

Pectenocypris nigra, a new danionine species (Teleostei: Cyprinidae: Danioninae) from Sumatra (Indonesia)

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Abstract: A new species of Danioninae, *Pectenocypris nigra* nov. sp. is described from peat swamps in the Riau Province, central Sumatra (Indonesia). The species differs from its congeners in the combination of the following characters: a distinct mid-lateral stripe, black spot on the base of the caudal fin, scales pale fawn with blackish margin; 28-30 scales in lateral midline, 7-10 pored lateral line scales, 160 gill-rakers on the first gill arch, and a short and deep caudal peduncle.

Keywords: *Pectenocypris*, Taxonomy, Morphology, Endemic, Indonesia.

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Introduction

The small cyprinid genus *Pectenocypris* is currently known to comprise three species: *Pectenocypris balaena* Roberts, 1989 from western Borneo (Kalimantan Barat Province), *P. korthausae* Kottelat, 1987 from southern Borneo (Kalimantan Tengah Province), and *P. micromysticetus* Tan & Kottelat, 2009 from Sumatra (Jambi Province) (Roberts, 1989; Doi, 1997; Tan and Kottelat, 2009). All species are small (<45 mm SL) with a slender body and with numerous and extremely elongated gill-rakers (Kottelat, 1982; Roberts, 1989; Tan and Kottelat 2009).

In this paper we describe an additional species of *Pectenocypris* from the Serkap River drainage in central Sumatra (Riau Province).

Materials and Methods

Specimens were sampled in peat lakes of the Serkap River system, Sumatra (Fig. 1). Counts and measurements follow Kottelat (2001). We also measured predorsal, prepelvic, preanal length and dorso-hypural distance (Tan and Kottelat, 2009) and added head width (distance from left to right dorsal origin of the opercular opening),

postorbital length (posterior most edge of the eye to the posteriormost point of the opercle), prepectoral length (tip of snout to dorsal origin of the pectoral fin) and pectoral-pelvic length (dorsal origin of pectoral fin to lateral origin of pelvic fin). Measurements were taken to 0.01 mm using an electronic caliper and rounded to the nearest 0.1 mm. Counts and measurements were taken twice; the data are presented as means. The pharyngeal jaw was investigated by MicroCT imaging (for details of MicroCT imaging see Ahnelt et al., 2015). Type specimens are deposited in the Museum Zoologicum Bogoriense (MZB), Bogor, Indonesia, and the Naturhistorisches Museum Wien (NMW), Vienna, Austria. Additional institutional abbreviations: MHNG = Muséum d'histoire naturelle, Ville de Genève.

Comparative material

Pectenocypris korthausae Kottelat, 1982; MHNG 2073.073-075, three paratypes; 20.31-21.1 mm SL; Indonesia, Borneo, Kalimantan Tengah, approximately 50 to 100 km North of Sampit; collected by Mrs. Korthaus, March 1979. CAS 50488, one paratype; 20.7 mm SL; same data as MHNG 2073.073-075. CAS 94171, three specimens; 31.8-36.6 mm SL; Indonesia, Borneo,

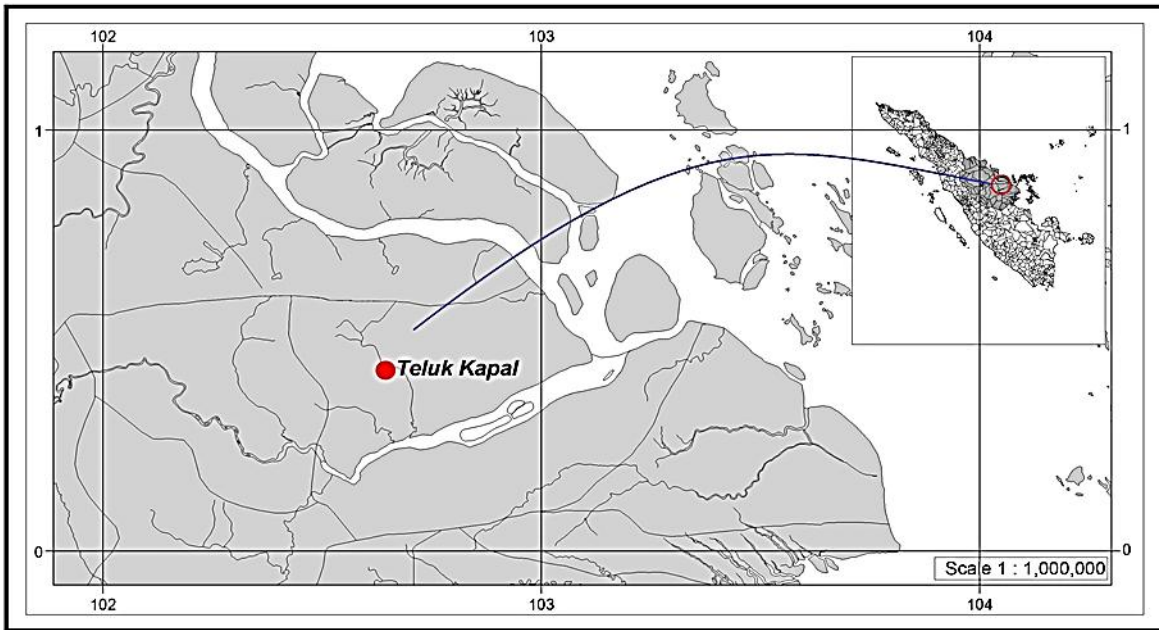


Figure 1. Sampling site of *Pectenocypris nigra*, Teluk Kapal, Sumatra. Insert: Location of Riau province (dark grey) in Sumatra.

Kalimantan Tengah, Sungai Seruyan Basin, Danau Sembuluh at Bangkal (-2.701715°, 112.388515°; source: FishNet Collaborative Georeferencing Project); collected by Tyson R. Roberts, 12-13 June 1992.

Pectenocypris balaena Roberts, 1989; CAS 49307, five paratypes; 23.3-28.5 mm SL; Indonesia, Borneo, Kalimantan Barat, Kapuas River Basin, Danau Piam near Ketungau, 39 km NNE of Sintang (0°23'30"N, 111°37'30"E); collected by Tyson R. Roberts and S. Woerjoatmodjo, 5-6 July 1976.

Results

Generic diagnosis: The genus *Pectenocypris* Kottelat, 1982 differs in following morphological characters from all other known genera of Cyprinidae: very long, densely set and numerous gill rakers; shape of lower pharyngeal jaws tripodal; the posterior limb of each pharyngeal jaw with two processes (forked). Type species: *Pectenocypris korthausae* Kottelat, 1982.

Key to species of *Pectenocypris*:

- 1- Black mid-lateral stripe absent; lower jaw not or only indistinctly projecting beyond upper jaw..... 2
- Black mid-lateral stripe distinct; lower jaw distinctly projecting beyond upper jaw..... 3
- 2- Black spot at base of caudal fin elongated; 165-240 gill-rakers on first gill-arch; Jambi, Sumatra.....
.....*Pectenocypris micromysticetus*
- Black spot at base of caudal fin oval to roundish; 95-135

- gill-rakers on first gill-arch; Kalimantan Tengah, Born..... *Pectenocypris korthausae*
- 3- Black spot at base of caudal fin oval; pale fawn scales with blackish margin; symphysal knob distinct; 160 gill-rakers; Riau, Sumatra..... *Pectenocypris nigra* sp. nov.
- Black spot at base of caudal fin absent; dark grey scales with pale fawn margin; no symphysal knob; 180-212 gill-rakers; Kalimantan Barat, Borneo.....
.....*Pectenocypris balaena*

***Pectenocypris nigra*, new species**

(Figs. 2-4, Table 1)

Holotype: MZB 22149; 33.1 mm SL, Indonesia, Central Sumatra, Riau province, peat swamp, Serkap river system, river and peat lakes 'Teluk Kapal' (00°25'42"N, 102°38'45"E) approximately 90 km east of Pelalawan; collected by A. Wibowo and party, May 2013.

Paratypes: MZB 22150; 5, NMW 98607; 2, 30.2-34.2 mm SL; same data as holotype.

Etymology: From the Latin word *niger* meaning "black". The name refers to the blackish coloration of the species in life.

Diagnosis: *Pectenocypris nigra* sp. nov. differs from all congeners (*P. balaena*, *P. korthausae* and *P. micromysticetus*) by the following unique combination of characters: a distinct mid-lateral stripe; an oval black spot on the base of the caudal fin; scales pale fawn with blackish margin; 28-30 scales in lateral midline; lateral



Figure 2. *Pectenocypris nigra*, holotype, 33.1 mm SL, lateral view. MZB 22149. Scale bar = 5 mm. (right side, reversed). Mid-lateral stripe does not extend on opercle (opercle covered by many similar sized small melanophores).

Table 1. Characters of *Pectenocypris*. Pb- *Pectenocypris balaena*, Pk- *Pectenocypris korthausae*, Pm- *Pectenocypris micromysticetus*, Pn- *Pectenocypris nigra*. Characters of coloration are separated from other morphological characters by a double line. ? - character not known.

Characters	Pb	Pm	Pk	Pn
Scales in lateral series <30	+	+	-	+
Scales in lateral series >31	-	-	+	-
Pored lateral line scales 7-8	+	+	-	-
Pored lateral line scales 7-10	-	-	+	+
Number of gill rakers <140	-	-	+	-
Number of gill rakers <170	-	-	-	+
Number of gill rakers <220	+	-	-	-
Number of gill rakers <250	-	+	-	-
Denticles on first pharyngeal tooth	?	?	+	-
Lower jaw distinctly projecting upper jaw	+	-	-	+
Caudal peduncle long, narrow	+	+	-	-
Caudal peduncle short, deep	-	-	+	+
Black mid-lateral stripe distinct	+	-	-	+
Black mid-lateral stripe absent or indistinct	-	+	+	-
Light narrow stripe dorsal to mid-lateral stripe present	-	-	-	+
Light narrow stripe dorsal to mid-lateral stripe absent	+	-	+	-
Thin black mid-dorsal stripes present	+	+	?	-
Thin black mid-dorsal stripes absent	-	-	?	+
Black spot on base of caudal fin present	-	+	+	+
Black spot on base of caudal fin narrow, elongate	-	+	-	-
Black spot on base of caudal peduncle wide, round	-	-	+	-
Black spot on base of caudal fin oval	-	-	-	+
Scales light with dark margins	-	-	+	+
Scales dark with light margin	+	+	-	-

line incomplete, with 7-10 pored scales; 160 gill-rakers (n=1) on the first gill arch; and a short and high caudal peduncle.

Description: See Figure 2 for overall appearance. Body slender, compressed; body depth deeper than head depth; dorsal outline slightly arched, ventral outline straight; mouth terminal; jaws short; lower jaw with distinct symphysal knob; gill rakers densely set, thin and very long; dorsal fin originates above or slightly before pelvic fin; pectoral fin long, roundish, reaching about 75% of distance to pelvic fin; depressed tip of the first (longest) pelvic fin ray reaches origin of anus; caudal fin distinctly

forked with pointed and elongated lobes; caudal peduncle short, high, nearly 60% as high as long.

Measurements of holotype (33.1 mm SL) and paratypes (30.1-34.2 mm SL) as percent of standard length (range and mean in parentheses, values of holotype in brackets): head length 26.5-28.8 (28.0) [28.2], head width at dorsal origin of gill opening 12.4-13.4 (12.8) [13.4], head depth at nape 15.4-16.2 (16) [16.1], predorsal length 50.8-54.9 (52.7) [54.6], prepelvic length 51.8-54.1 (52.9) [53.6], preanal length 72.2-75.7 (74.1) [74], prepectoral length 28.0-29.7 (28.7) [29.2], pectoral-pelvic length 24.0-25.2 (24.3) [24.9], pectoral fin length 16.6-17.9 [17.8], body



Figure 3. *Pectenocypris nigra*, holotype, head, lateral view. MZB 22149. Scale bar = 0.5 mm. Note whitish symphyseal knob on lower jaw and extension of mid-lateral stripe on opercle (large roundish melanophores in upper half of opercle).

depth at dorsal fin origin 18.4-20.2 (19.3) [18.8], caudal peduncle depth 10.1-11 (10.6) [11], caudal peduncle length 17.7-18.6 (17.8) [18.2], snout length 7.2-8.1 (7.5) [7.7], eye diameter 7.7-8.9 (8.4) [8.4], postorbital length 10.9-11.8 (11.4) [11.6], interorbital width 9.6-10.6 (10.0) [10.0], dorso-hypural distance 49.2-50.6 (49.7) [49.5]. As percentage of head length: snout length 27.3-28.6 (27.8) [27.4], eye diameter 29.1-31.8 (31.0) [29.6], interorbital width 34.4-38.1 (36.0) [35.6], postorbital length 41.2-42.8 (41.3) [42.5]. As percentage of eye diameter: interorbital width 114.0-118.9 (116.7) [118.9]. As percentage of caudal peduncle length: caudal peduncle depth 58.2-61.7 (59.6) [58.6].

Counts of holotype and paratypes (values of holotype are indicated by an asterisk (*), in parentheses each value is followed by a colon and by the number of specimens respectively): dorsal fin with 2 simple and 6½ to 7½ branched rays (6½: 1, 7*: 5, 7½: 1); anal fin with 3 simple and 5½ branched rays (5½*: 8); pectoral fin with 1 simple and 12 to 13 branched rays (12*: 4, 13: 4); pelvic fins with 1 simple and 7 to 8 branched rays (7: 3, 8*: 5); caudal fin deeply forked with 18 to 19 principle rays (18: 1, 19*: 7), 16-17 of them branched (16: 1, 17*: 7) (from dorsal to ventral: 1/8+8/1 or 1/9+8/1). Scales in lateral series 27+1-28+2 (27+1: 1, 27+2: 1, 28+2*: 6); lateral line incomplete, pored scales left/right 7/7-9/10 (7/7: 1, 8/9: 2, 9/8: 1, 9/9: 1, 10/9*: 2, 10/10: 1); predorsal scales 11-12 (11*: 7, 12: 1); scales in transversal series from origin of dorsal fin rearwards and downwards 7.5-8.5 (7.5: 1, 8.5*: 7); scales in circumpeduncular series 11-12 (11: 6, 12*: 2). Gill-rakers (n=1): 50 on the upper, 110 on the lower arm of the

first gill arch. Gill-rakers and gill filaments of about the same length. Vertebral count (n=2): 32; 17 precaudal+15 caudal vertebra.

The pharyngeal jaws (n=2) are of a tripodal shape (Fig. 4). The posterior limb of each pharyngeal jaw is forked ending in two distinct processes. Three teeth are attached perpendicularly on the medial side of the tooth-bearing process and are arranged in a single row (tooth formula 3-3). The shape of the pharyngeal jaws and the pharyngeal teeth of *P. nigra* are similar to those of *P. korthausae* (Kottelat, 1982; Fig. 1) and to *P. balaena* (Roberts, 1989). But contrary to *P. korthausae*, no pharyngeal tooth of *P. nigra* has denticles. The shape of the pharyngeal jaws and the pharyngeal dentition of *P. micromysticetus* are not known (Tan and Kottelat, 2009).

Coloration: Living specimens (from observations during sampling) are black on the dorsal side, somewhat lighter on the ventral side, with a distinct black mid-lateral stripe ending in a black oval black spot. Preserved specimens are blackish on the dorsal side and light grey to fawn on the ventral side. A distinct black mid-lateral stripe runs from the posterior margin of the opercle to the base of the caudal fin. Mid-lateral stripe not (holotype, three paratypes) or indistinctly (three paratypes) extending on the opercle; in latter case, many melanophores form a diffuse dark area on opercle (Fig. 2). Mid-lateral stripe ends at distinct black oval spot at base of caudal fin. Dorsal sides of head (including snout) and trunk very dark with blackish mid-dorsal line from base of last dorsal fin to dorsal origin of caudal fin. Conspicuous symphyseal knob on lower jaw whitish (holotype, four paratypes) or bright white (three paratypes), distinctly contrasting with blackish upper lip and head (Fig. 3). Trunk ventral to mid-lateral stripe fawn to light grey. Fawn stripe immediately dorsal to mid-lateral stripe. These lighter areas, enclosing the mid-lateral stripe, accentuate its black color (Fig. 2). Thin black mid-axial streak accompanies mid-lateral stripe from below dorsal fin close to caudal spot. Margins of scales dark grey pigmented, yielding distinct reticulate pattern which is more pronounced dorsal to mid-lateral stripe. Blackish mid-ventral streak from last anal fin ray to ventral origin of caudal fin. No black streak on base of anal fin. Black melanophores follow course of all fin rays, most densely covering rays of paired and dorsal fins. Gill filaments light fawn, covered by one distinct black spot (short filaments) or by a row of up to five distinct black spots extending on gill filaments (except on the very short

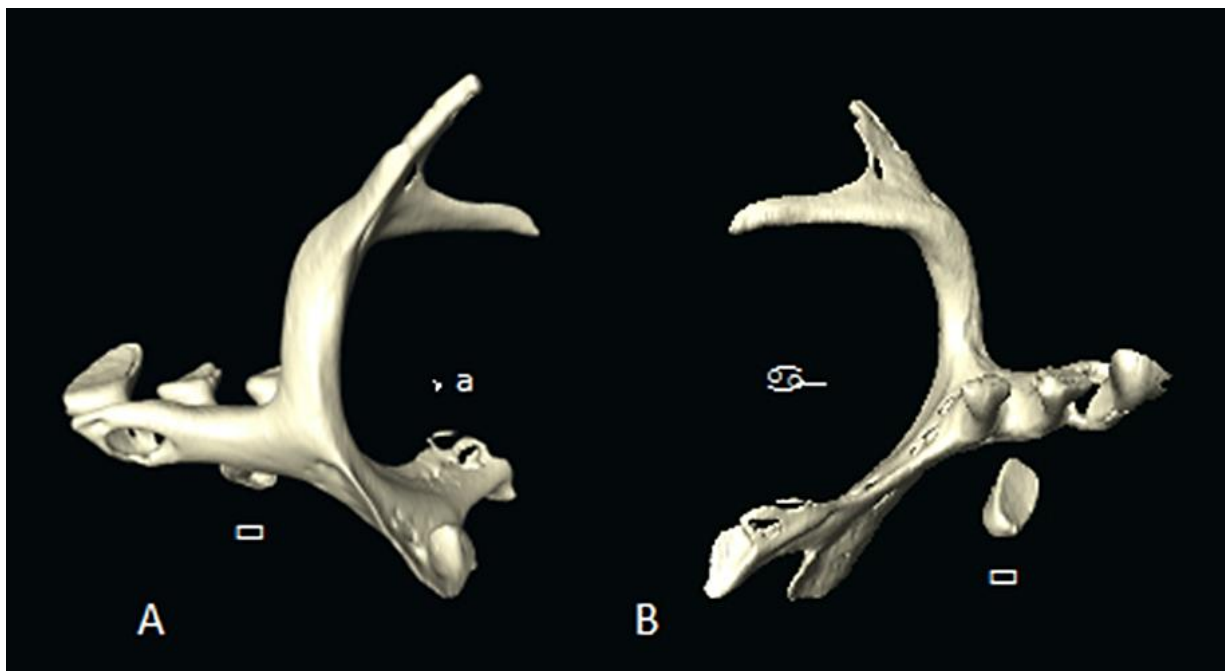


Figure 3. *Pectenocypris nigra*, paratype, NMW 98607, 30.2 mm SL. Right lower pharyngeal jaw, lateral view (A), medial view (B). Tooth crown of a replacement tooth indicated by arrowhead. a=anterior.

filaments at the origin of the ceratobranchial and the end of the epibranchial) giving gills a spotted pattern.

Ecology: *Pectenocypris nigra* is currently only known from peat swamps surrounded by pristine forest. The water quality is characterized by acid waters (pH of 3.2-4.3; values classified as ultra to extremely acid, by low dissolved oxygen (1.3-5.9 ppm) and a water transparency of 50-100 cm. The color of the water is tannin-stained dark brown. *Pectenocypris nigra* is seemingly the only species of the genus occurring in peat swamps with a pH classified as ultra to extremely (Bird, 2004) acid. In contrast, *P. balaena* “inhabits small forest streams” (Roberts, 1989) having a pH of 5-5.6 (accessed from “www.calacademy.org/scientists/ichthyology-collections” on 10.06.2016). The pH values of the waters inhabited by *P. korthausae* and *P. micromysticetus* are not known. *Pectenocypris korthausae* was “collected in a flooded forest” (Kottelat, 1982), and *P. micromysticetus* occurs “in oxbow lakes and still pools in open or recently flooded areas” and seemingly not in peat swamp areas (Tan and Kottelat, 2009, Fig. 1).

Distribution: *Pectenocypris nigra* is presently only known from river and peat lakes ‘Teluk Kapal’ of the Serkap River system in the Riau Province of Central Sumatra.

Remarks: Comparison with the three congeners: *Pectenocypris nigra* is distinguished from *P. balaena*

(characters in parentheses), a species also with a distinct black mid-lateral stripe, by a wide and oval black spot on the base of the caudal fin (vs. no black spot; some specimens with “a small dark area at the very end of the stripe” (Roberts, 1989)) and by light fawn scales with dark brown margins (vs. dark grey scales with light fawn margins, 160 gill-rakers on the first gill arch (vs. 180-212 gill-rakers [Roberts (1989) stated that the lower number of gill-rakers (180) is “... possibly somewhat too low due to the minute size of the gill-rakers at the ends of the upper and lower limits of the gill arch.”]), deeper caudal peduncle, 17.8 % in SL (vs. 10.7 %) and a smaller eye, 8.4 % in SL (vs. 12.0 %). *Pectenocypris balaena* is currently only known from Borneo.

Pectenocypris nigra is distinguished from *P. micromysticetus* (characters in parentheses) by the presence of a distinct mid-lateral strip (vs. absent or very indistinct mid-lateral stripe), light fawn scales with dark grey margin (vs. yellowish brown scales with fawn margin), 160 gill-rakers on the first gill arch (vs. 240 gill-rakers), caudal peduncle shorter, 17.8% in SL (vs. 20.2 %), larger eye, 31 % in head length (vs. 28.2 %) and larger interorbital width, 36 % in head length (vs. 32.7 %). Both species are presently only known from Sumatra.

Pectenocypris nigra is distinguished from *P. korthausae* (characters in parentheses) by a distinct

mid-lateral stripe (vs. absent mid-lateral stripe), an oval spot at the base of the caudal fin (vs. roundish spot), thin black mid-axial streak extending on posterior half of body (vs. thin mid-axial streak extending along the entire body), no denticles on the pharyngeal teeth (vs. three denticles on the anterior-most pharyngeal tooth) (Fig. 4), the lower jaw distinctly projecting beyond the upper jaw (vs. lower jaw indistinctly projecting beyond the upper jaw), the lower jaw with a distinct symphysal knob (vs. no such distinct symphysal knob), lower number of circumpeduncular scales, 11-12 (vs. 14), 160 gill-rakers on the first gill arch (vs. max. 135 gill-rakers), its larger size, 30.1-34.2 mm SL (vs. 21.5-30 mm SL), longer predorsal distance, 52.7 % in SL (vs. 50.8 %), longer head, 28.0 % in SL (vs. 26.1 %), longer snout, 7.5 % in SL (vs. 6.1 %) and a smaller eye, 31.0 % in head length (vs. 33.4 %) (Table 1). *Pectenocypris korthausae* resembles in coloration *P. nigra* in the combination of a black spot at the base of the caudal fin and scales with a dark margin, brown in *P. korthausae* and blackish in *P. nigra*. *Pectenocypris korthausae* is currently only known from Borneo.

Gill-raker number is increasing with size in *P. balaena* (Roberts, 1989), *P. korthausae* and *P. micromysticetus* (Tan and Kottelat, 2009). Therefore we compared the gill-raker number of similar sized specimens of all four *Pectenocypris* species to exclude a possible size bias by size. Actually the gill-raker number differs distinctly between similar sized specimens. The lowest number occurs in *P. korthausae* (135 gill-rakers; 30 mm SL) (Tan and Kottelat, 2009), followed by *P. nigra* (160 gill-rakers; 30.2 mm SL) (this study), *P. micromysticetus* (205 gill-rakers; 32.5 mm SL) (Tan and Kottelat, 2009) and, with the highest number *P. balaena* (212 gill-rakers; 30.1 mm SL) (Roberts, 1989). These gill-raker numbers are also the maximum number except for *P. micromysticetus*. This species reaches a size of approximately 45 mm SL with up to 240 gill-rakers.

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