Sinocyclocheilus donglanensis, a new cavefish (Teleostei: Cypriniformes) from Guangxi, China

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Abstract *Sinocyclocheilus donglanensis*, a new cyprinid species from a subterranean river in Donglan County in the Guangxi Zhuang Autonomous Region of southern China, is described. It is distinguished from all congeners by the following combination of characteristics: a completely scaled body with well-developed eyes; a curved lateral line possessing 57–64 scales; pectoral fin not reaching pelvic fin origin and last unbranched ray of the dorsal fin clearly serrated along its posterior edge; 8–9 predorsal vertebrae; 8–9 gill rakers; joints of dentary-angulars not close to each other at the isthmus; and a slightly inferior mouth with the upper jaw (6.2–7.4% in standard length: SL) protruding slightly beyond the lower one (5.7–6.7% SL). *Sinocyclocheilus donglanensis* is sympatric with the peculiarly shaped, hunchbacked *S. altishoulderus*.

Key words *Sinocyclocheilus* · Cyprinidae · New species · Cavefish · China

Some cyprinid fishes have been discovered that display a high level of adaptation to dwelling in caves, including *Caecobarbus geertsii* Boulenger, 1921 from the Congo (Heuts, 1951), *Iranocypris typhlops* Bruun and Kaiser, 1944 from Iran, *Typhlogarra widdowsoni* Trewavas, 1955 in Iraq (Marshall and Thines, 1958), *Troglocyclocheilus khammouanensis* Kottelat and Bréhier, 1999 from Laos, and *Typhlobarbus nudiventris* Chu and Chen, 1982, plus species of the genus *Sinocyclocheilus* from southwestern China (Romero and Paulson, 2001). Only this last genus contains numerous hypogean species exhibiting a spectrum of cave-dwelling specializations.

China and southeastern Asia have a very rich subterranean ichthyofauna (Trajano et al., 2004; Romero and Paulson, 2001). The genus *Sinocyclocheilus* is endemic to the Karst area of the Yun-gui Plateau, including southern Guizhou Province, eastern Yunnan Province, and the northern part of the Guangxi Zhuang Autonomous Region in China. The first *Sinocyclocheilus*, *Sinocyclocheilus grahami*, was described by Regan (1904) from Lake Dianchi in Yunnan. Fang (1936) established the genus *Sinocyclocheilus* with the species *Sinocyclocheilus tingi* Fang, 1936. Many new troglobite and troglophile *Sinocyclocheilus* species have been discovered in the past 20 years, brought about in part by advances in Chinese biospeleology. As of 2004, 51 valid (53 nominal) species have been described in this genus. Interestingly, almost all known species of *Sinocyclocheilus* dwell in or around caves.

In a recent systematic study on the genus *Sinocyclocheilus*, several specimens representing an undescribed species were discovered. All specimens were collected by the authors in a field survey in October 2002 in Guangxi. Herein, we describe this new species.

Materials and Methods

Detailed specimen information is listed in the Comparative Materials section. Morphological data for related congeners were taken from their original descriptions. Some of the comparative specimens for this study have been deposited in the Animal Museum of the Institute of Zoology, Chinese Academy of Sciences (ASIZB), while others are currently preserved in the private collection of W.X. Li.

Measurements were taken point to point with a digital caliper (0.1-mm precision). Individual measurements were taken as shown in Fig. 1. Measurements and counts were taken on the left side of the fish body whenever possible.

Lateral line scales were counted along the lateral line pores from the scale immediately posterior to the upper end of the gill opening to the last scale on the caudal fin base. Scale rows above the lateral line were counted from the scale immediately under the dorsal fin origin caudoventrally to the lateral line, but not including the lateral line row. Scale rows below the lateral line were counted from the scale immediately above the pelvic fin origin caudodorsally to the lateral line, but not including the lateral line row. Predorsal scales were counted along the dorsal midline from the first scale behind the head to the last scale in front of the dorsal fin insertion. Scales around the narrowest por-

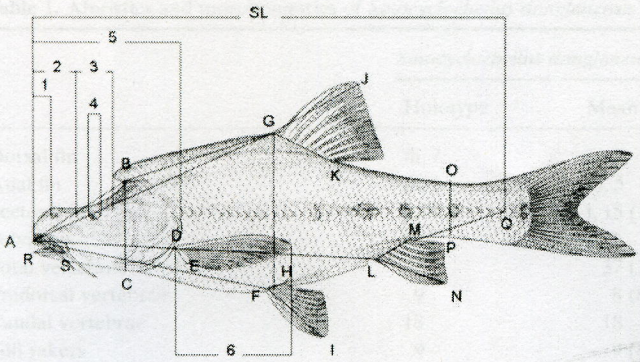

Fig. 1. Principal measurements taken on *Sinocyclocheilus* species. *Sinocyclocheilus angularis* here is illustrated as a typical example (after Shan et al., 2000). Standard length (*SL*), from the tip of the upper jaw to the position of the last half-centrum (from point *A* to point *Q*); body depth, from the insertion of the dorsal fin vertically to ventral midline; predorsal length, from the tip of the upper jaw to the insertion of the dorsal fin (*A–G*); dorsal fin length, from the insertion of the dorsal fin to the tip of the longest ray (*G–J*); dorsal fin base length, from anterior to posterior end of dorsal fin base (*G–K*); preanal length, from the tip of the upper jaw to the insertion of the anal fin (*A–L*); anal fin length, from the insertion of the anal fin to the tip of the longest ray (*L–N*); anal fin base length, from anterior to posterior end of anal fin base (*L–M*); prepectoral length, from the tip of the upper jaw to the base of anterior pectoral fin ray (*A–D*); pectoral fin length, from the base of anterior pectoral fin ray to the tip of the longest ray (*6*, *D–H*); pectoral fin base length, from the anterior to posterior end of pectoral fin base (*D–E*); prepelvic length, from the tip of the upper jaw to the base of anterior pelvic fin ray (*A–F*); pelvic fin length, from the base of anterior pelvic fin ray to the tip of the longest ray (*F–I*); pelvic fin base length, from the anterior to posterior end of pelvic fin base (*F–H*); caudal peduncle length, from the end of the anal fin base to the position of the last half-centrum (*M–Q*); caudal peduncle depth, at approximately the middle of the caudal peduncle (*O–P*); head length, from the tip of the upper jaw to the posteriormost point of operculum (not including skin flap, *5*; *A–D*); head depth, from the nape (the point between head and body, dorsal scales start here) vertically to the ventral midline (*B–C*); snout length, from the tip of the upper jaw to the anterior margin of the circumorbital series (*2*); eye diameter, from the anterior to posterior margins of the circumorbital series (*3*), using the shorter tips of the caliper, and pressing slightly to find firm points; eyeball diameter, the horizontal diameter of eyeball (*4*); interorbital width, the shortest distance between the orbits across the top of the head; prenostril length, the tip of the upper jaw to the anterior margin of the anterior nostril (*1*); width between posterior nostrils, the shortest distance between posterior nostrils; upper jaw length, from the tip of upper jaw (the symphysis of the premaxilla) to the corner of the mouth (*A–S*); lower jaw length, from the symphysis of the dentary to the corner of the mouth (*R–S*); mouth width, the distance between the two corners of the mouth

tion of the caudal peduncle were counted as circumpeduncular scales.

Gill rakers were only counted in the lower part of the first gill arch, on the ceratobranchial and branchial bones. Osteological characters were observed on soft X-ray photographs. Radiographs were made using SOFTEX CMB-2 and Xiangyi RX-60 X-ray Units (Zhao et al., 2002). Vertebrae were counted excluding the Weberian complex. Predorsal vertebrae were counted from the first free vertebra to the vertebra before the first dorsal fin pterygiophore. Caudal vertebrae were counted from the first vertebra with a hemal spine to the last half-centrum. Morphometric and meristic information were analyzed using SYSTAT version 10 (Wilkinson, 2001).

For providing genetic characteristics of the new species and comparative species, nucleotide sequences of the mitochondrial cytochrome *b* were ascertained by the method described in Watanabe et al. (2000), using primer pairs L14724 (5′-CGAAGCTTGATATGAAAAACCATC GTTG-3′) (Meyer and Wilson, 1990) and H15915 (5′-ACCTCCGATCTYCGGATTACAAGAC-3′) (Aoyama et al., 2000).

Sinocyclocheilus donglanensis sp. nov.

(Fig. 2; Table 1)

Holotype. ASIZB 94746, 98.1 mm standard length (SL), from Zhujiang River basin: Hongshuihe River, Gongping Village (24°20′30″ N, 107°24′39″ E), Taiping Town, Donglan County, Guangxi Zhuang Autonomous Region, China; caught on 7 October 2002 by C.G. Zhang and K. Watanabe. Tissue was taken for DNA sequencing.

Paratypes. ASIZB 74217, 74.0 mm SL; ASIZB 74218, 123.9 mm SL; ASIZB 94747, 64.0 mm SL (for DNA sequencing); ASIZB 94748, 53.2 mm SL; data as for holotype.

Diagnosis. The species of *Sinocyclocheilus*, distinguished from all congeners by the following combination of characteristics: a completely scaled body with well-developed eyes; a curved lateral line possessing 57–64 scales; the pectoral fin not reaching the origin of the pelvic fin and the last unbranched ray of the dorsal fin clearly serrated along its posterior edge; 8–9 predorsal vertebrae; 8–9 gill rakers; joints of dentary-angulars not close to each other at the isthmus; and a slightly inferior mouth with the upper jaw (6.2%–7.4% SL) protruding slightly beyond the lower one (5.7%–6.7% SL).

Description. General body features are shown in Fig. 2. Meristics and proportional measurements as percentages of standard length are listed in Table 1.

Body compressed. Dorsal profile convex while ventral profile slightly concave, tapering gradually toward anal fin. The greatest body depth exactly at dorsal fin insertion.

Head compressed with rounded eyes and anterior snout tip. Nostrils midway between snout tip and anterior margin of orbit. Anterior nostrils possessing a rim with a fleshy flap forming a complete tube. Mouth curved and slightly inferior, with a projecting upper jaw. Two pairs of barbels, maxillary barbel insertions in front of anterior nostril, barbels extending beyond posterior margin of eye; rictal barbels a little longer, reaching anterior part of operculum. Gill opening large, operculum membrane not connected at isthmus. Joint of dentary-angulars not close to each other at isthmus (see Fig. 3). Gill rakers triangular, 8–9 in first gill arch, epibranchial with 2, ceratobranchial with 6 (2 specimens), 7 (3); generally, the three lowest ceratobranchial gill rakers

Table 1. Meristics and morphometrics of *Sinocyclocheilus donglanensis* sp. nov. and *S. yishanensis*

	Sinocyclocheilus donglanensis sp. nov. ($n = 5$)		*S. yishanensis* ($n = 17$)	
	Holotype	Mean ± SD (min–max)	Holotype	Mean ± SD (min–max)
Dorsal fin	iii, 7	iii, 7	iii, 7	iii, 7
Anal fin	iii, 5	iii, 5	iii, 5	iii, 5
Pectoral fin	i, 14	i, 15 (14–15)	i, 14	i, 15 (13–15)
Pelvic fin	ii, 9	ii, 9	ii, 9	ii, 8 (7–9)
Total vertebrae	37	37 (37–38)	—	36 (35–37)[a]
Predorsal vertebrae	9	8 (8–9)	—	7 (6–7)
Caudal vertebrae	18	18	—	18 (17–18)
Gill rakers	9	9 (8–9)	10	10 (9–11)
Lateral line scales	61	60 (57–64)	54	62 (54–69)
Standard length (mm)	98.1	82.6 (53.2–123.9)	129.9	100.6 (80.1–129.9)
In % of standard length				
Body depth	35.9	31.1 ± 2.8 (28.5–35.9)	29.4	31.5 ± 2.4 (25.7–36.8)
Predorsal length	59.7	57.1 ± 1.6 (55.4–59.7)	54.3	56.1 ± 1.9 (52.9–60.5)
Dorsal fin base length	12.8	12.4 ± 0.6 (11.6–13.1)	12.5	13.4 ± 1.2 (10.7–15.7)
Dorsal fin length	21.4	21.6 ± 1.9 (19.7–24.0)	22.5	22.2 ± 1.9 (17.3–25.4)
Preanal length	77.6	77.2 ± 1.7 (75.1–79.7)	74.6	73.8 ± 1.6 (71.4–76.6)
Anal fin base length	7.8	7.9 ± 0.3 (7.4–8.2)	6.0	8.0 ± 0.7 (6.0–8.9)
Anal fin length	18.4	18.8 ± 1.4 (17.2–20.8)	15.2	18.4 ± 1.3 (15.2–21.1)
Prepectoral length	29.1	29.0 ± 1.5 (26.5–30.3)	26.1	29.4 ± 1.2 (26.1–30.8)
Pectoral fin base length	4.4	4.5 ± 0.5 (3.8–5.1)	4.0	4.5 ± 0.4 (3.7–5.1)
Pectoral fin length	24.6	22.9 ± 1.9 (19.7–24.6)	22.0	21.8 ± 2.3 (16.0–24.8)
Prepelvic length	55.3	54.5 ± 1.1 (52.8–55.4)	50.1	51.5 ± 1.2 (49.6–53.6)
Pelvic fin base length	5.0	4.4 ± 0.5 (3.8–5.1)	4.6	4.6 ± 0.4 (3.6–4.9)
Pelvic fin length	18.4	17.7 ± 1.3 (16.3–19.4)	18.2	17.5 ± 1.1 (15.4–20.1)
Caudal peduncle length	16.8	18.3 ± 1.6 (16.8–20.4)	20.5	20.0 ± 1.2 (18.2–22.6)
Caudal peduncle depth	15.5	13.6 ± 1.1 (12.5–15.5)	13.6	13.3 ± 0.8 (12.2–15.3)
Head length	28.9	28.2 ± 1.2 (26.6–29.5)	26.3	29.7 ± 1.2 (26.3–31.0)
Head depth	17.5	18.2 ± 0.4 (17.5–18.8)	16.3	18.7 ± 1.0 (16.3–20.1)
Head width	16.5	15.3 ± 0.8 (14.5–16.5)	15.5	14.2 ± 0.7 (13.2–15.6)
Snout length	9.0	7.9 ± 0.7 (7.2–9.0)	8.4	8.9 ± 0.5 (7.3–9.7)
Eye diameter	8.1	8.6 ± 1.7 (6.5–10.9)	6.6	8.2 ± 0.7 (6.6–9.2)
Eyeball diameter	6.2	6.6 ± 1.6 (4.7–8.6)	4.0	6.0 ± 0.6 (4.0–6.6)
Interorbital width	8.7	7.8 ± 0.6 (7.4–8.7)	7.0	7.4 ± 0.4 (6.7–8.4)
Prenostril length	6.3	5.2 ± 0.7 (4.7–6.3)	5.8	5.7 ± 0.2 (5.4–6.2)
Width between posterior nostrils	5.7	5.5 ± 0.3 (5.2–6.0)	5.7	5.5 ± 0.4 (4.6–6.1)
Upper jaw length	6.6	6.8 ± 0.5 (6.2–7.4)	8.2	8.4 ± 0.5 (7.2–9.1)
Lower jaw length	6.1	6.1 ± 0.4 (5.7–6.7)	7.6	7.9 ± 0.6 (7.0–8.9)
Mouth width	6.9	6.8 ± 0.5 (6.0–7.3)	9.0	7.4 ± 0.7 (6.1–9.0)
Maxilla barbel length	12.9	14.3 ± 4.1 (11.1–21.1)	10.1	11.0 ± 1.7 (8.9–15.1)
Rictal barbel length	16.2	15.3 ± 3.7 (11.3–21.1)	11.4	12.7 ± 1.8 (8.8–15.5)

[a] Twelve specimens (excluding type specimens) of *S. yishanensis* were X-ray photographed for the vertebrae counts

not well developed. Pharyngeal teeth in 3 rows with counts of 2, 3, 4–4, 3, 2.

Pectoral fin insertion slanting anteriorly at an angle from the vertical of approximately 30°; pectoral fin not reaching pelvic fin insertion. Pelvic fin insertion anterior to dorsal fin insertion, midway between pectoral and anal fin insertions; pelvic fin stretching three-quarters of distance between pelvic and anal fin insertions, not beyond anus. Dorsal fin origin at 51%–53% of distance from snout tip to caudal-fin and posterior to pelvic fin insertion. Last unbranched ray of dorsal fin hard at base, softening toward tip, with serrations along posterior edge. Anal fin 17%–21% SL, with insertion midway between pelvic fin origin and caudal fin base. Caudal fin bifurcate.

Lateral line complete and curved, descending to point above pectoral fin rays with fin pressed against body, then ascending to body midline above anal fin base, extending to the end of caudal peduncle. Scales small. The lateral line scales larger than other scales. Lateral line scale counts (number of specimens): 57 (1), 59 (1), 61 (2), and 64 (1); scale row counts above lateral line: 23 (1), 24 (3), and 25 (1); scale row counts below lateral line: 12 (3) and 14 (2);

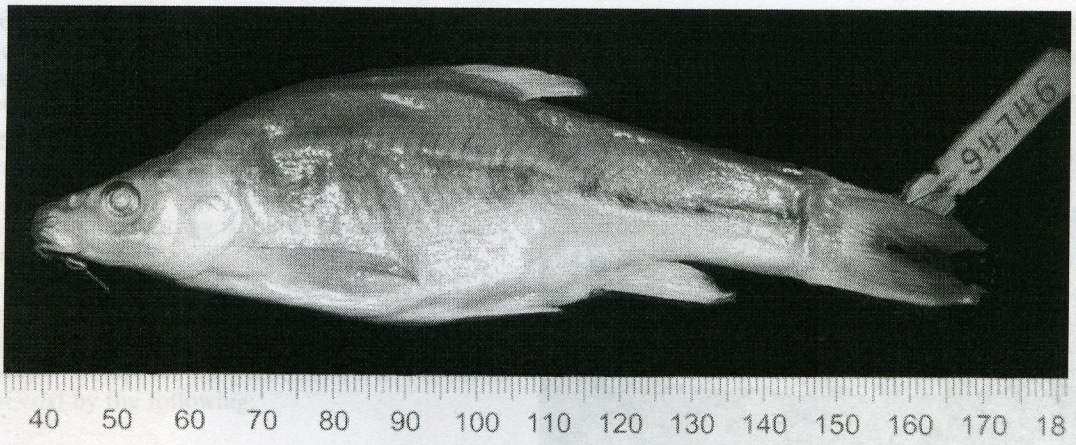

Fig. 2. Holotype of *Sinocyclocheilus donglanensis* sp. nov., ASIZB 94746, 98.1 mm SL

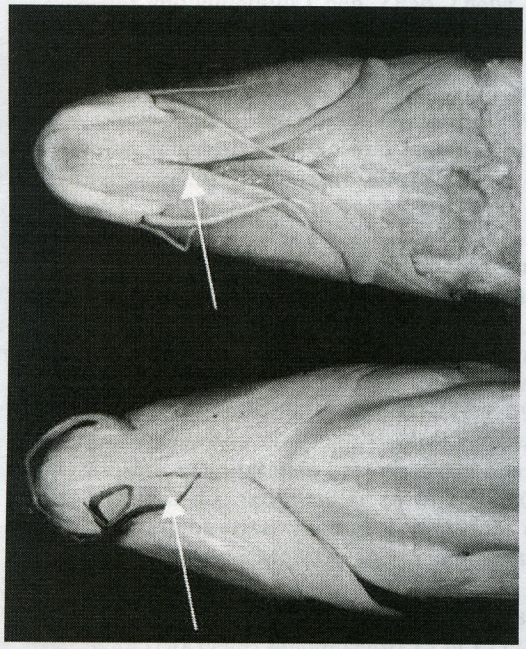

Fig. 3. Ventral view of the *Sinocyclocheilus donglanensis* sp. nov. holotype, ASIZB 94746, 98.1 mm SL (*top*) and *S. yishanensis*, ASIZB 74145, 98.3 mm SL (*bottom*), showing the differences in the articular characteristics. *Arrows* indicate joints of dentary-angulars at the isthmus

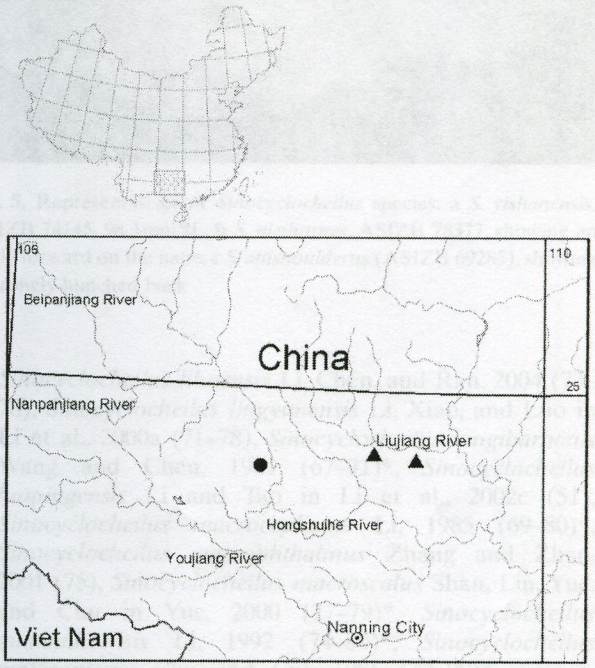

Fig. 4. Collection localities of *Sinocyclocheilus donglanensis* sp. nov. (*solid circle*) and *S. yishanensis* (*triangles*)

circumpeduncular scale counts: 38 (1), 40 (1), 42 (1), and 44 (2). Predorsal scales irregularly arranged and difficult to count. Pelvic fin axillary scales (generally 2) present.

Coloration in alcohol.—Back dark brownish; abdomen light grayish; an indistinct black stripe running from posterior border of operculum along body midline to caudal fin base, becoming blotchy posterior to anal fin insertion. Pectoral, dorsal, and caudal fins dark grayish; pelvic and anal fins light yellowish.

DNA data.—Two 1139-bp nucleotide sequences (with one transition) of the mitochondrial cytochrome *b* gene for two *S. donglanensis* sp. nov. specimens (ASIZB 94746 and 94747) are deposited in the DDBJ/EMBL/GeneBank, with accession numbers AB196440 and AB196441, respectively.

Distribution. Known only from a subterranean tributary of the Hongshuihe River, which belongs to the Xijiang River system, the longest tributary of the Zhujiang River basin. Collection site is near Gongping Village, Taiping Town, Donglan County, Guangxi, China (Fig. 4).

Habitat. Specimens were found in a subterranean river whose water surface was about 10–20 m inside the mouth of a small cave located about 50–100 m up from the bottom of a 4-km^2 lowland depression in a mountainous region. During the flood season, the subterranean water flows out and

makes the lowland depression look like a small lake. Specimens were caught by hook. The locality is the same as for the type specimens of *Sinocyclocheilus altishoulderus* (Li and Lan, 1992).

Etymology. The name of the new species, *donglanensis*, is derived from the name of the collection locality, Donglan County.

Behavior. Virtually nothing is known about the behavior of *S. donglanensis*.

Remarks. We can distinguish the new species from all other known 51 valid *Sinocyclocheilus* species [* indicates data from Shan et al. (2000); other data are taken from the original literature, except for the predorsal vertebrae count for *S. yishanensis*] by the following:

1. Developed eyes vs. undeveloped eyes (blind), to distinguish from *Sinocyclocheilus albeoguttatus* Zhou and Li, 1998b, *Sinocyclocheilus anatirostris* Lin and Luo, 1986*, *Sinocyclocheilus anophthalmus* Chen, Zhao, Zheng, and Li, 1988*, *Sinocyclocheilus furcodorsalis* Chen, Yang, and Lan, 1997, *Sinocyclocheilus guangxiensis* Zhou and Li, 1998a, *Sinocyclocheilus hyalinus* Chen and Yang, 1993*, *Sinocyclocheilus microphthalmus* Li, 1989, *Sinocyclocheilus tianeensis* Li, Xiao, and Luo in Li et al., 2003d, *Sinocyclocheilus tianlinensis* Zhou, Zhang, and He, 2004, and *Sinocyclocheilus xunlensis* Lan, Zhao, and Zhang, 2004
2. Normal body shape vs. the presence of strikingly peculiar body features such as an angle forward on the nape (Fig. 5b) or a strongly humped back (Fig. 5c), to distinguish from *Sinocyclocheilus altishoulderus**, *Sinocyclocheilus angularis* Zheng and Wang, 1990*, *Sinocysclocheilus bicornutus* Wang and Liao, 1997, *Sinocyclocheilus cyphotergous* (Dai, 1988)*, *Sinocyclocheilus hugeibarbus* Li and Ran in Li et al., 2003c, *Sinocyclocheilus jiuxuensis* Li and Lan in Li et al., 2003a, *Sinocyclocheilus rhinocerous* Li and Tao, 1994*, and *Sinocyclocheilus tileihornes* Mao, Lu, and Li in Mao et al., 2003
3. Body completely scaled vs. incompletely scaled, to distinguish from *Sinocyclocheilus huaningensis* Li in Li et al., 1998 (anterior body naked/scaleless), *Sinocyclocheilus oxycephalus* Li, 1985 (totally naked, no lateral line scales)*, *Sinocyclocheilus qiubeiensis* Li in Li et al., 2002a (abdomen naked), *Sinocyclocheilus longifinus* Li in Li et al., 1996 (totally naked, no lateral line scales), *Sinocyclocheilus maculates* Li in Li et al., 2000b (totally naked, no lateral line scales), *Sinocyclocheilus purpureus* Li, 1985 (abdomen naked)*, and *Sinocyclocheilus robutus* Chen and Zhao in Chen et al., 1988 (body naked, lateral line scales unclear)*
4. Lateral line scales 57–64 vs. other lateral line scale counts, to distinguish from *Sinocyclocheilus angustiporus* Zheng and Xie, 1985 (68–89)*, *Sinocyclocheilus guishanensis* Li in Li et al., 2003b (73–80), *Sinocyclocheilus hei* Li and Xiao in Xiao et al., 2004 (86–91), *Sinocyclocheilus huanglongdongensis* Li and Xiao in Xiao et al., 2004 (71–74), *Sinocyclocheilus jii* Zhang and Dai, 1992 (48–50), *Sinocyclocheilus lateristriatus* Li, 1992 (72–84)*, *Sinocyclocheilus liboensis* Li, Chen, and Ran, 2004 (73–78), *Sinocyclocheilus lingyunensis* Li, Xiao, and Luo in Li et al., 2000a (71–78), *Sinocyclocheilus longibarbatus* Wang and Chen, 1989 (67–71)*, *Sinocyclocheilus luopingensis* Li and Tao in Li et al., 2002c (51), *Sinocyclocheilus macrocephalus* Li, 1985 (69–80)*, *Sinocyclocheilus macrophthalmus* Zhang and Zhao, 2001 (75), *Sinocyclocheilus macroscalus* Shan, Lin, Yue, and Chu in Yue, 2000 (77–79)*, *Sinocyclocheilus maitianheensis* Li, 1992 (74–80)*, *Sinocyclocheilus malacopterus* Chu and Cui, 1985 (72–80)*, *Sinocyclocheilus qujingensis* Li, Mao, and Lu, 2002b (70–79), *Sinocyclocheilus wumengshanensis* Li, Mao, and Lu in Li et al., 2003b (67–76), and *Sinocyclocheilus yangzongensis* Tsü and Chen in Wu et al., 1977 (72–79)*
5. Last unbranched ray of dorsal fin hard at the base, softening toward the tip, with serrations along the posterior edge vs. a completely soft ray without serrations, to distinguish from *Sinocyclocheilus macrolepis* Wang and Chen, 1989*
6. Lateral line curved vs. straight, to distinguish from *Sinocyclocheilus multipunctatus* (Pellegrin, 1931)*, *Sinocyclocheilus jiuchengensis* Li in Li et al., 2002a, and *Sinocyclocheilus tingi**
7. Pectoral fin not reaching pelvic fin origin vs. reaching beyond pelvic fin origin, to distinguish from *Sinocyclocheilus brevis* Lan and Chen in Chen and Lan, 1992*

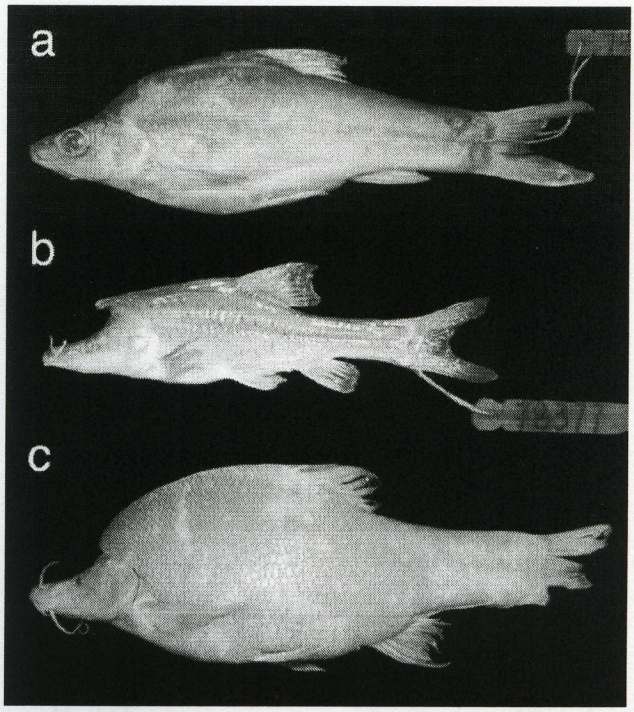

Fig. 5. Representatives of *Sinocyclocheilus* species: **a** *S. yishanensis*, ASIZB 74145, 98.3 mm SL; **b** *S. tileihornes*, ASIZB 78377, showing an angle forward on the nape; **c** *S. altishoulderus* (ASIZB 69285), showing a strongly hunched back

8. Gill rakers 8–9 vs. other gill raker counts, to distinguish from *Sinocyclocheilus grahami* (5–7)* and *Sinocyclocheilus guangduensis* Li and Xiao in Xiao et al., 2004 (5–6)
9. Predorsal vertebrae 8–9 vs. 6–7, to distinguish from *Sinocyclocheilus yishanensis* Li and Lan, 1992.

Sinocyclocheilus donglanensis sp. nov. is morphologically most similar to *S. yishanensis* (Fig. 5a), described from the Liujiang River, another tributary of the Zhujiang River basin (see Fig. 4), in body shape and lateral line scale count (see Table 1), but may be differentiated from the latter by the following: more predorsal vertebrae (8–9 for *S. donglanensis* vs. 6–7 for *S. yishanensis*); fewer gill rakers (8–9 vs. 9–11); mouth slightly inferior versus terminal; joints of dentary-angulars not close to each other at the isthmus (see Fig. 2); shorter upper and lower jaws (6.2%–7.4% vs. 7.2%–8.4% SL and 5.7%–6.7% vs. 7.0%–8.9% SL, respectively; see Table 1, Fig. 6). Nucleotide sequences of the mitochondrial cytochrome *b* displayed were 4.0%–4.2% different for these two species.

The new species was found in the same locality as that of another species, *Sinocyclocheilus altishoulderus*. The two species share the same water body in a small cave. Such sympatric distributions have also been known for other species groups in the genus; e.g., *S. macrocephalus*, *S. oxycephalus*, and *S. lunanensis* were found in the same reservoir of Shilin County, Yunnan Province (Li, 1985), and *S. anatirostris*, *S. microphthalmus*, and *S. lingyunensis* were from the same subterranean river in the Sha-dong cave in Lingyun County, Guangxi (Zhang, Watanabe, and Zhao, personal observation, 2001).

The new species is easily distinguished from the sympatric species *Sinocyclocheilus altishoulderus*. The most obvious difference between the two species is their different body shapes. The dorsal profile of *S. altishoulderus* steeply ascends from the nape to the dorsal fin origin, and its snout is depressed and duckbilled (see Fig. 5c). The two species also differ in the following: a curved lateral line in *S. donglanensis* vs. a straight lateral line in *S. altishoulderus*; 8–9 vs. 6–7 predorsal vertebrae and 18 vs. 20 caudal vertebrae (although the total vertebrae count is the same); 9 vs. 7–8 soft pelvic fin rays; a shorter pectoral fin in *S. donglanensis* (19.7%–24.6% vs. 25.3%–27.5% SL); and longer upper and lower jaws (6.2%–7.4% vs. 5.0%–6.1% SL and 5.7%–6.7% vs. 4.2%–5.2% SL, respectively). The size and position of the eye also differ, as seen from the mean snout length, 9.0% SL vs. 12.8% SL, and mean eyeball diameter, 9.0% SL vs. 6.2% SL. Nucleotide sequences of the mitochondrial cytochrome *b* displayed were 9.8%–9.9% different for these two species.

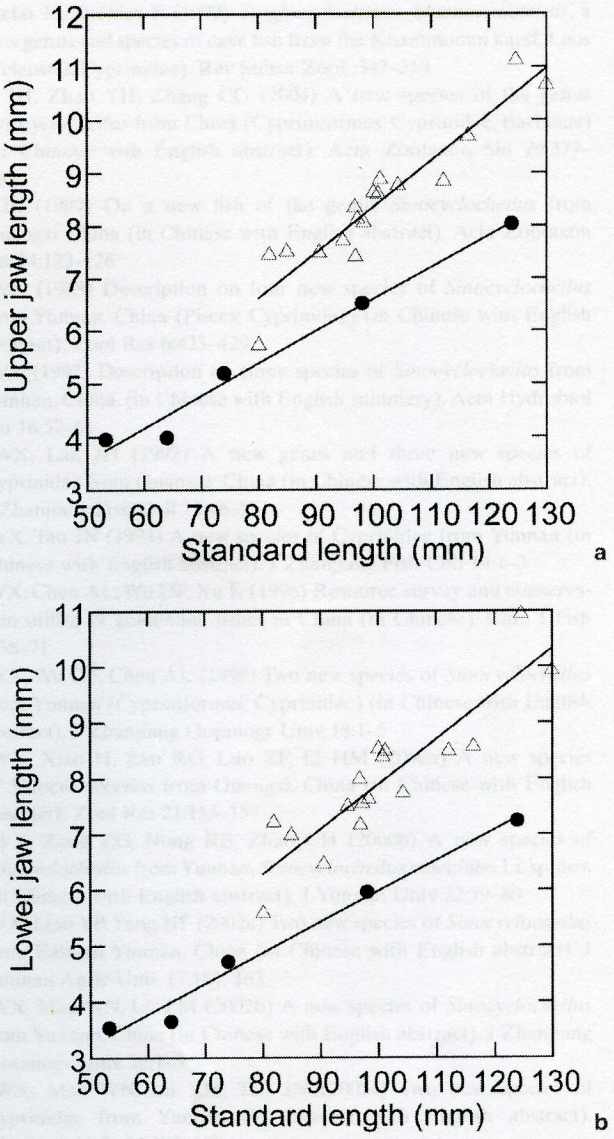

Fig. 6. Morphometric comparisons between *Sinocyclocheilus donglanensis* sp. nov. (*solid circles*) and *S. yishanensis* (*open triangles*). **a** Upper jaw length plotted against standard length to illustrate relatively shorter upper jaw in the new species; **b** lower jaw length plotted against standard length to illustrate relatively shorter lower jaw in the new species

Comparative materials. *Sinocyclocheilus altishoulderus*: ASIZB 69285 (1 specimen), 190.3 mm SL, Zhujiang River basin, Hongshuihe River, Donglan County, Guangxi, China, 1986; ASIZB 74214 (1), 90.1 mm SL, ASIZB 74215 (1), 76.5 mm SL, ASIZB 78729 (1), 91.7 mm SL (for DNA sequencing; AB196442), ASIZB 94776 (1), 72.3 mm SL, Zhujiang River basin, Hongshuihe River, Gongping Village (24°20′30″ N, 107°24′39″ E), Taiping Town, Donglan County, Guangxi, China, 7 October 2002, C.G. Zhang and K. Watanabe. *S. tileihormes*: ASIZB 78377 (1), 63.3 mm SL, Zhujiang River basin, Nanpanjiang River, Gule Village (25°00′58″ N, 103°59′11″ E), A'gang Town, Luoping County, Yunnan, China, 28 June 2004, C.G. Zhang, Y.H. Zhao, and W.N. Mao; *S. yishanensis*: Li 8311001 (holotype), 129.9 mm SL, Zhujiang River basin, Liujiang River, Lidong reservoir (24°16′41″ N, 108°53′53″ E), Yizhou City, Guangxi, China, November 1983, collected by W.X. Li and J.H. Lan; Li 8903002 (1, paratype), 96.9 mm SL, March 1989, other information is same as for holotype, type specimens are preserved in the private collection of W.X. Li; ASIZB 73159–73161 (3), 90.6–116.3 mm SL; ASIZB 73163 (1),

80.1 mm SL, ASIZB 74144–74153 (10), 81.9–129.9 mm SL; uncatalogued fin specimens (2) (for DNA sequencing; AB196443 and AB196444), same locality as holotype, 25 September 2002, C.G. Zhang and K. Watanabe; ASIZB 74216 (1), 112.1 mm SL, same river basin as holotype, Lengcun Village (24°27′58″ N, 108°26′49″ E), Tongde, Yizhou, Guangxi, China, 27 September 2002, C.G. Zhang and K. Watanabe (for DNA sequencing; AB196445).

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