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Serrapinnus zanatae, a new species from the rio Jequitinhonha basin, Minas Gerais State, Brazil (Teleostei: Characidae: Cheirodontinae)

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Serrapinnus zanatae, new species, is described from the rio Jequitinhonha basin, an eastern Brazilian coastal drainage. It is diagnosed from its congeners by the following combination of characters: presence of premaxillary teeth with 7–9 cusps; 11–13 parallel spatulated ventral procurrent caudal-fin rays; incomplete lateral line; absence of a black blotch on the dorsal fin; absence of a dark longitudinal stripe extending over the pseudotympanum to the caudal peduncle; absence of a black spot on the posteroventral region of the abdomen; caudal-fin spot oval and horizontally elongated not extending to dorsal and ventral margins of the caudal peduncle; sexually dimorphic males without unbranched dorsal-, pelvic-, and anal-fin rays extended as filaments. *Serrapinnus zanatae* and *Acinocheirodon melanogramma* are the only known cheirodontines to inhabit the rio Jequitinhonha basin.

Introduction

Serrapinnus Malabarba, 1998 is a Neotropical freshwater characid genus with a wide East Andean distribution in South America, from the rio Amazonas, rio Orinoco, and Guyana Shield drainages in French Guyana and Suriname, to the North of the La Plata basin in Southern of Brazil, Argentina, and Uruguay (Malabarba, 2003; Zarske, 2012; Jerep & Malabarba, 2014; Malabarba & Jerep, 2014). The genus includes fourteen species, all presenting a series of unique secondary sexual dimorphic characters supporting their monophyly within the subfamily Cheirodontinae (Malabarba, 1998; Jerep & Malabarba, 2014; Malabarba & Jerep, 2014).

Four genera and five species of the Cheirodontinae are currently known from the drainages of the Northeastern Mata Atlântica freshwater ecoregion sensu Abell et al. (2008). These are *Acinocheirodon melanogramma* Malabarba & Weitzman, 1999 and *Kolpotocheirodon figueiredoi* Malabarba, Lima & Weitzman, 2004, which are endemic to this ecoregion, and *Compsura*

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heterura Eigenmann, 1915, *Serrapinnus heterodon* (Eigenmann, 1915), and *S. piaba* (Lütken, 1875) that are widely distributed in coastal drainages of northeastern Brazil, including rio Itapicuru, rio Paraguaçu, and rio de Contas basins, plus the rio São Francisco freshwater ecoregion and the Upper Paraná ecoregion in the case of *S. heterodon*. A new species of *Serrapinnus* is described herein from the rio Jequitinhonha basin, representing the southernmost distribution of the genus in the Northeastern Mata Atlântica freshwater ecoregion of Brazil.

Material and methods

Counts and measurements follow Fink & Weitzman (1974) except of the number of scale series below the lateral line that was counted from the series just below the lateral line to the scale anterior to the pelvic-fin origin. Vertebral count includes the four vertebrae of the Weberian apparatus; the terminal centrum was counted as a single element as described in Weitzman & Malabarba (1999). Measurements were made with a caliper under a microscope and are presented as percentages of standard length (SL) or head length (HL) for subunits of the head. Tooth cusps, gill rakers along first branchial arch, supraneurals, procurrent caudal-fin rays, and vertebrae were counted on cleared and stained (c&s) specimens prepared according to Taylor & Van Dyke's (1985) method. In the description, counts are followed by the frequency in parentheses; the value presented by the holotype is highlighted with an asterisk. Photographs of jaws and teeth, ventral procurrent caudal-fin rays, and anal fin were taken from c&s specimens in a microscope camera with focus stacking. Nomenclature for bones follows Weitzman (1962) and Zanata & Vari (2005). The 'Habitat and ecological notes' section was based on information from the lots UFBA 6967 and UFBA 7123, recently collected. Institutional abbreviations are: ANSP, Academy of Natural Sciences of Drexel University, Philadelphia; CAS, California Academy of Sciences, San Francisco; FMNH, Field Museum of Natural History, Chicago; MCNIP, Museu de Ciências Naturais da Pontifícia Universidade Católica de Minas Gerais, Belo Horizonte; MCP, Museu de Ciências e Tecnologia, Pontifícia Universidade Católica do Rio Grande do Sul, Porto Alegre; MNRJ, Museu Nacional, Rio de Janeiro; MZUEL, Museu de Zoologia da Universidade Estadual de Londrina, Londrina; MZUSP, Museu de Zoologia da Universidade de São Paulo, São Paulo; ROM, Royal Ontario Museum, Toronto; UFBA, Museu de Zoologia da Universidade Federal da Bahia, Salvador; UFRGS, Departamento de Zoologia, Universidade Federal do Rio Grande do Sul, Porto Alegre.

Serrapinnus zanatae, new species
(Fig. 1)

Holotype. MZUSP 116000, 36.8 mm SL, male; Brazil: Minas Gerais State: Salinas: rio Bananal, tributary of the rio Salinas in a dam nearby Salinas, rio Jequitinhonha basin; 16°08'36.2"S 42°16'59.7"W; 478 m above sea level; A. M. Zanata, P. Camelier, J. O. Birindelli, R. Burger & B. Sardeiro, 11 Jul 2011.

Paratypes. All from Brazil: Minas Gerais State: rio Jequitinhonha basin: UFBA 6967, 8, 31.4–35.9 mm SL; same data as holotype. – ANSP 173798, 4, 21.0–38.5 mm SL (2 measured, 31.7–38.5 mm SL); São Pedro do Jequitinhonha: rio Jequitinhonha; 16°30'55"S 41°20'02"W; R. E. Reis, W. G. Saul & J. F. Pezzi da Silva, 20 Jan 1995. – MCNIP 1597, 2, 38.7–39.4 mm SL; Olhos D'Água: small tributary at left margin of rio Jequitinhonha; 17°20'30.44"S 43°31'57.31"W; T. C. Pessali, T. A. Barroso & I. S. Penido, 29 Oct 2014. – MZUSP 5133, 30, 34.3–41.0 mm SL (20 measured, 34.3–39.4 mm SL; c&s 3 males 32.8–36.8 mm SL, 2 females 30.9–34.2 mm SL); Itaobim: rio Jequitinhonha; DZ Expedition, 25 Jun 1966. – MZUSP 42835, 9, 23.2–31.8 mm SL (6 measured, 27.2–31.8 mm SL); Jacinto: marginal lake of rio Jequitinhonha, kilometer 205 on road to Salto da Divisa; MZUSP-USNM Expedition, 22 Mar 1985. – UFBA 7123, 1, 32.8 mm SL; Salinas: rio Salinas, under bridge at highway between Salinas and BR-116, 478 above sea level; 16°07'51.8"S 42°47'10.1"W; A. M. Zanata, P. Camelier, J. L. O. Birindelli, R. Burger & B. Sardeiro, 11 Jul 2011. – USNM 318483, 21, 19.0–27.1 mm SL; rio Ribeirão, tributary of the rio Jequitinhonha, approximately 4–5 km ESE from Jordânia; 15°54'S 40°10'W; R. M. C. Castro & S. L. Jewett, 12 Jul 1991.

Non-type material. MZUSP 93797, 3, 20.8–25.2 mm SL; Araçuaí: Calhauzinho dam; 16°56'18"S 42°00'59"W; O. T. Oyakawa, J. L. O. Birindelli & L. Sousa, 11 Apr 2007.

Diagnosis. *Serrapinnus zanatae* is distinguished from its congeners by the following characters: premaxillary teeth with 7–9 cusps (vs. 10–12 cusps in *S. gracilis* (Géry, 1960) and *S. littoris* (Géry, 1960), and 3–5 cusps in *S. microdon* (Eigenmann, 1915) and *S. potiguar* Jerep & Malabarba, 2014); spatulate and parallel ventral procurrent caudal-fin rays (vs. scimitar-shaped procurrent caudal-fin rays arranged in a semi-circle in *S. aster* Malabarba & Jerep, 2014 and *S. potiguar*); incomplete lateral line (vs. complete lateral line in *S. heterodon*, sometimes also complete in *S. sterbai* Zarske, 2012 and *S. tocantinensis* Malabarba & Jerep, 2014); dorsal fin without markings (vs. black pigmentation on the anterior and proximal border of the dorsal fin in *S. notomelas* (Eigenmann, 1915) and a faint black blotch on the distal half of the dorsal fin in *S. microdon* and *S. heterodon*); dark longitudinal stripe extending from the region below the dorsal fin to the caudal peduncle (vs. dark longitudinal stripe extending from the region anterior to the pseudotympanum to the caudal peduncle in *S. sterbai*); abdomen without distinctive marks (vs. abdomen with a black spot on the posteroventral region in *S. kriegi* (Schindler, 1937)); absence of fins rays extended as filaments (vs. unbranched dorsal-, pelvic- and anal-fin rays extended as filaments in mature males in *S. tocantinensis*); 11–13 ventral procurrent caudal-fin rays (vs. 13–16 in *S. calliurus* (Boulenger, 1900), 14–16 in *S. kriegi*, 17–19 in *S. lucindai* Jerep & Malabarba, 2014, and 13–16 in *S. micropterus* (Eigenmann, in Eigenmann & Ogle, 1907)); 16–19 branched anal-fin rays (vs. 19–22 in *S. calliurus*); 33–36 scales on longitudinal series (vs. 31–32 in *S. micropterus*); caudal-fin spot oval and horizontally elongated not extending to dorsal and ventral margins of the caudal peduncle (vs. caudal spot usually lozenge, vertically elongated, reaching the dorsal and ventral margins of the caudal peduncle in *S. calliurus* and *S. piaba*).

Description. Morphometric data on Table 1. Body slightly elongated and compressed. Greatest body depth at vertical through pelvic-fin origin. Snout slightly rounded. Dorsal profile of head convex from snout to vertical through posterior border of nostril, slightly concave from vertical through posterior border of pupil to distal tip of supraoccipital bone. Predorsal profile convex from posterior end of supraoccipital to dorsal-fin origin. Dorsal-fin origin located at midlength of SL; dorsal-fin base slightly convex. Dorsal profile from last dorsal-fin ray to adipose-fin base slightly convex, and commonly ventrally arched in preserved sexually dimorphic males. Dorsal profile of caudal peduncle slightly concave from adipose-fin origin to caudal-fin origin; ventral profile straight to slightly concave, straight with exposed distal tip of hypertrophied ventral procurrent caudal-fin rays in males. Ventral profile of head and body slightly convex from mouth to pelvic-fin origin; straight to slightly convex from that point to anal-fin origin, sometimes concave in sexually dimorphic males. Anal-fin base straight to slightly concave, slightly convex anteriorly and concave posteriorly in mature males. Snout rounded in lateral view. Mouth terminal, opening at horizontal line through middle of eye pupil. Maxilla posteroventrally angled, posterior end reaching vertical through anterior border of eye and surpassing ventrally horizontal through ventral margin of eye. Teeth pedunculated, distally expanded, all similar in shape. Four (1), 5* (29) or 6 (2) premaxillary teeth aligned in a single row, teeth with 7–9 cusps. Three* (25) or 4 (6) maxillary teeth with 5–9 cusps. Four* (26) or 5 (5) large dentary teeth bearing 7 cusps, followed posteriorly by 4 or 5 smaller teeth, decreasing in size and cusp number posteriorly, bearing 3–7 cusps. All teeth with midcentral cusp longer and wider than lateral ones (Fig. 2).

Dorsal-fin rays ii,8 (2) or ii,9* (36). First unbranched dorsal-fin ray about half length of second unbranched ray. First branched ray slightly longer than second unbranched ray, following branched rays gradually decreasing in size posteriorly. Adipose-fin origin slightly posterior to vertical through base of antepenultimate anal-fin ray. Anal-fin origin posterior to vertical through base of last dorsal-fin ray. Unbranched anal-fin rays iii* (34) or iv (2); branched anal-fin rays 16 (3), 17* (16), 18 (15) or 19 (16). Anal-fin distal profile slightly pointed on anterior lobe and concave posteriorly, slightly rounded on anterior lobe and deeply concave posteriorly in sexually dimorphic males. First branched anal-fin ray longer, remaining rays decreasing in size posteriorly. Mature males with acute, retrorse hooks on posterior border and posterior branches of anal-fin rays, posterolaterally arranged on last unbranched to 6th–9th branched rays (Fig. 3). Two to three unpaired hooks per ray segment of lepidotrichia. Hooks mostly distributed along middle third of anal-fin ray length. Hook-bearing rays with segments and branches progressively fused according to degree of maturation of males. Hypertrophied

Fig. 1. *Serrapinnus zanatae*, MZUSP 116000, holotype, male, 36.8 mm SL; Brazil: Minas Gerais State: rio Jequitinhonha basin.

soft tissue associated to hook-bearing anal-fin rays. Pectoral-fin rays i*(38), 10(14), 11*(20) or 12(4). Unbranched pectoral-fin ray falling short of pelvic-fin origin. Pelvic-fin origin anterior to vertical through dorsal-fin origin. Pelvic-fin rays i,7*(38). Branched pelvic-fin rays with acute hooks in males, 1 pair per segment of lepidotrichia, ventromedially placed on rays, and associated with hypertrophied soft tissue; hooks rarely placed on first unbranched ray. Principal caudal-fin rays 19*(36). Dorsal procurrent caudal-fin rays 11(1), 12(3) or 14(1); ventral procurrent caudal-fin rays 11(3), 12(1) or 13(1), hypertrophied in sexually dimorphic males, expanded on sagittal plane, usually trespassing muscles and skin on ventral margin of caudal-peduncle, resulting in exposed sharp keel. Hypertrophied ventral procurrent rays straight, proximal end acute, expanding distally, distal end spatulate (Fig. 4).

Fig. 2. *Serrapinnus zanatae*; MZUSP 5133, paratype male, 36.8 mm SL; clear and stained jaws showing left side of premaxilla, maxilla and dentary. Lateral view, anterior to left. Scale bar 1 mm.

Scales cycloid, 33*(8), 34(16), 35(12) or 36(2) on longitudinal line. Pored scales on lateral line 8(4), 9*(9), 10(13), 11(5), 12(2), 13(3) or 14(1); predorsal scales 10(4), 11(26), 12*(7) or 13(1); scale rows from lateral line to dorsal-fin origin 5(4) or 6*(23); scale rows from lateral line to pelvic-fin origin 4*(24) or 5(1); circumpeduncular scale rows 14*(38). Scales sheath over base of anterior anal-fin rays 4(7), 5(16), 6*(12), 7(1) or 8(1).

Counts based on c&s specimens: total gill rakers 16(1), 17(3) or 18(1); supraneurals 5(5); abdominal vertebrae 16(1) or 17(4), caudal vertebrae 16(4) or 17(1).

Color in alcohol. Overall body coloration white to dusky, old preserved specimens yellowish (Fig. 1). Head darker over dorsal region of neurocranium, moderately dark anteriorly and usually darker on posterior half. Snout and maxilla darker due to higher concentration of dark chromatophores. Dark brown chromatophores scattered

Fig. 3. *Serrapinnus zanatae*; MZUSP 5133, paratype male, 36.8 mm SL; anal fin of a mature male with hypertrophied anal-fin rays and hooks shape and arrangement. Lateral view, anterior to left. Scale bar 1 mm.

Fig. 4. *Serrapinnus zanatae*; MZUSP 5133, paratype male, 36.8 mm SL; ventral procurrent caudal-fin rays. Lateral view, anterior to left. Scale bar 1 mm.

over maxillary bone, infraorbitals and opercular apparatus. Opercular apparatus, infraorbitals 3–6 and branchiostegal rays silver in some individuals due to concentration of guanine. Ventral region of head pale or with a few scattered dark chromatophores on anteriormost portion; abdomen pale, darkened in old preserved specimens. Humeral region with triangular darkened area due to pseudotympanum muscular hiatus. Body scales with higher concentration of dark chro-

matophores on exposed margin, resulting in a somewhat reticulated aspect more conspicuous on upper portion of body. Longitudinal dark subcutaneous line on lateral side of body extending from rear of pseudotympanum to caudal peduncle spot, usually more evident posterior to area below dorsal-fin base. Some specimens with retention of guanine over the longitudinal stripe. Scattered dark pigmentation above anal-fin base, some black chromatophores faintly aligned and following line of myosepta on body above anal fin. Caudal-peduncle blotch black, usually surrounded by dark shadow formed by underlying pigment, horizontally elongated, two scales deep, not reaching upper or lower margins of caudal peduncle and extending over base of middle caudal-fin rays. Some specimens with caudal blotch almost indistinguishable from longitudinal line. Dorsal, anal, pectoral and pelvic fins mostly hyaline, with dark chromatophores scattered on interradial membrane, mainly along border of rays. Unbranched dorsal-fin rays slightly darker than branched rays due to higher concentration of black chromatophores. Adipose fin hyaline, with few black chromatophores distributed near distal margin. Caudal fin with clear whitish to hyaline areas on base of caudal-fin lobes, bordering caudal-peduncle spot posteriorly.

Color in life. Dark pigmentation as described on alcohol preserved specimens. Dorsal region of head and longitudinal region of body with light green to yellowish iridescence (Fig. 5). Dorsal border of eye with coppery to golden iridescence; ventral region of eye silvery. Ventral region of head whitish, with silvery reflexes depending on light incidence. Body light olive brown slightly translucent; more translucent on caudal region below longitudinal line. Abdominal cavity whitish, with silvery reflexes depending on light incidence. Longitudinal stripe visible in life, silver or grayish. Some specimens from MCNIP 1597 with iridescent longitudinal bright yellow stripe, located above longitudinal grayish stripe, running from end of opercle to upper caudal-fin lobe (Fig. 5b). Pectoral and pelvic fins mostly hyaline with tin of yellow to orange. Anterior dorsal-fin rays with basal-distal gradient from yellow to orange. Rays of anterior lobe of anal fin slightly orange. Base of dorsal and ventral

Table 1. Morphometric data of *Serrapinnus zanatae*. Males range, mean, and standard deviation (SD) include values of the holotype.

		males					females				
	holotype	N	min	max	mean	SD	N	min	max	mean	SD
Standard length (mm)	36.8	23	28.6	39.4	34.8		15	27.2	39.3	34.8	
Percentages of standard length											
Head length	24.2	23	19.0	25.6	24.0	1.3	15	23.2	25.4	24.0	0.5
Bony head length	25.6	18	24.2	25.6	24.8	0.5	13	23.6	26.3	24.5	0.8
Snout-anal fin distance	66.4	23	61.9	66.6	64.4	1.5	15	64.2	68.1	66.2	1.3
Snout-dorsal fin distance	52.1	23	50.3	53.5	51.5	0.9	15	50.3	54.9	53.1	1.1
Snout-pelvic fin distance	46.6	23	42.8	47.4	44.6	1.2	15	43.7	46.4	45.2	0.8
Snout-pectoral fin distance	26.2	23	23.6	26.2	24.7	0.7	15	23.5	25.8	24.7	0.8
Dorsal-fin base length	13.6	23	11.7	14.6	13.0	0.7	15	10.2	13.1	12.5	0.7
Anal-fin base length	23.4	23	20.1	25.3	23.4	1.3	15	21.4	25.2	23.0	1.0
Length of caudal peduncle	14.5	23	13.3	18.1	15.5	1.2	15	12.8	15.9	14.7	0.9
Depth of caudal peduncle	13.8	23	11.4	14.3	13.1	0.8	15	10.7	13.6	12.4	0.7
Body depth at dorsal fin	37.5	23	31.7	38.1	35.0	1.9	15	32.8	40.5	37.1	2.4
Dorsal-fin length	27.9	23	24.7	29.7	28.0	1.1	14	24.6	29.5	27.8	1.4
Anal-fin length	19.3	22	16.3	19.7	18.3	0.8	14	17.5	21.5	19.2	1.2
Pelvic-fin length	17.3	23	15.0	21.2	19.6	1.3	14	16.3	19.1	17.9	0.8
Pectoral-fin length	19.2	23	15.0	21.2	19.6	1.3	15	18.0	21.3	19.6	0.9
Percentages of head length											
Snout length	23	23	23	32	26.0	2.2	15	24	28	25.9	1.1
Upper jaw length	26	23	26	38	29.1	2.2	15	24	31	28.5	1.7
Horizontal orbit diameter	33	23	33	46	37.1	2.7	15	35	40	37.3	1.3
Interorbital width	31	23	33	45	35.7	2.7	15	31	37	34.3	1.5

caudal-fin rays yellow to orange, distal region of dorsal and ventral caudal-fin rays and middle caudal-fin rays hyaline. Distal tip of longest pelvic and anal-fin rays slightly white or hyaline (Fig. 5a) or remarkably white in some specimens (Fig. 5b).

Sexual dimorphism. Sexually dimorphic characters were observed in males above 28.0 mm SL. Bony hooks on pelvic and anal-fin rays of sexually dimorphic males. In pelvic fins, hooks common and numerous on branched rays, rare on first unbranched ray. In anal fin, rays bearing bony hooks hypertrophied, sometimes with fused ray segments, and expanded in sagittal plane (Fig. 3). Sexually dimorphic males also with hypertrophied and ventrally exposed procurrent caudal-fin rays (Fig. 4). Furthermore, caudal peduncle slightly arched ventrally in a few preserved adult males.

Distribution. *Serrapinnus zanatae* is known to inhabit the upper and middle portions of the rio Jequitinhonha basin, Minas Gerais State, southeastern region of Brazil (Fig. 6).

Etymology. The specific name *zanatae* is in honor to the Brazilian ichthyologist Angela Maria Zanata, in recognition of her great contribution to our knowledge of Neotropical freshwater fishes, and for collecting the new species. A noun in genitive.

Habitat and ecological notes. *Serrapinnus zanatae* was collected in clear water streams running over rock, pebbles, and sand bottoms, at altitudes around 480 m above sea level, in habitats characterized by moderate to rapid water current, less than one meter deep (Fig. 7). The riparian vegetation is mainly composed by grass, shrubs, and trees. *Serrapinnus zanatae* was collected syntopically with *Astyanax* aff. *lacustris*, *Astyanax* sp., *Characidium* cf. *timbuiense*, *Geophagus* aff. *brasiliensis*, *Hypostomus* sp., *Knodus* sp., *Nematocharax venustus*, *Parotocinclus* sp., and *Poecilia reticulata*. From all species listed above, only *P. reticulata* is an allochthonous species. The analysis of stomach contents of one specimen of *S. zanatae* revealed the presence of allochthonous and autochthonous items, composed by filamentous algae, fragments of plants, organic debris, insect aquatic larvae (Trichoptera), and fragments of unidentified arthropods.

Discussion

The new species is herein placed in the genus *Serrapinnus* for presenting all synapomorphies proposed by Malabarba (1998: 216) for the genus, such as: caudal peduncle conspicuously ventrally arched in preserved mature males, and the main axis of the ventral procurrent caudal-fin rays not supported by the parhypural perpendicular to the longitudinal axis of the body, whereas the most anterior elements are anteriorly directed. In males of *Serrapinnus*, the ventral procurrent caudal-fin rays not supported by the parhypural gradually shifts from a posteriorly angled position, the condition found in females and immature males, to a perpendicular or anteriorly angled position during ontogeny. This transition occurs as the elements are being hypertrophied during sexual maturation of the individual. An intermediary stage is present in Figure 3. In addition, all *Serrapinnus* have an incomplete lateral line, except *S. heterodon* and occasionally some specimens of *S. sterbai* and *S. tocantinensis*.

A detailed knowledge of the distribution of the species of the genus *Serrapinnus* in South America is still missing. So far, *S. heterodon*, *S. piaba*, and *S. potiguar* were the only species of the genus known to occur on the northeastern coastal drainages of Brazil. The recognition of *S. zanatae* in the upper and middle portions of the rio Jequitinhonha drainage expands the geographic distribution of the genus along the coastal drainages to the South. The genus remains unregistered in the Atlantic coastal river drainages south of the rio Jequitinhonha, except for *S. calliurus* in the laguna dos Patos and rio Uruguay drainages in the southernmost region of Brazil, Uruguay, and Argentina.

In addition to *Serrapinus zanatae* the only other known species of Cheirodontinae inhabiting the rio Jequitinhonha basin is *Acinocheirodon melanogramma*. In addition to differences regarding the secondary sexual dimorphism of *A. melanogramma*, a member of the Compsurini (Malabarba & Weitzman, 1999) with hypertrophied tissues and hooks in the caudal fin of males, and *S. zanatae*, a member of Cheirodontini, both species differ in the extension of the lateral line (complete in *A. melanogramma* vs. incomplete in *S. zanatae*), body shape (elongate in *A. melanogramma* vs. short and deep in *S. zanatae*) and tooth morphology (dentary teeth different from those of the premaxilla, with three central cusps largely expanded and

Fig. 5. Coloration in life of *Serrapinnus zanatae*; Brazil: Minas Gerais State: rio Jequitinhonha basin; **a,** UFBA 6967, 32.6 mm SL, paratype male (photograph by José L. O. Birindelli); and **b,** MCNIP 1597, 39.4 mm SL, paratype male (photograph by Tiago C. Pessali).

equal in size and length forming a straight line in *A. melanogramma* vs. dentary teeth with central cusp longer and remaining cusps smaller similar to those of premaxillary teeth in *S. zanatae*).

Material examined. *Acinocheirodon melanogramma*: MNRJ 16455, holotype, 31.8 mm SL; Brazil: Minas Gerais: Bocaiuva: Cachoeira stream, tributary to rio Jequitaí.

Cheirodon microdon: FMNH 57867, holotype, 32.2 mm SL; Brazil: Mato Grosso: Caceres: rio Ibicuhy.

C. micropterus: CAS 59780, holotype, 23.9 mm SL; Brazil: Pará: rio Amazonas drainage at Santarém.

C. notomelas: FMNH 57829, holotype, 28.2 mm SL; Brazil: São Paulo: Miguel Calmone.

Serrapinnus heterodon: CAS 117522, 4 paratypes, 32.2–36.5 mm SL; Brazil: Minas Gerais: Jaguara: rio Grande.

S. aster: MZUSP 115011, holotype, 22.9 mm SL; Brazil: Tocantins: Arraias: periodic lake at confluence of rio Paranã and rio Bezerra, rio Tocantins drainage.

S. calliurus: MCP 12537, 4 c&s, 21; Brazil: Rio Grande do Sul: São Nicolau: arroio Canoin. – MZUEL 8146, 5, 19.8–29.2 mm SL; Brazil: Mato Grosso do Sul: Corumbá: rio Miranda, tributary of the rio Paraguay.

S. gracilis: ROM 86254, 3, 19.3–23.0 mm SL; Guyana: Essequibo: about 10 km N of Lethem, Maranari river.

S. kriegi: MCP 12043, 5 c&s; Paraguay: Cerrito: Estância Montreal Potrero.

S. lucindai: UFRGS 19198, holotype, 21.1 mm SL; Brazil: Goiás: Piranhas: tributary of rio Piranhas, between Piranhas and Bom Jardim de Goiás.

S. piaba: MCP 14007, 4 c&s, 25; Brazil: Minas Gerais:

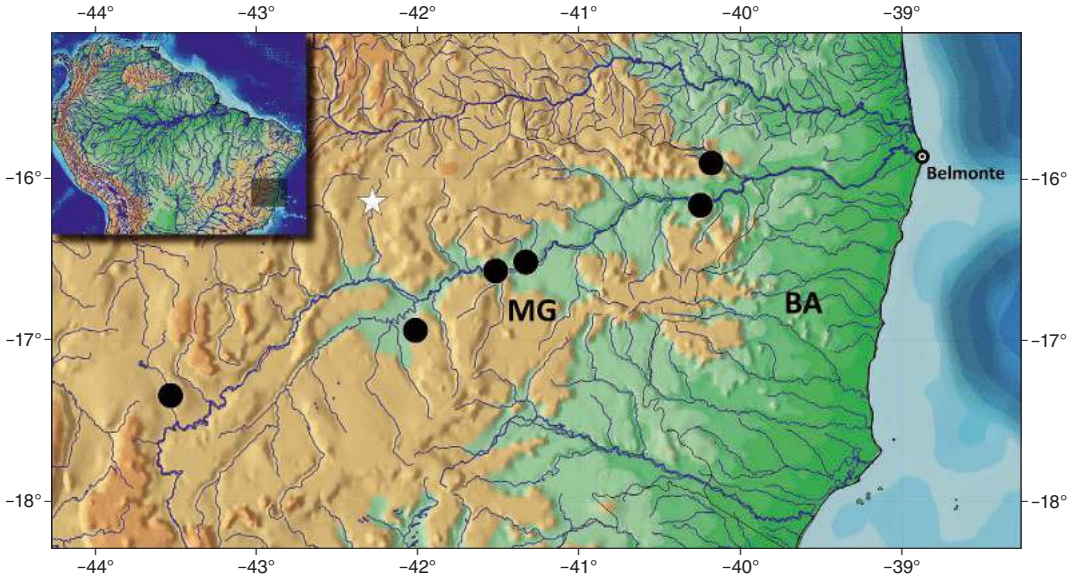

Fig. 6. Map of eastern portion of Brazil showing the geographic distribution of *Serrapinnus zanatae* in the rio Jequitinhonha basin. ☆, type locality.

Moema: rio São Francisco. – MZUEL 3244, 2, 28.2–28.4 mm SL; Brazil: Rio Grande do Norte: Maxaranguape: lagoa Grande.

S. potiguar: MCP 48054, holotype, 26.6 mm SL; Brazil: Rio Grande do Norte: Taipu: rio Ceará-Mirim, district of Umari.

S. sterbai: MZUSP 40359, 69, 22.2–26.7 mm SL, 4 c&s, 23.6–25.8 mm SL; Brazil: Tocantins: Arraias: temporary pond on rio Paraná and rio Bezerra confluence, rio Tocantins drainage.

S. tocantinensis: UFRGS 16442, holotype, 32.5 mm SL; Brazil: Mato Grosso: Barra do Garças: córrego Fundo, tributary of the rio das Garças.

Spintherobolus broccae: FMNH 58864, 1 paratype, 18.7 mm SL; Brazil: Rio de Janeiro.

S. papilliferus: FMNH 104802, holotype, 32.9 mm SL; Brazil: São Paulo: Alto da Serra.

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Fig. 7. Type locality of *Serrapinnus zanatae*; rio Bananal, tributary of rio Salinas in a dam nearby Salinas, rio Jequitinhonha basin (photograph by Angela M. Zanata).

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