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Crenicichla dandara, new species: the black jacundá from the Rio Xingu (Teleostei: Cichlidae)

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ABSTRACT.—*Crenicichla dandara*, new species, is endemic to the rio Xingu above the Belo Monte narrows, and its major left bank tributary the rio Iriri. The new species is distinguished from all congeners by the following combination of characters: body uniformly black (live fishes) or dark brown (preserved specimens) in adults and 74–86 scales in the E1 row. *Crenicichla dandara* is considered herein to be the tenth species of the *C. lugubris* group, but its allies within the group are not clear. Among members of this group, *C. dandara* is most similar in general body shape, snout characteristics and squamation to *C. lugubris* and *C. adspersa*, but lacks a caudal-fin blotch as does *C. johanna* and *C. monicae*, a condition rare within the *Crenicichla-Teleocichla* clade. The overall black coloration in *Crenicichla dandara* is shared with the syntopic, but not closely related, *Teleocichla preta*. Both species inhabit clear water rapids where they hide among the shadows of large rocks, suggesting that the dark coloration is for camouflage and ambush predation. Based on a preliminary assessment of its conservation status following the criteria and categories of IUCN classification, *Crenicichla dandara* is considered as a species of least concern (LC).

RESUMO.—*Crenicichla dandara*, nova espécie, é endêmica da drenagem do rio Xingu a montante das cachoeiras de Belo Monte, incluindo o rio Iriri, um dos principais tributários da margem esquerda. A nova espécie distingue-se das congêneres pela coloração geral do corpo uniformemente enegrecida (em peixes vivos) ou amarronzada (em espécimes preservados) em combinação com 74–86 escamas na série E1. *Crenicichla dandara* é considerada aqui como a décima espécie do grupo *C. lugubris*, mas as relações da espécie dentro do grupo não estão claras: embora mais similar à *C. lugubris* e *C. adspersa* com relação ao formato geral do corpo, características do focinho e de escamação, ela compartilha com *C. johanna* e *C. monicae* a ausência de mancha na nadadeira caudal, uma condição incomum no clado *Crenicichla-Teleocichla*. A coloração geral enegrecida de *Crenicichla dandara* também está presente na sintópica, mas não proximamente relacionada, *Teleocichla preta*. Ambas as espécies habitam corredeiras com substrato composto por rochas escuras, escondendo-se nos espaços entre as rochas; logo, a coloração escura dessas espécies pode estar associada com camuflagem e estratégias alimentares. A partir de uma avaliação preliminar de seu estado de conservação, seguindo os critérios e categorias da classificação da IUCN, *Crenicichla dandara* seria considerada como menos preocupante (LC).

Keywords: Amazon basin; endemism; rapids; rheophilic species; taxonomy; camouflage; feeding strategy

Palavras-chave: bacia amazônica; endemismo; corredeiras; espécies reofílicas; taxonomia; camuflagem; estratégia alimentar

INTRODUCTION

Crenicichla and *Apistogramma* jockey for the most species-rich genus of Neotropical Cichlidae, the former with about 91 valid species (Kullander and Varella, 2015; Varella et al., 2016; herein) and the latter with about 88 (Britzke et al. 2014; Varella and Sabaj Pérez, 2014; Varella and Britzke, 2016; Römer et al. 2017). To help classify diversity within *Crenicichla*, at least eight species groups have been proposed, and most of them have been recovered as monophyletic (Kullander, 1990; Ploeg, 1991; Lucena and Kullander, 1992; Kullander et al., 2009; Piálek et al., 2011). In his revision of the genus, Ploeg (1991) recognized only five species groups, one of which (*C. lugubris* group) included 13 species characterized by their large size (SL up to 350 mm), high longitudinal scale counts (series E1), and juvenile coloration.

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Kullander (1991; 1997) subdivided the *C. lugubris* group *sensu* Ploeg (1991) into two subsets: *C. lugubris* group *sensu stricto* with short, blunt snout and more than 110 scales in E1 row, and *C. acutirostris* group with long, pointed snout, dorsoventrally depressed head and fewer than 110 scales in E1 row. Kullander and Varella (2015) updated the diagnosis of the *Crenicichla lugubris* group *sensu stricto* (*C. lugubris* group hereafter) to species of large size (240–300 mm SL) with >89 (usually >110) scales in E1 row and snout blunt with nostril close to mouth (i.e., closer to postlabial skin fold than to anterior margin of the orbit). Species of the *C. lugubris* group also show an ontogenetic transformation in color pattern wherein juveniles have many small dark spots scattered on the head (see Kullander and Varella, 2015 for details). Those authors restricted the *C. lugubris* group to nine species distributed in the Amazon and Orinoco basins, and coastal drainages of the Guianas.

A previously undescribed member of the *C. lugubris* group inhabits the rio Xingu, a large clear water tributary to the lower Amazonas draining the north-central Brazilian Shield. In their checklist of Xingu fishes, Camargo et al. (2004) reported this species as *Crenicichla* sp. “preta”, one of twenty species of *Crenicichla* they listed for the basin. Local fishermen commonly refer to this species as the black jacundá, while aquarists have figured it as *Crenicichla* sp. Xingu III (*e.g.*, Warzel, 1992: 77, 79; Gottwald, 2007: 19).

Recent sampling efforts in the rio Xingu basin, particularly those focused on its many cataracts and rheophilic inhabitants, have yielded important specimens for the taxonomic study of its fish fauna. The primary objective of this paper is to formally describe the black jacundá, a species that is apparently endemic to the rio Xingu.

MATERIAL AND METHODS

Measurements and counts follow Kullander (1986). Specimen length is given as standard length (SL) measured from the tip of the upper jaw to the end of the caudal peduncle. Longitudinal scales are counted in the row (E1) immediately dorsal to the scale row containing the lower lateral line. Vertebral counts include the last half centrum and were counted on digital images of X-rays made on a Faxitron LX-60 in the fish collection of Instituto Nacional de Pesquisas da Amazônia (INPA). Counts for holotype denoted by asterisk. Color pattern terminology follows Kullander (1986) unless otherwise noted. Measurements of the lower pharyngeal tooth plate follow Barel et al. (1977).

Type specimens are deposited in the following institutions: The Academy of Natural Sciences of Philadelphia (ANSP), USA; Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus, Brazil; Laboratório de Ictiologia de Altamira, Universidade Federal do Pará, Campus Altamira (LIA), Brazil; Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro (MNRJ), Brazil; Museu Paraense Emílio Goeldi (MPEG), Belém, Brazil; Museu de Zoologia da Universidade de São Paulo (MZUSP), São Paulo, Brazil. Other institutional abbreviations follow Sabaj (2016). Xingu basin divided into hydrographic areas according to Camargo et al. (2004).

RESULTS

Crenicichla dandara[*]

Figs. 1–4.

Crenicichla sp. “Xingu III” Warzel, 1992; Gottwald, 2007 [aquarist comments on species from the Rio Xingu].

Crenicichla sp. “Preta” Zuanon, 1999 [taxonomic comments and life history of fishes in the Rio Xingu basin]; Camargo et al., 2004 [checklist of fishes of the Rio Xingu].

Holotype.—INPA 53073 (279.0 mm SL, adult female, DNA CTGA 11197). Brazil: Pará: Altamira: rio Xingu, Cachoeira do Jericoá, 3°21’57”S, 51°44’8”W, 1 Sep 2012, E.D. Ribeiro and L.M. Sousa.

Paratypes.—43 specimens (28.4–292 mm SL). Brazil: Pará: ANSP 193066 (1, 292 mm SL, tissue tag B2134), rio Xingu (Volta Grande), Praia do Caju and rock outcrops upstream of cachoeira do Jericoá, ca. 55 km east-southeast of Altamira, 3°22’55.7”S, 51°44’11.4”W, 13 Oct 2012, M. Sabaj et al.; ANSP 194699 (1), rio Xingu (lower Volta Grande), near confluence of main straight channel running from south-southwest to north-northeast and smaller straight channel running from west to east, 3°9’8.4”S, 51°36’21.6”W, 28 Sep 2013, M. Sabaj, et al.; ANSP 197429 (1, 190 mm SL, female), rio Xingu, major north braid of river just below cachoeira Aninduba, 3°07’13.8”S, 51°38’01.5”W, 19 Nov 2014, M. Sabaj, et al.; INPA 23509 (1, 224.5 mm SL), rio Xingu, Senador José Porfírio, Viracebo do Arroz Cruz, 3°25’16”S, 51°55’8”W, 7 Oct 1996, J.A. Zuanon; INPA 30781 (1, 200.4 mm SL, DNA t1426), rio Iriri, Ilha do Curapé, 4°6’53”S, 53°22’28”W, 17 Aug 2008, H. López-Fernández; INPA 38005 (1, 279.4 mm SL, tissue tag B2015), rio Iriri, ca. 8 km upstream from confluence with rio Xingu, 3°49’24”S, 52°40’39”W, 9 Oct 2012, M. Sabaj, L.M. Sousa and M. Arce; INPA 40130 (22, 28,4-33.2 mm SL), rio Xingu, backwater next to rapids near right bank of right major braid of Xingu, ca. 53 km south-southwest of Altamira., 3°39’4.54”S, 52°22’42.92”W, 11 Sep 2013, M. Sabaj et al.; INPA 40773 (1, 79.8 mm SL, tissue tag t1498), same data as ANSP 194699; INPA 42693 (1, 65.5 mm SL, DNA CTGA 11189), same data as holotype; INPA 47728 (1, 187.9 mm

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[*] LSID urn:lsid:zoobank.org:pub:D9B1D597-A18A-40B5-853F-A80E7699C4DF

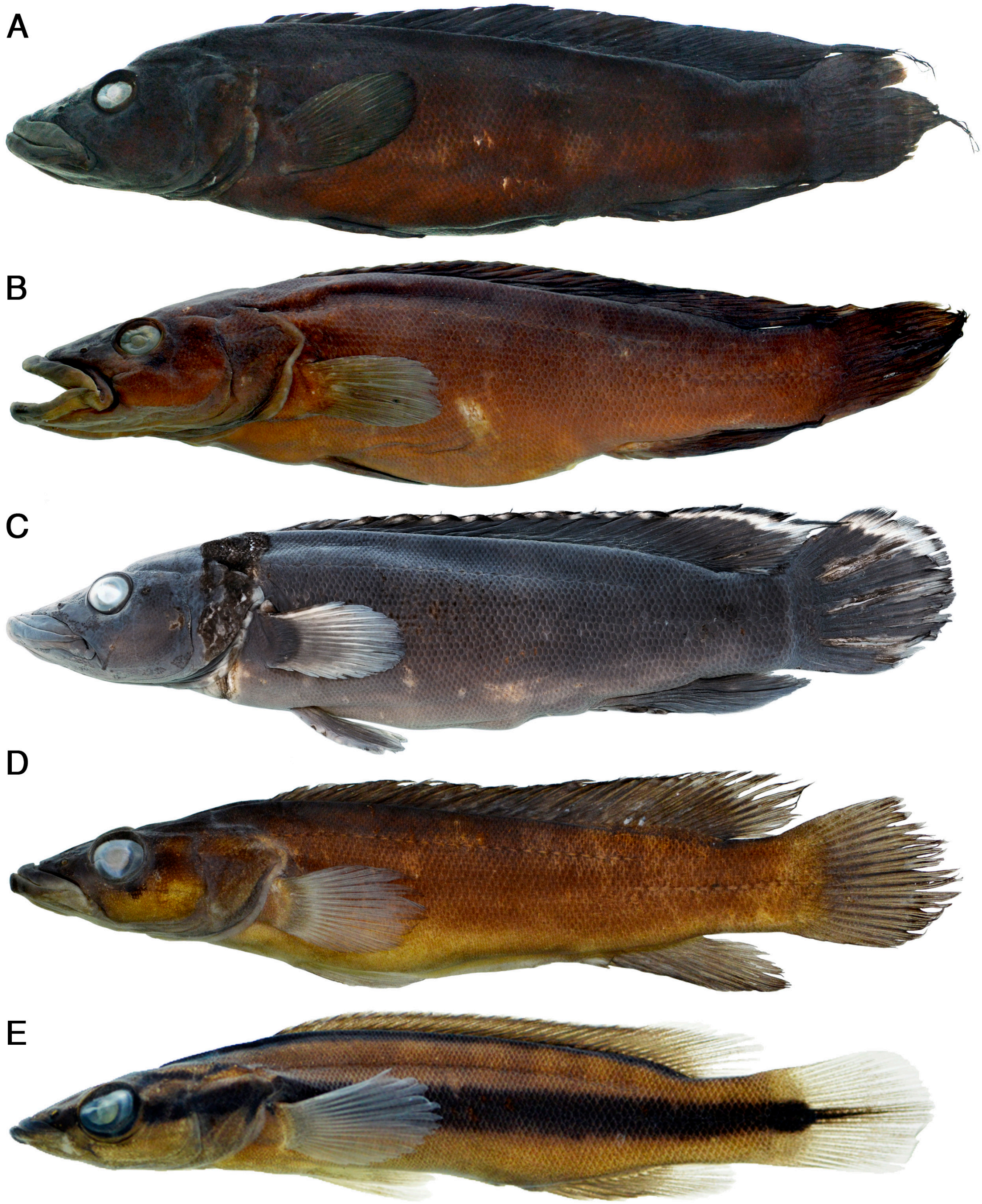

Fig. 1. *Crenicichla dandara*: A) holotype, INPA 53073 (279.0 mm SL), rio Xingu, Cachoeira do Jericoá; B) INPA 23509 (224.5 mm SL), rio Xingu, Viracebo do Arroz Cruz; C) ANSP 194856 (190 mm SL, female), rio Xingu, below cachoeira Espelho [posterior head scarred by gill net]; D) INPA 40773 (79.8 mm SL), rio Xingu, downstream of Volta Grande; E) INPA 40130 (28.4 mm SL), main channel of rio Xingu close in Altamira.

SL, tissue tag t3099), rio Iriri, just downstream of cachoeira Grande do Iriri, ca. 15 km upstream from confluence with rio Xingu, 3°50’32”S, 52°44’4”W, 1–2 Nov 2014, M. Sabaj Pérez et al.; INPA 53072 (2, 100.4-101.0 mm SL), rio Xingu, 3°56’21”S, 52°34’44”W, 26 Aug 2012, E.D. Ribeiro and L.M. Sousa; LIA 6806 (1, 142.0 mm SL), rio Xingu, Costa Júnior, between rocks in shallow rapids, 22 Sep 1997, J. Zuanon; MNRJ 50715 (1, 108.8 mm SL), rio Xingu (lower Volta Grande), main straight channel running from south-southwest to north-northeast, 3°11’3.36”S, 51°37’2.46”W, 28 Sep 2013, L.M. Sousa, et al.; MPEG 34983 (1, 147.2 mm SL), rio Xingu (upper Volta Grande), rapids in narrow bedrock channel of left major braid of Xingu, ca. 2.5 km northeast of campsite 7 (Praia Alta), 3°16’41”S, 52°2’18”W, 18 Sep 2013, M. Sabaj, et al.; MPEG 34984 (1, 85.8 mm SL), rio Xingu, Costa Júnior, 21 Mar 1997, J. Zuanon; MZUSP 32775 (1, 81.6 mm SL), rio Xingu, Belo Monte, 26 Sep 1983, M. Goulding; MZUSP 106281 (1, 244.0 mm SL), rio Xingu, cachoeira Tapaiúna, 3°7’37”S, 51°40’8”W, 14 Nov 2000, UFPA team; MZUSP 106282 (1, 236.0 mm SL), rio Xingu, Boa Esperança, 13 Dec 2000, UFPA team; MZUSP 111269 (1, 108.7 mm SL), rio Iriri, cachoeira Grande, 3°50’37”S, 52°44’2”W, 16 Nov 2011, O.T. Oyakawa et al.; MZUSP 111542 (1, 69.9 mm SL), rio Xingu, cachoeira do Espelho, 3°39’5”S, 52°22’42”W, 18 Nov 2011, O.T. Oyakawa et al.; MZUSP 111975 (1, 243.0 mm SL), rio Xingu, Cachoeira Grande, 3°11’55.1”S, 52°12’37.4”W, 23 Oct 2011, H. Varella; MZUSP 111998 (1, 227.0 mm SL), rio Xingu, rocks in front of Praia do Besouro, 3°17’03.0”S, 52°11’34.0”W, 28 Oct 2011, H. Varella.

Non-types.—24 specimens. Brazil: Pará: ANSP 194856 (22), rio Xingu, backwater next to rapids near right bank of right major braid of Xingu, ca. 53 km south-southwest of Altamira, 3°39’4.54”S, 52°22’42.92”W, 11 Sep 2013, M. Sabaj, et al.; ANSP 197599 (1), ANSP 198842 (1), rio Xingu, below rapids in right major braid upstream of campsite 2, ca. 50 km south-southwest of Altamira, 3°39’05.5”S, 52°22’42.5”W, 3–4 Nov 2014, M. Sabaj, et al.; LIA 2623 (2), rio Xingu, São Félix do Xingu, Xadá waterfall, 6°52’35.04”S, 52°2’9”W, 26 May 2015, A. Gonçalves, et al.; LIA 2637 (1), rio Xingu, São Félix do Xingu, Xadá waterfall, 6°53’1.43”S, 52°1’28.42”W, 26 May 2015, A. Gonçalves, et al.; LIA 2652 (1), rio Xingu, São Félix do Xingu, Xadá waterfall, 6°53’34.44”S, 52°53’34.44”W, 26 May 2015, A. Gonçalves,

Fig. 2. *Crenicichla dandara*: live coloration in A) mature female ca. 200 mm SL, B) juvenile ca. 100 mm SL. Photographed in aquarium by Oliver Lucanus (specimens not preserved).

et al.; LIA 2662 (1), rio Xingu, São Félix do Xingu, Xadá waterfall, 6°53’44.23”S, 52°2’35.84”W, 26 May 2015, A. Gonçalves, et al.; LIA 3523 (2), rio Iriri, RESEX do rio Iriri, Cachoeirinha, 4°40’29.32”S, 54°27’23.47”W, 23 Jan 2016, A. Gonçalves, et al.; LIA 5718 (1), rio Iriri, Estação Ecológica Terra do Meio, 6°40’29.30”S, 53°57’37.70”W, 23 May 2013, A. Gonçalves & M. Andrade; LIA 5819 (1), rio Xingu, main channel with reduced flow, waterfall complex of Jericoá, 3°20’15.58”S, 51°45’4.72”W, 24 Aug 2016, J. Santos; LIA 5840 (1), rio Xingu, main channel with reduced flow, Casa Branca, 3°20’17.23”S, 51°45’14.19”W, 12 Aug 2016, J. Santos; LIA 5973 (1), rio Iriri, Boa Esperança, RESEX do Iriri, Garrancho, 4°28’4.98”S, 53°41’40.02”W, 27 Aug 2016, A. Gonçalves et al.; LIA 6006 (2), rio Iriri, São Francisco, RESEX do Iriri, Cajueiro, 4°27’40.03”S, 53°53’54.71”W, 30 Aug 2016, A. Gonçalves et al.; LIA 6083 (1), rio Xingu, RESEX do Xingu, Gabiroto, 4°59’31.42”S, 52°55’16.79”W, 21 Sep 2016, A. Gonçalves et al.; LIA 6249 (1), rio Xingu, São Félix do Xingu, Xadá waterfall, 6°52’42”S, 52°1’10”W, 11 Aug 2016, L.M. Sousa, et al.; LIA 6261 (5), rio Xingu, São Félix do Xingu, lateral branch of stream, Corredeira da Onça, 7°7’35”S, 52°31’37”W, 12 Aug 2016, L.M. Sousa, et al.; LIA 6323 (1), rio Xingu, São Félix do Xingu, Xadá waterfall, 6°53’54”S, 52°2’16”W, 10 Aug 2016, L.M. Sousa, et al.

Diagnosis.—*Crenicichla dandara* is distinguished from all congeners except *C. hu* Piálek et al., 2010 by adult body coloration uniformly black (live) or dark brown (preserved specimens). *Crenicichla dandara* is distinguished from *C. hu* by having E1 row with 74–86 scales (*vs*. 47–54) and caudal blotch absent (*vs*. present) in adults (i.e., caudal blotch as well as vertical bars and suborbital stripe conspicuously evident in adults of *C. hu*).

The high number of small longitudinal scales places *Crenicichla dandara* in the *C. lugubris* group *sensu* Kullander & Varella (2015). In addition to its uniformly dark coloration, *C. dandara* differs from other species of the *C. lugubris* group except *C. johanna* Heckel, 1840 and *C. monicae* Kullander and Varella, 2015 by the absence (*vs*. presence) of a dark caudal blotch. *Crenicichla dandara* is distinguished from *C. johanna* and *C. monicae* mainly by having squamation ctenoid on flanks (*vs*. squamation on flanks cycloid except for occasional occurrence of ctenoid scales on caudal peduncle), by having E1 row with 74–86 scales (*vs*. 89–116 in *C. johanna* and 110–123 in *C. monicae*), and by having the nostril closer to anterior margin of orbit than to tip of upper jaw *vs*. nostril closer to tip of upper jaw than to orbit. *Crenicichla dandara* also lacks small dark spots on head and flanks (vs. present in *C. monicae*).

Description.—Head depth and width approximately equal, about half that of head length. Body moderately elongate, depth 15.7–22.9% of SL. Caudal peduncle generally longer than deep in small specimens, becoming as deep as long or deeper in larger specimens.

Snout pointed in lateral profile. In dorsal view, postlabial margin of snout generally rounded in small specimens (<80 mm SL), becoming truncate to slightly concave in larger specimens. Lower jaw prognathous, its articulation below vertical through middle of orbit; ascending premaxillary process reaching dorsally to vertical through middle of orbit; maxilla reaching vertical through anterior margin of orbit. Lips moderately thick and wide; lower lip folds widely separated anteriorly; upper lip discontinuous, expanded medially and imparting slight concavity to transverse portion of postlabial fold in large specimens. Orbit at midlength of head and

Table 1. Morphometric data on 15 specimens of *Crenicichla dandara*. All measurementes expressed as percentage of standard length (SL).

	Holotype	Min.	Max.	Mean ± s.d.
SL (mm)	279.0	79.8	279.4	
Head Length	30.9	30.9	35.5	33.4 ± 1.2
Snout Length	12.3	9.2	13.5	11.5 ± 1.4
Orbital Diameter	6.3	6.3	9.8	7.8 ± 1.0
Upper Jaw Length	14.0	10.5	15.5	13.0 ± 1.5
Lower Jaw Length	15.2	15.1	18.9	16.6 ± 1.2
Interorbital width	7.7	3.9	8.3	6.3 ± 1.5
Head Depth	15.9	12.3	17.3	14.8 ± 1.6
Body Depth	21.6	15.7	22.9	19.3 ± 2.2
Pectoral-fin Length	17.1	16.8	19.7	18.0 ± 0.8
Last Dorsal-fin Spine Length	9.8	7.8	4.0	10.4 ± 1.1
Caudal-peduncle Depth	11.5	9.9	13.0	11.6 ± 0.9
Caudal-peduncle Length	11.5	10.8	13.3	12.2 ± 0.8
Pelvic-fin Length	14.5	14.3	16.7	15.9 ± 0.7

dorsolateral, not visible from below. Interorbital area flat, narrower than mouth. Nostril lateral, located near the lateral margin of postlabial skin fold and closer to the anterior margin of orbit than to tip of upper jaw; margin of nostril slightly elevated, membranous skin flap absent. Preopercle with minute serrations along vertical margin. Lateralis pores on head with multiple small openings.

Scales ctenoid on flanks. Scales cycloid on cheek, subopercle, opercle, dorsum above anterior half of upper lateral line and along dorsal-fin base, breast and abdomen to ventral part of caudal peduncle. Scales in E1 row: 74* (3), 75 (2), 77 (2), 78 (2), 79 (1), 80 (2), 81 (3), 83 (2), 86 (1). Circumpeduncular scale row 16–18 dorsally, 16–21 ventrally (35–40 total, including lateral line scales). Lateral line scales 26/12 (2), 26/13 (1), 27/11 (1), 27/12 (2), 27/13 (2), 28/11 (4), 28/12 (3), 28/13 (2), 29/10* (1), 29/11 (1) not including one or two scales continuing lower lateral line onto caudal fin. Scales between anterior lateral line and base of dorsal fin 14–18. Scale rows between anterior and posterior portions of lateral line 4–5. Dorsal, anal, pectoral and pelvic fins without scales. Caudal-fin squamation extending to about 1/3 of fin length.

Dorsal fin XIX.15 (1), XX.16 (1), XXII.14 (5), XXII.15 (2), XXII.16* (2), XXIII.13 (6), XXIII.14 (2). First dorsal-fin spine about one-third the length of last one. In small specimens <80 mm SL, posterior margin of soft dorsal fin forming acute tip finishing near vertical through caudal-fin base. Larger specimens with soft dorsal-fin rays 8–10 prolonged, forming acuminate tip finishing beyond midlength of caudal fin. Pectoral fin rounded with 15 (1), 16 (9), 17* (9) rays. Pelvic fin inserted posterior to vertical through pectoral axilla, acute tip extending to vertical through tip of pectoral fin. Anal-fin rays III.8 (4), III.9 (11), III.10 (4); posterior margin of soft anal fin rounded in small juveniles (ca. 25-30 mm SL), acutely pointed in larger specimens. Caudal fin evenly rounded, medial rays longest.

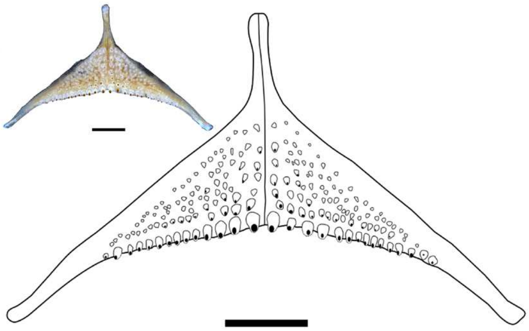

Fig. 3. Photograph and schematic drawing of the lower pharyngeal tooth plate of *Crenicichla dandara* (INPA 23509, 224.5 mm SL), in dorsal view. Scale bar = 10 mm.

Oral teeth conical, slightly recurved. Teeth arranged in one outer row and 4–5 inner rows on premaxilla and dentary; outermost inner row extending posteriorly almost as far as outer row; other inner rows somewhat irregular and restricted to symphyseal region. All teeth movable, but outer-row teeth slightly larger and more fixed than inner-row teeth. Outer row with 26–29 teeth on left premaxilla and 25–32 teeth on left dentary.

First gill arch with 1 (4) or 2* (15) gill rakers externally on epibranchial and 9* (9) or 10 (10) on ceratobranchial. Occasionally, one gill raker at angle and included in count for ceratobranchial. Microbranchiospines present externally on arches 2–4.

Lower pharyngeal tooth-plate (Fig. 3; dissected from INPA 23509, 224.5 mm SL) strongly depressed in lateral view, with long posterior and anterior processes. Tooth plate much wider than long (length 56.5% of width); dentigerous area much wider than long, length 28% and width 64.3% of plate width. Twenty-nine teeth in posterior row, 14 on left side and 15 on right. Admedian rows with 7 teeth on each side (includes one tooth in posterior row). Posterior teeth largest, more robust and more fixed than teeth situated rostrally and laterally. Teeth of posterior and admedian rows bicuspid with main cusp antrorse; lateral and rostral teeth unicuspid, nearly conical.

Vertebrae (abdominal + caudal = total vertebrae): 21+16=37 (1); 21+17=38* (12); 5–6 vertebrae contained within caudal peduncle.

Coloration in alcohol.—Small juveniles (28.4–33.2 mm SL, Fig. 1D) with ground color pale brown, markings blackish; ventral portion of body and unpaired fins slightly lighter and yellowish; paired fins hyaline. Preorbital stripe begins on tip of lower jaw, continues dorsally onto upper lip, then posteriorly below nostrils to anterior margin of orbit. Postorbital stripe aligned with preorbital one, from posterior margin of orbit to opercular angle. Postorbital stripe paralleled dorsally by thinner stripe running from dorsoposterior margin of orbit to vertical through posterior preopercular margin and extrascapular region. Suborbital stripe lacking except for irregularly shaped dark blotch just below orbit. Midlateral stripe continuous with postorbital stripe and similarly conspicuous, depth occupying 7–8 horizontal scale rows, continuing onto caudal fin as narrower band that gradually tapers and fades towards distal margin. Dark pigment surrounding perforation in each scale of anterior lateral line. Dark middorsal stripe begins near upper lip fold, runs along either side of dorsal-fin base and finishes on caudal peduncle; middorsal stripe weakly bifurcate from interorbital region to dorsal-fin origin, separated by pale intermittent pinstripe along dorsal midline.

Subadults and mature adults uniformly dark brown, lacking most markings present in juveniles. Most specimens up to 150 mm SL preserve dark suborbital blotch against slightly lighter background; larger specimens with suborbital marking almost or completely masked by uniformly dark overall coloration. Some specimens up to 150 mm SL with a series of 6–7 dark vertical bars on dorsum along base of dorsal fin. No obvious sexual dimorphism in coloration between mature males and females among preserved specimens, except for white subdistal margin occasionally present in dorsal fin and upper caudal fin of mature females (Fig. 1C).

Coloration in life.—Descriptions based on personal observations (HRV) and photographs of mature female and subadult (Fig. 2B) taken in aquarium. Subadult (ca. 100 mm SL, Fig. 2B) with ground color pale gray, darker on dorsal half of body. Suborbital blotch conspicuous, dark gray. Postorbital stripe and vertical bars along dorsum dusky; midlateral stripe scarcely evident. Reddish pigmentation in iris, on lappets of dorsal fin, and scattered as dots on head just behind orbit. Dorsal fin with blackish margin and whitish submarginal band, both continuous with same pattern on dorsal portion of caudal fin. Greenish iridescence evident on distal border of anal fin.

Female (ca. 200 mm SL, Fig. 2A) with ground color blackish to brown except ventral portion of body, notably the abdomen, with magenta coloration indicating gonadal maturity. Magenta coloration also in iris and on paired fins. Suborbital blotch blackish, conspicuous. Dorsal-fin margin and dorsal margin of caudal fin whitish, also a sign of sexual maturity. Mature males with slightly darker ground color, lacking magenta coloration and whitish dorsal-fin margin.

Warzel (1992) and Gottwald (2007) published photographs of mature females of *Crenicichla dandara* (as *Crenicichla* Xingu III); their photos agree with the description above except the magenta coloration is expanded dorsally, dominating midbody.

Distribution.—*Crenicichla dandara* is currently known from the Middle to Upper Rio Xingu basin, including the Rio Iriri, a major left bank tributary (Fig. 5).

Etymology.—*Crenicichla dandara* is named after an Afro-Brazilian warrior of Brazil's colonial period. According to legend, Dandara and her husband Zumbi fiercely defended the community of Palmares, a safe haven for escaped slaves in the coastal state of Alagoas, Brazil. Nowadays, she has become a symbol of the struggle against racism and the exploitation of black women. The day of Zumbi's death, 20 November 1695, is celebrated as the Dia da Consciência Negra [Black Awareness Day] throughout Brazil. The epithet *dandara* may be treated as noun in apposition.

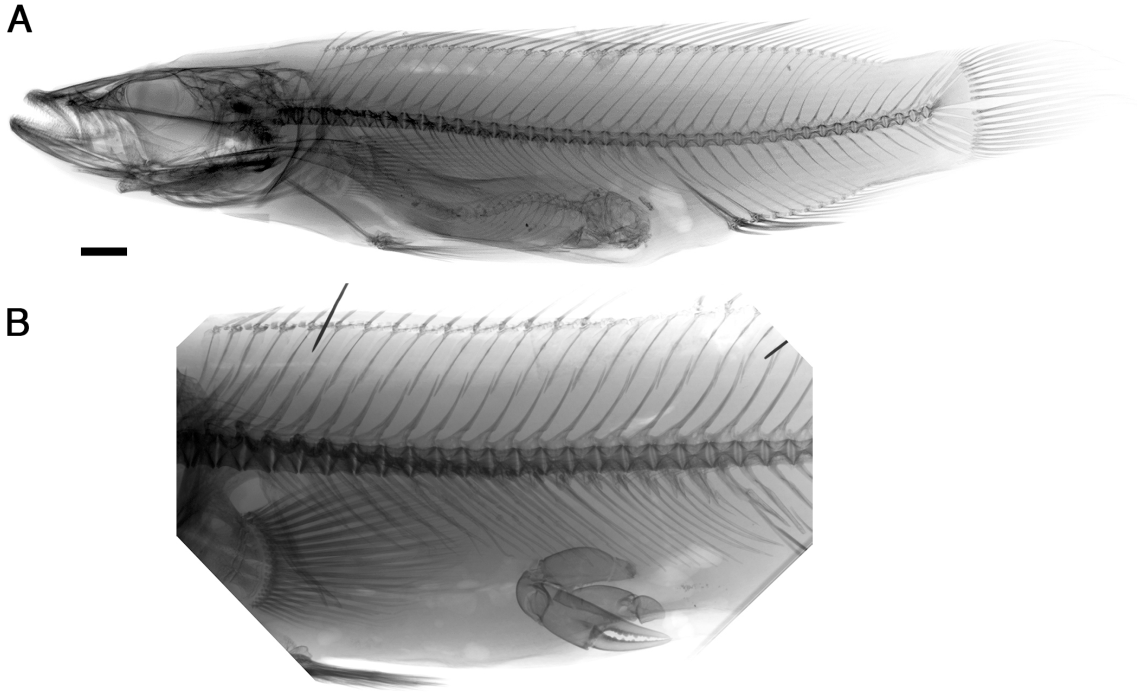

Fig. 4. X-ray images of *Crenicichla dandara*: A) INPA 53072, 100.4 mm SL, gut filled with entire characid; B) INPA 38005, 279.4 mm SL, gut with crab chela.

Biological notes.—Crenicichla dandara is often collected in the same habitats as the recently described *Teleocichla preta* (see Varella et al., 2016): shallow clearwater rapids associated with major channels of the rio Xingu over substrates composed mainly of large rocks and with little accumulated sediment. During underwater exploration, HRV and Oliver Lucanus (pers. comm., 2016) observed *C. dandara* hiding in rocky crevices and performing short excursions to forage, occasionally in close proximity with *T. preta*. Based on radiographs, gut contents of *C. dandara* included an entire characid (100.4 mm SL, Fig. 4A) and a crab chela (279.4 mm SL, Fig. 4B). Oliver Lucanus and Leandro Sousa observed *C. dandara* feeding on small loricariids, and ornamental fishermen allege that this species follows their harvest, often taking plecos out from their hands in moments of carelessness.

DISCUSSION

Relationships.—Crenicichla dandara is the tenth valid species of the *Crenicichla lugubris* group as proposed by Kullander and Varella (2015). Members of the *C. lugubris* group share two features with those of the *Crenicichla acutirostris* group: large size (200-300 mm SL) and high number of small scales on the E1 row (generally more than 89, but see below). Species of the *C. lugubris* group have a relatively deep, robust body and a deep, laterally compressed head with blunt snout and lower jaw only slightly prognathous. In contrast, species of the *C. acutirostris* group have an elongate body and depressed head with long, pointed snout and distinctively prognathous lower jaw.

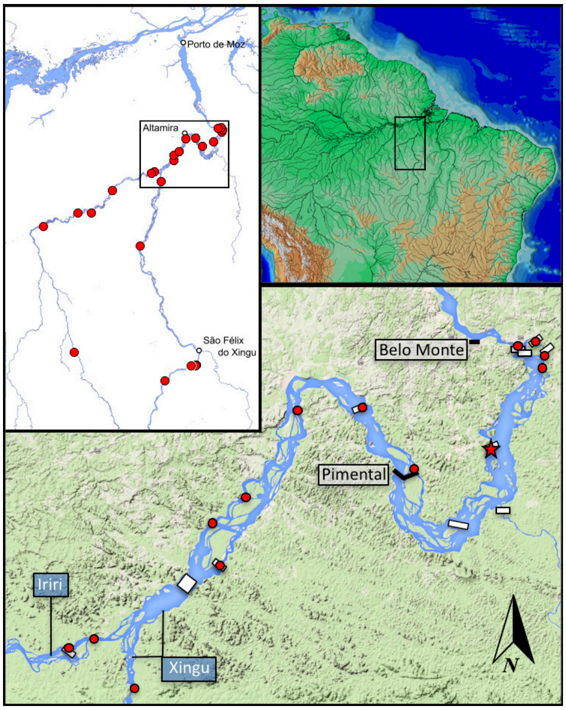

Fig. 5. Distribution of *Crenicichla dandara* (star denotes type locality). Note affiliation of *C. dandara* with large cataracts (white bars). Black bars denote dams.

Our placement of *Crenicichla dandara* in the *C. lugubris* group prompted reassessment of the scale counts used in part to define that group and the *C. acutirostris* group. Other members of the *C. lugubris* group have 89–123 scales in the E1 row (Kullander and Varella, 2015; our data). Therefore, our inclusion of *C. dandara* with 74–86 E1 scales expands the lower limit of this count. Within the *C. acutirostris* group, *C. jegui* Ploeg, 1986 has the lowest number of E1 scales with 74–82. Both species obscure the gap traditionally employed to separate small-scaled species (*C. lugubris* and *C. acutirostris* groups) from large-scaled ones (several groups with generally less than 73 scales in E1 row). Large-scaled species with E1-scale counts overlapping that of *C. dandara* include: *C. celidochilus* Casciotta, 1987 with 61–74 (Lucena and Kullander, 1992), *C. lacustris* (Castelnau, 1855) with 57–75 (Kullander and Lucena, 2006) and *C. chicha* Varella et al., 2012 with 66–75. One species that potentially eliminates the gap between small- and large-scaled species of *Crenichichla* is *C. vittata* Heckel, 1840 with 79–93 E1 scales. Whereas morphological authorities (Ploeg 1991; Kullander et al. 2010; Kullander and Varella 2015) place *C. vittata* in the *C. acutirostris* group (small-scaled species), molecular evidence (Piálek et al., 2011) relocates *C. vittata* to the *C. lacustris* group (large-scaled species).

Juveniles of *Crenicichla dandara* (Fig. 1D) exhibit three conspicuous dark markings: middorsal stripe, midlateral stripe, and punctations along upper lateral line. Those marking are lost early in ontogeny, with the body becoming almost uniformly dark in specimens >79 mm SL. An ontogenetic transformation in pigmentation commonly occurs in other species of the *C. lugubris* group (Kullander and Varella, 2015). In large adults of *C. adspersa* Heckel, 1840, *C. johanna*, *C. lugubris* Heckel, 1840 and *C. strigata* Günther, 1862, the body is almost uniformly pigmented (but not as dark as *C. dandara*) except for an occasional dark patch just dorsal to the pectoral-fin base (absent in *C. dandara*). Juveniles of those species exhibit the three dark markings as described for juvenile *C. dandara* in addition to many small dark spots scattered on the head, nape and pre-pelvic region (absent in *C. dandara*). The scattered spots are occasionally retained (though reduced or faded) in subadults and adults depending on species (see Graça et al., 2013; Kullander and Varella, 2015).

Most species of *Crenicichla* exhibit a dark blotch on the base of the caudal fin. The caudal blotch is absent in only three species besides *C. dandara*: *C. johanna* and *C. monicae* (*C. lugubris* group) and *C. ternetzi* Norman, 1926 (*C. acutirostris* group). Thus, the absence of the blotch is somewhat diagnostic and has been used to hypothesize phylogenetic relationships. For example, Kullander and Varella (2015) used this condition, together with cycloid squamation and nostril position, to infer *C. monicae* and *C. johanna* as sister taxa.

On the other hand, *Crenicichla dandara* is more similar to *C. lugubris* and *C. adspersa* by having a deep body, ctenoid squamation on head and flanks, and snout relatively long with nostril slightly closer to anterior margin of orbit than to tip of upper jaw. In most species in the *C. lugubris* group, the snout is similarly elongated beyond the nostril. The exceptions are *C. monicae, C. johanna, C. marmorata* Pellegrin, 1904 and *C. lenticulata* Heckel, 1840, wherein the snout is relatively short and the nostril is closer to the transverse margin of the upper lip than to the orbit (putatively derived condition) vs. equidistant between transverse margin of upper lip and orbit in *C. dandara*, *C. adspersa* and *C. lugubris*. Thus, the phylogenetic affinity of *C. dandara* to other members of the *C. lugubris* group remains ambiguous.

Cryptic coloration.—Varella et al. (2016) stated that the extremely dark coloration of *Teleocichla preta*, *Crenicichla hu* and now *C. dandara* may be an adaptation for inhabiting swift, clear-water rapids over beds of dark rocks. Those three members of the *Crenicichla-Teleocichla* clade are not considered to be closely related; therefore, the dark coloration is interpreted as convergence (Varella et al., 2016). In both *C. dandara* and *T. preta,* black coloration occurs in adult males and females and is not sexually dimorphic, although mature females in *Crenicichla dandara* do exhibit sexual dichromatism (i.e., magenta coloration centered on abdomen).

Crenicichla dandara and *Teleocichla preta* occur syntopically in sites throughout the Rio Xingu basin. Varella et al. (2016) inferred that the dark coloration helps to achieve crypsis among the dark rocks that dominate the river beds of the Xingu rapids. Leandro Sousa (pers. comm. 2017) has observed *C. dandara* and *T. preta* during many dive sessions in sites throughout the Middle and Upper Xingu basin. According to Sousa, both species were always observed hiding in the dark spaces underneath large rocks, and were very hard to spot even during targeted searches. Sousa described both species as moving like snakes between the rocks, using the shadows as camouflage. The color of the rocks themselves was variable in the clear and well-lit water, whereas the shadows they cast were uniformly dark. Thus, the dark coloration in the two species achieves crypsis not with the rocks, but more precisely with their shadows.

Differences between *Crenicichla dandara* and *Teleocichla preta* include adult size and feeding behavior. *Teleocichla preta* is large (maximum SL 121.3 mm) among congeners, but small compared to *C. dandara* (maximum SL 292 mm). *Teleocichla preta* feeds mainly on hard-shelled invertebrates (durophagous) and has robust teeth in the outer maxillary row and sturdy pharyngeal plates supporting molariform teeth (Varella et al., 2016). *Crenicichla dandara* has relatively small oral teeth and slender pharyngeal plates supporting bicuspid and conical teeth (molariform or papiliform teeth absent). Therefore, *C. dandara* is more piscivorous, like most congeners (López-Fernández et al., 2012), and evidently swallows fish whole (Fig. 4A) as does *C. lugubris* (Montaña and Winemiller, 2009). *Crenicichla dandara* presumably shares with *C. lugubris* the functional traits associated with ram feeding such as rapid jaw movement and small oral jaw muscles (Arbour and López-Fernández, 2014). Interestingly, *C. dandara* is well known among ornamental fishermen for their ability to snatch plecos from their hands. Based on underwater observations, Oliver Lucanus and Leandro Sousa reported that after a rock is abruptly turned, *C. dandara* are quick to grab any lingering plecos.

Although uniformly dark coloration allows *C. dandara* and *T. preta* to hide among the shadows in rocky clearwater rapids, this adaptation may serve slightly different purposes: concealment from prey by large *C. dandara* vs. concealment from both prey and predators by small *T. preta*.

Xingu diversity of Crenicichla.—Camargo et al. (2004) assessed the diversity and distribution of fishes in the Xingu basin based on published works, museum collection databases and field surveys. They listed a total of 20 species-level taxa for *Crenicichla* in the entire Xingu basin including 17 nominal species and three potentially new ones. Two of their taxa (*Crenicichla* cf. *regani* and *Crenicichla* sp.) both correspond to the recently described *Crenicichla anamiri* Ito and Rapp Py-Daniel (2016). Their *Crenicichla* sp. “preta” corresponds to *Crenicichla dandara* described here. Camargo et al. (2004) reported *Crenicichla* sp. “preta” from both the Lower and Middle Xingu (i.e., from the mouth of the Xingu to its confluence with the Iriri). We did not observe *C. dandara* in the Lower Xingu and restrict its downstream limit to the Belo Monte narrows (i.e., transition between Lower and Middle Xingu). Furthermore, we extend the range of *C. dandara* in the Rio Xingu to above São Feliz do Rio Xingu and into the Rio Iriri. Despite recent collecting expeditions to the headwaters of the Xingu basin, there are no records of *C. dandara* in the Rio Suiá-Missu, Rio Culuene or other such tributaries.

At least two other members of the *Crenicichla lugubris* group await formal description and are endemic to the Xingu basin above the Belo Monte narrows. These are well-known to aquarists as *Crenicichla* sp. "Xingu I" and "Xingu II" (*e.g*., Warzel, 1992; Gottwald, 2007). The former has been cited by others as *Crenicichla* sp. "laranja" (*e.g*., Zuanon et al., 1999; Camargo et al., 2004) in reference to the distinctive orange coloration in juveniles. The second one apparently corresponds to the *Crenicichla lugubris* Heckel 1840 listed by Camargo et al. 2004 based on museum specimens (INPA 4082 reexamined here, MZUSP 50840 not available).

Nominal valid species also restricted to the Xingu above the Belo Monte narrows include *C. percna* Kullander, 1991 (Middle Xingu and Iriri), *C. phaiospillus* Kullander, 1991 (Upper Xingu) and *C. rosemariae* Kullander, 1997 (Xingu headwaters).

Two species listed by Camargo et al. (2004) cannot be otherwise confirmed from the Xingu basin: *Crenicichla* cf. *ternetzi* Norman, 1929 from the Middle Xingu, and *C. vittata* Heckel, 1840 from the Iriri. *Crenicichla ternetzi* is distributed in the Oyapock river basin in French Guiana and Brazil (Ploeg, 1991). The authors cited Zuanon (1999) as the source for the Iriri record of *C.* cf. *ternetzi*, but we did not find mention of that species in Zuanon's thesis. *Crenicichla vittata* is restricted to the Paraguay and lower Paraná river basins (Varella, 2011). Therefore, we do not consider *C. ternetzi* and *C. vittata* to be members of the Xingu fauna.

Camargo et al. (2004) also listed two species of the *C. reticulata* group, *C. reticulata* (Heckel, 1840) and *C. cametana* Steindachner, 1911, and three of the *C. saxatilis* group, *C. saxatilis* (Linnaeus, 1758), *C. labrina* (Spix and Agassiz, 1831) and *C. inpa* Ploeg, 1991. The voucher of *C. cametana* listed by them (MZUSP 32775) is actually *C. dandara* and now designated as a paratype. We only confirm *C. reticulata* in the lower portion of rio Xingu near Porto de Moz. Taxonomic uncertainty prevents us from confidently identifying species in the *C. saxatilis* group. However, two species with the typical humeral blotch diagnostic for this group inhabit the Xingu basin: a deep-bodied species with a low number of large scales in the E1 row (like *C. saxatilis*), and another with slender body and relatively high number of smaller scales in the E1 row (like *C. inpa*).

Finally, Camargo et al. (2004) listed *Crenicichla acutirostris* Günther, 1862, *C. johanna* Heckel, 1840, *C. macrophthalma* Heckel, 1840 and *C. strigata* Günther, 1862 from the Middle and Lower Xingu, and *C. marmorata* Pellegrin, 1904 from the Iriri and Lower Xingu. Those species are present in the Xingu basin, but not as endemics as they occur widely in other parts of the Amazonas basin (Camargo et al., 2004; Ito and Rapp Py-Daniel, 2015). *Crenicichla acutirostris*, *C. johanna* and *C. strigata* are highly variable throughout their range and may yield new species endemic to the Xingu upon taxonomic revision. In summary, based on our study, there are approximately 15 species-level taxa known from the Xingu basin including at least two undescribed ones.

Conservation status.—Construction of the Belo Monte dam complex has impacted part of the known range of *Crenicichla dandara*. Three collecting sites upstream of the Pimental dam are now inundated by the in-stream reservoir which began filling during the 2015–16 rainy season (Fig. 5). Five sites downstream of the Pimental dam, including the type locality, have been severely dewatered by the diversion of Xingu river water into an off-stream reservoir to supply the main power station at Belo Monte. Given the close affiliation of *C. dandara* with large cataracts over clean rocky substrates, populations inundated by the in-stream reservoir will likely disappear as lotic habitats become lentic and sediments accumulate on the river bottom (Sawakuchi et al., 2015). Populations of *C. dandara* downstream of the reservoir may suffer from the effects of dewatering such as increased sediment deposition and chronic attenuation of the Xingu's highly variable flood pulse (Zuanon, 1999; Sabaj Pérez, 2015; Lees et al., 2016). Additionally, a potential hazard to water quality is Belo Sun's Volta Grande Gold Project licensed for construction in Feb 2017 (GLOBO1, 2017). Two open pit mines, Ouro Verde and Grota Seca, are proposed for the right bank of the rio Xingu below the Pimental dam (Belo Sun Mining, 2017) and are likely to release additional sediments directly into the river channel. Cyanide will be used to extract the gold and the tailings pond is within 2 km of the Xingu channel according to the proposed site plan (Belo Sun Mining, 2017). Although Belo Sun describes its gold processing facility as a "completely closed loop system" (Jamasmie, 2017), spills and leaks persist as serious threats.

We tentatively assessed the conservation status of *Crenicichla dandara* using the methods, categories and criteria defined by the International Union for Conservation of Nature (IUCN, 2017). Using the polygon method based on the collecting sites of *C. dandara*, we estimated the extent of occurrence (EOO) to be 93,585.126 km^2. We also estimated the area of occupancy (AOO) by measuring the distance between all the points of the distribution along the tributaries and main channel of Rio Xingu and Rio Iriri (ca. 1,202.52 km), then applying a buffer of 2 km, thus resulting in 2,405.04 km^2 of AOO. Both EOO and AOO are beyond the limits defined for any IUCN category of vulnerability under criterion B (i.e., EOO < 20,000 km^2; AOO < 2,000 km^2). The in-stream reservoir and chronic suppression of river discharge below Pimental currently fragments populations of the new species (satisfying subcriterion a), and the increased sediment deposition and the inundation and dewatering of cataracts above and below Pimental, respectively, will reduce habitat quality throughout much of the known range of *C. dandara* (satisfying subcriterion iii). The wide distribution and high EOO and AOO values, however, prevent the classification of *C. dandara* into any IUCN category of vulnerability, thus rendering it a species of least concern (LC).

The downstream limit of *Crenicichla dandara* appears to be firmly established at the Belo Monte narrows whereas the upstream limit to its distribution remains unclear. The most upstream records are above São Félix do Xingu and close to the Parque Indígena do Xingu, suggesting its presence within this national park. Despite the IUCN status adopted here, populations of *C. dandara* should be monitored because of the threats to its primary habitat posed by the Belo Monte dam complex.

COMPARATIVE MATERIAL EXAMINED

All from Brazil. *Crenicichla acutirostris*.—Pará: Rio Tapajós drainage: MZUSP 22018 (4, 75,6–150.0 mm SL; 1 c&s, 1, 87.6 mm SL); MZUSP 32767 (12, 73.2–204.0 mm SL; 2 c&s, 110.3–165,9 mm; mus, 2, 89,9–106,0 mm). *Crenicichla cincta*. —Amazonas: Rio Aripuanã drainage: INPA 25274 (1, 248.0 mm SL). *Crenicichla jegui*.—Pará: Rio Araguaia drainage INPA 53066 (1, 149.8 mm SL). *Crenicichla johanna*.—Pará: INPA 47399 (1, 140.1 mm SL), Rio Araguaia drainage. *Crenicichla marmorata*.—Pará: Rio Xingu drainage: INPA 40588 (1, 268.0 mm SL). *Crenicichla multispinosa*.—French Guyana: Rio Maroni drainage: INPA 21642 (1, 134.8 mm SL). *Crenicichla percna*.—Pará: Rio Xingu drainage: INPA 40177 (1, 206.8 mm SL). *Crenicichla strigata*.—Brazil: Pará: Rio Xingu drainage: INPA 47634 (1, 1927 mm SL); MZUSP 111968 (1, 122.8 mm SL); MZUSP 112005 (1, 104.1 mm SL).

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