

# *Australoheros sanguineus* sp. n. – a new cichlid species from the rio Cubatão basin, southern Brazil (Cichlidae: Heroini)

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## Abstract

A new species of *Australoheros* is herein described from the rio Cubatão basin, southern Brazil. The new species differs from all its congeners mainly by the following character states: presence of a conspicuous rounded caudal-fin base; presence of two blood red regions on the corners of caudal-fin posterior margin; absence of conspicuous metallic blotches on anal-fin base; absence of a red pigmented line on dorsal-fin margin; presence of one conspicuous blue iridescence bar on dorsal-margin; more pectoral-fin rays (14); fewer proximal radials on dorsal-fin base (24–25); more proximal radials on anal-fin base (13); anal-fin base squamation beginning at 7<sup>th</sup> anal-fin spine; and dorsal-fin base squamation beginning between 11<sup>th</sup> and 12<sup>th</sup> dorsal-fin spine.

## Resumo

Uma nova espécie de *Australoheros* é aqui descrita para a bacia do rio Cubatão, sul do Brasil. A nova espécie difere de todos os congêneres principalmente pelos seguintes estados de caracteres: presença de uma mácula arredondada e conspícua na base da nadadeira caudal; presença de duas regiões vermelho sangue nas esquinas da margem posterior da nadadeira caudal; ausência de manchas metálicas conspícuas na base da nadadeira anal; ausência de uma linha com pigmento vermelho na margem da nadadeira dorsal; presença de uma barra conspícua azulada na margem da nadadeira dorsal; mais raios na nadadeira peitoral (14); menos radiais proximais na base da nadadeira dorsal (24–25); mais radiais proximais na base da nadadeira anal (13); escamação da base da nadadeira anal começando a partir do sétimo espinho da nadadeira anal; e escamação da base da nadadeira dorsal começando entre os espinhos onze e doze da nadadeira dorsal.

## Key words

*Australoheros facetus*, coastal basins, Santa Catarina state, Joinville municipality, Labroidei, taxonomy.

## Introduction

*Australoheros* ŘÍČAN & KULLANDER, 2006 is a South American cichlid genus erected to include three species previously located in the genus *Cichlasoma* SWAINSON, 1839: “*Cichlasoma*” *facetum* (JENYNS, 1842), “*Cichlasoma*” *tembe* CASCIOTTA, GÓMEZ & TORESANI, 1995 and “*Cichlasoma*” *scitulum* ŘÍČAN & KULLANDER, 2003 (CASCIOTTA *et al.*, 2006; OTTONI 2010; OTTONI, 2012;

OTTONI & COSTA 2008; ŘÍČAN & KULLANDER 2006; ŘÍČAN & KULLANDER 2008). Since the erection of *Australoheros* several new species have been described. Currently it constitutes one of the most specious genus of the Cichlinae and the most specious genus of the Heroini (OTTONI, 2012; ŘÍČAN *et al.*, 2011).

Despite *Australoheros* being the southernmost component of the Heroini, occurring in the mid-southern portion of South America, studies conducted by ŘÍČAN & KULLANDER (2006; 2008) supported that genus to be a member of a clade comprising Mesoamerican heroines. ŘÍČAN & KULLANDER (2006; 2008) also provided a phylogenetic hypothesis of relationship among species of *Australoheros* from the Paraná-Uruguay-Paraguay river system. According to ŘÍČAN & KULLANDER (2006; 2008), the *Australoheros* from the Paraná-Uruguay-Paraguay river system are divided into four monophyletic groups: the *A. facetus* group (including *A. facetus* and *A. guarani* ŘÍČAN & KULLANDER, 2008), the *A. scitulus* group (including *A. scitulus* and *A. charrua* ŘÍČAN & KULLANDER, 2008), the *A. forquilha* group (including *A. forquilha* ŘÍČAN & KULLANDER, 2008 and *A. tembe*) and the *A. kaaygua* (*A. kaaygua* CASCIOTTA *et al.*, 2006 and *A. minuano* ŘÍČAN & KULLANDER, 2008) (OTTONI, 2012). More recently, OTTONI & CHEFFE (2009) described *A. taura* OTTONI & CHEFFE, 2009, which was tentatively included in the *A. scitulus* group due to the presence of three apomorphic character states: four scales on the dorsal-fin origin series, 12–13 proximal radials on the anal fin and very narrow spot on the caudal-fin base. Additionally *Heros acaroides* HENSEL, 1870 was re-described by SCHINDLER *et al.* (2010) as valid species of *Australoheros*.

The Atlantic forest was the second largest tropical rain forest of the American continent (TABARELLI *et al.*, 2005), comprising more than 8.000 endemic species (MYERS *et al.*, 2000). Due to the proximity of larger urban centres, this environment is one of the most affected by the anthropoid action, remaining less than 7% of the natural forest areas (TABARELLI *et al.*, 2005). In the Santa Catarina state of southern Brazil, the Atlantic forest was the predominant vegetal formation, but the forest has been destroyed and replaced by agriculture (QUEIROZ, 1994). This scenario shows the urgency to improve the taxonomic knowledge about the fauna of this area before species become extinct.

A new species of *Australoheros* is described herein from the rio Cubatão basin. This is a coastal basin encompassing a total area of 492 km<sup>2</sup>, located on northern part of the Santa Catarina state. It is an isolated basin, its spring is placed at about 1.100 meters of altitude, on the Serra Queimada, discharging in the Baía da Babitonga (GONÇALVES *et al.* 2006).

## Materials and Methods

The material is 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 Uni-

versidade Católica do 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); **MZUSP** (Museu de Zoologia, Universidade de São Paulo, São Paulo); **UFRJ** (Instituto de Biologia, Universidade Federal do Rio de Janeiro, Rio de Janeiro); and **ZMB** (Museum für Naturkunde – Leibniz-Institut für Evolutions- und Biodiversitätsforschung, Berlin).

The morphometric and meristic characters are made according to OTTONI *et al.* (2011) and OTTONI (2011). Internal counts were made in radiographed specimens. The nomenclature of osteological characters follows COSTA (2006). Bars are grouped into two groups: head and trunk bars; bars and spots are numbered from the caudal-fin to the snout (KULLANDER, 1983). SL means standard length, HL head length and C&S cleared and stained specimens for bone and cartilage. In description and tables, the number of specimens exhibiting a character state is presented in parentheses. For species delimitation the population aggregation analysis (DAVIS & NIXON, 1992) was adopted, a character-based method in which species are delimited by a unique combination of stable morphological character states occurring in one or more populations.

Information about colouration in live for *A. facetus* is based on CALVIÑO (2007; fig. 3) and five photographs, from near type locality, for *A. acaroides* on the photographed specimen presented herein. The photograph of *A. acaroides* (fig. 3) corresponds to an adult specimen. Earlier, SCHINDLER *et al.* (2010) have published a photograph of *A. acaroides* (SCHINDLER *et al.*, 2010; fig. 2); however it does not correspond to a complete formed adult (juvenile). Besides that, this specimen was not apparently in good conditions, showing a paler colouration and not exhibiting all colour pattern character states.

## Comparative material

Comparative material is listed in OTTONI *et al.* (2008), OTTONI & COSTA (2008), OTTONI & CHEFFE (2009), OTTONI (2010), OTTONI *et al.* (2011), OTTONI (2012) and SCHINDLER *et al.* (2010).

## *Australoheros sanguineus*, spec. nov.

Figs 1 and 2

**Holotype.** MCP 14556, 88.1 mm SL; Brazil: Santa Catarina state: arroio Lindo, tributary of the rio Cubatão, near the road SC-301, near BR-101, Pirabeiraba, Joinville municipality; C. Lucena, L. Malabarba and R. Reis, September 19<sup>th</sup> 1985.

**Paratypes.** Brazil: Santa Catarina state: MCP 6912, 2, 57.9–62.9 mm SL; rio Cubatão, near the road BR-101, Joinville municipality; R. Reis, L. Malabarba and C. Lucena, September 10<sup>th</sup>–20<sup>est</sup> 1985; MZUSP 16160, 2, 61.6–84.7 mm SL; rio Cubatão, near Joinville, Joinville municipality; H. Britski and J. Garavello, November 8<sup>th</sup> 1974; and MZUSP 2583, 6, 63.4–105.3 mm SL; Hansa, Joinville municipality; W. Ehrardt, 1908.



**Fig. 1.** Colouration in life of *Australoheros sanguineus* sp.n. Not preserved specimen. Photograph by Marcelo Notare.



**Fig. 2.** *Australoheros sanguineus* sp.n.; MCP 14556, 88.1 mm SL, holotype; Brazil: Santa Catarina state: Joinville municipality: rio Cubatão basin.

**Diagnosis.** *Australoheros sanguineus* sp.n. differs from species of the *A. forquilha* and *A. scitulus* groups, *A. angiru* ŘÍČAN *et al.*, 2011, *A. kaaygua* CASCIOTTA *et al.*, 2008 and *A. taura* by having conspicuous rounded caudal-fin base spot (vs. narrow and inconspicuous, or absent); from species of the *A. kaaygua* group, *A. angiru*, and

*A. perdi* OTTONI *et al.*, 2011 by having more pectoral-fin rays (14 vs. 11–13); from *A. austrani* OTTONI & COSTA, 2008, *A. barbosa* OTTONI & COSTA, 2008, *A. capixaba* OTTONI, 2010, *A. forquilha* ŘÍČAN & KULLANDER, 2008, *A. macaensis* OTTONI & COSTA, 2008, *A. macacuensis* OTTONI & COSTA, 2008, *A. mattosi* OTTONI, 2012, *A. mon-*



Fig. 3. *Australoheros acaroides*, adult not preserved. Photograph by Morevy Cheffe.

*tanus* OTTONI, 2012, *A. muriae* OTTONI & COSTA, 2008, *A. paraibae* OTTONI & COSTA, 2008, *A. ribeirae* OTTONI *et al.*, 2008, *A. robustus* OTTONI & COSTA, 2008, *A. scitulus*, *A. saquarema* OTTONI & COSTA, 2008, *A. taura*, and *A. ykeregua* ŘÍČAN *et al.*, 2011 by presence of two blood red regions on the corners of caudal-fin posterior margin (fig. 1) [vs. absence of red pigment on caudal-fin posterior margin in *Australoheros autrani*, *A. capixaba*, *A. forquilha*, *A. macaensis*, *A. macacuensis*, *A. ribeirae*, *A. saquarema*, *A. scitulus* and *A. ykeregua* (see OTTONI *et al.*, 2008, fig. 1; OTTONI, 2008, fig. 1, 8, 9 and 13; OTTONI, 2010, fig. 1; and ŘÍČAN *et al.*, 2011, fig. 7)]; reddish pigment present, but no blood red colour in *A. barbosa*, *A. mattosi*, *A. muriae*, *A. paraibae*, *A. robustus*, and *A. taura*; and reddish pigment forming a complete bar on caudal fin posterior margin in *A. montanus* (see OTTONI, 2012, fig. 3; and Ottoni, 2013, figs. 1–6)]; from *A. barbosa*, *A. macacuensis*, *A. mattosi*, *A. montanus*, *A. paraibae*, and *A. robustus* by absence of conspicuous metallic blotches on anal-fin base [vs. presence (see OTTONI & COSTA, 2008; fig. 8 and OTTONI, 2012; fig. 3)]; from *A. barbosa*, *A. facetus*, *A. guarani*, *A. ipatinguensis*, *A. macacuensis*, *A. minuano*, *A. muriae*, *A. paraibae*, *A. ribeirae*, *A. robustus*, and *A. saquarema* by longer caudal peduncle (caudal peduncle length 9.8–10.8% SL in *A. sanguineus* sp. n. vs. 5.1–9.2% SL combined in the other species); from *A. barbosa* and *A. ipatinguensis* by having longer snout (snout length 38.6–44.9% HL *A. sanguineus* sp. n. vs. 32.9–37.6% HL combined); from *A. barbosa* by deeper caudal peduncle (caudal peduncle depth 17.4–18.5% SL vs. 15.4–17.2% SL); from *A. ipatinguensis* by having a deeper head

(head depth 90.7–104.8% HL vs. 87.3–89.7% HL), wider head (52.4–61.4% HL vs. 47.9–50.2% HL), higher interorbital width (41.5–46.5% HL vs. 37.1–39.3% HL) and higher preorbital depth (61.0–70.7% HL vs. 56.6–60.3% HL); from *A. perdi* by head without conspicuous depression just above eyes (vs. with a conspicuous depression); from *A. tavaresi* OTTONI, 2012 by fewer proximal radials on dorsal-fin base (24–25 vs. 26), deeper body (body depth 45.4–49.0% SL vs. 39.0–42.2% SL) and higher preorbital depth (61.0–70.7% SL vs. 51.2 vs. 60.0% SL); from *A. mattosi* by more proximal radials on anal-fin base (13 vs. 12); from *A. facetus*, *A. guarani*, and *A. minuano* by anal-fin base squamation beginning at the 7<sup>th</sup> anal fin spine (vs. between the 4<sup>th</sup> and 5<sup>th</sup> in *A. facetus* and *A. guarani* and about 3<sup>rd</sup> in *A. minuano*) (see ŘÍČAN & KULLANDER, 2008, fig. 9); from *A. acaroides*, *A. facetus*, *A. guarani*, and *A. minuano* by dorsal-fin base squamation beginning between 11<sup>th</sup> and 12<sup>th</sup> dorsal-fin spine (vs. 8<sup>th</sup> in *A. acaroides*, 15<sup>th</sup> in *A. facetus*, 10<sup>th</sup> in *A. guarani*, and about 9<sup>th</sup> in *A. minuano*) (see ŘÍČAN & KULLANDER, 2008, fig. 9); from *A. acaroides* and *A. facetus* by absence of a red pigmented line on dorsal-fin margin (fig. 1) [vs. red pigmented line on dorsal-fin margin, more conspicuous on posterior portion (figs. 3, and CALVIÑO, 2007; fig. 3)], and presence of a conspicuous blue iridescent bar on dorsal-margin (Fig. 1) (vs. bar not conspicuous, with usually blue pigmentation more conspicuous near dorsal-fin posterior margin) (fig. 3, and CALVIÑO, 2007; fig. 3).

**Description.** Morphometric data are summarized in Table 1, meristic data in Table 2. Body elongated and laterally compressed. Dorsal profile slightly convex from

**Table 1.** Morphometric data of *Australoheros sanguineus* sp. n. H = holotype, R = range, M = mean and SD = standard deviation.

	H	R (n = 11)	M	SD
<b>Standard length (mm)</b>	88.1	57.9–105.3	77.5	15.5
<b>Percent, standard length (SL)</b>				
Body depth	47.9	45.4–49.0	47.3	1.2
Predorsal length	42.8	42.7–45.3	43.7	0.7
Prepelvic length	42.9	41.9–45.0	43.8	1.1
Caudal peduncle depth	17.7	17.4–18.5	17.8	0.3
Caudal peduncle length	10.4	9.8–10.8	10.2	0.3
Dorsal-fin base length	59.3	55.4–59.3	57.9	1.2
Anal-fin base length	27.8	27.8–30.2	29.1	0.8
Pelvic-fin spine length	14.8	14.4–16.2	15.0	0.5
Pelvic-fin length	25.3	25.3–39.9	31.8	4.6
Last dorsal-fin spine length	15.9	14.5–16.4	15.5	0.7
Last anal-fin spine length	15.7	14.2–16.6	15.3	0.8
Pectoral-fin length	28.1	21.4–33.7	28.2	3.3
Caudal-fin length	29.1	26.0–35.1	31.2	2.4
Head depth	56.8	33.8–56.8	37.1	6.6
Orbital diameter	14.7	9.3–14.7	10.3	1.5
Snout length	22.5	14.4–22.5	15.8	2.3
Head width	31.8	19.2–21.8	21.5	3.5
Interorbital width	24.2	15.1–24.2	16.4	2.6
Preorbital depth	36.8	22.7–36.8	25.5	4.0
Upper jaw length	16.8	10.8–16.8	12.4	1.6
Lower jaw length	13.3	7.9–13.3	9.1	1.6
Head length (mm)	31.4	21.3–37.9	28.4	5.8
<b>Percents, head length (HL)</b>				
Head depth	104.8	90.7–104.8	96.6	4.6
Orbital diameter	27.1	25.1–28.8	26.9	1.2
Snout length	41.4	38.6–44.9	41.5	2.0
Head width	58.6	52.4–61.4	55.9	3.0
Interorbital width	44.6	41.5–46.5	42.7	1.5
Preorbital depth	67.8	61.0–70.7	66.5	3.3
Upper jaw length	30.9	30.0–35.1	32.4	1.8
Lower jaw length	24.5	21.2–26.1	23.6	1.8

snout to caudal peduncle origin. Dorsal-fin base slightly curved, progressively descending from origin to end. Ventral profile slightly curved from snout to caudal peduncle origin. Caudal peduncle approximately straight ventrally and dorsally. Head profile between tip of snout and orbit slightly curved. Nostrils centred between tip of snout and anterior margin of orbit. Mouth terminal, distal tip of maxilla not reaching vertical tangent to anterior margin of orbit. Lower lip fold covering distal portion of upper lip. Lower jaw slightly shorter than upper. Jaw teeth caniniform, slightly curved to inside mouth. Teeth hyaline, red at tip. Teeth in outer row increasing in size symphysiad, anterior teeth in upper jaw longest, anterior teeth in lower jaw subequal. Opercle not serrated.

Dorsal-fin origin placed at level of posterior margin of opercle. Dorsal-fin rounded anteriorly, and pointed posteriorly. Tip of dorsal fin reaching vertical through half of caudal fin. Squamation of dorsal-fin base beginning at dorsal-fin spines 11–12. Anal fin rounded anteriorly, pointed posteriorly. Squamation of anal-fin base

beginning at anal-fin spine 7. Tip of anal fin reaching vertical through half of caudal fin. Caudal fin long, distal margin convex. Caudal fin with small ctenoid scales covering about 1/4 of fin. Posterior margin of pectoral fin rounded, extending to about first anal-fin spine or trunk bar 4. Pectoral-fin base on vertical through trunk bar 4. Pelvic fin pointed. Pelvic-fin base on vertical through third or 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. Chest scales cycloid. Uniserial predorsal scale pattern (all scales cycloid). Scales on head and chest not distinctly smaller than flank scales. Two scale rows between lateral lines. Sides of head (opercle, subopercle and interopercle) covered with cycloid scales. Cheek with three (9) or four (2) rows of scales. Two (4) or three (1) vertical rows of opercular scales. One longitudinal row of interopercular and subopercular scales.

**Colouration in alcohol** (fig. 2). Side of body light brown, with seven dark brown trunk bars (bars 1–5 continuous, 6–7 interrupted above longitudinal stripe) between caudal peduncle and posterior margin of opercle. Trunk bars usually not forked ventrally. Trunk bars 2–4 dorsally inclined posteriorly. Trunk bar 5 not forked dorsally, connected to trunk bar 6, above upper lateral line. Trunk bar 6 interrupted between longitudinal stripe and upper lateral line. Trunk bar 7 forked dorsally and interrupted above longitudinal stripe. Posterior arm of trunk bar 7 with same width as anterior one. TrunkAbdominal bar 1 somewhat arched. Three dark spots: first spot conspicuous and rounded, located on caudal-fin peduncle, crossed by lower lateral line; second spot on junction between longitudinal stripe and trunk bar 4; third spot on posterior margin of opercle and longitudinal stripe. Interrupted conspicuous brown longitudinal stripe, from trunk bar 1 to preopercle, lighter and inconspicuous between trunk bars 1–4, darker between trunk bar 4 and head bar 1.

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

Dorsal fin light brown, slightly invaded by dark brown trunk bars. Anal fin colour pattern similar to dorsal fin. Caudal fin light brown, darker near caudal peduncle. Pectoral fin light brown, pelvic fin somewhat darker.

**Colouration in life** (fig. 1). Side of body yellowish brown. Seven dark brown bars. Three black spots. Chest darker than rest of trunk. Dorsal portion of trunk with few red dots. Longitudinal stripe not continuous. Green and blue iridescence on margin of trunk bars, spots and longitudinal stripe, more concentrated near longitudinal stripe.

Side of head with same colouration as trunk bars, darker on opercle and below eye. Eye not crossed by longitudinal stripe and bars, with red iris.

**Table 2.** Meristic variation data of *Australoheros sanguineus* sp. n. Pc = procurent rays.

	Holotype	Range
Dorsal-fin spines	15	15 (3)–16 (8)
Dorsal-fin rays	10	10 (7)–11 (4)
Anal-fin spines	7	6 (1)–7 (10)
Anal-fin rays	9	9 (11)
Pelvic-fin spines	1	1 (11)
Pelvic-fin rays	5	5 (11)
Caudal-fin rays	3 Pc + 8 + 8 + 3 Pc	2(1)–3(5) Pc + 8 (6) + 8 (6) + 2 (3)–3(3) Pc
Pectoral-fin rays	14	14 (9)
Total vertebrae	26	25 (2)–26 (4)
Pleural ribs	12	11(4)–12 (2)
Precaudal vertebrae	14	13 (2)–14 (4)
Caudal vertebrae	12	12 (6)
Scales of upper lateral line series	17	16 (8)–17 (3)
Scales of lower lateral line series	9	7 (5)–8 (3)–9 (3)
E0 series	26	25 (6)–26 (5)
E1 series	27	26 (7)–27 (3)–28 (1)
E2 series	22	20 (3)–21 (6)–22 (2)
Scales of dorsal fin origin series	4	4 (11)
Scales of the end of superior lateral line to dorsal fin series	3	3 (11)
Scales of anal fin origin series	8	8 (11)
Scales between lateral line	2	2 (11)
Scales of peduncle depth	7	7 (11)
Cheek scales rows	4	3 (9)–4 (2)
Squ. Op.	—	8 (2)–9 (3)
Squ. lop.	—	3 (1)–4 (4)
Squ. Sop.	—	2 (2)–3 (1)–4 (2)
Squ. Predorsal	—	9 (2)–10 (3)
Squ. Prv	—	11 (2)–12 (3)
Proximal radials on dorsal-fin base	24	24 (5)–25 (1)
Proximal radials on anal-fin base	13	13 (6)

Dorsal fin light brown, invaded by trunk bars. Anal fin darker than dorsal-fin. Caudal fin yellow to brown greenish. Two blood red regions on caudal-fin posterior margin, one on upper corner and other on lower corner (fig. 1). Blue iridescence on posterior margins of dorsal, anal and caudal-fins. Pelvic fin dark brown, with yellow iridescence on rays. Pectoral fin hyaline.

**Distribution.** Rio Cubatão basin, Joinville municipality, Santa Catarina state, southern Brazil (fig. 4).

**Etymology.** From the Latin *sanguineus*, meaning blood red, because of the two blood red zones on the caudal-fin's posterior margin.

## Discussion

*Australoheros* is easily recognizable by the presence of an interruption in the bars 6–7, just above the longitudinal stripe (OTTONI & COSTA, 2008; OTTONI & CHEFFE,

2009; OTTONI, 2010, and ŘÍČAN & KULLANDER, 2006). The new species from the rio Cubatão basin fits perfectly with this colour pattern characteristic of the genus.

Besides of the character states presented in the diagnosis section, there are additional ones useful to diagnose the new species: *Australoheros sanguineus* has a longer snout compared to *A. facetus*, *A. guarani* and *A. minuano* (snout length 14.4–22.5 % SL vs. 8.9–12.6 % SL, pooled data), as well as, a broader interorbital (interorbital width 15.1–24.2 % SL) compared to *A. facetus*, *A. guarani* and *A. minuano* (10.6–13.3 % SL, pooled data). The new species always possess 11–12 pleural ribs, while *A. acaroides*, *A. austrani*, *A. ipatinguensis*, *A. paraiba*, *A. saquarema*, and *A. robustus* have just 9–10 (pooled data), as well as nine anal-fin rays, while *A. angiru*, *A. capixaba*, *A. charrua*, *A. guarani*, *A. kaaygua*, *A. robustus*, *A. ribeirae*, *A. scitulus*, *A. taura*, and *A. tembe* have just 6–8 (pooled data). Besides that, *A. sanguineus* never has dark marks on the suborbital region in preserved condition, while *A. ykeregua*, *A. scitulus*, and *A. forquilha* always exhibit these dark marks (see ŘÍČAN & KULLANDER, 2008; fig. 5). The new species also differs from *A. facetus*, which has a prognathous mouth, by having an isognathous mouth, from *A. guarani* by having a shorter last dorsal-fin spine (last dorsal-fin spine length 14.5–16.4%

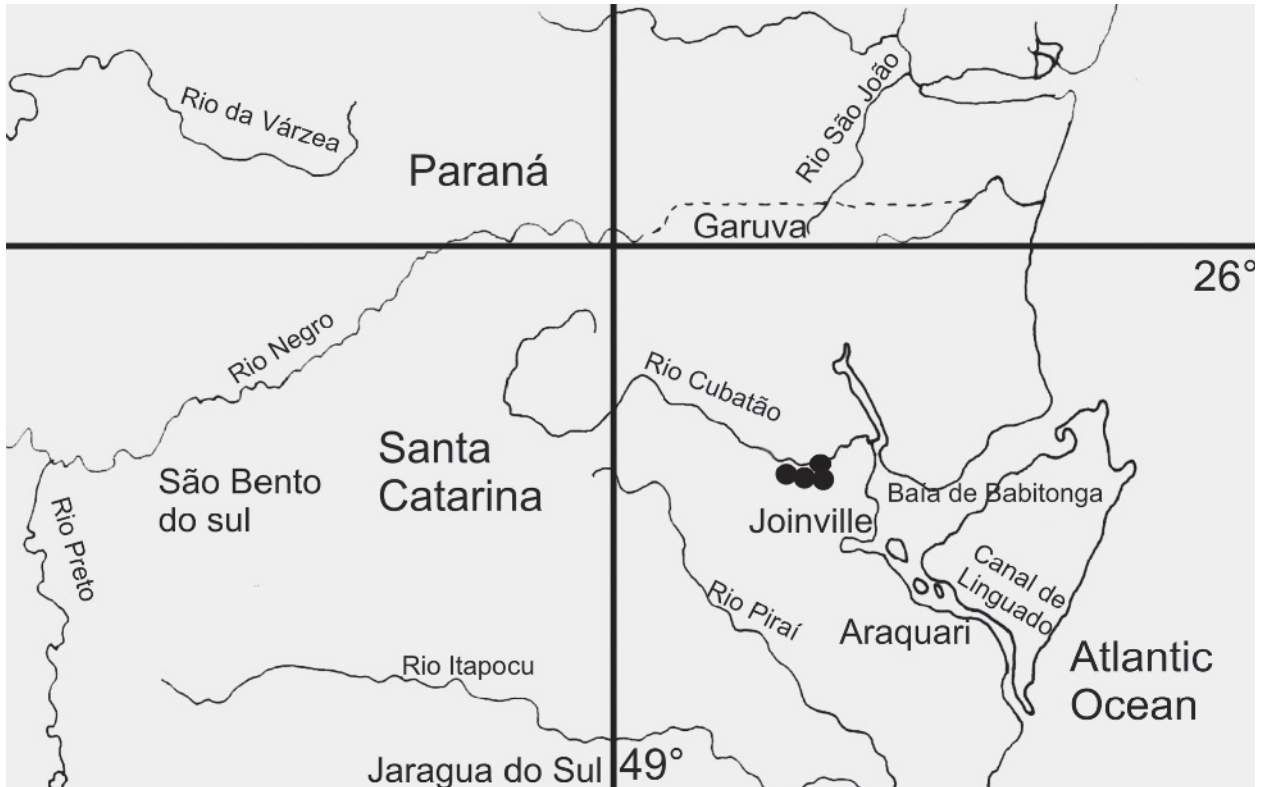


Fig. 4. Distribution map of *Australoheros sanguineus* sp. n. ● *Australoheros sanguineus* sp. n.

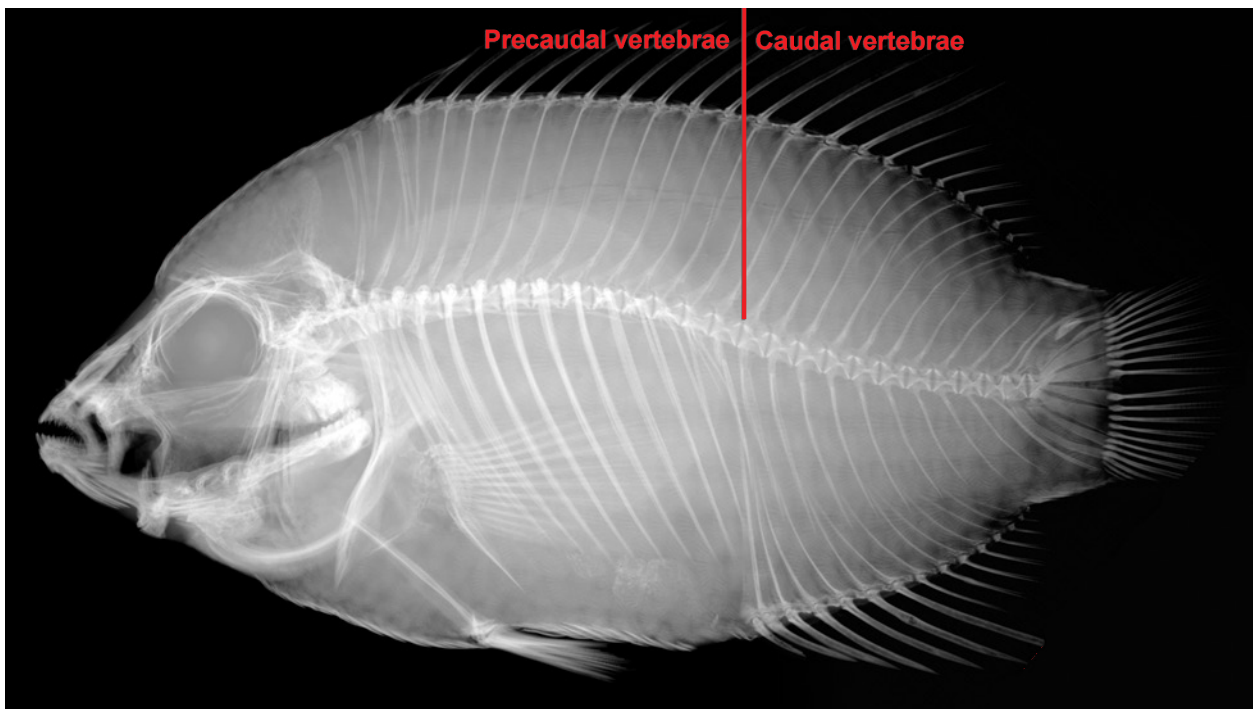


Fig. 5. *Australoheros sanguineus* sp.n., MCP 14556, 88.1 mm SL, holotype (radiographed).

SL), while *A. guarani* has a longer one (dorsal-fin spine length 16.6–19.5 % SL); from *A. taura* by having deeper body (body depth 45.4–49.0% SL), while *A. taura* has a shorter one (40.1–42.4 % SL) and a shorter predorsal length (42.7–45.3 % SL), while *A. taura* has a longer one (47.2–50.2 % SL). *Australoheros sanguineus* is

distinguished from *A. acaroides* by some scales counts (*A. sanguineus* sp. n. has 25–26 and 26–28 scales on E0 and E1 series respectively, while *A. acaroides* has just 23–24 and 24–25), by having 24 proximal radials on dorsal-fin base (26 in *A. acaroides*), by having modally just 3 cheek scale rows (5 in *A. acaroides*), and by the

presence of a thinner and less conspicuous longitudinal stripe.

*Australoheros acaroides* and *A. facetus* share a unique colour pattern characterized by the presence of a red pigmented line on dorsal-fin margin (figs. 3, and CALVIÑO, 2007; fig. 3). This character state differentiates both species from *A. sanguineus* (fig. 1) and from the congeners of south-eastern Brazil (see OTTONI *et al.*, 2008; fig. 1; OTTONI & COSTA 2008; figs. 1, 8, 9 and 13; OTTONI, 2010; fig. 1; and OTTONI, 2012; fig. 3). Besides that, both *A. acaroides* and *A. facetus*, as well as *A. sanguineus* exhibit red colouration on the caudal-fin's margin corners (fig. 1 and 3, and CALVIÑO, 2007; fig. 3), distinguishing it from the congeners of the coastal rivers basin from south-eastern Brazil (see OTTONI *et al.*, 2008; fig. 1; OTTONI & COSTA, 2008; figs. 1, 8, 9 and 13; and OTTONI, 2010; fig. 1); and do not possess conspicuous metallic blotches on anal-fin base (fig. 1 and 3, and CALVIÑO, 2007; fig. 3), differentiating these species from the congeners of the rios São Francisco, Paraíba do Sul, Macacu and upper Paraná basins from south-eastern Brazil (see OTTONI *et al.*, 2008; fig. 1; OTTONI & COSTA, 2008; figs. 8; OTTONI, 2012; fig. 3 and OTTONI, 2013, figs. 3–6). *Australoheros sanguineus* presents this red pigmentation of the caudal-fin margin as a blood red colouration (fig. 1), differing from the congeners of the rios São Francisco, Paraíba do Sul and upper Paraná basins, from south-eastern Brazil, which only has a reddish colouration (see OTTONI, 2012, fig. 3 and OTTONI, 2013; figs. 1–6), instead of a blood red one.

Despite ŘIČAN *et al.* (2011) affirmed that the species of *Australoheros* from the Atlantic coastal basins possess 13+13 vertebrae, not 14+12 as recorded by OTTONI *et al.* (2008), OTTONI & COSTA (2008), OTTONI & CHEFFE (2009), OTTONI (2010) and OTTONI (2012), by fig. 5 we again are able to confirm that vertebrae counts (14+12) proposed by the latter authors. *Australoheros sanguineus* possesses 13–14 precaudal vertebrae and 12 caudal vertebrae (fig. 5). This count is clearly observed on fig. 5. The caudal vertebrae are those in which the parapophyses are fused in an arch (as the posteriorly 11 vertebrae before the last half centrum, and including the last half centrum), and the precaudal vertebrae are those in which the parapophyses are not fused in an arch (corresponding the other anterior vertebrae) (fig. 5). The lower number of caudal vertebrae is uniquely shared with the other congeners from south-eastern Brazil (OTTONI & COSTA, 2008; OTTONI & CHEFFE, 2009; OTTONI, 2010; OTTONI, 2012).

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