

# A new miniature killifish of the genus *Melanorivulus* (Cyprinodontiformes: Rivulidae) from the Xingu river drainage, Brazilian Amazon

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## Abstract

*Melanorivulus rubroreticulatus*, new species, is described on the basis of material collected in the lower section of the Xingu river drainage, Brazilian Amazon. It is a member of a group endemic to the region encompassing the southern Amazonas river tributaries and the Paraiíba river basin. The new species is distinguished from other congeners of this group by the presence of broad red bars on the caudal fin in males, bars often interconnected to form reticulations, and short red bars contrasting with intense light blue ground colour on the anal-fin base. It represents the northern-most record for the group, besides being the only species occurring in the Amazon rain forest and possibly is also the smallest one, barely surpassing 25 mm of standard length.

## Key words

Amazon forest, Biodiversity, Killifish, Systematics, Taxonomy.

## Introduction

*Melanorivulus* COSTA, 2006 is a killifish genus comprising over 40 small species occurring in a vast portion of tropical South America (COSTA, 2011). However, most species are only found in savannah areas, with few records for the Amazon (COSTA, 2008, 2009; COSTA & DE LUCA, 2011; BRAGANÇA *et al.*, 2012). In the area encompassing the four main southern Amazonas river tributaries, comprising the Tocantins, Araguaia, Xingu and Tapajós river drainages, which have their upper courses running on the savannahs of the upper lands of central Brazil and the lower portions crossing the Amazon rain forest, the genus is represented by species of the *M. zygometes* group (COSTA, 2008, 2009). It is diagnosed by containing slender species, with the whole flank having a dark gray stripe and red dots arranged in oblique chev-

ron-like pattern with vertex below body midline. Here we describe a new species of this group collected in the lower section of the Xingu river drainage.

## Material and methods

Material is deposited in UFRJ, Instituto de Biologia, Universidade Federal do Rio de Janeiro, Rio de Janeiro. Specimens were fixed in formalin just after collection, for a period of ten days, and then transferred to 70 % ethanol. Descriptions of colour patterns were based on photographs of both sides of live individuals of each

population taken in small aquaria one day after collection; colour patterns derived from distribution of melanophores on fins were also observed in all preserved specimens. Measurements and counts follow COSTA (1988). Measurements are presented as percentages of standard length (SL), except for those related to head morphology, which are expressed as percentages of head length. Fin-ray counts include all elements. Number of vertebrae and gill-rakers were recorded only from the cleared and stained specimen; the compound caudal centrum was counted as a single element. The osteological preparation was made according to TAYLOR & VAN DYKE (1985); the abbreviation c&s means specimens cleared and stained for bone and cartilage. Terminology for cephalic neuromast series follows COSTA (2001) and for cephalic squamation patterns, HOEDEMAN (1958).

### *Melanorivulus rubroreticulatus* spec. nov.

Figs 1–2, Table 1

**Holotype:** UFRJ 9950, male, 24.2 mm SL; Brazil: Estado do Pará: Município de Altamira: swamp close to the road to the Altamira airport, lower Xingu river drainage, southern Amazonas river basin, 03°14'02"S 52°14'05"W, altitude about 100 m; P.F. AMORIM & P.H.N. BRAGANÇA, 30 May 2013.

**Paratypes:** All from the Xingu river drainage, southern Rio Amazonas basin, Município de Altamira, Estado do Pará, Brazil: UFRJ 9555, 1 male, 15.5 mm SL, 3 females, 16.1–18.5 mm SL; UFRJ 9556, 1 male, 14.6 mm SL; collected with holotype. – UFRJ 9558, 9 males, 17.0–21.4 mm SL, 17 females, 14.4–25.7 mm SL; UFRJ 9949, 2 males, 19.2–23.7 mm SL, 3 females, 18.1–21.0 mm SL (C&S); UFRJ 9557, 1 male, 14.9 mm SL, 3 females, 15.5–19.5 mm SL, 2 juveniles of undetermined sex, 12.0–12.1 mm SL; swamp near Altamira airport, 03°17'03"S 52°19'47"W, altitude about 120 m; same collectors, 28 May 2013. UFRJ 9560, 1 male, 25.1 mm SL, 5 females, 17.8–25.4 mm SL; UFRJ 9559, 2 females, 15.2–19.8 mm SL; swamp near the road BR-230, between the town of Altamira and the village of Novo Brasil, 03°15'41"S 52°21'39"W, altitude about 110 m; same collectors, 28 May 2013.

**Diagnosis.** Distinguished from all other congeners of the *M. zygonectes* group by two characters of the colour pattern: caudal fin with broad red bars in males, bars often interconnected to form reticulations, and anal-fin base with short red bars contrasting with intense light blue ground colour.

**Description.** Morphometric data appear in Table 1. Dorsal profile almost straight from snout to dorsal-fin origin, ventral profile gently convex from snout to posterior end anal-fin base, about straight on both dorsal and ventral profiles of caudal peduncle. Body slender, sub-cylindrical anteriorly, slightly deeper than wide, compressed posteriorly. Greatest body depth at vertical just in front

to pelvic-fin base. Jaws short, snout weakly pointed in lateral view.

Dorsal and anal fins short, extremity rounded. Caudal fin oval, longer than deep. Pectoral fin rounded, posterior margin reaching vertical at about 80–90 % of length between pectoral-fin and pelvic-fin bases. Pelvic fin small, tip reaching between base of 1<sup>st</sup> and 2<sup>nd</sup> anal-fin rays in males, reaching between anus and urogenital papilla in females; pelvic-fin bases medially in close proximity. Dorsal-fin origin on vertical between base of 10<sup>th</sup> and 11<sup>th</sup> anal-fin rays; second proximal radial of dorsal fin between neural spines of 19<sup>th</sup> and 21<sup>st</sup> vertebrae, first proximal radial of anal fin between pleural ribs of 13<sup>th</sup> and 15<sup>th</sup> vertebrae. Dorsal-fin rays 9–10; anal-fin rays 12–14; caudal-fin rays 28–31; pectoral-fin rays 13–14; pelvic-fin rays 7.

Scales small, cycloid. Body and head entirely scaled, except anterior ventral surface of head. Body squamation extending over anterior 35 % of caudal-fin base; no scales on dorsal and anal-fin bases. Frontal squamation F-patterned; E-scales not overlapping medially; scales arranged in regular circular pattern around A-scale without exposed margins. Longitudinal series of scales 33–35; transverse series of scales 9; scale rows around caudal peduncle 16. No contact organs.

Cephalic neuromasts: supraorbital 3+3, parietal 1, anterior rostral 1, posterior rostral 1, infraorbital 1+12–14+1, preorbital 2, otic 1, post-otic 2, supratemporal 1, median opercular 1, ventral opercular 1, pre-opercular 2+4, mandibular 3+1, lateral mandibular 2–3, paramandibular 1.

Basihyal sub-triangular, greatest width about 45 % of length; basihyal cartilage about 20 % of total length of basihyal. Six branchiostegal rays. Second pharyngobranchial teeth absent. Gill-rakers on first branchial arch 1+8. Vomerine teeth 3. Dermosphenotic well developed. Ventral process of posttemporal absent. Total vertebrae 30–31.

**Colouration. Males.** Flank light brown with pale blue iridescence; dark grey to black stripe between postorbital region and caudal-fin base mainly visible when fish is exposed to strong light; oblique rows of red dots united to form chevron-like marks anteriorly directed, with medial portion interrupted and vertex below midline of flank. Dorsum light brown with dark brown dots, venter white. Dorsal portion of head side light brown, ventral portion white with blue iridescence, to pale golden on opercular region. Upper jaw light brown, lower jaw dark black. Iris pale yellow, with dark brown bar on anterior and posterior portions. Dorsal fin light yellow with oblique dark red bars, antero-distal portion pale yellow. Anal fin light blue with short transverse red stripes on basal and posterior portions, pale yellow on distal portion. Caudal fin light blue, with 5 or 7 broad red bars, dorsal and ventral margins pale yellow. Pectoral fin hyaline. Pelvic fin pale blue. **Females.** Similar to males, except by dark grey marks on fins instead of red; red chevron marks of flank darker, usually not interrupted on the median portion; distal mar-



**Fig. 1.** *Melanorivulus rubroreticulatus*: UFRJ 9950, holotype, male, 24.2 mm SL: Brazil: Pará: Altamira.



**Fig. 2.** *Melanorivulus rubroreticulatus*: UFRJ 9955, paratype, female, 18.2 mm SL: Brazil: Pará: Altamira.



**Fig. 3.** *Melanorivulus megaroni*: UFRJ 9416, male, 28.6 mm SL: Brazil: Mato Grosso: Canarana.

gin of dorsal and anal fins, whole margin of caudal fin and anterior margin of pelvic fin dark grey; and, small rounded spot on dorsal portion of caudal-fin base preceded by two white spots and dorsally bordered by white zone.

**Distribution.** Known only from the type locality area, floodplains of the lower Xingu river around the town of Altamira, Amazonas river basin, northern Brazil.

**Table 1.** Morphometric data of *Melanorivulus rubroreticulatus*.

	holotype	paratypes	
	male	males (3)	females (5)
Standard length (mm)	24.2	20.7–25.1	19.6–25.7
<b>Percent of standard length</b>			
Body depth	21.8	19.3–20.8	20.1–20.5
Caudal peduncle depth	13.3	12.5–13.5	11.8–13.7
Pre-dorsal length	76.6	75.2–77.7	77.6–79.4
Pre-pelvic length	55.1	52.5–54.9	54.2–56.4
Length of dorsal-fin base	9.6	9.6–10.6	8.4–10.0
Length of anal-fin base	21.1	18.0–21.2	17.4–19.2
Caudal-fin length	36.2	33.3–36.0	33.7–37.1
Pectoral-fin length	20.3	20.0–22.6	20.3–22.6
Pelvic-fin length	14.3	11.1–11.3	9.7–12.0
Head length	26.9	26.1–26.7	25.1–27.9
<b>Percent of head length</b>			
Head depth	59.4	59.6–61.6	58.2–64.8
Head width	75.4	75.2–76.5	74.1–83.3
Snout length	12.6	12.7–13.7	12.6–14.1
Lower jaw length	19.4	18.8–20.9	18.5–21.9
Eye diameter	33.8	34.8–36.5	32.6–36.7

**Etymology.** From the Latin *rubro* (red) and *reticulatus* (reticulate), referring to the colour pattern of the caudal fin in males.

## Discussion

*Melanorivulus rubroreticulatus* is the second species of the genus described from the Xingu river basin. The other species, *M. megaroni* COSTA, 2009, is found in a vast area of the upper and middle sections of that basin (COSTA, 2009). Instead of the unique colour pattern of the caudal and anal fins of *M. rubroreticulatus*, in *M. megaroni* the caudal fin is light pink, often with a few short and narrow red bars on the fin base region, and the anal-fin base does not have bright colours (Fig. 3).

*Melanorivulus rubroreticulatus* is the northern-most record among species of the *M. zygometes* group, occurring in an area of the lower Xingu river basin within the Amazon rain forest. This record thus contrasts with other congeners of the group that has been found in the typical savannahs of central Brazil or in transitional zones between the savannah and the rain forest (COSTA, 2003, 2007, 2008, 2009). *Melanorivulus rubroreticulatus* also seems to be the smallest species of the *M. zygometes* group, since among the 44 specimens from three localities the largest had 25.7 mm SL, instead of about 28–35 mm SL in other species of the group.

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