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# *Schistura albirostris*, a new nemacheiline loach (Teleostei: Balitoridae) from the Irrawaddy River drainage of Yunnan Province, China

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## Abstract

*Schistura albirostris*, a new species of nemacheiline loach, is described from the Longchuanjiang, a tributary of the Irrawaddy River of Tengchong County, southwestern Yunnan, China. It differs from all congeners in the combination of an extremely slender body; a distinctive rectangular unpigmented area on the snout, ethmoid region and anterior rostral barbels; 5–7 dark dorsal saddles that are confluent with 5–8 lateral bars; lacking a suborbital flap in males; and possessing an incomplete lateral line with 27–51 pores, and a weakly-developed processus dentiformis.

**Key words:** Irrawaddy, Ayeyarwaddy, taxonomy, fish, biodiversity

## Introduction

During an expedition to southwestern Yunnan in 2006, we collected five specimens of a small, slender loach with distinctive saddles and a unique pigmentation pattern from the upper Longchuanjiang, a tributary to the Irrawaddy River in Tengchong County, Yunnan, China, that was clearly distinguishable from all other members of the group currently known from Southeast Asia. Review of other material from Yunnan and adjacent regions of Myanmar resulted in the discovery of only a single additional series, collected during 1998 by C. Ferraris and X.Y. Chen from the lower Longchuanjiang. We provide a description of this loach herein.

## Materials and methods

Standard counts and measurements follow Hubbs and Lagler (1958); loach-specific measurements and terminology generally follow Kottelat (1990). Measurements were taken with digital calipers to the nearest 0.1 mm. Measurements other than standard length (SL) were not taken from the two ethanol-fixed specimens due to shrinkage from the fixative. Institutional abbreviations follow the current American Society of Ichthyologists and Herpetologists list (http://www.asih.org/codons.pdf). Local geographic nomenclature was obtained when possible. The Irrawaddy River is known as the Ayeyarwadi River in adjacent Myanmar; the Longchuanjiang is known as the Shweli in Myanmar. Color notes are from freshly caught live specimens and/or photographs of live specimens taken in 2006.

## *Schistura albirostris*, sp. nov.

(Figs. 1–4)

**Holotype.** KIZ 20060415122, a 41.9 mm SL male. Longchuanjiang near Shuang Zhu Yuang village, approximately 3 km upstream of Qiao Tou village, Jie Tou township, Tengchong County, Yunnan, China,

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25°30'11"N, 98°39'15"E, 1573 m elevation, D.A. Neely, X.Y. Chen, X.F. Pan, Y.F. Huang, R. Min and a local fisherman, 15 April 2006.

**FIGURE 1.** *Schistura albirostris*, KIZ 20060415122, holotype, male, 41.9 mm SL. Photo taken approximately 1 min after death.

**Paratypes.** CAS 224427 (1, 41.9 mm SL), KIZ 20060415123 (1, 39.5 mm SL); same collection data as holotype. CAS 224631 (12, 26.7–36.0 mm SL, 2 cs), Longchuanjiang just north of Qushi at Huishuiwan bridge, Tengchong County, Yunnan, China, 25°16'50"N, 98°35' 22"E, 1456m elevation, C.J. Ferraris and X.Y. Chen, 25 October 1998.

**Additional material.** CAS 224428 (1), KIZ uncat. (1) Longchuanjiang near Shuang Zhu Yuang village, approx. 3 km upstream of Qiao Tou village, Jie Tou township, Tengchong County, Yunnan, China, 25°30'11"N, 98°39'15"E, 1573m elevation, D.A. Neely, X.Y. Chen, X.F. Pan, Y.F. Huang, R. Min and a local fisherman, 15 April 2006, both originally preserved in 95% ethanol.

**Diagnosis.** A small, slender *Schistura* with a distinctive rectangular unpigmented area on the snout and ethmoid region anterior to the nares (Figs. 1, 2), five to seven prominent dark saddles traversing the dorsum and confluent with dark, oblique lateral bars that are expanded ventrally, a disassociated basicaudal bar, an incomplete lateral line, no suborbital flap in males, and a weakly-developed processus dentiformis.

**Description.** Body shape as in Fig. 1. Morphometrics are presented in Table 1. Small (maximum known size is 41.9 mm SL), slender, maximum body depth 11–14% in SL. Head compressed. Eye small (17–20% of dorsal head length), high on head, snout long (46–49% of dorsal head length). Maxillary barbel about equal in length to eye diameter, when adpressed reaching midpoint of eye. Posterior rostral barbel roughly equal in length to maxillary barbel. Anterior rostral-barbel length about ¾ of eye diameter. Mouth strongly arched. Lower jaw entire, without median notch. Lobes of lower lip broadly triangular, broadly separated, neither sides nor lobes strongly furrowed (Fig. 3). Nasal flap tubular, moderate in length; anterior nares in a tubular nasal flap; nasal flap is triangular, moderate in length, not reaching eye when depressed. Posterior nares large, oval.

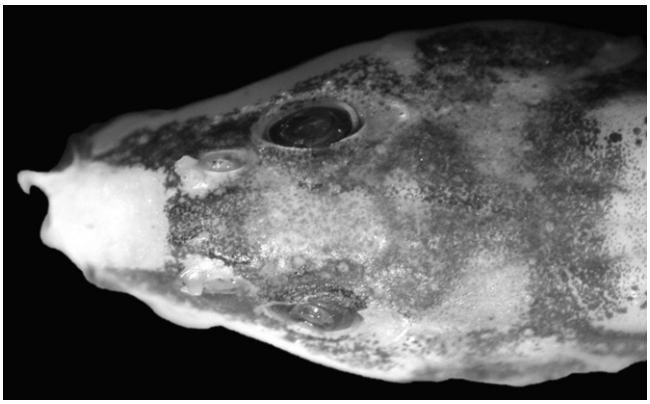

**FIGURE 2.** Dorsal view of head of holotype of *Schistura albirostris*, showing distinctive unpigmented area anterior to nares.

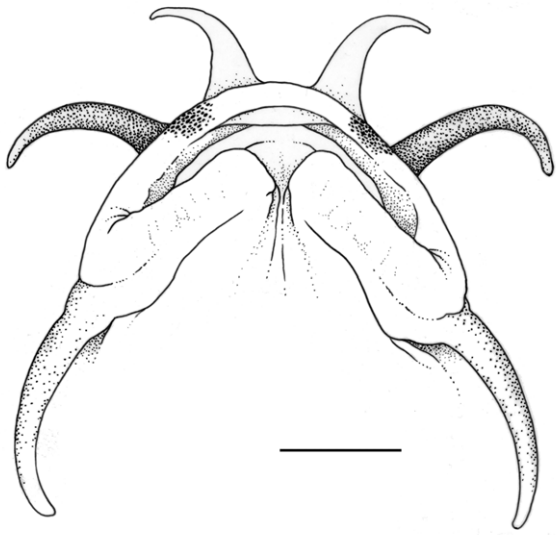

**FIGURE 3.** Ventral view of mouth of holotype of *Schistura albirostris*. Scale bar = 1 mm.

**TABLE 1.** Proportional measurements of type specimens of *Schistura albirostris*.

| | Holotype | Paratypes ($n$ = 12) |
|---|---|---|
| Standard length (mm) | 41.9 | 26.4–41.9 (32.0 ± 5.8) |
| **As % standard length** | | |
| Total length | 117.8 | 116.4–121.3 (119.3 ± 1.7) |
| Dorsal head length | 20.0 | 18.6–21.6 (20.3 ± 1.0) |
| Lateral head length | 21.6 | 21.6–24.2 (23.0 ± 1.1) |
| Predorsal length | 55.6 | 52.5–56.1 (54.4 ± 1.0) |
| Prepelvic length | 54.0 | 50.6–54.0 (52.4 ± 1.1) |
| Preanal length | 76.8 | 72.5–77.9 (75.5 ± 1.4) |
| Head depth at eye | 8.2 | 8.2–9.5 (8.9 ± 0.4) |
| Head depth at nape | 9.9 | 8.9–11.2 (10.4 ± 0.8) |
| Body depth | 13.0 | 10.9–15.7 (13.3 ± 1.4) |
| Caudal-peduncle depth | 7.1 | 7.0–10.2 (9.0 ± 1.0) |
| Caudal-peduncle length | 17.2 | 15.9–17.9 (16.8 ± 0.7) |
| Snout length | 9.2 | 8.2–9.6 (9.1 ± 0.4) |
| Head width at nares | 7.3 | 6.5–8.5 (7.3 ± 0.5) |
| Head width, maximum | 10.8 | 10.8–13.7 (12.4 ± 0.9) |
| Body width at dorsal-fin origin | 10.4 | 8.2–10.9 (10.0 ± 0.8) |
| Body width at anal-fin origin | 7.6 | 6.1–7.6 (6.8 ± 0.5) |
| Eye diameter | 3.5 | 3.5–4.1 (3.9 ± 0.1) |
| Infraorbital width | 4.3 | 3.8–5.7 (5.1 ± 0.3) |
| Dorsal-fin length | 14.2 | 13.5–17.1 (15.2 ± 1.1) |
| Upper caudal-lobe length | 17.0 | 17.0–21.2 (19.1 ± 1.4) |
| Lower caudal-lobe length | 17.9 | 17.7–22.0 (20.2 ± 1.6) |
| Median caudal-ray length | 12.9 | 12.9–18.9 (16.1 ± 1.9) |
| Anal-fin length | 12.7 | 12.7–16.3 (14.3 ± 1.1) |
| Pelvic-fin length | 13.9 | 12.9–17.0 (15.1 ± 1.1) |
| Pectoral-fin length | 15.8 | 15.8–18.8 (17.2 ± 0.5) |
| **As % dorsal head length** | | |
| Eye diameter | | 17.3–20.0 (18.7 ± 0.9) |
| Infraorbital width | | 20.4–26.7 (25.0 ± 2.1) |

Cephalic lateralis system with 6 supraorbital, 5+10 infraorbital, 9 preoperculomandibular, and 3 supratemporal pores. Lateral line incomplete with 27–51 pores; endpoint either just anterior to, below, or just posterior to dorsal-fin base. Scales small, highly embedded; breast and belly unscaled.

Distal margin of dorsal fin straight or slightly convex; caudal fin emarginate. Fin ray counts (counts from holotype indicated by asterisk): Dorsal-fin rays 4/7*, anal-fin rays 3,5*, pectoral-fin rays 1/7–8*, pelvic-fin rays 1,5*, principal caudal-fin rays 1/8*, 8/1; dorsal-precaudal rays 8–9, ventral-precaudal rays 4–5. Second branched pectoral and pelvic-fin rays longer than remaining rays. Pelvic-fin origin beneath dorsal-fin origin. Adpressed pelvic fins reaching anus, not reaching anal-fin origin. Anal-fin tip reaching posteriorly to midpoint of caudal peduncle, anus immediately in front of anal-fin origin.

Pelvic axillary flap well developed. Gut with a single bend, no accessory bend posteriorly in 12 specimens (Fig. 4). No tubercles observed in any of the available specimens, despite the April 2006 material all having enlarged gonads and appearing to be in breeding condition. No suborbital flap.

Pharyngeal teeth 9–9, vertebrae 38 in 2 cleared and stained specimens.

**Pigmentation.** Five to seven prominent dorsal saddles confluent with five to eight ventrally expanded lateral bars, superimposed over a faint dusky stripe along lateral midline. In life, saddles and bars dark brown or black (Fig. 1), saddle immediately anterior to dorsal-fin origin darker than others in some specimens. Basicaudal bar broken, disassociated from dark saddles; vertical bar below lateral midline, a dark blotch at base of dorsalmost 4–5 caudal-fin rays.

Preorbital bar distinct, extending from anterior margin of orbit onto upper lip and posterior rostral barbel. Parts of snout, ethmoid region, and anterior rostral barbels white to cream, posterior rostral barbel dusky; cheek pearlescent, without markings. Body bicolored, silvery, iridescent below lateral line, olivaceous ground color above.

Dorsal fin yellow-orange, a single weak median band with melanophores restricted to rays. A black basal blotch at dorsal-fin origin, in some specimens having the appearance of the dorsal saddles extending onto basal part of fin. Caudal fin slightly yellowish-orange in life, its lowermost rays unpigmented; a weak single median band with melanophores restricted to rays. Anal fin cream to white, with no markings. Pelvic fins cream to pale yellow, with no markings. Pectoral fins yellowish-orange along leading edge, fading to cream on most of fin. No paired iridescent streaks along base of dorsal fin in life, as observed in syntopic populations of *Schistura vinciguerrae* (Hora) and *S. longa* (Zhu) from the adjacent Salween drainage.

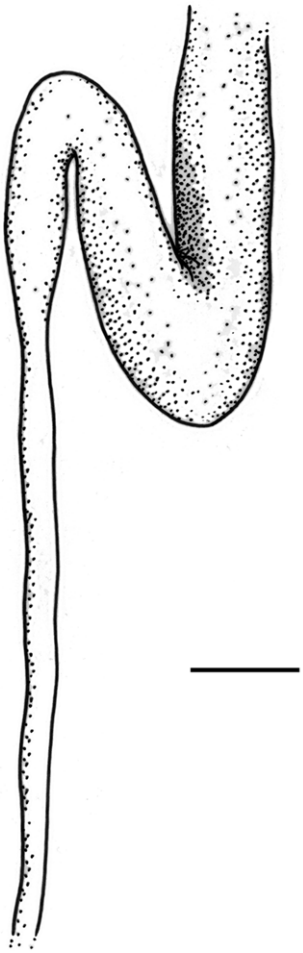

**FIGURE 4.** Ventral view of gastrointestinal tract of holotype of *Schistura albirostris*. Scale bar = 1 mm.

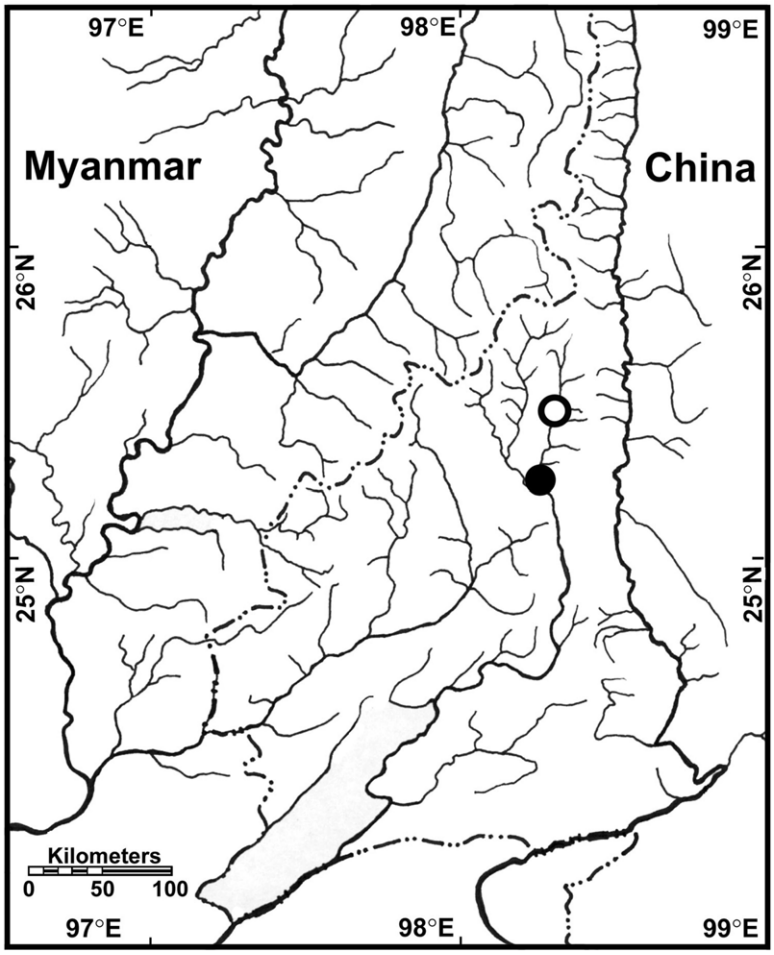


**FIGURE 5.** Distribution of *Schistura albirostris*. Open symbol indicates type locality. Dotted line indicates boundary between China and Myanmar.

**Distribution and habitat.** Presently known from only two localities in the Longchuanjiang (Fig. 5). At the type locality, specimens were collected in a reach of alternating riffles and flowing pools, river width was about 20m, depth to 1m, water clear, substrates generally unembedded and consisting of mixed cobble and gravel. Associated species collected included *Garra tengchongensis* Zhang & Chen, *Pseudorasbora parva* (Temminck and

Schlegel), *Schistura polytaenia* (Zhu), *Schistura vinciguerrae* (Hora), *Misgurnus anguillicaudatus* (Cantor), *Oreoglanis insignis* Ng and Rainboth, and *Pareuchiloglanis macropterus* Ng.

**Etymology.** The specific epithet is derived from Latin *albi* (= white colored) and *rostrata* (= nose or beak), in reference to the unpigmented area on the snout, and is treated as an adjective in the feminine nominative singular.

**Remarks.** *Schistura albirostris* can be distinguished from all nemacheilines known to occur in the upper Irrawaddy River on the basis of the combination of a rectangular unpigmented area on the snout and ethmoid region, and few, bold, dark-brown saddles.

*Schistura malaisei* Kottelat (1990) also has a short and incomplete lateral line, bold saddles and a basal blotch on dorsal-fin base, and is known from adjacent portions of the Irrawaddy drainage in both China and Myanmar. The new species can be differentiated from *S. malaisei*, however, on the basis of a more slender body (body depth 10.9–15.7% of SL vs. 16.1–18.9%); a more slender caudal peduncle (7–10.2% of SL vs. 11.4–13.6%); a more slender head (head depth at eye 8.2–9.5% of SL vs. 11.1–12.1% of SL, at nape 8.9–11.2% of SL vs. 12.3–13.8); a sharper snout (vs. blunt); maxillary barbels shorter, barely reaching the plane of the anterior edge of the orbit (vs. reaching the plane of the posterior edge of the orbit), a disassociated basicaudal bar (vs. a complete bar); anus about halfway between anal-fin origin and tip of adpressed pelvic fin (vs. pelvic fins reaching anus, gap between anus and anal-fin origin approximately equal to anal-fin base length); upper lip much narrower (vs. broad), and mouth more strongly arched (vs. broader).

*Schistura albirostris* is also similar to *Schistura kloetzliae* Kottelat (2000) from the Mekong drainage of Laos and China (which reaches at least 54 mm SL; KIZ 2002008335) in having bold lateral blotches connected to dorsal saddles and superimposed on a midlateral stripe. The new species differs from *S. kloetzliae* in having the pale area on the snout ending abruptly anterior to the nares (vs. extending posteriorly past the nares and often partially encircling the anterodorsal portion of the orbit; the head is not as deep, both at the plane of the eye (8.2–9.5% of SL vs. 9.7–10.7%) and at the nape (8.9–11.2% of SL vs. 11/4–12.7); posterior rostral barbel darkly pigmented (vs. pale); upper lip with blotch of pigment (vs. completely pale); a single row of brown spots forming a median band on caudal-fin rays (vs. two rows); mouth more strongly arched, and in having a shorter lateral line (vs. usually extending past the vertical through the depressed tip of the dorsal fin).

*Schistura albirostris* is perhaps most similar to *Schistura pridii* Vidthayanon (2003) from the Chao Phraya drainage of Thailand, but differs in details of the color pattern (in *S. albirostris*, bar on head much narrower and more oblique; more numerous, more oblique and narrower saddles); presence of a complete basicaudal band (vs. absent); silvery (vs. yellow) ventrolateral surface in life; and a greater number of lateral-line pores (27–51, vs. 17–18).

While individual elements of color pattern are shared with several other congeners, including *S. amplizona* Kottelat (2000), *Schistura bannaensis* Chen *et al.* (2005), *S daubentoni* Kottelat (2000), *S. dorsizona* Kottelat (1998), *S. isostigma* Kottelat (1998), and *S. geisleri* Kottelat (1990), the new species is readily discernable from all of these, and all other nemacheilines known from the Irrawaddy and adjacent regions in the combination of characters discussed above.

The bold saddles, especially prominent in taxa that occupy gravel or cobble habitats, likely serve as disruptive camouflage as hypothesized by Armbruster and Page (1996).

The future of this loach (and of the other native fishes of the Irrawaddy in China) is uncertain; hydropower reservoirs are currently under construction at two localities on the Longchuanjiang downstream of the type locality (one near Longling and the other near Shaungpo), and more are planned. While several nature reserves have been established within the drainage, they principally protect higher elevation stream reaches, above the zone typically used for corn/rice agriculture (>2000–2400m), and above the known elevational range occupied by this loach.

**Comparative material.** *Schistura kloetzliae*. KIZ 2002008329–30 (2, 40–49 mm SL) China: Yunnan: Xiaohei River near Jinggu Zhengxing, 18 October 2002, Coll: G-H Cui. KIZ 2002008397–80 (3, 36–47 mm SL), same locality and date. KIZ 2002008496–8503 (8, 31–50 mm SL), Mengga River near Jinggu city, 15 October 2002. Coll: G-H Cui.

*Schistura malaisei*. USNM 378447 (1, 24.1 mm SL), Myanmar: Dot Tha Ra Ti River NNE of Naphai, 22 March 2003, Coll. R. Britz. KIZ uncatalogued, China: Yunnan, Irrawaddy drainage, exact locality unknown (6, 26–41 mm SL).

*Schistura polytaenia*. CAS 226044, DAN06–57, China: Yunnan, Ming Guang River at first bridge on road N of Ming Guang, 14 April 2006 (5 of 10, 50–57 mm SL), Coll: DA Neely, X-Y Chen, X-F Pan, R Min, Y-F Huang. DAN06–59, China: Yunnan, Longchuanjiang about 3km upstream of Qiao Tou, near village of Shuang Zhu Yuang,

15 April 2006 (10, 44–66 mm SL), Coll: DA Neely, X-Y Chen, X-F Pan, R Min, Y-F Huang. *Schistura vinciguerrae*. CAS 226051, DAN06–63, China: Yunnan, Longchuanjiang at Man Mi village, Hong Mu town, Qushi township, 17 April 2006 (15, 44–77 mm SL), Coll: DA Neely, X-Y Chen, X-F Pan, R Min, Y-F Huang. DAN06–61, China: Yunnan, Ming Guang River at power station in Qushi, ca. 1 km upstream from confluence with Longchuanjiang, 16 April 2006 (9, 47–67 mm SL), Coll: DA Neely, X-Y Chen, X-F Pan, R Min, Y-F Huang. *Schistura yinglangjensis*. DAN06–78, China: Yunnan, Longchuanjiang in vicinity of Lianmengjie, Wuhe township, 23 April 2006 (1, 72 mm SL), Coll: DA Neely, X-Y Chen, X-F Pan, R Min, Y-F Huang.

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