

# Life colouration of three *Australoheros* species from the rio Paraíba do Sul basin, southeastern Brazil (Teleostei: Labroidei: Cichlidae)

FELIPE P. OTTONI

Laboratório de Sistemática e Evolução de Peixes Teleósteos, Instituto de Biologia, Universidade Federal do Rio de Janeiro, Cidade Universitária, Caixa Postal 68049, CEP 21994-970, Rio de Janeiro, RJ, Brasil; Email: fpottoni(at)gmail.com

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## Abstract

The colouration in life of three *Australoheros* species from the rio Paraíba do Sul basin is described herein: *Australoheros muriae*, *Australoheros paraibae* and *Australoheros robustus*. These three species share a character state characterized by the presence of two red zones on caudal-fin's posterior margin corners, differentiating them from its congeners from the coastal river basins of southeastern Brazil. *Australoheros muriae*, as well as, its congeners from the coastal river basins of southeastern Brazil (except *A. macacuensis*), do not expose metallic blotches on anal fins, differing from *A. paraibae* and *A. robustus* which always show metallic blotches on anal fin. *Australoheros muriae* is also distinguished from these other two species by having red iridescence restricted to the upper region of flank, near dorsal-fin base. *Australoheros paraibae* differs from *A. robustus* by having ground of body yellow or yellowish brown, absence of any red iridescence on flank, dorsal-fin ground colouration yellow to yellowish brown and anal fin with ground colouration reddish brown on anterior portion, and yellowish brown on posterior portion.

## Resumo

A coloração em vida de três espécies de *Australoheros* da bacia do Rio Paraíba do Sul é aqui descrita: *Australoheros muriae*, *Australoheros paraibae* e *Australoheros robustus*. Essas três espécies compartilham um estado de caráter caracterizado pela presença de duas zonas avermelhadas nas quinas da margem posterior da nadadeira caudal, as diferenciando dos congêneres das bacias costeiras do sudeste do Brasil. *Australoheros muriae*, assim como seus congêneres das bacias costeiras do sudeste do Brasil (exceto *A. macacunesis*), não possui manchas metálicas na nadadeira anal, diferentemente de *A. paraibae* e *A. robustus* que sempre possuem manchas metálicas na nadadeira anal. *Australoheros muriae* também difere de ambas as espécies por possuir iridescência vermelha restrita à região superior do flanco, próximo a base da nadadeira dorsal. *Australoheros paraibae* difere de *A. robustus* por possuir corpo amarelo ou marrom amarelado, ausência de qualquer iridescência vermelha no flanco, coloração da nadadeira dorsal amarela ou marrom amarelado e nadadeira anal com coloração marrom avermelhado na porção anterior, e marrom amarelado na porção posterior.

## Key words

*Australoheros muriae*, *Australoheros paraibae*, *Australoheros robustus*, Cichlasomatini, Cichlinae, ichthyology, South America, taxonomy.

## Introduction

*Australoheros* RÍCAN & KULLANDER, 2006 is a South American cichlid fish genus distributed on the Paraná-Paraguay-Uruguay river system of southern Brazil,

Uruguay, northeastern Argentina, along several coastal basins between Bahia, northeastern Brazil, and northeastern Argentina, and on the São Francisco and upper

Paraná drainages, within Brazil (RÍCAN & KULLANDER, 2006; OTTONI & COSTA, 2008; RÍCAN & KULLANDER, 2008; OTTONI, 2010; SCHINDLER *et al.*, 2010; OTTONI *et al.*, 2011; and OTTONI, 2012).

In the last two decades, several species have been described, making *Australoheros* one of the genera within the Cichlinae with the highest species diversity (RÍCAN *et al.*, 2011 and OTTONI, 2012).

Colouration in life has revealed several characters useful in the taxonomy of the genus and to diagnose *Australoheros* species (e.g. OTTONI *et al.*, 2008; OTTONI & CHEFFE, 2009; OTTONI, 2010; RÍCAN *et al.*, 2011; and OTTONI, 2012). Due to the importance of life characters in taxonomy of the genus, the life colouration of three species of the *Australoheros autrani* species group *sensu* OTTONI (2010 & 2012), from the rio Paraíba do Sul basin, is described herein, i.e. *Australoheros muriae* OTTONI & COSTA, 2008, *Australoheros paraibae* OTTONI & COSTA, 2008 and *Australoheros robustus* OTTONI & COSTA, 2008. These species were first described without information about colouration in life.

## Materials and methods

The material is deposited in the Instituto de Biologia, Universidade Federal do Rio de Janeiro (UFRJ), Brasil. The descriptions of colouration in life were made according OTTONI & COSTA (2008), OTTONI *et al.* (2008), OTTONI (2010) and OTTONI (2012). Bars are grouped in head and trunk bars, numbered from the caudal-fin to the snout, as well as, spots (KULLANDER, 1983). Information about colouration in life of each species is based on photographed live specimens and field observations. The number of specimens photographed were four *A. muriae*, four *A. paraibae* and one *A. robustus*. All the photographs were taken in the field, immediately before preservation.

## Results

### *Australoheros muriae* OTTONI & COSTA, 2008

**Material examined.** UFRJ 8393, 8, 13.2–53.7 mm SL; rio Palanquim, between Itaperuna and Italva, road BR-356, Itaperuna municipality, 21° 17' 24.92" S 41° 42' 45.79" W; F. Ottoni, J. Mattos and P. Bragança, December 19<sup>th</sup> 2011. UFRJ 8412, 4, 52.1–67.0 mm SL; rio Palanquim, between Itaperuna and Italva, road BR-356, Itaperuna municipality, 21° 17' 24.92" S 41° 42' 45.79" W; F. Ottoni, J. Mattos and P. Bragança, December 19<sup>th</sup> 2011.

**Colouration in life (figs. 1–2).** Side of body varies from light brown, to yellowish brown or greenish brown; seven dark brown or black trunk bars. Three black spots located on same regions as in preserved specimens. Conspicuous rounded caudal-fin base spot. Metallic green, blue or golden iridescence on flank, mainly near longitudinal stripe. Usually red iridescence restricted to upper region of body, near dorsal-fin base. Intensity of bars strongly and quickly changing. Spots darkness slightly changing. Intensity of bars strongly and quickly changing. Intensity of spots slightly changing.

Side of head with same colouration as flank, darker on cheek, opercle and near snout; three bars with same colouration as trunk bars. Eyes not crossed by horizontal stripe or bars, with iris often changing from dark brown or yellowish brown colouration. Metallic golden iridescence on opercle and cheek, sometimes red iridescence on snout.

Basic colouration of dorsal fin reddishbrown or red on anterior portion, yellowish brown or yellow on posterior portion, intensely invaded by trunk bars; missing metallic iridescence on entire fin (except single stripe located on its margin). Metallic green stripe on dorsal-fin margin. Anal fin red or reddish brown near base, yellow or yellowish brown on posterior portion, with green stripe on its margin. Anal fin never possessing metallic blotches. Caudal fin with same basic colouration as flank, usually with metallic green iridescence, with green or blue stripe on posterior margin. Two red zones on caudal-fin's posterior margin corners, one superior, the other inferior. Pelvic fin darker than flank, usually with golden, green or blue iridescence, more concentrated near spine. Pectoral fin hyaline.

### *Australoheros paraibae* OTTONI & COSTA, 2008

**Material examined.** UFRJ 7822, 4, 58.0–70.5 mm SL; stream Santa Cecilia, tributary from the rio do Peixe, road to São Bento, Santa Luzia and Araxá, near the km 132 of the road MG-353, 21° 59' 15.2" S 43° 36' 37.87" W; F. Ottoni, P. Bragança and F. Pereira, July 26<sup>st</sup> 2010.

**Colouration in life (figs. 3–4).** Side of body varies from yellow to yellowish brown; seven dark brown or black trunk bars. Three black spots located on same regions as in preserved specimens. Conspicuous rounded caudal-fin base spot. Metallic green or golden iridescence usually on flank, more concentrated near longitudinal stripe. Intensity of bars strongly and quickly changing. Intensity of spots slightly changing.

Side of head with same colouration as flank, darker on cheek, opercle, and near snout; three bars with same colouration as trunk bars. Eyes not crossed by horizontal stripe or bars, with iris often changing from red to yellow or yellowish brown. Metallic green or golden iridescence on opercle and cheek.



**Fig. 1.** *Australoheros muriae*: UFRJ 8412, 67.0 mm SL; rio Muriaé drainage, rio Paraíba do Sul basin, southeastern Brazil.



**Fig. 2.** *Australoheros muriae*: UFRJ 8412, 52.1 mm SL; rio Muriaé drainage, rio Paraíba do Sul basin, southeastern Brazil.



**Fig. 3.** *Australoheros paraibae*: UFRJ 7822, 70.5 mm SL; rio do Peixe drainage, rio Paraíba do Sul basin, southeastern Brazil. Photo: P. Bragança.



**Fig. 4.** *Australoheros paraibae*: UFRJ 7822, 58.0 mm SL; rio do Peixe drainage, rio Paraíba do Sul basin, southeastern Brazil. Photo: P. Bragança.



**Fig. 5.** *Australoheros robustus*: UFRJ 7825, 65.1 mm SL; stream in Chiador municipality, rio Paraíba do Sul basin, southeastern Brazil. Photo: P. Bragança.



**Fig. 6.** *Australoheros robustus*: UFRJ 7825, 65.1 mm SL; stream in Chiador municipality, rio Paraíba do Sul basin, southeastern Brazil. Photo: P. Bragança.

Basic colouration of dorsal fin yellow to yellowish brown, densely invaded by trunk bars, usually with metallic green, blue, or golden iridescence near base. Blue stripe on dorsal-fin margin. Basic colouration of anal fin reddish brown on anterior portion, and yellowish brown on posterior portion, with blue stripe on its margin. Anal fin always exhibiting metallic blue or green blotches,

mainly on its base. Caudal fin yellowish brown or greenish brown, with blue stripe on posterior margin. Two red zones on caudal-fin's posterior margin corners, one superior, the other inferior. Pelvic fin darker than trunk, usually with blue or green iridescence, more concentrated near base and spine. Pectoral fin hyaline.

## *Australoheros robustus* OTTONI & COSTA, 2008

**Material examined.** UFRJ 7825, 1, 65.1 mm SL; stream in Chiador municipality, on the road between Chiador and Mar de Espanha, 21°58'40.73"S 43°01'47.32"W; F. Ottoni, P. Bragança and F. Pereira, July 27<sup>th</sup> 2010. UFRJ 7828, 2, 36.9–41.1 mm SL; road MG-126 between Sapucaia and Mar de Espanha; F. Ottoni, P. Bragança and F. Pereira, July 27<sup>th</sup> 2010.

**Colouration in life (figs. 5–6).** Side of body reddish brown; seven dark brown or black trunk bars. Three black spots located on same regions as in preserved specimens. Conspicuous rounded caudal-fin base spot. Metallic green iridescence usually on flank, near longitudinal stripe. Red iridescence on entire body. Intensity of bars strongly and quickly changing. Intensity of spots slightly changing.

Side of head with same colouration as flank, darker on cheek and near snout; three bars with same colouration as trunk bars. Eyes not crossed by horizontal stripe or bars, with iris often changing from dark brown to yellowish brown colouration. Metallic golden iridescence on opercle.

Basic colouration of dorsal fin varies from reddish brown to red, slightly invaded by trunk bars, usually with metallic green iridescence, more concentrated on posterior portion. Gray, light brown or dark brown stripe on dorsal-fin margin. Basic colouration of anal fin with same colouration as dorsal fin. Anal fin always exhibiting metallic blue or green blotches, mainly on its base. Caudal fin hyaline to light brown, with gray stripe on posterior margin, usually with metallic green iridescence near base. Two red zones on caudal-fin's posterior margin corners, one superior, the other inferior. Pelvic fin darker than trunk, usually with green iridescence, more concentrated near spine. Pectoral fin hyaline.

## Discussion

The life colouration of three *Australoheros* species from the rio Paraíba do Sul basin (*Australoheros muriae*, *A. paraibae* and *A. robustus*) is herein described. These three species, as well as, its congeners of the same river basin share a character state characterized by the presence of two red zones on their caudal-fin's posterior margin corners, one superior and other inferior (figs. 1–6). This character state differentiates these species from all the *Australoheros* species from the coastal river basins of southeastern Brazil: *A. austrani* OTTONI & COSTA, *A. capixaba* OTTONI, 2010, *A. macaensis* OTTONI & COSTA, 2008, *A. macacuensis* OTTONI & COSTA, 2008, *A. ribeirae* OTTONI *et al.*, 2008 and *A. saquarema* OTTONI & COSTA, 2008.

*Australoheros muriae* has a unique character state among its congeners from the rio Paraíba do Sul basin:

anal fin never exhibiting metallic blotches (figs. 1–2). This differs *A. muriae* from both *A. paraibae* and *A. robustus*, as well as, from its congeners from the rio Paraíba do Sul basin. As well as *A. muriae*, the *Australoheros* species from the coastal rivers basin of southeastern Brazil never exhibit metallic blotches on anal fin, except *A. macacuensis* which also exposes comparable metallic blotches. *Australoheros muriae* also differs from *A. paraibae* and *A. robustus* by exposing red iridescence restricted to the upper region of flank, near dorsal-fin base (figs. 1–2), while *A. paraibae* miss any red iridescence on flank (figs. 3–4), and *A. robustus* show red iridescence on entire body (figs. 5–6).

Both *Australoheros paraibae* and *A. robustus* expose metallic blotches on anal-fin base. *Australoheros paraibae* differs from *A. robustus* by having basic colouration of body yellow to yellowish brown, and by absence of any red iridescence on flank (figs. 3–4), while *A. robustus* have ground of body reddish brown and red iridescence on entire body (figs. 5–6); dorsal-fin ground colouration yellow to yellowish brown (figs. 3–4), while *A. robustus* posses reddish brown to red ground colouration (figs. 5–6); and basic colour of anal fin reddish brown on anterior portion, yellowish brown on posterior portion (figs. 3–4), while *A. robustus* exhibit basic colouration reddish brown to red on entire anal fin (figs. 5–6).

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