* (Gr) without; *ophthalmus* (Gr) eyes. **Major synonyms:** None. **Ecological classification:** Troglomite. **History:** First collected in 1986 (Chen et al. 1988b). **Morphological characteristics:** D iii, 7; A iii, 5; P i, 15–18; V ii, 8–9. Gill rakers on the first gill arch 7–8. Pharyngeal teeth in 3 rows with counts of 2, 3, 4–4, 3, 2. Body almost naked, lateral line complete, slightly curved, with indistinct scales and 46–59 easily-counted pores. Blind, either eyeless or with small eye remains. Snout duck-billed. Barbels 2 pairs. Last unbranched ray of dorsal fin hard at base, softening toward tip, with serrations along posterior edge. Pectoral fin long, reaching pelvic fin insertion. Maximum standard length: 113.3 mm (Zhao 2006). Live coloration is mostly semi-transparent with some shades of gray. **Troglomorphic characters:** Eyes not externally visible, or highly reduced, highly reduced pigmentation, few scales covering only parts of the body. **Distribution:** China: Yunnan Province: Yiliang County: cave (25°03' N, 103°23' E) (Fig. 19). **Habitat and ecology:** Subterranean stream in a limestone cave, located on a hillside around 20 m higher than a neighboring stream. **Food and feeding:** Insect remains have been found in stomach contents. **Reproduction and development:** External fertilization, non-guarder (Riehl and Baensch 1991). Spawning season is in late May or early June. **Other**

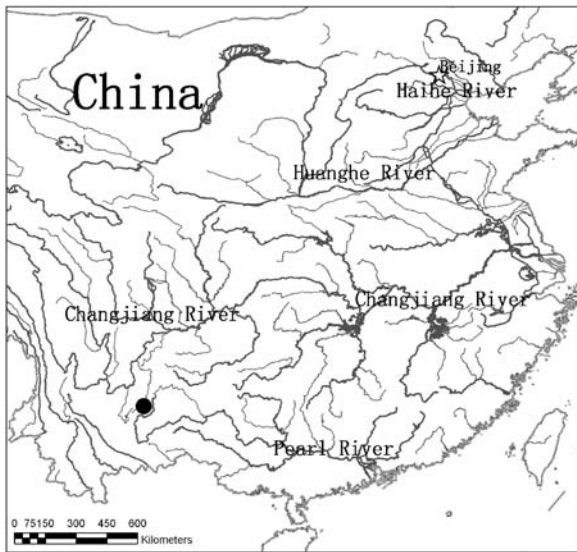


Fig. 19 Distribution of *Sinocyclocheilus anopthalmus*

behavior: Unknown. **Conservation status:** Rare in China’s Red Data Book of Endangered Animals, Pisces (Yue and Chen 1998); Vulnerable in China’s Species Red List, Vol. 1 Red List (Wang and Xie 2004); second grade protected animal category in Yunnan Province. **Major threats:** Habitat degradation and Excessive collecting (Yue and Chen 1998). **Conservation plans:** No official plan aiming at this species. **Phylogenetic relationships:** It belongs to the *tingi* lineage.

10. *Sinocyclocheilus aquihornes* Li and Yang, 2007 (in Li et al. 2007) (Fig. 20). **Common name:**



Fig. 20 *Sinocyclocheilus aquihornes*, holotype, Li 060512001, standard length 62 mm. (Cited from Li et al. 2007, photocopy) 1. Profile 2. Dorsal view

Eagle-mouth-like horn golden-line barbel (E, translation from Chinese). **Etymology:** *aquila* (L) eagle; *horn* (Anglo Saxon) horn. **Major synonyms:** None. **Ecological classification:** Troglobite. **History:** First collected in 12 May 2006 (Li et al. 2007). **Morphological characteristics:** D iii, 7; A iii, 5; P i, 9; V i, 6. Gill rakers on the first gill arch 8. Pharyngeal teeth in 3 rows with counts of 2, 3, 4–4, 3, 2. Body elongated and naked. Lateral line complete, straight. Snout duck-billed. Blind. Mouth sub-inferior. Two pairs of barbels. Last unbranched ray of dorsal fin hard at base, softening toward tip, with serrations along posterior edge. Pectoral fin long, beyond pelvic fin insertion. Maximum standard length: 62 mm (Li et al. 2007). Live coloration is semi-transparent, pinkish (due to the visible blood vessels), vertebrae and entrails visible, a white speckle on each cheek; preserved specimens whitish, opaque, all fins lack coloration. **Troglomorphic characters:** Eyeless, depigmented, scaleless, horn. **Distribution:** China: Yunnan Province: Qiubei County (ca. 24°02' N, 104° 11' E) (Fig. 21). **Habitat and ecology:** Subterranean river in a cave. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined, but only one specimen has been collected so far. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:**

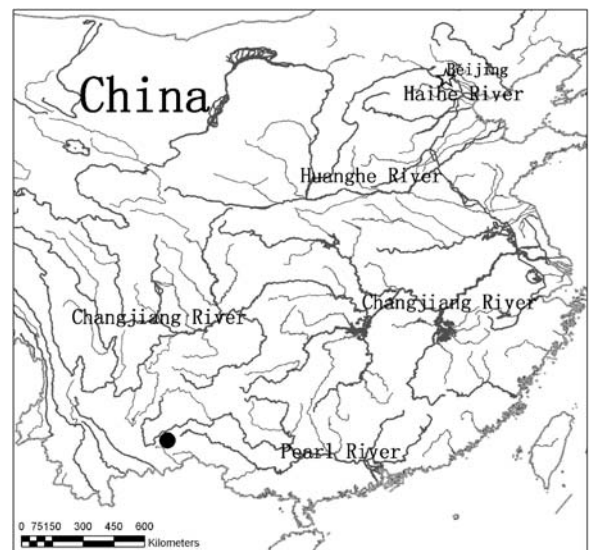


Fig. 21 Distribution of *Sinocyclocheilus aquihornes*

None. **Phylogenetic relationships:** It belongs to the *angularis* lineage.

11. *Sinocyclocheilus bicornutus* Wang and Liao, 1997 (Fig. 22). **Common name:** Double-horned golden-line barbel (E, translation from Chinese). **Etymology:** *bi* (L) two, double; *cornutus* (L) horned, having a horn. **Major synonyms:** *Ceratobarbus biangularis* (Wang and Liao 1995). **Ecological classification:** Troglolobite. **History:** Type specimens were collected in 1990 (Wang and Liao 1997). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 13–16 V i, 6–7. Forked horn; snout duck-billed; mouth sub-inferior; eye very small; 2 pairs of barbels, maxillary barbel beyond posterior edge of eye, rictal barbel reaching anterior part of operculum; pectoral fin long, beyond pelvic fin insertion; scale small, embedded; lateral line scale 37–44. Maximum standard length: 100.1 mm (Zhao 2006). Living fish are whitish and semi-transparent, 7–8 irregular black spots along lateral line. **Troglomorphic characters:** Microphthalmic, depigmented, scales embedded, horn. **Distribution:** China: Guizhou Province: Xingren County: Gaowu town (ca. 25°32' N, 105°12' E) (Fig. 23). **Habitat and ecology:** No information available. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined, but it should be categorized as VU (Vulnerable) at a minimum. **Major threats:** Local people extract saltpeter or other rocks and sometimes pollute the subterranean water. Also road construction is changing the original karstic landscape. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *angularis* lineage.

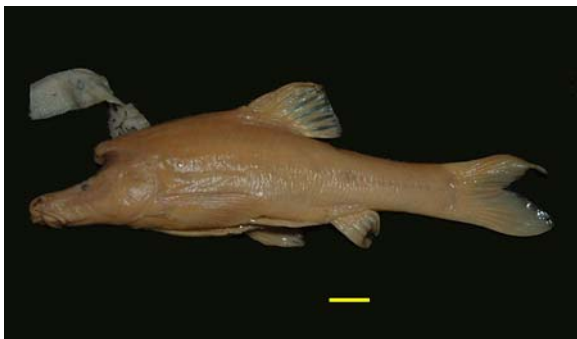


Fig. 22 *Sinocyclocheilus bicornutus*, paratype, IHB12209043-9o5o241, standard length 98.8 mm. (Photo by Zhao, Y.)

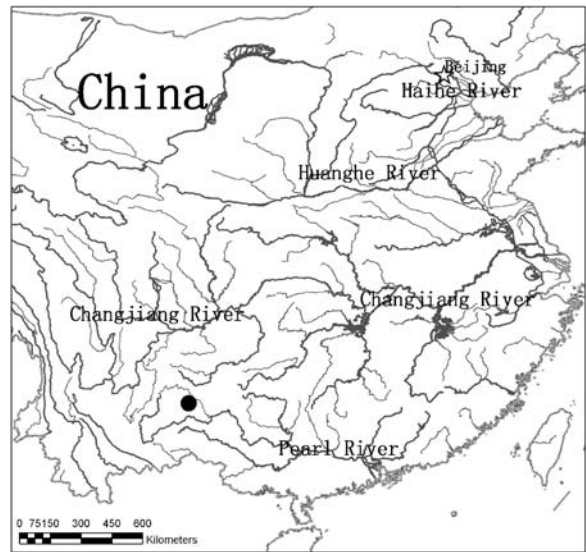


Fig. 23 Distribution of *Sinocyclocheilus bicornutus*

12. *Sinocyclocheilus brevibarbus* (Zhao et al. 2009a) (Fig. 24). **Common name:** Short-barbeled golden-line barbel (E, translation from Chinese). **Etymology:** *brevis* (L) short; *barbatus* (L) bearded. **Major synonyms:** None. **Ecological classification:** Troglolobite. **History:** Collected for the first time on 4 June 2001. **Morphological characteristics:** D iii, 7 A iii, 5 P i, 14–15 V i, 8–9. Body humpbacked; scaled; snout slightly duckbilled; mouth sub-inferior; normal eyes; joint of dentary-angulars close to each other at isthmus; lateral line straight, possessing 49–51 scales; short maxillary and rictal barbels. Maximum standard length: 168.3 mm (Zhao et al. 2009a). Coloration of



Fig. 24 *Sinocyclocheilus brevibarbus*, holotype, ASIZB74229, standard length 69.8 mm. (Photo by Zhao, Y.)

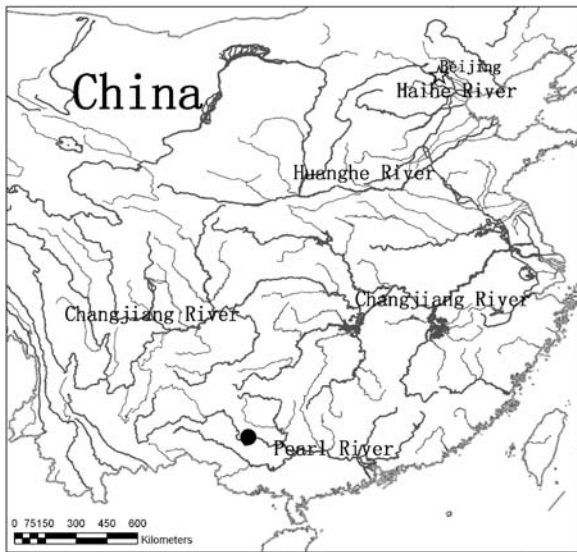


Fig. 25 Distribution of *Sinocyclocheilus brevibarbus*

preserved specimens (in alcohol) is brownish, ventral part light yellowish, all fins light yellowish. **Troglo-morphic characters:** Humpbacked. **Distribution:** China: Guangxi Zhuang Autonomous Region: Du’an County: Gaoling town (ca. 24°03' N, 108°02' E) (Fig. 25). **Habitat and ecology:** Karst cave. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *cyphotergous* lineage.

13. *Sinocyclocheilus brevis* Lan and Chen, 1992 (in Chen and Lan 1992) (Fig. 26) **Common name:** Short-body golden-line barbel (E, translation from Chinese). **Etymology:** *brevis* (L) short. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** Collected in August 1987. **Morphological characteristics:** D iii, 7 A iii, 5 P i, 15–16 V i, 9–10. A little humpbacked, but not obvious; lateral line scales 51–56, scale rows above and below lateral 19–21, 11 respectively; rictal barbels long, reaching posterior edge of preopercle. Maximum standard length: 96.5 mm (Zhao 2006). Coloration of preserved specimens (in alcohol) light yellowish, all fins gray-whitish. **Troglomorphic characters:** None known except possibly being a little humpbacked. **Distribution:** China: Guangxi Zhuang Autonomous Region: Luocheng County (ca. 24°47' N, 108°53' E)

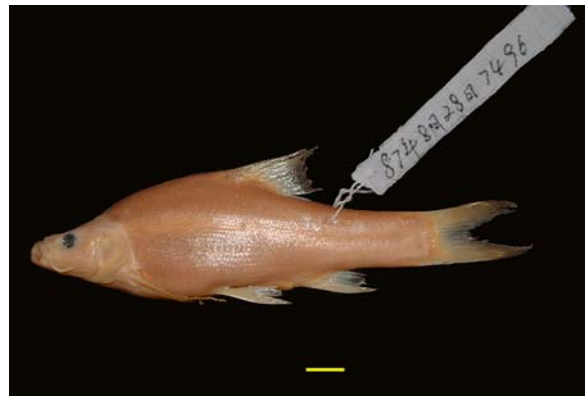


Fig. 26 *Sinocyclocheilus brevis*, holotype, IHB12209033-87087496, standard length 96.5 mm. (Photo by Zhao, Y.)

(Fig. 27). **Habitat and ecology:** Subterranean stream. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** It should be considered rare based on the field observations by one of us (YZ). **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *cyphotergous* lineage.

14. *Sinocyclocheilus broadihornes* Li and Mao, 2007 (Fig. 28). **Common name:** Broad horn golden-line barbel (E, translation from Chinese); horned fish (E, translation from Chinese). **Etymology:** *broadi*

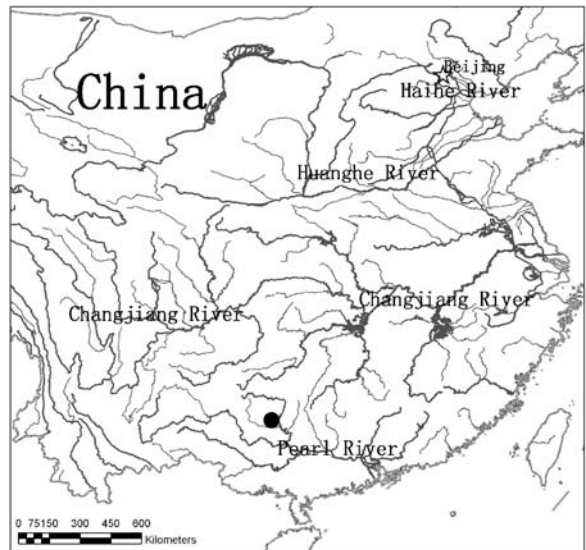


Fig. 27 Distribution of *Sinocyclocheilus brevis*



Fig. 28 *Sinocyclocheilus broadihornes*, holotype, Li 060412001, standard length 106 mm. (Cited from (Li and Mao 2007), photocopy)

(Anglo Saxon) broad; *horn* (Anglo Saxon) horn. **Major synonyms:** None. **Ecological classification:** Troglolite. **History:** This fish was first found in the 1980s by local people. Type specimens were collected on 12 April 2006 (Li and Mao 2007). **Morphological characteristics:** D iii, 6–7 A ii, 5 P i, 12–13 V i, 5–6. Horn forward on nape; snout duckbilled; mouth inferior; barbels well developed; almost naked, only lateral line scales present, 35–37. Maximum standard length: 106 mm (Li and Mao 2007). Live coloration is light gray-whitish. **Troglomorphic characters:** Microphthalmic, depigmented, reduced number of scales, horn. **Distribution:** China: Yunnan Province: Shilin County: Shilin town: Bat Cave (ca. 24°48' N, 108°18' E) at 1,750 m above sea level. (Fig. 29). **Habitat and ecology:** Bat Cave is a huge karst cave

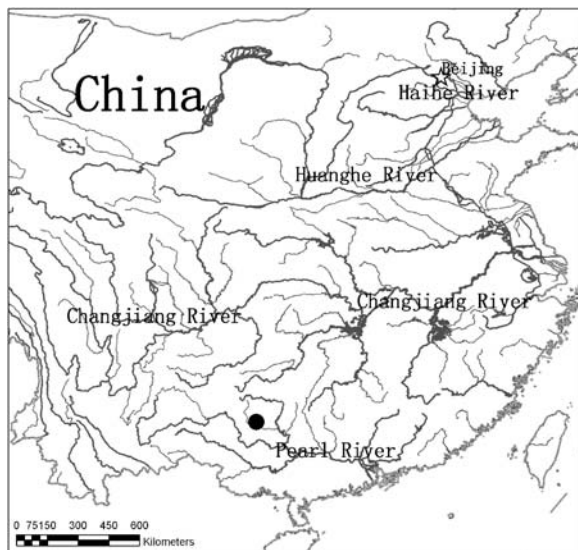


Fig. 29 Distribution of *Sinocyclocheilus broadihornes*

with a 400 m² subterranean lake. The water is very clear (Li and Mao 2007). **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** It does not respond to intense illumination, but is sensitive to water vibrations (Li and Mao 2007). **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *angularis* lineage.

15. *Sinocyclocheilus cyphotergous* (Dai, 1988) (Fig. 30). **Common name:** Humpbacked golden-line barbel (E, translation from Chinese). **Etymology:** *cypho* (Gr) curved, convex; *terg(ous)* (L) back, because of its humpback. **Major synonyms:** *Gibbi-barbus cyphotergous*, original combination. **Ecological classification:** Troglolite. **History:** Type specimen was collected in 1986 (Dai 1988). **Morphological characteristics:** D iii, 8 A iii, 5 P i, 13–15 V i, 8. Humpbacked with a sarcous horn on back; eyes small, degenerate; pectoral fin short, not reaching pelvic fin base; lateral line straight, possessing 53 scales; scales small, embedded. Maximum standard length: 122 mm (Wang et al. 1995). Coloration of preserved specimens (in alcohol) brownish, back darker, no speckles, all fins light brownish. **Troglomorphic characters:** Microphthalmic or degenerated eyes, depigmented, scales small and embedded, horn, humpbacked. **Distribution:** China: Guizhou Province: Luodian County: cave at Daxiao Dong, Dajing village (ca. 25°37' N, 107°05' E) (Fig. 31). **Habitat and ecology:** Found at 300 m from the entrance of the cave. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:**



Fig. 30 *Sinocyclocheilus cyphotergous*, IHB12209040, standard length 116.2 mm (Photo by Zhao, Y.)

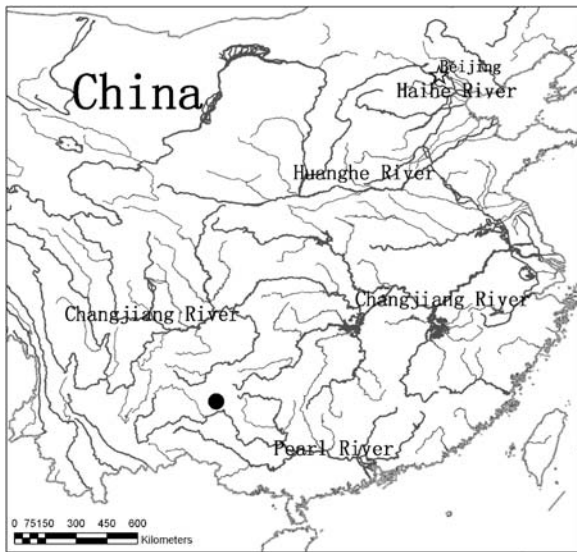


Fig. 31 Distribution of *Sinocyclocheilus cyphotergous*

Unknown. **Conservation status:** Endangered suggested based on the field observations by one of us (YZ). **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *cyphotergous* lineage.

16. *Sinocyclocheilus donglanensis* (Zhao et al. 2006a) (Fig. 32). **Common name:** Donglan golden-line barbel (E, translation from Chinese). **Etymology:** *donglanensis* (L) after the name of the type locality, Donglan County. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** Type specimens were collected in 2002 (Zhao et al. 2006a). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 14–15 V i, 9. A completely scaled body with well-

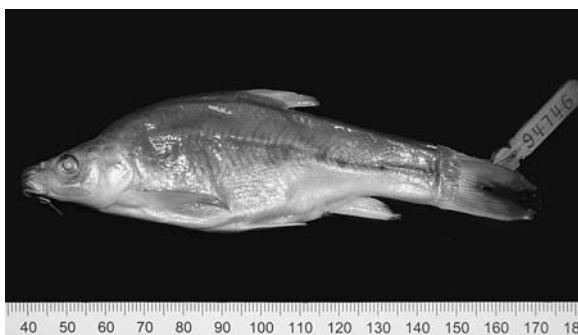


Fig. 32 *Sinocyclocheilus donglanensis*, holotype, ASIZB94746, standard length 98.1 mm. (Photo by Zhao, Y.)

developed eyes; a curved lateral line possessing 57–64 scales; 8–9 pre-dorsal vertebrae; 8–9 gill rakers; joint of dentary-angulars not close to each other at the isthmus. Maximum standard length: 123.9 mm (Zhao et al. 2006a). Coloration of preserved specimens is brownish, abdomen light grayish; an indistinct black stripe running from posterior border of operculum along body midline to caudal fin base. Pectoral, dorsal and caudal fins dark grayish, pelvic and anal fins light yellowish. **Troglomorphic characters:** None known. **Distribution:** China: Guangxi Zhuang Autonomous Region: Donglan County: Taiping Town (ca. 24°20' N, 107°24' E) (Fig. 33). **Habitat and ecology:** The locality is the same as for the type specimens of *Sinocyclocheilus altishoulderus* (Zhao et al. 2006a). **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** Exploitation of the underground water resource, solid waste and pesticide pollution, and general landscape alterations. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *cyphotergous* lineage.

17. *Sinocyclocheilus furcodorsalis* (Chen et al. 1997) (Fig. 34). **Common name:** crossed-fork back golden-line barbel (E, translation from Chinese). **Etymology:** *furco* (L) forked; *dorsalis* (L) on the back, after the bifurcation on the anterior part of the horn. **Major synonyms:** *Sinocyclocheilus tianeensis*

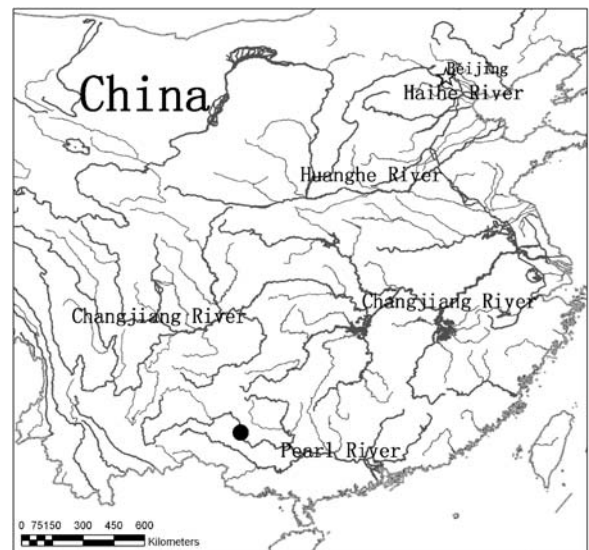


Fig. 33 Distribution of *Sinocyclocheilus donglanensis*



Fig. 34 *Sinocyclocheilus furcodorsalis*, ASIZB73164, standard length 69.4 mm. (Photo by Zhao, Y.)

(Li et al. 2003d). **Ecological classification:** Troglolite. **History:** Type specimens were collected in September 1993 (Chen et al. 1997). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 14–15 V i, 7. Eyeless. Horn forked on tip; snout duck-billed; blind; mouth sub-inferior; scales small with most of them being embedded; pectoral fin long, beyond pelvic fin insertion. Maximum standard length: 88.0 mm (Zhao 2006). Live coloration is whitish and semi-transparent. Coloration of preserved specimens (in alcohol) is white-yellowish. **Troglomorphic characters:** No externally visible eyes, depigmented, scales reduced in size and embedded. **Distribution:** China: Guangxi Zhuang Autonomous Region: in an underground stream in Tian'e County (24°58' N, 107°02' E) (Fig. 35). The species is sympatric with *Triplophysa tianeensis*. **Habitat and ecology:** No informa-

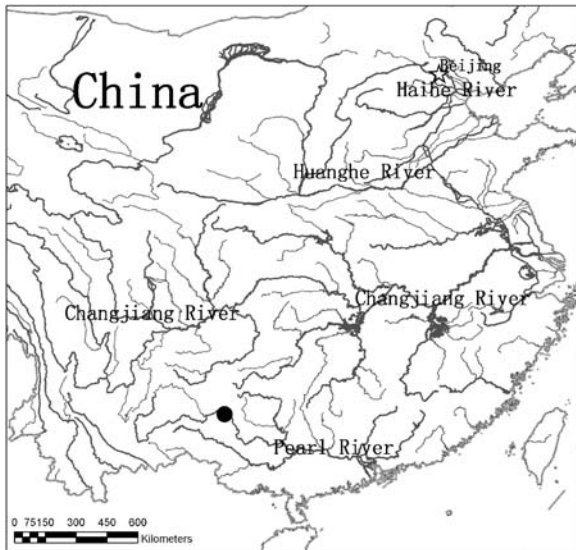


Fig. 35 Distribution of *Sinocyclocheilus furcodorsalis*

tion available. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Endangered, suggested based on the field observations by one of us (YZ). **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *angularis* lineage.

18. *Sinocyclocheilus grahami* (Regan, 1904) (Fig. 36). **Common name:** Dianchi golden-line barbel (E, translation from Chinese). **Etymology:** *grahami* (L) after John Graham, who provided the specimens. **Major synonyms:** *Barbus grahami* (original combination), *Percocypris grahami* (Wu 1963), *Sinocyclocheilus hei*, *Sinocyclocheilus guanduensis*, *Sinocyclocheilus huanglongdongensis* (Xiao et al. 2004). **Ecological classification:** Troglophile. **History:** Original description did not mention the collection date of the type specimens. In the past, it was one of the most commercially exploited fish in Lake Dianchi. **Morphological characteristics:** D iii, 7 A iii, 5 P i, 15–17 V i, 8–9. Body elongated; pelvic fin insertion posterior to vertical line of dorsal fin insertion; most of scales embedded, lateral line scales 60–74; rictal barbel not reaching to posterior edge of preopercle. Maximum standard length: 130.1 mm (Zhao 2006). Coloration of preserved specimens (in alcohol) is brownish, abdomen lighter. **Troglomorphic characters:** None known although most scales are embedded. **Distribution:** China: Yunnan Province: Lake Dianchi and its connected subterranean waters (24°48' N, 102°43' E) (Fig. 37). **Habitat and ecology:** The Dianchi Lake, with many subterranean streams, is 370 km² in total surface, with a 4.4 m in depth on average, and located at 1,885 m above sea level. This is the eight largest lake in China and the



Fig. 36 *Sinocyclocheilus grahami*, ASIZB03496, standard length 112.6 mm. (Photo by Zhao, Y.)

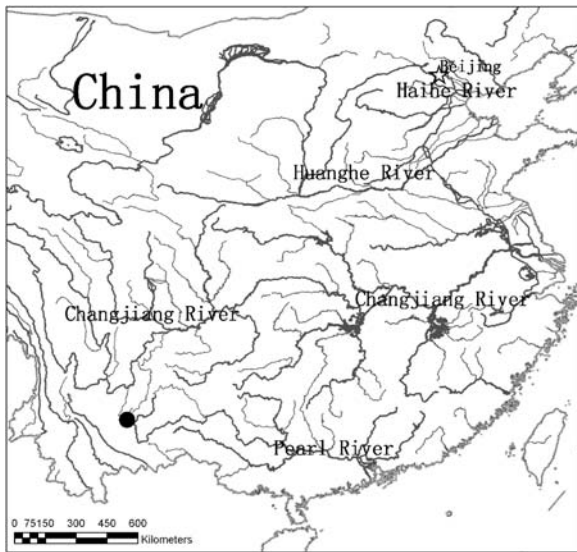


Fig. 37 Distribution of *Sinocyclocheilus grahami*

largest in the Yunnan Province. **Food and feeding:** Aquatic insects, zooplankton (Yue and Chen 1998). **Reproduction and development:** During the spawning season it swims into the karst caves with springs on the lake beach to spawn and hatch (Yue and Chen 1998). There were two successful artificial breeding experiments in 2007. The mean fertilization rate was 73% and the mean hatching rate 36%. After 10 days 95% of the young fish survived and they reached 8–12 mm in length (Yang et al. 2007). **Other behavior:** Unknown. **Conservation status:** It was listed as a Second Class State Protected Animal in 1989. Endangered in China’s Red Data Book (Yue and Chen 1998). Endangered in China’s Species Red List (Wang and Xie 2004). **Major threats:** Anthropogenic impacts including the reclamation of land around the lake, water pollution, introduction of exotic species, and overfishing for commercial purposes. **Conservation plans:** No plans. **Phylogenetic relationships:** It belongs to the *tingi* lineage.

19. *Sinocyclocheilus guilinensis* (Zhao et al. 2009b) (Fig. 38). **Common name:** Guilin golden-line barbel (E, translation from Chinese). **Etymology:** *guilinensis* (L) after the collection locality, Guilin City. **Major synonyms:** *Sinocyclocheilus jii* (Zhang and Dai 1992). **Ecological classification:** Troglophile. **History:** First collected scientifically in 1982. **Morphological characteristics:** D iii, 7 A iii, 5 P i, 13–15 V i, 8. A completely scaled body with well-

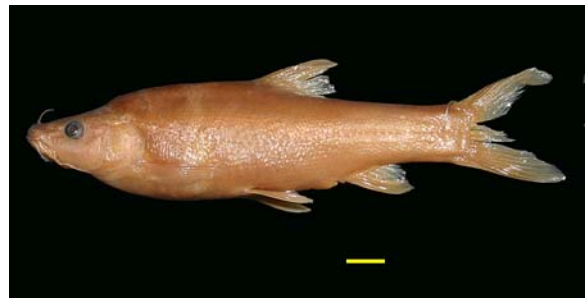


Fig. 38 *Sinocyclocheilus guilinensis*, holotype, ASIZB113753, standard length 107.3 mm. (Photo by Zhao, Y.)

developed eyes; last unbranched ray of dorsal fin soft, without serration; scale row counts above and below lateral line 19–20 and 11–12 respectively; circum-peduncular scale counts 34–36; gill rakers 8–11; pre-dorsal vertebrae 8–9. Maximum standard length: 136.5 mm (Zhao et al. 2009b). **Trogomorphic characters:** None known. **Distribution:** China: Guangxi Zhuang Autonomous Region: Guilin city (ca. 25°17' N, 110°17' E) (Fig. 39). **Habitat and ecology:** Subterranean stream, karst cave, and deep well. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** This species is found very near to Guilin City, which is heavily visited by tourists and which is being rapidly developing. **Conservation plans:**

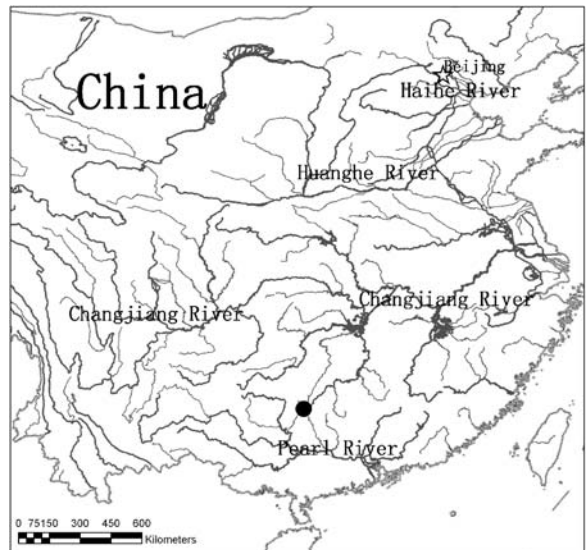


Fig. 39 Distribution of *Sinocyclocheilus guilinensis*



Fig. 40 *Sinocyclocheilus guishanensis*, paratype, Li980514005, standard length 64.9 mm. (Photo by Zhao, Y.)

None. **Phylogenetic relationships:** It belongs to the *jii* lineage.

20. *Sinocyclocheilus guishanensis* Li, 2003 (in Li et al. 2003b) (Fig. 40). **Common name:** Guishan golden-line barbel (E, translation from Chinese). **Etymology:** *guishanensis* (L) after the type locality, Guishan town. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** Type specimens were collected in 1998 (Li et al. 2003b). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 15–18 V i, 8–9. Body elongated and scaled; pectoral fin short, not reaching to insertion of pelvic fin base, which is opposite to dorsal fin insertion; gill rakers on first gill arch 5–8; upper corner of gill open below horizontal line of upper edge of eye. Maximum standard length:

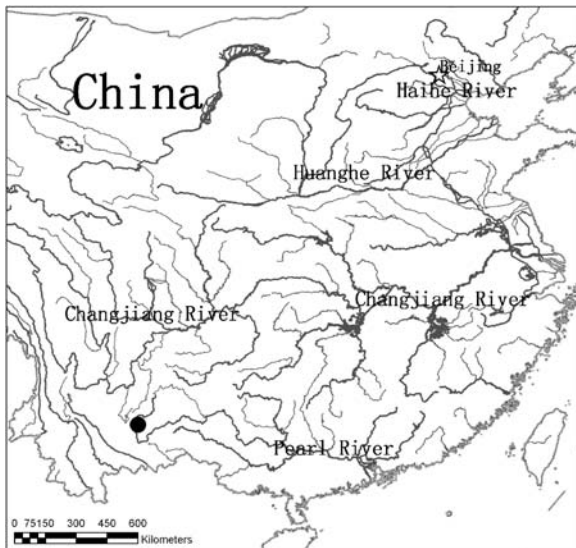


Fig. 41 Distribution of *Sinocyclocheilus guishanensis*

109.1 mm (Zhao 2006). **Troglomorphic characters:** None known. **Distribution:** China: Yunnan Province: Shilin County: Guishan town (24°35' N, 103°32') (Fig. 41). **Habitat and ecology:** Subterranean stream but also in the water near the cave mouth, but never far more than 10 m. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined, but should be classified as rare as suggested based on the field observations by one of us (YZ). **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *tingi* lineage.

21. *Sinocyclocheilus huaningensis* Li, 1998 (Fig. 42). **Common name:** Huaning golden-line barbel (E, translation from Chinese). **Etymology:** *huaningensis* (L) after the name of the type locality, Huaning County. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** First collected in 1992 (Li et al. 1998). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 16–18 V i, 8–9. Body elongated and scaled; pectoral fin reaching to insertion of pelvic fin base; dorsal fin insertion posterior to pelvic fin insertion; lateral line curved, possessing 58–63 scales. Maximum standard length: 92.2 mm (Zhao 2006). Live coloration is golden with small black spots. **Troglomorphic characters:** None known. **Distribution:** China: Yunnan Province: Huaning County: Panxi town (ca. 24°14' N, 103°06') (Fig. 43). **Habitat and ecology:** Exit of subterranean stream. **Food and feeding:** Unknown. **Repro-**

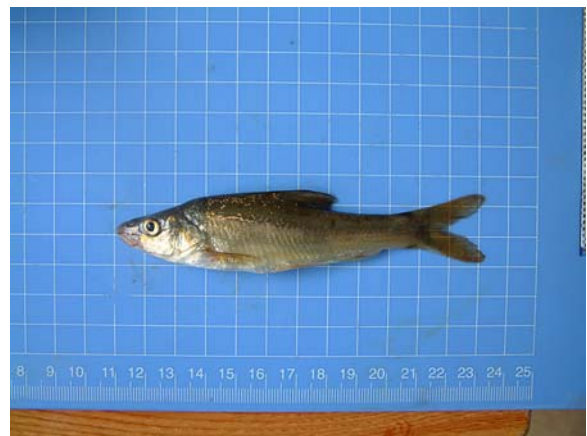


Fig. 42 *Sinocyclocheilus huaningensis*, ASIZB79228, standard length 92.2 mm. (Photo by Zhao, Y.)

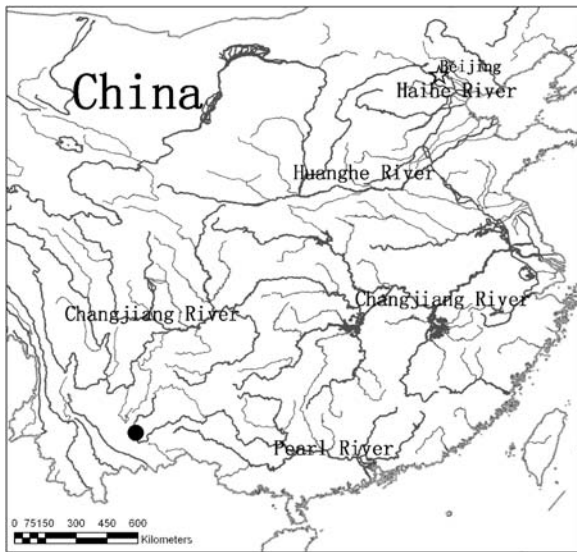


Fig. 43 Distribution of *Sinocyclocheilus huaningensis*

duction and development: Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. It should be classified as Rare, based on the field observations by one of us (YZ). **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *tingi* lineage.

22. *Sinocyclocheilus hugeibarbus* Li and Ran, 2003 (in Li et al. 2003c) (Fig. 44). **Common name:** Super-long barbeled golden-line barbel (E, translation from Chinese). **Etymology:** *hugei* (Anglo Saxon) huge, big; *barba* (L) beard. **Major synonyms:** None. **Ecological classification:** Troglabite. **History:** First collected in May 1995 (Li et al. 2003c). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 15–16 V i, 7–

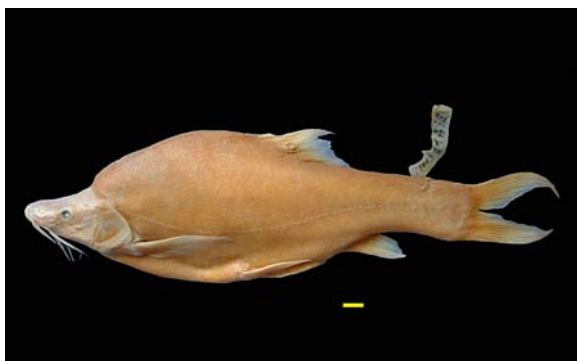


Fig. 44 *Sinocyclocheilus hugeibarbus*, paratype, Li200210003, standard length 200.5 mm. (Photo by Zhao, Y.)

8. Body humpbacked; barbels long, rictal barbel beyond posterior edge of opercle; lateral line curved, possessing 65–82 scales. Maximum standard length: 200.5 mm (Zhao 2006). Live coloration is whitish, semi-transparent. **Trogomorphic characters:** Depigmented, humpbacked. **Distribution:** China: Guizhou Province: Libo County: Dongtang town and Bantanba village (24°14' N, 103°06' E) (Fig. 45). **Habitat and ecology:** Subterranean stream. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. It should be classified as Rare as suggested based on the field observations by one of us (YZ). **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *cyphotergous* lineage.

23. *Sinocyclocheilus hyalinus* Chen and Yang, 1994 (in Chen et al. 1994) (Fig. 46). **Common name:** Translucent golden-line barbel (E, translation from Chinese); hyaline fish (E, translation from Chinese). **Etymology:** *hyalinus*, from *hyalinus* (Gr) glass, after the transparency of the fish. **Major synonyms:** None. **Ecological classification:** Troglabite. **History:** Two specimens were collected in June 1991. This may have been the first troglomorphic fish in China ever reported in writing (Romero 2001). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 12–13 V i, 6–7. Body naked; blind; horned; pectoral fin long, beyond

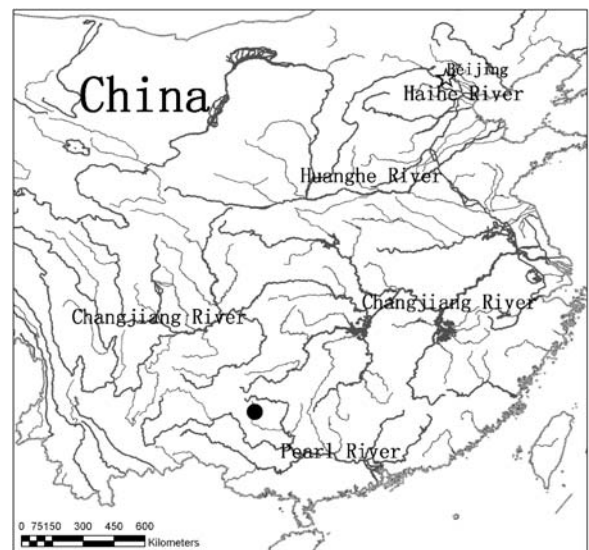


Fig. 45 Distribution of *Sinocyclocheilus hugeibarbus*

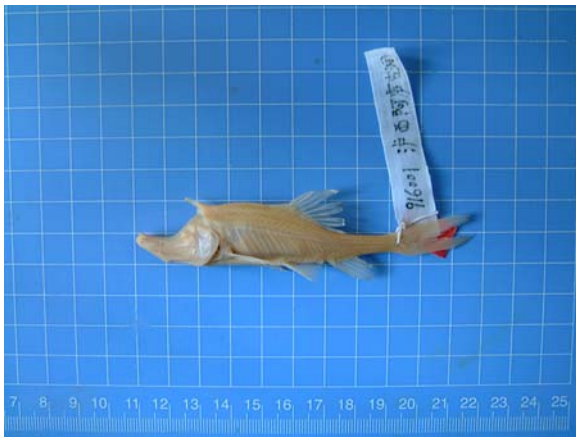


Fig. 46 *Sinocyclocheilus hyalinus*, holotype, KIZ916001, standard length 79.9 mm. (Photo by Zhao, Y.)

pelvic fin insertion; pharyngeal teeth 1 3 4: 4 3 1. Maximum standard length: 87 mm (Chen et al. 1994). Live coloration is whitish and semi-transparent. **Troglomorphic characters:** No externally visible eyes, depigmented, scaleless, horn. **Distribution:** China: Yunnan Province: Luxi County: Alu limestone caves (24°33' N, 103°45' E) (Fig. 47). **Habitat and ecology:** In an underground stream (Yusun River) of a cave of 625 m in length at an elevation of 1,712 m above sea level (Chen et al. 1994). **Food and feeding:** Feeds on microscopic animals and aquatic insects (Chen et al. 1994). **Reproduction and**



Fig. 47 Distribution of *Sinocyclocheilus hyalinus*

development: Unknown. **Other behavior:** Unknown. **Conservation status:** VU in China's Species Red List (Wang and Xie 2004). **Major threats:** Excessive collecting and environmental degradation (Wang and Xie 2004). Alu Cave has been developed to a popular tourist site. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *angularis* lineage.

24. *Sinocyclocheilus jii* Zhang and Dai, 1992 (Fig. 48). **Common name:** Ji golden-line barbel (E, translation from Chinese). **Etymology:** *Jii* (L) after Cunshan Ji, who described unofficially another species *S. guilinensis*. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** Type specimens were collected in 1992 (Zhang and Dai 1992). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 14–15 V i, 8. Body scaled; last unbranched ray of dorsal fin soft, no serration; scale rows above and below lateral line 27–29, 15–17 respectively; scale around caudal peduncle 46–50; gill rakers on first gill 6–7. Maximum standard length is 123.6 mm. Live coloration is brownish with a black stripe along (a little above) lateral line. **Troglomorphic characters:** None known. **Distribution:** China: Guangxi Zhuang Autonomous Region: Fuchuan County (ca. 24°50' N, 111°17' E) (Fig. 49). **Habitat and ecology:** In the vicinity of a karst cave (Zhang and Dai 1992). **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined but it should be classified as Endangered as suggested based on the field observations by one of us (YZ). **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *jii* lineage.

25. *Sinocyclocheilus jiuxuensis* Li and Lan, 2003 (in Li et al. 2003a) (Fig. 50). **Common name:** Jiuxu



Fig. 48 *Sinocyclocheilus jii*, holotype, ASIZB62726, standard length 123.6 mm. (Photo by Zhao, Y.)

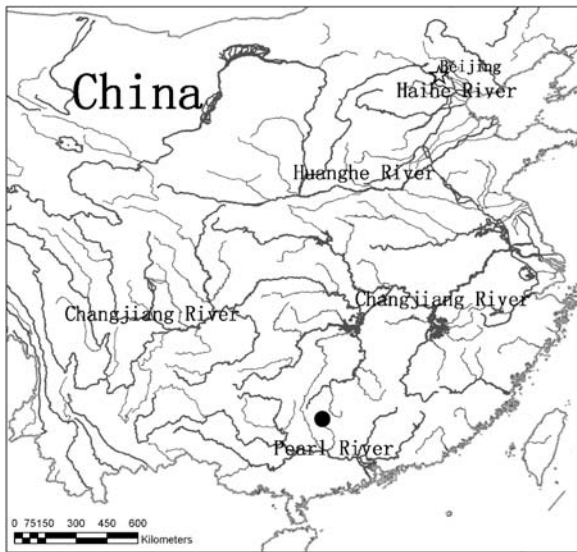


Fig. 49 Distribution of *Sinocyclocheilus jii*

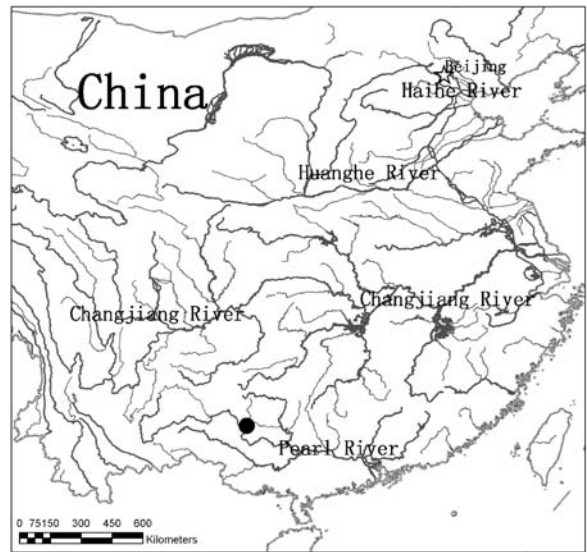


Fig. 51 Distribution of *Sinocyclocheilus juxuensis*

golden-line barbel (E, translation from Chinese). **Etymology:** *Jiuxuensis* (L) after the name of the type locality, Jiuxu town. **Major synonyms:** None. **Ecological classification:** Troglolite. **History:** Type specimens were collected in 2002 (Li et al. 2003a). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 13–15 V i, 7–8. Body scaled; eyes small; hump-backed; lateral line straight, possessing 42–51 scales; barbels short. Maximum standard length: 136.1 mm. Live coloration is whitish and semi-transparent. **Troglomorphic characters:** Microphthalmic, depigmented, humpbacked. **Distribution:** China: Guangxi Zhuang Autonomous Region: Jinchengjiang city: Jiuxu town (24°32' N, 107°45' E) (Fig. 51). **Habitat and ecology:** Subterranean stream. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conserva-**

tion status: Undetermined but it should be classified as Rare, based on the second author's (YZ) anecdotal field observations. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *cyphotergous* lineage.

26. *Sinocyclocheilus lateristritus* Li, 1992 (Fig. 52). **Common name:** Side-stripe golden-line barbel (E, translation from Chinese). **Etymology:** *lateris* (L) brick, tile; *striatus* (L) having stripes. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** Type specimens were collected in 1986 (Li 1992). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 15–19 V i, 8–9. Body elongated; last unbranched dorsal ray hard with serration; pelvic fin

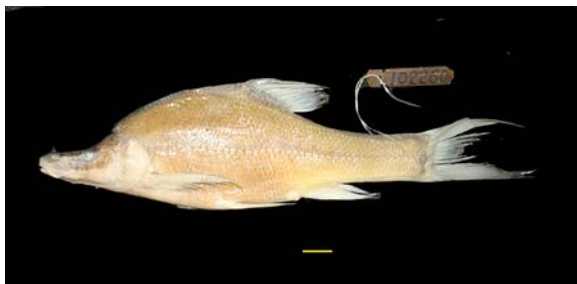


Fig. 50 *Sinocyclocheilus juxuensis*, ASIZB102260, standard length 125.1 mm. (Photo by Zhao, Y.)



Fig. 52 *Sinocyclocheilus lateristritus*, holotype, IHB12209036-865027, standard length 120.0 mm. (Photo by Zhao, Y.)

insertion posterior to vertical line of dorsal fin insertion; rictal short, not beyond to post edge of preopercle. Maximum standard length: 120.0 mm (Zhao 2006). Live coloration is yellow-brownish, a black stripe along lateral line. **Trogomorphic characters:** None known. **Distribution:** China: Yunnan Province: Luliang County: Fanghua town (26°10' N, 103°43') (Fig. 53). **Habitat and ecology:** Mouth of subterranean stream, which has been built into a pond, locates in a deserted residential area 1,879 m above sea level. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. It should be classified as Rare, based on the field observations by one of us (YZ). **Major threats:** Original exit of the subterranean stream has been replaced by several artificial pounds. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *tingi* lineage.

27. *Sinocyclocheilus lingyunensis* Li, Xiao and Luo, 2000 (in Li et al. 2000b) (Fig. 54). **Common name:** Lingyu golden-line barbel (E, translation from Chinese). **Etymology:** *lingyunensis* (L) after the type locality, Lingyu County. **Major synonyms:** None. **Ecological classification:** Troglolite. **History:** Holotype collected on 18 April 1999. **Morphological characteristics:** D iii, 7 A iii, 5 P i, 14 V i, 8–9. Body a little humpbacked, not obvious; scaled; pectoral fin long, beyond pelvic fin insertion; lateral line scales



Fig. 54 *Sinocyclocheilus lingyunensis*, ASIZB 73038, standard length 84.3 mm. (Photo by Zhao, Y.)

54–57; gill raker on first gill arch 10. Maximum standard length: 110.2 mm (Zhao 2006). Living individuals are white-pinkish, semi-transparent. **Trogomorphic characters:** Depigmented. **Distribution:** China: Guangxi Zhuang Autonomous Region: Lingyun County: Sicheng Town: Shadong Cave (24°20' N, 106°32' E) (Fig. 55). **Habitat and ecology:** Subterranean stream, 470 m above sea level. It shares the habitat with two other troglolite fish species, *Sinocyclocheilus microphthalmus* and *Schistura lingyunensis* (Li et al. 2000b). **Food and feeding:** Unknown. **Reproduction and development:** Believed that the reproductive season begins after May. **Other behavior:** Unknown. **Conservation status:** None given but it should be classified as Endangered, based on the field observations by one of us (YZ). **Major threats:** Environmental impacts due to road

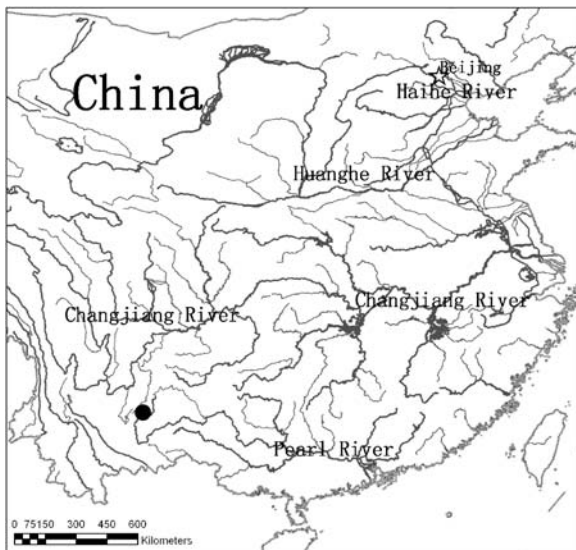


Fig. 53 Distribution of *Sinocyclocheilus lateristratus*

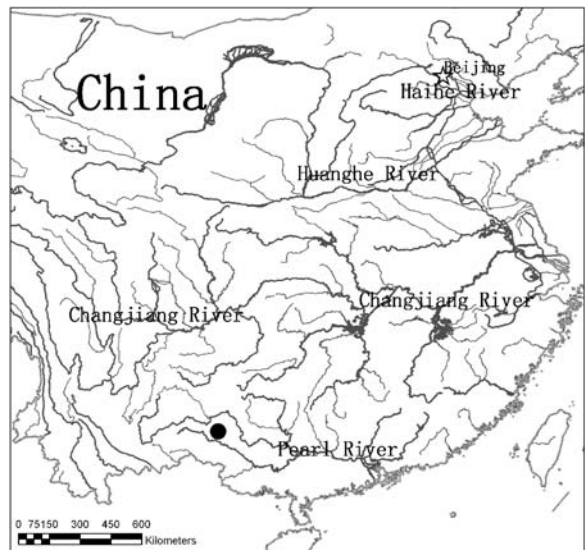


Fig. 55 Distribution of *Sinocyclocheilus lingyunensis*



Fig. 56 *Sinocyclocheilus longibarbarus*, paratype, IHB87IV465, standard length 114.1 mm. (Photo by Zhao, Y.)

construction. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *cyphotergous* lineage.

28. *Sinocyclocheilus longibarbarus* Wang and Chen, 1989 (Fig. 56). **Common name:** Long-barbeled golden-line barbel (E, translation from Chinese). **Etymology:** *longibarbarus* (L) after its long barbels. **Major synonyms:** None. **Ecological classification:** Troglolbite. **History:** First collected in April 1984. **Morphological characteristics:** D iii, 7 A iii, 5 P i, 15–18 V i, 8–10. Body a little humpbacked; lateral line curved, possessing 63–75 scales; scale rows above and below lateral line 28–29, 15–18 respectively. Maximum standard length: 137 mm (Wang and Chen 1989). **Troglomorphic characters:** Microphthalmic, depigmented, humpbacked. **Distribution:** China: Guizhou Province: Libo County (25° 24' N, 107°52' E) (Fig. 57). **Habitat and ecology:** Karst cave, exit of subterranean stream (Wang and Chen 1989). **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** None assigned but it should be classified as Rare, based on the field observations by one of us (YZ). **Major threats:** There is a National Park (Maolan Karst Forestry Natural Reserve) in Libo County. The main target for protection in this park is the forest, not the karst system. Inside the park the environment has been protected, but outside the park, the habitat is being rapidly affected by development. This fish can be found both inside and outside the protected area of the park. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *cyphotergous* lineage.

29. *Sinocyclocheilus longifinus* Li, 1998 (in Li et al. 1998) (Fig. 58). **Common name:** Long fin golden-

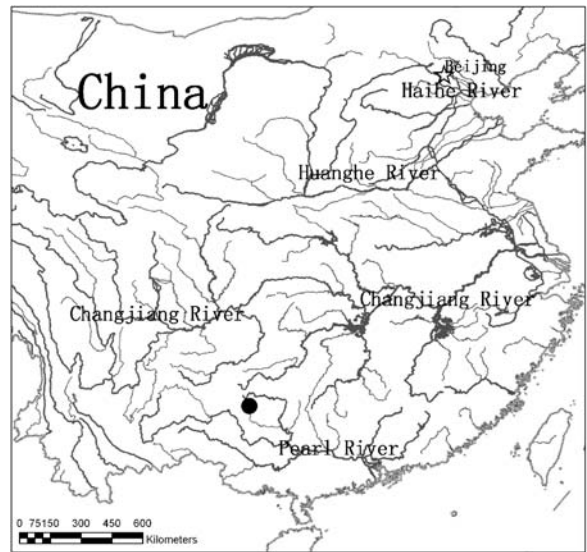


Fig. 57 Distribution of *Sinocyclocheilus longibarbarus*

line barbel; white golden-line barbel (E, translation from Chinese). **Etymology:** *longi* (L) long; *finus* (L) fin, after the long pectoral fin of the fish. **Major synonyms:** None. **Ecological classification:** Troglolbite. **History:** First collected in 1991 (Li et al. 1998). **Morphological characteristics:** D iii, 7 A ii, 5 P i, 16 V i, 8. Body elongated; almost naked, only a few small scales on posterior part of caudal peduncle; mouth sub-superior; 2 pairs of barbels, well-developed; lateral line complete, straight, possessing 70–72 pores; pectoral fin long, reaching to pelvic fin insertion. Maximum standard length: 154 mm (Li et al. 1998). Live coloration is whitish, back grayish. Coloration of preserved specimens (in alcohol) is light grayish in the dorsal area, all fins lack coloration (Li et al. 1998). **Troglomorphic characters:** Depigmented, scaleless greatly reduced in size and number. **Distribution:** China: Guizhou Province: Huanging County: Panxi town (ca. 24°14' N, 103°06' E) (Fig. 59). **Habitat and ecology:** Exit of subterranean

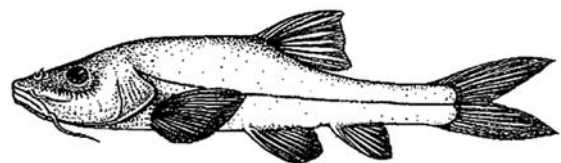


Fig. 58 *Sinocyclocheilus longifinus*, cited from (Li et al. 1998)

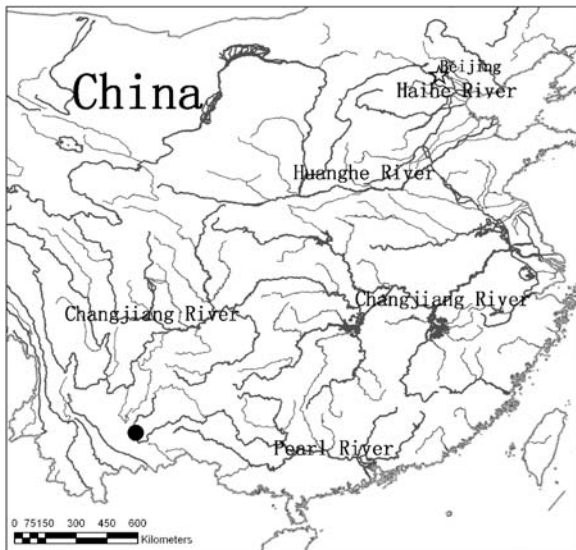


Fig. 59 Distribution of *Sinocyclocheilus longifinus*

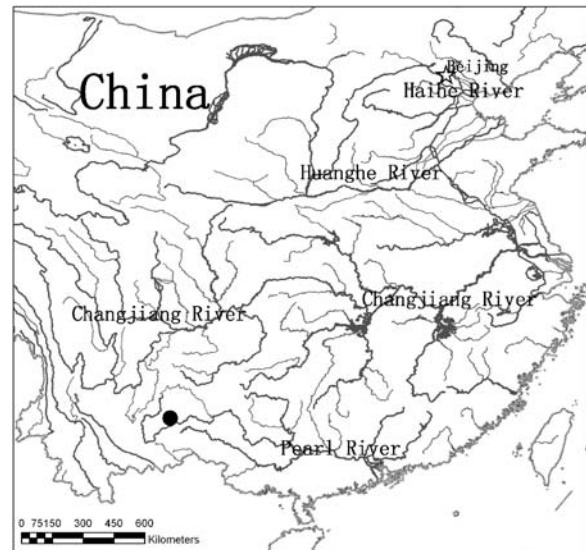


Fig. 61 Distribution of *Sinocyclocheilus luopingensis*

stream, same locality as *Sinocyclocheilus huaningensis* (Li et al. 1998). **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** At least Rare since only two specimens (the type specimens) have been collected so far, one in 1991, another in 1997. **Major threats:** This fish is known only from the Heilongtan Pool. This locality has been developed into a local park and opened for tourism. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *tingi* lineage.

30. *Sinocyclocheilus luopingensis* Li and Tao, 2002 (in Li et al. 2002c) (Fig. 60). **Common name:** Luoping golden-line barbel (E, translation from



Fig. 60 *Sinocyclocheilus luopingensis*, holotype, Li980831001, standard length 130.8 mm. (Photo by Zhao, Y.)

Chinese). **Etymology:** *luopingensis* (L) after the name of the type locality, Luoping County. **Major synonyms:** None. **Ecological classification:** Troglolite. **History:** First collection took place on 1 August 1998 (Li et al. 2002c). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 14 V i, 8. Body humpbacked, scales embedded; lateral line straight, possessing 57 scales; gill rakers on first gill arch 8. Maximum standard length: 130.8 mm (Zhao 2006). Live coloration is gold, back darker, all fins light yellowish. **Troglomorphic characters:** Scales embedded, humpbacked. **Distribution:** China: Yunnan Province: Luoping County (ca. 24°53' N, 104°18' E) (Fig. 61). **Habitat and ecology:** Subterranean stream. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** It should be classified as Endangered since only one specimen has been collected since 1996. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *cyphotergous* lineage.

31. *Sinocyclocheilus macrocephalus* Li, 1985 (Fig. 62). **Common name:** Big head golden-line barbel; big mouth oil fish (E, translation from Chinese). **Etymology:** *macro* (Gr) long, big; *cephal* (Gr) head. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** Type specimens were collected in 1966 (Li 1985). **Morphological**

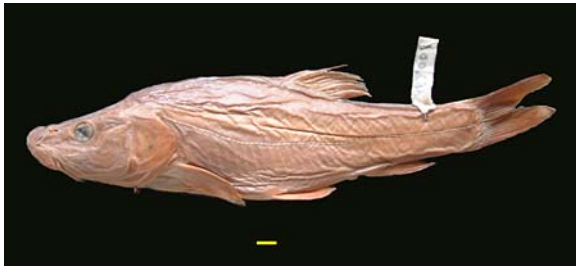


Fig. 62 *Sinocyclocheilus macrocephalus*, holotype, IHB12209012-662001, standard length 202.3 mm. (Photo by Zhao, Y.)

characteristics: D iii, 7 A iii, 5 P i, 15–17 V i, 8. Body elongated; mouth slightly superior; lateral line curved, possessing 63–72 scales; last unbranched dorsal ray strong with serration. Maximum standard length: 202.3 mm (Zhao 2006). Live coloration is golden. **Troglo-morphic characters:** None known. **Distribution:** China: Yunnan Province: Shilin County: Heilongtan reservoir (ca. 24°46' N, 103°16' E) (Fig. 63). **Habitat and ecology:** Subterranean stream that now flows into an anthropogenic reservoir. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** None assigned but it should be classified as Vulnerable, based on the field observations by one of us (YZ). **Major threats:** Environment degradation due to modifications of the subterranean streams containment into a small reser-

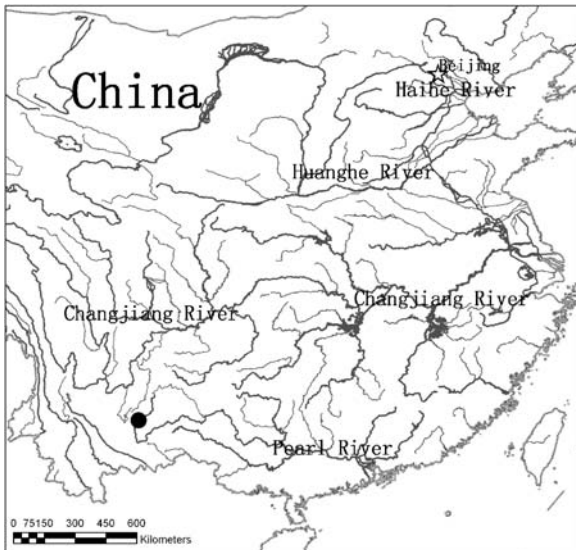


Fig. 63 Distribution of *Sinocyclocheilus macrocephalus*



Fig. 64 *Sinocyclocheilus macrolepis*, holotype, IHB12209035-87IV457, standard length 93.3 mm. (Photo by Zhao, Y.)

voir. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *tingi* lineage.

32. *Sinocyclocheilus macrolepis* Wang and Chen, 1989 (Fig. 64). **Common name:** Large scale golden-line barbel (E, translation from Chinese). **Etymology:** *macros* (Gr) long, big; *lepis* (Gr) scale. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** Type specimens were collected in 1987 (Wang and Chen 1989). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 12–15 V i, 7–10. Body elongated; last unbranched ray of dorsal fin soft, without serration; lateral line scales 53–56; scale row above and below lateral line 12–14, 5–6 respectively. Maximum standard length: 122 mm (Wang and Chen 1989). Coloration of preserved specimens (in alcohol) is dark brownish, lower lighter. **Troglo-morphic characters:** None known. **Distribution:** China: Guizhou Province: Libo County: Wangmeng town (ca. 25°16' N, 107°44' E); Guangxi Zhuang Autonomous Region: Nandan County (ca. 24°59' N, 107°32' E) (Fig. 65). **Habitat and ecology:** Exit of subterranean stream (Wang and Chen 1989). **Food and feeding:** Algae (Wang and Chen 1989) and probably insects too. **Reproduction and development:** Spawning season starts at the end of April. Egg diameter is 1.5–2 mm. **Other behavior:** Unknown. **Conservation status:** None assigned but it should be classified as Vulnerable, based on the field observations by one of us (YZ). **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *cyphoterous* lineage.

33. *Sinocyclocheilus macrophthalmus* Zhang and Zhao, 2001 (Fig. 66). **Common name:** Big eye golden-line barbel (E, translation from Chinese). **Etymology:** *macros* (Gr) long, big; *ophthalmus* (Gr)



Fig. 65 Distribution of *Sinocyclocheilus macrolepis*

eyes. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** The first collection was in 1999 (Zhang and Zhao 2001). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 14–15 V i, 8. Body elongated, scaled; mouth inferior; gill rakers on first gill arch 10–11. Maximum standard length: 97.0 mm (Zhao 2006). Live coloration is light yellowish, semi-transparent, a dark spot on the caudal base. After being kept for several months under natural light, individuals become more pigmented. **Troglomorphic characters:** Depigmented. **Distribution:** China: Guangxi Zhuang Autonomous Region: Du'an County: Xia'ao town (ca. 24°15' N, 107°05' E) (Fig. 67). **Habitat and ecology:** Karst cave at 210 m above sea level. The species is sympatric with at least *Protocobitis typhlops* and *Oreonectes translucens*. **Food and feeding:** It feeds on water flea and pet fish food in captivity. **Reproduction and development:** Un-

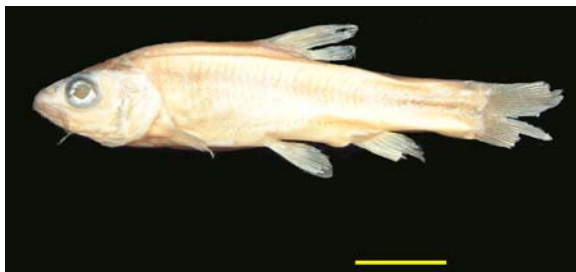


Fig. 66 *Sinocyclocheilus macrophthalmus*, holotype, ASIZB70907, standard length 44.9 mm. (Photo by Zhao, Y.)

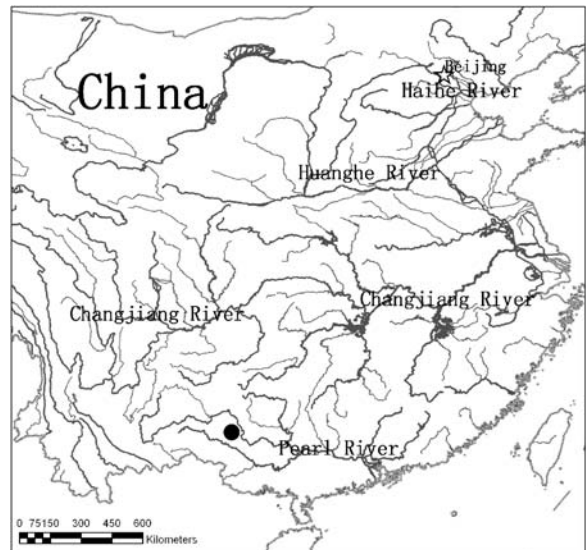


Fig. 67 Distribution of *Sinocyclocheilus macrophthalmus*

known. **Other behavior:** Unknown. **Conservation status:** None assigned but it should be classified as Vulnerable, based on the field observations by one of us (YZ). **Major threats:** Excessive collecting. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *cyphoterous* lineage.

34. *Sinocyclocheilus macroscalus* (Li, 1994) (after Li 1992) (Fig. 68). **Common name:** Luliang golden-line barbel (E, translation from Chinese). **Etymology:** *macro* (Gr) long, big; *sca* (L) scale. **Major synonyms:** *Anchicyclocheilus macrolepis*, *Sinocyclocheilus macrolepis*. **Ecological classification:** Troglophile. **History:** Type specimens were collected in 1986 (Li 1992). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 16–17 V i, 9. Body elongated; mouth terminal; last unbranched dorsal ray strong with serration; lateral line scale the same size as neighbor-

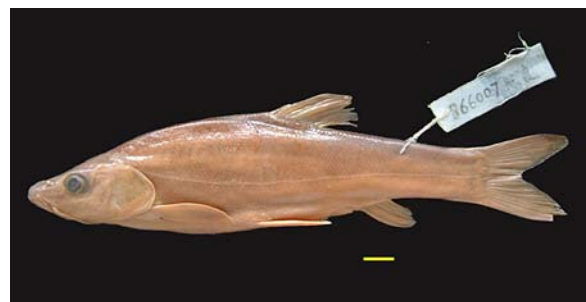


Fig. 68 *Sinocyclocheilus macroscalus*, holotype, IHB12209034-866007, standard length 136.9 mm

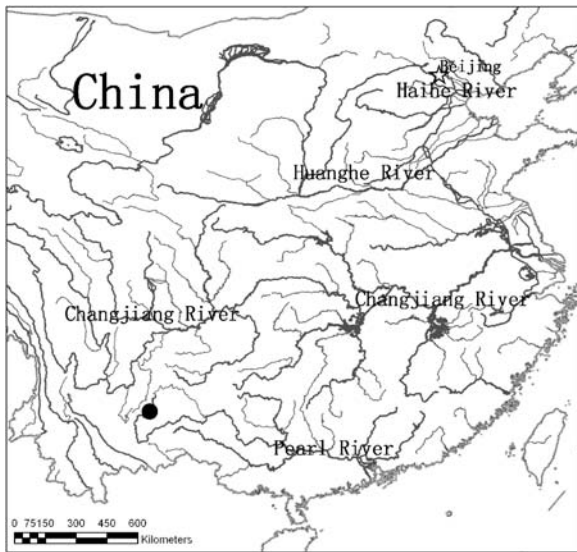


Fig. 69 Distribution of *Sinocyclocheilus macroscalus*

ing scales, lateral line curved. Maximum standard length: 167.6 mm (Zhao 2006). Live coloration is bright golden. **Troglophobic characters:** None known. **Distribution:** China: Yunnan Province: Luliang County: Fanghua town (26°10' N, 103°43') (Fig. 69). **Habitat and ecology:** Exit of the subterranean stream. The species is sympatric with *Sinocyclocheilus lateristrilus*. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** None assigned but it should be classified as Endangered as suggested based on the field observations by one of us (YZ). **Major threats:** Original exit of subterranean has been replaced by several artificial ponds. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *tingi* lineage.

35. *Sinocyclocheilus maculatus* Li, 2000 (in Li et al. 2000c) (Fig. 70). **Common name:** Maculate golden-line barbel (E, translation from Chinese). **Etymology:** *maculates* (L) speckled, maculate. **Major synonyms:** None. **Ecological classification:** Troglolite. **History:** First specimen was collected in April 1987. Staff from KIZ, (Kunming Institute of Zoology, Chinese Academy of Sciences) first found the species but did not publish its description. Type specimens were collected in August of the same year. **Morphological characteristics:** D iii, 7 A iii, 5 P i, 14–15 V i, 7–8. Body a little humpbacked; naked; lateral line pore present, 81–88; gill rakers on first gill arch 14–17. Maximum standard length: 82.7 mm



Fig. 70 *Sinocyclocheilus maculatus*, holotype, Li870808001, standard length 82.7 mm. (Photo by Zhao, Y.)

(Zhao 2006). Live coloration is golden with dark gray speckles. Preserved coloration (in alcohol) is brownish with many dark brown speckles. **Troglophobic characters:** Scaleless, slightly humpbacked. **Distribution:** China: Yunnan Province: Yanshan County (ca. 23°37' N, 104°20' E) and Qiubei County (ca. 24°02' N, 104°11' E) (Fig. 71). **Habitat and ecology:** Mouth of subterranean stream (Li et al. 2000c). **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** None has been assigned but it should be classified as Endangered, based on the field observations by one of us (YZ). **Major threats:** Environment change. **Conservation plans:** None.

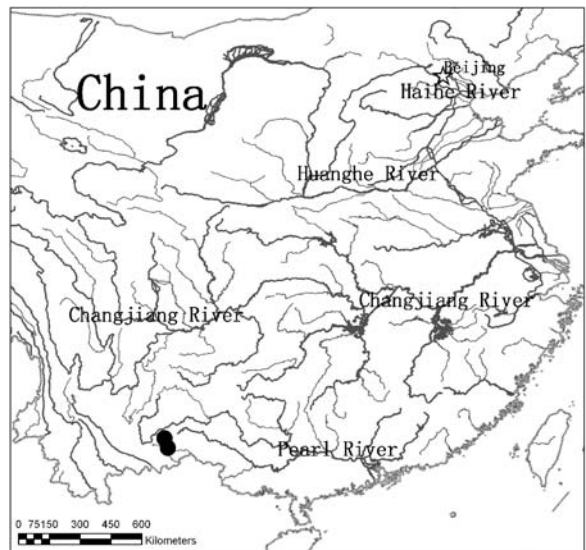


Fig. 71 Distribution of *Sinocyclocheilus maculatus*



Fig. 72 *Sinocyclocheilus maitianheensis*, holotype, IHB12209039-874001, standard length 90.0 mm. (Photo by Zhao, Y.)

Phylogenetic relationships: It belongs to the *tingi* lineage.

36. *Sinocyclocheilus maitianheensis* Li, 1992 (Fig. 72). **Common name:** Maitianhe golden-line barbel (E, translation from Chinese). **Etymology:** *maitianheensis* (L) after the name of the type locality, Maitianhe River. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** First collection took place in 1997 (Li 1992). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 14–15 V i, 9. Body elongated; scales embedded; pectoral fin short, not reaching to pelvic fin base; dorsal fin insertion posterior to vertical line of pelvic insertion; lateral line almost straight, possessing 70–82 scales. Maximum standard length: 147.8 mm (Zhao 2006). Coloration of preserved specimens (in alcohol) is light brownish; 5–7 black speckles on back side from dorsal to caudal fin base. **Troglomorphic characters:** Scales embedded. **Distribution:** China: Yunnan Province: Yiliang County: Maitianhe River (ca. 25°24' N, 103°27' E) (Fig. 73). **Habitat and ecology:** Exit of the subterranean stream. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** None has been assigned but it should be classified as Endangered as suggested based on the field observations by one of us (YZ). **Major threats:** Changes in the hydrological balance of the area due to dam construction and water extraction. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *tingi* lineage.

37. *Sinocyclocheilus malacopterus* Chu and Cui, 1985 (Fig. 74). **Common name:** Soft ray golden-line barbel (E, translation from Chinese). **Etymology:**



Fig. 73 Distribution of *Sinocyclocheilus maitianheensis*

malac (Gr) soft; *ptero* (Gr) fin. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** First collection took place in 1977 (Chu and Cui 1985). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 14–18 V i, 9. Body elongated; scales embedded; last unbranched ray of dorsal fin soft with serration. Maximum standard length: 172 mm (Chu and Cui 1985). Coloration of preserved specimens (In alcohol) is dorsally dark grayish, ventrally yellow brownish, black speckles in three rows on back and two on the sides (Chu and Cui 1985). **Troglomorphic characters:** Scales embedded. **Distribution:** China: Yunnan Province: Luoping County: Xinzhai town (ca. 24°46' N 104°17' E), Yangzhewo reservoir (ca. 24°51' N 104°17' E); Zhanyi County (ca. 25°37' N 103°49' E) (Fig. 75). **Habitat and ecology:** At the exit of a subterranean stream in a karstic cave. **Food and**



Fig. 74 *Sinocyclocheilus malacopterus*, paratype, KIZ775831, standard length 129.2 mm. (Photo by Zhao, Y.)



Fig. 75 Distribution of *Sinocyclocheilus malacopterus*



Fig. 77 Distribution of *Sinocyclocheilus microphthalmus*

feeding: Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** None assigned but it should be classified as Rare based on the field observations by one of us (YZ). **Major threats:** The underground water is being used by local people in different ways. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *tingi* lineage.

38. *Sinocyclocheilus microphthalmus* Li, 1989 (Fig. 76). **Common name:** Small eye golden-line barbel (E, translation from Chinese). **Etymology:** *micro* (Gr) small; *ophthalmus* (Gr) eyes. **Major synonyms:** *Anchicyclocheilus halfibindus*. **Ecological classification:** Troglolite. **History:** Li collected it in 1986, between April and May (Li 1989). **Morphological characteristics:** D iii, 8 A iii, 5 P i, 12 V i, 7. Body humpbacked; snout duck-billed; eye degener-



Fig. 76 *Sinocyclocheilus microphthalmus*, ASIZB73047, standard length 99.5 mm. (Photo by Zhao, Y.)

ated, forming small eye-dot; lateral line scaled 48–57, scale rows above and below lateral line 11–12, 7–9, respectively. Maximum standard length: 189.7 mm (Zhao 2006). Live coloration is whitish, somewhat transparent. **Troglomorphic characters:** Microphthalmic, depigmented, humpbacked. **Distribution:** China: Guangxi Zhuang Autonomous Region: Ling Yun County: Luo-lou town (24°20' N 106°49' E) and Sicheng Town: Shadong Cave (24°20' N, 106°32' E); Fengshan County: Fengcheng Town (24°32' N 107° 02' E) (Fig. 77). **Habitat and ecology:** At the exit of underground streams in karstic caves. In Lingyun (Sicheng Town), the species is sympatric with *Sinocyclocheilus lingyunensis* and *Schistura lingyunensis*. **Food and feeding:** Unknown. **Reproduction and development:** External, non-guarder (Riehl and Baensch 1991). **Other behavior:** Unknown. **Conservation status:** VU, in IUCN RL 2003; VU, in China's Species Red List (Wang and Xie 2004). **Major threats:** Excessive collecting and environmental degradation (Wang and Xie 2004). **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *cyphotergous* lineage.

39. *Sinocyclocheilus multipunctatus* Pellegrin, 1931 (Fig. 78). **Common name:** Speckled golden-line barbel (E, translation from Chinese). **Etymology:** *multi* (L) many; *punctatus* (L) having speckles or spots. **Major synonyms:** *Schizothorax multipunctatus*, original combination. **Ecological classification:**



Fig. 78 *Sinocyclocheilus multipunctatus*, ASIZB73000, standard length 188.6 mm. (Photo by Zhao, Y.)

Troglobite. **History:** Type specimens were collected by Père Cavalieris in 1913 (Pellegrin 1931). **Morphological characteristics:** D iii, 8 A iii, 5 P i, 15–18 V i, 8–9. Body humpbacked; scaled; mouth terminal; pectoral fin short, not reaching to pelvic fin base; lateral line straight, possessing 49–60 scales. Maximum standard length: 188.6 mm (Zhao 2006). Coloration of preserved specimens (in alcohol) is brownish, back darker and abdomen light brownish; small dark brown spots on sides above lateral line. **Troglomorphic characters:** Humpbacked. **Distribution:** China: Guangxi Zhuang Autonomous Region: Huanjiang County (26°08' N, 106°39' E) and Nandan County (24°49' N, 108°16' E), and Guizhou Province: Huishui (24°59' N, 107°32' E), Libo (25°24' N, 107°52' E), Huaxi (26°27' N, 106°40' E) counties (Fig. 79). **Habitat and ecology:** Subterranean

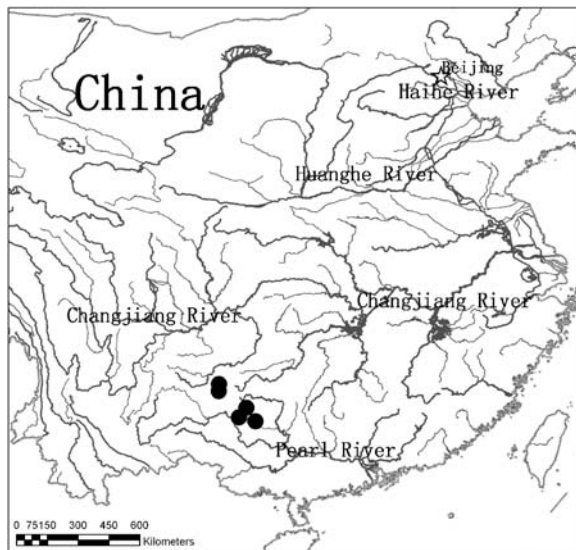


Fig. 79 Distribution of *Sinocyclocheilus multipunctatus*

streams. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** None assigned but it should be classified as Rare, based on the field observations by one of us (YZ). **Major threats:** Environment degradation. **Conservation plans:** None. **Hylogenetic relationships:** It belongs to the *cyphotergous* lineage.

40. *Sinocyclocheilus oxycephalus* Li, 1985 (Fig. 80). **Common name:** Cuspedate head golden-line barbel; sharp mouth oil fish; Kuma fish (E, translation from Chinese). **Etymology:** *Oxy* (Gr) sharp, peaked, cuspedate; *cephal* (Gr) head. **Major synonyms:** *Sinocyclocheilus lunanensis*. **Ecological classification:** Troglophile. **History:** Type specimens were collected in 1965 (Li 1985). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 15–16 V i, 8–9. Body elongated and naked; snout acute; lateral line pores 63–72, pectoral fin short, not reaching to pelvic fin base. Maximum standard length: 135.8 mm (Zhao 2006). Live coloration is golden, abdomen light yellowish, some dark speckles on back and sides (above lateral line). **Troglomorphic characters:** Scaleless. **Distribution:** China: Yunnan Province: Shilin County: Heilongtan reservoir (ca. 24°46' N, 103°16' E) (Fig. 81). **Habitat and ecology:** Subterranean stream whose course has been modified to end into a reservoir. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** None has been assigned but it should be classified as Rare as suggested based on the field observations by one of us (YZ). **Major threats:** Environment degradation due to modifications in the subterranean streams and containment into a small



Fig. 80 *Sinocyclocheilus oxycephalus*, holotype, IHB12209013-652047, standard length 103.1 mm. (Photo by Zhao, Y.)



Fig. 81 Distribution of *Sinocyclocheilus oxycephalus*

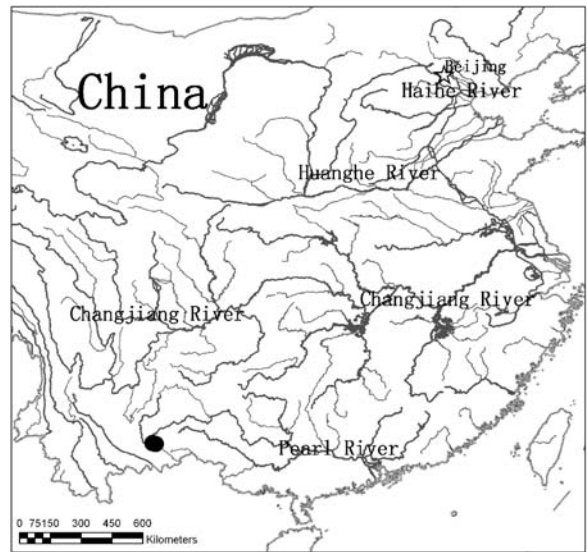


Fig. 83 Distribution of *Sinocyclocheilus purpureus*

reservoir. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *tingi* lineage.

41. *Sinocyclocheilus purpureus* Li, 1985 (Fig. 82). **Common name:** Purple golden-line barbel; oil fish (E, translation from Chinese). **Etymology:** *purpureus* (L) purple, light reddish. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** Type specimens were collected in 1973 (Li 1985). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 15–16 V i, 8–9. Body elongated and almost naked, lateral line scales present, 61–70. Maximum standard length: 97.6 mm (Zhao 2006). According to the original description live coloration is purplish, back darker, however one of us (YZ) could not see this latter feature when checking the type specimens.



Fig. 82 *Sinocyclocheilus purpureus*, holotype, IHB12209015-731004, standard length 97.6 mm. (Photo by Zhao, Y.)

Troglomorphic characters: Scaleless. **Distribution:** China: Yunnan Province: Yanshan County: Pingyuanjie town (ca. 23°44' N, 103°46' E); Kaiyuan city: Zhongheying town (ca. 23°46' N, 103°37' E) (Fig. 83). **Habitat and ecology:** Subterranean stream, original environment has been modified. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** None has been assigned but it should be classified as Endangered, based on the field observations by one of us (YZ). **Major threats:** The underground water has been drawn for agricultural irrigation and the pool at the exit of the cave has been greatly reduced in size. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *tingi* lineage.

42. *Sinocyclocheilus qiubeiensis* Li, 2002 (in Li et al. 2002a) (Fig. 84). **Common name:** Qiubei golden-



Fig. 84 *Sinocyclocheilus qiubeiensis*, holotype, Li990527002, standard length 103.3 mm. (Photo by Zhao, Y.)

line barbel (E, translation from Chinese). **Etymology:** *qiubeiensis* (L) after the name of the type locality: Qiubei County. **Major synonyms:** *Sinocyclocheilus jiuchengensis* (Li et al. 2002a). **Ecological classification:** Troglophile. **History:** Type specimens were collected in 1999 (Li et al. 2002a). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 14–17 V i, 8–9. Body elongated; scales embedded; mouth terminal; lateral line curved; dorsal fin insertion posterior to vertical line of pelvic fin insertion; speckled; rictal barbel short, reaching to posterior edge of eye. Maximum standard length: 120.6 mm (Zhao 2006). Live coloration is golden, with some dark speckles on both sides. **Troglomorphic characters:** Scales embedded. **Distribution:** China: Yunnan Province: Qiubei County: Jinping town: Jiucheng village (ca. 24° 03' N, 104°08' E) (Fig. 85). **Habitat and ecology:** Exit of a subterranean stream. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** None has been assigned but it should be classified as Rare, based on the field observations by one of us (YZ). **Major threats:** Environmental degradation due to recreational use of the underground water for bathing and fishing. Carps have been introduced and excessive collecting of the cave fish has occurred. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *tingi* lineage.

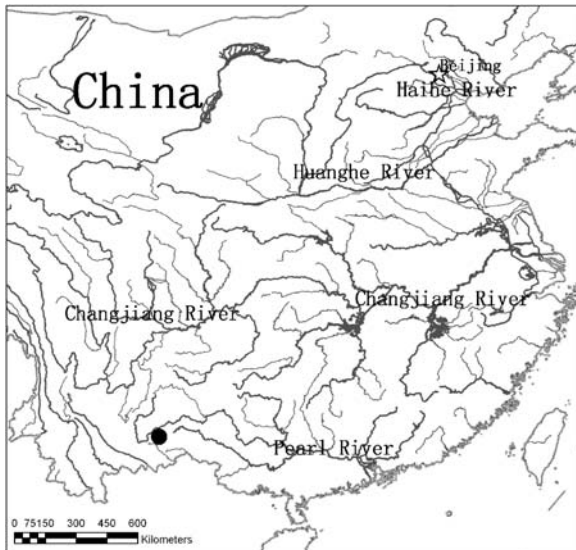


Fig. 85 Distribution of *Sinocyclocheilus qiubeiensis*



Fig. 86 *Sinocyclocheilus qujingensis*, ASIZB78790, standard length 99.9 mm. (Photo by Zhao, Y.)

43. *Sinocyclocheilus qujingensis* Li, Mao and Lu, 2002 (in Li et al. 2002b) (Fig. 86). **Common name:** Qujing golden-line barbel (E, translation from Chinese). **Etymology:** *qujingensis* (L) after the name of the type locality: Qujing City. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** Type specimens were collected in 1991 (Li et al. 2002b). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 15–18 V i, 6–8. Body elongated; scaled; lateral line almost straight, possessing 69–72 scales; mouth inferior; rictal barbel long, beyond posterior edge of preopercle. Maximum standard length: 100 mm (Zhao 2006). Live coloration is golden. **Troglomorphic characters:** None known. **Distribution:** China: Yunnan Province: Qujing city: Ciying town (ca. 25° 26' N, 103°57' E) (Fig. 87). **Habitat and ecology:**

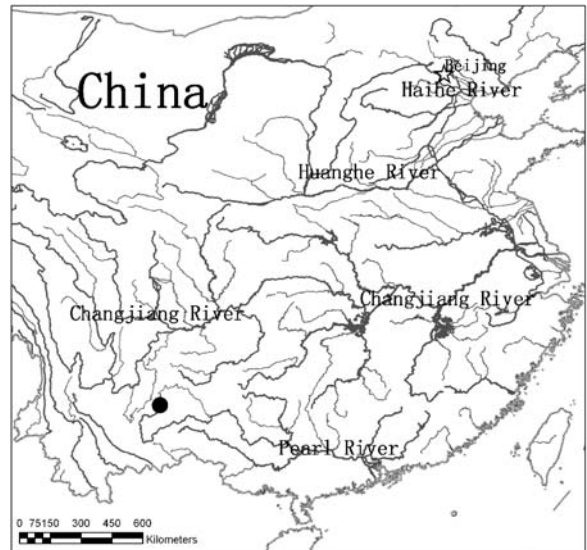


Fig. 87 Distribution of *Sinocyclocheilus qujingensis*

Exit of a subterranean stream. **Food and feeding:** Unknown. **Reproduction and development:** Spawning time takes place around May (Li et al. 2002b). **Other behavior:** Unknown. **Conservation status:** None has been assigned but it should be classified as Rare, based on the field observations by one of us (YZ). **Major threats:** The pool (including the exit of the subterranean flow) is very close to a populated area, so it is frequently affected by local people by water pollution, swimming, and agricultural water usage. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *tingi* lineage.

44. *Sinocyclocheilus rhinoceros* Li and Tao, 1994 (Fig. 88). **Common name:** Rhinocerontic horn golden-line barbel (E, translation from Chinese). **Etymology:** *rhinokeros* (Gr) rhino. **Major synonyms:** None. **Ecological classification:** Troglolite. **History:** Type specimens were collected in 1993 (Li and Tao 1994). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 11–14 V i, 6–7. Body with horn on nape, but simple; eyes small; scales degenerated, lateral line scales present, 35–40; pelvic fin short, not reaching to anus; gill rakers on first gill arch 8–10. Maximum standard length: 86.7 mm (Zhao 2006). Coloration of preserved specimens (in alcohol) is brownish. **Troglomorphic characters:** Microphthalmic, degenerated scales, presence of horn. **Distribution:** China: Yunnan Province: Luoping County: Xinzhai town (ca. 24°46' N 104°17' E) (Fig. 89). **Habitat and ecology:** Subterranean stream. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** VU, in China's Species Red List (Wang and Xie 2004). **Major threats:** Excessive collecting has taken place as well as excessive water withdrawal and pollution of the underground water

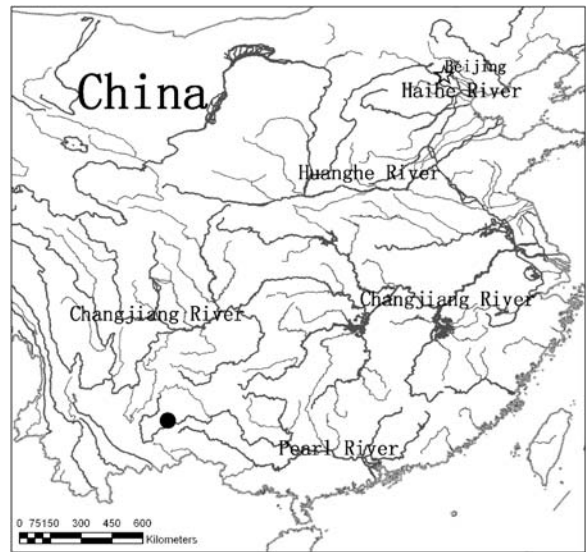


Fig. 89 Distribution of *Sinocyclocheilus rhinoceros*

(Wang and Xie 2004). **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *angulalis* lineage.

45. *Sinocyclocheilus robustus* Chen and Zhao, 1988 (Fig. 90). **Common name:** robust golden-line barbel (E, translation from Chinese). **Etymology:** *robustus* (L) strong. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** Type specimens were collected in 1980. **Morphological characteristics:** D iii, 7 A iii, 5 P i, 15 V i, 9. Body elongated and naked; pectoral fin short, not reach to pelvic fin base; last unbranched ray of dorsal fin strong with serration; dorsal fin insertion posterior to vertical line of pelvic fin insertion; lateral line curved, possessing 77 pores. Maximum standard length: 162.7 mm (Zhao 2006). Coloration of preserved specimen (in alcohol) is yellow-brownish, with some

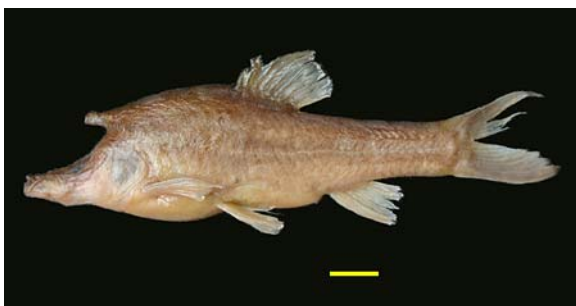


Fig. 88 *Sinocyclocheilus rhinoceros*, ASIZB93907, standard length 78.2 mm. (Photo by Zhao, Y.)



Fig. 90 *Sinocyclocheilus robustus*, holotype, IHB12209038-8001091, standard length 162.7 mm. (Photo by Zhao, Y.)

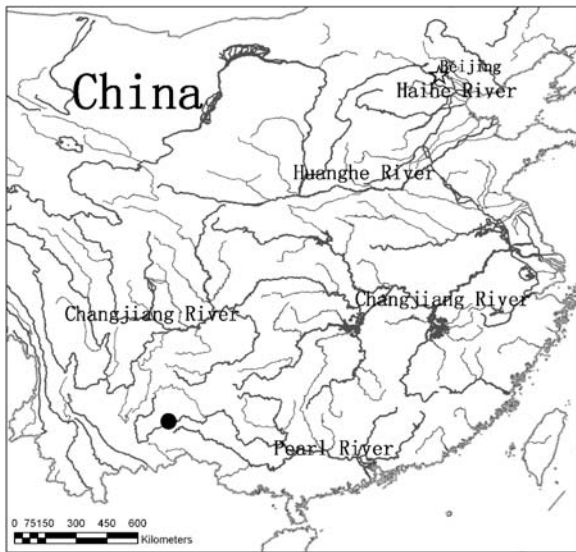


Fig. 91 Distribution of *Sinocyclocheilus robustus*



Fig. 93 Distribution of *Sinocyclocheilus tianlinensis*

dark spots (Chen et al. 1988a). **Troglobitic characters:** Scaleless. **Distribution:** China: Guizhou Province: Xingyi City: Huangnihe River (ca. 24°44' N 104°32' E) (Fig. 91). **Habitat and ecology:** Unknown. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** None assigned but it should be classified as Endangered because only one specimen has been found since 1980. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *tingi* lineage.

46. *Sinocyclocheilus tianlinensis* (Zhou et al. 2004) (Fig. 92). **Common name:** Tianlin golden-line barbel (E, translation from Chinese). **Etymology:** *tianlinensis* (L) after the name of the type locality, Tianlin County in Guangxi. **Major synonyms:** None.



Fig. 92 *Sinocyclocheilus tianlinensis*, holotype, ASIZB74125, standard length 93.0 mm. (Photo by Zhao, Y.)

Ecological classification: Troglobite. **History:** On 1 April 1998, *Guangxi Daily* reported that local people found blind fish in Tianlin. **Morphological characteristics:** D iii, 8 A iii, 5 P i, 12 V i, 7. Body elongated and naked; snout duck-billed; lateral line pores 41. Maximum standard length: 93.0 mm (Zhao 2006). Live coloration is whitish, semi-transparent. **Troglobitic characters:** No externally visible eyes, depigmented, scaleless. **Distribution:** China: Guangxi Zhuang Autonomous Region: Tianlin County: Pingshan Town (ca. 24°35' N, 106°18' E) (Fig. 93). **Habitat and ecology:** The karstic cave located in the half-hill of the northwest side of Cenwanglaoshan Mountains, around 60 m from the nearest stream. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** None has been assigned but it should be classified as Endangered, based on the field observations by one of us (YZ). **Major threats:** Environment change. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *angularis* lineage.

47. *Sinocyclocheilus tileihornes* Mao, Lu and Li, 2003 (in Mao et al. 2003) (Fig. 94). **Common name:** Tile-like horn golden-line barbel (E, translation from Chinese). **Etymology:** *tilei* (Anglo Saxon) for shingle; *hornes* (Anglo Saxon) for the horn of the fish. **Major synonyms:** None. **Ecological classification:** Troglobite. **History:** Type specimens were collected



Fig. 94 *Sinocyclocheilus tileihornes*, ASIZB78377, standard length 63.3 mm. (Photo by Zhao, Y.)

in 2002 (Mao et al. 2003). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 12–14 V i, 6–7. Horn complex, tile-like; body scaleless; lateral line pores 35–37. Maximum standard length: 64.3 mm (Zhao 2006). Live coloration is light brownish, with some dark speckles. **Troglomorphic characters:** Microphthalmic, scaleless, horn. **Distribution:** China: Yunnan Province: Luoping County: A’gang Town (ca. 25°01’ N 103°59’ E) (Fig. 95). **Habitat and ecology:** A subterranean stream with several dolines. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** None assigned but it should be classified as Endangered, based on the field observations by one of us (YZ). **Major threats:** A farm has been developed around the exit of the subterranean flow. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *angularis* lineage.

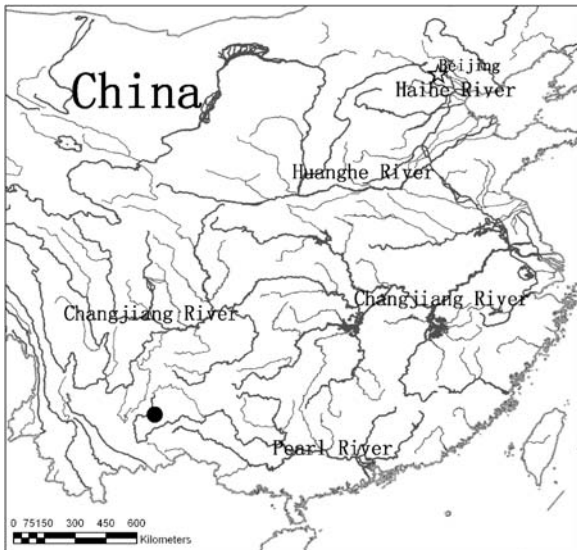


Fig. 95 Distribution of *Sinocyclocheilus tileihornes*



Fig. 96 *Sinocyclocheilus tingi*, ASIZB60227, standard length 109 mm. (Photo by Zhao, Y.)

48. Sinocyclocheilus tingi Fang, 1936 (Fig. 96). **Common name:** Fuxian golden-line barbel (E, translation from Chinese), boluoyu. **Etymology:** *tingi* (L) after a geologist, V. K. Ting, former general secretary of the Academia Sinica (Fang 1936). **Major synonyms:** *S. grahami tingi* (Fang 1936). **Ecological classification:** Troglophile. **History:** Type specimens were collected in 1934 (Fang 1936). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 14–16 V i, 6–8. Body elongated, mouth terminal, lateral line scales 63–72; dorsal fin insertion posterior to vertical line of pelvic fin insertion. Maximum standard length: 195 mm (Chu and Cui 1989). Live coloration is golden. **Troglomorphic characters:** None known. **Distribution:** China: Yunnan Province: Lake Fuxian (ca. 24°30’ N 102°53’ E) (Fig. 97). **Habitat and ecology:** Lake at the exit of a subterranean stream.

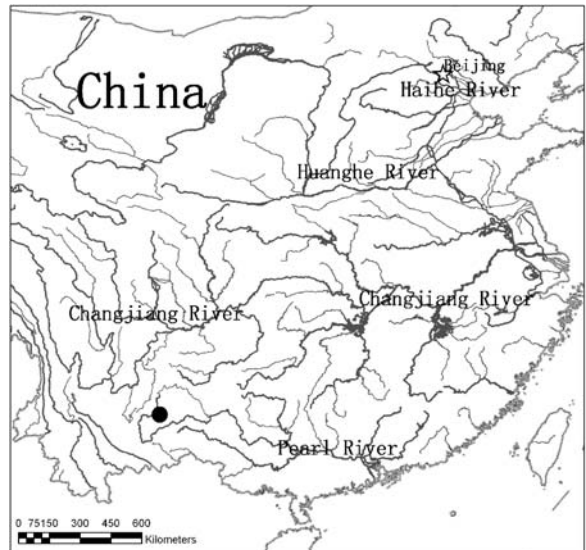


Fig. 97 Distribution of *Sinocyclocheilus tingi*

Food and feeding: Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** None assigned but it should be classified as Rare, based on the field observations by one of us (YZ). **Major threats:** Excessive collecting, water pollution. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *tingi* lineage.

49. *Sinocyclocheilus wumengshanensis* Li, Mao and Lu, 2003 (in Li et al. 2003b) (Fig. 98). **Common name:** Wumengshan golden-line barbel (E, translation from Chinese). **Etymology:** *wumengshanensis* (L) after the type locality: Wumengshan Mountains in Yunnan Province. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** First collected in 1990. **Morphological characteristics:** D iii, 7 A iii, 5 P i, 15–18 V i, 8–10. Body elongated, pectoral fin long, reaching to pelvic fin base; barbel long, rictal barbel generally beyond posterior edge of preopercle; lateral line curved, possessing 71–81 scales. Maximum standard length: 100.5 mm (Zhao 2006). Live coloration is golden. **Troglomorphic characters:** None known. **Distribution:** China: Yunnan Province: Xundian County (ca. 25°34' N 103°14' E); Zhanyi County: Deze town (ca. 25°59' N 103°36' E); Xuanwei County: Xize town (ca. 26°16' N 103°52' E) (Fig. 99). **Habitat and ecology:** Subterranean streams. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** None has been assigned but it should be classified as Rare, based on the field observations by one of us (YZ). **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *tingi* lineage.



Fig. 98 *Sinocyclocheilus wumengshanensis*, KIZ82100006, standard length 92.8 mm. (Photo by Zhao, Y.)

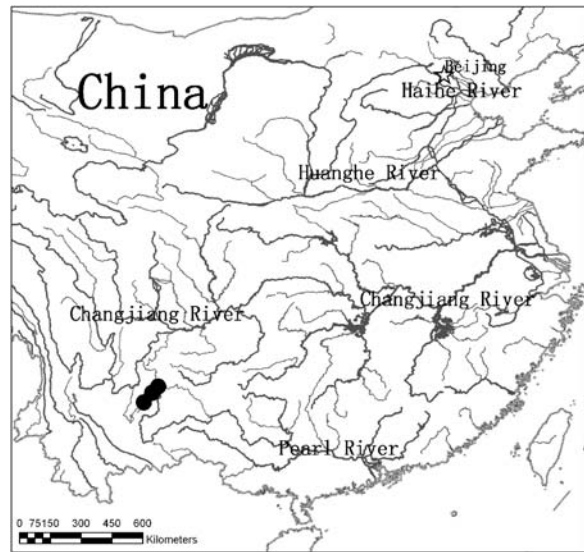


Fig. 99 Distribution of *Sinocyclocheilus wumengshanensis*

50. *Sinocyclocheilus xunlensis* (Lan et al. 2004) (Fig. 100). **Common name:** Xunle golden-line barbel (E, translation from Chinese). **Etymology:** *xunlensis* (L) after the type locality: Xunle town. **Major synonyms:** None. **Ecological classification:** Troglomite. **History:** Type specimens were collected in May 2000. **Morphological characteristics:** D iii, 7 A iii, 5 P i, 11–13 V i, 7. Body scaled; snout duck-billed; blind; lateral line straight, possessing 41–48 scales; pectoral fin long, beyond pelvic fin base. Maximum standard length: 129 mm (Lan et al. 2004). Live coloration is whitish, semi-transparent. **Troglomorphic characters:** No externally visible eyes, depigmented. **Distribution:** China: Guangxi Zhuang Autonomous Region: Huanjiang County: Xunle Town (ca. 25°24' N 108°16' E) (Fig. 101). **Habitat and ecology:** A karstic cave. **Food and feeding:** Un-



Fig. 100 *Sinocyclocheilus xunlensis*, holotype, ASIZB73169, standard length 129.0 mm. (Photo by Zhao, Y.)

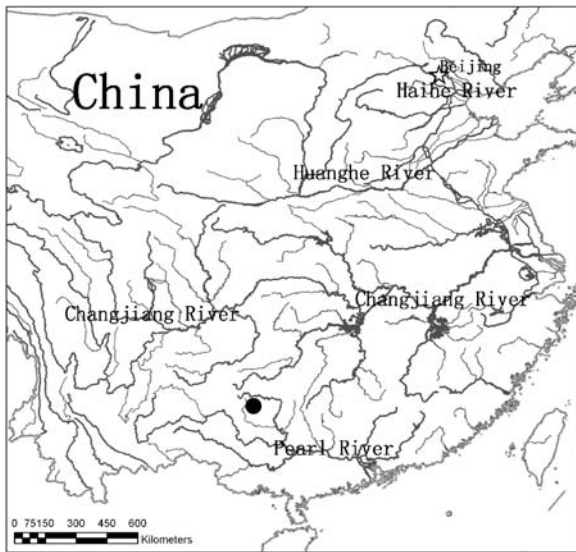


Fig. 101 Distribution of *Sinocyclocheilus xunlensis*

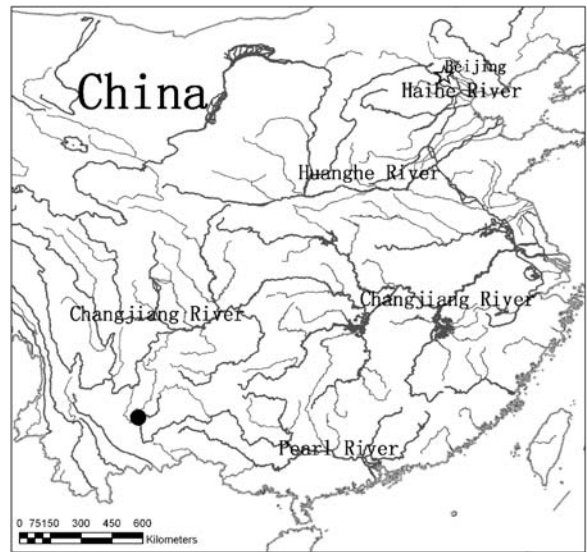


Fig. 103 Distribution of *Sinocyclocheilus yangzongensis*

known. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** None assigned but it should be classified as Endangered as suggested based on the field observations by one of us (YZ). **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *angularis* lineage.

51. *Sinocyclocheilus yangzongensis* Tsü and Chen, 1977 (in Wu et al. 1977) (Fig. 102). **Common name:** Yangzong golden-line barbel (E, translation from Chinese). **Etymology:** *yangzongensis* (L) after the type locality: Lake Yangzonghai, Yunnan Province. **Major synonyms:** *Sinocyclocheilus grahmi yangzongensis*. **Ecological classification:** Troglophile. **History:** First collecting took place in 1955 (Wu et al. 1977). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 16 V i, 9. Body elongated; mouth



Fig. 102 *Sinocyclocheilus yangzongensis*, holotype, KIZ6351069, standard length 144.5 mm. (Photo by Zhao, Y.)

superior; lateral line scales 71–81; pectoral fin short, not reaching to pelvic fin base. Maximum standard length: 150 mm (Shan et al. 2000). Live coloration is golden. **Troglomorphic characters:** None known. **Distribution:** China: Yunnan Province: Lake Yangzonghai (ca. 24°54' N 103°00' E) (Fig. 103). **Habitat and ecology:** Lake at the exit of a subterranean stream. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** None assigned but it should probably be classified as Endangered based on the fact that only a few individuals can be seen every year and yet they are subject to collecting and water pollution. **Major threats:** Excessive collecting and water pollution. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *tingi* lineage.

52. *Sinocyclocheilus yimenensis* Li and Xiao, 2005 (in Li et al. 2005b) (Fig. 104). **Common name:** Yimen golden-line barbel (E, translation from Chinese). **Etymology:** *yimenensis* (L) after the type locality: Yimen County. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** First collecting took place in 1999 (Li et al. 2005b). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 15 V i, 9. Body elongated and scaled; mouth ventral; gill rakers on first gill arch 5; dorsal fin insertion posterior to vertical line of pelvic fin insertion; rictal barbel beyond posterior edge of preopercle; lateral line curved, possessing 71–74 scales. Maximum standard length: 105 mm (Li et al. 2005b). Live

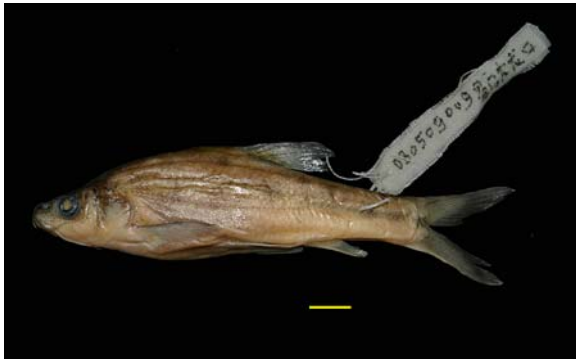


Fig. 104 *Sinocyclocheilus yimenensis*, paratype, Li030509009, standard length 92.5 mm. (Photo by Zhao, Y.)

coloration is golden, back darker, with some dark speckles. **Troglomorphic characters:** None known. **Distribution:** China: Yunnan Province: Yimen County (ca. 24°40' N 102°09' E) (Fig. 105). **Habitat and ecology:** Exit of a subterranean stream (Li et al. 2005b). **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *tingi* lineage.

53. *Sinocyclocheilus yishanensis* Li and Lan, 1992 (Fig. 106). **Common name:** Yishan golden-line barbel (E, translation from Chinese). **Etymology:** *yishanensis* (L) after the type locality: Yizhou



Fig. 106 *Sinocyclocheilus yishanensis*, ASIZB74145, standard length 98.3 mm. (Photo by Zhao, Y.)

(original name Yishan) City. **Major synonyms:** None. **Ecological classification:** Troglomite. **History:** First collecting took place in 1983. **Morphological characteristics:** D iii, 7 A iii, 5 P i, 13–15 V i, 7–9. Body a little humpbacked and scaled; last unbranched ray of dorsal fin soft, without serration; pectoral fin short, not reaching to pelvic fin base; predorsal vertebrae 6–7; gill rakers on first gill arch 9–11. Maximum standard length: 142 mm (Li and Lan 1992). Coloration of preserved specimens (in alcohol) is dark brownish, abdomen lighter. **Troglomorphic characters:** Humpbacked. **Distribution:** China: Guangxi Zhuang Autonomous Region: Yizhou city (ca. 24°28' N 108°40' E) (Fig. 107). **Habitat and ecology:** Original environment was a subterranean river. Now it has been changed to a reservoir. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown.

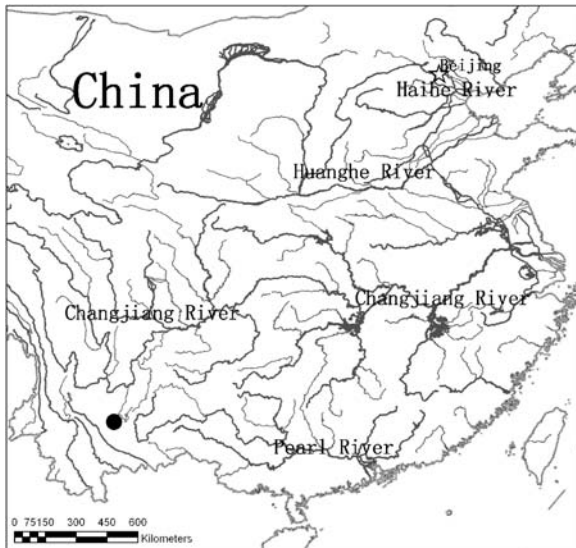


Fig. 105 Distribution of *Sinocyclocheilus yimenensis*

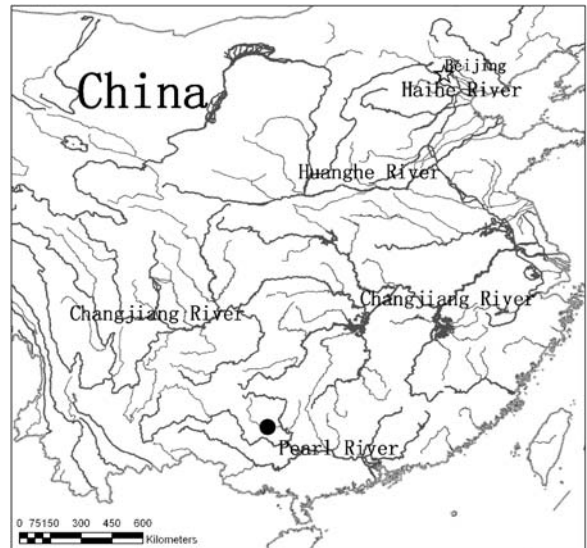


Fig. 107 Distribution of *Sinocyclocheilus yishanensis*

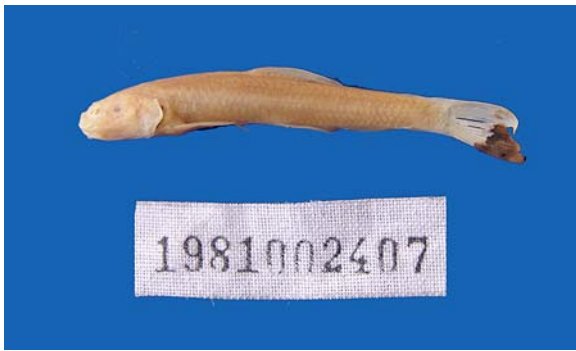


Fig. 108 *Typhlobarbus nudiventris*, holotype, standard length 46 mm. (Photo by He, M.)

Conservation status: None has been assigned but it should be classified as Rare a suggested based on the field observations by one of us (YZ). **Major threats:** Reservoir. Irrigation. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *jii* lineage.

Genus *Typhlobarbus* Chu and Chen, 1982

This is a monotypic genus.

54. *Typhlobarbus nudiventris* Chu and Chen, 1982 (Fig. 108). **Common name:** Blind naked-belly barbel (E, translation from Chinese). **Etymology:** *typhlo* (Gr) blind; *barbus* (L) carp; *nudi* (L) naked; *ventris* (L) ventral. **Major synonyms:** None. **Ecological classification:** Trogllobite. **History:** First collection took place in 1976. First reported in 1979. Known from only three specimens (Chu and Chen 1982). **Morphological characteristics:** D ii, 8 A ii, 5 P i, 15 V ii, 8. Body elongated; mouth inferior and arched; eye degenerated; scaled, but anterior back and thorax-abdomen regions naked; lateral line scales 39–40; dorsal and anal spine soft. Maximum standard length: 45.5 mm (Shan et al. 2000). Live coloration is pale pinkish, semi-transparent. The branchial region is very reddish due to the blood circulation in that area. **Troglomorphic characters:** No externally visible eyes, partially scaleless. **Distribution:** China: Yunnan Province: Jianshui County: Yangjieba (ca. 23°39' N, 102°46' E) (Fig. 109). **Habitat and ecology:** The underground water in the karst cave is about 100 m below the surface at an altitude of 1,450 m above sea level. The water moves slowly (Chu and Chen 1982; Yue and Chen 1998). **Food and feeding:** Outer shells of chitinozoa have been found in feces suggesting that

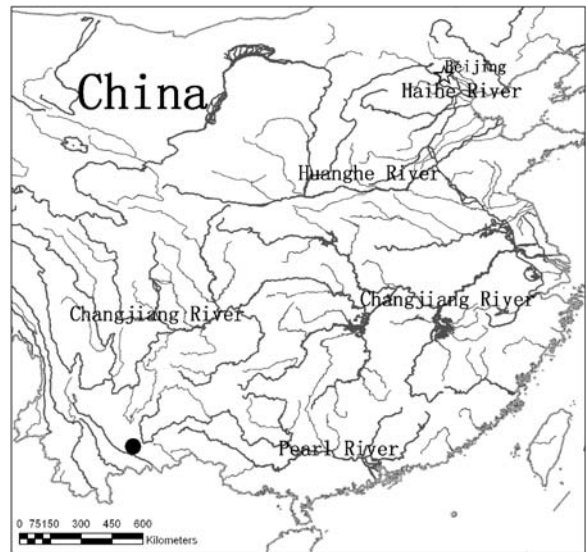


Fig. 109 Distribution of *Typhlobarbus nudiventris*

plankton is at least part of their diet (Chu and Chen 1982). **Reproduction and development:** External, non-guarder (Riehl and Baensch 1991). **Other behavior:** They support their bodies on the outer edge of pectoral and pelvic fins with the tip of the lower lobe of the caudal fin and the head raised upward. When swimming, they open their nostrils, lift the valve of their noses with their snouts extending forward and their bellies against the wall of the container and they again became still after swimming several rounds. They are very sensitive to vibration but show no response to light (Chu and Chen 1982; Yue and Chen 1998). **Conservation status:** VU in IUCN RL 2003, VU in China’s Species Red List (Wang and Xie 2004), Rare in China’s Red Data Book of Endangered Animals (Yue and Chen 1998) and a Second Class Protected Animal of Yunnan Province. **Major threats:** Water extraction by the locals. **Conservation plans:** None. **Phylogenetic relationships:** No known phylogenetic relationships except for the fact that it has been placed in the subfamily Barbinae. This species is superficially very similar to *Linichthys laticeps* (Zhang and Fang 2005).

Family: Cobitidae—loaches

This is a family composed of about 180 species of freshwater fishes from Eurasia and Morocco. They have a wormlike to fusiform body and are mostly

bottom dwellers (Nelson 2006; pp. 146–147). Only one troglomorphic species has been described and it is from China.

Genus *Protocobitis* (Yang et al. 1994)

There are two species for this genus and both as hypogean.

55. *Protocobitis polylepis* (Zhu et al. 2008) (Fig. 110). **Common name:** None given. **Etymology:** *proto* (Gr) primitive; *cobitis* (L) a generic name for members of the subfamily Cobitinae; *poly* (Gr) many; *lepis* (Gr) scales. **Major synonyms:** None. **Ecological classification:** Troglobite. **History:** Two specimens collected on May 2006 by Sheng Zhang. **Morphological characteristics:** D ii, 6–7, A 2–5 P 1–7, V 1–4. Gill rakers 8. Blind. Scales covering the entire body except for head and abdomen. It lacks a bony gas bladder capsule, which may be a primitive character. Maximum standard length: 33.0 mm (Zhu et al. 2008). Pigmented. **Troglomorphic characters:** No externally visible eyes, absence of gas bladder. **Distribution:** China: Guangxi Zhuang Autonomous Region: Wuming County (ca. 23°10' N, 108°17' E) (Fig. 111). **Habitat and ecology:** Underground water. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** None has been assigned. **Major threats:** Unknown. **Plans:** None. **Phylogenetic relationships:** The genus may be the primitive sister-group of the whole subfamily Cobitinae (Yang et al. 1994).

56. *Protocobitis typhlops* (Yang et al. 1994) (Fig. 112). **Common name:** None given. **Etymology:** *proto* (Gr) primitive; *cobitis* (L) a generic name for members of the subfamily Cobitinae; *typhlos* (Gr) blind; *ops* (Gr) eye. **Major synonyms:** None. **Ecological classification:** Troglobite. **History:** Specimens collected in August 1991 by Lan Jia-Hu.



Fig. 110 *Protocobitis polylepis*, paratype KIZ20060002. (Photo by He, M.)



Fig. 111 Distribution of *Protocobitis polylepis*

Morphological characteristics: D iii, 7 A iii, 4–5 P i, 6–7, V i, 5. Gill rakers 7–8. Vertebrae 4 + 43. Blind. Scales rudimentary and only along the midline of the sides of the body. Lacks lateral line. It also lacks a bony gas bladder capsule, which may be a primitive character. Maximum standard length: 54.0 mm (Yang et al. 1994). Live fish pinkish and translucent, viscera and vertebrae clearly visible. **Troglomorphic characters:** No externally visible eyes, depigmented, scales reduced in number, size, and structure, absence of gas bladder. **Distribution:** China: Guangxi Zhuang Autonomous Region: Du'an County: Xia'ao town (24°15' N, 107°05' E) (Fig. 113). **Habitat and ecology:** In a cave at 210 m above sea level. The species is sympatric with *Sinocyclocheilus macrophthalmus* and *Oreonectes translucens*. **Food and feeding:** Unknown. **Reproduction and develop-**



Fig. 112 *Protocobitis typhlops*, ASIZB70026, standard length 39 mm. (Photo by Ye, E and Zhao, Y.)

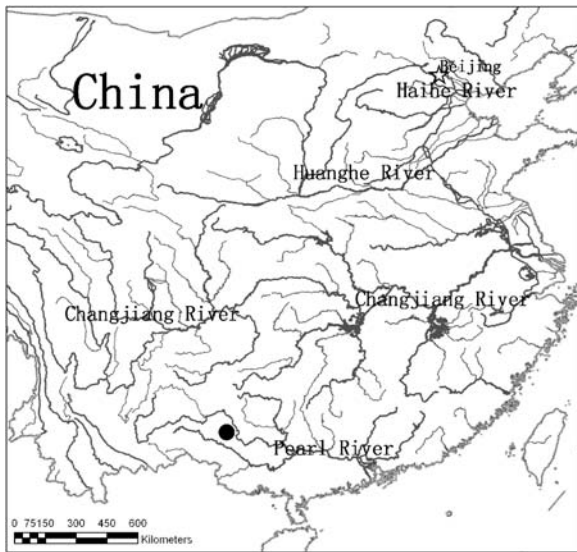


Fig. 113 Distribution of *Protocobitis typhlops*

ment: Unknown. **Other behavior:** Swims slowly near the bottom. **Conservation status:** VU (IUCN). **Major threats:** Excessive collecting. **Plans:** None. **Phylogenetic relationships:** None known.

Family: Balitoridae—River loaches

This is another freshwater family of the Order Cypriniformes, with about 600 species from Eurasia. They have three or more pair of barbels. Some species are scaleless. Many tend to hide underneath rocks (Nelson 2006). They have 32 hypogean representatives of which 11 are troglobitic. Trajano et al. (2002) found numerous individuals of the genera *Homaloptera* and *Balitora* in caves in Thailand. In 1997 an epigeic individual of the species *Balitora burmanica* was collected in a cave in Thailand (Trajano et al. 2002).

Genus *Heminoemacheilus* Zhu and Cao, 1987

Only two species have been described, both of them in caves and in a subterranean stream in Du’an County, Guangxi.

57. *Heminoemacheilus hyalinus* (Lan et al. 1996) (Fig. 114). **Common name:** translucent loach (E, translation from Chinese). **Etymology:** *hemi* (Gr) half, *nema* (Gr) filament, *cheilos* (Gr) lip; *hyalinus*, from *hyalinus* (Gr) of glass, referring to the transpar-



Fig. 114 *Heminoemacheilus hyalinus*, cited from Lan and Zhang 2006. (Photo by Lan, J.)

ency of the fish. **Major synonyms:** None. **Ecological classification:** Troglolobite. **History:** Type specimens were collected in September 1994 (Lan et al. 1996). **Morphological characteristics:** D iii, 7–8 A iii, 4–5 P i, 11–12, V i, 5. Body almost naked; lateral line incomplete; blind; branched caudal rays 11–12, barbels short, not reaching to opercular, head small. Maximum standard length: 43.5 mm (Lan et al. 1996). Live coloration is translucent with viscera and vertebrae clearly visible. Coloration of preserved specimens (in alcohol) is whitish with no speckles. **Troglomorphic characters:** No externally visible eyes, depigmented, mostly scaleless. **Distribution:** China: Guangxi Zhuang Autonomous Region: Du’an County: Bao’an town (ca. 24°07’ N, 107°51’ E) (Fig. 115). **Habitat and ecology:** Subterranean stream. **Food and feeding:** Unknown. **Reproduction**

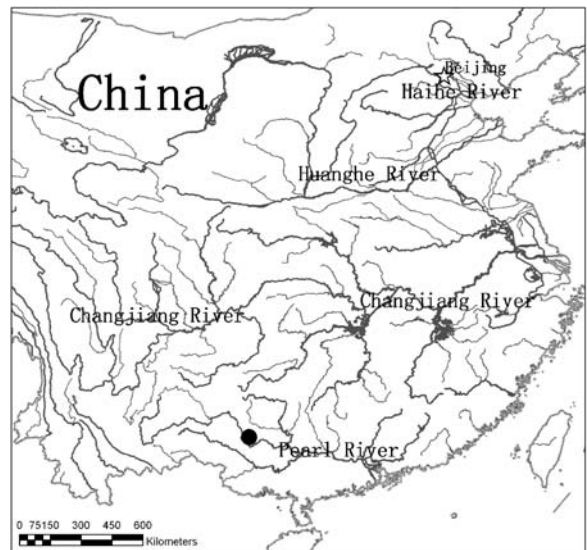


Fig. 115 Distribution of *Heminoemacheilus hyalinus*

and development: Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** The genus is closely related to *Paranemacheilus*.

58. *Heminoemacheilus zhengbaoshani* Zhu and Cao, 1987 (Fig. 116). **Common name:** Zheng's loach (E, translation from Chinese). **Etymology:** *zhengbaoshani* (L) after Dr. Zheng Baoshan's contribution to Chinese ichthyology. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** Type specimens were collected in September 1974 (Zhu and Cao 1987). **Morphological characteristics:** D iii, 7–9 A iii, 5 P i, 11–12, V i, 6–7. Body elongated; mouth sub-inferior, lower lip with a slight median incision, upper jaw with a tooth like structure; barbels reaching operculum or beyond; dorsal fin origin slightly in advance of ventral, its origin being considerable nearer to caudal base than to snout tip; ventral not reaching vent; lateral line incomplete; scales small and head naked. Maximum standard length: 87 mm (Zhu and Cao 1987). Coloration of preserved specimens (in alcohol) is pale brown, somewhat lighter below, no markings (Zhu and Cao 1987). **Troglomorphic characters:** Possibly smaller scales and/or lack thereof on head. **Distribution:** China: Guangxi Zhuang Autonomous Region: Du'an County (ca. 23°56' N, 108°05' E) (Fig. 117). **Habitat and ecology:** Subterranean stream. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** The genus is closely related to *Paranemacheilus*. **Remarks:** It is the type species of the genus *Heminoemacheilus*.



Fig. 116 *Heminoemacheilus zhengbaoshani*, holotype, ASIZB61075 (Field No. 741802), standard length 85 mm. (Photo by Ye, E and Zhao, Y.)

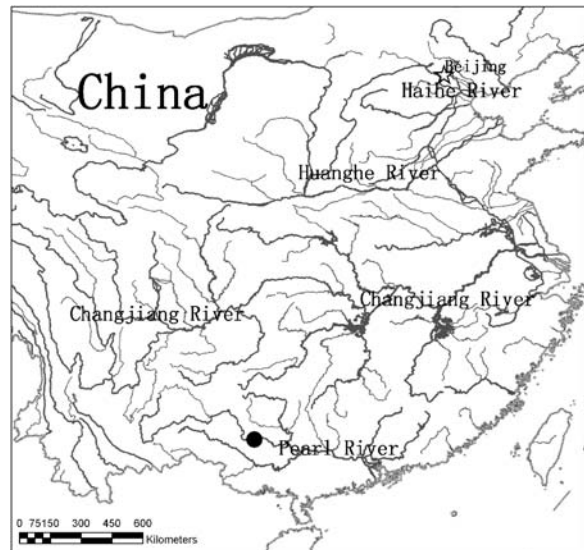


Fig. 117 Distribution of *Heminoemacheilus zhengbaoshani*

Genus *Oreonectes* Günther, 1868

There are seven known valid species for this genus. Except for type species, *Oreonectes platycephalus* and *O. polystigmus*, the rest of species are all cave dwellers. Interestingly, all cave fishes in the genus are all found in Guangxi, China. Classification of the genus is ambiguous and is still in need of further study.

59. *Oreonectes anophthalmus* Zheng, 1981 (Fig. 118). **Common name:** Eyeless flat-headed loach (E, translation from Chinese). **Etymology:** *Oreos* (Gr) mountain, *nekton* (Gr) swimmer; *an* (Gr) without; *ophthalmus* (Gr) eyes. **Major synonyms:** *Nemacheilus anophthalmus* (Kottelat 1988). **Ecological classification:** Troglóbite. **History:** Type specimens were collected in 1977. **Morphological characteristics:** D ii, 7 A ii, 5 P i, 10, V i, 4. Body



Fig. 118 *Oreonectes anophthalmus*, holotype, ASIZB60294 (Field No. Gui77001), standard length 41.3 mm (Photo by Ye, E. and Zhao, Y.)

naked; anterior section of body strong and slightly depressed, posterior part compressed; mouth inferior; 3 pairs of barbels, rostral one 2 pairs and maxillary one 1 pair; blind; dorsal fin opposite behind pelvic fin base; caudal fin rounded. Maximum standard length: 44 mm (Lan and Zhang 2006). Live coloration is semitransparent, fins transparent. **Troglophobic characters:** No externally visible eyes, depigmented, scaleless. **Distribution:** China: Guangxi Zhuang Autonomous Region: Wuming County: Qifeng Shan (hill): Taiji Cave (ca. 23°06' N, 108°40' E) (Fig. 119). **Habitat and ecology:** Subterranean stream in karst cave. **Food and feeding:** Unknown. **Reproduction and development:** External reproduction, non-guarder (Breder and Rosen 1966). **Other behavior:** Unknown. **Conservation status:** Rare in China's Red Data Book of Endangered Animals, Pisces (Yue and Chen 1998); Vulnerable in China's Species Red List, Vol. 1 Red List (Wang and Xie 2004). **Major threats:** Excessive collecting. Environment change since the type locality has been changed to a local park. **Conservation plans:** None. **Phylogenetic relationships:** The species is more closely related to *O. platycephalus* by having similar dorsal fin position, caudal fin shape and numbers of dorsal, and anal fin rays (Lan et al. 1995).

60. *Oreonectes furcocaudalis* Zhu and Cao, 1987 (Fig. 120). **Common name:** Forked caudal-fin flat-headed loach (E, translation from Chinese). **Etymol-**



Fig. 120 *Oreonectes furcocaudalis*, cited from Lan and Zhang 2006. (Photo by Lan, J.)

ogy: *furca* (L) fork; *cauda* (L) tail. **Major synonyms:** None. **Ecological classification:** Troglolite. **History:** Type specimens were collected in 1983. **Morphological characteristics:** D iii, 8 A iii, 6 P i, 12–13, V i, 7. Body elongated, compressed; mouth inferior; eyes small; caudal fin forked; lateral line incomplete; very small scales on back behind dorsal fin. Maximum standard length: 72 mm (Lan and Zhang 2006). Coloration of preserved specimens (in alcohol) is grayish, back darker, light brownish, no speckles. **Troglophobic characters:** Small eyes, **depigmented**, scales reduced in size and numbers. **Distribution:** China: Guangxi Zhuang Autonomous Region: Rongshui County (ca. 25°04' N, 109°13' E) (Fig. 121). **Habitat and ecology:** Mouth of a

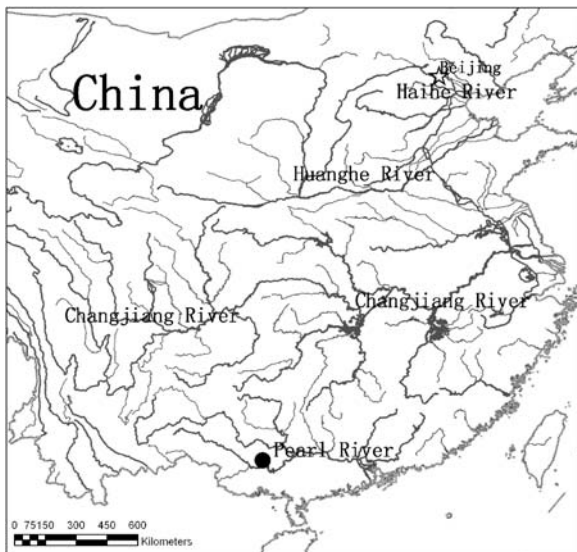


Fig. 119 Distribution of *Oreonectes anophthalmus*



Fig. 121 Distribution of *Oreonectes furcocaudalis*

subterranean stream. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** None known.

61. *Oreonectes microphthalmus* (Du et al. 2008) (Fig. 122). **Common name:** small eyes loach. **Etymology:** *micron* (Gr) small, and *phthalm* (Gr) eye. **Major synonyms:** None. **Ecological classification:** Troglolite. **History:** Du et al. (2008) were the first to mention this species. **Morphological characteristics:** D iii, 10; A ii, 7; Pi, 10; V i, 7; C 15. Body elongate; snout elongate; eyes reduced to a black pigment; body naked; cephalic lateral-line system with 2+2 supratemporal, 7 supraorbital, 3+0 infraorbital and 8 preoperculomandibular pores; lateral line incomplete, with 3 pores (Du et al. 2008). Live coloration is without pigments including the fins. **Troglomorphic characters:** Microphthalmic and degenerated, scaleless. **Distribution:** China: Guangxi Zhuang Autonomous Region: Du'an County (24°15' N 107°05' E) (Fig. 123). **Habitat and ecology:** Unknown. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** None known. Remarks: More studies are needed to determine the relationship with *Oreonectes translucens*.

62. *Oreonectes retrodorsalis* (Lan et al. 1995) (Fig. 124). **Common name:** Back dorsal-fin flat-headed loach (E, translation from Chinese). **Etymology:** *retro* (L) back, backwards, behind; *dorsalis* (L) back, dorsal, referring to the dorsal fin. **Major**



Fig. 122 *Oreonectes microphthalmus*, holotype KIZ20030001, standard length 39 mm. (Photo by He, M.)

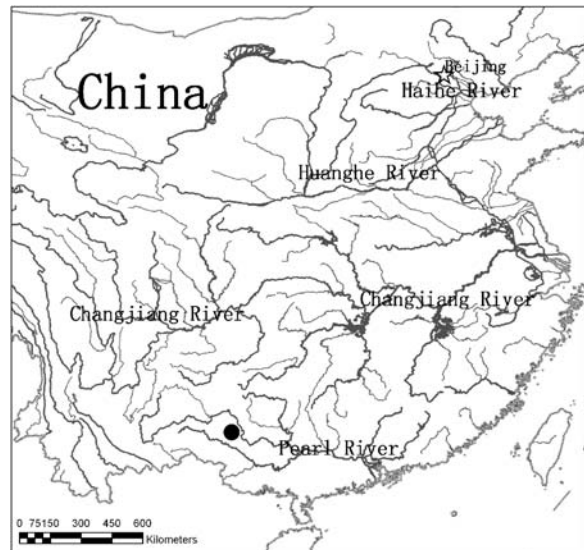


Fig. 123 Distribution of *Oreonectes microphthalmus*

synonyms: None. **Ecological classification:** Troglolite. **History:** Type specimens were collected in 1991 (Lan et al. 1995). **Morphological characteristics:** D iv, 7 A iv, 5 P i, 10–12, V i, 7. Body elongated, slightly compressed; head naked; mouth ventral; distance from dorsal fin insertion to snout tip obviously longer than to caudal fin base; caudal fin forked; lateral line incomplete. Maximum standard length: 56 mm (Lan and Zhang 2006). Coloration of preserved specimens (in alcohol) is grayish, ventral yellowish with a black stripe along midline of body sides. **Troglomorphic characters:** None known. **Distribution:** China: Guangxi Zhuang Autonomous Region: Nandan County: Liuzhai town: Longli Village (ca. 25°10' N, 107°10' E) (Fig. 125). **Habitat and ecology:** Exit of a subterranean stream. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** VU, in China's Species Red List (Wang and Xie 2004). **Major threats:** No survey



Fig. 124 *Oreonectes retrodorsalis*, cited from Lan and Zhang 2006. (Photo by Lan, J.)

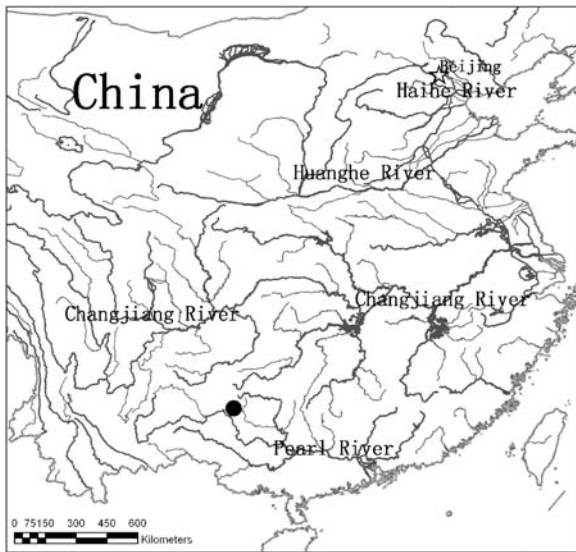


Fig. 125 Distribution of *Oreonectes retrodorsalis*

has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** The species is closely related to *O. platycephalus* and *O. anophthalmus* since the position of dorsal fin and the numbers of branched rays of anal fin are similar to the other two species (Lan et al. 1995).

63. *Oreonectes translucens* (Zhang et al. 2006) (Fig. 126). **Common name:** Transparent flat-headed loach (E, translation from Chinese). **Etymology:** *trans* (L) across; *lucens* (L) light. **Major synonyms:** None. **Ecological classification:** Troglóbite. **History:** Yang et al. (1994) mentioned this species. **Morphological characteristics:** D iii, 8 A iii, 6 P i, 11, V i, 6. Body elongated; head slightly depressed; blind; well developed crests; dorsal fin insertion opposite pelvic fin insertion; lateral line incomplete; vertebrae 4+ 32. Maximum standard length: 45.8 mm (Zhang et al. 2006). Live coloration is absent. Coloration of preserved specimens (in alcohol) is grayish with no speckles. **Troglomorphic characters:** No externally visible eyes, depigmented, scaleless. **Distribution:**



Fig. 126 *Oreonectes translucens*, holotype, ASIZB94785, standard length 45.8 mm. (Photo by Zhang, Z.)

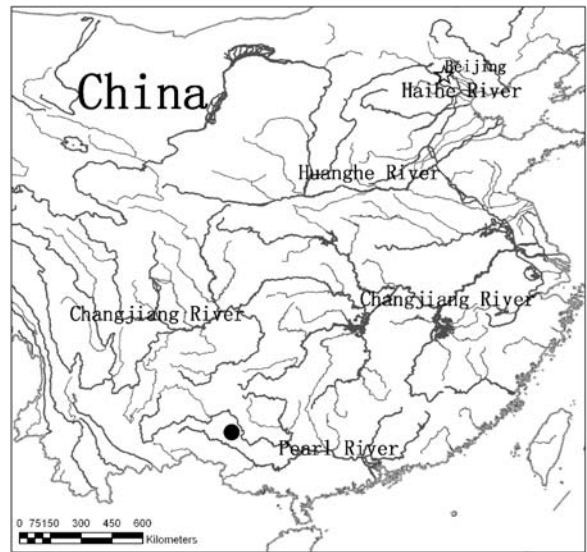


Fig. 127 Distribution of *Oreonectes translucens*

China: Guangxi Zhuang Autonomous Region: Du'an County: Xia'ao town (24°15' N, 107°05' E) (Fig. 127). **Habitat and ecology:** In a cave at 210 m above sea level. The species is sympatric with *Sinocyclocheilus macropthalmus* and *Protocobitis typhlops*. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** None assigned but it should be classified as Endangered, based on the field observations by one of us (YZ). **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** None known. **Remarks:** It needs a further study on the relationship with *Oreonectes microphthalmus*.

Genus *Paracobitis* Bleeker, 1863

More than 20 species of this genus have been described. *Paracobitis* species are distributed from Middle Asia to China and south-east Asia. Three species have been found from subterranean streams of south-west China in recent years.

64. *Paracobitis maolanensis* (Li et al. 2006) (Fig. 128). **Common name:** Maolan blind loach (E, translation from Chinese). **Etymology:** *maolanensis* (L) after the type locality, Maolan Karst Forestry Natural Reserve. **Major synonyms:** None. **Ecological classification:** Troglóbite. **History:** The holotype was collected on 3 January 2005. **Morphological**

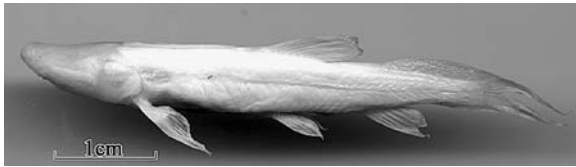


Fig. 128 *Paracobitis maolanensis*, holotype, Li050103001, standard length 46 mm. Cited from Li et al. 2006

characteristics: D iii, 8 A ii, 5 P i, 11, V i, 6. Body elongated, naked; mouth inferior; barbels 3 pairs, not well-developed; dorsal fin insertion opposite pelvic fin insertion; caudal fin deeply forked. Maximum standard length: 46 mm (Li et al. 2006). Live coloration is semi-transparent with viscera and blood vessel of caudal peduncle clearly visible. Coloration of preserved specimens (in alcohol) is whitish. **Troglomorphic characters:** No externally visible eyes, depigmented, scaleless. **Distribution:** China: Guizhou Province: Libo County: Maolan Karst Forestry Natural Reserve (a national park) (25°23' N, 108°04' E) (Fig. 129). **Habitat and ecology:** A karstic cave. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. Only one specimen has been found so far, so it should be classified as at least Rare. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic**

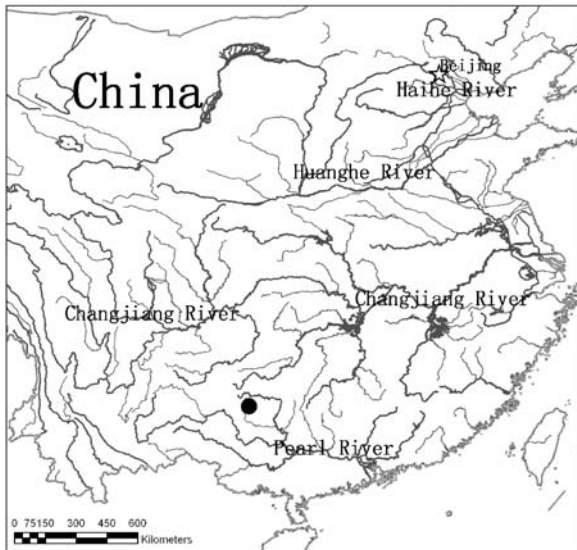


Fig. 129 Distribution of *Paracobitis maolanensis*

relationships: None known. **Remarks:** From description of Li et al. (2006), it is probably a species of *Triplophysa* and distinct from *T. longibarbatus*. Because it is sympatric with *T. longibarbatus* and has similar morphology, more studies are needed to determine its systematic status.

65. *Paracobitis posterodarsalus* Li, Ran and Chen, 2006 (in Ran et al. 2006) (Fig. 130). **Common name:** Poster dorsal-fin blind loach (E, translation from Chinese). **Etymology:** *post* (L) after; *darsum* (L) back; for the insertion of the dorsal fin behind the vertical line of the pelvic fin insertion. **Major synonyms:** None. **Ecological classification:** Troglomite. **History:** Only one specimen (the holotype) has been found so far. It was collected on 5 October 2004 (Ran et al. 2006). **Morphological characteristics:** D iii, 6 A ii, 4 P i, 13, V i, 5. Body elongated; naked; mouth inferior; barbels 3 pairs, well-developed; blind; dorsal fin insertion opposite behind pelvic fin insertion; caudal fin deeply forked, upper lobe longer than lower one. Maximum standard length: 53 mm (Ran et al. 2006). Live coloration is semi-transparent. Coloration of preserved specimens (in alcohol) is whitish. **Troglomorphic characters:** No externally visible eyes, depigmented, scaleless. **Distribution:** China: Guangxi Zhuang Autonomous Region: Nandan County (ca. 24°59' N, 107°32' E) (Fig. 131). **Habitat and ecology:** A karstic cave. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined, but because only one specimen has been found so far it should be classified as at least Rare. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** None known. **Remarks:** Li et al. (2006) proposed three diagnoses to differentiate *Paracobitis posterodarsalus* from *P. longibarbatus*. The first one, relative position of dorsal and pelvic fins, is actually not a prominent difference. The other two are fin ray counts of dorsal

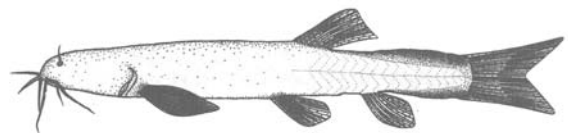


Fig. 130 *Paracobitis posterodarsalus*, cited from Ran et al. 2006

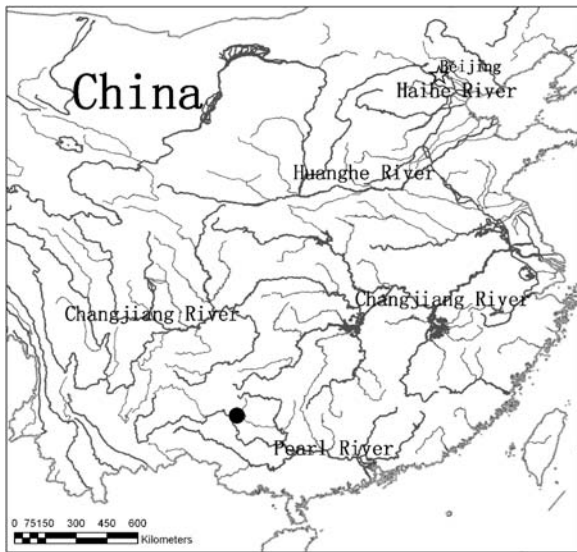


Fig. 131 Distribution of *Paracobitis posterodarsalus*

and anal fins. From Fig. 1 of Li et al. (2006), the branched dorsal-fin ray is at least 7 vs. 6 in the diagnosis and the branched anal-fin ray is at least 6 vs. 4 in the diagnosis. Therefore, the accuracy of fin-ray counts in this paper is problematic. We suggest that *Paracobitis posterodarsalus* might be a junior synonym of *Triplophysa longibarbatas*.

Genus *Paranemacheilus* Zhu, 1983

This is a monotypic genus from Guangxi.

66. *Paranemacheilus genilepis* Zhu, 1983 (Fig. 132). **Common name:** Unknown. **Etymology:** *para* (Gr) close to; *nema* (Gr) line; *geni* (Gr) from genys, meaning cheek, *lepis* (Gr) scales. **Major synonyms:** There seems to be a misspelling in the way the genus was originally described. It should be *Paranemacheilus* since the original intent was to relate it to the genus *Nemacheilus*. According to



Fig. 132 *Paranemachilus genilepis*, holotype ASIZB60382, standard length 79 mm. (Photo by Ye, E.)

Article 32.5.1. of the International Code of Zoological Nomenclature (Fourth Edition) ‘If there is in the original publication itself, without recourse to any external source of information, clear evidence of an inadvertent error, such as a *lapsus calami* or a copyist’s or printer’s error, it must be corrected. Incorrect transliteration or latinization, or use of an inappropriate connecting vowel, are not to be considered inadvertent errors.’ Therefore we believe that the correct spelling for this genus should be *Paranemacheilus* not *Paranemachilus*. **Ecological classification:** Troglophile. **History:** First specimen was collected in September 1979. **Morphological characteristics:** D iii, 7–8; A iii,5; P i, 11–13; V i, 6–7. Body robust, slightly elongate and compressed, completely covered with minute scales. Suborbital spine absent. Lateral line incomplete. Head slightly depressed, naked above, cheeks scaly. Nostrils close together, anterior one tubular. Barbels 6, 4 rostral and 2 maxillary. Coloration of the dorsum of preserved specimens (in formalin) is brownish with many irregular speckles and spots; some irregular short, vertical dark stripes along midline of each side from the gill opening to the caudal fin base. In some male specimens, it becomes a long horizontal stripe. **Troglomorphic characters:** None. **Distribution:** China: Guangxi Zhuang Autonomous Region: Fusui County: subterranean river of Changping (ca. 22°42’ N, 107°53’ E) (Fig. 133). **Habitat and ecology:**

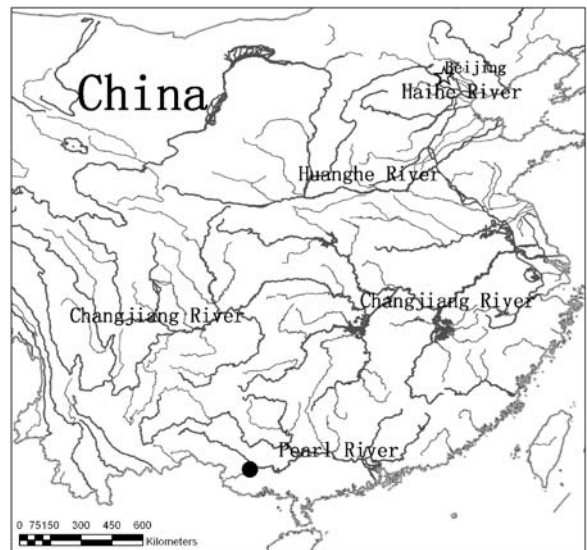


Fig. 133 Distribution of *Paranemachilus genilepis*

Unknown. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic Relationship:** None known.

Genus *Schistura* McClelland, 1838

This is a genus represented by about 200 species of which five are hypogean.

67. *Schistura dabryi microphthalmus* Liao and Wang, 1997 (in Liao et al. 1997) (Fig. 134). **Common name:** Small eye Dabry's loach (E, translation from Chinese). **Etymology:** *schistura* (Gr) or *skhizein* = to split; *oura* (Gr) tail as an allusion to the forked tail; *micro* (Gr) small; *ophthalmus* (Gr) eyes. **Major synonyms:** None. **Type:** Troglolobite. **History:** Type specimens were collected in 1991 (Liao et al. 1997). **Morphological characteristics:** D iii, 8 A ii, 5 P i, 9 V i, 7. Body elongated; naked; anterior and posterior nostrils situate closely together; mouth inferior; barbels 3 pairs; eye present, very small; dorsal fin insertion in front of vertical line of pelvic fin insertion; caudal fin forked; lateral line complete. Maximum standard length: 62 mm (Liao et al. 1997). Live coloration is grayish with irregular speckles on both sides. **Troglomorphic characters:** Microphthalmic. **Distribution:** China: Guizhou Province: Weng'an County: Hawk Cave (ca. 26°53' N, 107°02' E), Yangtze River drainage (Fig. 135). **Habitat and ecology:** A karstic cave. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** The species is most similar to *Triplophysa napanjiangensis*,

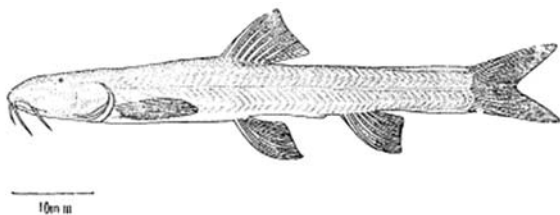


Fig. 134 *Schistura dabryi microphthalmus*, cited from Liao et al. 1997

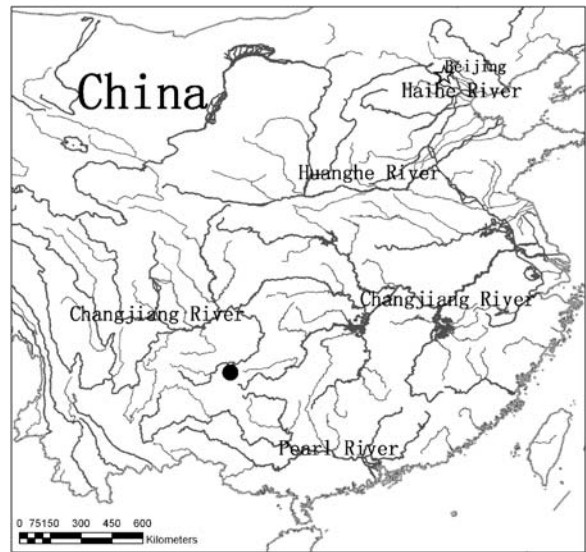


Fig. 135 Distribution of *Schistura dabryi microphthalmus*

which used to be *Schistura dabryi napanjingensis*, as a subspecies of *Schistura dabryi*. The systematics and taxonomy on this species needs to be reviewed.

68. *Schistura lingyunensis* Liao and Luo, 1997 (in Liao et al. 1997) (Fig. 136). **Common name:** Lingyun loach (E, translation from Chinese). **Etymology:** *lingyunensis* (L) after its type locality, Lingyun County in Guangxi. **Major synonyms:** None. **Type:** Troglolobite. **History:** Type specimens were collected in 1992 (Liao et al. 1997). **Morphological characteristics:** D iii, 6–7 A iii, 5 P i, 9 V i, 5–7. Body elongated; naked. Head slightly depressed; anterior and posterior nostrils situated closely together; mouth inferior; barbels 3 pairs, well-developed; eye very small, present as a black dot. Dorsal fin insertion in front of vertical line of pelvic fin insertion; anal fin close to anus, not reaching to caudal fin base, caudal fin forked. Lateral line



Fig. 136 *Schistura lingyunensis*, cited from Lan and Zhang 2006. (Photo by Lan, J.)

incomplete, stops below insertion of dorsal fin. Maximum standard length: 62 mm (Liao et al. 1997). Live coloration is mostly transparent, operculum red due to blood circulation (Liao et al. 1997). **Troglo-morphic characters:** Eyes degenerated, completely depigmented, scaleless. **Distribution:** China: Guangxi Zhuang autonomous region: Lingyun county: Guancang village (ca. 24°25' N, 106°30' E) and Sicheng Town: Shadong Cave (24°20' N, 106°32' E) (Fig. 137). **Habitat and ecology:** Subterranean streams, belonging to Nanpanjiang River basin. In Shadong Cave (Sand Cave), the species is sympatric with *Sinocyclocheilus microphthalmus* and *Sinocyclocheilus lingyunensis* (Li et al. 2000b). **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** The species is most similar to *Schistura incerta*, which has bigger eyes and a complete lateral line.

Genus *Triplophysa* Rendahl, 1933

The species of the genus *Triplophysa* are widely distributed in Qinghai-Tibet Plateau and its related areas, 107 species have been described so far. Some of them are cave dwellers. At least 11 cavefish species from the genus are found in south-west China.

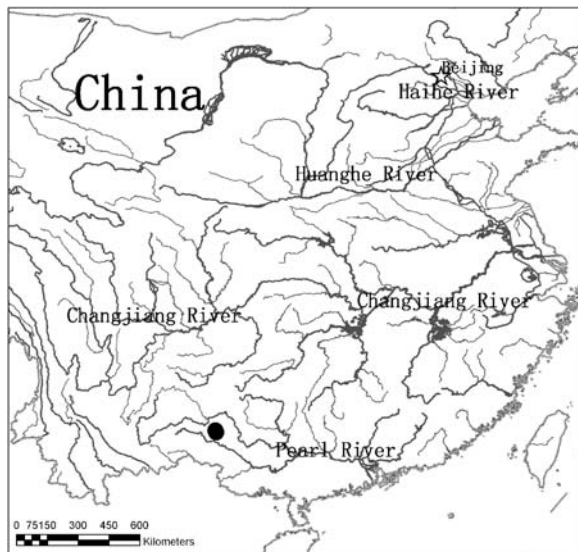


Fig. 137 Distribution of *Schistura lingyunensis*



Fig. 138 *Triplophysa aluensis*, holotype, KIZ20006007, standard length 74 mm. (Photo by Ms. He, M.)

69. *Triplophysa aluensis* Li and Zhu, 2000 (Fig. 138). **Common name:** Alu plateau loach (E, translation from Chinese). **Etymology:** *Triplos* (Gr) thrice; *physa* (Gr) tube; *aluensis* (L) after the name of the type locality, Alu Cave in Luxi County, Yunnan Province. **Major synonyms:** None. **Ecological classification:** Troglobite. **History:** The only specimen collected so far was in June 2000. **Morphological characteristics:** D iii, 7 A iii, 5 P i, 9, V i, 6. Body elongated; naked; mouth inferior; barbels 3 pairs, well-developed; eye degenerated; dorsal fin insertion slightly in front of vertical line of pelvic fin insertion; caudal fin forked; lateral line present, straight. Maximum standard length: 74 mm (Li and Zhu 2000). Live coloration is light grayish, back darker, two speckles on caudal fin. **Troglo-morphic characters:** Microphthalmic, depigmented, scaleless. **Distribution:** China: Yunnan Province: Luxi County: Alu limestone caves (24°33' N, 103°45' E) (Fig. 139). **Habitat and ecology:** In an underground stream



Fig. 139 Distribution of *Triplophysa aluensis*

(Yusun River) of a cave of 625 m in length at an elevation of 1,713 m above sea level **Food and feeding:** Feeds on microscopic animals including aquatic insects. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** Environmental degradation. Alu Cave has been developed as a popular tourist site. **Conservation plans:** None. **Phylogenetic relationships:** None known. **Remarks:** The fin-ray count in Li and Zhu (2000) is not accurate and some additional characters have been described elsewhere (see Chen and Yang 2005).

70. *Triplophysa gejiuensis* (Chu and Chen, 1979) (Fig. 140). **Common name:** Gejiu blind plateau loach (E, translation from Chinese). **Etymology:** *gejiuensis* (L) after the type locality, Gejiu City, Yunnan Province. **Major synonyms:** *Nemacheilus gejiuensis* (original combination) (Chu and Chen 1979), *Schistura gejiuensis* (Zhu 1989). **Ecological classification:** Troglolite. **History:** The first nine specimens were captured in March 1978. **Morphological characteristics:** D ii, 7–8 A ii, 4–6 P i, 9–10, V i, 5. Body elongated; naked; blind; 3 pairs of barbels, well-developed; mouth inferior; lateral line present, straight. Maximum standard length: 52.0 mm (Yang 1990). Live coloration is whitish, semi-transparent with all fins transparent. Coloration of preserved specimens (in alcohol) is milk-like whitish. **Troglo-morphic characters:** No externally visible eyes, depigmented, scaleless. **Distribution:** China: Yunnan Province: Gejiu City: Bajiaoqing 4 km from Kafang (23°16' N, 103°09' E) (Fig. 141). **Habitat and ecology:** In subterranean waters at a depth of 400 m underground. Water temperature 17°C, air temperature 20°C in cave, ground temperature 22°C in

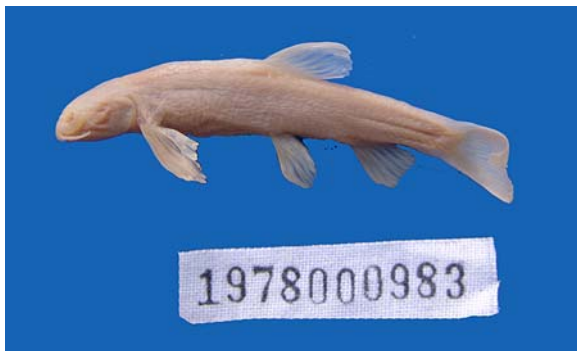


Fig. 140 *Triplophysa gejiuensis*, paratype, KIZ1978000983. (Photo by He, M.)

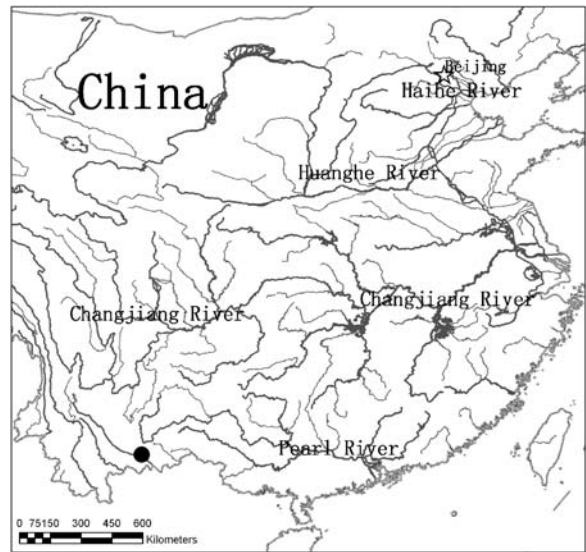


Fig. 141 Distribution of *Triplophysa gejiuensis*

August (Chu and Chen 1979). **Food and feeding:** Feeds on microscopic animals and aquatic insects. **Reproduction and development:** External reproduction, non-guarder (Breder and Rosen 1966). **Other behavior:** Unknown. **Conservation status:** VU, in IUCN RL2003; VU, in China's Species Red List (Wang and Xie 2004), Rare, in China's Red Data Book of Endangered Animals (Yue and Chen 1998). **Major threats:** Original environment has been severely modified. **Conservation plans:** None. **Phylogenetic relationships:** More closely related to *T. shilinensis* by having 14–15 branched rays in the caudal fin, and the position of dorsal fin insertion (Chen et al. 1992).

71. *Triplophysa longibarbatus* (Chen et al. 1998) (Fig. 142). **Common name:** Long-barbel blind loach



Fig. 142 *Triplophysa longibarbatus*, holotype, KIZ1995000636, standard length 68 mm. (Photo by He, M.)

(E, translation from Chinese). **Etymology:** *longi* (L) long; *barbatus* (L) barbels. **Major synonyms:** None. **Ecological classification:** Troglolite. **History:** The first three specimens were collected in March 1995 by a joint Slovenian-Chinese expedition (Chen et al. 1998). **Morphological characteristics:** D ii, 8 A ii, 6 P i, 10–11, V i, 5–6. Body elongated; naked; mouth inferior; blind; barbels well-developed; pectoral and pelvic fins long; adipose keel present, along dorsal and ventral edge of caudal peduncle; posterior margin of caudal fin strongly concave. Maximum standard length: 68 mm (Chen et al. 1998). Live coloration is transparent. Coloration of preserved specimens is whitish. **Troglomorphic characters:** No externally visible eyes, depigmented, scaleless. **Distribution:** China: Guizhou Province: Libo County, in a cave 13 km northeast of the town of Libo (ca. 25°15' N, 108°00' E) (Fig. 143). **Habitat and ecology:** The cave contains both streams and lakes with a sandy/rocky bottom. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** VU, in China's Species Red List (Wang and Xie 2004). **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** It is related to *Paracobitis variegatus longidorsalis*, which occurs in the same basin of Xijiang (Chen et al. 1998). **Remarks:** A recent study (Du et al. 2008) confirmed *Paracobitis*

longibarbatus is actually a *Triplophysa* species, and *Oreonectes liboensis* and *Nemacheilus liboensis* are all its synonyms. *Oreonectes liboensis* is an unpublished name and *N. liboensis* is a *nomen nudum*. Li et al. (2006) proposed three diagnoses of *Paracobitis posterodarsalus* from *P. longibarbatus*. The first one, relative position of dorsal and pelvic fins is actually not a prominent difference. The other two are fin ray counts of the dorsal and anal fins. From Fig. 1 of Li et al. (2006), the branched dorsal fin ray count is at least 7 vs. 6 in the diagnosis and the branched anal fin ray count is at least 6 vs. 4 in the diagnosis. Therefore, the accuracy of fin ray counts in this paper is problematic. We tentatively treat *Paracobitis posterodarsalus* as the junior synonym of *Paracobitis longibarbatus*. From its distribution range, we can see it is a relatively widely distributed species in the karst region of south Guizhou and north Guangxi.

72. *Triplophysa nandanensis* (Lan et al. 1995) (Fig. 144). **Common name:** Nandan blind plateau loach (E, translation from Chinese). **Etymology:** *nandanensis* (L) for the type locality, Nandan County: Guangxi. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** Type specimens were collected in 1991 (Lan et al. 1995). **Morphological characteristics:** D iv, 8 A iv, 5 P i, 10–11, V i, 7. Body elongated; naked; anterior and posterior nostrils situate closely together; nostril valve barbel-like; mouth inferior; eyes small; 3 pairs of barbels, well-developed; mouth ventral; lateral line present; dorsal fin insertion middle of snout tip to caudal fin base; caudal fin forked. Maximum standard length: 82.5 mm (Lan et al. 1995). Coloration of preserved specimens (in alcohol) is light yellowish, with many very small gray-black spots. **Troglomorphic characters:** Microphthalmic, scaleless. **Distribution:** China:

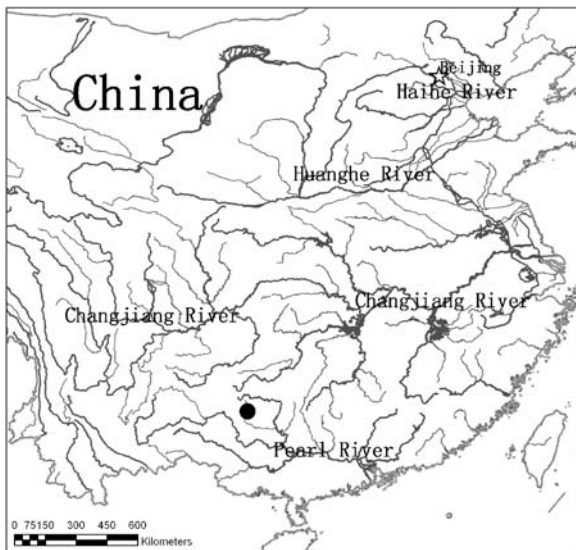


Fig. 143 Distribution of *Triplophysa longibarbatus*



Fig. 144 *Triplophysa nandanensis*, paratype, ASIZB70034. (Photo by Zhao, Y.)

Guangxi Zhuang Autonomous Region: Nandan County: Liuzhai town (ca. 25°18' N, 107°24' E) (Fig. 145). **Habitat and ecology:** Exit of a subterranean stream. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** None known.

73. *Triplophysa nasobarbatula* Wang and Li, 2001 (Fig. 146). **Common name:** Nasal barbel plateau loach (E, translation from Chinese). **Etymology:** *nas* (L) nostril, nose; *barb* (L) barbel. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** Type specimens were collected in 1984 (Wang and Li 2001). **Morphological characteristics:** D iii, 8 A iii, 5 P i, 9, V i, 6. Body elongated; 3 pairs of barbels, well-developed; mouth inferior; nostril valve barbel-like; scales small, anterior ventral part naked; lateral line present; two well expanded chambers in anterior vesicle of gas bladder. Maximum standard length: 90 mm (Wang and Li 2001). Coloration of preserved specimens (in alcohol) is light brownish with six dark brown speckles on back and a few dots on dorsal and caudal fins. **Troglomorphic characters:** None known. **Distribution:** China: Guizhou Province: Libo County: Weng'ang town (ca. 25°14' N, 107°54' E), Dongtang town (ca. 25°17' N, 108°01' E) (Fig. 147). **Habitat and ecology:** In small waters



Fig. 146 *Triplophysa nasobarbatula*, KIZ2005001334. (Photo by Li, J.)

or pools connected to subterranean streams. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** None known.

74. *Triplophysa rosa* Chen and Yang, 2005 (Fig. 148). **Common name:** Rose blind plateau loach (E, translation from Chinese). **Etymology:** *rosa* (L) after the name of a caving club, Red Rose, which collected the holotype. **Major synonyms:** None. **Ecological classification:** Troglomite. **History:** The first specimen was collected on 26 November 2002. Two, one and two specimens were collected in 2004, 2005 and 2007, respectively by the Hongmeigui Caving Club and were deposited in KIZ (Kunming Institute of Zoology, Chinese Academy of Sciences).

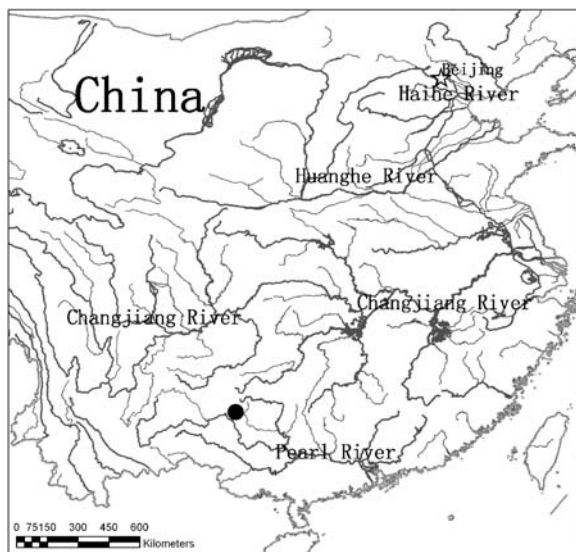


Fig. 145 Distribution of *Triplophysa nandanensis*

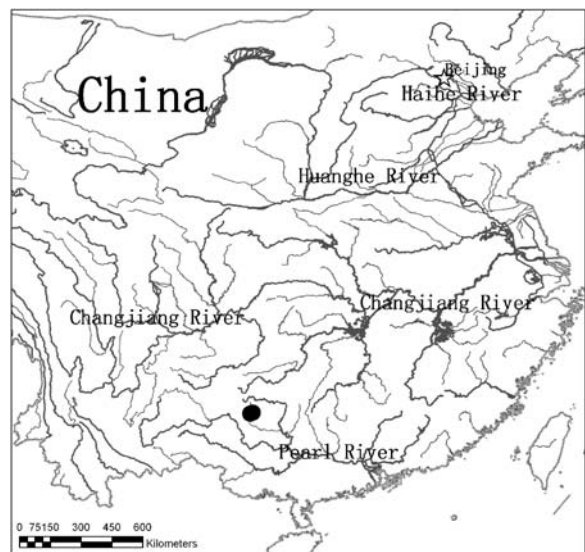


Fig. 147 Distribution of *Triplophysa nasobarbatula*



Fig. 148 *Triplophysa rosa*, holotype, KIZ2002005675, standard length 56 mm. (Photo by He, M.)

Morphological characteristics: D iii, 9 A iii, 6 P i, 12 V i, 7. Body elongated; naked; head slightly depressed; snout pointed; eyes vestigial; mouth ventral; distal margin of dorsal fin concave; tip of pelvic fin surpasses vertical level of anus; caudal fin deeply forked. Maximum standard length: 56.0 mm (Chen and Yang 2005). Coloration of preserved specimens (in alcohol) is pale, with no pigmentation and all fins transparent. **Troglo-morphic characters:** Eyes degenerated, completely depigmented, scaleless. **Distribution:** China: Chongqing City: Wulong County: Jiangkou Town: Tianxing Town: Dongba Cave (29°13'40.44" N, 107°55'16.46" E) (Fig. 149). **Habitat and ecology:** A small pool 581 m underground (the pool is at 314 m above sea level), 10 m long and 0.5 m deep. Air temperature is 16–17°C, water temperature 13°C (November). About 12 individuals

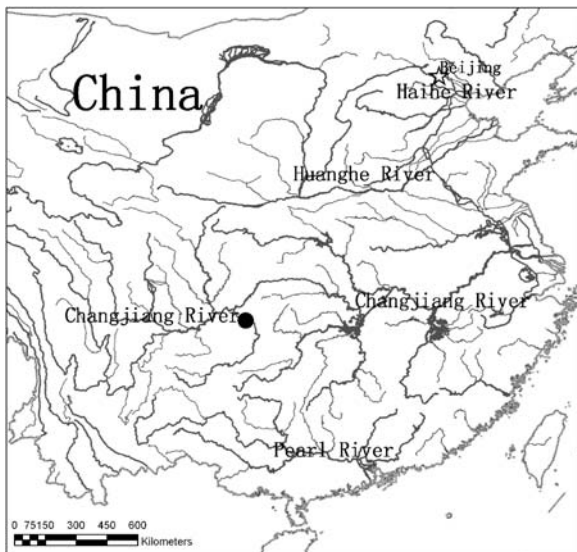


Fig. 149 Distribution of *Triplophysa rosa*

were seen in another adjacent pool (Chen and Yang 2005). **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** The species can be easily distinguished from other hypogean species of the genus by both body characters and distribution. Only one species, *T. bleekeri*, is distributed in the adjacent surface rivers. Although they share some common characters the relationships of both species still need to be further studied.

75. Triplophysa shilinsensis Chen and Yang, 1992 (in Chen et al. 1992) (Fig. 150). **Common name:** Shilin blind plateau loach (E, translation from Chinese). **Etymology:** *shilinsensis* (L) for the words Shi Lin which in Chinese means ‘Stone Forest’, the County where this species is found. **Major synonyms:** None. **Ecological classification:** Troglobite. **History:** The first two specimens were collected by the authors describing the species on 18 March 1991. **Morphological characteristics:** D iii, 7 A iii, 5 P i, 8–10 V i, 6. Body elongated; naked; blind; anterior and posterior nostrils situate closely together; nostril valve barbel-like; mouth inferior; pelvic fin origin opposite to dorsal fin insertion or slightly behind; caudal fin forked; posterior chamber of air bladder reduced, and anterior chamber enclosed in a bony capsule. Maximum standard length: 61.0 mm (Chen et al. 1992). Live coloration is semi-transparent. Coloration of preserved specimens (in alcohol) is whitish. **Troglo-morphic characters:** Eyes completely degenerated, completely depigmented, scaleless. **Distribution:** China: Yunnan Province: Lunan (=Shilin) County: cave at Weiboyi village near Stone Forest (24°47' N, 103°22' E) (Fig. 151). **Habitat and**



Fig. 150 *Triplophysa shilinsensis*, KIZ199100036 (Photo by He, M.)



Fig. 151 Distribution of *Triplophysa shilinensis*

ecology: The cave has a funnel-like opening and goes down vertically for 109 m before it reaches a horizontal stream where this fish can be found. **Food and feeding:** Insects have been found in their stomach contents (Chen et al. 1992). **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** VU, in China's Species Red List (Wang and Xie 2004). **Major threats:** Excessive collecting (Wang and Xie 2004). **Conservation plans:** None. **Phylogenetic relationships:** More closely related to *T. gejiuensis* (Chen et al. 1992).

76. *Triplophysa tianeensis* (Chen et al. 2004) (Fig. 152). **Common name:** Tian'e blind plateau loach (E, translation from Chinese). **Etymology:**



Fig. 152 *Sinocyclocheilus tianeensis*, cited from Lan and Zhang 2006. (Photo by Lan, J.)

tianeensis (L) derived from the name of the type locality, Tian'e County, Guangxi. **Major synonyms:** None. **Ecological classification:** Troglolbite. **History:** Type specimens were collected in January 2003 (Chen et al. 2004). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 9 V i, 6. Body elongated; naked; eye degenerated resulting in a small concentration of eye tissue; mouth inferior; lateral line present, straight; caudal fin forked. Maximum standard length: 61.4 mm (Chen et al. 2004). Live coloration is light yellowish, semi-transparent, operculum transparent, sides with some very small dots. **Troglomorphic characters:** No externally visible eyes, depigmented, scaleless. **Distribution:** China: Guangxi Zhuang Autonomous Region: Tian'e County: Bala town (24° 58' N, 107°02' E) (Fig. 153). **Habitat and ecology:** Same cave where *Sinocyclocheilus furcodorsalis* was found. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** The species is most closely related and sympatric to *T. nandanensis* (Chen et al. 2004).

77. *Triplophysa xiangshuingensis* Li, 2004 (Fig. 154). **Common name:** Xiangshuijing plateau loach (E, translation from Chinese). **Etymology:** *xiangshuingensis* (L) after the name of the type



Fig. 153 Distribution of *Sinocyclocheilus tianeensis*

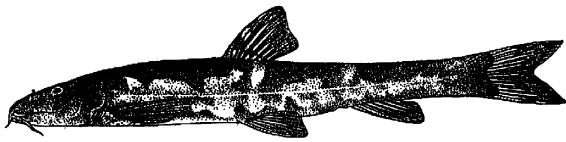


Fig. 154 *Triplophysa xiangshuingensis*, cited from Li 2004

locality, Xiangshuiqing, Shilin County. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** Type specimen (only one) was collected in 2000 (Li 2004). **Morphological characteristics:** D iii, 6 A ii, 5 P i, 9, V i, 6. Body elongated; naked; eye small; anterior and posterior nostrils close to each other, nostril valve barbel-like; 3 pairs of barbels, well developed; mouth ventral; caudal fin forked; lateral line complete and straight. Maximum standard length: 87 mm (Li 2004). Live coloration is light yellowish with four black-brown saddle-backed speckles on back and three black-brown stripes on dorsal and caudal fins. **Troglomorphic characters:** Microphthalmic, scaleless. **Distribution:** China: Yunnan Province: Shilin County: Xiangshuijing village (ca. 24°52' N, 103°21' E) (Fig. 155). **Habitat and ecology:** Subterranean stream. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Con-**



Fig. 155 Distribution of *Triplophysa xiangshuingensis*



Fig. 156 *Triplophysa xiangxiensis*, KIZ9705001. (Photo by Li, J.)

ervation plans: None. **Phylogenetic relationships:** None known.

78. *Triplophysa xiangxiensis* (Yang et al. 1986) (Fig. 156). **Common name:** Xiangxi blind plateau loach (E, translation from Chinese). **Etymology:** *xiangxiensis* (L) because it is found in the area of West Hunan (Xiang is the abbreviation of Hunan Province in Chinese). **Major synonyms:** *Noemacheilus xiangxiensis* (Yang et al. 1986), *Schistura xiangxiensis* (in Zhu 1989). **Ecological classification:** Troglomite. **History:** First found was in 1984 (He et al. 2006). **Morphological characteristics:** D iii, 8 A iii, 6 P i, 11 V i, 16. Body elongated; naked; blind; nostril valve well-developed; 3 pairs of barbels; mouth ventral; pectoral fin very long, reaches anal fin base or even caudal fin base. Maximum standard length: 85.0 mm (Yang et al. 1986). Live coloration is slightly pinkish due to the circulatory system been visible through the depigmented skin. **Troglomorphic characters:** No externally visible eyes, depigmented, scaleless. **Distribution:** China: Xiangxi: Hunan Province: Longshan County: Huoyan Township: Feihu (=Flying tiger) Cave (ca. 27°27' N, 109°26' E) (Fig. 157). **Habitat and ecology:** Subterranean waters in karst cave (360 m above sea level), Yuanjiang River system, 20 m underground. **Food and feeding:** Could be fed in aquarium. **Reproduction and development:** External reproduction, non-guarder (Breder and Rosen 1966). **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** None known.

79. *Triplophysa yunnanensis* Yang, 1990 (Fig. 158). **Common name:** Yunnan plateau loach (E, translation from Chinese). **Etymology:** *yunnanensis* (L) after the name of the Province of Yunnan. **Major**

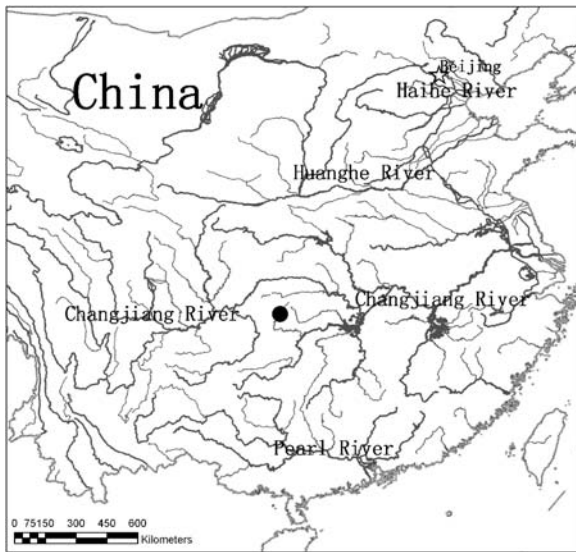


Fig. 157 Distribution of *Triplophysa xiangxiensis*

synonyms: None. **Ecological classification:** Troglophile. **History:** Type specimens were collected in 1987 (Yang 1990). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 10–11 V i, 7. Body elongated; eye small; anterior and posterior nostrils close to each other, posterior edge of nostril slightly long; 3 pairs of barbels; mouth inferior; dorsal fin longer than body depth; caudal fin forked, upper lobe longer than lower one; scaled from dorsal fin base; lateral line complete. Maximum standard length: 62.8 mm (Yang 1990). Live coloration is light yellowish with a row of round brown speckles along midline, 8–10 round speckle on back, and one light strip on dorsal fin. **Troglomorphic characters:** Microphthalmic. **Distribution:** China: Yunnan Province: Yiliang: Jiuxiang (ca. 25°00' N,



Fig. 158 *Triplophysa yunnanensis*, holotype, KIZ1987003994 (original number 874200), standard length 62.8 mm. (Photo by Ms. He, M. (KIZ))



Fig. 159 Distribution of *Triplophysa yunnanensis*

103°23' E) (Fig. 159). **Habitat and ecology:** Found in an underground river. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** None known.

80. *Triplophysa zhenfengensis* Wang and Li, 2001 (Fig. 160). **Common name:** Zhenfeng plateau loach (E, translation from Chinese). **Etymology:** *zhenfengensis* (L) after the name of the type locality: Zhenfeng County. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** Type specimens were collected in 1990 (Wang and Li 2001). **Morphological characteristics:** D iii, 7 A iii, 5 P i, 9–11, V i, 5–7. Body elongated; 3 pairs of barbels, well-developed; mouth ventral; scales small, anterior ventral part naked; lateral line present; gill rakers on first gill arch 7–12; vertebrae 4+36. Maximum standard length: 83 mm (Wang and Li 2001). Coloration of preserved speci-

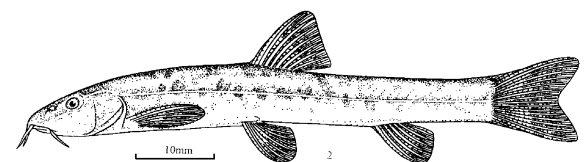


Fig. 160 *Triplophysa zhenfengensis*, cited from Wang and Li, 2001

mens (in alcohol) is brownish, back darker, with some round dark-brown speckles, 2 stripes on dorsal fin, and 2–3 stripes on caudal fin. **Troglo-morphic characters:** Possibly small scales. **Distribution:** **China:** Guizhou Province: Zhengfeng County: Longchang town (ca. 25° 32' N, 105°12' E); Xingren County: Gaowu town (ca. 25 °28' N, 105 °30' E) (Fig. 161). **Habitat and ecology:** Exit of a subterranean stream. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conser-vation plans:** None. **Phylogenetic relationships:** None known.

Genus *Yunnanilus* Nichols, 1925

About 30 species has been described for this genus. Most of species are only found in Yunnan Province. Other species are found in Guizhou Province of China, Myanmar (Burma), and Viet Nam. Hypogean species of this genus are all troglophile and almost all are found in Yunnan Province.

81. *Yunnanilus bajiangensis* Li, 2004 (Fig. 162). **Common name:** Bajiang Yunnan loach (E, translation from Chinese). **Etymology:** *bajiangensis* (L) after the type locality: Bajiang River. **Major syno-nyms:** None. **Ecological classification:** Troglophile. **History:** First collected in 1995 (Li 2004). **Morpho-**

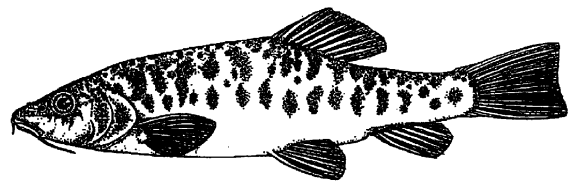


Fig. 162 *Yunnanilus bajiangensis*, cited from Li, 2004

logical characteristics: D iii, 9 A ii, 5 P i, 9–10, V i, 6. Body elongated and compressed; anterior nostrils tube-like, with a short distance to posterior one; mouth sub-ventral; dorsal fin insertion to snout tip longer than from it to caudal fin base; scales small; no lateral line. Maximum standard length: 52 mm (Li 2004). Live coloration is light yellowish, with brown horizontal stripes on sides. Coloration of preserved specimens (in alcohol) is gray-brownish. **Troglo-morphic characters:** None known. **Distribution:** **China:** Yunnan Province: Shilin County: Heilongtan Reser-voir (ca. 24°46' N, 103°16' E) (Fig. 163). **Habitat and ecology:** It is sympatric with *Sinocyclocheilus macrocephalmus* and *S. oxycephalus*. **Food and feeding:** Unknown. **Reproduction and develop-ment:** Unknown. **Other behavior:** Unknown. **Conser-vation status:** Undetermined. **Major threats:** Environment degradation due to modifications in the subterranean streams and containment into a small reservoir. **Conservation plans:** None. **Phylogenetic relationships:** None known.

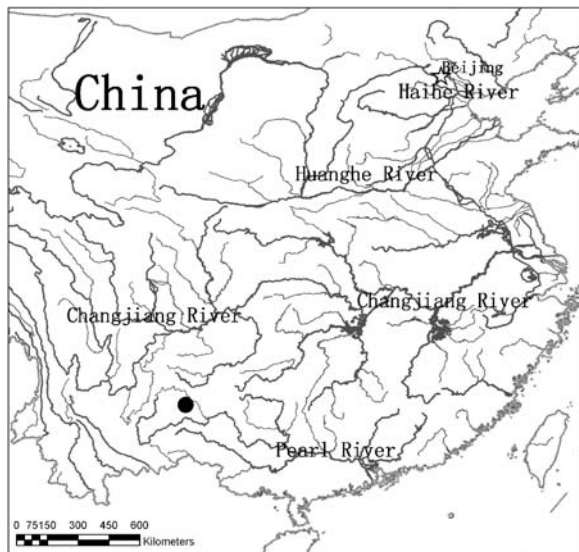


Fig. 161 Distribuion of *Triplophysa zhenfengensis*

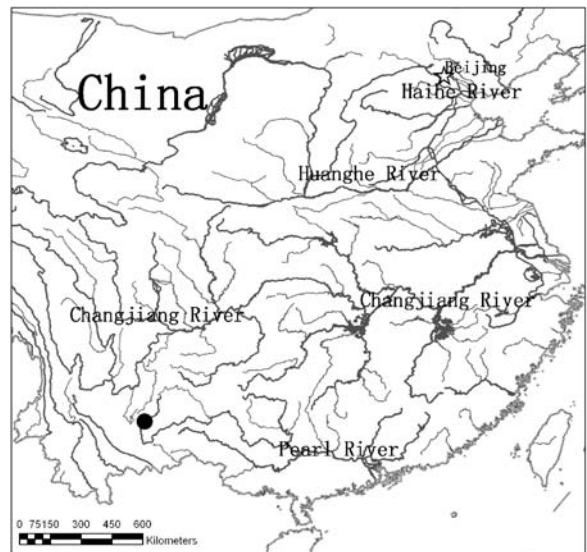


Fig. 163 Distribution of *Yunnanilus bajiangensis*

82. *Yunnanilus beipanjiangensis* Li, Mao and Sun, 1994 (in Li et al. 1994) (Fig. 164). **Common name:** Beipanjiang Yunnan loach (E, translation from Chinese). **Etymology:** *Yunnanilus* (L) meaning loach from Yunnan, a province on southwest China; *beipanjiangensis* (L) after the name of Beipanjiang River, where the species is found. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** Type specimens were collected in 1991 (Li et al. 1994). **Morphological characteristics:** D iii, 7–8 A ii, 5 P i, 10, V i, 6. Body elongated; naked; anterior nostrils tube-like, with a short distance to posterior one; mouth inferior; dorsal spine soft; caudal fin forked; lateral line incomplete, end above pectoral fin. Maximum standard length: 73 mm (Li et al. 1994). Coloration of preserved specimens (in alcohol) is light yellowish. Males have a black stripe along midline from posterior edge of operculum to caudal fin base. This stripe is not obvious in females. Both males and females have many black speckles on back and sides. **Troglomorphic characters:** Scaleless. **Distribution:** China: Yunnan Province: Zhanyi County: Xintun (26.02°N, 104.01°E) (Fig. 165). **Habitat and ecology:** Spring. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** None known.

83. *Yunnanilus discoloris* Zhou and He, 1989 (Fig. 166). **Common name:** Different color Yunnan loach (E, translation from Chinese). **Etymology:** *dis* (E) different; *color* (L) colorful. **Major synonyms:** None. **Ecological classification:** Troglophile. **Histo-**

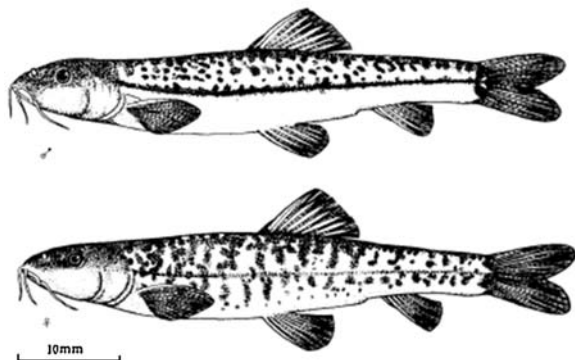


Fig. 164 *Yunnanilus beipanjiangensis*, cited from Li et al. 1994

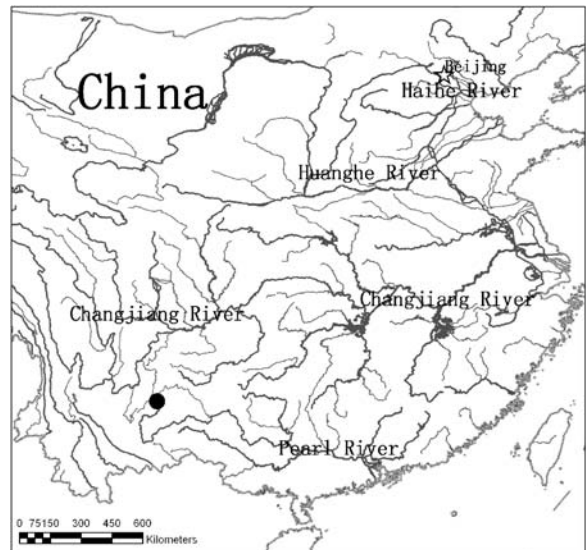


Fig. 165 Distribution of *Yunnanilus beipanjiangensis*

ry: First collection was in 1983. **Morphological characteristics:** D iii, 8–9; A iii, 5; P i, 11–12; V i, 7. Nostrils well separated, the anterior tubular. Mouth inferior. Upper lip smooth, lower one wrinkle, interrupted at middle. Male with a black longitudinal stripe on both sides and a light blackish stripe of spots along back; female with black spots and blotches on back and lateral sides. Both sexes, dorsal, anal and ventral with one light blackish stripe, caudal with one or two stripes (Zhou and He 1989). **Troglomorphic**

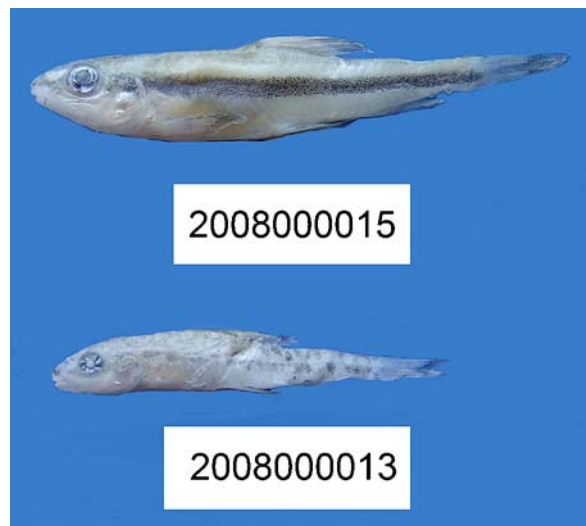


Fig. 166 *Yunnanilus discoloris*, KIZ200800015. (Photo by He, M.)

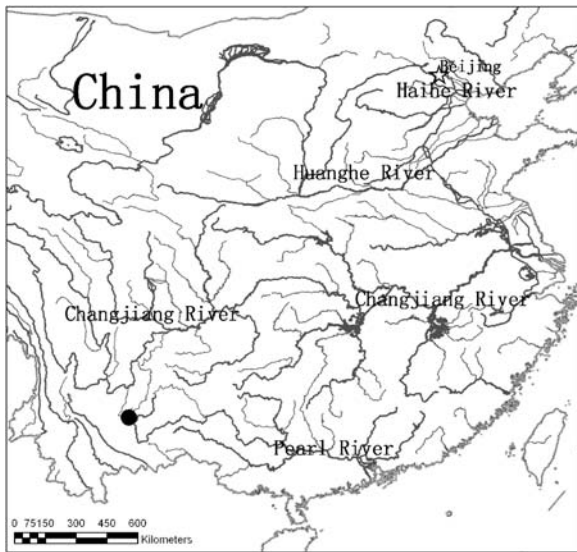


Fig. 167 Distribution of *Yunnanilus discoloris*

characters: None. **Distribution:** China: Yunnan: Chenggong County: White Dragon Spring (24 °54' N, 102 °48' E) (Fig. 167). **Habitat and ecology:** Lives in the spring water, the average water depth is about 80 cm, the bottom is made up of sand and gravel; the main aquatic macrophyte is *Hydrilla verticillata*. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Protected by Buddhist temples. **Major threats:** Its loss from the lake likely due to introduced fish species, changes in water quality, loss of macrophytes. Current threats at the springs are introduced species, modification of spring structure. **Conservation plans:** None. **Phylogenetic Relationship:** None known.

84. *Yunnanilus longidorsalis* Li, Tao and Lu, 2000 (in Li et al. 2000a) (Fig. 168). **Common name:** Long



Fig. 168 *Yunnanilus longidorsalis*, paratype, ASIZB73118, standard length 36 mm. (Photo by Ye, E. and Zhao, Y.)

back Yunnan loach (E, translation from Chinese). **Etymology:** *longi* (L) long; *dorsalis* (L) back, indicating typical characteristic of the species: a long dorsal fin. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** Type specimens were collected in 1994 (Li et al. 2000a). **Morphological characteristics:** D iii, 11 A ii, 6 P i, 10–11, V i, 6. Body elongated and compressed; eyes big; anterior nostrils tube-like, with a short distance to posterior one; mouth terminal; 3 pairs of barbels short; dorsal fin insertion to snout tip shorter than it to caudal fin base; dorsal fin long, longest ray opposite end of anal fin base; scales small; no lateral line. Maximum standard length: 37.6 mm (Li et al. 2000a). Coloration of preserved specimens (in alcohol) is gray-yellowish, with some brown spots on front of body and 7–8 brown worm-like speckles on sides. **Troglomorphic characters:** None known, except possibly small scales. **Distribution:** China: Yunnan Province: Luoping County: A'gang (ca. 25°05' N, 104°08' E) (Fig. 169). **Habitat and ecology:** Spring. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** None known.

85. *Yunnanilus macrogaster* Kottelat and Chu, 1988 (Fig. 170). **Common name:** Big stomach

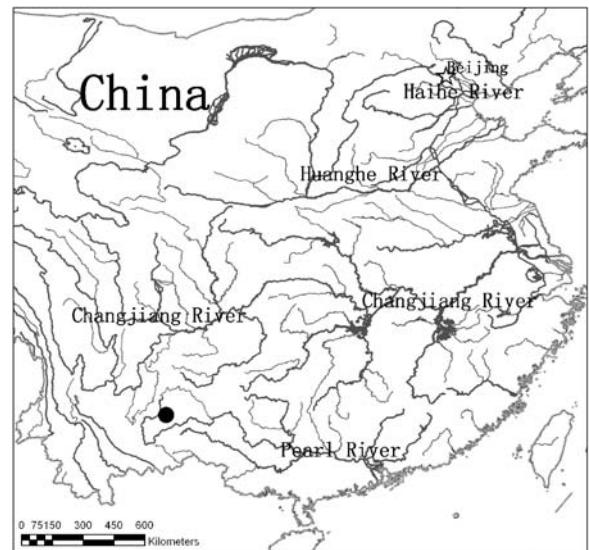


Fig. 169 Distribution of *Yunnanilus longidorsalis*



Fig. 170 *Yunnanilus macrogaster*, holotype, KIZ1980004273, standard length 70.5 mm. (Photo by He, M.)

Yunnan loach (E, translation from Chinese). **Etymology:** *macro* (Gr) large; *gaster* (Gr) stomach, an allusion to the large swollen stomach. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** First collected in 1980 (Kottelat and Chu 1988). **Morphological characteristics:** D iii, 8 A iii, 5 P i, 12–13, V i, 7. Body moderately elongated and compressed; lateral line short, with 6–10 pores; cephalic lateral line pores present; caudal peduncle 1.43–1.45 times longer than deep; eye diameter 17–19% dorsal HL. Maximum standard length: 63.2 mm (Yang 1990). Body yellowish brown with irregularly distributed dark brown spots on its upper two-thirds; top of head darker, a dark blotch on opercle behind eye; fins hyaline; black basal caudal bar vertical but not reaching upper and lower margins of caudal peduncle (Kottelat and Chu 1988). **Troglomorphic characters:** None known. **Distribution:** China: Yunnan Province: Luoping city: Datangzi village (ca. 24°52' N, 104°18' E) (Fig. 171). **Habitat and ecology:** Small marsh, about 0.1 km² (Kottelat and Chu 1988), actually it is the exit of a subterranean stream. This species is sympatric with *Yunnanilus macrogaster*, *Y. paludosus* and *Sinocyclocheilus malacopterus*. **Food and feeding:** Insects and worms. **Reproduction and development:** External reproduction, non-guarder (Breder and Rosen 1966). **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** Anthropogenic development. **Conservation plans:** None. **Phylogenetic relationships:** None known.

86. *Yunnanilus macrolepis* Li, Tao and Mao, 2000 (in Li et al. 2000a) (Fig. 172). **Common name:** Big scale Yunnan loach (E, translation from Chinese). **Etymology:** *macro* (Gr) long, big; *lepis* (Gr) scale. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** Type specimens were collected

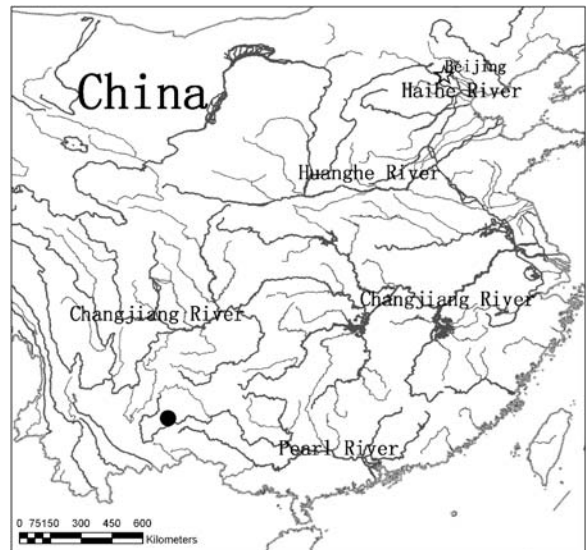


Fig. 171 Distribution of *Yunnanilus macrogaster*

in 1993 (Li et al. 2000a). **Morphological characteristics:** D iii, 11 A ii, 6 P i, 10–11, V i, 6. Body elongated and compressed; eye small; anterior nostrils tube-like, with a short distance to posterior one; mouth small and inferior; pairs of barbels long; dorsal fin insertion to snout tip longer than it to caudal fin base; all fins short; scale relatively big; lateral line incomplete. Maximum standard length: 92 mm (Li et al. 2000a). Fixed specimens have many brown spots on back and sides, all fins dark brownish. **Troglomorphic characters:** Possibly the small size of the eyes. **Distribution:** China: Yunnan Province: Luoping County: Xuetian Village (24°53' N, 104°18' E) (Fig. 173). **Habitat and ecology:** Exit of a subterranean stream. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** No survey has been con-



Fig. 172 *Yunnanilus macrolepis*, paratype, ASIZB73117, standard length 82 mm. (Photo by Ye, E. and Zhao, Y.)

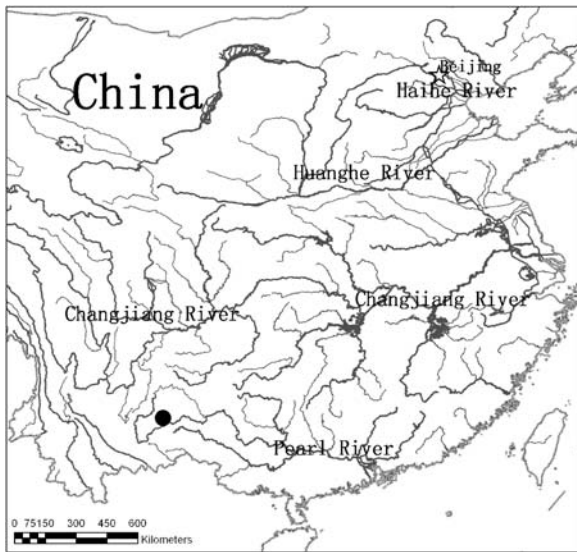


Fig. 173 Distribution of *Yunnanilus macrolepis*

ducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** None known.

87. *Yunnanilus nanpanjiangensis* Li, Mao and Lu, 1994 (in Li et al. 1994) (Fig. 174). **Common name:** Nanpanjiang Yunnan loach (E, translation from Chinese). **Etymology:** *nanpanjiangensis* (L) after the name of Nanpanjiang River, the type locality. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** Type specimens were collected in 1991. **Morphological characteristics:** D iii, 8–9 A ii, 6 P i, 10, V i, 6–7. Body elongated; naked or a few scales on caudal peduncle; anterior nostrils tube-like, with a short distance to posterior one; eye small; mouth inferior; dorsal spine soft; dorsal fin insertion to snout tip longer than it to caudal fin base; caudal fin forked; lateral line incomplete. Maximum standard length: 76 mm (Li et al. 1994). Male has a light black stripe along midline from posterior edge of operculum to caudal fin base. This stripe is not obvious in female. Both male and female have many black speckles on back and sides. **Troglomorphic characters:** Microphthalmic, almost entirely scaleless. **Distribution:** China: Yunnan Province: Luoping County: A’gang Town: She’Ao village (ca. 25°05’ N, 104°08’ E) (Fig. 175). **Habitat and ecology:** At the exit of subterranean waters. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown. **Conservation status:** Undeter-



Fig. 174 *Yunnanilus nanpanjiangensis*, paratype, ASIZB78386, standard length 64 mm. (Photo by Ye, E.)

mined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** None known.

88. *Yunnanilus niger* Kottelat and Chu, 1988 (Fig. 176). **Common name:** Black body Yunnan loach (E, translation from Chinese). **Etymology:** *niger* (L) black. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** First collecting took place in 1980 (Kottelat and Chu 1988). **Morphological characteristics:** D iv, 8 A iii, 5 P i, 11, V i, 7. Body deep and compressed; no lateral line; no head pores; no scales along dorsal midline in from of dorsal fin; body depth 26% SL, 14 branched caudal rays. Maximum standard length: 62.5 mm (Kottelat and Chu 1988). Coloration of preserved specimens (in



Fig. 175 Distribution of *Yunnanilus nanpanjiangensis*



Fig. 176 *Yunnanilus niger*, holotype, KIZ1980001275, standard length 62.5 mm. (Photo by He, M.)

alcohol) is brownish black with dorsal, anal and pelvic fins black, caudal and pectoral is grayish, and a continuous black basal caudal bar (Kottelat and Chu 1988). **Troglo-morphic characters:** None known; lack of scales may be one. **Distribution:** China: Yunnan Province: Luoping city: Datangzi village (ca. 24°52' N, 104°18' E) (Fig. 177). **Habitat and ecology:** See above, *Yunnanilus macrogaster*. **Food and feeding:** Unknown. **Reproduction and development:** External, non-guarder (Breder and Rosen 1966). **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** Environmental degradation. **Conservation plans:** None. **Phylogenetic relationships:** None known.

89. *Yunnanilus obtusirostris* Yang, 1995 (in Yang and Chen 1995) (Fig. 178). **Common name:** Obtuse

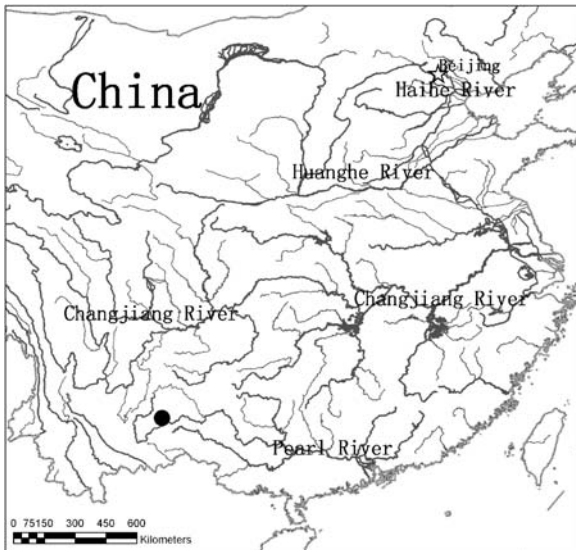


Fig. 177 Distribution of *Yunnanilus niger*



Fig. 178 *Yunnanilus obtusirostris*, holotype KIZ1987004000, standard length 33.5 mm. (Photo by He, M.)

snout loach. **Etymology:** *obtus* (L) obtuse; *rostrum* (L) mouth, snout. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** First record might be in 1958 (Yang and Chen 1995). **Morphological characteristics:** D iii,8; A iii,5; P i, 9–10; V i, 6–7. Snout obtuse and snout length is less than interorbital width. Nostrils well separated, the anterior tubular. Upper lip smooth, lower one wrinkled, interrupted at middle. Eyes present. Lateral line absent (Yang and Chen 1995). Maximum standard length: 41.5 mm (Yang and Chen 1995). Live coloration is grayish with a pearl blue longitudinal stripe on both sides (Yang and Chen 1995). **Troglo-morphic characters:** None. **Distribution:** China: Yunnan: Chengjiang County: West Dragon Spring and Lake Fuxian (24 °30' N, 102°53' E) (Fig. 179). **Habitat and ecology:** Lives in the spring water, rivulets and an estuary around Lake Fuxian with an average water depth of 0.5–3.0 m. There are a lot of macrophytes in that habitat (Yang and Chen 1995). **Food and feeding:** *Chironomus* (85%), Coleoptera pupa (6%) and *Gammarus* (5%) (Yang and Chen 1995). **Reproduction and development:** The reproductive season is from June to July. **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic Relationship:** None Known.

90. *Yunnanilus paludosus* Kottelat and Chu, 1988 (Fig. 180). **Common name:** Marsh Yunnan loach (E, translation from Chinese). **Etymology:** *palus*, *paludis* (L) marsh; after the habitat where the types were collected. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** First collection was in 1980 (Kottelat and Chu 1988). **Morphological characteristics:** D iii, 8 A iii, 5–6 P i, 9–11, V i, 6–7. Body elongated and slightly compressed, body depth 14–16% SL; caudal peduncle slender, 1.98–2.35 times longer than deep; body nearly naked, scales present only on dorsal and ventral margin of caudal

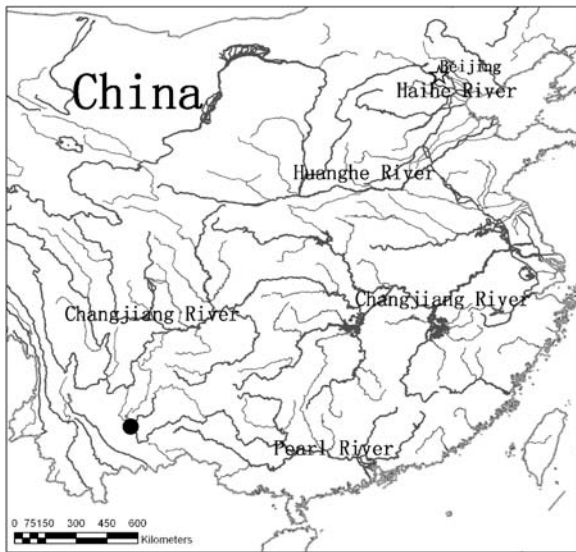


Fig. 179 Distribution of *Yunnanilus obtusirostris*

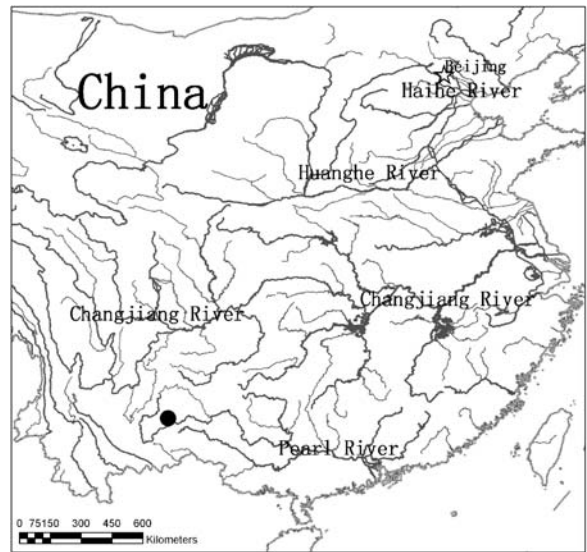


Fig. 181 Distribution of *Yunnanilus paludosus*

peduncle; lateral line pores 16–25; head pores present. Maximum standard length: 79.9 mm (Kottelat and Chu 1988). Body with 3 irregular longitudinal rows of spots; a sinuous black bar at base of caudal fin (Kottelat and Chu 1988). **Troglomorphic characters:** None except possibly for the reduction in the number of scales. **Distribution:** China: Yunnan Province: Luoping City: Datangzi Village (ca. 24°52' N, 104° 18' E) (Fig. 181). **Habitat and ecology:** See above, *Yunnanilus macrogaster*. **Food and feeding:** Flies (Kottelat and Chu 1988). **Reproduction and development:** Egg diameter is about 0.8–1.0 mm (Kottelat and Chu 1988). **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** Environmental change due to the local development. **Conservation plans:** None. **Phylogenetic relationships:** None known.



Fig. 180 *Yunnanilus paludosus*, holotype, KIZ1980001276, standard length 79.9 mm. (Photo by He, M.)

91. *Yunnanilus parvus* Kottelat and Chu, 1988 (Fig. 182). **Common name:** Small stripe Yunnan loach (E, translation from Chinese). **Etymology:** *parvus* (L) small. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** First collecting took place in 1984 (Kottelat and Chu 1988). **Morphological characteristics:** D iv, 8 A iii, 5 P i, 11–12, V i, 8. Body spindly and compressed; lateral line reaching, at most, to tip of pectoral fins and with only 7–16 pores; cephalic lateral line pores present; caudal peduncle 0.91–1.23 times longer than deep, its depth 11–13% SL; maximum size 37.6 mm. Maximum standard length: 38 mm (Kottelat and Chu 1988). Body with three longitudinal rows of spots, variable; head dark on top; a dark blotch on opercle; dorsal and anal fins have dark markings (Kottelat and Chu 1988). **Troglomorphic characters:** None



Fig. 182 *Yunnanilus parvus*, holotype, KIZ1984001244, standard length 26 mm. (Photo by He, M.)



Fig. 183 Distribution of *Yunnanilus parvus*

known. **Distribution:** China: Yunnan Province: Kaiyuan City: Nandong Cave (ca. 23°39' N, 103°17' E) (Fig. 183). **Habitat and ecology:** Karst cave located a few kilometers south of Kaiyuan. A swift stream comes out from the cave all year round (Kottelat and Chu 1988). **Food and feeding:** Unidentifiable animal remains or detritus in stomach contents (Kottelat and Chu 1988). **Reproduction and development:** Egg diameter is around 1 mm (Kottelat and Chu 1988). **Other behavior:** Unknown. **Conservation status:** Undetermined. **Major threats:** Nandong Cave has been developed as a public park. Lights, signs, and some construction have taken place in the cave which has become a popular tourist spot. **Conservation plans:** None. **Phylogenetic relationships:** This species belongs to the *Y. pleurotaenia* group and seems to be most closely related to *Y. pulcherrimus* (Yang et al. 2004). **Remarks:** Original authors could not ascertain whether this fish occurs inside the cave since it cannot be penetrated by humans (Kottelat and Chu 1988).

92. *Yunnanilus pulcherrimus* (Yang et al. 2004) (Fig. 184). **Common name:** Beautiful barred Yunnan loach (E, translation from Chinese). **Etymology:** *pulcherrimus* (L) most beautiful. **Major synonyms:** None. **Ecological classification:** Troglophile. **History:** First collected in 1999 (Yang et al. 2004). **Morphological characteristics:** D iii, 8–9 A iii, 5–6 P i, 8–10, V i, 6–7. Body spindly and compressed;



Fig. 184 *Yunnanilus pulcherrimus*, holotype, KIZ1999001786, standard length 39.6 mm. (Photo by He, M.)

anterior nostrils tube-like, with a short distance to posterior one; eye big; mouth small, sub-ventral; dorsal fin insertion midway from snout tip to caudal fin base; scale small; lateral line incomplete. Maximum standard length: 49 mm (Lan and Zhang 2006). Coloration of preserved specimens is gray-brownish on back and upper part of sides, lower part light yellowish; 12–17 black-brown horizontal strips around the body; all fins light grayish or grayish. **Troglomorphic characters:** None known. **Distribution:** China: Guangxi Zhuang Autonomous Region: Du'an County (ca. 23°56' N, 108°05' E) (Fig. 185). **Habitat and ecology:** Subterranean stream. **Food and feeding:** Unknown. **Reproduction and development:** Unknown. **Other behavior:** Unknown.

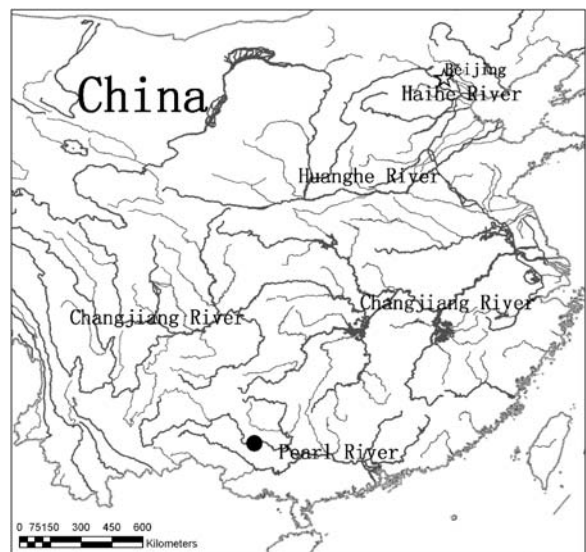


Fig. 185 Distribution of *Yunnanilus pulcherrimus*

Conservation status: Undetermined. **Major threats:** No survey has been conducted to assess its possible threats. **Conservation plans:** None. **Phylogenetic relationships:** It belongs to the *Y. pleurotaenia* group, and seems to be most closely related to *Y. parvus* (Yang et al. 2004).

Acknowledgments This study was funded by the projects of the National Natural Sciences Fund of China (NSFC-30470251 and NSFC-J0030092 to Y. Zhao, and NSFC-30730017 to X. Chen), and Basic Research Program of China (973 Program, 2007CB411600 to X. Chen). Many thanks go to Zhang C (IZB) for providing some suggestions and necessary stuffs. Appreciation to Ye E (IZB), Lan J (Du'an Fishery Bureau), He M (KIZ) and Li J (KIZ) for taking some pictures. Thanks to David L.G. Noakes for editorial suggestions.

References

- Berra TM, Humphrey JD (2002) Gross anatomy and histology of the hook and skin of forehead brooding male nurseryfish, *Kurtus gulliveri*, from northern Australia. *Environ Biol Fishes* 65:263–270 doi:10.1023/A:1020523905635
- Bleeker P (1871) Mémoire sur les cyprinoïdes de Chine. *Verh Akad Amsterdam* 1–91
- Breder CM, Rosen DE (1966) Modes of reproduction in fishes. T.F.H., Neptune City, New Jersey
- Brown RW (1956) Composition of scientific words. Smithsonian Institution, Washington, DC
- Burr BM, Adams GL, Krejca J, Paul RJ, Warren ML Jr (2001) Troglomorphic sculpins of the *Cottus carolinae* species group in Perry County, Missouri: distribution, external morphology, and conservation status review. *Environ Biol Fishes* 62:279–296 doi:10.1023/A:1011819922403
- Chen J, Lan J (1992) Description of a new genus and three new species of fishes from Guangxi, China (Cypriniformes: Cyprinidae, Cobitidae). *Acta Zootax Sin* 17:104–109
- Chen X, Yang J (2005) *Triplophysa rosa* sp. nov.: a new blind loach from China. *J Fish Biol* 66:599–608 doi:10.1111/j.0022-1112.2005.00622.x
- Chen J, Zhao Z, Zheng J, Li D (1988a) Description of three new barbines from Guizhou, China. *Acta Acad Med Zunyi* 11:1–4
- Chen Y, Chu X, Luo Z, Wu J (1988b) A new blind cyprinid fish from Yunnan, China with a reference to the evolution of its characters. *Acta Zool Sin* 34:64–70
- Chen Y, Yang J, Xu G (1992) A new blind loach of *Triplophysa* from Yunnan stone forest with comments on its phylogenetic relationship. *Zool Res* 13:17–23
- Chen Y, Yang J, Zhu Z (1994) A new fish of the genus *Sinocyclocheilus* from Yunnan with comments on its characteristic adaptation (Cypriniformes: Cyprinidae). *Acta Zootax Sin* 19:246–253
- Chen Y, Yang J, Lan J (1997) One new species of blind cavefish from Guangxi with comments on its phylogenetic status (Cypriniformes: Cyprinidae: Barbinae). *Acta Zootax Sin* 22:219–223
- Chen Y, Yang J, Sket B, Aljancic G (1998) A new blind cave loach of *Paracobitis* with comment on its characters evolution. *Zool Res* 19:59–63
- Chen X, Cui G, Yang J (2004) A new cave-dwelling fish species of genus *Triplophysa* (Balitoridae) from Guangxi, China. *Zool Res* 25:227–231
- Chen X, Yang J, Cui G (2006) A new fish species of genus *Sinocrossocheilus* (Cyprinidae) from Guangxi, China. *Zool Res* 27:81–85
- Christiansen KA (1962) Proposition pour la classification des animaux cavernicoles. *Spelunca Mem* 2:76–78
- Chu X, Chen Y (1979) A new blind cobitid fish (Pisces, Cypriniformes) from subterranean waters in Yunnan, China. *Acta Zool Sin* 25:285–287
- Chu X, Chen Y (1982) A new genus and species of blind cyprinid fish from China with special reference to its relationships. *Acta Zool Sin* 28:383–388
- Chu X, Cui G (1985) A revision of Chinese cyprinid genus *Sinocyclocheilus* with reference to the interspecific relationships. *Acta Zootax Sin* 10:435–441
- Chu X, Cui G (1989) Barbinae. In: Chu X, Chen Y (eds) The fishes of Yunnan, China Part I Cyprinidae. Science, Beijing, pp 135–229
- Dai D (1988) Un nouveau poisson cavernicole. pp. 88-89 Guizhou expe '86: Première expedition speleologique Franco-Chinoise dans le centre et le sud de la Province du Guizhou., Exped. Speleologiqu. Federation Franxaise de Speleologie, Paris
- Du LN, Chen XY, Yang JX (2008) A review of the Nemacheilinae genus *Oreonectes* Günther with descriptions of two new species (Teleostei: Balitoridae). *Zootaxa* 1729:23–36
- Ercolini A, Berti R, Chelazzi L, Messana G (1982) Researches on the phreatobitic fishes of Somalia: achievements and prospects. *Monit Zool Ital* 17:219–241
- Fang PW (1936) *Sinocyclocheilus tingi*, a new genus and species of Chinese barbid fishes from Yunnan. *Sinensia* 7:588–593
- Fang S (1981) Genus *Crossocheilus*. In: F.I.o.G.Z.A. Region & C.A.o.S. Institute of Zoology (eds) Freshwater fishes of Guangxi, China (1st ed). Guangxi People's Publishing House, Nanning, pp 101–103
- Gotch AF (1995) Latin names explained.. A guide to the scientific classification of reptiles, birds & mammals. Facts on File, New York
- He L, Wang X, Chen Q, Xiang J (2006) Morphological description on *Triplophysa xiangxiensis*. *Fresh Fish* 36:56–58
- Kottelat M (1988) Two species of cavefishes from northern Thailand in the genera *Nemacheilus* and Homaloptera (Osteichthyes: Homalopteridae). *Rec Aust Mus* 40:225–231
- Kottelat M, Chu X (1988) Revision of *Yunnanilus* with descriptions of a miniature species flock and six new species from China (Cypriniformes: Homalopteridae). *Environ Biol Fishes* 23:65–94 doi:10.1007/BF00000739
- Lan J, Zhang C (2006) Cobitidae. In: Zhou J, Zhang C (eds) Freshwater fishes of Guangxi, China (2nd ed). Guangxi People's Publishing House, Nanning, pp 80–122

- Lan J, Yang J, Chen Y (1995) Two new species of the subfamily nemacheilinae from Guangxi, China (Cypriniformes: Cobitidae). *Acta Zootax Sin* 20:366–372
- Lan J, Yang J, Chen Y (1996) One new species of cavefish from Guangxi. *Zool Res* 17:109–112
- Lan J, Zhao Y, Zhang C (2004) A new species of the genus *Sinocyclocheilus* from China (Cypriniformes: Cyprinidae: Barbinae). *Acta Zootax Sin* 29:377–380
- Li W (1985) Description on four species of *Sinocyclocheilus* from Yunnan, China (Pisces: Cyprinidae). *Zool Res* 6:423–429
- Li G (1989) On a new fish of the genus *Sinocyclocheilus* from Guangxi China. *Acta Zootax Sin* 14:123–126
- Li W (1992) Description on three species of *Sinocyclocheilus* from Yunnan, China. *Acta Hydrobiol Sin* 16:57–61
- Li W (2004) The three new species of Cobitidae from Yunnan, China. *J Jishou Univ* 25:93–96 *Nat Sci Ed*
- Li W, Lan J (1992) A new genus and three new species of Cyprinidae from Guangxi, China. *J Zhanjiang Fish Coll* 12:46–51
- Li W, Tao J (1994) A new species of Cyprinidae from Yunnan—*Sinocyclocheilus rhinoceros* sp. nov. *J Zhanjiang Ocean Univ* 14:1–3 former *J Zhanjiang Fish Coll*
- Li W, Zhu Z (2000) A new species of *Triplophysa* from cave Yunnan. *J Yunnan Univ* 22:396–398
- Li W, Mao W (2007) A new species of the genus *Sinocyclocheilus* living in cave from Shilin, Yunnan, China (Cypriniformes, Cyprinidae). *Acta Zootax Sin* 32: 226–229
- Li W, Mao W, Sun R, Lu Z (1994) Two new species of *Yunnanilus* from Yunnan province, China (Cypriniformes: Cobitidae). *Acta Zootax Sin* 19:370–374
- Li W, Wu D, Chen A, Tao J (1997) Histological study on the horn-like projection of the head of *Sinocyclocheilus rhinoceros*. *J Yunnan Univ* 19:426–428
- Li W, Wu D, Chen A (1998) Two new species of *Sinocyclocheilus* from Yunnan (Cypriniformes: Cyprinidae). *J Zhanjiang Ocean Univ* 18:1–5
- Li W, Tao J, Mao W, Lu Z (2000a) Two new species of *Yunnanilus* from eastern Yunnan, China (Cypriniformes: Cobitidae). *Acta Zootax Sin* 25:349–353
- Li W, Xiao H, Zan R, Luo Z, Li H (2000b) A new species of *Sinocyclocheilus* from Guangxi, China. *Zool Res* 21:155–157
- Li W, Zong Z, Nong R, Zhao C (2000c) A new species of *Sinocyclocheilus* from Yunnan—*Sinocyclocheilus maculatus* Li, sp. nov. *J Yunnan Univ* 22:79–80
- Li W, Liao Y, Yang H (2002a) Two new species of *Sinocyclocheilus* from Eastern Yunnan, China. *J Yunnan Agric Univ* 17:161–163
- Li W, Mao W, Lu Z (2002b) A new species of *Sinocyclocheilus* from Yunnan China. *J Zhanjiang Ocean Univ* 22:1–3
- Li W, Mao W, Lu Z, Tao J (2002c) Two new species of Cyprinidae from Yunnan. *J Yunnan Univ* 24:385–387
- Li W, Lan J, Chen S (2003a) A new species of cave *Sinocyclocheilus* from Guangxi—*Sinocyclocheilus Jiuxuensis* Li et Lan, sp. nov. *J Guangxi Norm Univ* 21:83–85
- Li W, Mao W, Lu Z, Yan W (2003b) The two new species of *Sinocyclocheilus* from Yunnan, China. *J Jishou Univ* 24:63–65 *Natur Sci Ed*
- Li W, Ran J, Chen H (2003c) A new species of Cave *Sinocyclocheilus* in Guizhou and its adaptation comment. *J Jishou Univ* 24:61–63 *Nat Sci Ed*
- Li W, Xiao H, Zan R, Luo Z, Ban C, Fen J (2003d) A new species of *Sinocyclocheilus* from caves in Guangxi. *J Guangxi Normal Univ* 21:80–81
- Li W, Xiao H, Feng H, Zhao H (2005a) A new species of *Sinocyclocheilus* from Yunnan: *Sinocyclocheilus aluensis*. *J Zhanjiang Ocean Univ* 25:1–3
- Li W, Xiao H, Jin X, Wu D (2005b) A new species of *Sinocyclocheilus* from Yunnan, China. *Southw China J Agric Sci* 18:90–91
- Li W, Ran J, Chen H (2006) A new species of *Paracobitis* from Guizhou, China. *J Zhanjiang Ocean Univ* 26:1–2
- Li W, Yang H, Han F, Tao C, Hong Y, Chen H (2007) A new species in cave of blind *Sinocyclocheilus* from Yunnan, China (Cypriniformes: Cyprinidae). *J Guangdong Ocean Univ* 27:1–3
- Liang L, Liu C, Wu Q (1987) Description of a new species of subfamily Labeoinae (Cyprinidae) from Guangxi. *J Guangxi Agri Coll* 2:77–80
- Liao J, Wang D, Luo Z (1997) A new species and a new subspecies of *Schistura* from Guangxi and Guizhou, China (Cypriniformes: Cobitidae: Noemacheilinae). *Acta Acad Med Zunyi* 20:4–7
- Lin R, Luo Z (1986) A new blind barbid fish (Pisces, Cyprinidae) from subterranean water in Guangxi, China. *Acta Hydrobiol Sin* 10:380–382
- Mao W, Lu Z, Li W, Ma H, Huang G (2003) A new species of *Sinocyclocheilus* (Cyprinidae) from cave of Yunnan, China. *J Zhanjiang Ocean Univ* 23:1–3
- Nelson JS (2006) *Fishes of the world*. Wiley & Sons, New York
- Pellegrin J (1931) Description de deus cyprinidés nouveaux de Chine appartenant au genre *Schizothorax* Heckle. *Bull Soc Zool Fr* 56:145–149
- Ran J, Li W, Chen H (2006) A new species blind loach of *Paracobitis* from Guangxi, China (Cypriniformes: Cobitidae). *J Guangxi Norm Univ* 24:81–82
- Regan CT (1904) On a collection of fishes made by Mr. John Graham at Yunnan Fu. *Ann Mag Nat Hist* 7:190–194
- Riehl R, Baensch HA (1991) *Aquarien Atlas*. Band. 1. Melle: Mergus. Verlag für Natur- und Heimtierkunde, Germany
- Romero A (2001) Scientists prefer them blind: the history of hypogean fish research. *Environ Biol Fishes* 62:43–71 doi:10.1023/A:1011830329016
- Romero A, Paulson KM (2001) It's a wonderful hypogean life: a guide to the troglomorphic fishes of the world. *Environ Biol Fishes* 62:13–41 doi:10.1023/A:1011844404235
- Romero A, Green SM (2005) The end of regressive evolution: examining and interpreting the evidence from cave fishes. *J Fish Biol* 67:3–32
- Sbordoni M, De Matthaes CE, Mattoccia M, Berti R, Sbordoni V (1996) Genetic variability and differentiation of hypogean cyprinid fishes from Somalia. *J Zoological Syst Evol Res* 34:75–84
- Shan X, Lin R, Yue P, Chu X (2000) Barbinae. In: Yue P (ed) *Fauna Sinica, Osteichthyes, Cypriniformes III*. Science, Beijing, pp 3–170

- Shi D, Zhou J, Liang H, He A (1994) Distribution and living environment of the *Sinocyclocheilus anatisrostris*. Zool Res 15(supplement):196–197
- Su R, Yang J, Cui G (2003) Taxonomic review of the genus *Sinocrossocheilus* Wu (Teleostei: Cyprinidae), with a description of four new species. Zool Stud 42:420–430
- Trajano E, Mugue N, Krejca J, Vidthayanon C, Smart D, Borowsky R (2002) Habitat, distribution, ecology and behavior of cave balitorids from Thailand (Teleostei: Cypriniformes). Ichthyol Explor Freshwat 13:169–184
- Wang D, Chen Y (1989) Descriptions of three new species of Cyprinidae from Guizhou province, China (Cypriniformes: Cyprinidae). Acta Acad Med Zunyi 12:29–34
- Wang D, Liao J (1995) The karyotype of a cave-living fish *Ceratobarbus biangularis*. Acta Acad Med Zunyi 18:85–86
- Wang D, Liao J (1997) A new species of *Sinocyclocheilus* from Guizhou, China (Cypriniformes: Cyprinidae: Barbinae). Acta Acad Med Zunyi 20:1–3
- Wang D, Li D (2001) Two new species of the genus *Triplophysa* from Guizhou, China. Acta Zootax Sin 26:98–101
- Wang S, Xie Y (2004) China species red list. Higher Education, Beijing
- Wang D, Huang Y, Liao J, Zheng J (1995) Taxonomic revision of the genus *Gibbibarbus* Dai. Acta Acad Med Zunyi 18:166–168
- Wu X (1963) Economic animals in China: Freshwater Fishes. Science Press, Beijing, p 159
- Wu X, Lin R, Chen J, Chen X, He M (1977) Barbinae. In: Wu X (ed) Cyprinid fishes in China. Shanghai Scientific and Technical, Shanghai, pp 261–265
- Wu HL, Shao KT, Lai CF (1999) Latin-Chinese dictionary of fishes names. The Sueichan, Keelung
- Xiao H, Li W, Zan R (2004) The three new species of *Sinocyclocheilus* from Kunming, Yunnan. Southwest China J Agri Sci 17:521–524
- Yang J (1990) Noemacheilinae. In: Chu X, Chen Y (eds) The fishes of Yunnan, China, Part II Cyprinidae. Science, Beijing, pp 12–63
- Yang J, Chen Y (1995) The biology and resource utilization of the fishes of Fuxian Lake, Yunnan. Yunnan Science and Technology, Kunming
- Yang G, Yuan F, Liao R (1986) A new blind cobitidae fish from the subterranean water in Xiangxi, China. J Huazhong Agric Univ 5:219–223
- Yang J, Chen Y, Lan J (1994) *Protocobitis typhlops*, a new genus and species of cave loach from China (Cypriniformes: Cobitidae). Ichthyol Explor Freshwat 5:91–96
- Yang J, Chen X, Lan J (2004) Occurrence of two new plateau-indicator loaches of Nemacheilinae (Balitoridae) in Guangxi with reference to zoogeographical significance. Zool Res 25:111–116
- Yang J, Pan X, Li Z (2007) Preliminary report on the successful breeding of the endangered fish *Sinocyclocheilus grahami* endemic to Dianchi Lake. Zool Res 28:329–331
- Yue P, Chen Y (1998) China red data book of endangered animals, pisces. Science, Beijing
- Zhang C (1986) On the ecological adaptation and geographical distribution of the barbina fish *Varicorhinus (Scaphesthes) macrolepis* (Bleeker). Acta Zool Sin 32:266–272
- Zhang C, Dai D (1992) A new species of *Sinocyclocheilus* from Guangxi, China (Cypriniformes: Barbinae). Acta Zootax Sin 17:377–380
- Zhang E, Chen J (1997) A taxonomical revision of the genus *Crossocheilus* in China and a description of a new genus from China (Pisces: Cyprinidae). Acta Zootax Sin 22:321–326
- Zhang C, Zhao Y (2001) A new fish of *Sinocyclocheilus* from Guangxi, China with a comment on its some biological adaptation. Acta Zootax Sin 26:102–107
- Zhang E, Fang F (2005) *Linichthys*: a new genus of Chinese cyprinid fishes (Teleostei: Cypriniformes). Copeia 2005:61–67 doi:10.1643/CI-03-256R2
- Zhang Z, Zhao Y, Zhang C (2006) A new blind loach, *Oreonectes translucens* (Teleostei: Cypriniformes: Nemacheilinae), from Guangxi, China. Zool Stud 45:611–615
- Zhao Y (2006) An endemic cavefish genus *Sinocyclocheilus* in China—species diversity, systematics and zoogeography (Cypriniformes: Cyprinidae). Chinese Academy of Sciences, Beijing
- Zhao Y, Zhang C (2006) Past research and future development on endemic Chinese cavefish of the genus *Sinocyclocheilus* (Cypriniformes, Cyprinidae). Acta Zootax Sin 31:769–777
- Zhao Y, Zhang C, Lan J (2006a) *Sinocyclocheilus*. In: Zhou J, Zhang C (eds) Freshwater fishes of Guangxi, China (2nd edition). Guangxi People's Publishing House, Nanning, pp 259–282
- Zhao Y, Watanabe K, Zhang C (2006b) *Sinocyclocheilus donglanensis*, a new cavefish (Teleostei: Cypriniformes) from Guangxi, China. Ichthyol Res 53:121–128
- Zhao Y, Lan J, Zhang C (2009a) A new cavefish species, *Sinocyclocheilus brevibarbus* (Teleostei: Cypriniformes: Cyprinidae), from Guangxi, China. Environ Biol Fishes (this issue)
- Zhao Y, Zhang C, Zhou J (2009b) *Sinocyclocheilus guilinensis*, a new species from an endemic cavefish group (Cypriniformes: Cyprinidae) in China. Environ Biol Fishes (this issue)
- Zheng B (1981) *Oreonectes anophthalmus* Zheng, sp. nov. In: F.I.o.G.Z.A. Region & C.A.o.S. Institute of Zoology (eds) Freshwater fishes of Guangxi, China (1st ed). Guangxi People's Publishing House, Nanning, pp 162–163
- Zheng C, Xie J (1985) One new carp of the genus *Sinocyclocheilus* (Barbinae, Cyprinidae) from Guizhou Province, China. In: Liu J (ed) Transactions of the Chinese Ichthyological Society, No.4. Science, Beijing, pp 123–126
- Zheng J, Wang J (1990) Description of a new species of the genus *Sinocyclocheilus* from China (Cypriniformes: Cyprinidae). Acta Zootax Sin 15:251–254
- Zhou W, He J (1989) A new species of dwarfism in *Yunnanilus* (Cypriniformes: Cobitidae). Acta Zootax Sin 14:380–384
- Zhou S, Li G (1998a) A new species of *Sinocyclocheilus* from Guangxi (Cypriniformes: Cyprinidae: Barbinae). Guangxi Sci 5:139–141,149
- Zhou S, Li G (1998b) A new species of the genus *Sinocyclocheilus* from cave Guangxi China (Cypriniformes, Cyprinidae, Barbinae). In: Sun J (ed) Contributions from Tianjin Natural History Museum, 15, Ocean Press, Beijing, pp 9–12

- Zhou J, Zhang C (2006) Freshwater fishes of Guangxi, China, 2nd edn. Guangxi People's Publishing House, Nanning
- Zhou J, Zhang C, He A (2004) A new species of the genus *Sinocyclocheilus* from Guangxi, China (Cypriniformes, Cyprinidae). *Acta Zootax Sin* 29:591–594
- Zhu S (1983) A new genus and species of Nemachilinae (Pisces: Cobitidae) from China. *Acta Zootax Sin* 8:311–313
- Zhu S (1989) The loaches of the subfamily Nemacheilinae in China (Cypriniformes: Cobitidae). Jiangsu Science and Technology Publishing House, Nanjing
- Zhu Y (2006) Labeoninae. In: Zhou J, Zhang E (eds) Freshwater fishes of Guangxi, China. 2nd edn. Guangxi People's Publishing House, Nanning, pp 310–345
- Zhu S, Cao W (1987) The nomeacheiline fishes from Guangdong and Guangxi with descriptions of a new genus and three new species. *Acta Zootax Sin* 12:323–331
- Zhu Y, Lu Y-J, Yang J-X, Zhang S (2008) A new blind underground species of the genus *Protocobitis* (Cobitidae) from Guangxi, China. *Zool Res* 29:452–454 doi:[10.3724/SP.J.1141.2008.00452](https://doi.org/10.3724/SP.J.1141.2008.00452)