

Taxonomic revision of the genus *Australoheros* RÍCAN & KULLANDER, 2006 (Teleostei: Cichlidae) with descriptions of nine new species from southeastern Brazil

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> Abstract

Nine new species of *Australoheros* from Southern Brazil are herein described: *Australoheros autrani* from rio São João basin; *A. barbosa* from rio Preto basin, rio Paraíba do Sul basin; *A. ipatinguensis* from rio Doce basin; *A. macacuensis* from rio Macacu basin, *A. macaensis* from rio Macaé basin, *A. muriae* from rio Muriaé basin, rio Paraíba do Sul basin; *A. paraíba* from rio do Peixe basin, rio Paraíba do Sul basin; *A. robustus* from córrego da Areia basin, rio Paraíba do Sul basin; and *A. saquarema* from lagoa de Saquarema system. The new species are easily distinguished from their congeners from South Brazil, Northern Argentina and North Uruguay (except *A. scitulus*) by having 12 caudal vertebrae (vs. 13 or more). The new species are distinguished from *A. scitulus* and *A. forquilha* by having no dark marks on side of head (vs. dark marks present on side of head), and differ from *A. ribeirae* by meristic counts. The nine new species differ from each other by several meristic counts, some morphometric measurements, shape of the snout and color pattern. A new phylogeny of the genus is required, because when these new species from Southern Brazil are included into the groups proposed by RÍCAN & KULLANDER (2006, 2008), the characters turns incongruent.

> Resumo

Nove novas espécies do gênero *Australoheros* do Sudeste do Brasil são aqui descritas. *Australoheros autrani* da bacia do rio São João; *A. barbosa* da bacia do rio Preto, bacia do rio Paraíba do Sul; *A. ipatinguensis* da bacia do rio Doce; *A. macacuensis* da bacia do rio Macacu; *A. macaensis* da bacia do rio Macaé; *A. muriae* da bacia do rio Muriaé, bacia do rio Paraíba do Sul; *A. paraíba* da bacia do rio do Peixe, bacia do rio Paraíba do Sul; *A. robustus* da bacia do córrego da Areia, bacia do rio Paraíba do Sul; e *A. saquarema* do sistema lagunar de Saquarema. As novas espécies são facilmente distinguíveis das demais espécies do gênero do Sul do Brasil, Norte do Uruguai e Nordeste da Argentina por possuir 12 vértebras caudais (vs. 13 ou mais vértebras caudais) (com exceção de *A. scitulus*). As novas espécies diferem de *A. scitulus* e *A. forquilha* por não possuir marcas escuras no lado da cabeça (vs. marcas escuras presentes no lado da cabeça), e diferem de *A. ribeirae* por contagens merísticas. As nove novas espécies diferem entre si por contagens merísticas, algumas medidas morfométricas, forma do focinho e padrão de colorido. Uma nova filogenia para o gênero se mostra necessária, porque quando as novas espécies do Sudeste do Brasil são incluídas nos grupos propostos por RÍCAN & KULLANDER (2006, 2008), os caracteres se tornam incongruentes.

> Kurzfassung

Neun neue Arten der Gattung *Australoheros* aus Südbrasilien werden hier erstmals beschrieben: *Australoheros autrani* aus dem rio São-João-Becken; *A. barbosa* aus dem Preto-Becken und rio-Paraíba-do-Sul-Becken; *A. ipatinguensis* aus dem rio-Doce-Becken; *A. macacuensis* aus dem Macacu-Becken; *A. macaensis* aus dem rio-Macaé-Becken; *A. muriae* aus dem rio-Muriaé-Becken und dem rio-Paraíba-do-Sul-Becken; *A. paraíba* aus dem rio-do-Peixe-Becken und dem rio-Paraíba-do-Sul-Becken; *A. robustus* aus dem córrego-da-Areia-Becken und dem rio-Paraíba-do-Sul-Becken sowie *A. saquarema* aus dem lagoa-de-Saquarema-System. Die neuen Arten sind leicht von allen anderen Vertretern der Gattung aus Südbrasilien, Nordargentinien und Norduruguay (mit Ausnahme von *A. scitulus*) anhand der 12 Caudalwirbel zu unterscheiden (vs. 13 und mehr). Die neuen Arten unterscheiden sich von *A. scitulus* und *A. forquilha* durch das Fehlen dunkler Punkte auf dem Kopf (vs. dunkle Punkte auf der Kopfseite vorhanden), sowie von *A. ribeirae* durch meristische Merkmale. Die neun neuen Arten unterscheiden sich voneinander durch verschiedene meristische Merkmale, einige morphometrische Charakteristika, die Form der Schnauze und das Zeichnungsmuster. Eine neue phylogenetische Betrachtung der Gattung ist erforderlich.

> Key words

Australoheros, “*Cichlassoma facetum*”, Cichlassomatinae, Cichlidae, coastal basin, Heroini, new species, rio Paraíba do Sul basin, Southeastern Brasil, taxonomy.

Introduction

The percomorph family Cichlidae is a diversified assemblage of freshwater fishes with wide geographic distribution in tropical and subtropical zones of America and Africa, besides a few occurrences in Asia. During several decades of the past century, and even to the present, both taxonomists and evolutionary biologists directed their attention to the unusual high diversity of cichlids of the Great Lakes of Africa. Only in recent years, geographically restricted speciose assemblages of cichlids have been reported from South America, usually comprising numerous undescribed species (KULLANDER, 1986; REIS & MALABARBA, 1988; LUCENA & KULLANDER, 1992). More recently, *Australoheros* RÍCAN & KULLANDER, 2006 was established as a new genus to include *Cichlasoma facetum* (JENYNS, 1842) and eight species endemic to southern Brazil, Uruguay and northeastern Argentina, described in recent years (RÍCAN & KULLANDER, 2008), thus comprising nine valid species: *Australoheros facetus*; *A. kaaygua* CASCIOTTA, ALMIRÓN & GÓMEZ, 2006; *A. tembe* CASCIOTTA, GÓMEZ & TORESANI, 1995; *A. scitulus* RÍCAN & KULLANDER, 2003; *A. forquilha* RÍCAN & KULLANDER, 2008; *A. guarani* RÍCAN & KULLANDER, 2008; *A. minuano* RÍCAN & KULLANDER, 2008; *A. charrua* RÍCAN & KULLANDER, 2008; and *A. ribeirae* OTTONI, OYAKAWA & COSTA, 2008. *Australoheros* is diagnosed by having a unique breeding coloration (body bars 5–7 interrupted in their middorsal part) and juveniles with distinct xanthophore dots on the caudal-fin base (RÍCAN & KULLANDER, 2006). Included species are often diagnosed by the position and shape of bars and spots, although these characters are not always clearly described for some species.

Some other nominal taxa were included in *Australoheros*, but considered as junior synonyms of *A. facetus*: *Chromys oblonga* CASTELNAU, 1855, from the rio Tocantins in Goiás, Brazil; *Heros autochthon* GÜNTHER, 1862, from Brazil without any precise locality; *H. jenymsii* STEINDACHNER, 1869, from Montevideo, Uruguay; and *H. acaroides* HENSEL, 1870, from Porto Alegre, Brazil (RÍCAN & KULLANDER, 2008). However, despite common in southeastern Brazilian rivers, no species of *Australoheros* is presently described from this region. After examination of large recent collec-

tions, we recognize nine new species, which are herein described.

Materials and Methods

Materials are deposited in CIMC, divisão de Fauna, Grupo Especial de Estudo e Proteção do Ambiente Aquático do Rio Grande do Sul, Rio Grande do Sul; MCP, Museu de ciências e tecnologia da Pontifícia Universidade Católica do Rio Grande do Sul, Pontifícia Universidade Católica do Rio Grande do Sul, Rio Grande do Sul; MNRJ, Museu Nacional do Rio de Janeiro, Universidade Federal do Rio de Janeiro, Rio de Janeiro; MTD F, Museum für Tierkunde Dresden fish collection, Dresden, Deutschland; MZUSP, Museu de Zoologia, Universidade de São Paulo, São Paulo; and UFRJ, Instituto de Biologia, Universidade Federal do Rio de Janeiro, Rio de Janeiro.

Measurements and counts follow RÍCAN & KULLANDER (2003), with addition of upper and lower jaw length, head depth (the highest measurement of head), predorsal length (measurement from the end of the snout to first dorsal-fin spine), prepelvic length (measurement from the end of the snout to the base of pelvic fins), dorsal-fin and anal-fin base length, pelvic-fin spine length, last anal-fin spine length and caudal-fin length; and number of pelvic-fin spines, pelvic-fin rays, caudal-fin rays, rib pairs, scale series of dorsal-fin origin, scale series of anal-fin origin and proximal radials on dorsal-fin base. Number of scale series of dorsal-fin origin is counted from the first dorsal-fin spine to the upper lateral line. Number of scale series of anal-fin origin series is counted from the first anal-fin spine to the upper lateral line. Measurements are presented as percentages of standard length (SL), except for those related to head morphology, which are expressed as percentages of head length (HL). Measurements were taken on the left side of each specimen with digital calipers under a binocular microscope. Osteogical studies were made on cleared and counterstained (C&S) specimens prepared according to TAYLOR & VAN DYKE (1985). Vertical bars are grouped into trunk bars and head bars, numbered from the caudal-fin to the snout. Spots are similarly numbered. Comparisons with *A. tembe*, *A. kaaygua* and *A. scitulus* were based on lit-

erature. Comparisons with *A. facetus* and *A. ribeirae* were based on examined material and literature.

Comparative material: *Australoheros facetus*: Uruguay: UFRJ 7596, 8, 32.3–95.7, bañado Higoeritas, Nueva Palmira; RINGUELET; UFRJ 7597, 29, 18.6–32.7, arroyo Sarandí Grande, Maldonado; M. CHEFFE, 5. Oct. 2000; and UFRJ 7598, 3 C&S, 32.4–42.1, arroyo Sarandí Grande, Maldonado; M. CHEFFE, 5. Oct. 2000.

Australoheros ribeirae: Estado de São Paulo: MZUSP 42289, 1, 43.7 mm SL, lagon near the Sr. Celso farm, road Sete Barras–EL Dorado; M. DAMATO & O. OYAKAWA, 11. Mar. 1990; MZUSP 40016, 4, 19.7–46.6 mm SL, river tributary to rio São Lourenço, Município de Miracatu; O. OYAKAWA, F. LANGEANI, V. SILVA & Z. VASCONCELOS, 30. Jan. 1988; MZUSP 50677, 1, 33.9 mm SL, river on road Jacupiranga–EL Dorado, Município de El Dorado; L. Travassos & L. Travassos Filho, 16. Sep. 1977; MZUSP 40042, 8, 12.3–61.3 mm SL; lagon near rio São Lourenço, Município de Juquiá; O. OYAKAWA, F. LANGEANI & V. SILVA, 30 Jan. 1988; MZUSP 2582, 1, 57.6 mm SL; Município de Iguape, E. GARBE, 1910; MZUSP 70032, 2, 46.5–61.8 mm SL, lago Mimoso, rio Mimoso, rio Juquia tributary, Município de Juquiá; O. OYAKAWA, AKAMA, NOLASCO & PAIXÃO, 16. Jun. 2001; MZUSP 2587, 1, 73.4 mm SL; Poço Grande stream, rio Juquiá tributary, Município de Juquiá; MOENKHAUS, 1898; MZUSP 3270, 10, 24.2–52.8 mm SL; Poço Grande stream, rio Juquiá tributary, Município de Juquiá; TRAVASSOS, 1940; MZUSP 50679, 10, 17.2–29.8 mm SL; Poço Grande farm, Município de Juquiá; W. BOCHERMANN & O. SCHULTZ, 7. Jun. 1953; MZUSP 70011, 2, 36.7–75.5 mm SL; rio Pariquera-Mirim, Município Paraquera-Açú; O. OYAKAWA, AKAMA, NOLASCO & PAIXÃO, 15. Jun. 2001; UFRJ 5368, 3 D&C, 32.6–50.5 mm SL; Município de Sete Barras; F. AUTRAN & O. OYAKAWA, 27. Oct. 1998; and UFRJ 5369, 1 D&C, 29.7 mm SL; Pedra do Largo, Município de Juquiá; F. AUTRAN & O. OYAKAWA, 28. Oct. 1998.

Australoheros sp.: Brazil: Estado do Rio Grande do Sul: Município de Bom Jesus: UFRJ 7574, 65.4 mm SL; near arroio Barreiro; M. CHEFFE & L. ROSA 06. Apr. 2004; UFRJ 7576, 17, 20.6–60.0 mm SL, near arroio Barreiro; M. CHEFFE & L. ROSA 06. Apr. 2004; MCP 42363, 4, 35.3–42.5 mm SL, near arroio Barreiro; M. CHEFFE & L. ROSA 06. Apr. 2004; UFRJ 7575, 4 C&S, 25.9–40.9 mm SL, near arroio Barreiro; M. CHEFFE & L. ROSA 06. Apr. 2004; UFRJ 7586, 1, 107.2 mm SL, rio das Antas, Passo do Gabriel; M. CHEFFE & L. ROSA, 13 Dec. 2004; UFRJ 7587, 3, 78.7–99.9 mm SL, arroio Espulli, arroio Pinheiro Alto basin, road Bom Jesus-Vacaria; M. CHEFFE & L. ROSA, 12. Dec. 2004; CIMC 12308, 2, 73.0–87.2 mm SL, arroio Barreiro, near Passo do Gabriel; M. CHEFFE, L. ROSA & R. BALTAR, 28. Mar. 2005; Município de São Francisco de Paula: CIMC 12102, 1, 124.5 mm SL, rio das Antas, dan of PCH Passo do Meio; M. CHEFFE, L. ROSA & R. BALTAR, 12. Nov. 2004; CIMC 12326, 2 C&S, 79.0–80.4 mm SL, arroio Barreiro, near Passo do Gabriel; M. CHEFFE, L. ROSA & R. BALTAR, 28. Mar. 2005; Município de Caçapava do Sul: MCP 16292, 3, 87.6–98.9 mm SL; A. RAMIRES, 15. Apr. 1993; Estado de Santa Catarina: UFRJ 1918, 3, 29.4–73.0 mm SL; pond near rio São Bento; F. BOCKMANN, 06. Mar. 1990; Estado do Paraná: UFRJ 2242, 2, 60.4–64.3 mm SL; pound near Vassouras, Curitiba; R. MACEDO, 12. Feb. 1977; Estado do Rio de Janeiro: UFRJ

7599, 7, 13.1–25.4 mm SL; lagoa de Jurubatiba; F. LEAL, 17. Jul. 2007; UFRJ 7606, 1, 55.1 mm SL; lagoa de Carapebuz, Jurubatiba; F. LEAL, 18. Jul. 2007; and UFRJ 7607, 3 D&C, 23.3–31.3 mm SL; lagoa de Carapebuz, Jurubatiba; F.P. OTTONI, F. LEAL & J. MATTOS.

Australoheros autrani, new species

(Fig. 1)

Holotype. UFRJ 7256, 57.0 mm SL: Brazil: Estado do Rio de Janeiro: Município de Silva Jardim: rio Aldeia Velha, BR-101, rio São João basin; W.J.E.M. COSTA, 28. Aug. 2005.

Paratypes. Brazil: Estado do Rio de Janeiro: Município de Silva Jardim: UFRJ 7201, 3, 59.3–71.7 mm SL; rio Aldeia Velha; W.J.E.M. COSTA, 16 Jul. 2005; UFRJ 7202, 4, 26.1–48.0 mm SL; rio Aldeia Velha, 23 km from the city of Silva Jardim, W.J.E.M. COSTA, 28. Aug. 2005; UFRJ 7203, 4, 51.9–71.9 mm SL; stream tributary to rio São João, Gaviões, W.J.E.M. COSTA, 28. Aug. 2005; UFRJ 0823, 4, 31.1–63.4 mm SL; stream tributary to rio São João; W.J.E.M. COSTA, 10. Jul. 1991; UFRJ 1071, 1 C&S, 35.4 mm SL; rio São João, near Gaviões; W.J.E.M. COSTA, 10. Jul. 1991; UFRJ 6115, 1 C&S, 44.9 mm SL; rio Aldeia Velha, 23 km from the city of Silva Jardim, W.J.E.M. COSTA, 1. Apr. 1996; UFRJ 6133, 1 C&S, 52.3 mm SL; stream tributary to São João basin; W. J. E. M. COSTA, 10. Jul. 1991; MTD F 31319, 1, 32.7 mm SL; rio da Aldeia, W.J.E.M. COSTA, E. VICENTE & R. CUNHA, 23 Sep. 1992; UFRJ 3571, 1, 15.1 mm SL; rio Aldeia Velha 23 km from the city of Silva Jardim, M. BRITTO & F. C. AUTRAN, 1. Apr. 1996; UFRJ 7270, 3, 60.1–73.2 mm SL; rio São João; W.J.E.M. COSTA, 10. Dec. 1991; and MCP 42364, 2, 48.9–53.4 mm SL; rio Águas Claras, tributary of rio São João, 29 km north from Silva Jardim, Silva Jardim, RJ; F. AUTRAN, M. LANDIM, C. MOREIRA & A. VIANNA, 30. Aug. 1997.

Diagnosis. *Australoheros autrani* is distinguished from *A. facetus*, *A. kaaygua*, *A. tembe*, *A. forquilha*, *A. guarani*, *A. minuano* and *A. charrua* by having fewer caudal vertebrae (12 in *A. autrani* vs. 13 in *A. guarani* and *A. minuano*; 13–14 in *A. kaaygua*, *A. tembe*, *A. charrua* and *A. facetus*; and 13–15 in *A. forquilha*). It is distinguished from *A. scitulus* and *A. forquilha* by having no mark on side of head (vs. dark marks below the orbit in *A. forquilha* and dark marks on opercle in *A. scitulus*). The new species differs from *A. kaaygua*, *A. macacuensis*, *A. paraibae*, *A. scitulus*, *A. tembe*, *A. macaensis*, *A. robustus*, *A. ribeirae*, *A. charrua*, *A. guarani*, *A. minuano*, *A. forquilha* and *A. facetus* by having more anal-fin rays (9–10



Fig. 1. *Australoheros autrani* n. spec., specimen not preserved; Brazil: Rio de Janeiro: rio São João basin.

in *A. autrani* vs. 6–7 in *A. kaaygua*; 7–8 in *A. robustus*, *A. guarani* and *A. charrua*; 8–9 in *A. minuano*, *A. macacuensis*, *A. paraibae* and *A. macaensis*; 6–8 in *A. scitulus*; 8 in *A. ribeirae*, 7–9 in *A. tembe*, *A. forquilha* and *A. facetus*). It is distinguished from *A. barbosa*, *A. macaensis* and *A. ribeirae* by having fewer rib pairs (10 vs. 11) and differs from *A. macacuensis*, *A. ipatinguensis*, *A. robustus* and *A. muriae* by having more proximal radials on dorsal-fin base (25–26 in *A. autrani* vs. 24–25 in *A. macacuensis*, *A. ipatinguensis* and *A. muriae*, and 24 in *A. robustus*). It differs from *A. muriae* by having a longer caudal peduncle (caudal peduncle length 10.2–11.9 % SL vs. 7.1–8.9 % SL). *Australoheros autrani* differs from *A. robustus* by having fewer dorsal-fin spines (15–16 vs. 17), more dorsal-fin rays (10–12 in *A. autrani* vs. 8–9) and the common snout of *Australoheros* (vs. robust snout) (Fig. 2). The new species is distinguished from *A. saquarema* by having fewer proximal radial on anal-fin base (13–14 in *A. autrani* vs. 14–15 in *A. saquarema*); from *A. saquarema* and *A. macaensis* by having no depressions on head (vs. depression present in specimens over 30.0 mm SL), and from *A. ipatinguensis* and *A. ribeirae* by having a wide ectopterygoid (vs. narrow) (Fig. 3). *Australoheros autrani* differs from *A. barbosa*, *A. paraibae* and *A. ipatinguensis* by having arms of epibranchial 2 with two long tubular processes (vs. short) (Fig. 4). Also differs from *A. macacuensis* by having arms of vertical trunk bar 7 with the same width (vs. posterior one wider).

Description. Morphometric data are summarized in Table 1a, meristic data in Table 2a. Dorsal profile slightly convex from snout to caudal peduncle origin, leaner between snout and dorsal-fin origin. Ventral profile slightly convex from snout to caudal peduncle origin. Caudal peduncle approximately straight ventrally and dorsally. Body profile moderately elongate, laterally compressed. Lower jaw slightly shorter than upper one. Jaw teeth caniniform. Teeth hyaline to red at tip. Opercle not serrated. Urogenital papilla externally visible, rounded, with projection, not sexually dimorphic.

Dorsal fin rounded in anterior portion to pointed in posterior region. Tip of dorsal fin reaching vertical through middle of caudal fin. Anal fin rounded anteriorly, pointed posteriorly. Tip of anal fin vertically reaching through middle of caudal fin. Caudal fin long, subtruncate. Pectoral fins pointed. Pectoral fin base on vertical through dorsal-fin origin. Tip of pectoral-fin reaching vertical through vertical bar 4 of trunk. Pelvic fin pointed. Pelvic fin base on vertical through third spine of dorsal fin. Tip of pelvic fin reaching vertical through second spine of anal fin. Trunk and caudal peduncle covered with ctenoid scales. Cycloid scales on opercle and preopercle.

Epibranchial 2 with two long tubular processes (Fig. 4), anterior arm of epibranchial 1 long (Fig. 4) and wide ectopterygoid (Fig. 3).

Coloration in alcohol. Side of body light brown with seven dark brown vertical bars between posterior end

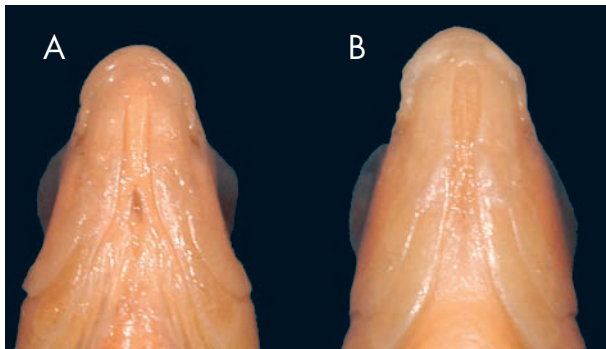


Fig. 2. Ventral view from the snout of **A:** *A. muriae*, paratype, MNRJ 16780, 55.5 mm SL and **B:** *Australoheros robustus*, paratype, MNRJ 16470, 57.7 mm SL.

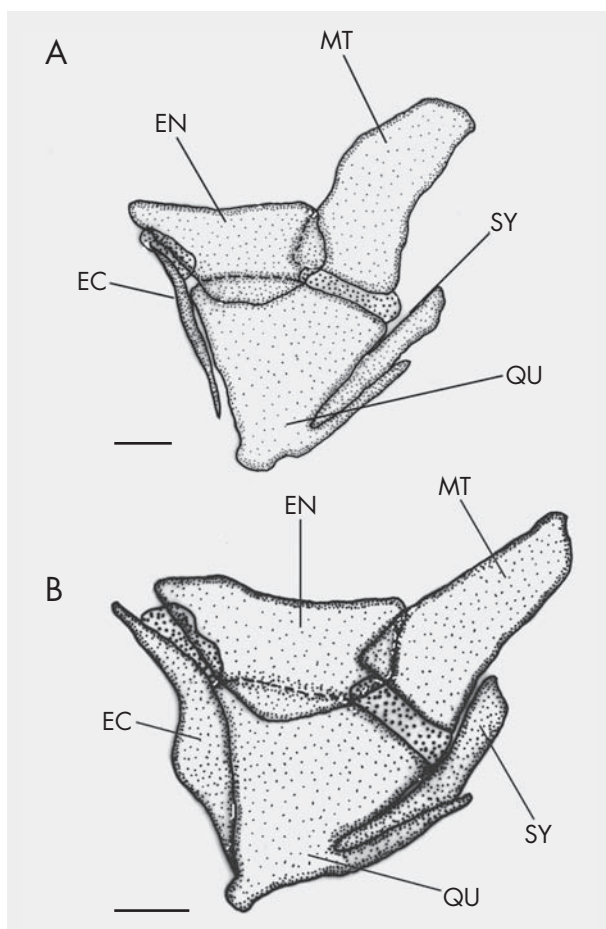


Fig. 3. Ectopterygoid of **A:** *Australoheros ipatinguensis* and *A. ribeirae*; and **B:** *Australoheros autrani*, *Australoheros barbosa*, *Australoheros facetus*, *Australoheros macacuensis*, *Australoheros macaensis*, *Australoheros muriae*, *Australoheros paraiba*, *Australoheros robustus* and *Australoheros saquarema*. EC = ectopterygoid; EN = entopterygoid; MT, metapterygoid; QU = quadrate; and SY = sympletic. Scale = 1 mm.

of caudal peduncle and posterior margin of opercle, all continuous, except vertical trunk bars 6 and 7 which are interrupted above horizontal stripe. Vertical trunk bars 2–4 dorsally inclined posteriorly. Vertical trunk bar 5 horizontally connected to vertical trunk bar 6,

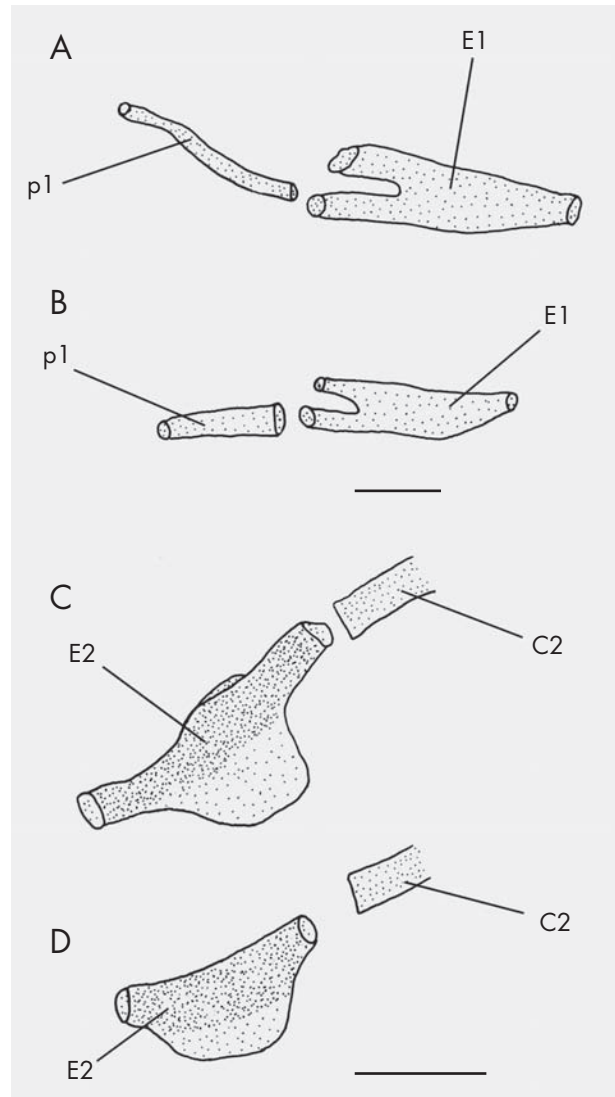


Fig. 4. Epibranchial 1 and 2 of **A:** *Australoheros autrani*, *A. barbosa*, *A. ipatinguensis*, *A. macacuensis*, *A. macaensis*, *A. muriae*, *A. paraiba*, *A. robustus* and *A. saquarema*; **B:** *A. facetus*; **C:** *A. autrani*, *A. macacuensis*, *A. macaensis*, *A. muriae* and *A. saquarema*; and **D:** *A. barbosa*, *A. facetus*, *A. ipatinguensis*, *A. paraiba* and *A. robustus*. C2 = ceratobranchial 2; E1–2 = epibranchials 1–2; and P1 = faringobranchial 1. Scale = 1 mm.

just above upper lateral line. Vertical trunk bar 6 usually interrupted between horizontal stripe and upper lateral line. Vertical trunk bar 7 forked, y-shaped with anterior arm more inclined than posterior one; bar interrupted between horizontal stripe and fork. Three dark spots: first spot on caudal peduncle zone, through lower lateral line; second one on junction between horizontal stripe and vertical trunk bar 4; third spot on posterior margin of opercle and horizontal stripe. Interrupted brown horizontal stripe from vertical trunk bar 1 to preopercle, lighter and inconspicuous between vertical trunk bars 1–4, darker between vertical trunk bars 5–6, having appearance of two dark spots.

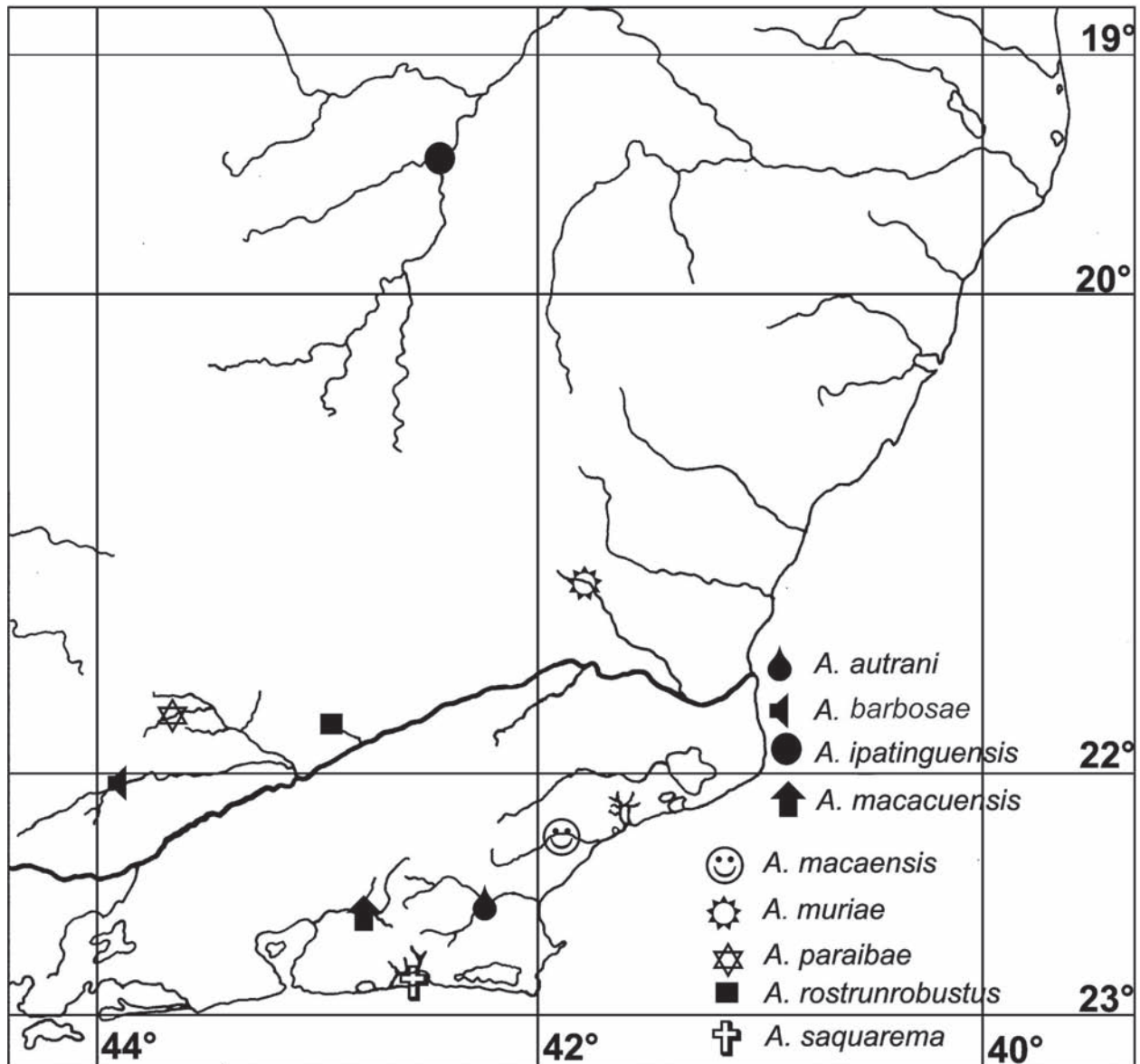


Fig. 5. Map of distribution from *Australoheros autrani*, *Australoheros barbosa*, *Australoheros ipatinguensis*, *Australoheros macacuensis*, *Australoheros macaensis*, *Australoheros muriae*, *Australoheros paraibae*, *Australoheros robustus* and *Australoheros saquarema*.

Side of head with three vertical brown bars, all continuous; vertical head bar 1 on post-orbital region, close to eye, vertical head bars 2–3 on supra-orbital zone, between the orbits; vertical head bar 2 on posterior orbital margin touching vertical bar 1 just above preopercle; vertical head bar 3 curved and directed to snout. Head darker than trunk, especially on dorsal part between vertical head bars 2–3.

Dorsal fin light brown, slightly invaded by dark brown trunk bars, more evident in vertical trunk bar 5. Anal fin color pattern similar to dorsal fin. Caudal fin light brown, darker near caudal peduncle. Pectoral fins light brown, pelvic fins darker.

Coloration in vivo (Fig.1). Side of body varies from a light brown to dark brown, to yellowish brown, or

to greenish brown; seven dark brown vertical trunk bars often changing from light brown to greenish brown, bluish brown, or to black. Three black spots. Small narrow black spot on end of dorsal-fin base. Small red spots usually on flank above horizontal stripe. Blue iridescence usually on flank, especially on margins of vertical trunk bars and spots, more concentrated near horizontal stripe. Darkness of bars strongly and quickly changing. Usually bars lighter than longitudinal stripe, rarely being with same color. Darkness of spots slightly changing.

Side of head varies from light brown, to darker brown, yellowish or greenish brown; three bars with same coloration as vertical trunk bars. Darker similar coloration between vertical head bars 1–2 and between snout and eyes. Eyes not crossed by horizontal



Fig. 6. *Australoheros barbosa* n. spec.; holotype, UFRJ 59.3 mm SL; Brazil: rio Paraíba do Sul basin: rio Preto.

stripe or vertical head bars, with black ring that often changes to red in iris.

Dorsal fin yellowish to brownish hyaline, invaded by trunk vertical bars, with blue iridescence on distal margin and often with small pale red spots. Anal fin with same coloration as dorsal fin. Caudal fin yellowish to brownish hyaline, with blue bar on posterior margin. Pelvic fin brown, darker near spine. Pectoral fin hyaline.

Distribution. Rio São João basin, Silva Jardim, Estado do Rio de Janeiro, southeastern Brazil (Fig. 5).

Etymology. The name *autrani*, in honor of Felipe Auran, who first studied this new species.

Australoheros barbosa, new species

(Fig. 6)

Holotype. UFRJ 7558, 59.3 mm SL; Brazil: Estado de Minas Gerais: between Município de Passa Vinte and Santa Rita da Jacutinga: tributary from rio Bananal, rio Preto basin, 24 km from Passa Vinte, street between Passa Vinte and Santa Rita da Jacutinga; C. MOREIRA, 02. May. 1997.

Paratypes. Brazil: Estado de Minas Gerais: between Município de Passa Vinte and Santa Rita da Jacutinga: UFRJ 4092, 10, 24.9–65.3 mm SL, collected with holotype; UFRJ 7561, 4 C&S, 35.3–46.8 mm SL, col-

lected with holotype; and MCP 42368, 2, 40.1–59.8 mm SL, collected with holotype; Estado do Rio de Janeiro: MNRJ 19640, 1, 96.2 mm SL; Município Falcão, rio Preto; M.R.S. MELO, A.T. ARANDA & R.S. MENDES.

Diagnosis. *Australoheros barbosa* differs from *A. kaaygua*, *A. macacuensis*, *A. paraiba*, *A. scitulus*, *A. tembe*, *A. macaensis*, *A. robustus*, *A. ribeirae*, *A. charrua*, *A. guarani*, *A. minuano*, *A. forquilha* and *A. facetus* by having more anal-fin rays (9–10 in *A. barbosa* vs. 6–7 in *A. kaaygua*; 7–8 in *A. robustus*, *A. guarani* and *A. charrua*; 8 in *A. ribeirae*; 8–9 in *A. minuano*, *A. macacuensis*, *A. paraiba* and *A. macaensis*; 6–8 in *A. scitulus*; 7–9 in *A. tembe*, *A. forquilha* and *A. facetus*). It is distinguished from *A. facetus*, *A. kaaygua*, *A. tembe*, *A. forquilha*, *A. guarani*, *A. minuano* e *A. charrua* by having fewer caudal vertebrae (12 in *A. barbosa* vs. 13 in *A. guarani* and *A. minuano*; 13–14 in *A. kaaygua*, *A. tembe*, *A. charrua* and *A. facetus*; and 13–15 in *A. forquilha*) and from *A. scitulus* and *A. forquilha* by having no mark on side of head (vs. dark marks below the orbit in *A. forquilha* and dark marks on opercle in *A. scitulus*). *Australoheros barbosa* differs from *A. ipatinguensis*, *A. muriae* and *A. robustus* by the number of dorsal-fin spines (16 in *A. barbosa* vs. 15 in *A. ipatinguensis* and *A. muriae*; and 17 in *A. robustus*); from *A. robustus*, *A. ribeirae* and *A. muriae* by the number of dorsal-fin rays (10–11 in *A. barbosa* vs. 8–9 in *A. robustus*, 9–10 in *A. ribeirae* and 11–12 in *A. muriae*) and from *A. robustus* the common snout of *Australoheros* (vs. robust snout) (Fig. 2). It differs from *A. paraiba* and *A. robustus* by having more pectoral rays (14–15 vs. 13–14). The new spe-

cies is distinguished from *A. autrani*, *A. ipatinguensis*, *A. paraibae*, *A. saquarema*, and *A. robustus* by the number of rib pairs (11 in *A. barbosa* vs. 10 *A. autrani*, *A. saquarema*, *A. paraibae* and *A. ipatinguensis*; 9–10 in *A. robustus* and 12 in *A. facetus*). It differs from *A. saquarema* and *A. macaensis* by having no depression on head (vs. depression present in specimens over 30.0 mm SL); and from *A. saquarema* by having fewer scales on upper lateral line row (15–17 vs. 17–18) and the number of proximal radials on anal-fin base (13–14 vs. 11–13 14–15).

Australoheros barbosa is distinguished from *A. ipatinguensis* and *A. ribeirae* by having a wide ectopterygoid (vs. narrow) (Fig. 3); from *A. facetus* by having arm of epibranchial 1 long (vs. short) (Fig. 4); from *A. autrani*, *A. muriae*, *A. macaensis*, *A. macacuensis* and *A. saquarema* by having arms of epibranchial 2 with two short tubular processes (vs. long) (Fig. 4). The new species also differs from *A. macaensis* by having a taller pre-orbital depth (60.5–65.3 % HL vs. 55.8–58.8 % HL) and differs from *A. macacuensis* by having arms of vertical trunk bar 7 with the same width (vs. posterior one wider).

Description. Morphometric data are summarized in Table 1b, meristic data in Table 2b. Dorsal profile slightly convex from snout to caudal peduncle origin, leaner between snout and dorsal-fin origin. Ventral profile slightly convex from snout to caudal peduncle origin. Caudal peduncle ventrally and dorsally approximately straight. Body profile moderately elongate, laterally compressed. Lower jaw slightly shorter than upper one. Jaw teeth caniniform. Teeth hyaline to red at tip. Opercle not serrate.

Dorsal fin rounded in anterior portion to pointed in posterior region. Tip of dorsal fin reaching vertical through middle of caudal fin. Anal fin rounded anteriorly, pointed posteriorly. Tip of anal fin reaching vertical through middle of caudal fin. Caudal fin long, subtruncate. Pectoral fins pointed. Pectoral-fin base on vertical through dorsal-fin origin. Tip of pectoral fin reaching vertical through trunk bar 4. Pelvic fin pointed. Pelvic-fin base on vertical through third spine of dorsal fin. Tip of pelvic fin reaching vertical through second spine of anal fin. Trunk and caudal peduncle covered with ctenoid scales. Head covered with cycloid scales.

Epibranchial 2 with two short tubular processes (Fig. 4), anterior arm of epibranchial 1 long (Fig. 4) and wide ectopterygoid (Fig. 3).

Coloration in alcohol (Fig. 6). Side of body light brown with seven dark brown vertical bars between posterior end of caudal peduncle and posterior margin of opercle, all continuous, except vertical trunk bars 6 and 7 which are interrupted above horizon-

tal stripe. Vertical trunk bars 2–4 dorsally inclined posteriorly. Vertical trunk bar 5 horizontally connected to vertical trunk bar 6, just above upper lateral line. Vertical trunk bar 6 usually interrupted between horizontal stripe and upper lateral line. Vertical trunk bar 7 forked, y-shaped, with anterior arm more inclined than posterior one; bar interrupted between horizontal stripe and fork. Three dark spots: first spot on caudal peduncle zone, through lower lateral line; second one on junction between horizontal stripe and vertical trunk bar 4; third spot on posterior margin of opercle and horizontal stripe. Brown interrupted horizontal stripe from trunk vertical bar 1 to preopercle, lighter and inconspicuous between vertical trunk bars 1–4, darker between vertical trunk bar 4 and vertical head bar 1, to much darker when crossing vertical trunk bars 5–6, having appearance of two dark spots.

Side of head with three vertical brown bars, all continuous; vertical head bar 1 on post-orbital region, close to eye, vertical head bars 2–3 on supra-orbital zone, between the orbits; vertical head bar 2 on posterior orbital margin touching vertical bar 1 just above preopercle; vertical head bar 3 curved and directed to snout. Head darker than trunk, especially on dorsal part between vertical head bars 2–3.

Dorsal fin light brown, slightly invaded by dark brown trunk bars, more evident in vertical trunk bar 5. Anal fin color pattern similar to dorsal fin. Caudal fin light brown, darker near caudal peduncle. Pectoral fins light brown, pelvic fins darker.

Distribution. Rio Preto, rio Paraíba do Sul basin, Minas Gerais, Brazil (Fig. 5).

Etymology. The name *barbosa*, in honor to the Zoologist Maria Anais Barbosa, who helped in the field and laboratory work.

Australoheros ipatinguensis, new species

(Fig. 7)

Holotype. UFRJ 7553, 53.5 mm SL; Brazil: Estado de Minas Gerais: Município de Ipatinga: córrego Braúna, rio Doce basin; W. COSTA, 28. Mar. 1990.

Paratypes. Brazil: Estado de Minas Gerais: Município de Ipatinga: UFRJ 7551, 3 C&S, 26.4–34.3 mm SL, collected with holotype; UFRJ 0035, 3, 24.2–44.5 mm SL, collected with holotype; MCP 42369, 3, 27.0–43.3 mm SL, tributary of rio Doce; W. COSTA, M. MELGAÇO & C. BIZERRIL, Mar. 1990; UFRJ 0486,



Fig. 7. *Australoheros ipatinguensis* n. spec.; holotype, UFRJ 7553, 53.5 mm SL; Brazil: Minas Gerais: rio Doce basin.

5, 19.6–41.2 mm SL, lago Tiririca, rio Doce basin; W. COSTA, C. BIZERRIL & M. MELGAÇO, Mar. 1990.

Diagnosis. *Australoheros ipatinguensis* is distinguished from *A. facetus*, *A. kaaygua*, *A. tembe*, *A. forquilha*, *A. guarani*, *A. minuano* and *A. charrua* by having fewer caudal vertebrae (12 in *A. ipatinguensis* vs. 13 in *A. guarani* and *A. minuano*; 13–14 in *A. kaaygua*, *A. tembe*, *A. charrua* and *A. facetus*; and 13–15 in *A. forquilha*). It is distinguished from *A. scitulus* and *A. forquilha* by having no mark on side of head (vs. dark marks below the orbit in *A. forquilha* and dark marks on opercle in *A. scitulus*). *Australoheros ipatinguensis* differs from *A. barbosa*, *A. macaensis*, *A. saquarema*, *A. macacuensis*, *A. ribeirae* and *A. robustus* by having fewer dorsal-fin spines (15 in *A. ipatinguensis* vs. 16 in *A. barbosa*, *A. macacuensis*, *A. macaensis*, *A. ribeirae* and *A. saquarema*; and 17 in *A. robustus*) and from *A. muriae*, *A. ribeirae* and *A. robustus* by the number of dorsal-fin rays (10–11 in *A. ipatinguensis* vs. 8–9 in *A. robustus*, 9–10 in *A. ribeirae* and 11–12 in *A. muriae*). The new species differs from *A. robustus* and *A. ribeirae* by having more anal-fin rays (9 vs. 7–8 in *A. robustus* and 8 in *A. ribeirae*) and from *A. robustus* by having the common snout of *Australoheros* (vs. robust snout) (Fig. 2). It is distinguished from *A. austrani* and *A. saquarema* by having fewer proximal radials on dorsal-fin base (24–25 vs. 25–26), differs from *A. facetus*, *A. barbosa*, *A. paraibae*, *A. macaensis*, *A. macacuensis*, *A. robustus*, *A. austrani* and *A. saquarema* by having a narrow ectopterygoid (vs. wide ectopterygoid) (Fig. 3), from *A. saquarema* and *A. macaensis* by having no depression on head (vs. depression present in specimens over 30.0 mm SL), and from *A. saquarema* by having

fewer proximal radial on anal-fin base (13 vs. 14–15). *Australoheros ipatinguensis* is distinguished from *A. facetus* by having arm of epibranchial 1 long (vs. short) (Fig. 4), from *A. austrani*, *A. muriae*, *A. macaensis*, *A. macacuensis* and *A. saquarema* by having arms of epibranchial 2 with two short tubular processes (vs. long) (Fig. 4). The new species is distinguished from *A. barbosa* and *A. macaensis* by having fewer rib pairs (10 vs. 11), and differs from *A. paraibae* and *A. barbosa* by having fewer scales in longitudinal row (25–26 in *A. ipatinguensis* vs. 27–28 in *A. barbosa* and 26–28 in *A. paraibae*) and from *A. paraibae* by having a taller body (body depth 47.3–51.2 % SL vs. 42.6–46.1 % SL), a longer last dorsal-fin spine (last dorsal-fin spine length 14.2–16.6 % SL vs. 11.9–13.5 % SL) and a longer last anal-fin spine (last anal-fin spine length 14.3–15.6 % SL vs. 12.2–13.3 % SL). Also differs from *A. macacuensis* by having arms of trunk vertical bar 7 with the same width (vs. posterior one wider).

Description. Morphometric data are summarized in Table 1b, meristic data in Table 2b. Dorsal profile slightly convex from snout to caudal peduncle origin, leaner between snout and dorsal-fin origin. Ventral profile slightly convex from snout to caudal peduncle origin. Caudal peduncle ventrally and dorsally approximately straight. Body profile moderately elongate, laterally compressed. Lower jaw slightly shorter than upper one. Jaw teeth caniniform. Teeth hyaline, red at tip. Opercle not serrate.

Dorsal fin rounded in anterior portion, pointed in posterior region. Tip of dorsal fin reaching vertical through middle of caudal fin. Anal fin rounded anteriorly, pointed posteriorly. Tip of anal fin reaching

vertical through middle of caudal fin. Caudal fin long, subtruncate. Pectoral fins pointed. Pectoral-fin base on vertical through dorsal-fin origin. Tip of pectoral fin reaching vertical through trunk bar 4. Pelvic fin pointed. Pelvic-fin base on vertical through third spine of dorsal fin. Tip of pelvic fin reaching vertical through second spine of anal fin. Scales of trunk and caudal peduncle ctenoid. Scales cycloid on side of head.

Epibranchial 2 with two short tubular processes (Fig. 4), anterior arm of epibranchial 1 long (Fig. 4) and narrow ectopterygoid (Fig. 3).

Coloration in alcohol (Fig. 7). Side of body light brown with seven vertical dark brown bars between posterior limit of caudal peduncle and posterior margin of opercle, all continuous; vertical trunk bars 6 and 7 are interrupted above longitudinal stripe. Vertical trunk bars 2–4 dorsally inclined posteriorly, feature more evident in vertical trunk bars 3–4. Vertical trunk bar 5 forked dorsally, and usually diagonally connected to vertical trunk bar 6 (sometimes this fork is not so clear because of the preservation of the material), just above upper lateral line. Vertical trunk bar 6 usually interrupted between longitudinal stripe and upper lateral line. Vertical trunk bar 7 not forked dorsally and interrupted just above longitudinal stripe. Vertical trunk bar 1 with the shape of an arc. In a few specimens the bar pattern follow the species cited below. Three dark spots: first spot on caudal peduncle zone, through lower lateral line; second one on junction between longitudinal stripe and vertical trunk bar 4; third spot on posterior margin of opercle and longitudinal stripe. Brown interrupted longitudinal stripe from vertical trunk bar 1 to preopercle, lighter and inconspicuous between vertical trunk bars 1–4, darker between vertical trunk bar 4 and head vertical bar 1, to much darker when crossing vertical trunk bars 5–6.

Side of head with three vertical brown bars, all continuous; vertical head bar 1 on post-orbital region, close to eye, vertical head bars 2–3 on supra-orbital zone, between the eyes; vertical head bar 2 on posterior orbital margin touching vertical head bar 1 just above preopercle; vertical head bar 3 curved and directed to snout. Head darker than trunk, especially on dorsal part between vertical head bars 2–3.

Dorsal fin light brown, slightly invaded by dark brown vertical trunk bars, more intensive in vertical trunk bar 5. Anal fin color pattern similar to dorsal fin. Caudal fin light brown, darker near caudal peduncle. Pectoral fins light brown, pelvic fins darker.

Distribution. Rio Doce basin, Minas Gerais State, Brazil (Fig. 5).

Etymology. Named *ipatinguensis* in reference to the city where the new species was collected.

Australoheros macacuensis, new species

(Fig. 8)

Holotype. UFRJ 7254, 67.0 mm SL: 7203 Brazil: Estado do Rio de Janeiro: Município de Cachoeiras de Macacu: rio Japuiba; W.J.E.M. COSTA, E. ARAÚJO & R. CUNHA, 13. Jun. 2001.

Paratypes. UFRJ 5344, 8, 22.3–83.2 mm SL; collected with holotype; UFRJ 5315, 8, 19.7–57.1 mm SL; rio Japuiba; ichthyology class 2001/1, 25. May 2001; UFRJ 7244, 3 C&S, 40.1–45.0 mm SL; rio Japuiba; ichthyology class 2001/1, 25. May 2001; MCP 42365, 1, 56.9 mm SL; tributary of rio Guapi-Açu, rio Macacu basin, 3 km from RJ-112, Cachoeiras de Macacu, RJ; M. BRITTO, C. MOREIRA, F. PUPO & D. ALMEIDA, 29. Jan. 1998; and MNRJ 14878, 7, 17.3–44.9 mm SL; rio Rabelo, rio Macacu basin, Friburgo-Parada Modelo street; 29. May 1983; Município de Guapimirim: MNRJ 20298, 1, 46.4 mm SL; rio Paraíso, rio Macacu basin, street on Paraíso; M.R.S. MELO, A.T. ARANDA & R.S. MENDES, 25. Apr. 2000; MNRJ 18092, 1, 68.1 mm SL; rio Paraíso near the street of Fazenda do Iguacu; P.A. BUCKUP, F.A.G. MELO & M.R.S. MELO, 10. Dec. 1998; and MNRJ 20278, 1, 65.0 mm SL; rio Icomba, between Guapimirim and RJ-122; M.R.S. MELO, A.T. ARANDA & F.A.S. MELO, 25. Apr. 2000.

Diagnosis. *Australoheros macacuensis* is distinguished from *A. facetus*, *A. kaaygua*, *A. tembe*, *A. forquilha*, *A. guarani*, *A. minuano* and *A. charrua* by having fewer caudal vertebrae (12 in *A. macacuensis* vs. 13 in *A. guarani* and *A. minuano*; 13–14 in *A. kaaygua*, *A. tembe*, *A. charrua* and *A. facetus*; and 13–15 in *A. forquilha*). It is distinguished from *A. scitulus* and *A. forquilha* by having no mark on side of head (vs. dark marks below the orbit in *A. forquilha* and dark marks on opercle in *A. scitulus*). The new species differs from *A. autrani*, *A. saquarema*, *A. macaensis*, *A. barbosa*, *A. paraibae*, *A. ipatinguensis*, *A. muriae*, *A. ribeirae* and *A. robustus* by having posterior arm of trunk vertical bar 7 wider than anterior one (vs. arms with same width) and is distinguished from *A. ipatinguensis*, *A. muriae* and *A. robustus* by the number of dorsal-fin spines (16 in *A. macacuensis* vs. 15 in *A. ipatinguensis* and *A. muriae*; and 17 in *A. robustus*). It differs from *A. robustus* by having more dorsal-fin rays (10–11 in *A. macacuensis* vs. 8–9 in *A. robustus* and 9–10 in *A. ribeirae*) and from *A. robustus* by having more rib pairs (10–11 vs. 9–10) and the common snout of *Australoheros* (vs. a robust snout) (Fig. 2). It differs from *A. autrani*, *A. barbosa* and *A. muriae* by having fewer anal-fin rays (8–9 vs. 9–10). *Australoheros macacuensis* is distinguished from *A.*



Fig. 8. *Australoheros macacuensis* n. spec., specimen not preserved; Brazil: Rio de Janeiro: rio Macacu basin.

autrani and *A. saquarema* by having fewer proximal radials on dorsal-fin base (24–25 vs. 25–26). It differs from *A. saquarema* and *A. macaensis* by having no depression on head (vs. depression present in specimens over 30.0 mm SL), from *A. saquarema* by having fewer proximal radial on anal-fin base (13 vs. 14–15), and from *A. macaensis* by having a higher pré-orbital depth (62.2–65.3 % HL vs. 55.8–58.8 % HL) and fewer interorbital width (37.2–41.1 % HL vs. 43.9–47.9 % HL). It is distinguished from *A. ipatinguensis* and *A. ribeirae* by having a wide ectopterygoid (vs. narrow) (Fig. 3), from *A. barbosa*, *A. paraibae* and *A. ipatinguensis* by having arms of epibranchial 2 with two long tubular processes (vs. short) (Fig. 4) and from *A. facetus* by having arm of epibranchial 1 long (vs. short). *Australoheros macacuensis* differs from *A. paraibae* by having a taller body (body depth 46.6–49.8 % SL vs. 42.6–46.1 % SL) and a longer last anal-fin spine (last anal-fin spine length 13.8–16.5 % SL vs. 12.2–13.3 % SL).

Description. Morphometric data are summarized in Table 1a, meristic data in Table 2a. Dorsal profile slightly convex from snout to caudal peduncle origin, leaner between snout and dorsal-fin origin. Ventral profile slightly convex from snout to caudal peduncle origin. Caudal peduncle approximately straight ventrally and dorsally. Body profile moderately elongate, laterally compressed. Lower jaw slightly shorter than upper one. Jaw teeth caniniform. Teeth hyaline, red at tip. Opercle not serrate. Urogenital papila externally visible, rounded, with projection, not sexually dimorphic.

Dorsal fin rounded in anterior portion to pointed in posterior region. Tip of dorsal fin reaching verti-

cal through middle of caudal fin. Anal fin rounded anteriorly, pointed posteriorly. Tip of anal fin reaching vertical through middle of caudal fin. Caudal fin long, subtruncate. Pectoral fins pointed. Pectoral fin base on vertical through dorsal-fin origin. Tip of pectoral-fin reaching vertical through trunk bar 4. Pelvic fin pointed. Pelvic fin base on vertical through third spine of dorsal fin. Tip of pelvic fin reaching vertical through second spine of anal fin. Trunk and caudal peduncle covered with ctenoid scales. Cycloid scales on opercle and preopercle.

Epibranchial 2 with two long tubular processes (Fig. 4), anterior arm of epibranchial 1 long (Fig. 4) and with wide ectopterygoid (Fig. 3).

Coloration in alcohol. Side of body light brown with seven dark brown vertical bars between posterior end of caudal peduncle and posterior margin of opercle, all continuous, except vertical trunk bars 6 and 7 are interrupted above horizontal stripe. Vertical trunk bars 2–4 dorsally inclined posteriorly. Vertical trunk bar 5 horizontally connected to trunk vertical bar 6, just above upper lateral line. Vertical trunk bar 6 usually interrupted between horizontal stripe and upper lateral line. Vertical trunk bar 7 forked, y-shape with anterior arm more inclined than posterior one; bar interrupted between horizontal stripe and fork. Posterior arm of vertical trunk bar 7 wider than anterior one. Three dark spots: first on caudal peduncle zone, through lower lateral line; second one on junction between horizontal stripe and vertical trunk bar 4; third spot on posterior margin of opercle and horizontal stripe. Brown interrupted horizontal stripe from vertical trunk bar 1 to preopercle, lighter and inconspicuous between vertical

trunk bars 1–4, darker between vertical trunk bar 4 and vertical head bar 1, much darker when crossing vertical trunk bars 5–6, appearance of two dark spots.

Side of head with three brown vertical bars, all continuous; vertical head bar 1 in post-orbital region, close to eye, vertical head bars 2–3 in supra-orbital zone, between the orbits; vertical head bar 2 on posterior orbital margin touching vertical bar 1 just above preopercle; vertical head bar 3 curved and directed to snout. Head darker than trunk, especially on dorsal part between vertical head bars 2–3.

Dorsal fin light brown, slightly invaded by dark brown trunk bars, more evident in vertical trunk bar 5. Anal fin color pattern similar to dorsal fin. Caudal fin light brown, darker near caudal peduncle. Pectoral fins light brown, pelvic fins darker.

Coloration in vivo (Fig. 8). Side of body varies from a light brown to a dark brown, to a yellowish or to a greenish brown; seven dark brown vertical bars often changing from light brown, to greenish brown, or to black. Posterior arm of vertical trunk bar 7 wider than anterior one. Three black spots. Golden and green iridescence usually on flank, especially on margins of vertical trunk bars and spots, more conspicuous near horizontal stripe. Darkness of vertical bars strongly and quickly changing. Usually vertical bars lighter than horizontal stripe, rarely being same color. Darkness of spots slightly changing.

Side of head varies from a light brown to a dark brown, to a yellowish or to a greenish brown; three vertical bars with the same coloration as vertical trunk bars. Darker similar coloration between vertical head bars 1–2, and between snout and eyes. Eyes not crossed by horizontal stripe and vertical bars, with black ring that often change to red in iris. Yellowish and greenish iridescence always under the eyes, on opercle and between vertical trunk bar 7 and eyes (on this region the iridescence is more concentrated).

Dorsal fin yellowish to brownish with green and golden iridescence on entire fin, invaded by trunk vertical bars. Anal fin with same coloration as dorsal fin. Caudal fin brownish to yellowish, with golden and green iridescence on entire fin, with dark brown bar on posterior margin. Pelvic fin black. Pectoral fin hyaline.

Distribution. Rio Macacu basin, Cachoeiras de Macacu and Guapimirim, Estado do Rio de Janeiro, southeastern Brazil (Fig. 5).

Etymology. Named *macacuensis* in reference to the river basin where the new species was collected.

Australoheros macaensis, new species

(Fig. 9)

Holotype. UFRJ 7573, 66.8 mm SL; Brazil: Estado do Rio de Janeiro: Município de Macaé: rio dos Quarenta, BR-101 (S 22° 13,13' / W 41° 45,580'); F. P. OTTONI, F. LEAL & J. MATTOS, 24. Aug. 2007.

Paratypes. Brazil: Estado do Rio de Janeiro: Município de Macaé: UFRJ 7568, 8, 47.7–73.7 mm SL, collected with holotype; MTD F 31320, 3, 30.6–65.1 mm SL, rio dos Quarenta, BR-101 (S 22° 13,13' / W 41° 45,580'); F. P. OTTONI, A. BARBOSA & J. MATTOS, 29. Oct. 2007; UFRJ 7569, 4 C&S, 34.5–43.6 mm SL, collected with holotype; UFRJ 7593, 6, 24.7–46.2 mm SL, Reserva União (S 22° 25,593' / W 42° 02,352'); F. P. OTTONI, A. BARBOSA & J. MATTOS, 29. Oct. 2007; and MCP 42403, 2, 30.6–41.7 mm SL, Reserva União (S 22° 25,593' / W 42° 02,352'); F. P. OTTONI, A. BARBOSA & J. MATTOS, 29. Oct. 2007.

Diagnosis. *Australoheros macaensis* is distinguished from *A. facetus*, *A. kaaygua*, *A. tembe*, *A. forquilha*, *A. guarani*, *A. minuano* and *A. charrua* by having fewer caudal vertebrae (12 in *A. macaensis* vs. 13 in *A. guarani* and *A. minuano*; 13–14 in *A. kaaygua*, *A. tembe*, *A. charrua* and *A. facetus*; and 13–15 in *A. forquilha*). It distinguished from *A. scitulus* and *A. forquilha* by having no mark on side of head (vs. dark marks below the orbit in *A. forquilha* and dark marks on opercle in *A. scitulus*) and from *A. macacuensis*, *A. facetus*, *A. ipatinguensis*, *A. robustus*, *A. ribeirae*, *A. austrani*, *A. barbosa*, *A. paraibae* and *A. muriae* by having head with a depression near the snout in individuals above 30.0 mm SL (vs. head without depression). The new species is distinguished from *A. ipatinguensis* and *A. ribeirae* by having a wide ectopterygoid (vs. narrow) (Fig. 3), from *A. barbosa*, *A. paraibae* and *A. ipatinguensis* by having arms of epibranchial 2 with two long tubular processes (vs. short) (Fig. 4) and from *A. facetus* by having arm of epibranchial 1 long (vs. short). It differs from *A. saquarema* by having fewer proximal radials on anal-fin base (13–14 vs. 14–15), and from *A. macacuensis* by having a higher pre-orbital depth (55.8–58.8 % HL vs. 62.2–65.3 % HL), less interorbital width (43.9–47.9 % HL vs. 37.2–41.1 % HL) and arms of vertical trunk bar 7 with the same width (vs. posterior one wider). *Australoheros macaensis* is distinguished from *A. ipatinguensis*, *A. muriae* and *A. robustus* by the number of dorsal-fin spines (16 in *A. macaensis* vs. 15 in *A. muriae* and *A. ipatinguensis*; 17 in *A. robustus*). The new species differs from *A. robustus* and *A. ribeirae* by having more dorsal-fin rays (10–11 in *A. macaensis* vs. 8–9 in *A.*



Fig. 9. *Australoheros macaensis* n. spec., paratype, UFRJ 7592, 65.1 mm SL; Brazil: Rio de Janeiro: rio Macaé basin.

robustus and 9–10 in *A. ribeirae*) and differs from *A. robustus* by having more proximal radial on dorsal-fin base (25 vs. 24), more scales on lower lateral line row (8–10 vs. 7–8) and the common snout of *Australoheros* (vs. a robust snout). The new species is distinguished from *A. robustus*, *A. muriae*, *A. barbosa*, *A. ribeirae* and *A. austrani* by the number of anal-fin rays (8–9 in *A. macaensis* vs. 7–8 in *A. robustus*; 8 in *A. ribeirae*; 9–10 in *A. austrani*, *A. barbosa* and *A. muriae*), from *A. austrani*, *A. ipatinguensis*, *A. paraibae*, *A. saquarema* and *A. robustus* by having more rib pairs (11 in *A. macaensis* vs. 9–10 in *A. robustus*; 10 in *A. austrani*, *A. ipatinguensis*, *A. paraibae* and *A. saquarema*), and from *A. barbosa* and *A. paraibae* by having a smaller pre-orbital depth (55.8–58.8 % HL in *A. macaensis* vs. 60.5–65.3 % HL in *A. barbosa* and 60.4–65.2 % SL in *A. paraibae*).

Description. Morphometric data are summarized in Table 1c, meristic data in Table 2a. Dorsal profile slightly convex from snout to caudal peduncle origin, leaner between snout and dorsal-fin origin. Ventral profile slightly convex from snout to caudal peduncle origin. Caudal peduncle approximately straight ventrally and dorsally. Body profile moderately elongate, laterally compressed. Head with a depression near the snout in individuals above 30.0 mm SL. Lower jaw slightly shorter than upper one. Jaw teeth caniniform. Teeth hyaline, red at tip. Opercle not serrated.

Dorsal fin rounded in anterior portion to pointed on posterior region. Tip of dorsal fin reaching vertical through middle of caudal fin. Anal fin rounded anteriorly, pointed posteriorly. Tip of anal fin reaching vertical through middle of caudal fin. Caudal fin long,

subtruncate. Pectoral fins pointed. Pectoral fin base on vertical through third spine of dorsal-fin. Tip of pectoral-fin reaching vertical through bar 4 of trunk. Pelvic fin pointed. Pelvic fin base on vertical through fourth spine of dorsal fin. Tip of pelvic fin reaching vertical through second spine of anal fin. Trunk and caudal peduncle covered with ctenoid scales. Head covered with cycloid scales.

Epibranchial 2 with two long tubular processes (Fig. 4), anterior arm of epibranchial 1 long (Fig. 4) and wide ectopterygoid (Fig. 3).

Coloration in alcohol. Side of body light brown with seven dark brown vertical bars between posterior limit of caudal peduncle and posterior margin of opercle, all continuous, except vertical trunk bars 6 and 7 are interrupted above horizontal stripe. Vertical trunk bars 2–4 dorsally inclined posteriorly. Vertical trunk bar 5 horizontally connected with vertical trunk bar 6, just above upper lateral line. Vertical trunk bar 6 usually interrupted between horizontal stripe and upper lateral line. Vertical trunk bar 7 forked, y-shapee, with anterior arm more inclined than posterior one; bar interrupted between horizontal stripe and fork. Three dark spots: first spot on caudal peduncle zone, through lower lateral line; second one on junction between horizontal stripe and vertical trunk bar 4; third spot on posterior margin of opercle and horizontal stripe. Brown interrupted horizontal stripe from vertical trunk bar 1 to preopercle, lighter and inconspicuous between vertical trunk bars 1–4, darker between vertical trunk bar 4 and vertical head bar 1, much darker when crossing vertical trunk bars 5–6, having appearance of two dark spots.

Side of head with three vertical brown bars, all continuous; vertical head bar 1 on post-orbital region, close to eye, head vertical bars 2–3 in supra-orbital zone, between the orbits; vertical head bar 2 on posterior orbital margin touching vertical bar 1 just above preopercle; vertical head bar 3 curved and directed to snout. Head darker than trunk, especially on dorsal part between vertical head bars 2–3.

Dorsal fin light brown, slightly invaded by dark brown trunk bars, more evident in vertical trunk bar 5. Anal fin color pattern similar to dorsal fin. Caudal fin light brown, darker near caudal peduncle. Pectoral fins light brown, pelvic fins darker.

Coloration in vivo (Fig.9). Side of body varies from a light brown to dark brown, to yellowish brown, or to greenish brown; seven dark brown vertical trunk bars often changing from light brown to black. Three black spots. Small red spots usually on flank above horizontal stripe. Blue or green iridescence usually on flank, more conspicuous near horizontal stripe. Darkness of bars strongly and quickly changing. Bars usually lighter than longitudinal stripe, rarely being same color. Darkness of spots slightly changing.

Side of head varies from light brown to darker brown, yellowish or greenish brown; three bars with same coloration as vertical trunk bars. Similar darker coloration between vertical head bars 1–2 and between snout and eyes. Eyes not crossed by horizontal stripe and vertical head bars, with black ring that often change to red or black on iris.

Margins of dorsal fin, anal fin and caudal fin with a bar that varies from a bluish to red or to black. Dorsal fin usually yellowish, brownish hyaline, or redish, invaded by vertical trunk bars, often with small pale red spots. Anal fin with same coloration as dorsal fin. Caudal fin with same coloration as dorsal fin. Pelvic fin brown or black, usually with blue iridescence on spine. Pectoral fin hyaline.

Distribution. Rio Macaé basin, southeastern Brazil (Fig. 5).

Etymology. Named *macaensis* in reference to the river basin where the new species was collected.

Australoheros muriae, new species

(Fig. 10)

Holotype. Rio de Janeiro: Itaperuna: MNRJ 32181, 121.3 mm SL; rio São Domingos, tributary from rio

Muriaé, rio Paraíba do Sul basin; D.F. MORAES JR. & D.H. HALBOTH, 29. Aug. 1989.

Paratypes. Rio de Janeiro: Itaperuna: MNRJ 16854, 1, 109.2 mm SL; collected with holotype; MNRJ 16780, 5, 1 C&S, 20.9–57.4 mm SL; rio Muriaé, rio Paraíba do Sul basin, near the crossing from BR 356 with RJ 186; D.F. MORAES JR. & D.H. HALBOTH, 23. Jan. 1990; MNRJ 16787, 5, 2 C&S, 23.2–46.1 mm SL; rio Muriaé, rio Paraíba do Sul basin, near the crossing from BR 356 with RJ 186; D.F. MORAES JR. & D.H. HALBOTH, 26. Mar. 1989; MNRJ 16814, 5, 47.1–65.8 mm SL, rio Muriaé, rio Paraíba do Sul basin, near the crossing from BR 356 with RJ 186; D.F. MORAES JR. & D.H. HALBOTH, 27. Mar. 1989; MNRJ 15505, 1 C&S, 50.1 mm SL; rio muriaé; D.A. HALBOTH & D.F. MORAES JR., 23. Jan. 1990; and MCP 42584, 1, 53.3 mm SL; rio Muriaé, rio Paraíba do Sul basin, near the crossing from BR 356 with RJ 186; D.F. MORAES JR. & D.H. HALBOTH, 23. Jan. 1990.

Diagnosis. *Australoheros muriae* is distinguished from *A. facetus*, *A. kaaygua*, *A. tembe*, *A. forquilha*, *A. guarani*, *A. minuano* and *A. charrua* by having fewer caudal vertebrae (12 in *A. muriae* vs. 13 in *A. guarani* and *A. minuano*; 13–14 in *A. kaaygua*, *A. tembe*, *A. charrua* and *A. facetus*; and 13–15 in *A. forquilha*). It is distinguished from *A. scitulus* and *A. forquilha* by having no mark on side of head (vs. dark marks below the orbit in *A. forquilha* and dark marks on opercle in *A. scitulus*). The new species differs from *A. barbosa*, *A. macacuensis*, *A. ribeirae*, *A. saquarema*, *A. macaensis* and *A. robustus* by having fewer dorsal-fin spines (15 in *A. muriae* vs. 16 in *A. barbosa*, *A. macacuensis*, *A. ribeirae*, *A. saquarema* and *A. macaensis*; and 17 in *A. robustus*) and from *A. paraibae* and *A. robustus* by having more pectoral-fin rays (14–15 vs. 13–14). It differs from *A. saquarema*, *A. macacuensis*, *A. macaensis*, *A. barbosa*, *A. paraibae*, *A. ribeirae*, *A. robustus* and *A. ipatinguensis* by having more dorsal-fin rays (11–12 in *A. muriae* vs. 8–9 in *A. robustus*; 9–10 in *A. ribeirae*; 10 in *A. paraibae*; 10–11 in *A. saquarema*, *A. macaensis*, *A. macacuensis*, *A. ipatinguensis* and *A. barbosa*) and from *A. macacuensis*, *A. paraibae*, *A. macaensis*, *A. ribeirae* and *A. robustus* by having more anal-fin rays (9–10 in *A. muriae* vs. 7–8 in *A. robustus*; 8 in *A. ribeirae*; 8–9 in *A. macacuensis*, *A. paraibae* and *A. macaensis*). *Australoheros muriae* differs from *A. autrani* by having fewer proximal radials on dorsal-fin base (24–25 vs. 25–26) and a shorter caudal peduncle (caudal peduncle length 10.2–11.9 % SL vs. 7.1–8.9 % SL). *Australoheros muriae* is distinguished from *A. ipatinguensis* by having more scales in longitudinal row (27–29 vs. 25–26) and from *A. ribeirae* and *A. ipatinguensis* by having a wide ectopterygoid (vs. narrow) (Fig. 3). The new species differs from *A. barbosa*, *A. paraibae* and *A. ipatinguensis* by having



Fig. 10. *Australoheros muriae* n. spec., holotype MNRJ 32181, 121.3 mm SL; Brazil: Rio de Janeiro: rio Paraíba do Sul basin: rio Muriaé basin.

arms of epibranchial 2 with two long tubular processes (*vs.* short) (Fig. 4) and from *A. facetus* by having arm of epibranchial 1 long (*vs.* short). It differs from *A. macacuensis* by having arms of trunk vertical bar 7 with the same width (*vs.* posterior one wider) from *A. macacuensis* and *A. saquarema* by having no depression on head (*vs.* depression present in specimens over 30.0 mm SL), and from *A. robustus* by having the common snout of *Australoheros* (*vs.* a robust snout) (Fig. 2).

Description. Morphometric data are summarized in Table 1c, meristic data in Table 2c. Dorsal profile slightly convex from snout to caudal peduncle origin. Ventral profile slightly convex from snout to caudal peduncle origin. Caudal peduncle approximately straight ventrally and dorsally. Body profile moderately elongate, laterally compressed. Lower jaw slightly shorter than upper one. Jaw teeth caniniform. Teeth hyaline, red at tip. Opercle not serrate.

Dorsal fin rounded, pointed on posterior region. Tip of dorsal fin reaching the middle or the end of caudal fin. Anal fin rounded anteriorly, pointed posteriorly. Tip of anal fin reaching the middle or the end of caudal fin. Caudal fin long, subtruncate. Pectoral fins pointed. Pectoral fin base on vertical through third spine of dorsal-fin. Tip of pectoral-fin reaching vertical through trunk bar 4 and beginning on 2nd dorsal spine. Pelvic fin pointed. Pelvic fin base on vertical through 3rd spine of dorsal fin. Tip of pelvic fin reaching the 2nd or the last anal fin spine. Trunk and caudal peduncle covered with ctenoid scales. Head covered with cycloid scales.

Epibranchial 2 with two long tubular processes (Fig. 4), anterior arm of epibranchial 1 long (Fig. 4); a wide ectopterygoid (Fig. 3).

Coloration in alcohol (Fig. 10). Side of body light brown with seven dark brown vertical bars between posterior end of caudal peduncle and posterior margin of opercle, all continuous, except vertical trunk bars 6 and 7 which are interrupted above horizontal stripe. Vertical trunk bars 2–4 dorsally inclined posteriorly. Vertical trunk bar 5 horizontally connected with vertical trunk bar 6, just above upper lateral line. Vertical trunk bar 6 usually interrupted between horizontal stripe and upper lateral line. Vertical trunk bar 7 forked, y-shaped, with anterior arm more inclined than posterior one; bar interrupted between horizontal stripe and fork. Three dark spots: first in caudal peduncle zone, through lower lateral line; second one on junction between horizontal stripe and vertical trunk bar 4; third spot on posterior margin of opercle and horizontal stripe. Brown interrupted horizontal stripe from vertical trunk bar 1 to preopercle, lighter and inconspicuous between vertical trunk bars 1–4, darker between vertical trunk bar 4 and vertical head bar 1, much darker when crossing vertical trunk bars 5–6, having appearance of two dark spots.

Side of head with three vertical brown bars, all continuous; vertical head bar 1 in post-orbital region, close to eye, vertical head bars 2–3 on supra-orbital zone, between the orbits; vertical head bar 2 on posterior orbital margin touching vertical bar 1 just above preopercle; vertical head bar 3 curved and directed to snout. Head darker than trunk, especially on dorsal part between vertical head bars 2–3.

Dorsal fin light brown, slightly invaded by dark brown trunk bars, more conspicuous in vertical trunk bar 5. Anal fin color pattern similar to dorsal fin. Caudal fin light brown, darker near caudal peduncle. Pectoral fins light brown, pelvic fins just darker.

Distribution. Rio Muriaé basin, rio Paraíba do Sul basin, southeastern Brazil (Fig. 5).

Etymology. Named *muriae* in reference to the river basin where the new species was collected.

Australoheros paraibae, new species

(Fig. 11)

Holotype. UFRJ 7559, 50.9 mm SL. Brasil: Estado de Minas Gerais: Município de Juiz de Fora: stream tributary to rio do Peixe, between Toledo and Torreões, F.A. BOCKMANN & P. ARAÚJO, 03. May. 1996.

Paratypes. Brazil: Estado de Minas Gerais: Município de Juiz de Fora: UFRJ 3589, 4, 33.1–61.1 mm SL, collected with holotype; MCP 42367, 2, 50.3–50.8, rio Monte Verde tributary to rio do Peixe, near Monte Verde, W. COSTA & G. SOUZA, 20. Aug. 1991 and UFRJ 7560, 4 C&S, 23.5–45.4 mm SL, collected with holotype. Município de Santa Bárbara do Monte Verde: UFRJ 3589, 1, 22.1, F. OTTONI, A. BARBOSA, J. PRATA & E. MATTOS, 20. Apr. 2006.

Diagnosis. *Australoheros paraibae* is distinguished from *A. facetus*, *A. kaaygua*, *A. tembe*, *A. forquilha*, *A. guarani*, *A. minuano* and *A. charrua* by having fewer caudal vertebrae (12 in *A. paraibae* vs. 13 in *A. guarani* and *A. minuano*; 13–14 in *A. kaaygua*, *A. tembe*, *A. charrua* and *A. facetus*; and 13–15 in *A. forquilha*). It is distinguished from *A. scitulus* and *A. forquilha* by having no mark on side of head (vs. dark marks below the orbit in *A. forquilha* and dark marks on opercle in *A. scitulus*), and from *A. macacuensis* by arms of trunk vertical bar 7 with the same width (vs. posterior one wider). The new species differs from *A. autrani*, *A. barbosa*, *A. muriae* and *A. robustus* by the number of anal-fin rays (8–9 in *A. paraibae* vs. 7–8 in *A. robustus*; 9–10 in *A. autrani*, *A. barbosa* and *A. muriae*), from *A. robustus* and *A. muriae* by the number of dorsal-fin rays (10 in *A. paraibae* vs. 8–9 in *A. robustus* and 11–12 in *A. muriae*), is distinguished from *A. robustus* by having fewer dorsal-fin spines (15–16 vs. 17), more proximal radials on dorsal-fin base (25 vs. 24) and the normal snout of *Australoheros* (vs. a robust snout) (Fig. 2). It differs from *A. barbosa* and *A. muriae* by having fewer pectoral-fin rays (13–14 vs. 14–15), and from *A. barbosa* and *A. macaensis* by having fewer rib pairs (10 vs. 11). *Australoheros paraibae* differs from *A. ipatinguensis* by having more scales in longitudinal row (26–28 vs. 25–26) and is distinguished from *A. ribeirae* by hav-

ing a wide ectopterygoid (vs. narrow) (Fig. 3). The new species differs from *A. facetus* by having arm of epibranchial 1 long (vs. short) (Fig. 4) and from *A. autrani*, *A. muriae*, *A. macaensis*, *A. macacuensis* and *A. saquarema* by having arms of epibranchial 2 with two short tubular processes (vs. long) (Fig. 4). Also differs from *A. saquarema* and *A. macaensis* by the pre-orbital length (60.4–65.2 % HL in *A. paraibae* vs. 55.8–58.8 % HL in *A. macaensis* and 60.0–69.1 % HL in *A. saquarema*) and by having no depression on head (vs. depression present in specimens over 30.0 mm SL). It differs from *A. saquarema* by having fewer proximal radials on anal-fin base (13–14 vs. 14–15) and fewer scales on upper lateral line row (16–17 vs. 17–18). The new species is distinguished from *A. ipatinguensis* and *A. macacuensis* by having a deeper body (body depth 42.6–46.1 % SL in *A. paraibae* vs. 47.3–51.2 % SL in *A. ipatinguensis* and 46.6–49.8 % SL in *A. macacuensis*) and from *A. autrani*, *A. ipatinguensis*, *A. saquarema* and *A. muriae* by having a shorter last dorsal-fin spine (last dorsal-fin spine length 11.9–13.5 % SL in *A. paraibae* vs. 13.9–16.9 % SL in *A. autrani*, 14.2–16.6 % SL in *A. ipatinguensis*, 15.5–17.4 % SL in *A. saquarema* and 14.0–17.3 % SL in *A. muriae*). The new species differs from *A. autrani*, *A. barbosa*, *A. macacuensis*, *A. ipatinguensis*, *A. saquarema*, *A. macaensis* and *A. muriae* by having a shorter last anal-fin spine (last anal-fin spine length 12.2–13.3 % mm SL in *A. paraibae* vs. 15.9–17.1 % SL in *A. autrani*, 13.8–15.9 % SL in *A. barbosa*, 13.8–16.5 % SL in *A. macacuensis*, 14.3–15.6 % SL in *A. ipatinguensis*, 15.9–17.1 % SL in *A. saquarema*, 13.6–17.1 % SL in *A. macaensis* and 14.3–17.0 % SL in *A. muriae*). *Australoheros paraibae* also differs from *A. autrani* by having a shorter peduncle caudal (peduncle caudal length 6.4–8.1 % SL vs. 10.2–11.9 % SL). *Australoheros paraibae* is distinguished from *A. ribeirae* by having more anal-fin spines (7–8 vs. 6–7) and fewer rib pairs (10 vs. 11).

Description. Morphometric data are summarized in Table 1b, meristic data in Table 2b. Dorsal profile slightly convex from snout to caudal peduncle origin, leaner between snout and dorsal-fin origin. Ventral profile slightly convex from snout to caudal peduncle origin. Caudal peduncle approximately straight ventrally and dorsally. Body profile moderately elongate, laterally compressed. Lower jaw slightly shorter than upper one. Jaw teeth caniniform. Teeth hyaline, red at tip. Opercle not serrate.

Dorsal fin rounded in anterior portion or pointed in posterior region. Tip of dorsal fin reaching vertical through middle of caudal fin. Anal fin rounded anteriorly, pointed posteriorly. Tip of anal fin reaching vertical through middle of caudal fin. Caudal fin long, subtruncate. Pectoral fins pointed. Pectoral-fin base



Fig. 11. *Australoheros paraibae* n. spec., holotype, UFRJ 50.9 mm SL; Brazil: rio Paraíba do Sul basin: rio do Peixe basin.

on vertical through dorsal-fin origin. Tip of pectoral fin reaching vertical through bar 4 of trunk. Pelvic fin pointed. Pelvic-fin base on vertical through third spine of dorsal fin. Tip of pelvic fin reaching vertical through second spine of anal fin. Trunk and caudal peduncle covered with ctenoid scales. Head covered with cycloid scales.

Epibranchial 2 with two short tubular processes (Fig. 4), anterior arm of epibranchial 1 long (Fig. 4); a wide ectopterygoid (Fig. 3).

Coloration in alcohol (Fig. 11). Side of body light brown with seven dark vertical brown bars between posterior limit of caudal peduncle and posterior margin of opercle, all continuous, vertical trunk bars 6 and 7 interrupted above longitudinal stripe. Vertical trunk bars 2–4 dorsally inclined posteriorly, this feature more evident in vertical trunk bars 3–4. Vertical trunk bar 5 forked dorsally, and usually connected diagonally with vertical trunk bar 6 (sometimes this fork is not so clear because of the preservation of the material), just above upper lateral line. Vertical trunk bar 6 usually interrupted between longitudinal stripe and upper lateral line. Vertical trunk bar 7 not forked dorsally and interrupted just above longitudinal stripe. Vertical trunk bar 1 with the shape of an arc. Three dark spots: first in caudal peduncle zone, through lower lateral line; second one on junction between longitudinal stripe and vertical trunk bar 4; third spot on posterior margin of opercle and longitudinal stripe. Brown interrupted longitudinal stripe from vertical trunk bar 1 to preopercle, lighter and inconspicuous between vertical trunk bars 1–4, darker between vertical trunk bar 4 and vertical head bar 1, much darker when crossing vertical trunk bars 5–6.

Side of head with three vertical brown bars, all continuous; vertical head bar 1 in post-orbital region, close to eye, vertical head bars 2–3 in supra-orbital zone, between the eyes; vertical head bar 2 on posterior orbital margin touching vertical head bar 1 just above preopercle; vertical head bar 3 curved and directed to snout. Head darker than trunk, especially on dorsal part between head vertical bars 2–3.

Dorsal fin light brown, slightly invaded by dark brown vertical trunk bars, more conspicuous in vertical trunk bar 5. Anal fin color pattern similar to dorsal fin. Caudal fin light brown, darker near caudal peduncle. Pectoral fins light brown, pelvic fins darker.

Distribution. Rio do Peixe, rio Paraíba do Sul basin, Município de Juiz de Fora, Minas Gerais, Brazil (Fig. 5).

Etymology. Named *paraibae* in reference to the river basin where the new species was collected.

Australoheros robustus, new species

(Fig. 12)

Holotype. Minas Gerais: Mar de Espanha: MNRI 32180, 74.5 mm SL; stream Cachoeirinha, tributary from córrego da Areia, rio Paraíba do Sul basin; D.F. MORAES, J.H.C. GOMES & T. AGUIARO, 03. Aug. 1990.

Paratypes. Minas Gerais: Mar de Espanha: MNRI 16470, 58, 4 C&S, 17.3–64.8 mm SL; collected with



Fig. 12. *Australoheros robustus* n. spec., holotype, MNRJ 32180, 74.5 mm SL; Brazil: rio Paraíba do Sul basin: córrego da areia basin.

holotype; MNRJ 13545, 7, 19.7–63.9 mm SL; tributary from córrego Lagoa, tributary from córrego da Areia, rio Paraíba do Sul basin; D.F. MORAES JR., J.H.P. GOMES & T. AGUIARO, 03. Aug. 1990; and MCP 42583, 2, 41.8–42.1 mm SL; collected with holotype; Município Chiador: MNRJ 14687, 1, 29.0 mm SL; córrego Areia, rio Paraíba do Sul basin, street MG-126; D.F. MORAES JR., J.H.P. GOMES & T. AGUIARO.

Diagnosis. *Australoheros robustus* is distinguished from *A. facetus*, *A. kaaygua*, *A. tembe*, *A. forquilha*, *A. guarani*, *A. minuano* and *A. charrua* by having fewer caudal vertebrae (12 in *A. robustus* vs. 13 in *A. guarani* and *A. minuano*; 13–14 in *A. kaaygua*, *A. tembe*, *A. charrua* and *A. facetus*; and 13–15 in *A. forquilha*). It is distinguished from *A. scitulus* and *A. forquilha* by having no mark on side of head (vs. dark marks below the orbit in *A. forquilha* and dark marks on opercle in *A. scitulus*).

The new species differs from *A. autrani*, *A. barbosa*, *A. ipatinguensis*, *A. paraibae*, *A. macaensis*, *A. macacuensis*, *A. muriae*, *A. ribeirae* and *A. saquarema* by having more dorsal-fin spines (17 in *A. robustus* vs. 15 in *A. ipatinguensis* and *A. muriae*; 15–16 in *A. autrani* and *A. paraibae*; and 16 in *A. barbosa*, *A. macacuensis*, *A. saquarema*, *A. ribeirae* and *A. macaensis*), fewer dorsal-fin rays (8–9 in *A. robustus* vs. 9–10 in *A. ribeirae*; 10 in *A. paraibae*; 10–11 in *A. barbosa*, *A. ipatinguensis*, *A. macacuensis*, *A. macaensis* and *A. saquarema*; 10–12 in *A. autrani*; and 11–12 in *A. muriae*) and a robust snout (vs. the common snout of *Australoheros*). The new species is distinguished from *A. autrani*, *A. barbosa*, *A. ipa-*

tinguensis, *A. paraibae*, *A. macaensis*, *A. macacuensis*, *A. muriae* and *A. saquarema* by having fewer anal-fin rays (7–8 in *A. robustus* vs. 8–9 in *A. macacuensis*, *A. macaensis* and *A. paraibae*; 9 in *A. ipatinguensis* and *A. saquarema*; 9–10 in *A. autrani*, *A. muriae* and *A. barbosa*). *Australoheros robustus* differs from *A. ipatinguensis* and *A. ribeirae* by having a wide ectopterygoid (vs. narrow) (Fig. 3); from *A. facetus* by having arm of epibranchial 1 long (vs. short) (Fig. 4); from *A. autrani*, *A. muriae*, *A. macaensis*, *A. macacuensis* and *A. saquarema* by having arms of epibranchial 2 with two short tubular processes (vs. long) (Fig. 4). It is distinguished from *A. saquarema* and *A. macaensis* by having no depression on head (vs. depression present in specimens over 30.0 mm SL), and from *A. macacuensis* by having arms of vertical trunk bar 7 with same width (vs. posterior one wider).

Description. Morphometric data are summarized in Table 1c, meristic data in Table 2c. Dorsal profile slightly convex from snout to caudal peduncle origin. Ventral profile slightly convex from snout to caudal peduncle origin. Caudal peduncle approximately straight ventrally and dorsally. Body profile moderately elongate, laterally compressed. Lower jaw slightly shorter than upper one. Robust snout (Fig. 2). Jaw teeth caniniform. Teeth hyaline, red at tip. Opercle not serrate.

Dorsal fin rounded, pointed on posterior region. Tip of dorsal fin reaching vertical through middle of caudal fin. Anal fin rounded anteriorly, pointed posteriorly. Tip of anal fin reaching vertical through middle of caudal fin. Caudal fin long, subtruncate. Pectoral

fins pointed. Pectoral fin base on vertical through third spine of dorsal-fin. Tip of pectoral-fin reaching vertical through vertical trunk bar 4 and beginning on 1st dorsal spine. Pelvic fin pointed. Pelvic fin base on vertical through 4th spine of dorsal fin. Tip of pelvic fin reaching vertical through 2nd spine of anal fin. Trunk and caudal peduncle covered with ctenoid scales. Head covered with cycloid scales.

Epibranchial 2 with two short tubular processes (Fig. 4), anterior arm of epibranchial 1 long (Fig. 4); a wide ectopterygoid (Fig. 3).

Coloration in alcohol (Fig.12). Side of body light brown with seven dark brown vertical bars between posterior limit of caudal peduncle and posterior margin of opercle, all continuous, except vertical trunk bars 6 and 7 which are interrupted above horizontal stripe. Vertical trunk bars 2–4 dorsally inclined posteriorly. Vertical trunk bar 5 horizontally connected to vertical trunk bar 6, just above upper lateral line. Vertical trunk bar 6 usually interrupted between horizontal stripe and upper lateral line. Vertical trunk bar 7 forked, y-shaped, with anterior arm more inclined than posterior one; bar interrupted between horizontal stripe and fork. Three dark spots: first in caudal peduncle zone, through lower lateral line; second one on junction between horizontal stripe and vertical trunk bar 4; third spot on posterior margin of opercle and horizontal stripe. Brown interrupted horizontal stripe from vertical trunk bar 1 to preopercle, lighter and inconspicuous between vertical trunk bars 1–4, darker between vertical trunk bar 4 and vertical head bar 1, much darker when crossing vertical trunk bars 5–6, having appearance of two dark spots.

Side of head with three vertical brown bars, all continuous; vertical head bar 1 on post-orbital region, close to eye, vertical head bars 2–3 on supra-orbital zone, between the orbits; vertical head bar 2 on posterior orbital margin touching vertical bar 1 just above preopercle; vertical head bar 3 curved and directed to snout. Head darker than trunk, especially on dorsal part between vertical head bars 2–3.

Dorsal fin light brown, slightly invaded by dark brown trunk bars, more evident in vertical trunk bar 5. Anal fin color pattern similar to dorsal fin. Caudal fin light brown, darker near caudal peduncle. Pectoral fins light brown, pelvic fins darker.

Distribution. Córrego da Areia, rio Paraíba do Sul basin, southeastern Brazil (Fig. 5).

Etymology. *robustus*, meaning robust in latin, because of its robust snout.

Australoheros saquarema, new species

(Fig. 13)

Cichlasoma facetum; COSTA 1987: (145–153) (*non Cichlasoma facetum* JENYNS, 1842)

Holotype. UFRJ 7255, 80.3 mm SL: 7203 Brazil: Estado do Rio de Janeiro: Município de Saquarema: rio Buracão; W.J.E.M. COSTA, L. VILLA VERDE, F.P. OTTONI, J.L. MATTOS & E. MATTOS, 09. Oct. 2005.

Paratypes. UFRJ 7221, 19, 30.4–59.6 mm SL; UFRJ 7231, 3, 37.9–47.4 mm SL C&S; collected with holotype; MCP 42366, 2, 46.3–48.2 mm SL; collected with holotype; and MTD F 31321, 1, 79.2 mm SL; rio Tinguí, rio Mato Grosso basin, sistema lagoa de Saquarema; F.P. OTTONI, F. LEAL, A. LANNA & J.L.O. MATTOS, 09. Aug. 2007.

Diagnosis. *Australoheros saquarema* is distinguished from *A. facetus*, *A. kaaygua*, *A. tembe*, *A. forquilha*, *A. guarani*, *A. minuano* and *A. charrua* by having fewer caudal vertebrae (12 in *A. saquarema* vs. 13 in *A. guarani* and *A. minuano*; 13–14 in *A. kaaygua*, *A. tembe*, *A. charrua* and *A. facetus*; and 13–15 in *A. forquilha*). It is distinguished from *A. scitulus* and *A. forquilha* by having no mark on side of head (vs. dark marks below the orbit in *A. forquilha* and dark marks on opercle in *A. scitulus*). *Australoheros saquarema* is distinguished from *A. macacuensis*, *A. facetus*, *A. ipatinguensis*, *A. robustus*, *A. austrani*, *A. barbosa*, *A. paraibae*, *A. macaensis*, *A. muriae*, *A. charrua*, *A. guarani*, *A. minuano*, *A. forquilha*, *A. ribeirae* and *A. kaaygua* by having more proximal radials on anal-fin base (14–15 in *A. saquarema* vs. 11–13 in *A. forquilha* and *A. kaaygua*, 12–13 in *A. charrua*, *A. guarani*, *A. ribeirae* and *A. minuano*; 13 in *A. macacuensis*, *A. ipatinguensis* and *A. robustus*; 13–14 in *A. austrani*, *A. barbosa*, *A. paraibae*, *A. macaensis* and *A. muriae*; in 12–14 *A. facetus*); and from *A. macacuensis*, *A. facetus*, *A. ipatinguensis*, *A. ribeirae*, *A. robustus*, *A. austrani*, *A. barbosa*, *A. paraibae* and *A. muriae* by having head with a depression near the snout in individuals above 30.0 mm SL (vs. head without depression). *Australoheros saquarema* is distinguished from *A. macaensis* and *A. ribeirae* by having fewer rib pairs (10 vs. 11) and more scales on upper lateral line row (17–18 vs. 16–17). The new species is distinguished from *A. ipatinguensis* and *A. ribeirae* by having a wide ectopterygoid (vs. narrow) (Fig. 3), from *A. barbosa*, *A. paraibae* and *A. ipatinguensis* by having arms of epibranchial 2 with two long tubular processes (vs. short) (Fig. 4) and from *A. facetus* by having arm of epibranchial 1 long (vs. short). It differs

from *A. macacuensis* by having arms of trunk vertical bar 7 with the same width (vs. posterior one wider).

Description. Morphometric data are summarized in Table 1a, meristic data in Table 2a. Dorsal profile slightly convex from snout to caudal peduncle origin, leaner between snout and dorsal-fin origin. Ventral profile slightly convex from snout to caudal peduncle origin. Caudal peduncle approximately straight ventrally and dorsally. Body profile moderately elongate, laterally compressed. Head with a depression near the snout in individuals above 30.0 mm SL. Lower jaw slightly shorter than upper one. Jaw teeth caniniform. Teeth hyaline, red at tip. Opercle not serrate. Urogenital papilla externally visible, rounded, with projection and not sexually dimorphic.

Dorsal fin rounded on anterior portion, pointed on posterior region. Tip of dorsal fin reaching vertical through middle of caudal fin. Anal fin rounded anteriorly, pointed posteriorly. Tip of anal fin reaching vertical through middle of caudal fin. Caudal fin long, subtruncate. Pectoral fins pointed. Pectoral fin base on vertical through dorsal-fin origin. Tip of pectoral-fin reaching vertical through bar 4 of trunk. Pelvic fin pointed. Pelvic fin base on vertical through third spine of dorsal fin. Tip of pelvic fin reaching vertical through second spine of anal fin. Trunk and caudal peduncle covered with ctenoid scales. Cycloid scales on opercle and preopercle.

Epibranchial 2 with two long tubular processes (Fig. 4), anterior arm of epibranchial 1 long (Fig. 4); a wide ectopterygoid (Fig. 3).

Coloration in alcohol. Side of body light brown with seven dark brown vertical bars between posterior end of caudal peduncle and posterior margin of opercle, all continuous, except vertical trunk bars 6 and 7 which are interrupted above horizontal stripe. Vertical trunk bars 2–4 dorsally inclined posteriorly. Vertical trunk bar 5 horizontally connected with vertical trunk bar 6, just above upper lateral line. Vertical trunk bar 6 usually interrupted between horizontal stripe and upper lateral line. Vertical trunk bar 7 forked, y-shaped, with anterior arm more inclined than posterior one; bar interrupted between horizontal stripe and fork. Three dark spots: first in caudal peduncle zone, through lower lateral line; second one on junction between horizontal stripe and vertical trunk bar 4; third spot on posterior margin of opercle and horizontal stripe. Brown interrupted horizontal stripe from vertical trunk bar 1 to preopercle, lighter and inconspicuous between vertical trunk bars 1–4, darker between vertical trunk bar 4 and vertical head bar 1, to much darker when crossing trunk vertical bars 5–6, having appearance of two dark spots.

Side of head with three vertical brown bars, all continuous; vertical head bar 1 on post-orbital region,

close to eye, vertical head bars 2–3 in supra-orbital zone, between the orbits; vertical head bar 2 on posterior orbital margin touching vertical bar 1 just above preopercle; vertical head bar 3 curved and directed to snout. Head darker than trunk, especially on dorsal part between vertical head bars 2–3.

Dorsal fin light brown, slightly invaded by dark brown trunk bars, more evident in vertical trunk bar 5. Anal fin color pattern similar to dorsal fin. Caudal fin light brown, darker near caudal peduncle. Pectoral fins light brown, pelvic fins darker.

Coloration in vivo (Fig. 13). Side of body light brown; usually changing to dark brown, to yellowish or greenish brown; seven vertical dark brown bars often changing from light brown to greenish brown or to black. Three black spots. Green and golden iridescence always on flank, particularly conspicuous near horizontal stripe and vertical bars. Darkness of bars strongly and quickly changing. Usually vertical bars lighter than horizontal stripe, rarely being of same color. Darkness of spots slightly changing.

Side of head light brown, dark brown, yellowish or greenish brown; three vertical bars with same coloration as vertical trunk bars. Darker similar coloration between vertical head bars 1–2 and between snout and eyes. Eyes not crossed by horizontal stripe or vertical bars, with black ring that often change to red in iris.

Dorsal fin invaded by vertical trunk bars, brownish hyaline to yellowish with golden iridescence on entire fin. Anal fin with same coloration as dorsal fin. Caudal fin yellowish, with golden iridescence on entire fin. Pelvic fins brown with golden iridescence on entire fin, darker near spine. Pectoral fins hyaline.

Distribution. Rio Mato Grosso basin, sistema lagoa de Saquarema, Estado do Rio de Janeiro, southeastern Brazil (Fig. 5).

Etymology. Named *saquarema* with reference to the occurrence of the new species in the lagoon system, where it is endemic.

Discussion

Australoheros autrani, *A. saquarema*, *A. macacuensis*, *A. macaensis*, *A. barbosa*, *A. muriae* and *A. robustus* share a distinctive color pattern characterized by having the vertical trunk bar 5 not dorsally forked, thus differing from *A. paraibae* and *A. ipatinguensis*, in which like in *A. facetus*, the vertical trunk bar 5 is dorsally forked. None of these new species



Fig. 13. *Australoheros saquarema* n. spec., UFRJ 7221, paratype, 54.7 mm SL (one day after collection); Brazil: Rio de Janeiro: lagoa de Saquarema System.

has the dark marks on the side of head described for *A. forquilha* and *A. scitulus* (RÍCAN & KULLANDER, 2008).

The high number of species from southern Brazil is probably a consequence of several isolated coastal basins in this area. *Australoheros autrani* is described from the rio São João basin, *A. macaensis* from the rio Macaé basin, *A. macacuensis* from rio Macacu basin, and *A. saquarema* from the lagoa de Saquarema system, all constituting isolated coastal basins. In con-

trast, *A. barbosa* from the rio Preto basin, *A. paraibae* from the rio do Peixe basin, *A. muriae* from the rio Muriae basin and *A. rostrunrobustus* from the córrego da Areia basin have their distribution areas within the rio Paraíba do Sul basin.

The *Australoheros* from southern Brazil, north Uruguay and Northern Argentina (except *A. scitulus*) are easily distinguished from those from southeastern Brazil by having 13 or more caudal vertebrae (*vs.* 12 in the other species).

Tab. 1a. Morphometric data of *Australoheros autrani*, *A. saquarema* and *A. macacuenis*.

	<i>A. autrani</i>		<i>A. saquarema</i>		<i>A. macacuenis</i>	
	Holotype	Paratypes (n=14)	Holotype	Paratypes (n=15)	Holotype	Paratypes (n=13)
Standard length (mm)	57.0	45.0–70.9	79.7	48.8–79.7	67.0	19.7–83.2
Percents, standard length						
Body depth	50.9	45.7–50.9	46.0	44.0–48.2	48.0	46.6–49.8
Predorsal length	47.0	42.3–48.3	43.4	42.2–44.8	43.9	43.8–48.6
Prepelvic length	49.3	45.4–49.3	45.0	44.9–47.7	46.0	45.8–50.3
Caudal peduncle depth	17.3	15.7–18.2	16.8	16.1–17.0	15.9	14.2–15.9
Caudal peduncle length	11.2	10.2–11.9	9.0	6.7–9.0	7.4	5.1–7.9
Dorsal-fin base length	59.8	53.5–59.7	58.0	57.8–60.8	55.6	54.2–55.6
Anal-fin base length	28.7	26.5–30.9	27.5	26.6–29.2	29.8	26.1–29.7
Pelvic-fin spine length	17.1	15.7–18.9	15.9	15.3–17.1	14.7	14.4–15.2
Pelvic-fin length	34.7	30.4–35.1	42.1	36.2–42.1	37.0	35.6–37.2
Last dorsal-fin spine length	15.3	13.9–16.9	17.2	15.5–17.4	15.9	12.6–15.9
Last anal-fin spine length	16.0	15.9–17.1	16.7	15.9–17.1	16.6	13.8–16.6
Pectoral-fin length	30.1	23.4–31.6	33.1	25.3–34.2	32.5	25.7–34.1
Caudal-fin length	35.2	31.0–36.7	28.7	28.7–31.1	31.3	28.0–31.4
Percents, head length						
Head depth	91.2	88.7–91.4	88.7	88.7–93.0	85.8	85.7–91.9
Orbital diameter	27.6	26.8–29.3	28.7	28.6–31.8	25.8	24.5–29.5
Snout length	34.2	34.2–37.8	36.5	34.5–38.0	35.4	33.7–36.7
Head width	52.6	52.6–54.6	56.0	52.5–56.0	53.5	52.6–56.3
Interorbital width	42.6	41.7–47.9	43.0	43.0–46.0	40.4	37.2–41.1
Preorbital depth	57.9	54.9–60.8	66.9	66.0–69.1	65.4	62.2–65.4
Upper jaw length	26.8	26.7–31.1	28.4	28.3–31.0	30.8	28.0–31.0
Lower jaw length	18.4	18.0–20.6	21.8	20.0–21.9	21.2	20.3–22.9

Tab. 1b. Morphometric data of *Australoheros ipatinguensis*, *A. barbosa* and *A. paraiba*.

	<i>A. ipatinguensis</i>		<i>A. barbosa</i>		<i>A. paraiba</i>	
	Holotype	Paratypes (n=10)	Holotype	Paratypes (n=10)	Holotype	Paratypes (n=10)
Standard length (mm)	53.5	19.6–53.5	59.3	24.9–96.2	50.9	33.1–61.1
Percents, standard length						
Body depth	51.2	47.3–51.2	45.5	44.6–49.0	45.8	42.6–46.1
Predorsal length	48.0	45.0–48.0	45.4	44.1–49.9	43.8	43.2–46.3
Prepelvic length	46.7	43.8–47.3	43.9	43.8–47.2	45.2	44.7–47.1
Caudal peduncle depth	15.8	15.7–18.0	15.9	15.4–17.2	16.1	15.5–18.2
Caudal peduncle length	7.5	6.6–8.0	6.9	5.5–8.7	7.9	6.4–8.1
Dorsal-fin base length	58.3	55.7–58.7	55.3	55.3–58.0	57.0	53.2–59.6
Anal-fin base length	29.0	25.4–29.0	29.5	28.6–30.2	28.7	25.4–29.5
Pelvic-fin spine length	17.7	14.6–17.8	16.5	12.9–17.5	15.1	14.5–15.9
Pelvic-fin length	46.5	29.6–46.5	31.0	27.1–37.8	34.0	27.7–34.0
Last dorsal-fin spine length	15.5	14.2–16.6	13.8	13.4–15.8	13.4	11.9–13.5
Last anal-fin spine length	14.6	14.3–15.6	14.2	13.8–15.9	12.2	12.2–13.3
Pectoral-fin length	32.3	29.2–32.3	28.2	27.5–32.2	28.9	24.6–28.9
Caudal-fin length	31.6	29.6–32.4	30.0	27.6–36.3	30.1	27.2–30.9
Percents, head length						
Head depth	89.3	87.3–89.7	91.2	88.3 – 93.9	88.2	87.6–90.7
Orbital diameter	27.1	27.1–32.8	29.6	28.2–31.8	31.6	27.8–32.1
Snout length	33.8	32.9–35.9	35.2	33.3–37.6	32.1	32.1–33.6
Head width	50.2	47.9–50.2	56.5	51.1–56.7	50.8	48.9–53.3
Interorbital width	38.2	37.1–39.3	45.4	40.3–47.8	43.3	40.1–44.9
Preorbital depth	59.1	56.6–60.3	63.9	60.5–65.3	63.1	60.4–65.2
Upper jaw length	27.6	25.4–27.6	27.3	26.8–30.2	28.9	27.7–28.9
Lower jaw length	19.1	17.0–19.2	19.9	17.3 – 23.3	19.8	19.8–21.9

Table 1c. Morphometric data of *Australoheros macaensis*, *A. muriae* and *A. robustus*.

	<i>A. macaensis</i>		<i>A. muriae</i>		<i>A. robustus</i> .	
	Holotype	Paratypes (n=12)	Holotype	Paratypes (n=12)	Holotype	Paratypes (n=13)
Standard length (mm)	68.5	22.1–76.4	121.3	17.3–121.3	74.5	17.3–74.5
Percents, standard length						
Body depth	48.2	44.0–48.2	47.2	43.8–50.1	45.4	43.7–46.0
Predorsal length	44.8	42.7–48.1	41.1	41.1–48.0	43.6	43.6–47.7
Prepelvic length	46.9	44.1–48.7	43.8	42.1–46.6	42.4	42.4–46.6
Caudal peduncle depth	16.3	15.4–18.4	19.0	15.3–19.0	7.4	15.1–17.5
Caudal peduncle length	7.6	7.6–10.8	7.1	7.1–8.9	17.3	7.4–9.2
Dorsal-fin base length	57.3	53.3–60.0	60.5	56.4–60.5	57.5	55.7–60.7
Anal-fin base length	26.2	26.2–31.0	29.7	26.4–30.3	28.5	26.0–29.8
Pelvic-fin spine length	16.8	14.5–16.8	15.4	13.0–16.1	15.8	14.3–17.0
Pelvic-fin length	32.0	27.8–38.0	52.4	28.0–52.4	37.5	27.1–37.5
Last dorsal-fin spine length	14.8	12.8–16.4	14.2	14.0–17.3	14.4	13.1–15.6
Last anal-fin spine length	16.0	13.6–17.1	14.3	14.3–17.0	15.0	13.3–15.6
Pectoral-fin length	26.8	26.8–33.3	33.1	27.5–33.1	28.6	28.1–30.4
Caudal-fin length	32.9	30.1–33.7	32.7	29.2–35.2	31.3	29.9–32.1
Percents, head length						
Head depth	93.7	85.1–94.1	99.1	84.8–99.1	96.6	86.1–96.6
Orbital diameter	28.6	26.8–33.9	23.0	23.0–31.8	27.5	27.5–35.0
Snout length	36.1	33.0–37.9	39.8	31.3–39.8	41.2	33.0–41.2
Head width	58.0	51.4–58.0	62.7	51.1–62.1	55.0	50.9–55.6
Interorbital width	43.9	41.2–47.9	44.8	39.8–46.1	46.9	40.6–47.0
Preorbital depth	58.8	55.0–58.8	70.8	56.3–72.7	68.7	53.3–68.7
Upper jaw length	32.2	27.1–32.2	33.1	26.1–33.1	31.7	27.5–31.7
Lower jaw length	22.0	20.0 – 22.9	24.6	19.4–24.6	25.2	20.0–25.2

Tab. 2a. Meristic variation data of *Australoheros autrani*, *A. saquarema*, *A. macacuensis* and *A. macaensis*.

	<i>A. autrani</i>	<i>A. saquarema</i>	<i>A. macacuensis</i>	<i>A. macaensis</i>
Dorsal-fin spines	15–16	16	16	16
Dorsal-fin rays	10–12	10–11	10–11	10–11
Anal-fin spines	7–8	7	7–8	7–8
Anal-fin rays	9–10	9	8–9	8–9
Pelvic-fin spines	1	1	1	1
Pelvic-fin rays	5	5	5	5
Caudal-fin rays	22 (3 + 8 + 8 + 3)	22 (3 + 8 + 8 + 3)	22 (3 + 8 + 8 + 3)	22 (3 + 8 + 8 + 3)
Pectoral-fin rays	14	14	14	13–15
Gill-rakers on first brachial arch	5–7 + 14–16	4–7 + 13–14	6–7 + 14–15	4–8 + 15–16
Total vertebrae	26	26	26	26
Rib pairs	10	10	10–11	11
Precaudal vertebrae	14	14	14	14
Caudal vertebrae	12	12	12	12
Scales of upper lateral line serie	15–18	17–18	15–17	16–17
Scales of lower lateral line serie	6–10	7–9	6–9	8–10
Scales of longitudinal serie	25–28	25–27	25–28	25–28
Scales of dorsal-fin origin serie	4	4	4	4
Scales of anal-fin origin serie	8	8	8	8
Proximal radial on dorsal-fin base	25–26	25–26	24–25	25
Proximal radial on anal-fin base	13–14	14–15	13	13–14

Tab. 2b. Meristic data of *Australoheros ipatinguensis*, *A. barbosa* and *A. paraiba*.

	<i>A. ipatinguensis</i>	<i>A. barbosa</i>	<i>A. paraiba</i>
Dorsal-fin spines	15	16	15–16
Dorsal-fin rays	10–11	10–11	10
Anal-fin spines	7	7–8	7–8
Anal-fin rays	9	9–10	8–9
Pelvic-fin spines	1	1	1
Pelvic-fin rays	5	5	5
Caudal-fin rays	21–22 (3 + 8 + 8 + 2–3)	22 (3 + 8 + 8 + 3)	21–22 (3 + 8 + 8–9 + 2–3)
Pectoral-fin rays	14	14–15	13–14
Gill-rakers on first brachial arch	3–5 + 13–16	6–8 + 15–17	7–8 + 13–16
Total vertebrae	26	26	26
Rib pairs	10	11	10
Precaudal vertebrae	14	14	14
Caudal vertebrae	12	12	12
Scales of upper lateral line serie	16–17	15–17	16–17
Scales of lower lateral line serie	7–9	7–9	7–9
Scales of longitudinal serie	25–26	27–28	26–28
Scales of dorsal-fin origin serie	4	4	4
Scales of anal-fin origin serie	8	8	8
Proximal radial on dorsal-fin base	24–25	24–26	25
Proximal radial on anal-fin base	13	13–14	13–14

Tab. 2c. Meristic data of *Australoheros robustus* and *A. muriae*.

	<i>A. robustus</i>	<i>A. muriae</i>
Dorsal-fin spines	17	15
Dorsal-fin rays	8–9	11–12
Anal-fin spines	7–8	6–8
Anal-fin rays	7–8	9–10
Pelvic-fin spines	1	1
Pelvic-fin rays	5	5
Caudal-fin rays	22 (3 + 8 + 8 + 3)	22 (3 + 8 + 8 + 3)
Pectoral-fin rays	13–14	14–15
Gill-rakers on first brachial arch	4–7 + 13–16	3–6 + 13–16
Total vertebrae	26	26
Rib pairs	9–10	10–11
Precaudal vertebrae	14	14
Caudal vertebrae	12	12
Scales of upper lateral line serie	16–17	16–17
Scales of lower lateral line serie	7–8	9–11
Scales of longitudinal serie	26–28	27–29
Scales of dorsal-fin origin serie	4	4
Scales of anal-fin origin serie	8	8
Proximal radial on dorsal-fin base	24	24–25

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