

# Diagnoses of a new genus and 64 new species of fishes from Laos (Teleostei: Cyprinidae, Balitoridae, Bagridae, Syngnathidae, Chaudhuriidae and Tetraodontidae)

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## Abstract

A new genus (*Laocypris*) and 64 new species of fishes are described from Laos. The new species belong to the genera *Acrossocheilus* (1), *Crossocheilus* (1), *Danio* (3), *Garra* (1), *Laocypris* (1), *Mystacoleucus* (1), *Poropuntius* (4), *Puntius* (1), *Rasbora* (2) (Cyprinidae), *Hemimyzon* (2), *Homaloptera* (1), *Schistura* (39), *Sectoria* (1), *Vanmanenia* (2) (Balitoridae), *Pseudomystus* (1) (Bagridae), *Doryichthys* (1) (Syngnathidae), *Chauduria* (1) (Chaudhuriidae) and *Monotrete* (1) (Tetraodontidae).

## Introduction

Fish surveys conducted in Laos between 1996 and 1999 have increased the number of species known in the country from some 210 recorded in the literature as at 1996 to 481 (15 of them not native to the country) recognized in a just-completed field guide (Kottelat, 2000a). Several of the species discovered during these surveys have been described elsewhere (e.g., Britz & Kottelat, 1999a, b; Chen et al., 1999; Chen & Kottelat, 2000; Fang & Kottelat, 1999, 2000; Kottelat, 1998; Kottelat & Bréhier, 1999; Kottelat & Ng, 1999; Larson & Vidhayanon, 2000; Ng, 1999a-b; Ng & Kottelat, 1998, 1999, 2000a-c). The field guide is due to be published in the second quarter of 2000 (a time-frame beyond my control) and clearly, it is desirable that the large number of species still unnamed should be named and identified in this work. It would be counterproductive to omit them from the fieldguide or to list them without valid names. The purpose of the present paper is to make names formally available for them.

It could be argued that this approach to taxonomy is no longer acceptable, arguably being reminiscent of work done in the 1930s or even in the 19th century. However, our knowledge of the fish fauna of Laos is far inferior to what was known of most tropical faunas in the 1930s. I therefore feel that it is justified, in this case, to use an approach that differs from that used in dealing with a much better-studied fauna. Further, the vast majority of the species described here have been observed by me alive; they are represented by large series of well preserved specimens with very accurate locality data and are documented with colour photographs. This differs markedly from the handicaps to which many early workers were subject: they, for the most part, of necessity described species from only a few specimens obtained from fishermen in a more or less useful state, often poorly preserved, and usually stored in museums with only vague locality data.

The present paper is certainly a far cry from the phylogenetic studies which some would like to have as a prerequisite to any systematic publication. The reality is that different individuals are subject to different priorities, and different projects result in different kinds of outputs. Biodiversity surveys which do not result in data immediately usable by the concerned communities represent wasted money, and much money has been wasted in accumulating material on which no reports have been generated, often lodged in institutions which do not even allow access by scientists. This problem has been discussed in Kottelat (1995).

The description of *Chaudhuria fusipinnis* is the result of joint work with Ralf Britz (Institut für Zoologie, Universität Tübingen, Germany).

### Material and methods

Material mentioned in this study is in the following collections: ANSP, Academy of Natural Sciences, Philadelphia; CAS, California Academy of Sciences, San Francisco; CMK, author's collection; KIZ, Kunming Institute of Zoology, Kunming; LARRI, Living Aquatic Resources Research Institute, Vientiane; NRM, Swedish Museum of Natural History, Stockholm; USNM, National Museum of Natural History, Washington; and ZRC, Zoological Reference Collection, National University of Singapore. Other abbreviations: ICZN, International Code of Zoological Nomenclature; SL, standard length. The listed comparison material includes only the specimens actually used for writing this article; this is usually only a small part of the material on which the diagnostic characters have been tested.

Methods for counts and measurements follow Kottelat (1984, 1990). Note that for Balitoridae (except where otherwise noted) the head length used for ratios is the dorsal head length measured from the tip of the snout to the tip of the occipital process. I purposely restricted morphometric analysis to cases and characters for which visual inspection revealed a potential for results of direct use in distinguishing species, especially in the field and for routine identifications. Morphometric descriptions are restricted to proportions because these describe an individual species in a way that is immediately understandable; they also facilitate comparison. More sophisticated (and now fashionable) methods no doubt result in better shape analysis, but they do not satisfy the above condition as they require considerable data manipulation and the outputs are not in a form that is immediately usable for identification. The species concept used here is the phylogenetic species concept (see Cracraft; 1989; Mayden & Wood, 1995; Kottelat, 1997).

Toponymy follows the 1985 1:100,000 Lao P.D.R. topographic maps. Co-ordinates were obtained with a Garmin 45 XL GPS, or, exceptionally, from maps.

### Family Cyprinidae

#### *Acrossocheilus xamensis*, new species (Figure 1)

**Holotype.** ZRC 45297, 158 mm SL; Laos: Houaphan Prov.: Houay Tangoua, small stream entering Nam Xam in Ban Houatangoua; 20°09'24"N, 104°32'50"E; M. Kottelat et al., 5 May 1999.

**Paratype.** CMK 15302, 1, 128 mm SL; same data as holotype.

**Diagnosis.** Distinguished from all species of the genus known from Vietnam, Laos and southern China (Yunnan, Guangdong, Hainan) by the following combination of characters: 33–35 + 3 lateral line scales; ½5–6/1/5½ rows of scales between dorsal-fin origin and belly (counted in front of pelvic fins); lower lip with a broad interruption, greater than half of mouth width; horny sheath on lower jaw sharp, broad, almost straight anteriorly; last simple dorsal-fin ray bony, strong, with 20 serrae along posterior margin.

**Distribution.** Presently known only from the Nam Xam basin in north-eastern Laos.

**Etymology.** Named for the Nam Xam, where the type series was collected.

**Remarks.** The species has a superficial resemblance to the non-barred *Acrossocheilus* species from southern China. It is distinguished from them in having different lateral line scale counts: 33–35 + 3, vs. 43–48 in *A. elongatus*, 42–44 in *A. yunnanensis* (Regan), 43–46 in *A. rendahli* (Lin) and 30–32 in *A. ikedai* (Harada). Wu et al. (1977: 285) give 43–45 for *A. elongatus*, while Pan (1991: 150) lists 45–46 and Chu & Chen (1989: 204) 47–48 for the same species. However, the identification of this species with



Figure 1. *Acrossocheilus xamensis*, paratype, CMK 15302, 128 mm SL.

*Crossocheilus elongatus* Pellegrin & Chevey (1934: 340, 1935: 467) seems erroneous. Kottelat (2000b) identified *C. elongatus* as a species of *Onychostoma* and the *Acrossocheilus "elongatus"* of Chinese authors is apparently unnamed. *Acrossocheilus xamensis* is distinguished from *A. hemispinus* (Nichols) by the broad interruption in the lower lip (vs. the two halves of the lower lip in contact anteriorly).

The present species is possibly that identified as *Acrossocheilus krempfi* by Wu et al. (1977: 293) on the basis of material from the Red River at Hekou (Yunnan) and from Luosuo River (Mekong basin). *Barbus krempfi* Pellegrin & Chevey (1934: 337, 1935: 467) is a species of *Poropuntius* (Kottelat, 1998: 48). The species figured as *A. krempfi* by Chu & Chen (1989: 211) apparently represents a third species, distinguished by a very massive last simple dorsal-fin ray (Kottelat, 1998: 48).

*Acrossocheilus xamensis* also has a resemblance with *Poropuntius* but is missing the branched lateral-line canals diagnostic of that genus.

***Crossocheilus atrilimes*, new species**  
(Figure 2)

**Holotype.** ZRC 45298, 64.9 mm SL; Laos: Vientiane Prov.: Nam Mang at Keng Nam Mang (rapids) about 6 km upstream of Ban Hatkhai; 18°26'33"N, 103°10'32"E; M. Kottelat et al., 23 Feb 1997.

**Paratypes.** LARRI uncat., 5; ZRC 45299, 5; NRM 44879, 5; CMK 13180, 25, 31.0–73.0 mm SL; same data as holotype.

**Diagnosis.** Distinguished from all other species of *Crossocheilus* by the following combination of characters: midlateral stripe extending to posterior extremity of median caudal-fin rays; 1 or 2 rows of faint dark spots along scale rows below lateral line; 1–1½ scale rows between anus and anal-fin origin; body depth 23.8–26.4 % SL; a single pair of barbels (rostral).

**Distribution.** Mekong basin in Laos, Thailand and Cambodia; Chao Phraya basin (material listed by Bañarescu, 1986: 145).

**Etymology.** From the Latin *ater* (black) and *limes* (a narrow and elongate space). A noun in apposition.

**Remarks.** Bañarescu (1986: 145) and Rainboth (1996: 120) recognised two species of *Crossocheilus* with a midlateral stripe extending onto median caudal-fin rays. They call *C. oblongus* a species in which the anus is separated from the anal-fin origin by 2–3½ scales and *C. siamensis* a species in which they are separated



Figure 2. *Crossocheilus atrilimes*, holotype, ZRC 45298, 64.9 mm SL (right side, reversed).

by 1–1½ scales. I recognise the same two species. Additional characters distinguishing the two species are body depth (19.4–21.1 % SL in 7 *C. oblongus* 48.5–104.0 mm SL, vs. 23.8–26.4 in 8 *C. "siamensis"* 33.6–74.0 mm SL) and the presence in *C. "siamensis"* of 1 or 2 rows of faint spots along scale rows below midlateral stripe.

I retain the name *C. oblongus* for the same species as Bañarescu and Rainboth. This species is tentatively identified as conspecific with Indonesian specimens (see Kottelat et al., 1993: 34, pl. 7; see figure of original material of Kuhl and van Hasselt in Roberts, 1993c).

Bañarescu had not examined the holotype of *C. siamensis*. The original description and illustration (Smith, 1931: 20) show a slender fish (body depth 4.6 times in SL, that is 21.7 % SL), without faint spots on scale rows below the midlateral stripe. The length of the holotype (113 mm SL) is greater than that of any specimen of *C. "siamensis"* seen by me or reported in the literature (up to 73 mm SL) and agrees with that of the species identified here as *C. oblongus*. The position of the anus is not mentioned in Smith's text and is not shown on his figure. The holotype of *C. siamensis* (USNM 90302) had been eviscerated and it is difficult to determine the position of the anus, but the estimate is that there are 3 scale rows between the anus and the anal-fin origin (David G. Smith, pers. comm.). I therefore treat *Epalzeorhynchus siamensis* Smith, 1931 as a junior synonym of *C. oblongus*. This leaves without name the species called *C. siamensis* by Bañarescu and it is described here as *C. atrilimes*.

*Crossocheilus atrilimes* and *C. oblongus* sometimes occur in syntopy, but *C. oblongus* is collected in very swift water, in rapids and torrents, whereas *C. atrilimes* is found in somewhat quieter habitats.

**Comparison material.** *Crossocheilus oblongus*: CMK 13182, 15, 48.5–104.0 mm SL; Laos: Vientiane Prov.: Nam Mang at Keng Nam Mang (rapids) about 6 km upstream of Ban Hatkhai; 18°26'33"N, 103°10'32"E; M. Kottelat et al., 23 Feb 1997.

*Danio fangfangae*, new species  
(Figure 3)

**Holotype.** NRM 44880, 66.7 mm SL; Laos: Bolikhhamxai Prov.: Nam Phao at waterfall immediately downriver of border post on road from Lak Sao to Vinh (Viet Nam); 18°23'00"N, 105°09'20"E; M. Kottelat et al., 19 Mar 1996.

**Paratypes.** LARRI uncat., 3; NRM 44881, 2; CMK 12668, 6, 53.9–66.1 mm SL; same data as holotype. – LARRI uncat., 15; ZRC 45300, 15; NRM 44882, 15; CMK 12798, 41, 31.3–68.1 mm SL; Laos: Bolikhhamxai Prov.: Nam Phao, about 5–8 km downstream of Lak Sao (upstream of confluence with Nam Kata); 18°08'30"N, 104°59'30"E; M. Kottelat et al., 24 Mar 1996.

**Diagnosis.** Distinguished from the other species of the genus in Southeast Asia by the following combination of characters: complete lateral line, perforating 33–36 + 2–3 scales; 2 pairs of barbels, rostral barbel slightly shorter than eye diameter, maxillary barbel much shorter; infraorbital process absent or very small; 9–10½ branched dorsal-fin rays; 12–14½ branched anal-fin rays; caudal peduncle 1.7–2.0 times longer than deep; cleithral spot present; three dark bluish stripes on side, stripe P extending from upper angle of gill opening to end of median caudal-fin rays, in specimens larger than about 50 mm SL often longitudinally split by a row of yellow spots in anterior half; P+1 and P-1 interspaces continuous in specimens less than about 35 mm SL and anteriorly dissociated into a series of spots in larger specimens. Colour-pattern terminology follows Fang (1997a: 290).

**Distribution.** Presently known only from the Nam Kading basin, but expected to occur in other basins in central Laos.

**Etymology.** Named for Fang Fang, who has published several papers on the systematics of *Danio*, in appreciation of her help.



Figure 3. *Danio fangfangae*, holotype, NRM 44880, 66.7 mm SL.

*Danio gibber*, new species  
(Figure 4)

**Holotype.** NRM 44883, 65.0 mm SL; Laos: Champasak Prov.: Xe Katam at bridge on road from Attapu to Pakse, about 1 km upriver of Nam Tok Xe Katam-Tok waterfall; 15°07'17"N, 106°37'28"E; M. Kottelat et al., 19 May 1999.

**Paratypes.** LARRI uncat., 8; NRM 44884, 8; ZRC 45301, 8; CMK 15530, 15, 15.7–64.5 mm SL; same data.

**Diagnosis.** Distinguished from the other species of the genus in Southeast Asia by the following combination of characters: complete lateral line, perforating 34–36 + 2–3 scales; 2 pairs of barbels, rostral barbel slightly shorter than eye diameter, maxillary barbel much shorter; infraorbital process rudimentary or absent; 9–10½ branched dorsal-fin rays; 12–14½ branched anal-fin rays; caudal peduncle 1.3–1.6 times longer than deep; head relatively slender in lateral view, with a small hump on nape; cleithral spot present; 3 or 4 dark bluish stripes on side, stripe P extending from upper angle of gill opening to end of median caudal-fin rays, in specimens larger than about 50 mm SL often longitudinally split by an additional yellow stripe (sometimes dissociated into a few elongated spots) in anterior half; in specimens larger than about 30 mm SL, stripes P and P-1 (and sometimes also P+1) irregular anteriorly, sometimes zigzag-shaped or dissociated into a series of spots, and spots of the different series can be connected. Colour pattern terminology follows Fang (1997a: 290).

**Distribution.** Known from the Xe Kong and Xe Don basins, expected to occur in other basins in southern Laos and northern Cambodia.

**Etymology.** From the Latin *gibber* (gibbous, hump-backed). An adjective.



Figure 4. *Danio gibber*, holotype, NRM 44883, 65.0 mm SL (right side, reversed).

*Danio salmonata*, new species  
(Figure 5)

**Holotype.** NRM 44885, 40.2 mm SL; Laos: Champasak Prov.: Huay Makchan-Gnai (Xe Nam Noy basin), south of Ban Taot, at turnoff to Xe Nam Noy Project, on road from Pakse to Attapu; 15°04'14"N, 106°32'33"E; M. Kottelat et al., 19 May 1999.

**Paratypes.** LARRI uncat., 1; ZRC 45302, 1; CMK 15515, 2, 25.1–44.7 mm SL; same data.

**Diagnosis.** A species of barred *Danio* distinguished from all other barred *Danio* by the following combination of characters: no barbels; lateral line complete, perforating 31–33 + 2–3 scales; no infraorbital process; 7–8½ branched dorsal-fin rays; 11–13½ branched anal-fin rays; cleithral spot present; 6–8 bars, gradually deeper, then gradually shorter from B1 to the last which is deeper than P stripe; P stripe uniformly pigmented or composed of a row of contiguous black spots. Colour pattern terminology follows Fang (1997b: 42). Life colour: body pinkish grey on the back, silvery on belly, bars bluish black (see Baird et al., 1999: 19, fig. 31). The holotype is apparently a male in breeding condition, and the belly, pelvic, anal and caudal fins were salmon-orange in life.

**Distribution.** Presently known only from the Xe Nam Noy on the Bolaven Plateau, above the falls.

**Etymology.** Derived from the Latin *salmo* (salmon), meaning with the colour of salmon flesh. An adjective.



Figure 5. *Danio salmonata*, holotype, NRM 44885, 40.2 mm SL.

*Garra cyrano*, new species  
(Figure 6)

**Holotype.** ZRC 45303, 89.9 mm SL; Laos: Vientiane Prov.: Nam Leuk about 500 m downstream of Thad Leuk waterfall; 18°23'34"N, 103°04'17"E; M. Kottelat et al., 25 Feb 1997.

**Paratypes.** LARRI uncat., 2; ZRC 45304, 1; CMK 13288, 4, 45.5–97.7 mm SL; same data.

**Diagnosis.** Distinguished from the other species of the genus in Southeast Asia by the combination of the following characters: snout with a conspicuous, deeply notched secondary rostrum with large tubercles, with a long and slender proboscis (slightly longer than its width at basis), pointed forwards and not in contact with snout along its inferior side; body and fins dark brown to black with 6 faint stripes on posterior part; dorsal and anal fins with yellowish tip; 8½ branched dorsal-fin rays; 31 + 2–3 scales along lateral line, ½4/1/5½ in transverse row in front of pelvic-fin origin, ½3/1/3½ in transverse row on caudal peduncle, 9–10 predorsal.

**Etymology.** From Cyrano de Bergerac, the main character in a comedy of Edmond Rostand, characterized by a long nose. A noun in apposition.

**Distribution.** Presently known only from Middle Nam Mang basin.

**Remarks.** Using Menon's (1964) key to the species of *Garra*, this species keys out as *G. nasuta* (McClelland, 1838). Menon (1964: 239) recognised *G. nasuta* as a widely distributed species with a range extending from Assam to northern Vietnam and Fujian (China). My comparison of the Nam Leuk material with



Figure 6. *Garra cyrano*, paratype, CMK 13288, 97.7 mm SL (right side, reversed).



Figure 7. *Garra salweenica*, CMK 14675, 75.0 mm SL; Thailand: Mae Nam Moei.



Figure 8. *Garra fuliginosa*, CMK 4271, 56.9 mm SL; Thailand: Mae Taeng (right side, reversed).



Figure 9. *Garra cyrano*, CMK 13288, 54.0 mm SL (right) and *Garra fuliginosa*, CMK 4271, 56.9 mm SL (left).

material of *G. 'nasuta'* from the Salween, Chao Phraya and Red River basins and from the Malay Peninsula indicates that at least three or four species are involved; none of them seems to be conspecific with the material from Assam illustrated by Menon (1964: pl. 13 figs. 11–12). Although the type locality of *G. nasuta* is Khasi Hills ("Kasya mountains") in Assam [presently in Meghalaya], Menon's material seems misidentified. McClelland described the species on the basis of at least one specimen 6 inches long; neither his description nor his figure show the secondary rostrum which is well developed at this size (but the name

*nasuta* seems to imply that McClelland's species had a particularly shaped snout).

The oldest name possibly available for Menon's *G. 'nasuta'* could be *Gonorhynchus caudatus* M'Clelland (1839: 375) from the "Mishmee mountains" (not Kasya mountains as reported by Menon, 1964: 239). Other names listed as synonyms of *Garra nasuta* by Menon are: *G. orientalis* Nichols (1925: 4) (type locality: Fukien [Fujian], China), *Discognathus bourreti* Pellegrin (1928: 340) (Rivière Claire, Tonkin [Song Lo, Vietnam]), *G. fuliginosa* Fowler (1934: 139) (Metang [Mae Taeng], Chao Phraya basin, Thailand), *G. salweenica* Hora & Mukerji (1934: 365) (Salween at Takaw, Kengtung, Burma [Myanmar]), and *Discolabeo fisheri* Fowler (1937: 211) (Tachin basin, Thailand). *Garra orientalis* has been treated as a valid species by subsequent Chinese authors (e.g., Chu & Cui, 1987: 275; Chu & Chen, 1989: 275).

*Garra cyrano* differs from comparison material of similar size from the Salween, Chao Phraya, Mekong and Red River basins in having a slender and much longer proboscis (slightly longer than wide, vs. about 1.5–2 times wider than long), pointing forwards and not in contact with the snout along its inferior side (vs. reflected downwards against the snout [except in topotypes of *G. bourreti*]), distinct even in the smaller specimens (although shorter) (vs. indistinct in specimens less than about 50 mm SL), in having a shallower body, a broader and longer labial disc, more developed secondary rostrum and tubercles, black body (all others were brown when alive or fresh), and smaller fins (I have not attempted to quantify these characters).

*Garra salweenica* from the Salween basin is stouter (Fig. 7), has a brown body, a series of distinct black spots at the base of the median dorsal-fin rays and a black mark at the tip of the upper (and sometimes the lower) caudal-fin lobe.

The species from the Red River basin has been identified as *G. orientalis* by Chu & Chen (1989: 275). This is probably the same as *G. bourreti*. Without fresh material from the type localities of both species it is impossible to decide whether they are conspecific. In December 1999, I saw live topotypes of *G. bourreti* in the Song Lo basin (Vietnam), but was not permitted to examine them. Like *G. cyrano*, *G. bourreti* has a proboscis pointing forwards and not reflected downwards against the snout; but in *G. bourreti*, the proboscis appears much stouter and thicker and the body is much deeper and stouter. I am unable with the available data to comment on the synonymy of *G. bourreti* and *G. orientalis*.

*Garra fuliginosa* was described from the holotype alone, 178 mm TL from the Chao Phraya basin. As figured by Fowler (1934: 135), the proboscis is less

developed than in *G. cyrano*, adjacent to the snout, the snout is rounded (vs. triangular) and the disc is smaller. The head is shorter than in *G. cyrano* (about 25 % SL, vs. 27.0 and 27.3 in specimens 89.9 and 97.7 mm SL). I was able only to examine a single (juvenile) topotype of *G. fuliginosa* (CMK 4271, 56.9 mm SL; Fig. 8). Compared to specimens of similar sizes of *G. cyrano*, the proboscis is hardly noticeable, the head shorter (26.0 % SL, vs. 27.0–30.0 in 6 specimens 45.5–60.1 mm SL) and narrower (17.9 % SL, vs. 19.6–20.8), and the disc much smaller (Fig. 9). *Discolabeo fisheri*, based on a single juvenile 42 mm TL from the Chao Phraya basin, obviously is a juvenile *Garra*, possibly *G. fuliginosa*. A single juvenile (CMK 13760, 51.3) from the Xe Bangiang in Laos cannot be distinguished from the Chao Phraya specimen.

Material from the Tapi basin (peninsular Thailand) apparently represents a distinct, unnamed species.

**Comparison material.** *Garra fuliginosa*: CMK 4271, 1, 56.9 mm SL; Thailand: Mae Taeng. – CMK 13760, 1, 51.3 mm SL; Laos: Savannakhet Prov.: Xe Bangiang. *Garra salweenica*: CMK 5244, 1; Thailand: Nam Mae Surin. – CMK 14675, 21; Thailand: Mae Nam Moei. *Garra bourreti*: CMK 5639, 2; China: Yunnan: Red River basin: Pingbian Co.

### *Laocypris*, new genus

**Type species.** *Laocypris hispida*, new species.

**Diagnosis.** See diagnosis of only included species, *L. hispida*.

**Etymology.** Derived from Laos and cypris, a common suffix for cyprinid genera. Gender feminine.

### *Laocypris hispida*, new species (Figure 10)

**Holotype.** ZRC 45305, 44.6 mm SL; Laos: Saisomboun Special Zone: Houay Sala Yai, a tributary of Nam San; 18°35'17"N, 103°05'00"E; M. Kottelat et al., 28 Feb 1997.

**Paratypes.** CMK 13348, 1, 51.2 mm SL; same data as holotype. – LARRI uncat., 1, 44.6 mm SL; Laos: Vientiane Prov.: confluence of Nam Leuk and Nam Ngang; 18°22'04"N, 103°05'27"E; M. Kottelat et al., 24 Feb 1997.

**Diagnosis.** Distinguished from all other species of cyprinids in Southeast Asia by the following combination of characters: mouth inferior; rostral fold present; lips fleshy, continuous around corner of

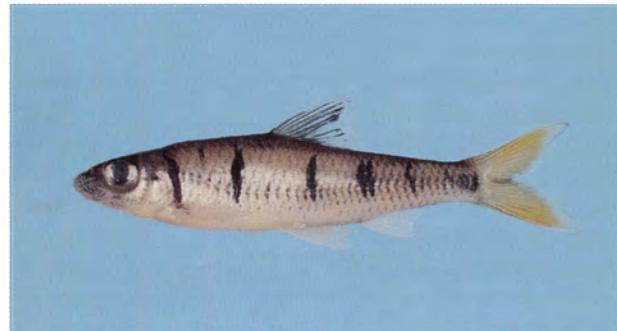


Figure 10. *Laocypris hispida*, paratype, CMK 13348, 51.2 mm SL.

mouth; lower lip without a median interruption; no horny sheath on lower jaw; two pairs of barbels; gill rakers broad, short, appearing as low bumps on gill arch, 4 on upper arm, 3 on lower; snout fleshy, protruding; conspicuous tubercles on lower jaw, snout, cheeks, top of head, scales of lower half of body behind pelvic-fin origin and base of anterior anal-fin ray; lateral line complete, perforating 35–37 + 2 scales;  $\frac{1}{4}$ /1 $\frac{1}{4}$  transverse rows of scales in front of pelvic-fin origin,  $\frac{1}{4}$ /1 $\frac{1}{4}$  on caudal peduncle; 11–12 predorsal scales; dorsal fin with 3 simple and 8 $\frac{1}{2}$  branched rays; last simple dorsal-fin ray not ossified and smooth posteriorly; anal fin with 3 simple and 5 $\frac{1}{2}$  branched rays; pectoral fin with 12–14 rays; pelvic fin with 10 rays; caudal fin with 9+8 branched rays; anal fin separated from anus by 3 scales.

**Colour pattern.** In life, body silvery with 5–6 black bars, anterior one immediately behind posterior edge of opercle. A black spot at caudal-fin base. Lateral line scales with a dark crescentic mark on scale pocket (appearing on the posterior margin of preceding scale). A faint bar on head, across eye. Dorsal-fin membrane black, rays hyaline. Caudal fin bright orange with a narrow dark posterior margin. Other fins hyaline.

**Distribution.** Only known from the Nam Leuk (a tributary of Nam Mang) and the Nam Sam (a tributary of Nam Ngum).

**Natural history notes.** *Laocypris hispida* was collected in the Nam Sam in clear, shallow (about 20–30 cm deep), swift water, in riffles, over a pebble substrate. The Nam Leuk specimen was found in the basket of a fisherman.

**Etymology.** From the Latin *hispidus* (bristling, spiky). An adjective.

**Remarks.** This species cannot be assigned to any of

the known genera of Southeast and East Asian cyprinids and is therefore placed in a new genus. In some respects it resembles *Acrossocheilus* with which it shares the overall appearance and the barred colour pattern. *Acrossocheilus* is unknown from the Mekong basin (Chu & Chen, 1989: 211, report *A. krempfi* from the Mekong basin, but this identification seems doubtful; Kottelat, 1998: 48).

The systematics of *Acrossocheilus* is somewhat confused and it is not certain that the genus, as presently composed, is monophyletic. The combination of the continuous lower lip (vs. interrupted in the middle), the lower jaw without sheath (vs. sheath present), the slender and smooth last simple dorsal-fin ray (vs. bony and serrated posteriorly in most species of *Acrossocheilus*) and details of the colour pattern distinguishes *L. hispida* from all nominal species of *Acrossocheilus*. The extensive development of tubercles on the three specimens suggest that they are adult or close to adult size.

*Mystacoleucus ectypus*, new species  
(Figure 11)

**Holotype.** ZRC 45306, 67.0 mm SL; Laos: Vientiane Prov.: Nam Mang downstream of Ban Thabok, between 18°22'25"N 103°13'30"E and about 1 km upstream; M. Kottelat et al., 22 Feb 1997.

**Paratypes.** LARRI uncat., 5; ZRC 45307, 5; NRM 45444, 5; CMK 13151, 19, 39.2-59.3 mm SL; same data as holotype.

**Diagnosis.** Distinguished from the other species of the genus by the following combination of characters: body relatively deep, depth 34.5-38.7 % SL; 33-37 + 2-

4 lateral line scales;  $\frac{1}{2}7(-8)/1/5-6\frac{1}{2}$  scales in transverse row in front of pelvic-fin origin,  $\frac{1}{2}3(-4)/1/3\frac{1}{2}$  on caudal peduncle; 9-10 $\frac{1}{2}$  branched anal-fin rays; a triangular distal blotch at tip of dorsal fin; no barbels (or very rudimentary).

**Distribution.** Presently known from the Mekong basin in central and southern Laos and northeastern Thailand, occurs probably elsewhere in middle Mekong basin.

**Etymology.** From the Latin *ectypus* (which is in relief), reference to the small hump with the procurent spine in front of dorsal-fin origin. An adjective.

**Remarks.** Rainboth (1996: 91) commented that the holotype and paratype of *M. atridorsalis* Fowler (1937: 176) represent two species and that Fowler's description "fits one form and his illustration fits the other". I have examined photographs of these two specimens and John G. Lundberg has obtained scale counts for me. Although the two specimens are not very well preserved and many scales are missing, the most salient difference between them is in the number of lateral line scales, 27 or 28 + 1(?) in the holotype, "more than 30 (probably 32-34)" (on body, scales on caudal base missing) in the paratype. It seems thus that both Fowler's description and illustrations are based on the holotype; Fowler gave the lateral line scale count as 28 or 29 + 3 and I count 28+3 on his figure.

In the material which I have examined, *M. ectypus* is distinguished from *M. atridorsalis* in having more lateral line scales (33-37 + 2-4, vs. 28-31 + 2-3), more rows of scales between the middorsal and lateral line rows (7 [8 in one specimen], vs. 5), and more scales rows around the caudal peduncle (16-17, vs. 14). The holotype of *M. atridorsalis* while agreeing with the lateral line count observed in the fresh material identified here as conspecific, disagrees in the number of scales rows, with 6 between middorsal and lateral line rows and 15 around the caudal peduncle (but I count  $\frac{1}{2}3/1/2\frac{1}{2}$  on Fowler's figure of the left side). The paratype apparently belongs to *M. ectypus*.

The two species apparently also differ in details of colour pattern, but these characters may show geographical variation. For example, in *M. atridorsalis*, there is a narrow black distal margin along the whole postero-superior edge of the dorsal fin and a black posterior margin on the caudal fin (missing in *M. ectypus*).

**Comparison material.** *M. atridorsalis*: ANSP 68084, holotype, 67 mm SL (photograph); Thailand: Kemarat. - CMK 15737, 6, 51.8-63.5 mm SL; Laos: Xekong Prov.

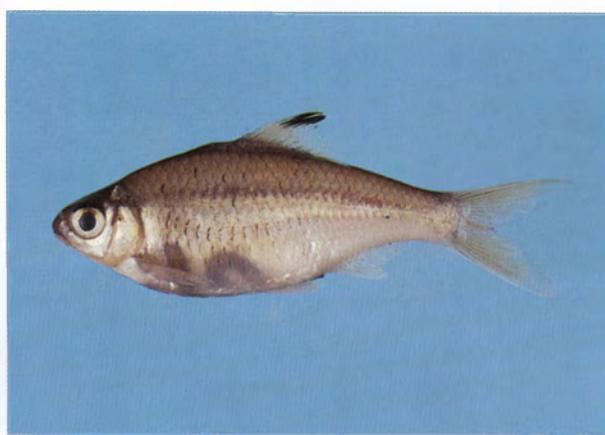


Figure 11. *Mystacoleucus ectypus*, holotype, ZRC 45306, 67.0 mm SL.

***Poropuntius laoensis* (Günther)**  
 and  
***P. normani* (Smith)**

Roberts (1998) reviewed the genus *Poropuntius*. The information on most species are lacunary and very difficult to use. Although a long list of examined material is listed for *P. deauratus*, all the morphological and meristic data are derived from Rainboth (1996: 98), except for five values derived from the holotype. Roberts identified as *P. deauratus* a species "distinguished from all other species of *Poropuntius* with well developed barbels [...] by its caudal coloration: bright lemon yellow, with bold submarginal black stripes on the upper and lower lobe". He considered *P. normani* Smith (1931: 15) as a possible synonym (p. 110). There are at least two species with this caudal-fin colour pattern in the Mekong basin, and neither of them is *P. deauratus*; they are called here *P. laoensis* and *P. normani*. In the Xe Bangiang basin (Laos), the two species are syntopic.

The two species are distinguished by number of lateral line scales (30–36 + 2–4 in *P. laoensis*, vs. 25–28 + 2–3 in *P. normani*), body depth (31–33 % SL, vs. 32–37), mouth position (subterminal, vs. inferior) and



**Figure 12.** *Poropuntius normani*, CMK 10726, 66.0 mm SL; Thailand: Nam Tok Salad Dhai.



**Figure 13.** *Poropuntius deauratus*, CMK 16016, 63.1 mm SL; Vietnam: Huong basin.

head shape (compare Fig. 69 in Kottelat, 1998 with Fig. 12 here). The holotype of *P. laoensis* has 30+2 lateral line scales and body depth 34.4 % SL (Kottelat, 1998: 48). I have not examined the holotype of *P. normani*. I have compared the Laotian *P. normani* specimens with CMK 10726 from Nam Tok Salad Dhai, a locality adjacent to the type locality, and found no difference.

*Poropuntius deauratus* is one of five fish species collected in "Cochinchina" by Diard (Kottelat, 1990: 214). Among the other species collected by Diard are *Schistura spiloptera* (Valenciennes, 1846) and *Sewellia lineolata* (Valenciennes, 1846). Both have very restricted distributions and are known only from a few coastal basins south of Hue (J. Freyhof, pers. comm.; Freyhof & Serov, in press), the former imperial capital of Vietnam (and therefore a very likely place for a foreigner to visit), which Diard is known to have visited (Kottelat, 1990: 214). A single species of *Poropuntius* is known from (and, apparently, endemic to) this area. I speculate that all Diard's species have been collected at the same locality, and that this is thus the type locality of *P. deauratus*. I have examined specimens collected in Huong basin 30 km west of Hue. They are distinguishable from *P. laoensis* and *P. normani* by general appearance (Fig. 13), the caudal fin in life is very pale yellow with dark upper and lower margins (J. Freyhof, pers. comm.). Specimens as small as 60 mm SL already have well developed breeding tubercles on the lower half of the posterior part of the body, suggesting that the species does not grow large. Noteworthy is the last simple dorsal-fin ray which is slender compared to other species of *Poropuntius*, with very weak serration along its posterior margin. Valenciennes (in Cuvier & Valenciennes, 1842: 189) described this ray as slender and smooth. Sauvage (1881: 183) examined the holotype (and figured its head) and described the ray as weakly denticulated. I consider this species as *P. deauratus* but this should be confirmed by comparison with the holotype.

**Examined material.** This list includes only material actually examined in detail. Numerous other lots have been seen from throughout Laos and Thailand. *P. deauratus*: CMK 16016, 5; Vietnam: Huong basin: creek Mau, 30 km west of Hue. *P. laoensis*: CMK 14043, 30; Laos: Phongsali: Nam Long at confluence with Nam Ou. – CMK 13993, 4; Laos: Louang Phabang: Nam Ou at Muang Ngoy. – CMK 13729, 3; Laos: Savannakhet: Xe Pon at Ban Fuang. *P. normani*: CMK 10726, 6; Thailand: Trat: Nam Tok Salad Dhai. – CMK 15043, 9; Thailand: Loei: Nam Huang. – CMK 15996, 5; Laos: Savannakhet: Xe Pon at Ban Fuang. – CMK 15703, 12; Laos: Attapu: Xe Nam Noy at Tat Hua Khon waterfall. – CMK 15663, 2; Laos: Attapu: Nam Pa at Ban Paam.

***Poropuntius angustus*, new species  
(Figure 14)**

**Holotype.** ZRC 45308, 116.7 mm SL; Laos: Louangphabang Prov.: Houay Houn, about 3 km upstream of Ban Houay Lek, in gorges; approx. 20°32'32"N, 102°40'51"E; M. Kottelat et al., 11 May 1997.

**Paratypes.** CMK 14016, 1, 111.0 mm SL; same data as holotype. – LARRI uncat., 2; ZRC 45309, 2; NRM 44886, 2; CMK 14225, 8, 48.0–98.8 mm SL; Laos: Louangnamtha Prov.: unnamed forest creek tributary to Nam Talan, at about km 60 on road from Oudomxai to Luang Nam Tha, about 3 km S of Ban Nateuy; 20°59'56"N, 101°39'47"E; M. Kottelat et al., 20 May 1997. – CMK 14334, 2, 70.1–119.3 mm SL; Laos: Louangnamtha Prov.: Nam Youan at ford south of Ban Muang Mon; 21°19'28"N, 101°10'19"E; M. Kottelat et al., 23 May 1997.

**Diagnosis.** Distinguished from the other species of *Poropuntius* in the Mekong basin by the following combination of characters: 30–33 + 2–3 lateral line scales; 14 predorsal scales; dorsal profile almost horizontal in front of dorsal-fin origin; body shallow, depth 25.3–28.8 % SL (in 5 specimens 70.1–119.3 mm SL); caudal peduncle length 16.9–19.4 % SL, depth 10.7–12.6 % SL; a brown stripe along upper and lower margins of caudal fin, rest of fin dusky to very pale yellow.

**Distribution.** Presently known only from northern Laos, from Nam Ou, Nam Tha and Nam Youan basins.

**Etymology.** From the Latin *angustus* (narrow). An adjective.

**Remarks.** The head and body shape (see Fig. 14) immediately distinguishes this species from its congeners known from the Mekong basin.



**Figure 14.** *Poropuntius angustus*, holotype, ZRC 45308, 116.7 mm SL.

***Poropuntius bolovenensis* Roberts**

Roberts (1998) described *P. bolovenensis* with four "morphs". The names he proposed for the four morphs are expressly stated as being for 'new morphs' and thus are infrasubspecific names (ICZN art. 45.6.1, 45.6.2). Infrasubspecific names are not available for zoological nomenclature (ICZN art. 45.5) and thus have no validity. The specimens listed as holotype and paratypes of these taxa have no nomenclatural status. The name *P. bolovenensis*, however, is available but Roberts did not designate a holotype for it; he designated a specimen explicitly as 'holotype' of the morph *P. b. bolovenensis*. This specimen has no nomenclatural status and formally it is not the holotype of *P. bolovenensis* but the invalid holotype of a morph. All specimens listed by Roberts for the four morphs are syntypes of *P. bolovenensis* and I retain CAS 94251 (the 'holotype' of the bolovenensis morph) as lectotype of *P. bolovenensis*.

Data provided by Roberts do not allow to reach a conclusion on the status of these morphs. The reader is told that there are "slight differences in body proportions (head length, body depth, caudal peduncle length)" but no supporting data are provided. Dorsal-fin ray, scale and gill raker counts are inconsistently provided in different combinations for the four morphs, making a comparison impossible. To render a discussion even more difficult, Roberts nowhere explicitly defines what he calls trophic morphs (his species concept is not clearer). The definition I am using is: morphs are alternative appearances of different individuals of a single species which a given individual will exhibit during its entire life (see Kottelat, 1997: 147 for discussion). The use of "trophic morphs" (Roberts, 1998: 106) apparently implies that the morphs correspond to different feeding habits, food resources, or feeding niches.

The published information reveals that beside differences in mouth structure, the 'morphs' bolovenensis and acuticeps differ in gill-raker (2–5+7–11=10–16, vs. 3–4+1+5–6=9–11) and branched dorsal-fin ray counts (8½, vs. 7½), which is incompatible with the hypothesis that they are trophic morphs of the same species, and suggests instead that two species are in fact involved. Under the species concept used here, therefore, they are treated as distinct species. I have found that the two species also differ in transverse scale counts (½5/1/5½, vs. ½6/1/6½). Roberts' morph bolovenensis should be called *P. bolovenensis* by virtue of the above lectotype designation. As Roberts' morph name acuticeps is not available, the morph acuticeps is named below as *P. consternans*.

Beside differences in mouth structure, the 'morph' *glaridostoma* differs from *acuticeps* in lateral line scale (35–39, vs. 32–33), predorsal scale (15–17, vs. 13) and gill-raker counts (13–17, vs. 9–11). Such data are not provided for the 'morphs' *glaridostoma* and *bolovenensis* (except for gill-raker counts which partly overlap and have different modes, 13–17, mode 15, vs. 10–16, mode 12–13 [given twice as 12 by Roberts, 1998: 125]). *Glaridostoma* differ from both *bolovenensis* and *acuticeps* in body, head and mouth shape, respective position of dorsal and pelvic fins (no real comparative data provided by author; information extracted from the figures). In the absence of evidence that this is only a trophic morph of *P. bolovenensis* and considering the obvious differences which involve non-feeding related structures, I do not see any reason for not treating *glaridostoma* as a valid species. Again, as Roberts' morph name is not available, the morph *glaridostoma* is named below as *P. lobocheilooides*.

The diagnosis of the 'morph' *laticeps* is vague and uninformative. I have only seen a photograph of the 'holotype' (provided by D. Catania, CAS) and I tentatively treat it as conspecific with *P. lobocheilooides*.

I have examined some of the specimens used by Roberts. Although they are not in good condition they confirm the distinctness of *P. bolovenensis*, *P. consternans* and *P. lobocheilooides*. They also allow me to conclude on the presence of a fourth species of *Poropuntius* on the Bolaven Plateau, hereunder named *P. solitus*. I have not attempted to redescribe the species diagnosed by Roberts as a revision of *Poropuntius*, although sorely needed, is beyond the scope and aims of the present paper.

I am not excluding here the possibility that different morphs of a single species are really involved, but besides the absence of a clear concept definition, Roberts failed to provide any evidence that morphs—and not species—are in fact involved. The two reasons he lists for recognising a single species (1998: 124) are: "their coloration in life is virtually identical" and "the smaller individuals have mouth parts of the generalized types". Applied to other genera, this argument would allow us to negate the existence of thousands of fish species whose larvae and juveniles cannot (at present) be identified. In addition, this ignores the differences in ray and scale counts listed by Roberts, which are not age or food dependent, and which would allow the identification of juveniles. Roberts continued: "The smallest recognizable individuals of the three divergent morphs, if they are present in the sample, are so similar to the most generalized morph that I have been unable to distinguish them". There are flaws in this reasoning, even if there were really no differences among the

juveniles (which we know not to be true): this reasoning implies that the small, 'unrecognisable' individuals are known to include the three morphs. This, in turn, implies that it has been established or demonstrated that the 'unrecognisable' individuals really include three morphs (this can only be done by actual breeding experiments); if this is not demonstrated, the argument is invalid. Then, if the 'unrecognisable' individuals already represent distinct "morphs" while the external characters are not present, the hypothesis of a genetic basis to the morphological differences (thus a pattern of ancestry and descent, one of the criteria of the phylogenetic species concept) is at least as parsimonious as the feeding morph. Unless it is demonstrated that morphs of a single species are involved, I consider that the *Poropuntius* of the Bolaven Plateau represent at least four species.

I note that under the description of his morph *glaridostoma* (p. 127), Roberts wrote "The differences in the mouth structures between these specimens [the 13 'types' of *glaridostoma*, 48.1–138 mm SL] and *P. b. bolovenensis* is almost as much in the smallest specimens as in the largest". This should be compared to his statement on p. 124, quoted above.

I visited the Bolaven Plateau in May 1999 and tried to obtain material of the local *Poropuntius* species. Unfortunately, heavy rains had greatly swollen the rivers and it was impossible to enter the water or to set nets at most localities and the specimens obtained are of small size. No specimens of *P. consternans* were obtained, but my samples included mixed juveniles (20–50 mm SL) of *P. bolovenensis* and *P. lobocheilooides*; all could unambiguously be attributed to one or the other species using the predorsal scale count (11–12 in *P. bolovenensis*, vs. 15–17 in *P. lobocheilooides*), transverse scale count ( $\frac{1}{2}5/1\frac{1}{2}$  scales in transverse row (vs.  $\frac{1}{2}6/1\frac{1}{2}$ ), lateral line scale count (29–32 + 2–3, vs. 35–39 + 2–3) and length/depth ratio of the caudal peduncle (1.34–1.73, vs. 1.83–2.05) (CMK 15509, 16035; all specimens collected together in an area about 20×5 m of large boulders, apparently excluding the possibility of habitat-induced morphological differentiation).

In making names available for *P. consternans* and *P. lobocheilooides*, I had two options: to make available as the specific epithets the names which Roberts already used for his "morphs" or to create new names. I consulted with some colleagues; while some favoured the 'validation' of the names proposed by Roberts, others strongly argued that morph names, invalid names, commercial names, etc. should never be used and this is also my point of view. I found that proposing new names has the advantage of avoiding the ambiguities and confusion which could result

from the use of the same names, especially for users not aware of nomenclatural rules. It also avoids having to refer to the unsupported polymorphism hypothesis.

#### *Poropuntius consternans*, new species

**Holotype.** CAS 94255 (the specimen listed as 'holotype' of morph acuticeps by Roberts, 1998: 125), 124 mm SL; Laos: "Xe Nam Noi 300 m downstream from main dam site for Xe Nam Noi-Xe Pian hydropower scheme, Bolovens Plateau, Sekong watershed"; T. R. Roberts, 24 Mar 1995 [photograph examined].

**Paratype.** CAS 94256, 1, 106 mm SL; same data.

**Diagnosis.** Distinguished from the other species of the genus by its narrower head, snout and head, hypertrophied lips, very pointed snout. Additional useful characters: 7½ branched dorsal-fin rays; 32–33 lateral line scales; 13 predorsal scales (after Roberts, 1998: 126, where additional notes and photographs of the fresh holotype can be found).

Roberts gives a transverse scale count of "7.1.3", but does not explain where and how the count is made. I counted ½/6/1/6½ from the dorsal-fin origin to about 3 scale rows in front of the pelvic-fin origin on the examined paratype.

**Etymology.** From the Latin *consterno* (to dismay, to scare, to disconcert). Treated as a noun in apposition.

#### *Poropuntius lobocheilooides*, new species

**Holotype.** CAS 94257 (the specimen listed as 'holotype' of morph glaridostoma by Roberts, 1998: 126), 138 mm SL; Laos: "Xe Nam Noi 300 m downstream from main dam site for Xe Nam Noi-Xe Pian hydropower scheme, Bolovens Plateau, Sekong watershed"; T. R. Roberts 24 Mar 1995 [photograph examined].

**Paratype.** CAS 94258, 10, 48.1–128 mm SL (4 examined); same data. – CMK 16035, 8, 31.9–41.6 mm SL; Laos: Champasak Prov.: Xe Nam Noy at bridge near Ban Latsasin, about 2 km downstream of Xe Nam Noy dam site; 15°03'25"N, 103°36'11"E; M. Kottelat et al., 19 May 1999.

**Diagnosis.** Distinguished from the other species of the genus by the combination of the following characters: lower jaw sheath thickened and broad, with a sharp edge; lower lip restricted to corner of mouth; 35–39 lateral line scales; 16–17 predorsal

scales (after Roberts, 1998: 126); 8½ branched dorsal-fin rays. See Roberts (1998: 126) for some additional notes and photograph of the fresh holotype.

Roberts gives a transverse scale count of "7.1.3–4". I counted ½/6/1/6½ from the dorsal-fin origin to about 3 scale rows in front of the pelvic-fin origin on the examined paratypes.

**Etymology.** Based on *Lobocheilus*, a genus which has a superficially similar appearance to the present species. An adjective.

#### *Poropuntius solitus*, new species (Figure 15)

**Holotype.** ZRC 45310, 91.4 mm SL; Laos: Champasak Prov.: Huay Makchan-Gnai (Xe Nam Noy basin), south of Ban Taot, at turnoff to Xe Nam Noy Project, on road from Pakse to Attapu; 15°04'14"N, 106°32'33"E; M. Kottelat et al., 19 May 1999.

**Paratypes.** LARRI uncat., 8; ZRC 45311, 8; NRM 44909, 8; CMK 15516, 25, 25.7–61.7 mm SL; same data.

**Diagnosis.** Distinguished from the other species of the genus by the combination of the following characters: 7½ branched dorsal-fin rays; 29–32 + 2–3 lateral line scales; ½/5/1/4½ scales in transverse row (from dorsal-fin origin to about 3 scale rows in front of pelvic-fin origin); 11–12 predorsal scales; lips not hypertrophied; mouth arched; sheath on lower jaw without sharp edge.

**Colour pattern.** Holotype plain olive brown with reticulate pattern; a faint midlateral stripe from a point about halfway between gill-opening and dorsal-fin origin to base of caudal fin; faint submarginal stripes along upper and lower margin of caudal fin. In the paratypes, the stripe is more contrasted. Colour in life greenish brown (no details could be observed as the work was conducted in heavy rain).



Figure 15. *Poropuntius solitus*, holotype, ZRC 45310, 91.4 mm SL (right side, reversed).

**Etymology.** From the Latin *solitus* (usual, ordinary). An adjective.

**Remarks.** *Poropuntius solitus* is distinguished from the other species of *Poropuntius* from the Bolaven Plateau as follow: from *P. bolovenensis* in having only  $7\frac{1}{2}$  branched dorsal-fin rays (vs.  $8\frac{1}{2}$ ) and  $\frac{1}{2}5/1/4\frac{1}{2}$  scales in transverse row (vs.  $\frac{1}{2}5/1/5\frac{1}{2}$ ); from *P. consternans* in missing the hypertrophied lips and the pointed snout and in having  $\frac{1}{2}5/1/4\frac{1}{2}$  scales in transverse row (vs.  $\frac{1}{2}6/1/6\frac{1}{2}$ ); from *P. lobocheilooides* in having 29–32 + 2–3 lateral line scales (vs. 35–39 + 2–3), 11–12 predorsal scales (vs. 15–17),  $\frac{1}{2}5/1/4\frac{1}{2}$  scales in transverse row (vs.  $\frac{1}{2}6/1/6\frac{1}{2}$ ) and  $7\frac{1}{2}$  branched dorsal-fin rays (vs.  $8\frac{1}{2}$ ).

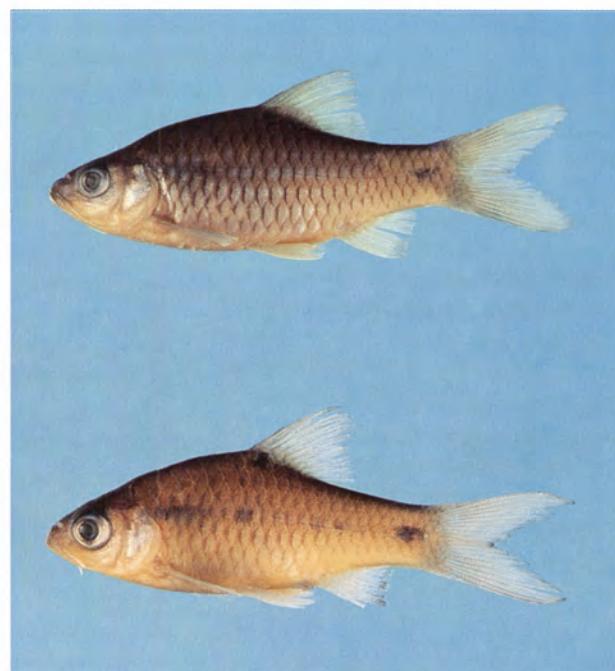
**Comparison material.** *Poropuntius bolovenensis*: CMK 15509, 14, 21.8–42.9 mm SL; Laos: Champasak Prov.: Xe Nam Noy at Ban Latsasin.

*Puntius rhombeus*, new species  
(Figure 16)

**Holotype.** ZRC 45312, 50.1 mm SL; Thailand: Trat Prov.: stream near Ban Tha Kum, 9 km north of Ban Noen Sung on road 3271 from Trat to Bo Rai; 12°32'N 102°37'E; M. Kottelat et al., 3 Dec 1993.

**Paratypes.** CMK 10678, 2, 33.8–40.2 mm SL; same data as holotype. – LARRI uncat., 1; CMK 13342, 2, 46.2–55.7 mm SL; Laos: Saisomboun Special Zone: Houay Sala Yai, a tributary of Nam San; 18°35'17"N, 103°05'00"E; M. Kottelat et al., 28 Feb 1997. – CMK 10716, 1, 63.7 mm SL; Thailand: Trat Prov.: Khlong Fit at Ban Kraduk Chang, road 3157 from Trat to Bo Rai, about 2–3 km after junction with road 3271; 12°28'N 102°38'E; M. Kottelat et al., 3 Dec 1993. – CMK 15020, 1, 36.6 mm SL; Thailand: Loei Prov.: Mekong basin: Nam San Kha at Nam Tok Song Khon, about 12 km SSE of Amphoe Phu Rua; 17°21'03"N, 101°24'28"E; M. Kottelat & K. Kubota, 30 Jan 1999. – CMK 13030, 1, 60.8 mm SL; Thailand: Prachin Buri Prov.: waterfall near Huai Khao; M. Kottelat & K. Kubota, 17 Nov 1996.

**Diagnosis.** Distinguished from the other species of the genus in Southeast Asia by the following combination of characters: two pairs of barbels; 24–25 + 3–4 lateral line scales; dorsal profile more or less straight; a small black spot immediately below dorsal-fin origin, one on middle of caudal peduncle at caudal-fin base; a faint longitudinally elongate blotch immediately behind upper extremity of gill opening, followed along body midline by a dark spot below dorsal and one or two above anal fin (these spots are usually indistinct in specimens larger than about 30



**Figure 16.** *Puntius rhombeus*, paratype, CMK 10678, 40.2 mm SL (above) and holotype, ZRC 45312, 50.1 mm SL (below).



**Figure 17.** *Puntius binotatus*, CMK 9193, 18.8, 24.4, 38.6 and 62.1 mm SL; Java.

mm SL); black crescent at the base of scales; a narrow black distal margin on anal fin in large individuals.

**Distribution.** Mekong basin in Laos, Thailand and Cambodia, south-eastern Thailand; Chao Phraya and Meklong basins; peninsular Thailand north of isthmus of Kra.

**Etymology.** From the Latin *rhombeus* (rhombic). An adjective.

**Remarks.** This species is usually identified as *P. binotatus* (Valenciennes, in Cuvier & Valenciennes,

1842: 168), a species restricted to Java, Bali, Lombok and highlands of Sumatra. All specimens referred to *P. binotatus* from elsewhere in Southeast Asia belong to several species, many of them still unnamed. The real *P. binotatus* (Fig. 17) is distinguished by its colour pattern: a small black spot on the middle of the caudal peduncle at caudal-fin base, a small one below dorsal-fin origin and a dark stripe from the upper extremity of the gill opening to the middle of caudal-fin base, usually wider on the body than on the caudal peduncle. In juveniles, the stripe may be dissociated into a few spots. The two species are easily distinguished by appearance and colour pattern (compare Figs. 16 and 17). Several species of the "*P. binotatus* group" occur in the intermediate areas (Sumatra lowlands and Malay Peninsula), all with distinctive colour patterns. A PCA analysis of morphometric and meristic characters of *P. binotatus* and the other species occurring on Sumatra has shown that these characters exhibit limited variation and that colour pattern is the most reliable character to distinguish species (Bariche, 1998).

**Comparison material.** CMK 9193, 20; Java: Djawa Timur: Kali Brantas basin: Kali Lanang at Sukoreno.

*Rasbora amplistriga*, new species  
(Figure 18)

**Holotype.** ZRC 45313, 29.4 mm SL; Laos: Xekong Prov.: Nam Vi at ford downriver (1.5 km NW) of Ban Kasang-Kan; 15°17'55"N, 106°54'10"E; M. Kottelat et al., 24 May 1999.

**Paratypes.** LARRI uncat., 5; ZRC 45314, 5; NRM 44887, 5; CMK 15740, 10, 16.4–32.4 mm SL; same data as holotype. – CMK 15665, 5, 27.4–30.0 mm SL; Laos: Attapu Prov.: Nam Pa about 1 km upstream of Ban Paam; 14°55'56"N, 107°03'00"E; M. Kottelat et al., 21 May 1999.

**Diagnosis.** Distinguished from the other species of the genus by the following combination of characters: lateral line complete, not markedly declivitous anteriorly, perforating 24–26 + 2–3 scales;  $\frac{1}{4}/1\frac{3}{4}$  scales in transverse row in front of pelvic-fin origin,  $\frac{1}{3}/1\frac{1}{2}$  on caudal peduncle; 1 scale row between lateral line and pelvic-fin origin; 10–11 predorsal scales; dorsal-fin origin above pelvic-fin origin; distance between dorsal-fin origin and middle of caudal-fin base equal to distance between anterior margin of eye and dorsal-fin origin; a dark lateral stripe from upper extremity of gill opening to caudal-fin base, somewhat more intense posteriorly, not extending on caudal fin, width  $1\frac{1}{2}$ –2 scale rows;



**Figure 18.** *Rasbora amplistriga*, paratype, CMK 15665, 30.0 mm SL.

narrow light stripe above lateral stripe; body depth 3.6–4.4 times in SL; head length 3.6–4.2 times in SL; anal fin hyaline.

**Distribution.** Presently known from the Mekong basin south of Khone Falls, in Laos and Cambodia, and in small coastal basins of south-eastern Thailand.

**Etymology.** From the Latin *amplus* (broad, wide) and *striga* (stripe). A noun in apposition.

**Remarks.** This is the *R. paucisqualis* of Rainboth & Kottelat (1987: 419) and Kottelat (1985: 266), who treated it as a valid species and identified under that name specimens from Cambodia and south-eastern Thailand. The lectotype of *R. paucisqualis* is figured in Kottelat (1991: 184).

Siebert (1997: 35) showed that two species had been confused under the name *R. bankanensis* and used the name *R. paucisqualis* for one of them, but without providing evidence supporting the identification of the lectotype of *R. paucisqualis* as this species, rather than the species reported by Rainboth & Kottelat (1987) and Kottelat (1985). This point remains open to discussion, especially since Ahl (1935: 144) explicitly described the anal fin of the preserved holotype of *R. paucisquamis* (and lectotype of *R. paucisqualis*) as transparent and described it as transparent also in the live specimens (from Schreitmüller's data). This cannot be checked on the lectotype as its anal fin is damaged.

*Rasbora amplistriga* is distinguished from *R. paucisqualis* (sensu Siebert) by the absence of the black mark along the anterior margin of the anal fin (vs. presence), although some pigments are present in this position in a single specimen, 1 row of scales between lateral line and pelvic-fin origin (vs. 2), and general appearance (compare Fig. 18 with plate 17 [as *R. bankanensis*] in Kottelat et al., 1993). The lectotype of *R. paucisqualis* has 2 scale rows between lateral line and pelvic-fin origin.

***Rasbora septentrionalis*, new species**  
 (Figure 19)

**Holotype.** ZRC 45315, 50.6 mm SL; Laos: Louangnamtha Prov.: stream said to be Nam Sing (but obviously not according to map) near Ban Nakbon (village also said to have another name), 4 km ESE of Muang Sing; 21°10'47"N, 101°10'50"E; M. Kottelat et al., 23 May 1997.

**Paratypes.** LARRI uncat., 1; ZRC 45316, 1; CMK 14318, 2, 47.0–54.3 mm SL; same data.

**Diagnosis.** Distinguished from the other species of the genus by the following combination of characters: lateral line complete, perforating 30–31 + 2–3 scales;  $\frac{1}{2}/1/2\frac{1}{2}$  scales in transverse row in front of pelvic-fin origin,  $\frac{1}{2}/1/1\frac{1}{2}$  on caudal peduncle; 1 scale row between lateral line and pelvic-fin origin; 13–14 predorsal scales; dorsal-fin origin behind insertion of last pelvic-fin ray; distance between dorsal-fin origin and middle of caudal-fin base equal to distance between middle of eye and dorsal-fin origin; dark lateral stripe from upper extremity of gill opening to caudal-fin base, more intense posteriorly, continued on caudal fin by a small black spot at base of median rays; dorsolateral stripe present, separated from dark lateral stripe by narrow light lateral stripe;  $1\frac{1}{2}$ –2 scales along dorsal midline between base of last dorsal-fin ray and vertical through anal-fin origin; caudal fin light yellow in life, with a very thin posterior dark margin. Colour pattern terminology follows Brittan (1954: 8).

**Distribution.** Presently known only from the Nam Youan basin in Laos (Louangnamtha Prov.) and Yunnan (Xishuangbanna).

**Etymology.** From the Latin *septentrionalis* (from northern areas); this is one of the northernmost ranging species of *Rasbora*. An adjective.



Figure 19. *Rasbora septentrionalis*, holotype, ZRC 45315, 50.6 mm SL.

**Remarks.** This is the *R. myersi* of Chu & Chen (1989: 25), and this is how it is identified using Brittan's (1954) key. *Rasbora myersi* is a synonym of *R. dusonensis* (see Kottelat, 1991: 186) and is distinguished from *R. septentrionalis* as follows: dark lateral stripe not continued by any pigment on median caudal-fin rays (vs. continued by a black spot at base of median caudal-fin rays), dorsolateral and light lateral stripes absent (vs. present), and  $2\frac{1}{2}$ – $3\frac{1}{2}$  scales along dorsal midline between base of last dorsal-fin ray and vertical through anal-fin origin (vs.  $1\frac{1}{2}$ –2). The light dorsolateral stripe in *R. septentrionalis* does not appear on the photograph of the fresh holotype (Fig. 19) but is very distinct in all preserved specimens as a narrow zone without pigments.

### Family Balitoridae

***Hemimyzon confluens*, new species**  
 (Figure 20)

**Holotype.** ZRC 45317, 46.5 mm SL; Laos: Xiangkhouang Prov.: Nam Ngum, rapids downstream of Ban Latbouak; 19°36'28"N, 103°14'23"E; M. Kottelat et al., 30 Apr 1999.

**Paratypes.** LARRI uncat., 1; ZRC 45318, 1; CMK 15228, 2, 36.5–44.8 mm SL; same data as holotype. – CMK 15214, 2, 40.5–45.0 mm SL; Laos: Xiangkhouang Prov.: Nam Ngum at Ban Phianglouang; 19°31'21"N, 103°03'58"E; M. Kottelat et al., 30 Apr 1999.

**Diagnosis.** Distinguished from all other species of the genus in having the pelvic fins posteriorly fused on most of their length, only the distal 1/10 being separated; pectoral fin with 13 simple and 11 (12 in a single specimen) branched rays; pelvic fin with 5 simple and 13–14 branched rays; 58–60 + 2–3 lateral line scales; 5 dark saddles along back; several large blotches on pectoral and pelvic fins.

**Distribution.** Presently known only from the upper Nam Ngum in Laos. In riffles and rapids.

**Etymology.** From the Latin *confluens* (confluent), an allusion to the fused pelvic fins. Treated as a noun in apposition.

**Remarks.** The genera *Hemimyzon* and *Sinogastromyzon* have been traditionally distinguished by a single character: pelvic fins fused (*Sinogastromyzon*) or not (*Hemimyzon*) (e.g., Chen, 1978). Kottelat & Chu (1988: 186) discussed generic limits within Balitorinae and comment that the distinction between the two genera is probably arbitrary and that, apparently, there are several

cases of parallelism. In *Hemimyzon*, there are species with well separated pelvic fins (e.g. *H. elongata*, *H. nanensis*, *H. papilio*), species in which the space between them is narrower (e.g. *H. nuijangensis*, *H. tchangi*), species in which they are contiguous (*H. taitungensis*, *H. pengi*), and one species in which they are fused at the base of the last rays (*H. macroptera*). *Hemimyzon confluens* bridges the gap further in having the pelvic fins fused on almost the entire length of the last rays. Nevertheless, I retain it in *Hemimyzon* as, posteriorly, the outline of each pelvic fin is still distinct (vs. they form a perfectly continuous disc in *Sinogastromyzon*) and the species still has the general appearance and colour pattern of several species of *Hemimyzon* of the Mekong and Chao Phraya basin (*H. nanensis*, *H. papilio*, *H. elongatus*). Most species of *Sinogastromyzon*, on the other hand, have a much stouter appearance, the body is longitudinally contracted, and several have a spinous last simple anal-fin ray and an emarginated caudal fin (vs. forked in *Hemimyzon*). For these reasons, I tentatively retain the two genera as distinct; further research may probably show both of them to be polyphyletic.



**Figure 20.** *Hemimyzon confluens*, holotype, ZRC 45317, 46.5 mm SL.

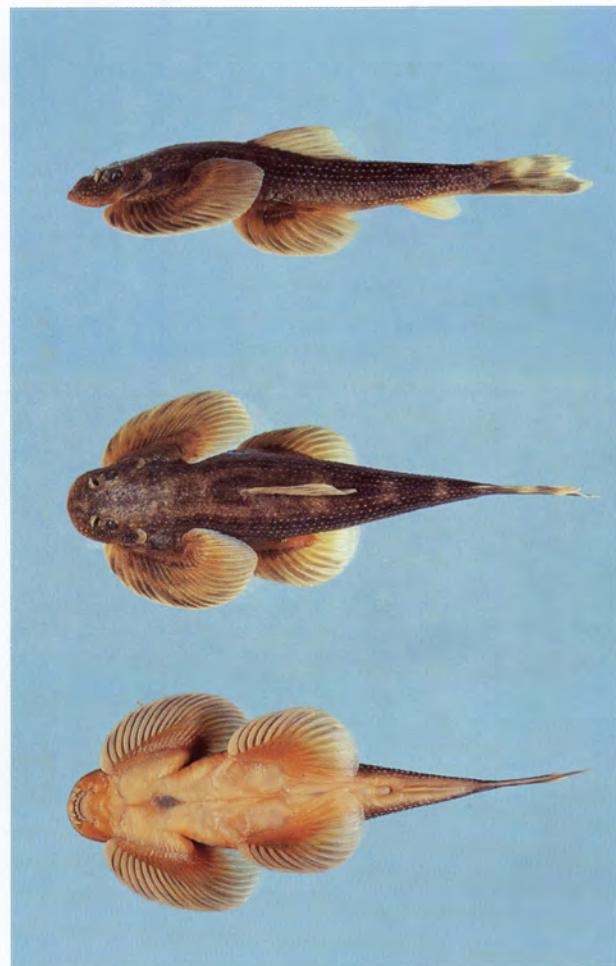
***Hemimyzon khonensis*, new species**  
(Figure 21)

**Holotype.** ZRC 45320, 50.7 mm SL; Laos: Champasak Prov.: Mekong mainstream at Ban Hang Khone, below Khone Falls; I. Baird, Jul 1993 - Jul 1998.

**Diagnosis.** Distinguished from all other species of the genus in having only 54 + 2 lateral line scales (vs. 58–81). Additional characters, not unique to the species: pectoral fin with 13 simple and 11 branched rays; pelvic fin with 5 simple and 11 branched rays; distance between bases of last pelvic-fin rays 3.3 times in body width at pelvic-fin origin.

**Distribution.** Presently known only from immediately downriver of Khone Falls.

**Etymology.** Named for Khone Falls.



**Figure 21.** *Hemimyzon khonensis*, holotype, ZRC 45320, 50.7 mm SL.

***Homaloptera confuzona*, new species**  
 (Figure 22)

**Holotype.** ZRC 45319, 37.2 mm SL; Thailand: Trat Prov.: Khlong Fit at Ban Kraduk Chang, road 3157 from Trat to Borai, about 2–3 km after junction with road 3271; 12°28'N 102°38'E; M. Kottelat et al., 3 Dec. 1993.

**Paratypes.** ZRC 35779, 7; CMK 10718, 7, 33.1–39.6 mm SL; same data as holotype. – CMK 15686, 1, 46.8 mm SL; Laos: Attapu Prov.: Xe Pian at Ban Mai, 14°42'22"N, 106°29'46"E; M. Kottelat et al., 22 May 1999.

**Diagnosis.** Distinguished from all other species of *Homaloptera* s.s. (see Kottelat, 1998: 270) by its unique colour pattern. Body yellowish to reddish brown, with 4 irregularly shaped or incomplete (sometimes absent) darker bars on body. Anterior bar at level of pectoral fin, narrow, usually reaching pectoral fin. Second bar

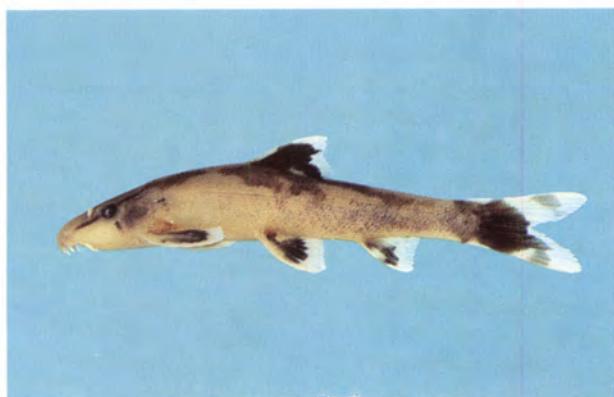


Figure 22. *Homaloptera confuzona*, paratype, CMK 15686, 46.8 mm SL.

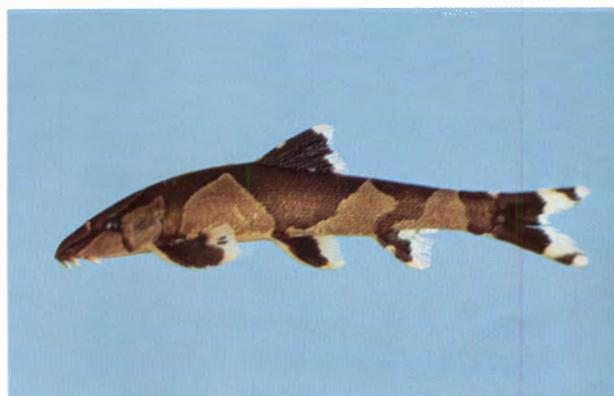


Figure 23. *Homaloptera orthogoniata*, CMK 10542, 45.0 mm SL; Indonesia: Borneo: Kapuas basin.

at dorsal-fin origin, very broad dorsally, extending along base of whole fin, more or less triangular, restricted to upper half of body or continued by a narrow extension to pelvic-fin origin. Third bar above anal-fin base, very irregular, often restricted to upper half of body, or even missing. Fourth bar at extremity of caudal peduncle, continuous with a large blotch on caudal-fin base and lower caudal-fin lobe. Second and third bars often connected along the back, first and second rarely so. A conspicuous stripe from tip of snout through eye to nape and one from eye towards throat. Colour pattern on fins less variable, as on Figure 22. Pectoral fin with 6–7 simple and 10–11 branched rays. Pelvic fin with 2 simple and 7 branched rays. 62–67 + 2 lateral line scales.

**Distribution.** Known from the Mekong basin downriver of Khone Falls in Laos and Cambodia and small coastal basins in south-eastern Thailand.

**Etymology.** A contraction of the Latin *confusus* (confused) and *zona* (belt). A noun in apposition.

**Remarks.** *Homaloptera confuzona* is very similar to *H. orthogoniata* (Fig. 23) from Borneo, Sumatra and the Malay Peninsula. The two species are easily distinguished however, by colour pattern. In *H. orthogoniata*, the bars exhibit much less variation among and within populations; they are broader, with more regular and more contrasted edges (often outlined by a darker margin), and extend to the lower half of body.

*Schistura*

Unless otherwise stated, the following characters apply to all species listed below and, therefore, are not repeated: anterior nostril pierced on front side of a flap (not at tip of short tube, not barbel-like). Processus dentiformis present. Lips with a few furrows, lower lip with 2–5 deep folds. Lower lip interrupted medially. Lateral line complete. Anus about 1–2 eye diameters in front of anal-fin origin. Dorsal-fin origin slightly in front or above pelvic-fin origin. 8½ branched dorsal-fin rays. Caudal fin emarginate, with 9+8 branched rays. Anal fin with 5½ branched rays. Pelvic fin with 7–8 rays. Pectoral fin with 10–13 rays. Axillary pelvic lobe present. One row of elongate black marks along rays in dorsal fin. Two vertical rows of faint elongate blackish marks along rays in caudal fin.

For all species the colour pattern forms part of the diagnostic characters, even if sometimes described in a different paragraph.

*Schistura amplizona*, new species  
(Figure 24)

**Holotype.** ZRC 45321, 65.6 mm SL; Laos: Louangnamtha Prov.: Nam Tha at Ban Finho, about 14 km N of Luang Nam Tha; 21°04'44"N, 101°24'09"E; M. Kottelat et al., 22 May 1997.

**Paratypes.** LARRI uncat., 3; ZRC 45322, 3; CMK 14283, 7, 34.5–90.9 mm SL; same data as holotype. – NRM 44888, 3; CMK 14266, 5, 41.4–85.7 mm SL; Laos: Louangnamtha Prov.: Nam Tha S of confluence with Nam Khon; 20°54'11"N, 101°26'25"E; M. Kottelat et al., 21 May 1997.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by its colour pattern. Body yellowish with a broad very faint grey midlateral stripe. 5–7 broad blackish brown bars on body, wider than interspaces, wider anteriorly than posteriorly, usually wider on lateral line than on back. Some bars sometimes restricted to a blotch on lateral line. Black bar at caudal-fin base slightly oblique, restricted to lower two-thirds; a black spot at base of upper principal rays. Dorsal fin with a long black blotch, along base of branched rays only. Series of marks on rays of all fins.

Body and head elongate, head slender. No notch in lower jaw, even in largest individuals. Caudal peduncle with hard dorsal and ventral keels on posterior half, 1.42–1.69 times longer than deep.

**Distribution.** Presently known only from the Nam Tha and Nam Youan basins in northern Laos.

**Etymology.** From the Latin *amplus* (broad) and *zona* (belt). A noun in apposition.



Figure 24. *Schistura amplizona*, holotype, ZRC 45321, 65.6 mm SL (right side, reversed).

*Schistura aramis*, new species  
(Figure 25)

**Holotype.** ZRC 45323, 66.6 mm SL; Laos: Phongsali Prov.: Houay Chik, about 2 km E of Muang Mai; 21°10'26"N, 102°44'06"E; M. Kottelat et al., 16 May 1997.

**Paratypes.** LARRI uncat., 2; ZRC 45324, 2; NRM 44910, 2; CMK 14148, 10, 23.8–70.2 mm SL; same data.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: dorsal-fin origin above or slightly behind pelvic-fin origin; belly entirely scaled, except between pectoral fins; no median notch in upper lip; lower lip with a median incision; lower jaw with a median notch; body depth 15.8–16.5 % SL; caudal peduncle with low dorsal and ventral adipose keels, length 17.1–18.5 % SL, depth 12.3–13.6 % SL, 1.35–1.39 times in length.

**Colour pattern.** Body with 8–11 bars, narrower than interspaces, not reaching ventral midline (even on caudal peduncle), regularly shaped in individuals more than about 35 mm SL, usually ending shortly before meeting their homologues of other body side on the back, leaving a pale predorsal area. Black bar at caudal-fin base incomplete, not reaching dorsal and ventral midlines, often appearing as divided at end of lateral line into two small arched lines. Dorsal-fin base with a black spot anteriorly, followed by an orange patch and a low elongate grey blotch.

**Distribution.** Presently known from a single stream near Muang Mai, in the Nam Nua basin, a tributary of the Nam Ou, flowing from Vietnam (Lai Chau Province) to Laos. In a small forest creek.

**Etymology.** Aramis, one of the characters of Alexandre Dumas' *Les trois mousquetaires*. A noun in apposition.



Figure 25. *Schistura aramis*, paratype, CMK 14148, 69.5 mm SL.

*Schistura athos*, new species  
(Figure 26)

**Holotype.** ZRC 45325, 85.8 mm SL; Laos: Louangphabang Prov.: Houay Houn, about 3 km upstream of Ban Houay Lek, in gorges; approx. 20°32'32"N, 102°40'51"; M. Kottelat et al., 11 May 1997.

**Paratypes.** LARRI uncat., 8; ZRC 45326, 8; NRM 44889, 8; CMK 14021, 21, 39.8–88.3 mm SL; same data as holotype. – CMK 14095, 9, 36.5–70.0 mm SL; Laos: Phongsali Prov.: Nam Pe at confluence with Nam Ou, about 12 km SSE of Ban Hatxa; 21°39'07"N, 102°15'19"E; M. Kottelat et al., 14 May 1997.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by its colour pattern. Cheeks mottled; top of head finely dotted. Body yellowish with a broad faint grey midlateral stripe. 7–9 broad blackish brown bars on body, usually wider than interspaces, wider anteriorly than posteriorly, usually wider on lateral line and on dorsal midline and constricted in-between. Bars often dissociated into a blotch along lateral line and a saddle on back, especially in individuals smaller than about 40 mm SL. Black bar at caudal-fin base not reaching dorsal and ventral midline; a black spot above base of upper principal rays (not distinct in large specimens). Dorsal fin with two low blotches along base.

Massive appearance, head broadly triangular, cheeks swollen in individuals larger than about 70 mm SL; largest specimens with a conspicuous hump in front of dorsal-fin origin. Caudal peduncle 1.1–1.2 times longer than deep.

**Distribution.** Presently known only from the Nam Ou basin in northern Laos.

**Etymology.** Athos, one of the characters of Alexandre Dumas' *Les trois mousquetaires*. A noun in apposition.



Figure 26. *Schistura athos*, paratypes, CMK 14095; a, 40.2 mm SL; b, 70.0 mm SL.

*Schistura bairdi*, new species  
(Figure 27)

**Holotype.** ZRC 45327, 28.8 mm SL; Laos: Champasak Prov.: Mekong mainstream at Ban Hang Khone below Khone Falls; I. G. Baird, Jul 1993 - Jul 1998.

**Paratypes.** LARRI uncat., 1; CMK 15902, 4, 26.7–31.1 mm SL; same data as holotype.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: 8 + 7–8 branched caudal-fin rays; 7 pelvic-fin rays; lateral line incomplete, reaching to vertical of dorsal-fin origin; nostril flap long, pointed, reaching front margin of eye; no median notch in upper lip; lower lip not interrupted medially, but slightly emarginate; a sharp median notch in lower jaw; axillary pelvic lobe rudimentary.

**Colour pattern.** A swarm of black pigments on cheek below eye. Body with 6–8 broad bars, wider than interspaces, somewhat irregular, or branched in lower half. An irregular midlateral swarm of sparsely-set black pigments from gill opening to caudal-fin base. Black bar at caudal-fin base complete. Dorsal fin with a low, small spot at anterior base (see Baird et al. [1999: 79, as *Schistura* sp. 5] for a photograph of one of the largest paratypes immediately after capture).

**Distribution.** Mekong mainstream downriver of Khone Falls. Very small specimens (15–20 mm SL) from gravel beds in the Xe Kong near Attapu and rapids on the lower Xe Kaman are tentatively identified as this species.

**Etymology.** Named for Ian G. Baird, who has worked on fish, fisheries and dolphins in southern Laos for several years and who collected the type series.

**Remarks.** The largest paratype (31.1 mm SL) is a female with ripe eggs about 1 mm in diameter.



Figure 27. *Schistura bairdi*, holotype, ZRC 45327, 28.8 mm SL.

*Schistura bolavenensis*, new species  
(Figure 28)

**Holotype.** ZRC 45328, 47.0 mm SL; Laos: Champasak Prov.: Huay Makchan-Gnai (Xe Nam Noy basin), south of Ban Taot, at turnoff to Xe Nam Noy Project, on road from Pakse to Attapu; 15°04'14"N, 106°32'33"E; M. Kottelat et al., 19 May 1999.

**Paratypes.** LARRI uncat., 5; ZRC 45329, 5; NRM 44890, 5; CMK 15520, 17, 20.9–63.7 mm SL; same data as holotype.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: body slender, depth 12.8–14.6 % SL; caudal peduncle slender, depth 9.8–12.0 % SL, 1.5–1.7 times in length; head short, lateral length 19.7–23.3 % SL; dorsal-fin origin above or slightly in front of pelvic-fin origin; both lips fleshy, upper lip notched medially.

**Colour pattern.** Body with 15–24 bars, as wide or thinner than interspaces, quite regularly set. Posteriormost bars sometimes incomplete, appearing as elongate blotches. Black bar at caudal-fin base usually complete (not reaching dorsal and ventral midlines), or split at about two-thirds of its height. Dorsal fin with 2–4 black spots along base, sometimes fused to form a single elongate blotch.

**Distribution.** Tributaries of the Xe Kong and Xe Don on Bolaven Plateau.

**Etymology.** Named after the Bolaven Plateau, to which the species is apparently endemic.



Figure 28. *Schistura bolavenensis*, holotype, ZRC 45328, 47.0 mm SL.

*Schistura clatrata*, new species  
(Figure 29)

**Holotype.** ZRC 45330, 61.1 mm SL; Laos: Xekong Prov.: Houay Cha Ngao, an east side tributary of Xe Kong, entering it about 8 km upriver of Muang Kaleum; 15°46'08"N, 106°45'54"E; M. Kottelat et al., 26 May 1999.

**Paratypes.** LARRI uncat., 8; ZRC 45331, 8; NRM 44911, 8; CMK 15800, 31, 17.7–65.9 mm SL; same data.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: body depth 15.9–17.9 % SL; caudal peduncle with dorsal and ventral adipose keels, length 16.2–17.7 % SL, depth 12.8–14.2 % SL, 1.14–1.35 times in length; no median notch in upper lip; lower lip with a median incision; lower jaw with a median notch.

**Colour pattern.** Top of head vermiculated, cheeks dotted. Body with 9–13 bars, wider than interspaces, wider anteriorly than posteriorly, in most individuals regularly shaped and set, in others very irregularly shaped and organised. Black bar at caudal-fin base usually complete. Dorsal-fin base with a blackish band, with a hyaline (orange in life) spot.

**Distribution.** Xe Kong basin.

**Etymology.** From the Latin *clatratus* (with rungs). An adjective.

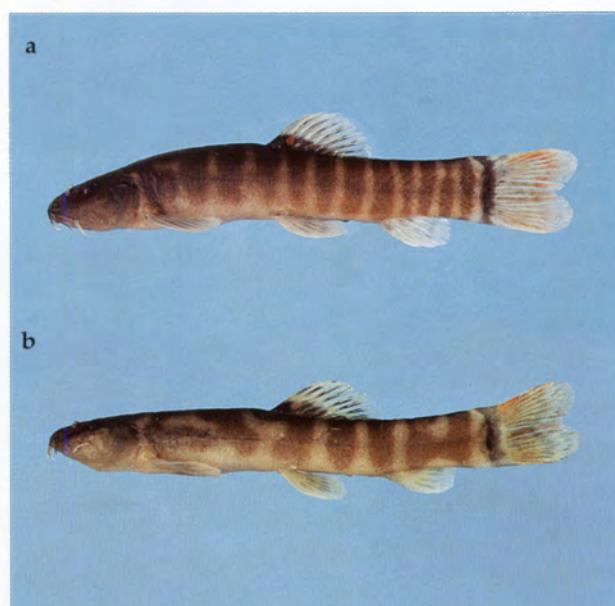


Figure 29. *Schistura clatrata*; a, holotype, ZRC 45330, 61.1 mm SL; b, paratype, CMK 15800, 64.7 mm SL.

*Schistura coruscans*, new species  
(Figure 30)

**Holotype.** ZRC 45332, 57.1 mm SL; Laos: Saisomboun Special Zone: Houay Sala Yai, a tributary of Nam San; 18°35'17"N, 103°05'00"E; M. Kottelat et al., 28 Feb 1997.

**Paratypes.** LARRI uncat., 10; ZRC 45333, 10; NRM 44891, 10; CMK 13355, 59, 14.4–65.3 mm SL; same data.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of character: snout profile arched; a small median notch in upper lip; lower lip with a median incision; head length 22.0–24.1 % SL; body depth 17.8–19.7 % SL; caudal peduncle length 16.5–18.8 % SL, depth 13.4–14.8 % SL, 1.16–1.33 times in length.

**Colour pattern.** Top of head marmorated, no particular pattern. Body with 7–13 bars, usually wider than or as wide as interspaces, wider anteriorly than posteriorly, usually very regular although some may be branched or incomplete. In some individuals, bars may be paler in centre. Black bar at caudal-fin base usually complete but very faint, except for a vertically elongate blotch occupying about half of caudal-fin base. Dorsal-fin base with a black spot at anterior extremity, sometimes an elongate blotch further behind. In life, bright red dorsal and caudal fins, bright yellow-orange anal, pelvic and pectoral fins. Juveniles about 20 mm SL with irregular bars, often appearing as pairs of black bars with paler grey area in-between.



Figure 30. *Schistura coruscans*; a, juvenile, CMK 13355, 24.9 mm SL; b, holotype, ZRC 45332, 57.1 mm SL.

**Distribution.** Lower and middle Nam San basin, a tributary of Nam Ngum. Collected in riffles, among stones.

**Etymology.** From the Latin *corusco* (to flame, to flash). Treated as a noun in apposition.

**Remarks.** *Schistura coruscans* resembles *S. nicholsi* from which it differs in having a complete lateral line (vs. usually incomplete), a median notch in upper lip (vs. none), a longer caudal peduncle (length 16.5–18.8 % SL, vs. 13.3–15.3, depth 1.16–1.33 times in length, vs. 0.84–1.13) (*S. nicholsi* data from Kottelat, 1990: 167) and the bright colour of the fins in life. In *S. nicholsi*, the caudal fin is sometimes red and there is a red spot between two black blotches along dorsal-fin base, the other fins are hyaline. There is no data allowing to say whether these vivid colours are exhibited all year round or only during a given time of the life cycle of the fish.

*Schistura crabro*, new species  
(Figure 31)

**Holotype.** ZRC 45334, 30.0 mm SL; Laos: Bolikhamsai Prov.: Nam Ngiap; K. Vatthanatham, Mar 1999.

**Diagnosis.** Distinguished from all species of the genus in Southeast Asia by the following combination of characters: 7+7 branched caudal-fin rays; lateral line incomplete, reaching vertical of middle of dorsal-fin base; small median notch in upper lip; median interruption in lower lip; no median notch in lower jaw.

**Colour pattern.** A black blotch on cheek, below eye. Tip of snout yellow. Body orange, with 4 broad dark brown bars, wider than interspaces. A swarm of black pigments forming a very broad band from first bar to caudal-fin base. Black bar at caudal-fin base restricted to lower two-thirds, with a lower posterior projection



Figure 31. *Schistura crabro*, holotype, ZRC 45334, 30.0 mm SL.

along base of 3 lowermost principal rays; an elongate black spot on last upper procurrent ray and base of uppermost principal ray. A low black spot on anterior base of dorsal fin. A series of blackish marks on rays of all fins.

**Distribution.** Presently known only from the holotype, part of material from mixed localities in the Nam Ngiap basin.

**Etymology.** From the Latin *crabro* (hornet, large wasp). A noun in apposition.

**Remarks.** The holotype has the appearance of an adult female. It has been dissected, but the inner organs were not very well fixed and the ovaries or eggs could not be observed.

*Schistura defectiva*, new species  
(Figure 32)

**Holotype.** ZRC 45335, 48.5 mm SL; Laos: Xiangkhouang Prov.: Nam Ngum at Ban Phianglouang; 19°31'21"N, 103°03'58"E; M. Kottelat et al., 30 Apr 1999.

**Paratypes.** LARRI uncat., 10; ZRC 45336, 10; NRM 44908, 10; CMK 15215, 60, 16.1–47.5 mm SL; same data.

**Diagnosis.** Distinguished from all other species of the genus in the Mekong basin by the following combination of characters: no median notch in upper lip; no median notch in lower jaw; body depth 14.3–15.8 % SL; caudal peduncle length 14.5–15.8 % SL, depth 10.5–11.8 % SL, 1.26–1.44 times in length.

Colour pattern. Top of head spotted. Body with 8–10 bars, as wide as or narrower than interspaces, not very regularly shaped and set, often dissociated into a blotch along side and a blotch along dorsal midline (blotches along dorsal midline may be fused into a middorsal stripe). A faint grey midlateral stripe or rows of longitudinally elongate blotches superimposed to the bar pattern. Black bar at caudal-fin base more or less complete, often not reaching ventral midline, bent forward along dorsal midline. Dorsal-fin base with a black spot at anterior extremity, followed by an orange dot and a grey elongate blotch.

**Distribution.** Nam Ngum and Nam Khan basins. In riffles and creeks.

**Etymology.** From the Latin *defectivus* (incomplete, imperfect, intermittent), a reference to the incomplete bars. An adjective.

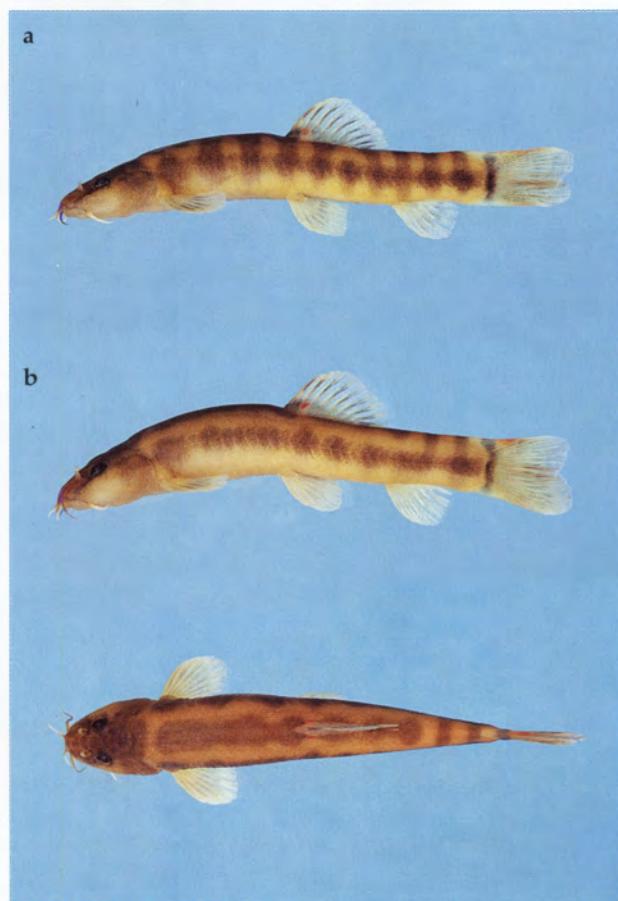


Figure 32. *Schistura defectiva*; a, paratype, CMK 15215, 47.3 mm SL; b, holotype, ZRC 45335, 48.5 mm SL.

**Remarks.** Using the key in Kottelat (1990), this species would key out as *S. sexcauda* or *S. kengtungensis*. It is distinguished from *S. sexcauda*, from the Chao Phraya basin, by its more slender caudal peduncle (1.26–1.51 times longer than deep, vs. 0.98–1.24), and details of colour pattern. It is distinguished from *S. kengtungensis*, from the Mekong basin in northern Laos, northern Thailand and Myanmar, by a slender body (depth 10.5–12.1 % SL, vs. 14.8–18.7) and details of coloration. Comparison data from Kottelat (1990: 134, 204).

*Schistura defectiva* also has some resemblance with *S. sombooni* from the Nam Kading, Nam Ngap and Nam Ngum basins, from which it is distinguished by a more slender body (depth 14.3–15.8 % SL, vs. 16.7–18.3), a more slender caudal peduncle (depth 10.5–11.8 % SL, vs. 12.5–13.6; 1.26–1.44 times in length, vs. 1.13–1.28) and details of colour patterns (especially the irregular bars, often dissociated into spots along dorsal midline, vs. more uniformly shaped, not dissociated into spots on dorsal midline).

*Schistura ephelis*, new species  
(Figure 33)

**Holotype.** ZRC 45337, 65.0 mm SL; Laos: Saisomboun Special Zone: Houay Sala Yai, a tributary of Nam San; 18°35'17"N, 103°05'00"E; M. Kottelat et al., 28 Feb 1997.

**Paratypes.** LARRI uncat., 8; ZRC 45338, 8; NRM 44892, 8; CMK 13356, 32, 22.0–81.9 mm SL; same data.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: body massive, with hump in front of dorsal-fin origin and swollen cheeks in specimens over about 70 mm SL; no median notch in upper lip; lower lip with a median incision.

**Colour pattern.** Top of head vermiculated, cheeks dotted. Body yellowish brown with 6–12 bars, very contrasted, usually narrower than interspaces, irregularly shaped and set, often branched, fused or incomplete, in posterior part of body several bars restricted to ventral half. Black bar at caudal-fin base almost complete, usually not reaching dorsal and ventral midlines. Dorsal-fin base with one or two low blotches. Colour pattern distinct already at about 25 mm SL.

**Distribution.** Lower and upper Nam San basin (a tributary of Nam Ngum). Collected in riffles, among stones.

**Etymology.** From the Greek *ephelis* (freckle), reference to the dotted cheeks. Treated as a noun in apposition.



Figure 33. *Schistura ephelis*, holotype, ZRC 45337, 65.0 mm SL.

*Schistura finis*, new species  
(Figure 34)

**Holotype.** ZRC 45339, 82.8 mm SL; Laos: Xiangkhouang Prov.: Nam Kan, a small creek making the border between Laos and Vietnam at Ban Xayden; 19°28'19"N, 104°05'04"E; M. Kottelat et al., 3 May 1999.

**Paratypes.** LARRI uncat., 8; ZRC 45340, 8; NRM 44912, 8; CMK 15271, 8, 17.9–89.0 mm SL; same data.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: body and head massive, cylindrical; snout blunt; cheeks slightly swollen in individuals larger than about 80 mm SL; no median notch in upper lip; lower lip with a median incision; lower jaw with a median notch.

**Colour pattern.** Body greyish brown with poorly contrasted pattern in adults. Body with about 12–15 bars between dorsal-fin origin and caudal fin, additional bars present in front of dorsal-fin but indistinct, except upper extremities which do not reach dorsal midline but form two series of dark blotches parallel to dorsal midline or sometimes fused to form two stripes. Bars thinner than interspaces, usually irregularly shaped and organised in individuals 60–70 mm SL, quite regular above this size. Black bar at caudal-fin base more or less complete, with posterior projection at lower extremity, curved forward at upper extremity. Dorsal-fin base with a black spot anteriorly, followed by a hyaline

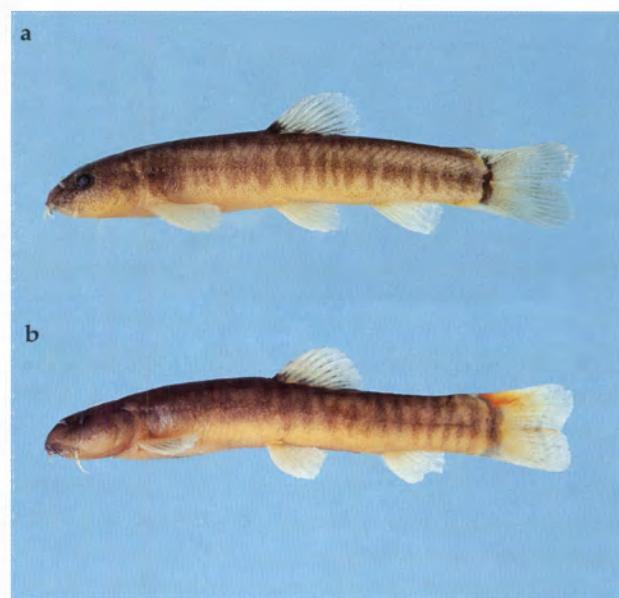


Figure 34. *Schistura finis*; a, paratype, CMK 15271, 35.0 mm SL; b, holotype, ZRC 45339, 82.8 mm SL (right side, reversed).

patch and a low elongate grey blotch. Caudal fin orange in life, with a red patch occupying from a few rays to most of upper lobe.

In specimens about 30–50 mm SL, a series of very narrow bars on side, not reaching dorsal midline. In front of dorsal-fin origin, a longitudinal series of small irregular blotches on each side of dorsal midline (Fig. 34).

**Distribution.** Only known from the type locality, a small creek in the Nam Mo basin.

**Etymology.** From the Latin *finis* (border), reference to the type locality. A noun in apposition.

*Schistura fusinotata*, new species  
(Figure 35)

**Holotype.** ZRC 45341, 38.3 mm SL; Laos: Xekong Prov.: Nam Vi at ford downriver (1.5 km NW) of Ban Kasang-Kan; 15°17'55"N, 106°54'10"E; M. Kottelat et al., 24 May 1999.

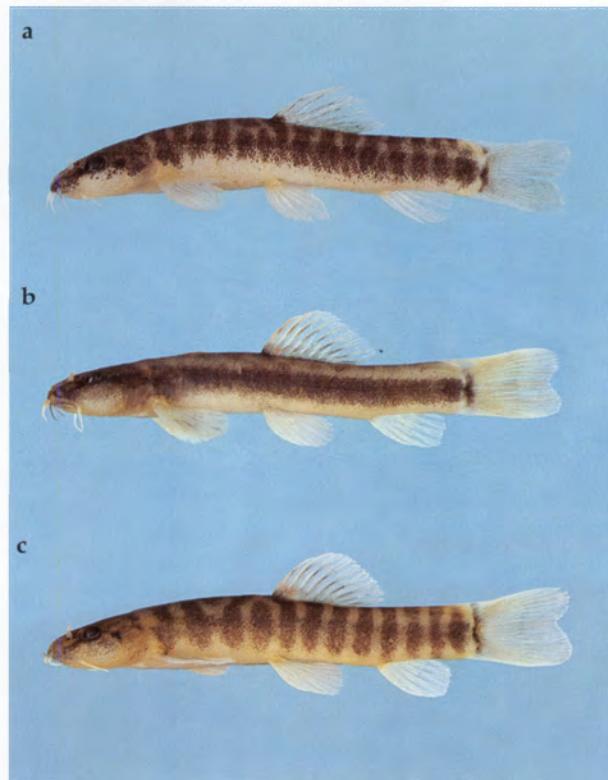
**Paratypes.** LARRI uncat., 2; ZRC 45342, 2; CMK 15745, 4, 17.2–34.9 mm SL; same data as holotype. – CMK 15577, 4, 22.3–32.9 mm SL; Laos: Attapu Prov.: Xe Kong between Attapu and downstream to Ban Ouk; 14°44'51"N, 106°43'59"E; M. Kottelat et al., 20 May 1999. – CMK 15615, 14, 21.5–38.7 mm SL; Laos: Attapu Prov.: unnamed creek entering Xe Kaman from the north at proposed Xe Kaman dam site; 14°57'40"N, 107°09'16"E; M. Kottelat et al., 21 May 1999.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: dorsal-fin origin above pelvic-fin origin; shallow median notch in both upper and lower lips; lower jaw with a shallow notch; 8+8 branched caudal-fin rays; lateral line from complete to reaching only level of pelvic-fin origin.

**Colour pattern.** Body with 11–16 bars, wider than interspaces. A broad midlateral stripe superimposed on bars. In some specimens, bars fainter, except along dorsal midline, and midlateral stripe darker, becoming main element of colour pattern; remains of bars then form small simple, regular saddles along back. In other specimens, stripe very faint. Black bar at caudal-fin base complete, usually quite faint. A small black spot at base of anterior dorsal rays.

**Distribution.** Presently known only from the Xe Kong basin, from small forest creeks to main rivers.

**Etymology.** From the Latin *fusio* (fusion) and *notatus* (marked). An adjective.



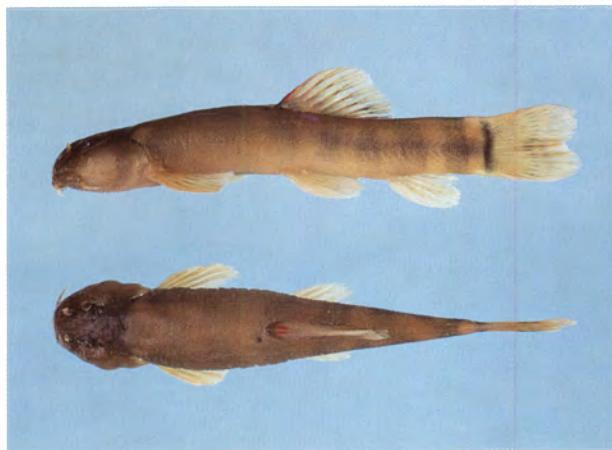
**Figure 35.** *Schistura fusinotata*; a, paratype, CMK 15615, 38.7 mm SL; b, paratype, CMK 15577, 22.6 mm SL; c, holotype, ZRC 45341, 38.3 mm SL.

*Schistura globiceps*, new species  
(Figure 36)

**Holotype.** ZRC 45343, 39.7 mm SL; Laos: Louangnamtha Prov.: unnamed forest creek tributary to Nam Talan, at about km 60 on road from Oudomxai to Luang Nam Tha, about 3 km S of Ban Nateuy; 20°59'56"N, 101°39'47"E; M. Kottelat et al., 20 May 1997.

**Paratypes.** LARRI uncat., 1; CMK 14231, 3, 38.7–52.3 mm SL; same data.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: dorsal-fin origin in front of pelvic-fin origin; adipose keel along back between dorsal and caudal fins, and ventrally on posterior half of caudal peduncle; cheeks swollen in specimens above 40 mm SL; pelvic fins reaching beyond anus; median notch in upper lip usually present; lower lip with a median incision; lower jaw with a median notch; body depth 12.9–16.4 % SL; caudal peduncle



**Figure 36.** *Schistura globiceps*, paratype, CMK 14231, 52.3 mm SL.

length 13.1–16.3 % SL, depth 10.1–13.4 % SL, 1.13–1.40 times in length.

**Colour pattern.** Body with 6–9 bars, more or less as wide as interspaces, bars anterior to dorsal-fin origin usually indistinct, quite regular although sometimes incomplete on caudal peduncle, continuous across dorsal midline. Black bar at caudal-fin base almost complete, not reaching dorsal and ventral midlines. Dorsal-fin base with a faint spot anteriorly, followed by a low elongate pale grey blotch.

**Distribution.** Presently known only from the type locality, a small forest creek along the water divide between the Nam Tha and Nam Ou basins. Among leaf litter, in 5–20 cm of water, over a clay bottom.

**Etymology.** From the Latin *globus* (globe, sphere) and the latinized Greek *cephalus* (head). A noun in apposition.

*Schistura imitator*, new species  
(Figure 37)

**Holotype.** ZRC 45344, 41.1 mm SL; Laos: Xekong Prov.: Xe Namnoy, rapids about 1 km upriver of Tad Feak waterfall; 15°14'09"N, 106°44'55"E; M. Kottelat et al., 25 May 1999.

**Paratypes.** CMK 15777, 1, 39.0 mm SL; same data as holotype. – LARRI uncat., 2; ZRC 45345, 2; NRM 44893, 2; CMK 15841, 5, 24.0–36.8 mm SL; Laos: Xekong Prov.: Xe Kong at Keng Prao, about 12 km upriver of Muang Kaleum; 15°48'18"N, 106°45'27"E; M. Kottelat et al., 26 May 1999. – CMK 15704, 3, 37.4–44.9 mm SL; Laos: Attapu Prov.: Xe Namnoy at Tat Hua Khon waterfall; 15°13'39"N, 106°44'47"E; M. Kottelat et al., 23 May 1999.



**Figure 37.** *Schistura imitator*, holotype, ZRC 45344, 41.1 mm SL.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: 9½ branched dorsal-fin rays; anus closer from pelvic-fin base than anal-fin origin; upper lip almost smooth, with a broad median notch; lower lip with median interruption; lower jaw with a deep notch.

**Colour pattern.** Body with 9–11 dark brown bars wider than interspaces, sometimes very regular, sometimes irregular or branched. In juveniles, fainter and darker bars alternate, darker ones often being wider on lateral line. Black bar at caudal-fin base complete but faint along dorsal and ventral midlines. Dorsal fin with one or two grey blotches along base and a black subdistal stripe, on both rays and membranes; a red mark along anterior edge of fin (on membranes between last simple ray and second branched ray) and on the following rays immediately above the black subdistal stripe (one little dot at base of membrane between branches of branched rays). Caudal fin reddish, pectoral and pelvic fins yellow-orange.

**Distribution.** Presently known only from the Xe Kong basin. In fast flowing water, rapids.

**Etymology.** From the Latin *imitator* (imitator). A noun in apposition.

**Remarks.** *Schistura imitator* has always been collected together with *S. khamtanhi*. They have quite similar colour patterns, especially the striking marks in the dorsal fin. They differ, however, in details of the pattern in the dorsal fin, the appearance of the body bar, number of dorsal-fin rays, shape of lips and jaws, position of the anus (see the diagnosis of the two species for details).

*Schistura implicata*, new species  
(Figure 38)

**Holotype.** ZRC 45346, 56.1 mm SL; Laos: Houaphan Prov.: Nam Poun at confluence with Nam Xang, downstream of Ban San; 20°19'25"N, 104°31'36"E; M. Kottelat et al., 11 May 1999.

**Paratypes.** LARRI uncat., 5; ZRC 45347, 5; NRM 44913, 5; CMK 15460, 17, 22.9–86.9 mm SL; same data.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: lateral head length 20.5–22.8 % SL; predorsal distance 51.1–53.6 % SL; prepelvic distance 48.7–51.5 % SL; body depth 13.4–16.3 % SL; caudal peduncle length 16.5–19.0 % SL, depth 10.8–12.3 % SL, 1.49–1.66 times in length; a median notch in upper lip; a median incision in lower lip; no median notch in lower jaw; cheeks slightly swollen in specimens larger than about 60 mm SL.

**Colour pattern.** Top of head vermiculated. Body with 8–11 bars, usually wider than interspaces, very irregularly shaped and organised, many incomplete, especially along dorsal midline where they often are branched, fused or with paler centre. Some individuals with dark body and very poorly contrasted bars, sometimes with a distinct axial stripe. Black bar at caudal-fin base complete. Dorsal-fin base with black spot anteriorly, followed by a very low elongate blackish blotch.

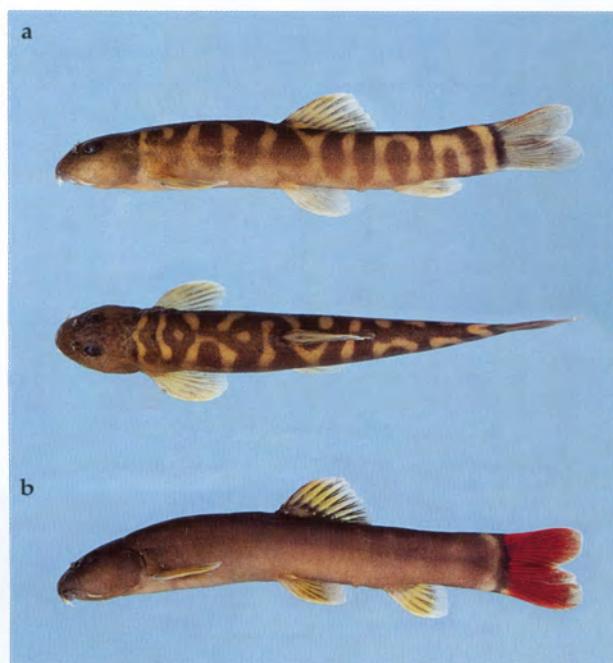


Figure 38. *Schistura implicata*; a, holotype, ZRC 45346, 56.1 mm SL; b, paratype, CMK 15460, 66.0 mm SL.

**Distribution.** Nam Luong basin, a southern tributary of the Nam Ma east of Viangxai entering it in Vietnam. In riffles.

**Etymology.** From the Latin *implicatus* (complicated, intricate). An adjective.

*Schistura irregularis*, new species  
(Figure 39)

**Holotype.** ZRC 45348, 54.4 mm SL; Laos: Xiangkhouang Prov.: Nam Khan at Muang Hian; 20°05'18"N, 103°22'09"E; M. Kottelat et al., 13 May 1999.

**Paratypes.** CMK 15490, 2, 56.5–85.2 mm SL; same data.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: no median notch in upper lip; lower lip with median incision; lower jaw with median notch; low dorsal keel along caudal peduncle; large individuals with swollen cheeks; body depth 17.4–18.8 % SL; caudal peduncle length 16.8–18.1 % SL, depth 12.5–15.0 % SL, 1.20–1.38 times in length.

**Colour pattern.** Body with 7–9 bars wider than interspaces, very irregularly shaped and set; anterior bars wider than posterior ones, not always distinct; posterior bars with dark edges and pale centre. Black bar at caudal-fin base incomplete, not reaching dorsal and ventral midlines, restricted to a narrow, short bar at end of lateral line, curved forwards at upper extremity. Dorsal-fin base with small anterior black spot followed by an orange patch and a very low elongate grey blotch.

**Distribution.** Presently known only from the Nam Khan basin.

**Etymology.** From the Latin *irregularis* (not regular). An adjective.



Figure 39. *Schistura irregularis*, holotype, ZRC 45348, 54.4 mm SL.

***Schistura khamtanhii*, new species**  
(Figure 40)

**Holotype.** ZRC 45349, 52.9 mm SL; Laos: Xekong Prov.: Houay Pao, a west side tributary of Xe Kong, entering it about 16 km upriver of Muang Kaleum; 15°50'17"N, 106°45'40"E; M. Kottelat et al., 26 May 1999.

**Paratypes.** LARRI uncat., 6; ZRC 45350, 6; NRM 44894, 6; CMK 15820, 18, 17.3–60.3 mm SL; same data as holotype. – CMK 15652, 71, 19.1–42.3 mm SL; Laos: Attapu Prov.: rapids on Xe Kaman at 14°53'29"N, 107°07'20"E; M. Kottelat et al., 21 May 1999.

**Diagnosis.** Distinguished from all other species of the genus in South East Asia by the following combination of characters: body compressed, deep; dorsal keel on caudal peduncle; 10½ branched dorsal-fin rays; anus midway between pelvic-fin base and anal-fin origin; both lips with many deep folds, upper notched, lower with median incision; no notch in lower jaw.

**Colour pattern.** Body with 8–10 dark brown bars wider than interspaces, edges darker than middle. Bars may all be very regular, or some may be irregular, interrupted or branched, or with a paler spot inside. In juveniles, fainter and darker bars alternate, darker ones often being wider on lateral line. Black bar at caudal-fin base narrow, complete. Dorsal fin with broad dark grey basal band, a black spot at base of anterior rays, and a conspicuous subdistal row of black spots (on rays only) distinct even in specimens only 12 mm SL. Pelvic, anal and caudal fins red-orange in life.

**Distribution.** Presently known only from the Xe Kong basin and the Mekong at Khone Falls. In fast flowing water, rapids.



Figure 40. *Schistura khamtanhii*; a, paratype, CMK 15652, 20.7 mm SL; b, holotype, ZRC 45349, 52.9 mm SL.

**Etymology.** Named for Khamtanh Vatthanatham, in appreciation for his help and efforts during the 1999 survey which resulted, among others, in the discovery of this species.

***Schistura kloetzliae*, new species**  
(Figure 41)

**Holotype.** NRM 33199, 46.8 mm SL; China: Yunnan: Xishuangbanna: Mengla Co.: Mengla market; S. O. Kullander & F. Fang, 28 Mar 1995.

**Paratype.** CMK 14312, 42.7 mm SL; Laos: Louangnamtha Prov.: Nam Sing about 1 km upstream of bridge along road from Luang Nam Tha to Muang Sing; 21°08'10"N, 101°12'17"E; M. Kottelat et al., 22 May 1997.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by its unique colour pattern. In the paratype: Body pale yellowish brown, with 6 large black blotches along lateral line, superimposed over a greyish axial stripe, each of them connected with blotches along dorsal midline. Blotches on dorsal midline more or less connected to each other to form an irregular stripe. A black bar shortly in front of extremity of caudal peduncle. A short black bar on lower half of caudal-fin base. A black spot near base of uppermost 3 principal rays. Two vertical rows of black spots on caudal-fin rays. One row of spots on dorsal-fin rays, one row of faint spots on anal and pectoral-fin rays. Holotype: same colour pattern, buts most midlateral blotches fused into an irregular stripe and only 3 blotches below dorsal fin are connected with mid-dorsal blotches.

Both lips finely pleated. Upper lip with a median incision. Lateral line almost complete in paratype,



Figure 41. *Schistura kloetzliae*, paratype, CMK 14312, 42.7 mm SL.

reaching above anal-fin origin in holotype. 8+8 branched caudal-fin rays.

**Distribution.** Presently known only from the Mengla basin in Yunnan and Laos (Nam Youan is a tributary of Mengla). In riffles.

**Etymology.** Named for Antoinette Kottelat-Kloetzli, in appreciation for her help and support to this and many other projects.

*Schistura latidens*, new species  
(Figure 42)

**Holotype.** ZRC 45351, 57.8 mm SL; Laos: Savannakhet Prov.: Xe Pon between rapids upstream and downstream of Ban Fuang; 16°37'06"N, 106°33'30"E; M. Kottelat et al., 30 Apr 1997.

**Paratypes.** LARRI uncat., 1; ZRC 45352, 1; CMK 13741, 3, 30.8–55.4 mm SL; same data.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by its short and very wide processus dentiformis, extending over about half of



Figure 42. *Schistura latidens*, paratype, CMK 13741, 39.8 mm SL.

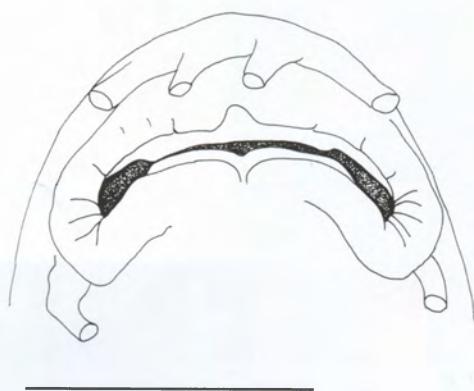


Figure 43. *Schistura latidens*, paratype, CMK 13741, 55.4 mm SL; mouth. Scale bar 5 mm.

exposed mouth gape (Fig. 43). Mouth wide, lower jaw notched in large specimens. Upper lip notched. Lower lip only feebly interrupted medially.

**Colour pattern.** Body with 7–10 broad dark bars, wider than interspaces, relatively regularly shaped and organised. Black bar at caudal-fin base complete. No black blotch at dorsal-fin base. Top of head dotted.

**Distribution.** Presently known only from the type locality, in the middle Xe Pon basin. In rapids, under boulders, in about 0.6 m of fast flowing water. Collected by women using baskets.

**Etymology.** From the Latin *latus* (wide) and *dens* (tooth), an allusion to the broad processus dentiformis. A noun in apposition.

**Remarks.** The mouth shape has some resemblance to the mouth of *Sectoria*. But *Sectoria* has no processus dentiformis (vs. present in *S. latidens*), the lower jaw is not notched (vs. notched in large specimens), and both jaws have a horny sheath and sharp cutting edge (vs. a rounded edge). In *Sectoria atriceps*, the intestine has numerous loops (vs. a single one in *Schistura latidens*, as in all other *Schistura*; *Sectoria megastoma* also has a single loop).

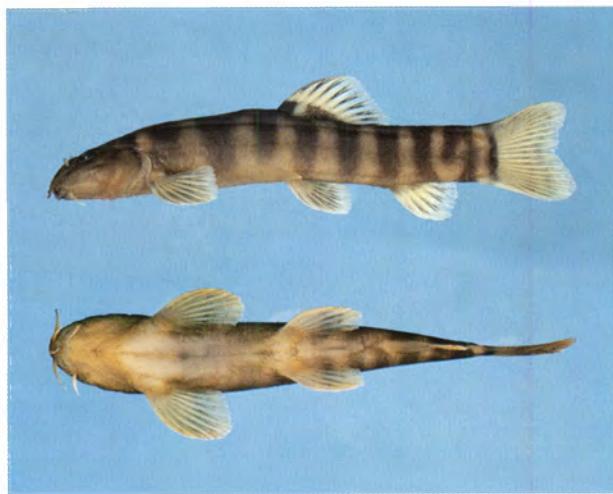
*Schistura leukensis*, new species  
(Figure 44)

**Holotype.** ZRC 45353, 57.0 mm SL; Laos: Vientiane Prov.: Nam Leuk at dam site; 18°26'15"N, 102°56'48"E; M. Kottelat et al., 26 Feb 1997.

**Paratypes.** LARRI uncat., 15; ZRC 45354, 15; NRM 44895, 15; CMK 13315, 90, 18.9–58.0 mm SL; same data.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: snout profile straight; usually no median notch in upper lip; lower lip with a median incision; 8+8 branched caudal-fin rays; body depth 14.9–16.8 % SL; caudal peduncle length 14.5–16.4 % SL, depth 12.7–13.1 % SL, 1.15–1.30 times in length.

**Colour pattern.** Top of head dotted. Body with 10–13 bars, as wide as or slightly wider than interspaces, somewhat wider anteriorly than posteriorly, quite regularly set although some may be incomplete or fused, especially behind dorsal-fin base. Black bar at caudal-fin base complete, usually with anterior and posterior projections along dorsal and ventral midlines. Dorsal fin with two conspicuous black blotches along base, encircling a paler round area (red in life); caudal fin bright red in life: this pattern already clearly distinct at about 25 mm SL.



**Figure 44.** *Schistura leukensis*, holotype, ZRC 45353, 57.0 mm SL.

**Distribution.** Nam Leuk, a tributary of Nam Mang. In slow current at the time of collection, but very fast flowing water over smooth basaltic rocks in the rainy season.

**Etymology.** Named for Nam Leuk, where the species has been collected.

**Remarks.** *Schistura leukensis* somewhat resembles *S. nicholsi* from which it differs in having 8+8 branched caudal-fin rays (vs. 9+8), a straight snout profile (vs. distinctly arched), a complete lateral line (vs. usually incomplete), and a more slender caudal peduncle (depth 12.7–13.1 % SL, vs. 13.2–16.1, 1.15–1.30 times in length, vs. 0.84–1.13) (*S. nicholsi* data from Kottelat, 1990: 167).

***Schistura macrocephalus*, new species**  
(Figure 45)

**Holotype.** ZRC 45355, 61.6 mm SL; Laos: Louangnamtha Prov.: Nam Youan at ford south of Ban Muang Mon; 21°19'28"N, 101°10'19"E; M. Kottelat et al., 23 May 1997.

**Paratypes.** LARRI uncat., 3; ZRC 45356, 3; CMK 14339, 11, 18.7–79.2 mm SL; same data as holotype. – NRM 33217, 12, 62.4–84.0 mm SL; China: Yunnan: Xishuangbanna: market in Mengla; S. O. Kullander & F. Fang, 28 Mar 1995.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: head with massive appearance, lateral length 3.4–3.8 times in SL (26.4–29.1 % SL); no median notch in upper lip; dorsal keel on caudal peduncle; axillary pelvic lobe reduced or missing.



**Figure 45.** *Schistura macrocephalus*, holotype, ZRC 45355, 61.6 mm SL.

Colour pattern. Top of head with a few large spots. Body with 6–9 brown bars, wider than or as wide as interspaces, wider anteriorly than posteriorly. Along lateral line, a series of faint blackish blotches more or less corresponding and superimposed to bars. Black bar at caudal-fin base either almost complete (not reaching dorsal and ventral midlines) or, often, dissociated into two blotches, a slightly oblique one along base of upper rays and a vertical and somewhat longer one on lower two-thirds of fin base.

**Distribution.** Presently known only from the Nam Youan basin in Laos and Mengla River in Xishuangbanna (Yunnan).

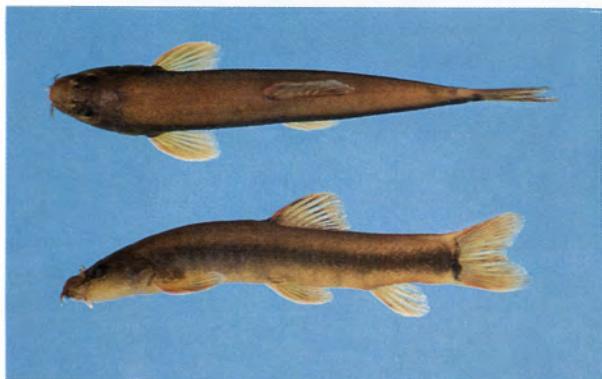
**Etymology.** From the Greek makros (large) and kephale (head). A noun in apposition.

**Remarks.** This is the species identified as *Schistura thai* by Chinese authors (e.g., Zhu, 1989: 44; Chu & Chen, 1990: 37). *Nemacheilus thai* Fowler (1934: 104) is a synonym of *Schistura nicholsi* (Smith, 1933) (see Kottelat, 1990: 169). The same authors also record their *S. thai* as occurring in the Salween basin; it seems unlikely to be conspecific with *S. macrocephalus* from the Mekong basin.

***Schistura malarancia*, new species**  
(Figure 46)

**Holotype.** ZRC 45357, 40.2 mm SL; Laos: Oudomxai Prov.: Nam Kouat near Ban Nam Kouat, a tributary of Nam Nga; 20°34'35"N, 102°07'56"E; M. Kottelat et al., 19 May 1997.

**Paratypes.** LARRI uncat., 3; ZRC 45358, 3; CMK 14202, 8, 34.4–70.4 mm SL; same data as holotype. – NRM 44896, 3; CMK 14115, 11, 24.0–82.9 mm SL; Laos: Phongsali Prov.: Nam Ou, about 3 km SSE of Ban Hatxa; 21°43'14"N, 102°12'29"E; M. Kottelat et al., 14 May 1997. – CMK 14024, 5, 48.7–95.2 mm SL; Laos: Louangphabang Prov.: Houay Houn, about 3 km upstream of



**Figure 46.** *Schistura malarancia*; a, paratype, CMK 14202, 43.9 mm SL; b, holotype, ZRC 45357, 40.2 mm SL.

Ban Houay Lek, in gorges; approx. 20°32'32"N, 102°40'51"; M. Kottelat et al., 11 May 1997.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by its colour pattern. Body and fins orange brown in life, pale chocolate brown when preserved. A broad conspicuous black stripe from gill opening to caudal-fin base. In some specimens (independent of size), some very faint bars on posterior half of body. A long black bar at caudal-fin base, not reaching dorsal and ventral midlines.

Body slightly compressed; head depressed, conical; snout long, pointed, eye directed upwards, slightly protruding along dorsal profile.

**Distribution.** Apparently endemic to the Nam Ou basin in northern Laos.

**Etymology.** From the old Italian malarancia (itself derived from the Arabian narandj) from which the modern word orange is derived. A noun in apposition.

*Schistura nomi*, new species  
(Figure 47)

**Holotype.** ZRC 45359, 44.5 mm SL; Laos: Attapu Prov.: Xe Kaman at Muang Xaiseththa; 14°48'27"N, 106°55'52"E; M. Kottelat et al., 22 May 1999.

**Paratypes.** CMK 16031, 2, 42.2–47.6 mm SL; same data.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: male with a suborbital flap; median notch in upper lip; median interruption in lower lip; no median notch in lower jaw; caudal peduncle length 15.4–17.0 % SL, depth 12.1–12.8 % SL, 1.20–1.33 times in length.

Colour pattern. Body with 9–11 bars, wider than



**Figure 47.** *Schistura nomi*, holotype, ZRC 45359, 44.5 mm SL.

interspaces, sometimes indistinct anteriorly, quite regularly shaped, slightly wider along lateral line, with edges appearing slightly darker than centre. Black bar at caudal-fin base complete although faint, a darker elongate blotch occupying about middle half. Dorsal-fin base with a dark spot anteriorly, followed by an orange spot and an elongate grey blotch.

**Distribution.** Presently known only from the Xe Kamang. On gravel banks.

**Etymology.** Named for Mr. Nom, in appreciation for his help during the 1999 field work.

**Remarks.** *Schistura nomi* has affinities with *S. desmotus* from the northern and western part of the Chao Phraya basin. They share the presence of a suborbital flap in male and the regular bars with darker edges. It differs in having more (9–11, vs. 7–9) and more closely set bars and a longer caudal peduncle (length 15.4–17.0 % SL, vs. 12.2–15.5, 1.20–1.33 times longer than deep, vs. 0.93–1.20) (data for *S. desmotus* from Kottelat, 1990).

*Schistura novemradiata*, new species  
(Figure 48)

**Holotype.** ZRC 45360, 50.0 mm SL; Laos: Louangnamtha Prov.: Nam Luang about 2 km upstream of Ban Namluang; 21°09'05"N, 101°20'34"E; M. Kottelat et al., 22 May 1997.

**Paratypes.** LARRI uncat., 2; ZRC 45361, 2; CMK 14300, 5, 17.3–56.8 mm SL; same data.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: 8–9½ (modally 9½) branched dorsal-fin rays; broad notch in upper lip; a low, hard dorsal keel along caudal peduncle.



**Figure 48.** *Schistura novemradiata*; **a**, paratype CMK 14300, 52.8 mm SL; **b**, holotype, ZRC 45360, 50.0 mm SL.

**Colour pattern.** Body pale brown with 7–9 dark bars, wider than interspaces, not very regularly shaped or organised. Bars in front of dorsal-fin origin much wider than those behind, usually less contrasted against background, wider along lateral line than on back. Black bar at caudal-fin base long, not reaching dorsal and ventral midlines. Top of head dotted. One or two low dark blotches along dorsal-fin base.

**Distribution.** Presently known only from Nam Tha basin in northern Laos.

**Etymology.** From the Latin *novem* (nine) and *radiatus* (rayed). An adjective.

#### *Schistura personata*, new species (Figure 49)

**Holotype.** ZRC 45362, 53.4 mm SL; Laos: Saisomboun Special Zone: Houay Sala Yai, a tributary of Nam San; 18°35'17"N, 103°05'00"E; M. Kottelat et al., 28 Feb 1997.

**Paratypes.** LARRI uncat., 4; ZRC 45363, 4; NRM 44897, 4; CMK 13354, 12, 19.7–60.6 mm SL; same data.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by its colour pattern. Top of head vermiculated; sometimes a few dark spots below eye. Body with 12–16 bars, as wide as or wider than interspaces, very irregularly shaped and set, branched or interrupted, or with paler centre. Some individuals with a darker ground colour, with bars blurred, not contrasted against background or indistinct; head also darker, with a large bluish-black blotch around eye and on cheek. Black bar at caudal-fin base narrow, almost complete, not reaching dorsal and ventral midlines. Dorsal-fin base with a black spot at anterior extremity, followed by a round, hyaline (red in life) spot and an elongate, grey blotch,



**Figure 49.** *Schistura personata*; **a**, paratype, CMK 13354, 51.2 mm SL; **b**, holotype, ZRC 45362, 53.4 mm SL.

No median notch in upper lip; a median incision in lower lip; a median notch in lower jaw; lateral line usually complete.

**Distribution.** Presently known only from the Nam San, a tributary of the Nam Ngum. In riffles, among stones.

**Etymology.** From the Latin *personatus* (masked). An adjective.

#### *Schistura pertica*, new species (Figure 50)

**Holotype.** ZRC 45364, 54.6 mm SL; Laos: Phongsali: Nam Ou at confluence with Houay Nam, 3 km ESE of Muang Khoa; 21°04'10.4"N, 102°31'43.8"E; M. Kottelat et al., 17 May 1997.

**Paratypes.** LARRI uncat., 8; ZRC 45365, 8; NRM 44914, 8; CMK 14166, 40, 16.1–65.6 mm SL; same data.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: body elongate, slightly compressed, depth more or less uniform from head to caudal-fin base; head depressed, lateral head length 19.0–22.6 % SL; body depth 13.8–15.8 % SL; caudal peduncle length 16.6–18.9 % SL, depth 11.0–11.9 % SL, 1.44–1.70 times in length; dorsal-fin origin behind pelvic-fin origin; no median notch in upper lip; lower lip with a median interruption; lower jaw with a median notch.

**Colour pattern.** Body with 12–18 bars, narrower than or as wide as interspaces, sometimes very regularly shaped and set but usually irregularly shaped, incomplete, or interrupted, anterior ones often



**Figure 50.** *Schistura pertica*, holotype, ZRC 45364, 54.6 mm SL.

incomplete or fused at upper extremity but not meeting counterparts of other body side on back, leaving a narrow pale dorsal midline stripe, outlined on each side by a dark stripe (made of the fused upper extremity of the lateral bars). Black bar at caudal-fin base incomplete, not reaching dorsal and ventral midlines, relatively broad and irregularly shaped, often split or with a constriction separating a black dot at upper extremity; a pale triangle in front of bar along both dorsal and ventral midlines. Dorsal-fin base with an anterior black spot, followed by an orange patch and a low (sometimes indistinct) elongate grey blotch.

**Distribution.** Presently known only from the type locality, in the Nam Ou basin.

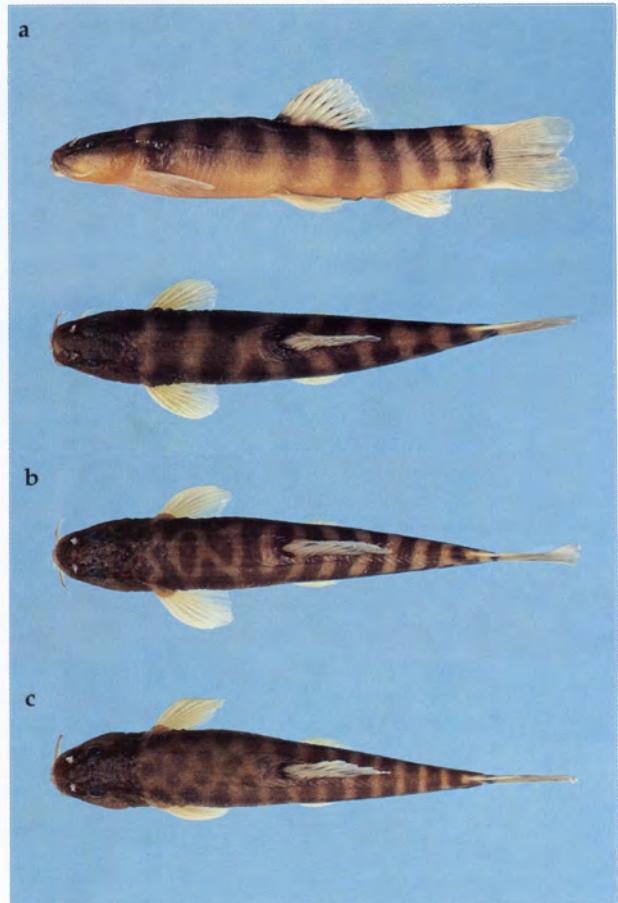
**Etymology.** From the Latin *pertica* (pole), a reference to the long, slender, rounded body. A noun in apposition.

***Schistura pervagata*, new species**  
(Figure 51)

**Holotype.** ZRC 45366, 55.8 mm SL; Laos: Houaphan Prov.: small stream tributary of Nam Hao; 20°31'09"N, 104°21'44"E; M. Kottelat et al., 10 May 1999.

**Paratypes.** CMK 15418, 9, 20.3–74.3 mm SL; same data as holotype. - LARRI uncat., 5; ZRC 45367, 5; NRM 44915, 5; CMK 15368, 12, 21.8–50.9 mm SL; Laos: Houaphan Prov.: Nam Et upstream of Muang Et; 20°48'25"N, 104°00'18"E; M. Kottelat et al., 8 May 1999.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: lateral head length 23.1–26.5 % SL; predorsal distance 52.3–54.9 % SL; prepelvic distance 52.3–54.8 % SL; body depth 15.4–17.4 % SL;



**Figure 51.** *Schistura pervagata*; **a**, holotype, ZRC 45366, 55.8 mm SL; **b**, paratype, CMK 15418, 53.4 mm SL; **c**, paratype, CMK 15418, 53.6 mm SL.

caudal peduncle length 14.9–18.6 % SL, depth 11.7–13.6 % SL, 1.17–1.51 times in length; no median notch or only very shallow notch in upper lip; a median incision in lower lip; no median notch in lower jaw; cheeks swollen in specimens larger than 70 mm SL.

**Colour pattern.** Top of head vermiculated. Body with 8–13 bars, as wide as or wider than interspaces, from quite regular to irregularly shaped and organised, but usually very few incomplete or branched bars. In predorsal area, bars either continuous across back, alternating or dissociated into small blotches (Fig. 51). Black bar at caudal-fin base more or less complete, usually not reaching dorsal and ventral midlines, often with posterior projections at upper and lower extremities. Dorsal-fin base with black spot anteriorly, followed by a pale patch and a low, elongate grey blotch.

**Distribution.** Nam Ma basin. In riffles and rapids.

**Etymology.** From the Latin *pervagatus* (common, banal). An adjective.

***Schistura porthos*, new species**  
(Figure 52)

**Holotype.** ZRC 45368, 72.7 mm SL; Laos: Louangnamtha Prov.: Nam Tha at Ban Finho, about 14 km N of Luang Nam Tha; 21°04'44"N, 101°24'09"E; M. Kottelat et al., 22 May 1997.

**Paratypes.** LARRI uncat., 15; ZRC 45369, 15; NRM 44898, 15; CMK 14282, 132, 24.1–85.8 mm SL; same data as holotype.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: body massive, head broadly triangular from above; hump in front of dorsal origin in individuals over 60 mm SL; caudal peduncle very deep, 0.9–1.1 times longer than deep; a conspicuous hard keel on back between dorsal and caudal fins and along lower edge of caudal peduncle.

Colour pattern. Top of head vermiculated. Body with 9–17 bars, much wider than interspaces, of quite regular width but irregularly organised, often fused two by two along dorsal midline, or upper or lower part missing. Black bar at caudal-fin base complete, wide, with anterior and posterior projections where it reaches dorsal and ventral midlines. Dorsal fin with 2–3 blotches along base. Dark marks on fin rays of all fins.

**Distribution.** Presently known only from Nam Ngiap, Nam Khan, Nam Xuang, Nam Ou and Nam Tha basins in northern Laos.

**Etymology.** Porthos, one of the characters of Alexandre Dumas' *Les trois mousquetaires*. A noun in apposition.

***Schistura procera*, new species**  
(Figure 53)

**Holotype.** ZRC 45370, 88.1 mm SL; Laos: Oudomxai Prov.: Nam Phak watershed: waterfall Taad Lak Sip Et, km 11 on road from Oudomxai to Nambak; 20°37'01.8"N, 102°00'12.0"E; M. Kottelat et al., 19 May 1997.

**Paratypes.** LARRI uncat., 5; ZRC 45371, 5; NRM 44916, 5; CMK 14191, 5, 21.0–88.3 mm SL; same data.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: 7–8½ branched dorsal-fin rays; dorsal-fin origin in front of pelvic-fin origin; no median notch in upper lip; a median interruption in lower lip; a median notch in lower jaw; cheeks slightly swollen in specimens larger than about 70 mm SL; low dorsal adipose keel on caudal peduncle.

Colour pattern. Body with 13–17 bars, wider than interspaces (as wide in specimens shorter than 40 mm SL), very regular on sides, becoming irregular along dorsal midline. In predorsal area, flank bars not reaching dorsal midline; space between bars occupied by irregularly-shaped large blotches leaving only very narrow pale spaces between them and bars. Black bar at caudal-fin base not reaching ventral midline, its upper extremity bent forward. Dorsal-fin base with a blackish band, with or without one or several paler or hyaline spots in it. Caudal fin red in life. Pattern distinct already at about 25 mm SL.

**Distribution.** Presently known only from the type locality, a small creek at the foot of a waterfall in forest, in the Nam Ou basin. At the time of visit, except in the pool at the waterfall itself, the creek was at most 100 cm wide and 5–10 cm deep, over pebbles. Other



Figure 52. *Schistura porthos*, paratype, CMK 14282, 78.7 mm SL (right side, reversed).

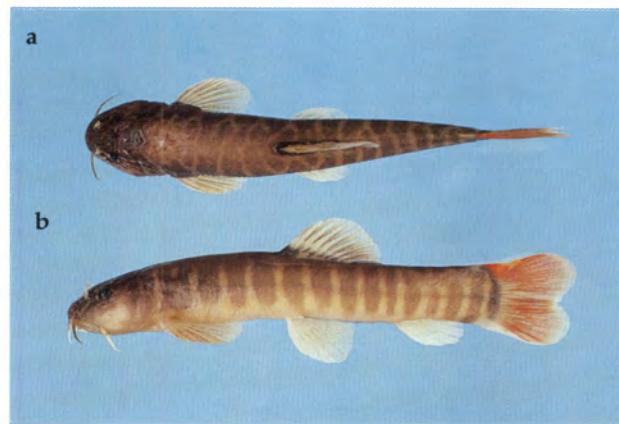


Figure 53. *Schistura procera*; a, paratype, CMK 14191, 84.9 mm SL; b, holotype, ZRC 45370, 88.1 mm SL.

species present: *Garra cambodgiensis* and *Schistura kengtungensis*.

**Etymology.** From the Latin *procerus* (elongate). An adjective.

*Schistura quaesita*, new species  
(Figure 54)

**Holotype.** ZRC 45372, 53.2 mm SL; Laos: Xiangkhouang Prov.: Nam Ngum, rapids downstream of Ban Latbouak; 19°36'28"N, 103°14'23"E; M. Kottelat et al., 30 Apr 1999.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: no median notch in upper lip; lower lip with median incision; no median notch in lower jaw; dorsal-fin origin in front of pelvic-fin origin; caudal peduncle with elevated dorsal and ventral keels on posterior extremity, length 15.4 % SL, depth 9.4 % SL, 1.64 times in length; body depth 15.8 % SL; snout length 11.3 % SL, 49 % dorsal HL, eye diameter 5.5 % SL, 24 % HL.

**Colour pattern.** Body with 8 broad bars, much wider than interspaces, except on caudal peduncle where interspaces are wider, irregularly shaped (see Fig. 54), the anterior ones not very distinct. 13 irregular black dots along lateral line, last one largest, immediately anterior to caudal-fin base. Black bar at caudal-fin base complete but faint, except for conspicuous black vertically-elongate blotch occupying median half of fin base. Dorsal-fin base with a small black blotch anteriorly, followed by a hyaline patch and a low faint grey elongate blotch.

**Distribution.** Presently known only from the type locality, the upper Nam Ngum. In riffles and rapids.

**Etymology.** From the Latin *quaesitus* (subtle, refined, delicate). An adjective.

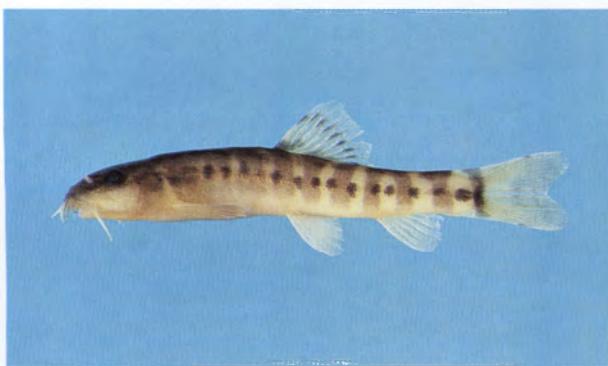


Figure 54. *Schistura quaesita*, holotype, ZRC 45372, 53.2 mm SL (right side, reversed).

*Schistura quasimodo*, new species  
(Figure 55)

**Holotype.** ZRC 45373, 47.7 mm SL; Laos: Saisomboun Special Zone: Houay Sala Yai, a tributary of Nam San; 18°35'17"N, 103°05'00"E; M. Kottelat et al., 28 Feb 1997.

**Paratypes.** LARRI uncat., 6; ZRC 45374, 6; NRM 44899, 6; CMK 13352, 37, 20.8–45.0 mm SL; same data.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the combination of the following characters: body cylindrical, greatest depth in front of dorsal-fin origin, sometimes with a conspicuous hump; head flat with pointed profile and depressed snout; eyes dorsal, protruding above dorsal profile of head; nostril flap pointed, barbel-like, reaching anterior margin of eye; anus at equal distance from pelvic-fin base and anal-fin origin; mouth subterminal, lips smooth, no median notch in upper lip; lateral line reaching at most level of anal-fin origin.

**Colour pattern.** 6–8 broad dark bars on body (up to 10 bars in juveniles less than about 20 mm SL). Bars quite regularly shaped, usually wider than interspaces. Dorsal-fin with two large black blotches along base. Black bar at caudal-fin base not reaching lower and upper margin of caudal peduncle. Body sometimes plain dark brown, independent of size.

**Distribution.** Lower and upper Nam San basin (a Nam Ngum tributary). Collected in riffles, among stones.

**Etymology.** Quasimodo, the hump-backed character in Victor Hugo's *Notre Dame de Paris*. A noun in apposition.



Figure 55. *Schistura quasimodo*, paratype, CMK 13352, 39.2 mm SL.

*Schistura rikiki*, new species  
(Figure 56)

**Holotype.** ZRC 45375, 24.2 mm SL; Laos: Attapu Prov.: Xe Kong between Attapu and downstream to Ban Ouk; 14°44'51"N, 106°43'59"E; M. Kottelat et al., 20 May 1999.

**Paratypes.** CMK 16028, 5, 19.6–21.8 mm SL; same data as holotype. - LARRI uncat., 3; ZRC 45376, 3; NRM 44917, 3; CMK 16029, 7, 13.0–23.5 mm SL; Laos: Attapu Prov.: rapids on Xe Kaman at 14°53'29"N, 107°07'20"E; M. Kottelat et al., 21 May 1999.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: 8+7 branched caudal-fin rays; 7 pelvic-fin rays; lateral line incomplete, reaching vertical of dorsal fin.

**Colour pattern.** Body with 6–10 bars, much narrower than interspaces, very irregular in smaller individuals, becoming more regular in specimens above about 20 mm SL, sometimes dissociated into a lateral blotch and a middorsal saddle. Black bar at caudal-fin base incomplete, restricted to lower half of caudal-fin base in several specimens. A black dot at anterior extremity of dorsal-fin base.

**Distribution.** Xe Kong and Xe Kaman main rivers.

**Etymology.** From French slang rikiki, also spelt riquiqui (weeny, pint-sized). Treated as a noun in apposition.

*Schistura russa*, new species  
(Figure 57)

**Holotype.** ZRC 45377, 49.2 mm SL; Laos: Louangnamtha Prov.: Nam Tha at Ban Finho, about 14 km N of Luang Nam Tha; 21°04'44"N, 101°24'09"E; M. Kottelat et al., 22 May 1997.



Figure 56. *Schistura rikiki*, holotype, ZRC 45375, 24.2 mm SL.

**Paratypes.** LARRI uncat., 2; ZRC 45378, 2; CMK 14284, 7, 25.4–32.8 mm SL; same data as holotype. – NRM 44900, 2; CMK 14267, 11, 17.1–45.3 mm SL; Laos: Louangnamtha Prov.: Nam Tha S of confluence with Nam Khon; 20°54'11"N, 101°26'25"E; M. Kottelat et al., 21 May 1997.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: head and snout depressed, pointed; eyes dorsal, often protruding above dorsal profile of head; lateral line incomplete, reaching to anal-fin fin origin; body plain russet brown in life, chocolate brown when preserved.

**Distribution.** Presently known only from the upper Nam Tha basin. In riffles.

**Etymology.** From the Latin *russus* (russet). An adjective.

**Remarks.** Specimens of the paratype series CMK 14267 have a much more depressed head and body, even more than figured here for *S. quasimodo* (Fig. 55) and *S. malarancia* (Fig. 46).

*Schistura sertata*, new species  
(Figure 58)

**Holotype.** ZRC 45379, 52.8 mm SL; Laos: Louangphabang Prov.: Mekong basin, Nam Xi below Kuang Xi waterfall, upstream of Ban Thapen; 19°45'10"N, 102°00'10"E; M. Kottelat et al., 8 May 1997.

**Paratypes.** LARRI uncat., 3; ZRC 45380, 3; NRM 44918, 3; CMK 13909, 57, 13.0–45.6 mm SL; same data.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: median notch in upper lip



Figure 57. *Schistura russa*, holotype, ZRC 45377, 49.2 mm SL.



**Figure 58.** *Schistura sertata*; **a**, paratype, CMK 13909, 35.6 mm SL; **b**, holotype, ZRC 45379, 48.5 mm SL.

absent or very small; shallow median notch in lower jaw; head length 24.9–26.9 % SL; body depth 15.2–17.2 % SL, caudal peduncle length 14.6–17.0 % SL, depth 12.4–13.0 % SL, 1.16–1.33 times in length.

**Colour pattern.** Body with 10–13 thin bars, much narrower than interspaces, quite regular anteriorly (although often indistinct), more irregular on caudal peduncle, often interrupted or dissociated into blotches. A conspicuous row of chevron-shaped dots along lateral line. Black bar at caudal-fin base complete (in specimens longer than about 35 mm SL, split into two elongate blotches in smaller individuals), not reaching dorsal and ventral midlines. Dorsal-fin base with a small black spot anteriorly, a low elongate orange patch, and a low, elongate grey blotch.

**Distribution.** Presently known only from the type locality, Kuang Xi waterfall near Louang Phabang.

**Etymology.** From the Latin *sertatus* (crowned, ornate with a garland), reference to the row of dots along lateral line. An adjective.

**Remarks.** The very faint colour pattern of the type series may be due to environmental factors. The specimens were collected in the creek flowing from Kuang Xi waterfall, in a side arm with quiet water and a quite muddy bottom (limestone clay). Specimens from clear, running water might have a darker and more contrasted colour pattern.

#### *Schistura sigillata*, new species (Figure 59)

**Holotype.** ZRC 45381, 41.0 mm SL; Laos: Saisomboun Special Zone: Houay Sala Yai, a tributary of Nam San;



**Figure 59.** *Schistura sigillata*, holotype, ZRC 45381, 41.0 mm SL.

18°35'17"N, 103°05'00"E; M. Kottelat et al., 28 Feb 1997.

**Paratypes.** LARRI uncat., 6; ZRC 45382, 6; NRM 44901, 6; CMK 13353, 23, 15.0–45.9 mm SL; same locality.

**Diagnosis.** Distinguished from the other species of the genus in Southeast Asia by the following combination of characters: small median notch in upper lip in specimens larger than about 35 mm SL; lateral line incomplete, reaching about level of pelvic-fin origin; large pectoral fin reaching pelvic-fin origin when depressed.

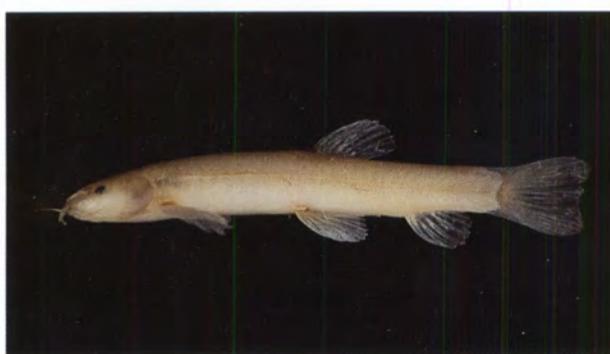
**Colour pattern.** Body with 13–15 narrow bars, somewhat irregularly shaped and placed, some of them broader and darker on middle of side, often alternating with narrower and shorter bars, giving the impression of an axial row of blotches (especially distinct in live specimens, less so when preserved). Dorsal-fin base with two black spots along its anterior half, anterior one narrow and pointed. A vertically elongate black blotch on lower two-thirds of caudal-fin base.

**Distribution.** Nam San (a tributary of Nam Ngum) and Nam Ngiap basins. Collected in riffles, among stones.

**Etymology.** From the Latin *sigillatus* (ornate with delicate carvings). An adjective.

#### *Schistura suber*, new species (Figure 60)

**Holotype.** ZRC 45383, 29.7 mm SL; Laos: Vientiane Prov.: unnamed small forest stream along road from Thad Leuk to Nam Leuk dam site; 18°27'05"N, 103°04'06"E; M. Kottelat et al., 25 Feb 1997.



**Figure 60.** *Schistura suber*, holotype, ZRC 45383, 29.7 mm SL.

**Paratypes.** CMK 13308, 2, 26.5–28.2 mm SL; same data.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: body, head and fins plain grey (yellowish grey in life); barbel-like, pointed nostril flap reaching to posterior margin of eye; dorsal-fin origin above origin of last pelvic-fin ray; 8+8 branched caudal-fin rays; 7½ branched dorsal-fin rays; lateral line complete.

**Distribution.** Upper Nam Leuk basin. Found among leaf-litter, in a small pool, in a drying small forest creek.

**Etymology.** From the Latin *suber* (cork, cork-oak), reference to the yellowish grey colour of the fish. A noun in apposition.

***Schistura tenura*, new species**  
(Figure 61)

**Holotype.** ZRC 45384, 46.2 mm SL; Laos: Vientiane Prov.: Nam Leuk about 1 km downstream of dam site; 18°26'10"N, 102°57'01"E; M. Kottelat et al., 26 Feb 1997.

**Paratypes.** LARRI uncat., 6; ZRC 45385, 6; NRM 44902, 6; CMK 13324, 25, 30.9–42.4 mm SL; same data.

**Diagnosis.** Distinguished from the other species of the genus in Southeast Asia by the following combination of characters: snout with a massive appearance in lateral view, strongly convex; relatively slender and tapering caudal peduncle, depth 1.5–1.8 times in its length; a broad median notch in upper lip.

**Colour pattern.** Body with 7–10 conspicuous, irregularly shaped and spaced bars, about as wide as or thinner than interspaces. A conspicuous black bar



**Figure 61.** *Schistura tenura*, holotype, ZRC 45384, 46.2 mm SL.

at caudal-fin base, sometimes dissociated into a black blotch in lower half of caudal-fin base and a spot at base of uppermost rays. A single black spot at anterior extremity of dorsal-fin base.

**Distribution.** Presently known only from upper Nam Leuk basin, a tributary of the Nam Mang.

**Etymology.** A contraction of the Latin *tenuis* (thin, slender) and the Greek *oura* (tail). A noun in apposition.

***Schistura tizardi*, new species**  
(Figure 62)

**Holotype.** ZRC 45386, 46.2 mm SL; Laos: Attapu Prov.: Xe Kaman at Muang Xaiseththa; 14°48'27"N, 106°55'52"E; M. Kottelat et al., 22 May 1999.

**Paratypes.** LARRI uncat., 1; ZRC 45387, 1; NRM 44919, 1; CMK 15674, 6, 28.7–48.1 mm SL; same data.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the combination of the following characters: body cylindrical, its greatest depth in front of dorsal-fin origin, sometimes with a small hump; head flat with straight to concave dorsal profile and depressed snout; eyes slightly protruding above dorsal profile of head; no median notch in upper lip; median incision in lower lip; shallow median notch in lower jaw.

**Colour pattern.** Body with 7–9 bars, wider than interspaces, not very contrasted in front of dorsal-fin origin, not very regular. Black bar at caudal-fin base almost complete but faint, often only contrasted on middle half of base, not reaching dorsal and ventral midlines. Dorsal-fin base with a black spot anteriorly, followed by an orange spot and an elongate grey blotch. Base of rays of upper caudal-fin lobe orange with a cloud of black pigments. Body sometimes plain dark brown.



**Figure 62.** *Schistura tizardi*, holotype, ZRC 45386, 46.2 mm SL.

**Distribution.** Xe Kong basin. In main rivers, on gravel beds.

**Etymology.** Named for Robert Tizard, in gratitude for his help at various stages of this project.

*Schistura xhatensis*, new species  
(Figure 63)

**Holotype.** ZRC 45388, 35.0 mm SL; Laos: Louangphabang Prov: Nam Xhat, upstream of Ban Nam Sa; 20°06'43"N, 103°19'56"E; M. Kottelat et al., 12 May 1999.

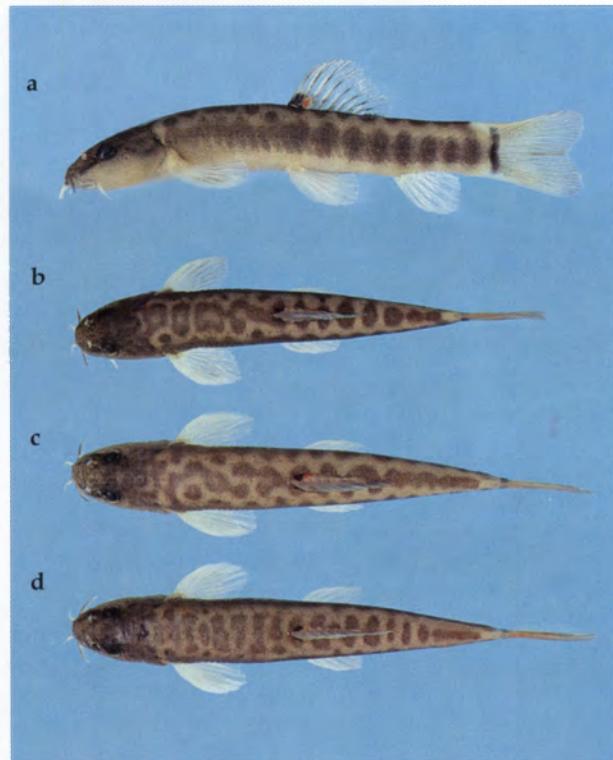
**Paratypes.** LARRI uncat., 1; ZRC 45389, 1; CMK 15481, 5, 14.8–38.6 mm SL; same data as holotype.

**Diagnosis.** Distinguished from all other species of the genus in Southeast Asia by the following combination of characters: dorsal-fin origin above pelvic-fin origin; very shallow median notch in upper lip; lower lip with a median incision; lower jaw with a shallow notch.

**Colour pattern.** Body with a midlateral row of 12–15 vertically elongated blotches, usually only those posterior to dorsal-fin origin distinct, anterior ones more or less fused and not very well defined. A broad midlateral stripe superimposed on these blotches, usually darker anteriorly and masking the anterior blotches, in some specimens to the point that individual blotches are no longer distinct. Saddles along back very irregularly shaped, sometimes fused into an irregular stripe on caudal peduncle or forming squarish marks with pale centre on predorsal area. Black bar at caudal-fin base complete, but not reaching dorsal and ventral midlines. A conspicuous elongate black spot at base of anterior dorsal-fin rays.

**Distribution.** Presently known only from the type locality, the Nam Xhat, a tributary of the Nam Khan.

**Etymology.** Named for the Nam Xhat.



**Figure 63.** *Schistura xhatensis*; a-b, holotype, ZRC 45388, 35.0 mm SL; c-d, paratypes, CMK 15481, 38.2 and 38.6 mm SL.

*Sectoria megastoma*, new species  
(Figure 64)

**Holotype.** NRM 33232, 61.7 mm SL; China: Yunnan: Xishuangbanna: market in Mengla; S. O. Kullander & F. Fang, 28 Mar 1995.

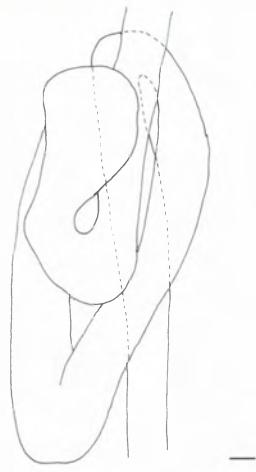
**Paratypes.** NRM 44921, 14, 60.2–97.3; NRM 33215, 5, 64.7–70.0 mm SL; NRM 33213, 6, 31.8–35.8 mm SL; same data as holotype. – LARRI uncat., 2; CMK 14340, 7, 33.0–37.5 mm SL; Laos: Louangnamtha Prov.: Nam Youan at ford south of Ban Muang Mon; 21°19'28"N, 101°10'19"E; M. Kottelat et al., 23 May 1997.

**Diagnosis.** Distinguished from the other species of the genus (*S. atriceps*), by a larger maximum size (97 mm SL, vs. 44), 8½ branched dorsal-fin rays (vs. 9½), digestive tract with a single loop (vs. several; compare Fig. 65 with Fig. 174b in Kottelat, 1990: 231), upper lip without median notch or with only a very small one in a few specimens only (vs. with a broad notch).

**Colour pattern.** Body with 9–13 bars, irregularly shaped, many of them incomplete or reduced to blotches on middle of flank, alternating with mid-dorsal blotches. Black bar at caudal-fin base variable, from complete to restricted to an elongate blotch in middle of caudal-fin base.



**Figure 64.** *Sectoria megastoma*, holotype, NRM 33232, 61.7 mm SL.



**Figure 65.** *Sectoria megastoma*, paratype, NRM 33215, 70.0 mm SL; digestive tract. Scale bar 1 mm.

**Distribution.** Presently known only from the Nam Youan - Mengla basin in Laos and Yunnan. Juveniles were collected in small riffles.

**Etymology.** From the Greek *megas* (large) and *stoma* (mouth). A noun in apposition.

*Vanmanenia crassicauda*, new species  
(Figure 66)

**Holotype.** ZRC 45390, 66.2 mm SL; Laos: Houaphan Prov.: Houay Keap, waterfall adjacent to road on creek entering Nam Xam at km 5 on road from Xam Tai to Ban Houatangoua; 20°01'00"N, 104°35'44"E; M. Kottelat et al., 6 May 1999.

**Paratypes.** LARRI uncat., 3; ZRC 45391, 3; NRM 44903, 3; CMK 15328, 8, 23.8–64.3 mm SL; same data as holotype.

**Diagnosis.** Distinguished from other species of the genus by the combination of the following characters: caudal peduncle 1.2–1.5 times longer than deep,

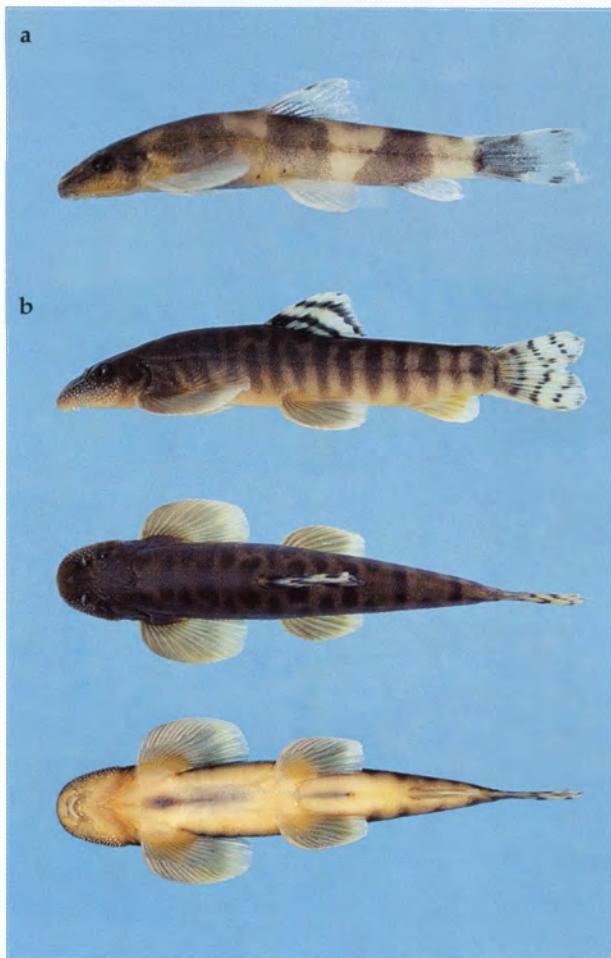
depth 9.3–10.7 % SL; anus closer to posterior extremity of pelvic-fin base than to caudal-fin origin; 12–16 black bars on body, their width about equal to eye diameter, quite regularly shaped and spaced in individuals larger than about 50 mm SL, less regular in smaller ones; juvenile (24 mm SL) with 3 broad black bars (centre paler) on body and a large black blotch on anterior half of caudal fin; 7–8 narrow saddles along back; pelvic, pectoral and anal fins plain coloured, bright orange in life; 2 broad black stripes or row of spots on dorsal, 3 black bars or rows of spots on caudal fin; 15–16 branched pectoral-fin rays; 9 branched pelvic-fin rays; 86–93 lateral line pores.

**Distribution.** Presently known only from Nam Xam and Nam Ma basins in Laos. Collected in rapids, torrents and waterfalls.

**Etymology.** From the Latin *crassus* (thick) and *cauda* (tail), allusion to the stout caudal peduncle. A noun in apposition.

**Remarks.** Using the key in Chen (1980), this species keys out as *V. striata* Chen, 1980, a species described from the uppermost reaches of the Red River basin in Yunnan. *Vanmanenia crassicauda* differs from *V. striata* in having a deeper body (17.7–18.9 % SL, vs. 15.6–16.7), a stouter caudal peduncle (1.2–1.5 times longer than deep, vs. 2.0), and in having fewer and much broader bars on body in both adults and juveniles, 12–16 in adults (vs. 19–23 in the two specimens I have seen or photographed), 3 in juveniles (vs. 5–6, not including a spot at caudal-fin base which results from the break down of a large blotch on caudal fin) (compare Figs. 66 and 67). The examined material of *V. striata* is from the Yangbi river, a tributary of the Mekong; the type locality of *V. striata* is Xiaguan, in the Yuan Jiang (Red River). I have not seen a difference between the Yangbi and Xiaguan specimens. The upper part of the Yuang Jiang valley in Xiaguan is occupied by Dali Lake which belongs to the Mekong basin. This is the result of a relatively recent river capture as is obvious from topographic maps and a visit to the site. Numerous species collected in Yangbi and Dali Lake do not occur elsewhere in the Mekong basin but are either recorded from the Red River or belong to lineages represented by numerous species in Red River and Yangtze basins.

Chu & Chen (1990: 83) consider *V. striata* to be a junior synonym of *V. tetraloba* (Mai, 1978). *Homaloptera tetraloba* is one of four nominal species described from northern Vietnam (with *H. monoloba*, *H. multiloba* and *H. ventrosquamata*) by Mai (1978) and which possibly belong to *Vanmanenia*. Their fin formulae, with a single simple ray in pelvic and pectoral fins, exclude them



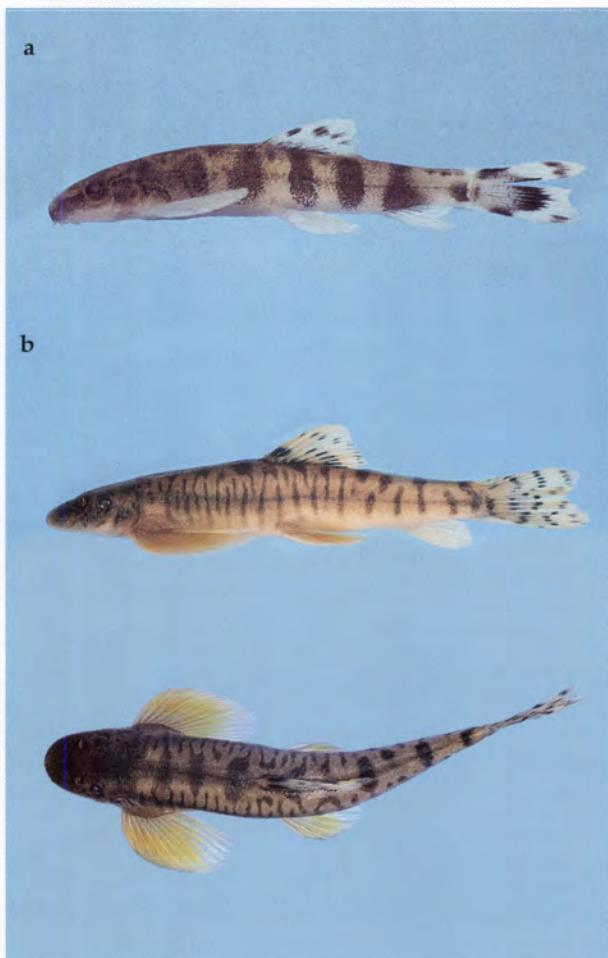
**Figure 66.** *Vanmanenia crassicauda*; **a**, paratype, CMK 15328, 23.8 mm SL; **b**, holotype, ZRC 45390, 66.2 mm SL.

from *Balitora*. Other possible generic allocation on the basis of the available data are *Liniparhomaloptera*, *Plesiomyzon* and *Crossostoma*. Without access to fresh material from the type locality (not stated), it would be merely speculative to discuss their identity on the basis of the original descriptions alone. The presence of dark marks on the pectoral, pelvic and anal fins of the figure *H. tetraloba* seems to indicate that *V. striata* and *V. crassicauda* (which have respectively plain bright yellow and orange fins in life) are distinct species.

**Comparison material.** *V. striata*: CMK 5414, 7, 15.0–64.0 mm SL; China: Yunnan: Yangbi Jiang.

***Vanmanenia serrilineata*, new species**  
(Figure 68)

**Holotype.** ZRC 45392, 42.7 mm SL; Laos: Louangnamtha Prov.: Nam Tha at Ban Finho, about 14 km N of Luang Nam Tha; 21°04'44"N,

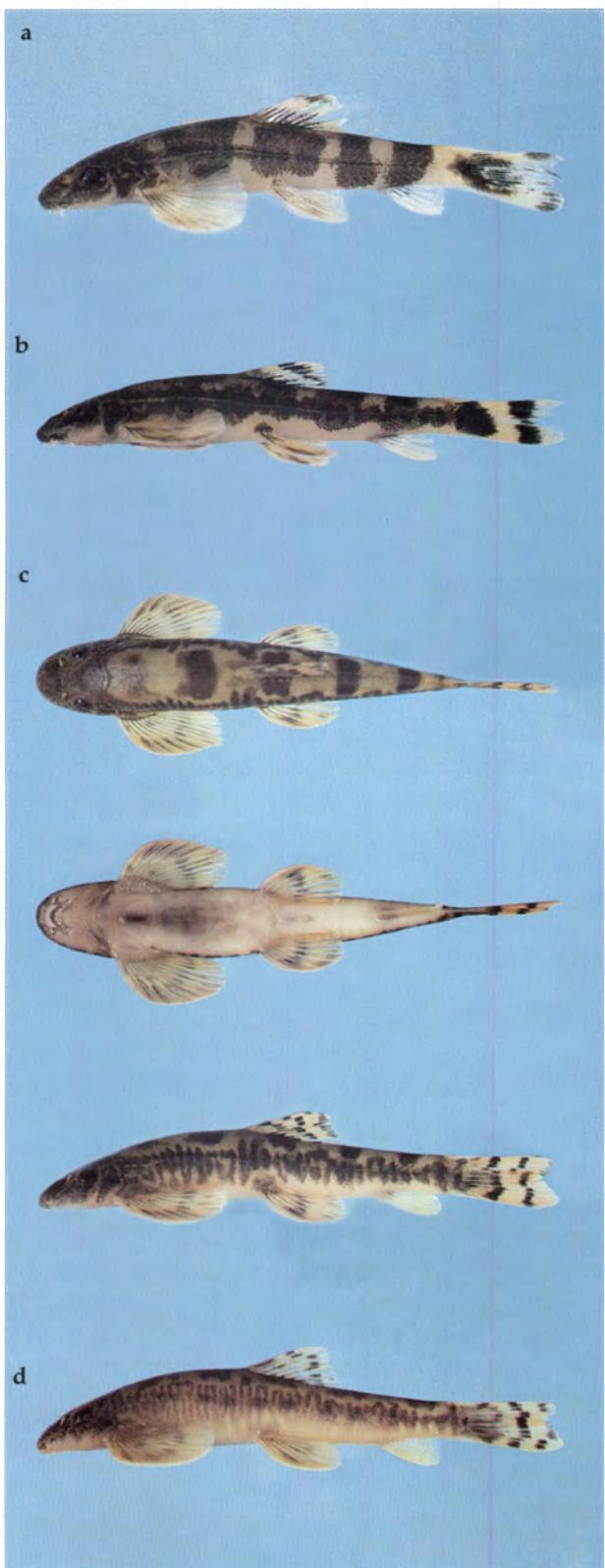


**Figure 67.** *Vanmanenia striata*, Yunnan: Yangbi; **a**, CMK 5614, 23.9 mm SL; **b**, KIZ uncat., 81.1 mm SL.

101°24'09"E; M. Kottelat et al., 22 May 1997.

**Paratypes.** LARRI uncat., 5; ZRC 45393, 8; NRM 44904, 8; CMK 14285, 26, 15.0–43.6 mm SL; same data as holotype. – CMK 14203, 4, 48.9–58.1 mm SL; Laos: Oudomxai Prov.: Nam Kouat near Ban Nam Kouat, a tributary of Nam Nga; 20°34'35"N, 102°07'56"E; M. Kottelat et al., 19 May 1997. – CMK 14025, 1, 55.4 mm SL; Laos: Louangphabang Prov.: Houay Houn, about 3 km upstream of Ban Houay Lek, in gorges; approx. 20°32'32"N, 102°40'51"E; M. Kottelat et al., 11 May 1997.

**Diagnosis.** Distinguished from other species of the genus by the combination of the following characters: caudal peduncle 1.2–1.4 times longer than deep, depth 8.6–9.7 % SL; anus closer to posterior extremity of pelvic-fin base than caudal-fin origin; 18–30 dark brown bars on body, their width conspicuously smaller than eye diameter, very irregularly shaped and spaced, more or less connected along lateral line to form a saw-toothed stripe; juveniles (less than 25



**Figure 68.** *Vanmanenia serrilineata*; **a**, CMK 14285, 17.6 mm SL, paratype; **b**, CMK 14285, 25.8 mm SL, paratype; **c**, ZRC 45392, 42.7 mm SL, holotype; **d**, CMK 14025, 55.4 mm SL, paratype.

mm SL) with 5–6 broad black bars on body and a large black blotch on anterior half of caudal fin; 5 large saddles on back; pelvic and pectoral fins yellow in life, with a series of dark brown marks; 2–3 irregular row of brown spots on dorsal fin, 2 irregular black bars or rows of spots on caudal fin; 15–16 branched pectoral-fin rays; 8 branched pelvic-fin rays; 71–83 lateral line pores.

**Distribution.** Presently known from Nam Ou and Nam Tha basins in northern Laos. Collected in swift creeks under forest cover.

**Etymology.** From the Latin *serra* (saw) and *lineatus* (striped), a reference to the saw-toothed midlateral stripe. An adjective.

**Remarks.** Using the key in Chen (1980), this species keys out as *V. striata* Chen, 1980, a species discussed above under *V. crassicauda*. *Vanmanenia serrilineata* differs from *V. striata* in having a deeper body (16.2–20.3 % SL, vs. 15.6–16.7), a stouter caudal peduncle (1.2–1.4 times longer than deep, vs. 2.0), and fewer and much broader saddles along the back (5, vs. 7–8).

#### Family Bagridae

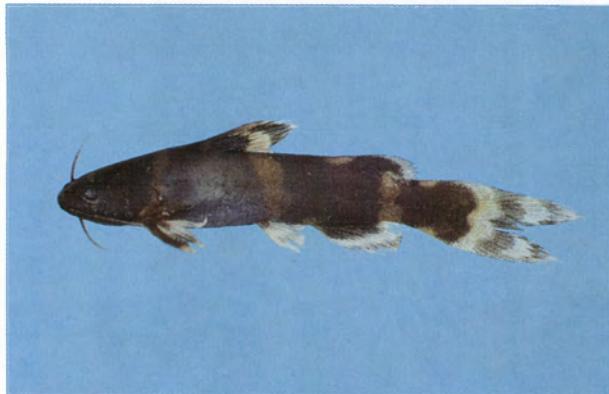
##### *Pseudomystus bombooides*, new species (Figure 69)

**Holotype.** ZRC 45426, male, 41.2 mm SL; Laos: Vientiane Province, Mekong basin; confluence of Nam Leuk and Nam Ngong; 18°22'04"N, 103°05'27"E; M. Kottelat et al., 24 Feb 1997.

**Paratypes.** LARRI uncat., 2; ZRC 45493, 2; CMK 13256; 4, 23.7–31.7 mm SL; same data as holotype.

**Diagnosis.** Distinguished from other species of the genus by the following combination of characters: body coloration dark greyish-brown with three pale whitish bars; a dark greyish-brown bar across caudal fin, a second one across each lobe, joined to the first one on the median rays; tip of caudal-fin lobes not produced into a filament; absence of supra-clavicular process; relatively large eyes (eye diameter 16.3–21.4 % of head length); relatively low adipose fin (adipose fin depth 4.2–6.9 % SL); hind margin of dorsal-fin spine almost smooth; relatively long maxillary barbels that extend past edge of opercle almost to beneath origin of dorsal fin.

**Distribution.** Presently known only from the Nam Mang basin, expected elsewhere in middle and lower Mekong basin.



**Figure 69.** *Pseudomystus bombooides*, holotype, ZRC 45426, 41.2 mm SL (right side, reversed).

**Etymology.** From the Latin *bombus* (bumblebee) and the suffix *-oides* (alike), an allusion to the barred colour pattern. An adjective.

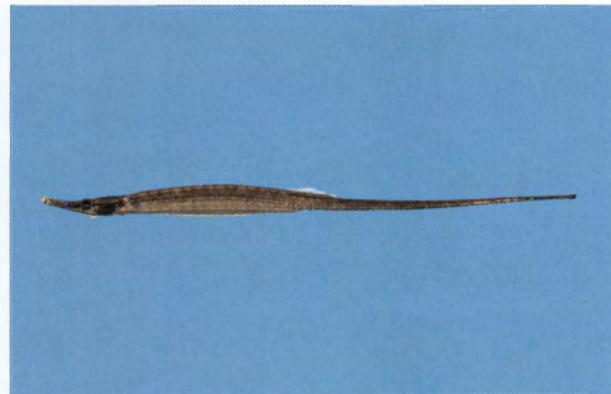
#### Family Syngnathidae

##### *Doryichthys contiguus*, new species (Figure 70)

**Holotype.** ZRC 45395, 90.5 mm SL; Laos: Vientiane Prov.: confluence of Nam Leuk and Nam Ngang; 18°22'04"N, 103°05'27"E; M. Kottelat et al., 24 Feb 1997.

**Paratypes.** LARRI uncat., 8; ZRC 45396, 10; NRM 44905, 10; CMK 13258, 24, 51.0–102.0 mm SL; same data as holotype - CMK 12612, 2, 103.7–109.8 mm SL; Laos: Khammouan Prov.: Xe Bangfai about 3 km upriver of Ban Pakphanang; 17°24'20"N, 104°45'50"E; M. Kottelat et al., 15 Mar 1996. - CMK 15094, 2, 67.1–85.2 mm SL; Thailand: Nong Khai Prov.: Huai Kham Pia, km 46 on road from Bung Kan to Nakhon Phanom; 18°15'30"N, 104°00'32"E; M. Kottelat & K. Kubota, 2 Feb 1999.

**Diagnosis.** Distinguished from all other species of the genus by the following combination of characters: lateral trunk ridges deflected downwards and continuous with inferior tail ridge (vs. not); inferior trunk and tail ridges not confluent (vs. confluent); 16–17 trunk rings (vs. 17–20 in *D. deokhatoides*, 22–26 in *D. boaja* and *D. heterosoma*); tail rings 25–27 (vs. 28–38); total rings 41–44 (vs. 45–62); 25–28 dorsal-fin rays (vs. 27–35 in *D. deokhatoides*, 30–39 in *D. martensi*, 43–69 in *D. boaja* and *D. heterosoma*), 18–19 pectoral-fin rays (vs. 19–23 in *D. deokhatoides*, 22–27 in *D. boaja* and *D. heterosoma*), snout length 1.9–2.1 times in head length (vs. 1.6–1.9 in *D. deokhatoides*, 2.0–2.4 in *D.*



**Figure 70.** *Doryichthys contiguus*, paratype, CMK 12612, 109.8 mm SL.

*martensi*); body dark brown, without conspicuous series of darker spots on or above lateral trunk ridge (vs. usually with small dark spots on lateral trunk ridge in *D. martensi* and a series of conspicuous large dark spots above lateral trunk ridge, sometimes with red spot in the middle, in *D. deokhatoides*). Data on other species from Dawson (1981).

**Distribution.** Mekong basin in Laos, Thailand and Cambodia; material has been collected in the Nam Mang, Xe Bangfai, Xe Bang Hiang and Xe Kong basins in Laos and in Bung Kan in Thailand.

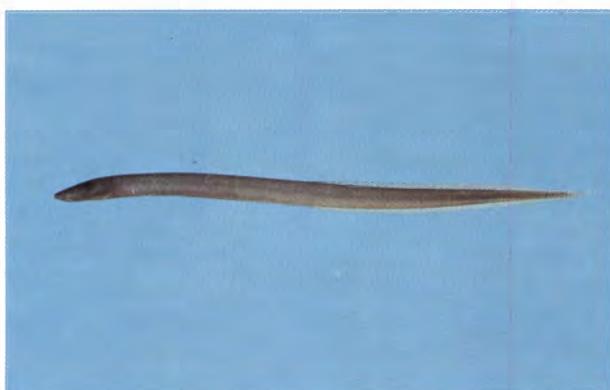
**Etymology.** From the Latin *contiguus* (contiguous), a reference to the continuous lateral trunk ridge and inferior tail ridge. An adjective.

**Remarks.** *Doryichthys contiguus* was identified as *D. deokhatoides* by Kottelat (1998: 109), a species from which it differs by the characters listed above. *Doryichthys contiguus* seems to be a smaller species. The largest examined specimen is 109.8 mm SL, while Dawson (1981: 9) gives a maximum known size of 159.5 mm in *D. deokhatoides*. The smallest specimen unambiguously identifiable as a male is 90 mm SL (vs. 102) and has a pouch with 30 membranous egg compartments. A 103.7 mm SL male has a pouch with 28 egg compartments. Egg compartments are in two alternating longitudinal rows.

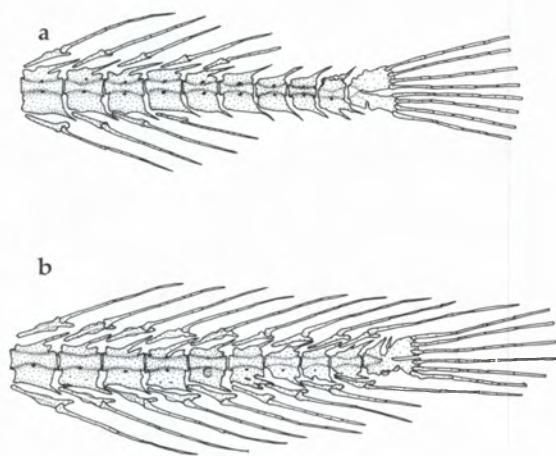
#### Family Chaudhuriidae

##### *Chaudhuria fusipinnis* Kottelat & Britz, new species (Figure 71)

**Holotype.** ZRC 45397, 43.3 mm SL; Laos: Bolikhamsai: confluence of Nam Leuk and Nam Ngang; 18°22'04"N, 103°05'27"E; M. Kottelat et al., 24 Feb 1997.



**Figure 71.** *Chaudhuria fusipinnis*, paratype, CMK 15966, 44.8 mm SL.



**Figure 72.** Last vertebrae of: a, *Chaudhuria fusipinnis*, CMK 15967, 35.8 mm SL; b, *C. caudata*, CMK 15965, 34.9 mm SL. Scale bar 1 mm (drawing by R. Britz).

**Paratypes.** LARRI uncat., 5; ZRC 45398, 5; NRM 44906, 5; CMK 15966, 18, 29.5–45.0 mm SL; same data as holotype. – CMK 15967, 6, C&S, 30.1–36.0 mm SL; same data.

**Diagnosis.** Distinguished from the only other species of the genus (*C. caudata*) in having the dorsal-fin and anal fins continuous with caudal fin (vs. not continuous) (Fig. 72a), 44–48 dorsal rays (vs. 34–39), 44–48 anal-fin rays (vs. 37–41), 6–7 caudal-fin rays (vs. 8), 27–29 + 42–47 = 71–74 vertebrae (vs. 25–28 + 42–43 = 67–71 [compound centrum bearing the two hypurals counted as one]), and absence of teeth on hypobranchial 3 (vs. presence).

**Distribution.** Presently known only from the Middle Nam Mang basin.



**Figure 73.** *Monotrete turgidus*, holotype, ZRC 45399, 71.3 mm SL.

**Etymology.** From the Latin *turgidus* (puffy, swollen, bombastic, pompous). An adjective.

**Remarks.** *Chaudhuria fusipinnis* and *C. caudata* occur in syntopy at the type locality of *C. fusipinnis*.

#### Family Tetraodontidae

##### *Monotrete turgidus*, new species (Figure 73)

**Holotype.** ZRC 45399, 71.3 mm SL; Laos: Savannakhet Prov.: Xe Pon between rapids upstream and downstream of Ban Fuang; 16°37'06"N, 106°33'30"E; M. Kottelat et al., 30 Apr 1997.

**Paratypes.** LARRI uncat., 3; ZRC 45400, 3; NRM 44922, 3; CMK 13751, 14, 28.5–80.2 mm SL; same data.

**Diagnosis.** Distinguished from the other species of the genus in Southeast Asia by its colour pattern. Back greenish brown to black, belly white, transition may be gradual or abrupt. Back and side of head and body with numerous small black spots, usually several of them with a paler (orange to red in life) central area. No ocellus or no large blotch below dorsal-fin origin. This colour pattern can be observed already in juveniles about 30 mm SL.

**Distribution.** Mekong basin in Laos and Thailand; possibly also in Chao Phraya basin.

**Etymology.** From the Latin *turgidus* (puffy, swollen, bombastic, pompous). An adjective.

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