



# Article

urn:lsid:zoobank.org:pub:5B387626-0565-4363-8CC0-7EC92D72E95C

## ***Yaoshania* and *Erromyzon kalotaenia*, a new genus and a new species of balitorid loaches from Guangxi, China (Teleostei: Cypriniformes)**

JIAN YANG<sup>1,2</sup>, MAURICE KOTTELAT<sup>3</sup>, JUN-XING YANG<sup>1,4</sup> & XIAO-YONG CHEN<sup>1,4</sup>

<sup>1</sup>State Key Laboratory of Genetic Resources and Evolution, Kunming Institute of Zoology, The Chinese Academy of Sciences, Kunming, Yunnan, 650223, P.R. China

<sup>2</sup>School of Chemistry and Life Sciences, Guangxi Teachers Education University, Nanning, 530001, P.R. China.  
E-mail: yangjian81@gmail.com

<sup>3</sup>Route de la Baroche 12, Case postale 57, 2952 Cornol, Switzerland (permanent address); and Raffles Museum of Biodiversity Research, Department of Biological Sciences, National University of Singapore, Lower Kent Ridge Road, Singapore 119260, Republic of Singapore. E-mail: mkottelat@dplanet.ch

<sup>4</sup>Corresponding author. E-mail: chenxy@mail.kiz.ac.cn; yangjx@mail.kiz.ac.cn

### **Abstract**

*Yaoshania*, new genus, is described with *Protomyzon pachytilus* as type species. *Yaoshania* is distinguished from other genera of Balitoridae by its larger gill opening, a lip lamina at angle of mouth, and the rostral fold with four notches to accommodate rostral barbels. A lectotype is designated for *Y. pachytilus*. *Erromyzon kalotaenia*, new species, is described from Guangxi, China. It is distinguished from other species of *Erromyzon* by the very reduced median lobe of the rostral fold; the lower lip distinctly covered with melanophores; and the color pattern on the flank. A key to the species of *Erromyzon* is provided.

**Key words:** *Yaoshania*, new genus, *Erromyzon*, new species, China

### **Introduction**

Hora (1932) described the genus *Protomyzon* from Borneo, with *P. whiteheadi* (Vaillant 1893) as type species. Later, three more species were described, also from Borneo: *P. borneensis* Hora & Jayaram 1952, *P. griswoldi* (Hora & Jayaram 1952) and *P. aphelocheilus* Inger & Chin 1962. Two further species of *Protomyzon* were described from China: *P. sinensis* Chen 1980b and *P. pachytilus* Chen 1980b. Kottelat (2004) re-examined the genus *Protomyzon* while describing *Katibasia*, and commented that its distribution is restricted to Borneo and that the Chinese species belong to a distinct genus that he named *Erromyzon*. He included two species in *Erromyzon*: *E. sinensis* from China and *E. compactus*, a species that he described from northeastern Vietnam. Kottelat (2004) had no access to material of *Protomyzon pachytilus*, which is only found in streams of the Dayaoshan mountain in Guangxi (China). He commented that *P. pachytilus* is unlikely to be an *Erromyzon*. Neely *et al.* (2007) described another new species of *Erromyzon*, *E. yangi*, also from Guangxi. At present, three species are recognized in the genus *Erromyzon*, all from northeastern Vietnam and southern China. In this study, we show that *P. pachytilus* represents a distinct genus. We also describe a new species of *Erromyzon* from Guangxi.

### **Materials and methods**

Methods for most counts and measurements follow Chu & Chen (1989). Measurements are projections on the horizontal axis, except for gill opening length, which is measured point-to-point between the dorsal and ventral extremities. Measurements were taken with digital calipers and recorded to the nearest 0.1 mm. The last two branched rays are counted as one when borne by the same pterygiophore. Specimens examined are deposited in the collection of Kunming Institute of Zoology (KIZ), Raffles Museum of Biodiversity Research, Singapore (ZRC), and

the Freshwater Fish Museum of Institute of Hydrobiology (IHB), Chinese Academy of Sciences. Data on *Erromyzon compactus* are from Kottelat (2004), morphometric data on *E. yangi* and *Y. pachychilus* are from Neely *et al.* (2007).



**FIGURE 1.** Dorsal, lateral and ventral views of *Yaoshania pachychilus*, KIZ 200241775, 46.9 mm SL, Dayaoshan Mountain, Jinxiu County, Guangxi, China.

### ***Yaoshania*, new genus**

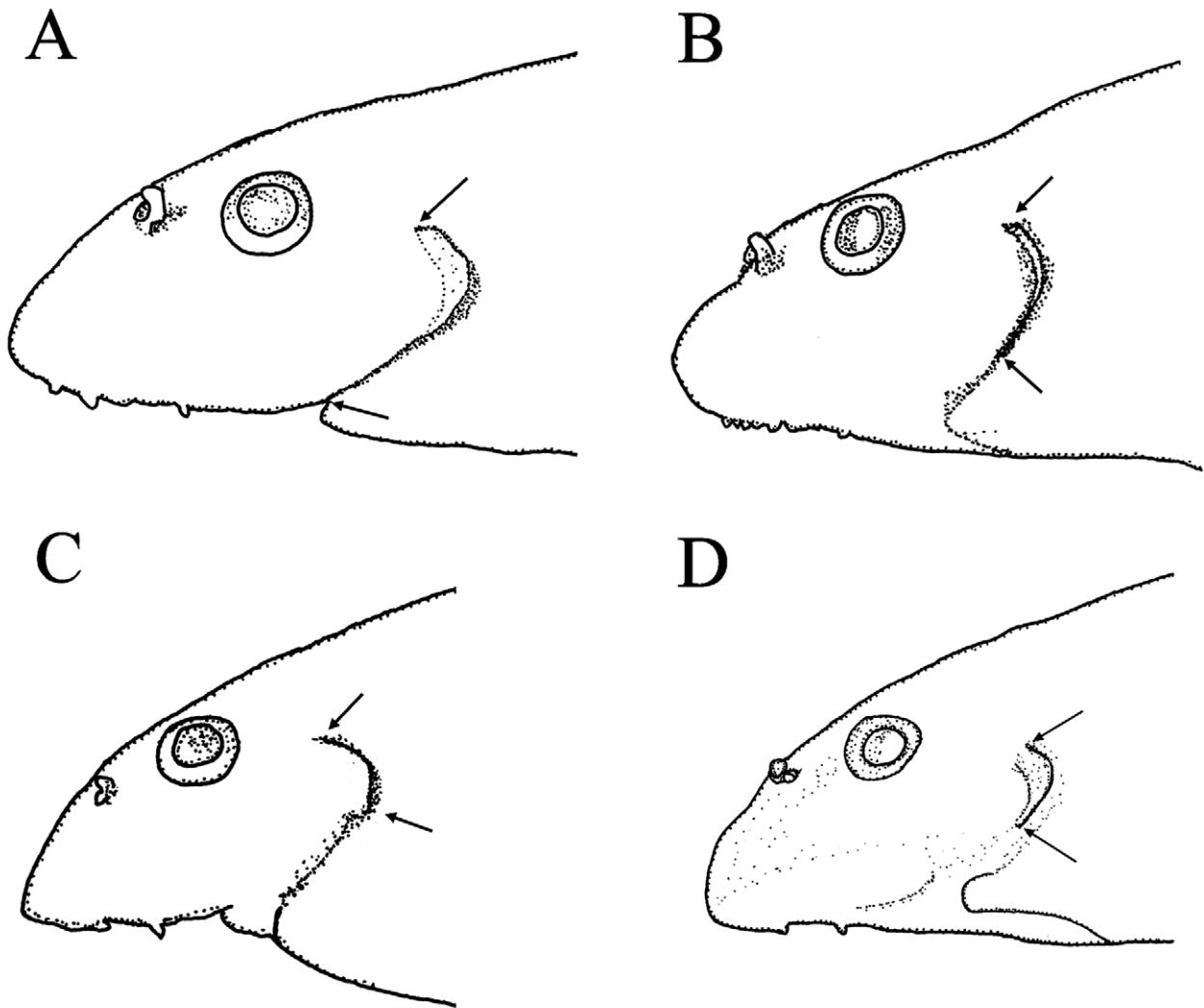
**Type species.** *Protomyzon pachychilus* Chen 1980b (Figs. 1, 2A, 3A).

**Etymology.** The generic name is derived from the Dayaoshan, the mountain from where the type species was recorded. Gender feminine.

**Diagnosis.** *Yaoshania* is distinguished from all other genera of Balitoridae by: a unique enlarged lip lamina at angle of mouth (Fig. 3A), connecting the upper lip and maxillary. Other characters useful to diagnose the genus, but not unique to it are: gill opening large, with the ventral extremity reaching lower extremity of pectoral-fin base (Fig. 2A); upper lip and rostral fold separated by a groove, rostral fold with four notches to accommodate rostral barbels; two pairs of rostral barbels and one pair of maxillary barbels; a small fleshy lobe present posterior to each maxillary barbel; pectoral fin with one simple and 17–18 branched rays; pelvic fin with one simple and 8–9 branched rays; side of body lacking vertical blotches in adult; lateral line with 71–75 scales.

We retain the wording 'lip lamina' (as used by Chen 1980a) for the flange of skin originating under the lateral part of the upper lip and continuous with the maxillary barbel. This flange appears as if pinched between the rostral

fold and the upper lip. We have not observed significant ontogenetic differences in the development of the lamina in our material.



**FIGURE 2.** Lateral view of head in: (A) *Yaoshania pachytilus*, KIZ 200241775, 46.9 mm SL, (B) *Erromyzon kalotaenia*, KIZ 200304310, holotype, 41.3 mm SL, (C) *E. sinensis* KIZ 2005009985, 46.2 mm SL, and (D) *E. yangi*, KIZ 200304423, 42.8 mm SL. Arrows indicate extremities of gill opening.

***Yaoshania pachytilus* (Chen 1980b)**

*Protomyzon pachytilus* (Chen 1980b): 106, type locality: Dayaoshan Mountain, Jinxiu County, Xi Jiang (a tributary of the Pearl River); Yue 1981: 169; Chen & Zheng 1989: 249; Chen & Tang 2000: 477; Kottelat 2004: 301; Neely *et al.* 2007: 97; Kong *et al.* 2008: 243.

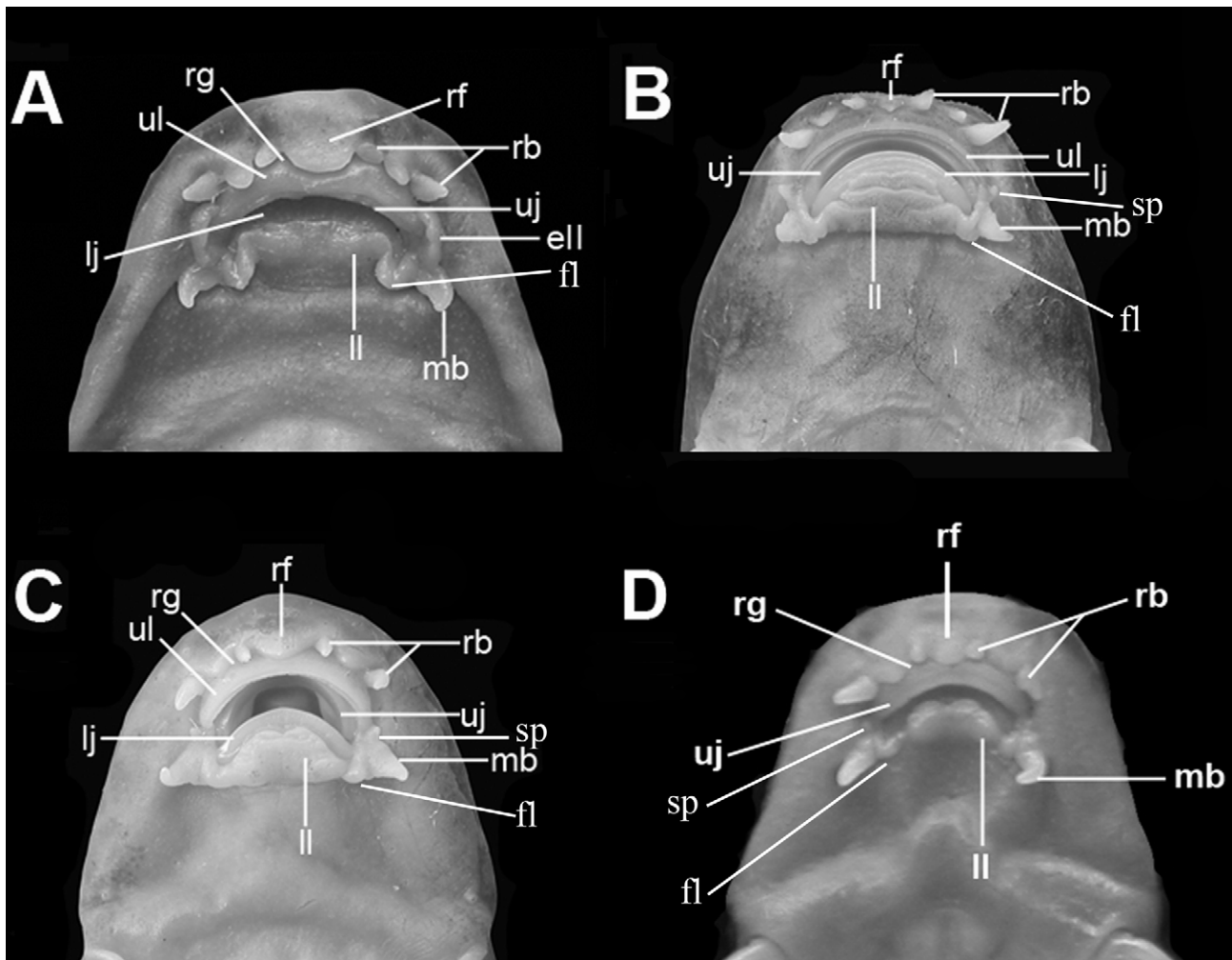
**Material examined.** IHB 8, lectotype, 57.7 mm SL, IHB 7, 12–14, 4 paralectotypes 27.6–56.0 mm SL, Dayaoshan Mountain, Jinxiu County, Guangxi, China.—KIZ 200241648–200241649, 200243055, 200243060–200243061, 200243063–200243064, 200243068, 200243080–200243081, 200241655, 11, 34.4–51.2 mm SL, Meicun village (Meicun river) (24°08'23.0"N, 110°06'49.0"E), Jinxiu County, Guangxi, China; Kong De Ping, 11 April 2002.—KIZ 2008007849, 2008007851, 2008007856, 2008007857, 4, 19.0–24.4 mm SL, Jinxiu County, Guangxi, China; Lan Jia Hu, 2008.—KIZ 2002005610, 2002005621, 2002005648, Shibajia, Jinxiu County, Guangxi, China; Kong De Ping, 2002.—ZRC 53443, 4, 15.0–23.0 mm SL; aquarium import, from China; don. P. Yap, 14 December 2011.

**Diagnosis.** See generic diagnosis.

**Description.** Morphometric characters of *Y. pachytilus* are given in Table 1. See Figure 1 for general appearance and Figure 3A for ventral view of head.

Body moderately elongate, anterior part cylindrical, posterior part compressed. Head length greater than head width. Snout blunt. Anterior and posterior nostrils close together, anterior nostril with a short tubular flap. Eye small, 10.4–16.2% of head length, eye diameter shorter than gill opening length. Interorbital width shorter than snout length, 39.5–53.8% of head length. Gill opening large, its ventral extremity at lower extremity of pectoral-fin base. Mouth inferior, width 32.9–45.2% of head width. Rostral fold with four notches to accommodate rostral barbels; notches create three lobes of rostral fold; middle lobe largest, crescentic. A maxillary barbel at corner of mouth, longer than rostral barbels. A groove present between rostral fold and upper lip. Lip lamina at angle of mouth. A small fleshy lobe present posterior to each maxillary barbel on lower lip. Lips smooth, lower lip fleshy and laterally enlarged. Lower jaw arched, with radial grooves on surface.

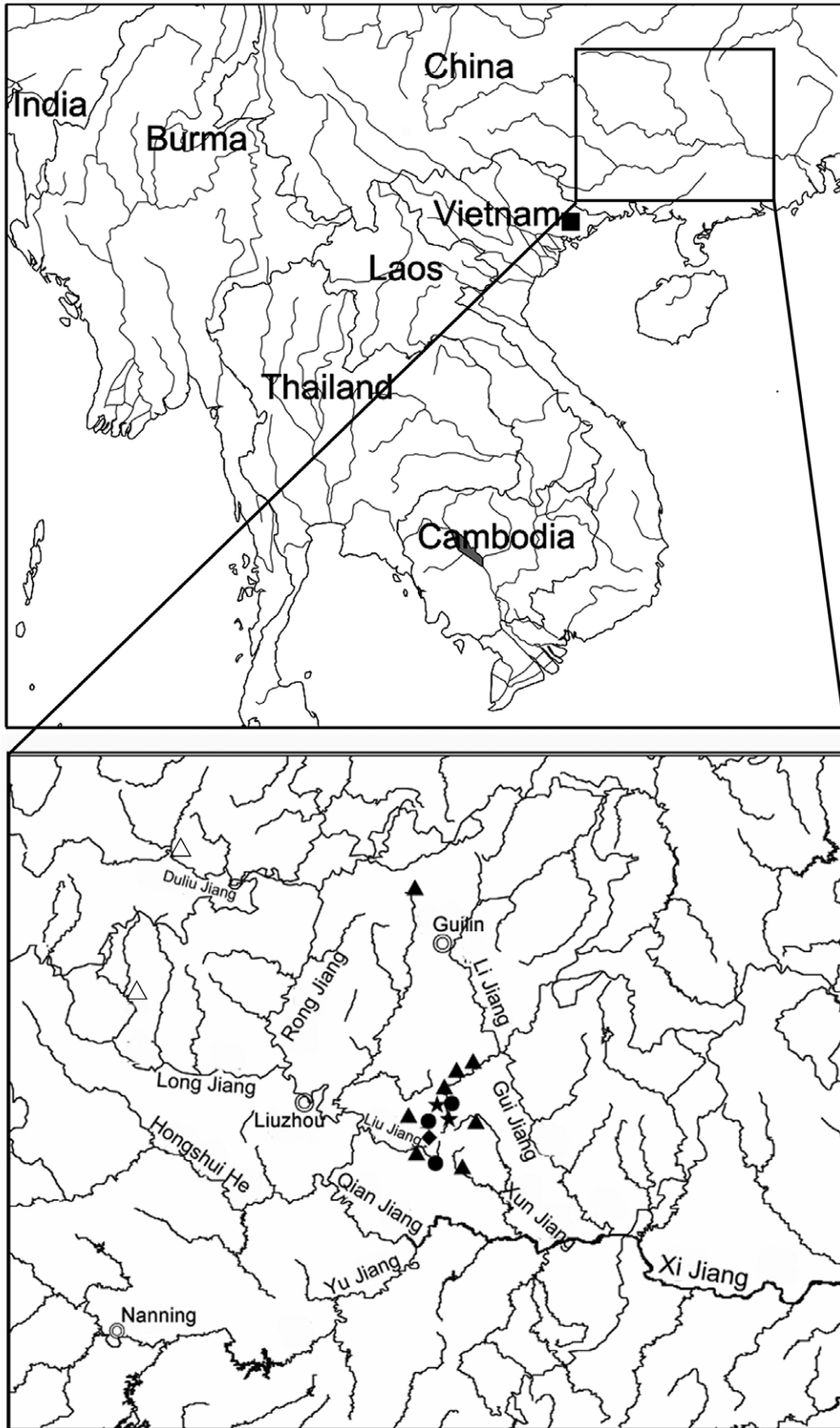
Dorsal fin inserted posterior to midpoint of body, with 3 simple and 7 branched rays, longest dorsal-fin ray shorter than head length; pectoral fin with 1 simple and 16–17 branched rays; pectoral-fin length greater than head length, last 4 or 5 branched pectoral rays shorter, close to flank; tip of pectoral fin reaching two-thirds of distance between pectoral fin and pelvic-fin origins; pelvic-fin origin posterior or opposite to vertical through dorsal-fin origin, with 1 simple and 7–8 branched rays, tip of pelvic fin reaching anus; anal fin with 3 simple and 5 branched rays, reaching caudal-fin base. Caudal fin shallowly emarginate, lower lobe slightly longer than upper one. Lateral line complete, with 71–75 scales. No tubercles observed on side of body.



**FIGURE 3.** Ventral view of head in: (A) *Yaoshania pachytilus*, KIZ 200241655, 51.2 mm SL, (B) *Erromyzon kalotaenia*, KIZ 200304314, 47.8 mm SL, (C) *E. sinensis* KIZ 200304306, 39.8 mm SL, and (D) *E. yangi*, KIZ 200304423, 42.8 SL. ell, enlarged lip lamina; fl, flesh lobe; lj, lower jaw; ll, lower lip; mb, maxillary barbel; rb, rostral barbels; rf, rostral fold; rg, rostral groove; sp, small papilla; uj, upper jaw; ul, upper lip.

**TABLE 1.** Morphometric characters of *Yaoshania pachychilus*, *Erromyzon kalotaenia*, *E. sinensis* and *E. yangi* (mean±SD). Data for *E. yangi* and *Y. pachychilus* from Neely *et al.* (2007).

	<i>Y. pachychilus</i> (n = 10)	<i>E. kalotaenia</i> (n = 9)	<i>E. sinensis</i> (n = 22)	<i>E. yangi</i> (n = 3)
Standard length (mm)	34.4–51.2 (44.6±5.3)	32.4–47.9 (43.4±4.8)	33.3–52.5 (44.1±5.6)	36.7–42.8 (38.9±3.4)
<b>In percent standard length</b>				
Body depth	15.4–20.9 (17.6±1.8)	15.7–22.3 (18.6±2.0)	15.2–22.1 (19.1±1.6)	17.7–19.2 (18.3±0.8)
Body width at pectoral-fin origin	18.8–22.2 (20.8±1.1)	15.9–18.5 (17.0±1.0)	14.7–19.6 (17.4±1.5)	16.0–17.6 (16.9±0.8)
Lateral-head length	23.8–27.2 (25.3±1.1)	20.4–23.1 (21.6±0.9)	20.8–24.7 (22.2±1.0)	21.0–23.0 (21.7±1.1)
Caudal-peduncle length	8.2–12.4 (10.8±1.3)	8.9–12.4 (10.7±1.0)	8.0–13.3 (10.5±1.6)	9.7–11.9 (11.1±1.2)
Caudal-peduncle depth	10.5–12.1 (11.0±0.6)	8.9–10.7 (9.7±0.6)	8.1–11.4 (9.2±0.8)	9.2–9.7 (9.4±0.3)
Predorsal length	53.3–57.1 (54.8±1.5)	51.1–55.1 (52.8±1.2)	50.4–56.3 (52.9±1.6)	50.3–54.3 (52.7±2.1)
Snout length	13.5–15.6 (14.5±0.7)	9.1–10.7 (10.3±0.6)	10.1–14.0 (11.6±1.1)	11.1–12.4 (12.1±0.9)
<b>In percent lateral head length</b>				
Snout length	49.5–65.4 (57.4±5.0)	39.4–52.4 (47.6±3.6)	44.3–57.9 (52.1±3.3)	52.6–58.9 (55.8±3.1)
Eye diameter	10.4–16.2 (13.3±5.0)	19.2–25.1 (21.6±1.9)	16.3–26.9 (20.9±2.7)	17.3–21.4 (20.0±2.3)
Interorbital width	39.5–53.8 (46.5±4.6)	57.4–70.9 (62.5±4.3)	41.8–73.7 (56.6±8.3)	45.8–53.4 (49.3±3.8)
Length of base of dorsal fin	43.0–55.0 (48.9±3.7)	49.3–67.3 (60.1±5.8)	49.8–66.1 (57.4±4.4)	54.8–61.9 (57.8±3.7)
Length of longest dorsal-fin ray	73.3–94.4 (83.3±8.4)	80.2–94.3 (87.3±4.8)	72.0–98.8 (85.7±8.0)	90.0–109.8 (100.0±9.9)
<b>In percent of head width</b>				
Mouth width	32.9–45.2 (38.3±3.7)	32.9–40.5 (36.1±2.2)	30.3–47.9 (36.0±3.9)	38.8–43.6 (40.6±2.6)
Width at upper extremity of gill opening	71.8–86.1 (80.3±4.5)	83.1–92.8 (87.9±3.3)	80.3–95.0 (89.0±4.4)	93.3–95.2 (94.2±1.0)
<b>In percent caudal-peduncle length</b>				
Caudal-peduncle depth	92.4–129.0 (103.5±12.7)	79.7–108.7 (91.4±9.6)	90.6–138.8 (113.6±15.1)	77.8–95.9 (85.0±9.6)
<b>In percent body depth</b>				
Gill opening length	47.8–65.3 (54.7±5.2)	25.3–33.8 (29.1±3.2)	14.6–29.6 (24.3±3.9)	21.7–28.0 (25.6±3.4)
<b>In percent eye diameter</b>				
Gill opening length	224.7–338.6 (288.6±35.3)	97.3–142.0 (116.3±15.2)	73.5–149.4 (102.0±22.2)	105.5–112.1 (107.8±3.7)



**FIGURE 4.** Map showing distributions of *Yaoshania* and *Erromyzon* species. ● *Yaoshania pachytilus*; ★ *Erromyzon kalotaenia*; ▲△ *E. sinensis*; ◆ *E. yangi*; ■ *E. compactus*. filled symbols based on examined specimens and hollow symbols based on literature data.



**Coloration.** After fixing in 10% formalin and storage in 75% ethanol, in juveniles (less than 27.6 mm SL), body pale yellowish with bold black marks: a black blotch at tip of snout and three broad black bars circling the body, one located between eye and midlength of pectoral fin, one between dorsal-fin origin and tip of dorsal fin, and one on posterior extremity of caudal peduncle, extending onto caudal fin in three triangular processes, one in the middle of the fin and one each along upper and lower edges. A black blotch at base of dorsal and pelvic fins. Anal-fin rays black. Coloration changing with increasing size, with bars becoming connected along dorsal midline and along middle of flank while at same time disappearing in intermediate areas. In adults, after fixation in 10% formalin and preservation in 75% alcohol, body background light yellow, markings dark brown to black. Head mottled leaving two yellow longitudinal stripes, one running from tip of snout, along nostrils, and ending at upper edge of eye; the other from side of snout to lower edge of eye. A bold black stripe (height less than 1/3 body depth) along lateral line; a thin black stripe from above dorsal side of pectoral-fin base, along pelvic-fin base, along anal-fin base, and ending at ventral extremity of caudal-fin base. Dorsum dark brown, with short band connecting to midlateral stripe, leaving a row of elongated yellow marks between them (between upper extremity of gill opening and upper part of caudal-fin base: Fig. 1). A light yellow mark across back at middle of base of dorsal fin, connected to series of yellow marks above midlateral stripe. One row of dark-brown spots on dorsal-fin rays, two rows on caudal-fin rays.

**Distribution.** *Yaoshania pachyichilus* is presently known from three headwater streams (Meicun, Changtan and Dishui streams) on Dayaoshan Mountain, Guangxi, China (Fig. 4).

**Remarks.** *Yaoshania pachyichilus* was first described by Chen (1980a) based on seven syntypes, of which we were able to examine five: IHB 8, 57.7 mm SL is here designated as lectotype. IHB 7, 27.6 mm SL, is juvenile, IHB 8, IHB 12–14, 39.3–57.7 mm SL, are adults. IHB 8, the specimen in best condition, is apparently the one illustrated by Chen (1980a).

Fishes exported in 2011 by the aquarium fish trade from China as "panda loach" are apparently juveniles of *Yaoshania pachyichilus*. Four specimens obtained in Singapore (ZRC 53443, 4 ex., 15.0–23.0 mm SL) were examined and the lips show the lip lamina already completely formed (Fig. 5).



**FIGURE 5.** *Yaoshania pachyichilus* (juvenile), aquarium fish trade, exported from China as "panda loach", about 20 mm SL (out of ZRC 53443, 4, 15.0–23.0 mm SL) (photograph by Tan Heok Hui).

***Erromyzon kalotaenia*, new species**

(Fig. 6)

**Holotype:** KIZ 200304310, 41.3 mm SL; Changle village (Liuding river), Jinxiu County, Guangxi, China; 24°22'54.3"N, 110°06'38.7"E; altitude 256 m; Kong De Ping & Cui Gui Hua; 13 April 2003.

**Paratypes.** KIZ 200304313, 1, 47.9 mm SL; KIZ 200304317, 1, 46.9; SL; KIZ 200304314, 1, 47.8 mm SL; same data as the holotype.—KIZ 200304049–52, 200304071, 5, 32.4–45.8 mm SL; Shibajia village (Dishui river), Jinxiu County, Guangxi, China; 24°10'21.9"N, 110°16'34.4"E; altitude 600 m; Kong De Ping and Cui Gui Hua; 14 April 2003.

**Nontypes:** KIZ 200242069, 1, 47.7 mm SL; KIZ 200242070, 1, 44.0 mm SL; Shibajia village (Dishui river), Jinxiu County, Guangxi, China, Kong De Ping and Cui Gui Hua; 20 April 2002.



**FIGURE 6.** Dorsal, lateral and ventral views of *Erromyzon kalotaenia*, KIZ 200304310, holotype, 41.3 mm SL; Changle village (Liuding River), Jinxiu County, Guangxi, China.

**Diagnosis.** *Erromyzon kalotaenia* is distinguished from the other species of the genus by the combination of the following characters: a small median lobe of the rostral fold (Fig. 3B); lower lip distinctly covered with melanophores; 9–12 squarish blotches on side of body, their height about one-third body depth; lateral line with



85–89 scales. *Erromyzon kalotaenia* differs from *E. sinensis* (Fig. 7) by having 9–12 irregular blotches on body (vs 17–21 very irregular bars or a mottled pattern). *Erromyzon kalotaenia* differs from *E. compactus* (Fig. 8) by the following characters: lower lip with two or three folds (vs folds absent); a midlateral row of squarish blotches on flank (vs bars continuous across dorsum); four rows of blackish spots on dorsal-fin rays, six rows on caudal-fin rays (vs two rows on both dorsal and caudal-fin rays). *Erromyzon kalotaenia* further differs from *E. yangi* (Fig. 9) in having fewer lateral-line scales (85–89 vs 96–99), and by color pattern (9–12 blotches on flank vs a black midlateral stripe dark brown dorsum and an incomplete lower black stripe).



**FIGURE 7.** Dorsal, lateral and ventral views of *Erromyzon sinensis*, KIZ 2005009985, 46.2 mm SL, Jinxiu County, Guangxi, China.

**Description.** Morphometric characters of *E. kalotaenia* are given in Table 1. Figure 1 shows the general appearance and Fig. 3B shows the ventral view of the head. Body moderately elongate, compressed, head length greater than head width and length of dorsal-fin base. Snout blunt, snout length almost half head length, 1.5–2.0 times eye diameter. Anterior and posterior nostrils close together, anterior nostril within a short tubular flap. Eye small, 19.2–25.1% of head length, eye diameter shorter than length of gill opening. Interorbital width less than snout length, 57.4–70.9% of head length. Gill opening small, not reaching base of pectoral fin. Mouth inferior, width 32.9–40.5% head width. Three pairs of barbels. Rostral fold with four broad notches to accommodate rostral barbels; notches creating three small lobes; median lobe smallest, equal in length to inner rostral barbels. Outer

rostral barbel longer than inner one, but shorter than eye diameter. A shallow groove between rostral fold and upper lip; upper lip continuous with lower lip. A small papilla present anteriorly at base of maxillary barbel. Maxillary barbel present at corner of mouth, longer than rostral barbels. A small fleshy lobe posterior to maxillary barbel present on lower lip. Lower lip thick, forming a pad with an uneven surface. In some specimens, surface of lower lip with two or three transverse folds (Fig. 3B). Lower lip without papilla. Postlabial groove continuous in some specimens. Lower jaw not covered by lower lip, without radial grooves or ridges on surface.



**FIGURE 8.** Dorsal, lateral and ventral views of *Erromyzon compactus*, ZRC 49636, holotype, 30.8 mm SL; Ba Che River, Quang Ninh Province, Vietnam.

Dorsal fin inserted behind midlength of body, with 3 simple and 8 branched rays, longest ray shorter than head length. Pectoral-fin origin between posterior edge of eye and lower extremity of gill opening. Pectoral fin longer than head, with 1 simple and 16–17 branched rays; last 4 or 5 branched rays shorter, close to flank. Pectoral fin reaching two-thirds of distance between pectoral fin and pelvic-fin origins. Pelvic-fin origin opposite to first branched ray of dorsal fin, with 1 simple and 7–8 branched rays. Anal fin with 2 simple and 5 branched rays; reaching caudal-fin base. Caudal fin shallowly emarginate, lower lobe slightly longer than upper one. Lateral line with 85–89 scales. Conspicuous tubercles on suborbital part of head and side of snout, some larger tubercles in a row below lateral line, between tip of pelvic fin to base of caudal fin; numerous small tubercles on posterior half of caudal peduncle anterior to dark spot on caudal-fin base.

**Coloration.** In fresh condition, 9–12 squarish brown blotches on flank, blotches 1/3 depth of body, as wide as interspace, interrupted on dorsum. A light brown stripe along lateral line connecting all squarish blotches. Lower lip distinctly covered with melanophores. Body and fins light reddish. After fixation in 10% formalin and preservation in 75% alcohol, body background straw yellow; light-brown stripe along lateral line faded, leaving 9–12 distinct squarish black blotches on flank, height about 1/3 body depth. Four rows of dark-brown spots on dorsal fin, six rows on caudal fin; four or five dark-brown spots present on anterior half of pectoral-fin rays. A dark spot equal to eye diameter on middle of base of caudal fin. In two small specimens (KIZ 200304071, 32.4 mm SL; KIZ 200242070, 44.0 mm SL), blotches on flanks more or less fused, forming a dark maroon lateral stripe (but individual blotches still distinguished as darker areas).



**FIGURE 9.** Dorsal, lateral and ventral views of *Erromyzon yangi*, KIZ 200304423, holotype, 42.8 mm SL, Meicun river, Jinxiu County, Guangxi, China.

**Distribution and habitat.** *Erromyzon kalotaenia* is presently known only from two headwater streams (Liuding and Dishui streams) of the Guijiang river drainage (a tributary of Pearl River), in Guangxi, China (Fig. 4). It is collected in shallow water at depths of 0.1–0.5 m amongst boulders and cobbles mixed with sand on the river bed (Fig. 10). The maximum depth of the river is about 1 m in June. Aquatic macrophytes are absent but aquatic bryophytes and algae are abundant on the stream substrate. Other fishes found in the same locality (Shibajia village, Dishui River) include the following species, Cyprinidae: *Opsariichthys bidens*, *Acrossocheilus parallens*; Balitoridae: *Pseudogastromyzon fangi*, *Vanmanenia pingchowensis*, *Yaoshania pachytilus*, *Schistura fasciolata*;



Sisoridae: *Glyptothorax fokiensis*, *Pterocryptis anomala*. In Changle village (Liuding River), species present with *E. kalotaenia* include, Cyprinidae: *Zacco platypus*, *Puntius semifasciolatus*, *Pseudorasbora parva*, *Carassius auratus*; Balitoridae: *Oreonectes platycephalus*, *Tracacatichthys pulcher*; Cobitidae: *Cobitis sinensis*; Bagridae: *Tachysurus adiposalis*.

**Etymology.** *Kalo* from the Greek *kalos*, meaning beautiful, and *taenia*, from Greek *tainia*, meaning stripes or bars; in reference to the blotches on the flank of this species. A noun in apposition.



**FIGURE 10.** Type locality of *Erromyzon kalotaenia*, Changle village (Liuding River), Jinxiu County, Guangxi, China. Photography by Kong De Ping.

## Discussion

*Yaoshania pachytilus* was first described as a species of *Protomyzon* by Chen (1980a). *Protomyzon* was previously known to include only species from Borneo. Kottelat (2004) discussed the differences between the Borneo and Chinese species of *Protomyzon* and created the genus *Erromyzon* for the mainland Asian species. He listed the following features distinguishing *Erromyzon* from *Protomyzon*: gill opening restricted to a small slit above pectoral-fin base, with no externally distinct opercle (*vs* opercle distinct, even when the gill opening does not reach the base of the pectoral fin); upper and lower lip continuous around corner of mouth (*vs* interrupted); and lower lip smooth (*vs* papillate). We have examined specimens of *E. sinensis*, *E. yangi* and *E. kalotaenia* and the results indicate that the three species share the diagnostic characters of *Erromyzon* listed by Kottelat (2004). After examination of the type specimens and freshly collected topotypes of *P. pachytilus*, it is clear that this species is distinguished from *Erromyzon* by the following characters: gill opening reaching the lower extremity of the base of the pectoral fin (*vs* restricted to a small slit above pectoral-fin base); and an enlarged lip lamina at the corner of the mouth, which connects the upper and the lower lips. We consider that these characters justify the recognition of a distinct genus.

*Yaoshania* is placed in Gastromyzontinae on the basis of a simple unbranched pectoral and pelvic ray (*vs* Balitorinae with two or more unbranched pectoral and pelvic rays) (Chen & Tang 2000). *Yaoshania* is

distinguished from the other genera of *Gastromyzontinae* by having separated pelvic fins not forming a sucker (*vs* pelvic fins fused in *Beaufortia*, *Gastromyzon*, *Neogastromyzon*); the absence of an axillary flap at the base of the pelvic fin; and the tip of the pectoral fin falling short of pelvic-fin origin (*vs* a distinct axillary flap present, and tip of pectoral fin reaching pelvic-fin origin in *Pseudogastromyzon*, *Paraprotomyzon* and *Beaufortia*); the gill opening reaching the base of the pectoral-fin origin (*vs* restricted above the base of pectoral fin in *Erromyzon*, *Sewellia*, *Pseudogastromyzon*, *Paraprotomyzon* and *Beaufortia*); a rostral groove present between upper lip and rostral fold (*vs* absent in *Plesiomyzon*, rostral groove absent in *Katibasia*); snout with only two pairs of rostral barbels (*vs* with two pairs of rostral barbels and 9 barbel-like projections along the edge of the rostral fold in *Formosania*); lower lip thicker and without any papillae (*vs* lower lip carrying 4 papillae in *Vanmanenia* and *Formosania*).

*Yaoshania* is morphologically similar to *Liniparhomaloptera* and *Katibasia* in sharing the following characters: gill opening large, reaching lower extremity of base of pectoral fin; tip of pectoral fin not reaching pelvic-fin origin; pelvic fins separate. *Yaoshania* is further distinguished from *Liniparhomaloptera* by having the lower extremity of the gill opening not reaching the ventral side of the head (*vs* reaching the ventral side of the head) and having a wider mouth, whose width is greater than one-third of head width (*vs* less than a quarter of head width). *Yaoshania* differs from *Katibasia* in possessing a groove between the upper lip and the rostral fold (*vs* upper lip anteriorly fused with rostral fold); no papillae on lower lip (*vs* several papillae in median area of lower lip); and pectoral fin with 17–18 (*vs* 20–21) branched rays.

*Yaoshania pachychilus* was listed as rare in China's Red List in 1998 (Yue & Chen 1998) and as vulnerable in 2004 (Wang & Xie 2004). As presently known, *Y. pachychilus* is syntopic with *Vanmanenia pingchowensis* in seasonal headwater streams with water depth less than 50 cm. *Erromyzon sinensis* is collected from the lower reaches of the same stream.

### Key to species of *Erromyzon*

- 1a. No blotches or bars on flank ..... *E. yangi*
- 1b. 9–20 blotches or bars on flank ..... 2
- 2a. 17–20 irregular bars on flank ..... *E. sinensis*
- 2b. 9–12 blotches or bars on flank ..... 3
- 3a. Squarish blotches on flank, only 1/3 of depth body, as wide as interspaces, not reaching dorsal midline. .... *E. kalotaenia*
- 3b. 12 bars on flank, continuous across back ..... *E. compactus*

### Comparison material

*Erromyzon compactus*: Holotype, ZRC 49636, 30.8 mm SL, Quang Ninh Province, Vietnam.

*Erromyzon sinensis*: All from China: Guangxi: IHB 75-IV-1801–1804, 4, 40.7–43.4 mm SL; Longsheng, Guilin.—IHB 75-IV-2581, 1, 33.3 mm SL, Xiuren.—IHB 75-IV-3217, 75-IV-3219, 75-IV-3220, 3, 5.8–41.1 mm SL, Jinxiu County; KIZ 200304302, 200304303, 200304306, 200304308, 200304310, 200304311, 200304320 (a), 200304320 (b), 200304321, 9, 42.2–52.4 mm SL, Shanjiangxingcun (Dishui River), Jinxiu County; 24°10'21.9"N, 110°16'34.4"E; altitude 600 m; Kong De Ping & Cui Gui Hua; 14 April 2003.—KIZ 200304308, 200304309, 200304311, 200304312, 200304315, 200304316, 6, 39.8–49.4 mm SL, Changle village (Liuding River), Jinxiu County; 24°22'54.3"N 110°06'38.7"E; altitude 256 m; Kong De Ping & Cui Gui Hua; 13 April 2003.—KIZ 2005003923, 2005003924, 2, 46.4–48.0 mm SL, Dazhang river, Jinxiu County; Kong De Ping, May 2005.—KIZ 2005006134, 1, 43.8 mm SL, Meicun village, Jinxiu County; Kong De Ping, May 2005.

*Erromyzon yangi*: KIZ 200304423, holotype, 42.8 mm SL, Meicun river, Xi Jiang, tributary of Zhu Jiang (Pearl River); KIZ 200304422, KIZ 2003004424, 2, paratypes, 36.7–37.1 mm SL, Meicun river, Xi Jiang, tributary of Zhu Jiang (Pearl River).



## Acknowledgements

We would like to thank Kong De Ping and Cui GuiHua for their efforts in collecting the material used in this study, Yuan Le Yang (IHB) and Huang Yan Fei for measuring and examining the syntypes of *E. sinensis* and *Y. pachytilus*, and Tan Heok Hui (ZRC) for permission to use Fig. 5. We are very grateful to anonymous reviewers for extensive commentary that helped to improve this paper. This work was funded by the National Natural Science Foundation of China (30730017), the National Basic Research Program of China (2007CB411600), Kadoorie Farm & Botanic Garden (Hongkong), and Guangxi Natural Science Foundation (2012GXNSFBA053035).

## References

- Chen, Y.Y. (1980a) Systematic studies of the family Homalopteridae of China II. Classification of the fishes of the subfamily Gastromyzoninae. *Acta Hydrobiologica Sinica*, 7, 95–120. [In Chinese]
- Chen, Y.Y. (1980b) Systematic studies on the fishes of the family Homalopteridae of China III. Phyletic studies of the Homalopterid fishes. *Acta Zootaxonomica Sinica*, 5, 200–211. [In Chinese]
- Chen, Y.Y. & Tang, W.Q. (2000) Homalopteridae. In: Yue, P.Q. (Ed), *Fauna Sinica (Osteichthyes: Cypriniformes III)*. Science Press, Beijing, pp. 438–567. [In Chinese]
- Chen, Y.Y. & Zheng, C.Y. (1989) Homalopteridae. In: Zheng, C.Y. (Ed), *Fishes of the Zhujiang River*. Science Press, Beijing, pp. 240–268. [In Chinese]
- Chu, X.L. & Chen, Y.R. (1989) *The Fishes of Yunnan, China. Part I: Cyprinidae*. Science Press, Beijing, 377 pp. [In Chinese]
- Hora, S.L. (1932) Classification, Bionomics and Evolution of Homalopterid Fishes. *Memoirs of the Indian Museum*, 12, 263–330.
- Kong, D.P., Chan, B.P.L. & Yang, J.X. (2008) Threatened fishes of the world: *Protomyzon pachytilus* Chen, 1980 (Balitoridae). *Environmental Biology of Fishes*, 83, 243–244.
- Kottelat, M. (2004) On the Bornean and Chinese *Protomyzon* (Teleostei, Balitoridae), with descriptions of two new genera and two new species from Borneo, Vietnam and China. *Ichthyological Exploration of Freshwater*, 15, 301–310.
- Neely, D.A., Conway, K.W. & Mayden, R.L. (2007) *Erromyzon yangi*, a new hillstream loach (Teleostei: Balitoridae) from the Pearl River drainage of Guangxi Province, China. *Ichthyological Exploration of Freshwaters*, 18, 97–102.
- Wang, S. & Xie, Y. (2004) *China Species Red List. Vol. 1. Red List*. Higher Education Press, Beijing. [In Chinese]
- Yue, P.Q. & Chen, Y.Y. (1998) *Pisces*. In: Wang, S. (Ed.), *China Red Data Book of Endangered Animals*. Science Press, Beijing, pp. 207–208. [In Chinese]
- Yue, Z.H. (1981) Gastromyzonidae. In: Zheng, B.S. (Ed), *The Freshwater Fishes of Guangxi*. Guangxi People's Press, Nanning, pp.166–174. [In Chinese]