

A NEW SPECIES OF CYPRINID FISH: *Puntius bunau* FROM THE SETURAN BASIN OF INDONESIAN BORNEO

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Abstract

Puntius bunau, new species from the Seturan Watershed, Bulungan, East Kalimantan, Indonesia is distinguished from its congeners by the combination of the following characters: a black triangular bar on the side of the body under the dorsal fin, black spots behind the opercle, a black bar on the edge of the anal fin, 22-23 lateral line scales, predorsal profile convex, and eye diameter 21.28-29.73% of head length.

Introduction

A study on the biodiversity of the Bulungan Research Forest, Malinau Regency, East Kalimantan, Indonesia, was carried out from 15 November to 12 December 1999, and from 30 October to 27 November 2000, organised by the Centre of International Forestry Research (CIFOR). Forty-seven species of fish were obtained during the surveys, of which 21 belong to the family Cyprinidae, and 15 (31.9%) are endemic to Borneo (Rachmatika, 2001). There is one species of cyprinid in the collection that could not be associated with any existing species. It belongs to the genus *Puntius* Hamilton (sensu lato), and could be closely related to *Puntius lateristriga* (Valenciennes). This taxon is herein described as *Puntius bunau*.

Material and Methods

Specimens were collected with electro-fishing gear (12 Volt, 10 Ampere) and cast net from four localities in the 1999 survey, and from nine localities in the 2000 survey. Specimens were fixed in 4% formalin and then transferred to 76% ethanol for long-term preservation. Measurements and meristic counts follow Hubbs & Lagler (1974), Kottelat *et al* (1993) and Roberts (1989: 22).

Material examined are from the following depositories: Museum Zoologicum Bogoriense, Cibinong, Indonesia (MZB); Raffles Museum of Biodiversity Research, National University of Singapore (ZRC); The Natural History Museum, London, England (BMNH), The National Museum of Natural History, Washington D. C., USA (USNM), and the collection of Maurice Kottelat in Cornol, Switzerland (CMK).

Puntius bunau, new species

Figs. 1 & 2

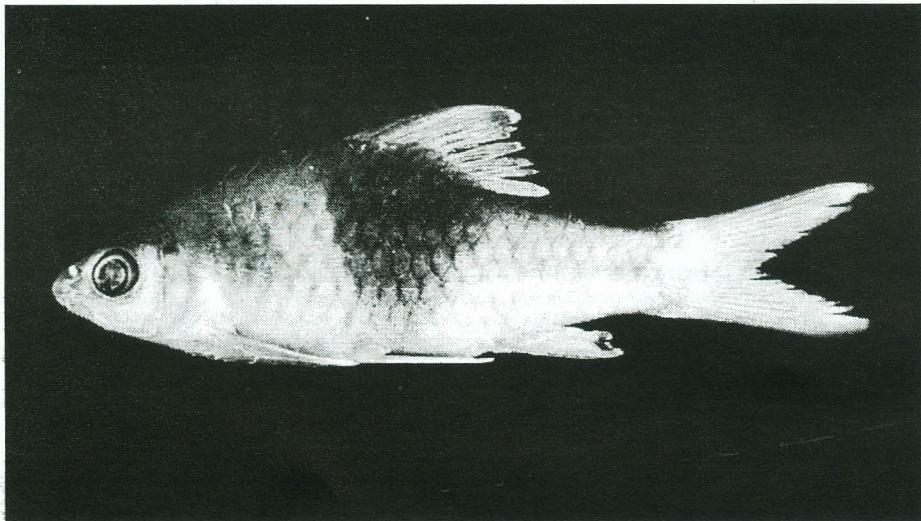


Fig. 1. *Puntius bunau*, n. sp. - holotype (MZB 12074), 51.5 mm SL.

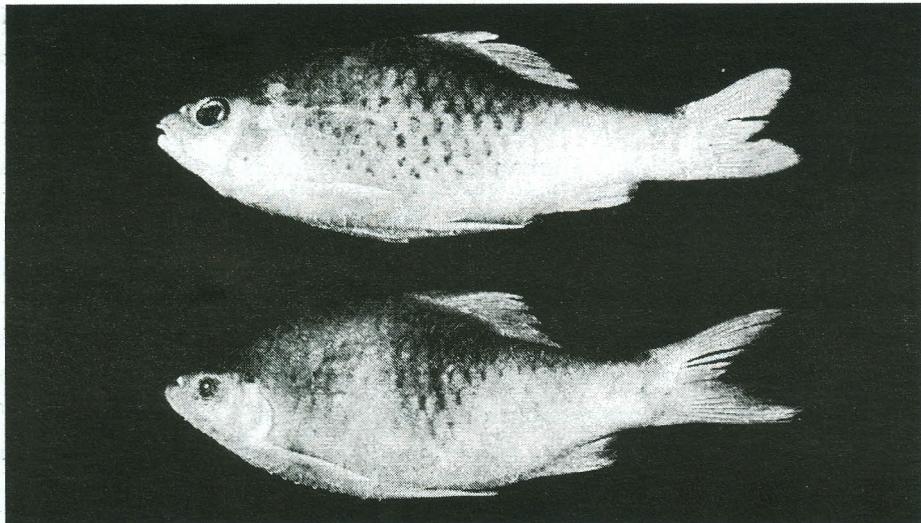


Fig. 2. *Puntius bunau*, n. sp. - male (MZB 12077), 84.2 mm SL; female (MZB 12088), 84.8 mm SL.

Diagnosis. - *Puntius bunau* is distinguished from its congeners by a combination of the following characters: a broad black triangular bar on the side of the body under the dorsal fin, black spots behind the opercle, a black bar on the edge of the anal fin, 22-23 lateral line scales, predorsal profile convex, and eye diameter 21.28-29.73% of head length.

Material examined. - All specimens from Indonesia: East Kalimantan, Paya Seturan County, Sesayap basin. **Holotype:** MZB 12074 (51.5 mm SL), Sungai Belalang at 113 m, coll: I. Rachmatika *et al.*, 27 November 2000. **Paratypes:** ZRC 49867 (4 ex.: 67.3-77.8 mm SL), S. Belakau, a tributary of Sungai Rian coll: I. Rachmatika *et al.*, 6 Dec. 1999; ZRC 49220 (2 ex.: 69.3-70.1 mm SL), Sungai Bengahau, coll: I. Rachmatika *et al.*, 26 November 1999; BMNH 2004.4.26.1 (1 ex.: 84.2 mm SL), Seturan River, coll: Marlin, 2 November 2000; CMK 17999 (1 ex.: 72.5 mm SL), unnamed stream flowing to Rian River, coll: I. Rachmatika, 17 November 2000; USNM uncat. (1 ex.: 71.20 mm SL) Sungai Belalang, a tributary of Sungai Rian, coll: I. Rachmatika *et al.*, 27 November 2000

MZB 12075 (1 ex.: 89.9 mm SL), Sungai Uping, a tributary of Sungai Sidi, a tributary of Sungai Rian, coll: I. Rachmatika *et al.*, 17 November 2000; MZB 12076 (2 ex.: 78.8-85.5 mm SL), Sungai Belakau, 2 November 2000; MZB 12077 (1 ex.: 84.2 mm SL), Seturan River at CIFOR camp, coll: Marlin, 2 November 2000; MZB 12078 (1: 62.8 mm SL), Sungai Bengahau at Bina Benoa camp, coll: I. Rachmatika *et al.*, 9 November 2000.

Additional material (non-types): MZB 12079 (2 ex.: 60.6-74.8 mm SL), unnamed stream flowing to Sungai Rian; MZB 12080 (1 ex.: 86.2 mm SL), Sungai Rian; MZB 12081 (1 ex.: 93.5 mm SL), Sungai Lit; MZB 12082 (2 ex.: 26.2-75.9 mm SL), Sungai Ulet; MZB 12083 (2 ex.: 42.7-53.1 mm SL), unnamed stream flowing to Sungai Rian; MZB 12084 (2 ex.: 69.5-72.5 mm SL), Sungai Uping, tributary of Sungai Sidi, tributary of Sungai Rian; MZB 12085 (1 ex.: 70.6 mm SL), Piyang; MZB 12086 (1 ex.: 43.4 mm SL), unnamed stream flowing to Sungai Rian (plot 27); MZB 12087 (1 ex.: 42.5 mm SL), unnamed stream flowing to Seturan River (behind CIFOR camp); MZB 12088 (1 ex.: 84.8 mm SL), ponding of Sungai Kenowan to the left of the entrance to CIFOR camp; MZB 12089 (1 ex.: 72.6 mm SL), unnamed stream flowing to Sungai Rian [plot 32]; MZB 12090 (1 ex.: 69.9 mm SL), Sungai Bengahau at Bina Benoa camp; MZB 12091 (1 ex.: 33.7 mm SL), Sungai Belakau, a tributary of Rian River.

Description. - Body shape and general appearance as in Figure 2. Morphometric data on Table 1. Meristic data on Table 2. Dorsal fin rays III-IV, 8 $\frac{1}{2}$; anal fin rays III.5 $\frac{1}{2}$; pectoral fin rays I.14 -15; pelvic fin rays I.8-9; caudal fin rays 9+8 (branched rays at upper and lower lobes). 22-23 scales pierced by lateral line, 4 $\frac{1}{2}$ -5 $\frac{1}{2}$ / 3 $\frac{1}{2}$ transverse body scales, 8 predorsal scales, 12 circum-peduncular scales. Lateral line continuous, following ventral contour in the anterior part and anal fin base contour in the posterior part. One pair of maxillary barbels, one pair of mandibular barbels. Body compressed, oblong, with relatively small head (head length 18.4-26.8% in standard length). Snout obtuse, its length 8.5-9.9% in standard length. Mouth sub-terminal with slightly inferior lower jaw and prominent upper jaw. Eye diameter 21.3-29.7% in head length, situated near the upper part of head. Predorsal profile from occipital process to dorsal fin origin convex, particularly pronounced in mature specimens above 60 mm SL. Origin of dorsal fin directly opposite origin of pelvic fins through an imaginary line joining

Table 2. Morphometric data of *Puntius bunau*, *P.lateristriga*, *P.kuchingensis* and *P.banksi*. Measurements are in per cent of SL, except head parts (eye diameter, snout length, post orbital length, interorbital length) are presented in percent of HL.

	<i>P. bunau</i>		<i>P.lateristriga</i>		<i>P.kuchingensis</i> (N=4)	<i>P.banksi</i> (N=3)
	Holotype MZB 12074	paratype (N=8)	(1) N=6	(2) N=1		
Standard length (mm)	51.5	62.8 - 89.9	39.7 - 59.0	49.2	56.8 - 74.6	35.3 - 55.4
Head length (mm)	15.2	18.4 - 25.7	11.8 - 16.0	14.3	16.9 - 19.7	12.0 - 17.6
Head length	29.5	25.3 - 29.9	26.9 - 29.7	28.9	26.4 - 29.7	31.7 - 33.9
Body depth	38.6	40.1 - 43.5	38.0 - 40.0	40.1	38.5 - 40.9	39.1 - 39.5
Caudal peduncle depth	16	14.9 - 15.9	15.9 - 16.9	16.1	14.2 - 16.5	16.6 - 17.4
Caudal peduncle length	20.5	15.8 - 19.7	17.1 - 21.7	19.8	16.8 - 17.9	16.6 - 19.2
Head depth	16.3	14.4 - 18.7	15.8 - 17.5	16.9	15.9 - 18.6	15.1 - 19.1
Inter orbital length	37.9	34.0 - 40.8	36.4 - 37.9	33.7	33.1 - 37.1	29.2 - 33.1
Post orbital length	49.44	48.7 - 54.9	46.4 - 51.3	45.6	46.8 - 50.2	42.9 - 45.4
Pre dorsal length	26.9	50.1 - 52.5	43.7 - 50.8	50.9	52.4 - 55.2	58.2 - 59.8
Eye diameter	28.9	21.3 - 29.7	31.0 - 35.9	32.3	24.8 - 30.8	32.5 - 34.8
Snout length	32.61	29.9 - 37.3	29.8 - 34.2	30.8	30.9 - 34.8	23.5 - 37.1

Description of colour pattern. - In alcohol: greyish-brown above, whitish below. A distinct inverted triangular black blotch on the side of body spanning about 7 scales below dorsal fin base and tapers downwards to pelvic fin base one or two scales beneath lateral line, its base spanning from dorsal fin origin to first or second scale behind end of dorsal fin. In large individuals over 93.50 mm SL, the triangular blotch becomes faint with obscured borders and apex. A cluster of black spots above lateral line between hind edge of opercle and triangular blotch present only on mature females (Fig.3). The diagnostic triangular blotch is present on the smallest specimens around 26.2 mm SL. Individuals at this size have a faint blackish midlateral stripe extends from behind opercle, through triangular blotch, to caudal base. On the individuals longer than this size the blackish midlateral stripe is absent.

In life: adult fish silvery green on head, yellowish on opercle through dorsal and caudal region, silvery white on ventrum. Anal, ventral, and caudal fins reddish; pectoral fins orange.

Biological notes. - Most specimens were collected from streams flowing either directly to the Seturan River (Malinau) or to its tributaries such as Sungai Rian, in areas with relatively moderate current. Observations of three individuals show that this fish is omnivorous. It has short intestines (intestinal length 63.0–94.1% SL), and a stomach with relatively thick, folded wall. Fragments of aquatic insect, small mollusc, plant and sand were found in stomach contents. Mature females (84.3–86.2 mm SL) were found to contain 970–1233 eggs, each 0.7–0.9 mm in diameter. Males from 88.0 mm SL have well-developed gonads.

Puntius bunau inhabits a variety of depths from 0.2 to 0.8 m, in habitats with clear flowing water of slow to moderate velocity; rocky substrates littered with submerged logs, branches, and detritus. Sungai Belakau, a forest stream (about 3 m wide at the sampling site) from where the most number of specimens were collected (N = 5) had the following ecological conditions during the 1999 survey: water up to 0.30 m deep, clear, average dissolved oxygen 6.8 mg/liter, average pH 7.2, moderately flowing water (velocity 0.5m/sec.), water temperature $25.78 \pm 0.16^\circ\text{C}$ with silt, sand and rock substrate. In this location *Puntius bunau* is syntopic with *Cylochelichthys repasson*, *Garra borneensis*, *Hampala macrolepidota*, *Lobocheilus* cf. *bo*, *Nematabramis everetti*, *Osteochilus waandersii*, *Puntius binotatus*, *Parachela ingerkongi*, *Rasbora argyrotaenia*, *R. elegans*, *R. caudimaculata* (Cyprinidae); *Gastromyzon* cf. *lepidogaster*, *Gastromyzon* sp., *Nemacheilus saravacensis*, *N. selangoricus* (Balitoridae); *Hemibagrus* cf. *nemurus*, *H. baramensis*, *Leiocassis* sp. (Bagridae), *Mastacembelus unicolor*, *M.* cf. *maculatus* (Mastacembelidae), *Osphronemus septemfasciatus* (Osphronemidae). The holotype of *Puntius bunau* was obtained from Sungai Belalang at a site which was 4.5 m wide, about 0.75 m at its deepest point, had turbid water, stony substrate with old jakau at the bank. The turbid water at this site had dissolved oxygen content of 5.5 mg/liter, pH value of 6.6, water temperature at 26.7°C , and a conductivity value of 0.066 mc/cm.

Distribution. - This species is presently known only from the Seturan watershed of East Kalimantan, Indonesian Borneo. It is probably endemic to that region.

Etymology. - *Bunau* is the vernacular name of the present species in the language of the Dayak Punan, one of the native peoples living in the surveyed area.

Comparison Material

Puntius banksi

Malay Peninsula - ZRC 41866 (3 ex.: 71.5–85.2 mm SL) Malaysia: Terengganu, Sungai Brang; ZRC uncat. (3 ex.: 36.3–54.3 mm SL) Malaysia: Johor, Kota Tinggi,

Sg. Tementang; ZRC 1267 (14 ex.: 57.6-80.2 mm SL) Singapore: Sungei Kallang; ZRC 659 (19 ex.: 15.4-65.5 mm SL).

Borneo - Malaysia: Sarawak, Kampung Pangkalan Kuap 7 miles south of Kuching; ZRC 49256 (10 ex.: 20.0-57.7 mm SL) Indonesia: Kalimantan Barat, Sungai Belado at base of Gunung Kloncet.

Puntius kuchingensis

Borneo - ZRC 45793 (3 ex.: 64.7-75.6 mm SL) Malaysia: Sarawak, Rajang basin, Kapit; ZRC 43146 (1 ex.: 84.8 mm SL) Malaysia: Sarawak, Rajang basin, Kapit; ZRC 37852 (1 ex.: 79.2 mm SL) Malaysia: Sarawak, Sarikei, Taman Selangkoi; ZRC 661 (1 ex.: 55.7 mm SL) Malaysia: Sarawak, Kuching, Bukit Stingang; ZRC 49282 (2 ex.: 42.0-68.8 mm SL) Indonesia: Kalimantan Barat: Kapuas basin, Sintang. ZRC uncat. (1 ex.: 60.60 mm SL) Malaysia: Sarawak, S. Kukas.

Puntius lateristriga

Malay Peninsula - ZRC 17753 (1 ex.: 77.5 mm SL) Singapore: Lower Peirce forest; ZRC 42890 (1 ex.: 70.1 mm SL) Malaysia: Johor, Mersing; ZRC 14176 (20 ex.: 18.9-82.4 mm SL) Malaysia: Johor, Kota Tinggi, foothills of Gunung Pantii; ZRC 19320 (3 ex.: 56.0-72.1 mm SL) Malaysia: Johor, Desaru; ZRC 39981 (3 ex.: 23.5-73.7 mm SL) Malaysia: Johor, base of Gunung Pulai; ZRC 4771 (10 ex.: 32.6-52.1 mm SL) Malaysia: Johor, Gunung Pulai Reservoir; ZRC 579 (8 ex.: 56.1-91.8 mm SL) Malaysia: Selangor, Sungai Buloh; ZRC 39531 (10 ex.: 13.0-66.0 mm SL) Malaysia: Perak, tributary of Sungai Kulim about 11 km from Gerik; ZRC 41086 (7 ex.: 13.8-78.3 mm SL) Malaysia: Kedah, 2 km before Baling along Gerik-Sungai Petani Road; ZRC 583 (3 ex.: 90.5-116.6 mm SL) Malaysia: Pahang, Kuala Tahan; ZRC 573 (40 ex.: 42.4-106.4 mm SL) Malaysia: Kelantan, River Condor; ZRC 42159 (4 ex.: 22.5-53.9 mm SL) Thailand: Satun Province, Bang Kong Kruat.

South China Sea - ZRC 40453 (38 ex.: 17.2-97.3 mm SL) Malaysia: Pahang, Pulau Tioman, Sungai Raya; ZRC 49283 (3 ex.: 36.2-85.3 mm SL) Anambas Islands: Pulau Jemaja, Air Neraja waterfall.

Borneo - ZRC 39358 (1 ex.: 67.2 mm SL) Malaysia: Sarawak, Sungai Stinggang at Kampung Stinggang; ZRC 43637 (1 ex.: 59.1 mm SL) Malaysia: Sarawak, Lundu, Sungai Sebiris; MZB 3296 (1 ex.: 41.6 mm SL) West Kalimantan: Kapuas basin, Sungai Kapuas. Sumatra - ZRC 30723 (2 ex.: 29.6-42.5 mm SL) Sumatra: Pulau Banka, 9 km east of Muntok; MZB 1621 (19 ex.: 32.4-74.0 mm SL) Sumatra: Lampung Tengah, Way Jepara; ZRC 49284 (4 ex.: 91.5-112.5 mm SL) Sumatra: West Sumatra, Sungai Dareh.

Discussion

The Spanner or T- Barb, *Puntius lateristriga* (Valenciennes) is widely distributed in the Sunda region (see Bleeker, 1863: 103; Weber & de Beaufort, 1916: 180). It appears

to be highly variable throughout its range, and the various allopatric populations can be distinguished by their colour pattern. Tweedie (1961) recognised six forms of *P. lateristriga* in the Malay Peninsula. Should the various geographical forms of *Puntius lateristriga* be recognised as distinct taxa, the name *P. lateristriga* should be restricted to the Javanese form described by Valenciennes (in Cuvier & Valenciennes, 1842: 161 as *Barbus lateristriga*), and figured in Roberts (1993: 21, 63, fig. 18). However, this species has not been collected recently from the type locality.

Puntius kuchingensis Herre (1940a: 11, pl. 5) from Sarawak, and *Puntius lateristriga punctatus* Banarescu & Bianco (1984) from the Kapuas basin of Kalimantan Barat had been regarded as synonyms of *P. lateristriga* by Kottelat *et al* (1993: 43). *P. kuchingensis* is later treated as a distinct species by Kottelat & Lim (1995: 233). The different geographical forms of *P. lateristriga*, *P. kuchingensis* and *P. lateristriga punctatus* share the same basic colour marks, in varying intensity and width, of two vertical black bars in the anterior part of the body and a longitudinal black stripe over the posterior part.

Puntius lateristriga punctatus was described by Banarescu & Bianco (1984) from the Kapuas River at Segadau. Its colour pattern strongly resembles that of *P. kuchingensis* and the two seem to be conspecific. Both *P. kuchingensis* and *P. lateristriga punctatus* have apparently been overlooked by Roberts (1989: 65) in his diagnosis of *P. lateristriga* from the Kapuas basin. *Barbus zelleri* Ahl (1937: 115) was described based on aquarium specimens probably from the Malay Peninsula. It is regarded as a synonym of *Puntius lateristriga* (see Klausewitz, 1957).

Puntius banksi Herre (1940b: 31) was described from Sarawak, Singapore and southern Johor, as a subspecies of *P. binotatus*. The type locality of *P. banksi* is restricted to Sarawak (Bohlke, 1953) and the Sarawakian fish are characterised by an oblique black bar under the dorsal fin. The population from the southern Malay Peninsula appears to be not conspecific (see Kottelat & Lim, 1995: 232) as fish above 40 mm SL develop a black inverted triangular blotch similar to that of *P. bunau*.

Puntius bunau appears to be closely related to *Puntius lateristriga*, and *P. kuchingensis*. Mature examples of 60 mm SL and above develop a distinct hump on the predorsum, and the distal edge of the dorsal fin is convex. All colour forms of *P. lateristriga* (including *P. zelleri*) have a broad black band descending from the base of the dorsal fin to the base of the ventral fins, and second one anterior to that descending from the predorsum behind the hind edge of the operculum. There is a black horizontal band over the middle of the trunk from under the posterior end of the dorsal fin base to the middle of the caudal fin base, and a black spot above the anal fin base. On *P. kuchingensis*, a broad blackish band descends from the anterior base of the dorsal fin to above the ventral fins, a second one anterior to that extends obliquely from the nape backwards. The horizontal band (in *P. lateristriga*) is represented by either a series of black spots scattered along the lateral line or longitudinal black band along the middle of the body. The black spot above the anal

fin is present. In contrast, *P. bunau* has a large black inverted triangular bar under the dorsal fin base, no band under the nape, no black spot on the anterior base of the anal fin, and no distinct horizontal band over the posterior part of the body. In adult females, the black triangular bar under the dorsal fin appears to be relatively diffused; and between this and the opercular edge, above the lateral line, is a cluster of black spots. In males these black spots are absent, but there may be a dusky patch in their place.

The colour pattern of *P. bunau* resembles that of *P. banksi*, but in the latter species, the band under the dorsal fin is between 2 to 5 (versus 6 to 7 in *P. bunau*) scales wide, and the spots behind the opercle are never present. *P. banksi* also has a blackish spot on the caudal base which is not present on *P. bunau*. Mature specimens (over 60 mm SL) of *P. banksi* have a slightly concave dorsal fin and an ascending predorsal profile with a slight convexity behind the nape (strongly convex in *P. bunau* of similar size). The colour pattern of *P. bunau* appears to undergo relatively minor ontogenetic changes. In the smallest specimens (around 26 mm SL) examined, the large inverted triangular band under the dorsal fin is already well-developed, and descends to the pelvic base. The black spots behind the opercle are absent, but represented by a faint mid-lateral line or dusky blotch. In contrast, juvenile *P. banksi* up to around 36 mm SL have the broad triangular bar under the dorsal fin represented by a narrow (about one scale wide) and well-demarcated black bar. With its unique colour pattern, *P. bunau* is unlikely to be mistaken for any other species of *Puntius*.

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