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Update of diagnoses, information on distribution, species, and key for identification of *Laetacara* species (Teleostei, Cichlidae, Cichlasomatini)

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Abstract

The diagnoses of *Laetacara* species is updated herein based on either character states outlined in their original descriptions, redescriptions, or found in examined material (both type and non-type material) and additional observed data. Information on distribution of *Laetacara* species is herein updated. A key for species identification including all known species of *Laetacara* is provided. New information about the species of the genus is provided, based on examined material and compilation from literature.

Resumo

As diagnoses das espécies de *Laetacara* são atualizadas no presente trabalho, com base em estados de caracteres levantados à partir de suas descrições originais, redescrições, material examinado (tanto material tipo quanto não tipo) e dados adicionais observados. Informações sobre a distribuição das espécies de *Laetacara* são aqui atualizadas. Uma chave de identificação incluindo todas as espécies conhecidas de *Laetacara* é aqui apresentada. Novas informações sobre as espécies do gênero são aqui disponibilizadas, baseadas tanto em material examindado, como em compilação à partir da literatura.

Key words

Acanthomorpha, Amazonas river basin, Cichlinae, Ichthyology, Ovalentaria, Pantanal, Taxonomy.

Introduction

Cichlidae is the most species-rich non-Ostariophysyan freshwater fish family, including more than 1,700 valid species (Kullander, 2003; Ottoni & Mattos, 2015; Nelson *et al*., 2016; Eschmeyer & Fong, 2018). The family is distributed within freshwater systems of Africa, Americas, and Asia (Kullander, 1998, 2003). Currently, Cichlidae is divided into four subfamilies: Etroplinae, Ptychochrominae, Pseudocrenilabrinae and Cichlinae (Smith *et al.*, 2008). Cichlinae, comprising the Neotropical taxa, currently including about 570 valid species (Eschmeyer & Fong, 2018), is divided into seven tribus: Cichlini, Retroculini, Astronotini, Chaetobranchini, Geophagini, Chiclasomatini and Heroini (Smith *et al.*, 2008).

Laetacara Kullander, 1986 has been described as a South American cichlid genus, member of the tri-

bus Cichlasomatini (Smith *et al*., 2008), including the *Aequidens dorsiger* group *sensu* Kullander (1983), which comprised: *Aequidens curviceps* (Ahl, 1924), *A. dorsiger* (Heckel, 1840), *A. flavilabris* (Cope, 1870), and *A. thayeri* (Steindachner, 1875). This genus would be distributed within the Amazonas river basin, including the Araguaia, Madeira, Xingú, Tocantins, Tapajós, Rio Negro, Napo, Putumayo, Yavarí, Tigre, Ucayali, Yavarí, Juruá and Solimões river drainages, but also occurring in the coastal river basins of the northern edge of the Guiana Shield besides the Paraná-Paraguay-Uruguay river system (Kullander, 1986, 2003; Schindler, 1991; Römer, 1992, 1994; Staeck & Schindler, 2007; Ottoni & Costa, 2009; Ottoni *et al*., 2009, 2012; Lanés *et al*., 2010).

Kullander (1986) provided redescriptions for *Laetacara flavilabris*, then designed as the type species of the genus, and *L. thayeri*. However, his morphological data were based mainly on material from the upper tributaries of the Amazonas river basin of Peru, and did neither present formal and explicit diagnoses for these species, nor a key for species identification of the genus. He just briefly distinguished both species from each other in a section called "notes", however did not compare them with the other congeners.

About two decades later, *Laetacara fulvipinnis* Staeck & Schindler, 2007 was described based on six specimens collected in the upper Rio Negro, Casiquiare and Orinoco river basins (Staeck & Schindler, 2007). This species had been well known for some decades before its description from aquarium publications (see Prick, 1978; Koslowski, 1985; Schindler, 1991; Römer, 1992, 1994; Linke & Staeck, 1994; Staeck, 2003). Just after the formal description of *L. fulvipinnis*, Ottoni & Costa (2009) re-described *L. dorsigera* based on Brazilian material, as well as described *L. araguaiae* Ottoni & Costa, 2009 from the Verde river drainage, part of the Araguaia river drainage, southern Amazonas river basin, Central Brazil. In the same year, Ottoni *et al*. (2009) re-described *L. curviceps* based on both type material and specimens recently collected in the lower Amazonas river basin. More recently, *L. flamannellus* Ottoni, Bragança, Amorim & Gama, 2012 was described based on several specimens from different coastal river basins of northern Brazil (Ottoni *et al*., 2012).

The aim of this paper is to update the diagnoses of the valid species of *Laetacara* based on character states outlined in their original descriptions, re-descriptions, (re-) examination of voucher specimens (both type and non-type) and inclusion of additional observational data. Formal and explicit diagnoses were never proposed for both *L. flavilabris* and *L. thayeri*. Difference between species and some main characteres were just briefly cited in some sections of their original descriptions and redescriptions, not explicitly comparing them with all the valid congeners. What make a proposition of formal and explicit diagnoses for these species suitable for a better taxonomic understanding of the genus. In addition, the diagnoses of the other congeners have to be updated since a) new species have been described during the last decades, and b) additional data have been collected for all species of the genus. The final scope of this paper is to present an update of the comprehensive dichotomous key of Ottoni *et al*. (2009) for identification of all yet known species of *Laetacara* based on the new observational data set.

Material and methods

Material

Material is deposited in the following institutions: ANSP, Academy of Natural Sciences of Philadelphia; IEPA, Instituto de Pesquisas Científicas e Tecnológicas do Estado do Amapá, Macapá; MCP, Museu de Ciências e Tecnologia da Pontifícia Universidade Católica do Rio Grande do Sul, Porto Alegre; MNRJ, Museu Nacional, 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; NMW, Naturhistorisches Museum Wien, Viena; UFRJ, Instituto de Biologia, Universidade Federal do Rio de Janeiro, Rio de Janeiro; and ZMB, Museum für Naturkunde, Berlin. Additional comparative material is listed in Ottoni (2015) and Ottoni & Mattos (2015).

Morphological data

Morphological data and species distribution information were taken either from published papers (including original descriptions, re-descriptions, and other reliable publications), or from examined material, containing type material, museum material and recently collected specimens.

Morphological data were obtained from both preserved and live specimens. Specimens were fixed in formalin 10% for a period of 15 days, and then transferred to 70 % ethanol. The recent collected specimens (since 2012) were euthanized in tricain mesylate (TMS), used for anesthesia, sedation, or euthanasia of fish. This euthanasia method is recommended by the "American Veterinary Medical Association" (Leary *et al*., 2013) and "European Commission DGXI" (Close *et al*., 1996; 1997). Information on life colour patterns was obtained both on direct observations of live specimens during field works, and photographs of live specimens. Information on life colouration of *Laetacara* species is based on photographs of: a) *L. araguaiae*: 88 live specimens, and all specimens collected by the author; b) *L. curviceps*: seven live specimens, and all specimens collected by the author; c) *L. dorsigera*: 13 live specimens, and all specimens collected by the author; d) *L. flamannellus*: seven specimens, and all the specimens from the lots UFRJ 8060, UFRJ 8005, UFRJ 8010, UFRJ 8038; e) *L. flavilabris*: eight specimens; f) *L. fulvipinnis*: five specimens; and g)

L. thayeri: 14 specimens, and all specimens collected by the author.

Measurements and counts were made according to Ottoni *et al*. (2011), Ottoni *et al*. (2012) and Ottoni & Mattos (2015). The smaller ray that occurs at the extremities of the dorsal, anal and pectoral fins may eventually be connected to the anterior ray. However, it is counted as a separate element. Some measurements and counts provided by Ottoni *et al*. (2011) were erroneously and poorly defined, being herein redefined:

Measurements: (1) standard length - from the upper jaw symphysis to posterior end of the caudal peduncle; and (4) preorbital depth – measured in an imaginary vertical line through the anteriormost eye margin.

Counts: (17) scales of caudal-peduncle depth is the number of scales (or series of scales) through a vertical line at approximately the middle of the caudal peduncle; The (18) caudal-fin rays are counted following the formula "number of dorsal unsegmented procurrent rays (Pc) + number of dorsal principal rays (segmented) + number of ventral principal rays (segmented) + number of ventral unsegmented procurrent rays (Pc)"; and The (21) scales of anal-fin origin series is the vertical count of scales from the anal-fin origin to the upper lateral line (not counting the lateral line scale) .

Counts of gill-rakers of the first branchial arch are made according Ottoni & Mattos (2015), including rakers from both sides of each bone. The Prepelvic scales series (squ.prv) is a longitudinal count of scales, in a ventral view, from the base of pelvic fins (including the scales between these paired fins) to the last scale in of the ventral profile. The predorsal (squ. predorsal), is a longitudinal count of scales, in a dorsal view, from the first dorsal-fin spine, to the last scale in the dorsal profile (in the case of squamation pattern trisserial, this count begins on the pair of scales which are deeply in contact with the first dorsal-fin spine).

Osteological studies were made on cleared and counterstained (C&S) specimens prepared according to Taylor & Van Dyke (1985); osteological nomenclature follows Costa (2009); precaudal and caudal vertebrae are defined according to Ottoni (2013). Nomenclature related to colour patterns follows Kullander (1983). Bars are numbered from caudal-fin base to head following Kullander (1983, 1986).

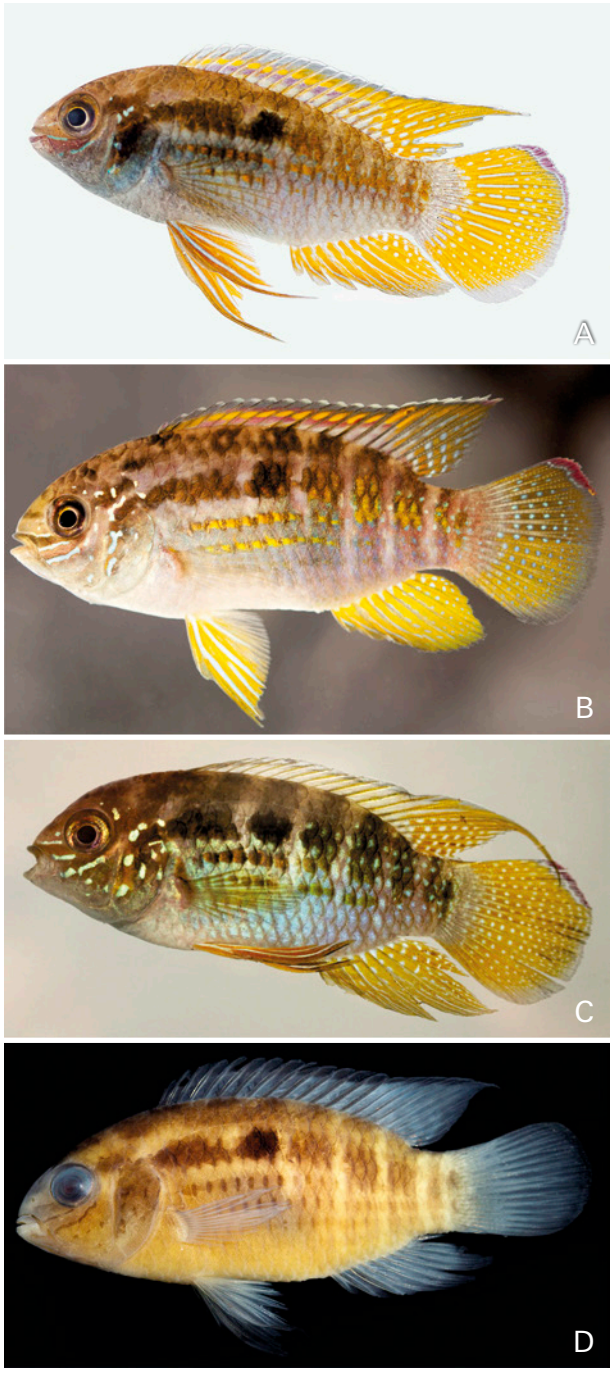

Fig. 1. *Laetacara araguaiae*: (A) UFRJ 8705, 31.5 mm SL, Araguaia river basin.; (B) UFRJ 8333, about 40 mm SL, Upper Paraná river basin; (C) UFRJ 9362, 39.5 mm SL, Xingú river basin; (D) UFRJ 8344, 40.8 mm SL, Upper Paraná river basin. A, B & C photographed by P. Bragança, and D photographed by F. Ottoni.

Results

Laetacara araguaiae Ottoni & Costa, 2009

Fig. 1; table 1

Laetacara araguaiae Ottoni & Costa, 2009: 43. Type locality: "Brazil: Estado de Goiás: buriti palm near rio Verde, 32 km N of São Miguel do Araguaia, rio Araguaia basin" [13°26'17" S 50°17'12" W]. Holotype: UFRJ 7557: 32.1 mm SL.

Diagnosis

Laetacara araguaiae differs from all its congeners by having one exclusive character state: longitudinal stripes on the mid-ventral portion of flank, below the lateral band, light brown on preserved specimens and yellowish brown to golden in live specimens (fig. 1) (*vs*. absent). In addition, *L. araguaiae* is distinguished from

Table 1. Meristic data of *L. araguaiae* and *L. curviceps*. Pc = procurrent rays.

	L. araguaiae	***L. curviceps***
Dorsal-fin spines	13 (7)–14 (164)–15 (78)	14 (7)–15 (28)–16 (3)
Dorsal-fin rays	7 (5)–8 (67)–9 (137)–10 (33)	8 (23)–9 (16)
Proximal radials on dorsal-fin base	20 (2)–21 (34)–22 (31)–23 (1)	22 (3)–23 (3)
Supra neurals	1 (6)–2 (54)	2 (6)
Anal-fin spines	3 (240)–4 (2)	3 (39)
Anal-fin rays	7 (19)–8 (112)–9 (58)	8 (20)–9 (19)
Proximal radials on anal-fin base	8 (66)–9 (43)	8 (1)–9 (5)
Pectoral-fin rays	12 (72)–13 (137)–14 (10)	12 (13)–13 (3)
Pelvic-fin spines	1 (144)	1 (30)
Pelvic-fin rays	5 (144)	5 (30)
Caudal-fin rays	1 (2)–2 (1)–3 (47)–4 (8) Pc+ 8 (58) + 8 (58) + 3 (49)–4 (7) Pc	3 (6) Pc + 8 (6) + 8 (6) + 3 (6) Pc
Precaudal vertebrae	12 (65)	12 (6)
Caudal vertebrae	11 (10)–12 (55)	12 (6)
Pleural rib pairs	8 (1)–9 (52)–10 (14)	9 (5)–10 (1)
Gill-rakers on first branchial arch	0 (5)–1 (29)–2 (13)–3 (3)+ 1 (13)–2 (31) + 9 (10)–10 (14)–11 (12)–12 (11)–13 (3)	1 (2)–2 (2) + 1 (2)–2 (2) + 9 (2)–10 (2)
Teeth on posterior margin of ceretobranchial 5	18 (2)–19 (3)–20 (6)–21 (6)–22 (11)–23 (7)–24 (7)–25 (3)	19 (2)–20 (2)
Teeth on mid-line of ceretobranchial 5	5 (2)–6 (17)–7 (19)–8 (6)–9 (1)	5 (1)–6 (1)–7 (1)–8 (1)
Scales of upper lateral line series	10 (1)–11 (3)–12 (18)–13 (60)–14 (111)–15 (24)–16 (2)	12 (2)–13 (13)–14 (14)–15 (3)
E2	18 (9)–19 (132)–20 (34)–21 (1)	19 (23)–20 (9)
Scales of lower lateral line series	5 (3)–6 (47)–7 (76)–8 (55)–9 (4)	5 (1)–6 (15)–7 (16)
E0	22 (24)–23 (101)–24 (58)	23 (13)–24 (18)–25 (1)
Scales of dorsal-fin origin series	3 (238)	3 (46)
Scales of the end of upper lateral line to dorsal fin series	1 (4)–2 (203)	2 (46)
Scales between lateral lines	2 (122)	2 (46)
Scales of peduncle depth	7 (209)	7 (46)
Cheek scales rows	2 (198)	2 (32)

L. flavilabris and *L. fulvipinnis* by possessing 23 or 24 vertebrae in total (*vs*. 25–27); from *L. thayeri* by having flank spot approximately rounded, without intense dorsal extension to the dorsal-fin base in preserved or live specimens (fig. 1) (*vs*. flank spot with intense dorsal extension to the dorsal-fin base in preserved and live specimens; fig. 10), and absence of brown suborbital bar in preserved or live adult specimens (fig. 1) (*vs*. presence; Fig. 10); from *L. curviceps, L. dorsigera* and *L. flamannellus* by absence of brown dorsal-fin base spot in preserved or live specimens (fig. 1) (*vs*. presence; figs. 3, 5, 6 and 7); and finally from *L. fulvipinnis* by presence of dots on the caudal fin of preserved (brown) as well as of live specimens (bluish brown) (fig. 1) (*vs*. absence; fig. 7).

Distribution. *Laetacara araguaiae* is known from several localities of the Araguaia, upper-middle Tocantins, Xingú and upper-middle Tapajós river drainages, of the Amazon river basin, and upper Paraná river basin, central Brazil (fig. 2).

Remarks. *Laetacara araguaiae* was first described based on material from only three localities near to São Miguel do Araguaia municipality, central Brazil (Ottoni & Costa, 2009). However, the present study revealed that this species has a wider distribution, occurring in several localities of the Araguaia, Tocantins, Xingú, Tapajós and upper Paraná river drainages. The present study brought to light that live specimens of populations from the Araguaia, Tocantins and upper Paraná river drainages exhibit red lines surrounding yellow stripe of dorsal-fin mid-portion (figs. 1 A and B), while specimens of the Xingú and Tapajós river drainages do not express these red lines (fig. 1 C). However, when specimens were photographed some hours after collection, the redlines became inconspicuous, and absent in others. Therefore I consider here all these populations to belong to a single species.

Two specimens exhibiting abnormal higher vertebrae count (25) among the 67 examined specimens were recorded. In these specimens apparently there are an abnormal vertebrae, which are smaller than the others and have an uncommon shape, suggesting that one vertebra has been divided in two abnormal ones. As they apparently are a malformation and were rarely recorded, I excluded them from the species counts.

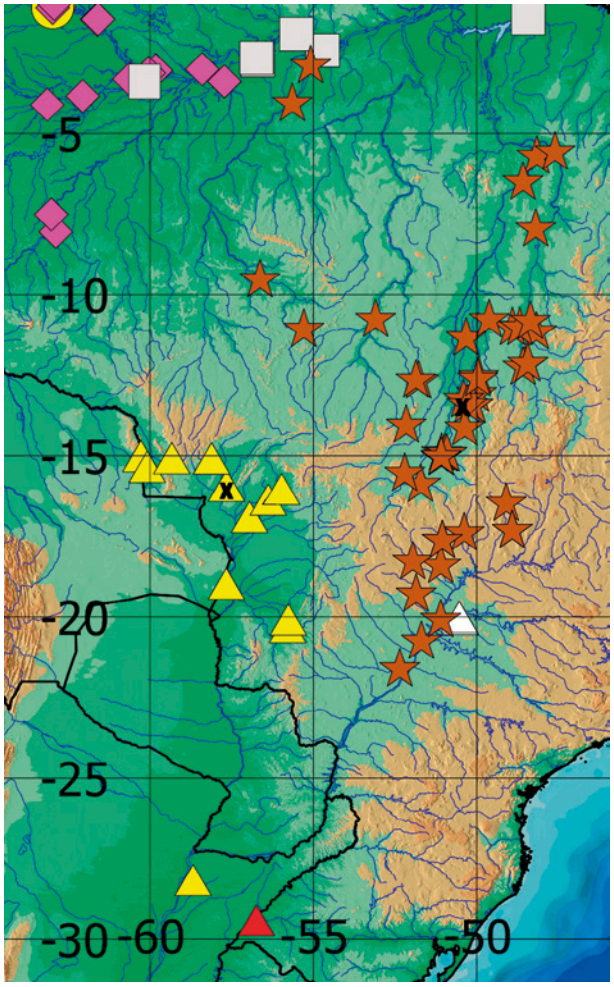

Fig. 2. Map of Distribution map of: *L. araguaiae* – material examined (brown star) and literature information (white triangle) (Souza-Filho & Casatti, 2010); *L. curviceps* – material examined (gray square); *L. dorsigera* – material examined (yellow triangle) and literature information (red triangle) (Lanés *et al*., 2010); *L. fulvipinnis* – material examined (yellow circle); and *L. thayeri* material examined (pink lozenge). Type localities marked with "X".

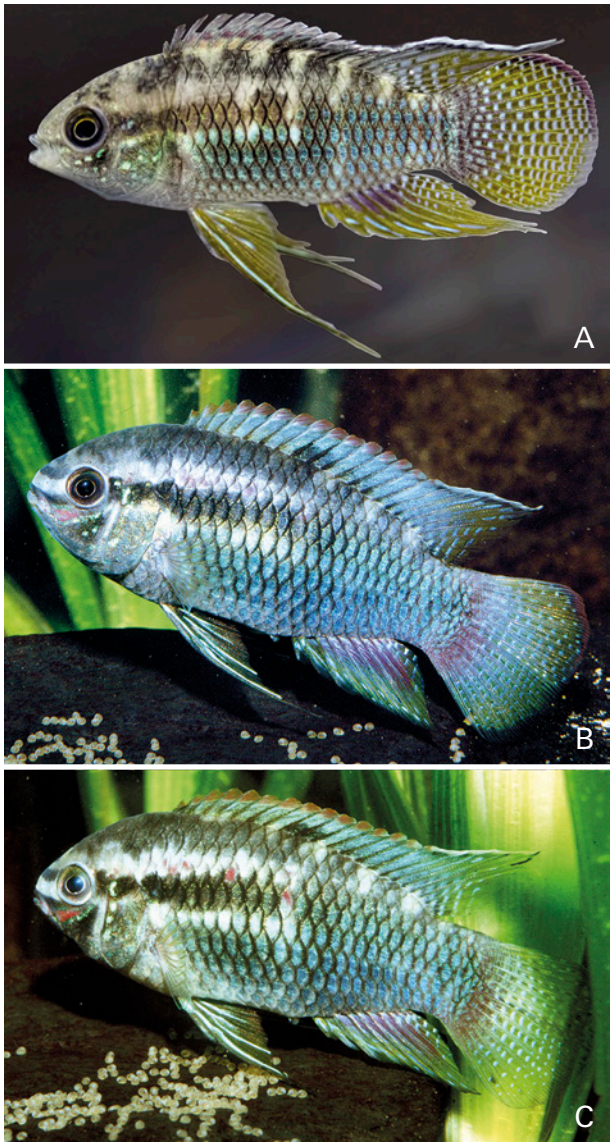

Fig. 3. *Laetacara curviceps*: (A) UFRJ 7971, about 35.0–40.0 mm SL, Utinga lake, Belém; Photographed by Pedro Bragança; (B) male, not preserved, from Santarém – PA; and (C) female, not preserved, from Santarém – PA. B & C: photographed by R. Stawikowski.

Laetacara curviceps (Ahl, 1924)

Fig. 3; table 1

Acara curviceps Ahl, 1924: 44. Type locality: Amazonenstrom. Holotype: ZMB 31324: 46.8 mm SL.

Diagnosis. *Laetacara curviceps* differs from all its congeners (except *L. dorsigera* and *L. flamannellus*) by possessing a brown dorsal-fin base spot, just above the trunk bar 5 in both preserved and live specimens (fig. 3) (*vs*. absence). In addition, *L. curviceps* is distinguished from *L. flavilabris* and *L. fulvipinnis* by having 24 total vertebrae (*vs*. 25–27); from *L. araguaiae* by absence of longitudinal stripes on the mid-ventral portion of flank below the lateral band in preserved or live specimens (fig. 3) (*vs*. presence of longitudinal stripes on the mid-ventral portion of flank below lateral band, light brown on preserved specimens and yellowish brown to golden in live specimens; fig. 1); from *L. thayeri* by having flank spot without intense dorsal extension to the dorsal-fin base both in preserved and live specimens (fig. 3) (*vs*. flank spot with intense dorsal extension to the dorsal-fin base in preserved and live specimens; fig. 10), and absence of brown suborbital bar in adults of preserved and live specimens (fig. 3) (*vs*. presence; fig. 10); from *L. fulvipinnis* by presence of brown dots (preserved specimens) or bluish brown dots on the caudal fin (live specimens) (fig. 3) (*vs*. absence; fig. 9). *Laetacara curviceps* differs from *L. dorsigera* by having red pigmentation of the caudal fin restricted to the upper corner of posterior margin in live specimens (fig. 3) (*vs*. on entire posterior margin; figs. 5 and 6), and chin, chest and belly never with red or reddish blue pigmentation in live specimens (fig. 3) (*vs*. with red pigmentation, mainly in breeding specimens; figs. 5 and 6) (Schmettkamp, 1982; Linke & Staeck, 1984; Koslowski, 1985; Stawikowski & Werner, 1998; Staeck,

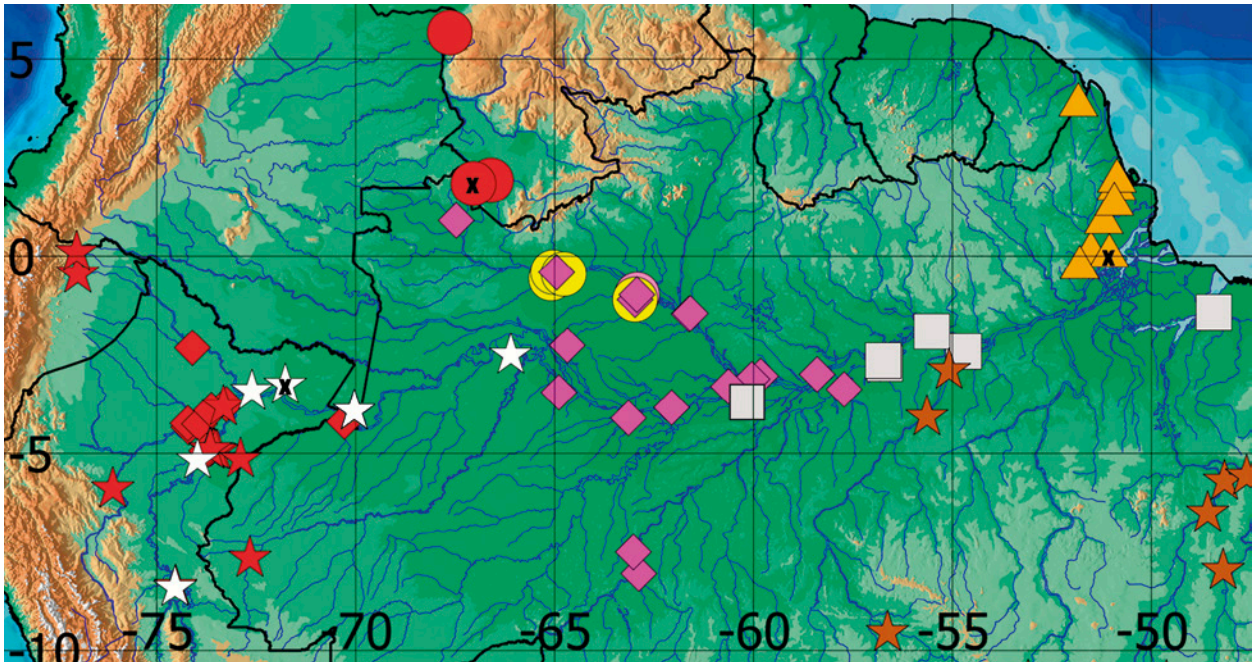

Fig. 4. Map of Distribution map of: *L. araguaiae* – material examined (brown star); *L. curviceps* – material examined (gray square); *L. flamannellus* - material examined (orange triangle); *L. flavilabris* – material examined (white star) and literature information (red star) (Kullander, 1986); *L. fulvipinnis* – material examined (yellow circle) and literature information (red circle) (Staeck & Schindler, 2007); and *L. thayeri* – material examined (pink lozenge) and literature information (red lozenge) (Kullander, 1986). Type localities marked with "X". Type localities of *L. curviceps* and *L. thayeri* are imprecise.

2003; Ottoni *et al*., 2009); and from *L. flamannellus* by having yellow stripe at dorsal-fin mid-portion incomplete, restricted to the posterior portion of the fin in live specimens with size about 34 mm SL or larger (fig. 3) (*vs*. complete yellow stripe at dorsal mid-portion; fig. 7), presence of a red or purple region on the anal-fin base (*vs*. absence), and presence of a red region on the caudal-fin base (fig. 3) (*vs*. absence; fig. 7).

Distribution. *Laetacara curviceps* is known from several localities of the lower Amazonas river basin in Brazil (fig. 4).

Remarks. The exact type locality of *Acara curviceps* is unknown. This species was introduced in the German aquarium trade in 1909 as "*Acara thayeri*". Later it was recognized as a new species and described by Ahl (1924), former curator of Herpetology in the ZMB, based on specimens obtained from the tropical aquarium-fish trade, collected in "Amazonenstrom" (Amazonas river) (Ottoni *et al.* 2009). The examination of the type series did not help to conclude the exact type locality.

The major part of the gut content of seven specimens of UFRJ 4361 was composed of adult aquatic insects of Coleoptera and Hemiptera, and immature Chironomidae. In addition, few undetermined eggs, and adults of Amphipoda and Ostracoda were found.

Laetacara dorsigera (Heckel, 1840)

Figs. 5 and 6; table 2

Acara dorsiger Heckel 1840: 348. Type locality: "Sümpfe in der Nähe des Paraguay-Flusses bei Villa Maria" [currently Cáceres, Mato Grosso state, Brazil]. Holotype: NMW 33669: approximately 40 mm SL.

Diagnosis. *Laetacara dorsigera* differs from all its congeners (except *L. curviceps* and *L. flamannellus*) by a brown dorsal-fin base spot, just above trunk bar 5 in preserved and live specimens (figs. 5 and 6) (*vs*. absent). In addition, *L. dorsigera* is distinguished from *L. flavilabris* and *L. fulvipinnis* by having 24 total vertebrae (*vs*. 25–27); from *L. araguaiae* by missing longitudinal stripes on the mid-ventral portion of flank, below lateral band, in preserved or live specimens (figs. 5 and 6) (*vs*. presence of longitudinal stripes on the mid-ventral portion of flank, below lateral band, light brown on preserved and yellowish brown to golden on live specimens; fig. 1); from *L. thayeri* by having flank spot approximately rounded, without intense dorsal extension to the dorsal-fin base in preserved and live specimens (figs. 5 and 6) (*vs*. flank spot with intense dorsal extension to the dorsal-fin base in preserved or live specimens; fig. 10), and absence of brown suborbital bar in adults of preserved and live specimens (figs. 5 and 6) (*vs*. presence; fig. 10); and from *L. fulvipinnis* by brown dots on the caudal fin of preserved, and bluish brown on that of live specimens (figs. 5 and 6) (*vs*. absence; fig. 9). *Laetacara dorsigera* differs from *L. curviceps* and *L. flamannellus* by having red pigmentation of the caudal fin along the entire poste-

Fig. 5. *Laetacara dorsigera*: (A) NMW 33669, holotype; (B) specimen in brooding colouration from Arroyo Saladas some km south of Corrientes, at the ruta nacional No. 12 between San Lorenzo and San Roque, not preserved. Photographed by W. Staeck. (C) specimen from Cuiabá river Pantanal, photographed immediately after capture, not preserved. Photographed by W. Staeck. Scale bar = 1cm.

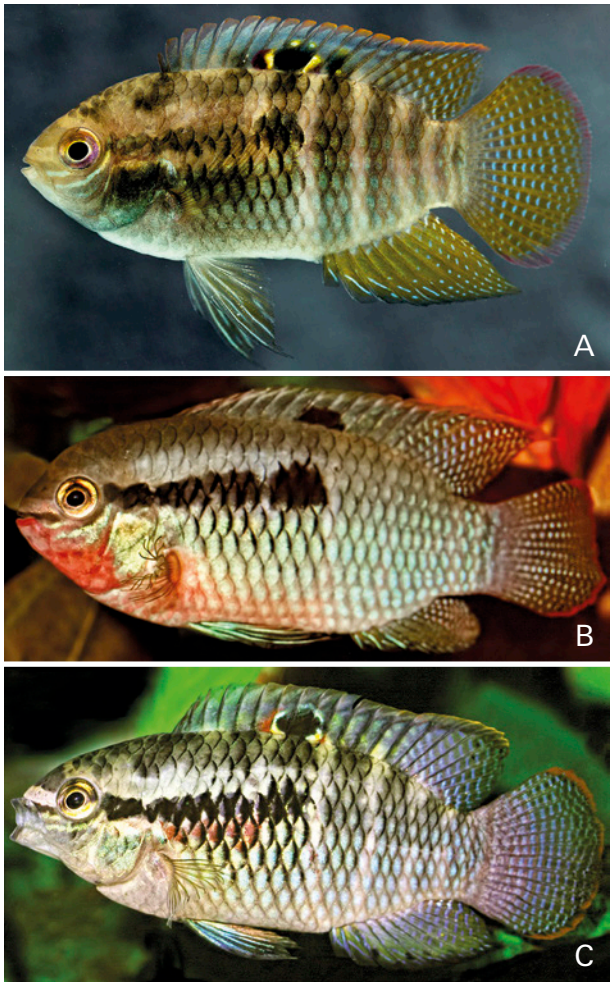

Fig. 6. *Laetacara dorsigera*: (A) UFRJ 10076, 37.0 mm SL, Aquidauana, Pantanal. Photographed by A. Katz. When captured, the specimen expressed reddish purple pigmentation on belly, however when photographed (hours after capture) that pigmentation was lost. (B) breeding male, not preserved, collected few km south of Corumbá. Photographed by W. Staeck. (C) one breeding female, not preserved, collected few km south of Corumbá. Photographed by W. Staeck.

rior margin in live specimens (figs. 5 and 6) (*vs*. restricted to the upper corner of posterior margin; figs. 3 and 7), and chin, chest and belly with red or reddish blue pigmentation in live specimens, especially in breeding specimens (figs. 5 and 6) (*vs*. never with red pigmentation; figs. 3 and 7) (Schmettkamp, 1982; Linke & Staeck, 1984; Koslowski, 1985; Stawikowski &Werner, 1998; Staeck, 2003; Ottoni *et al*., 2009).

Distribution. *Laetacara dorsigera* is known from the middle Paraná and Paraguay river basins, Guaporé, Beni and Mamoré river drainages of the upper Madeira river basin in Brazil, Argentina, Paraguay and Bolivia (Kullander, 2003; Staeck & Schindler, 2007; Ottoni & Costa, 2009; pers. Observ.), and more recently, recorded from the Uruguay river basin (Lanés *et al*., 2010).

Remarks. The type locality of *A. dorsigera* is "Sümpfe in der Nähe des Paraguay-Flusses bei Villa Maria" meaning "marshes near the Paraguay river basin at Villa Maria". Villa Maria, more correctly Vila-Maria do Paraguai, was a village located at the Mato Grosso state, founded in 1778 by the Tenente de Dragões Antônio Pinto Rego e Carvalho. In 1874, Vila-Maria do Paraguai was elevated to the category of city, receiving the name of São Luiz de Cáceres (http://www.mteseusmunicipios.com.br/NG/conteudo.php?sid=127&cid=442 14 October 2013).

The major part of the gut content of ten specimens of UFRJ 3708 contained adult aquatic Hemiptera, immature Chironomidae and adult crustaceans of Copepoda. In addition was recorded few undetermined eggs, fish eggs, adults crustaceans of Cladocera and immature aquatic insects of Coleoptera.

One specimen possessing an apparently additional abnormal caudal vertebra (13) was detected among six specimens examined for this character. Two of the caudal vertebrae are smaller than the others with uncommon shape, suggesting that one normal vertebra was divided in two abnormal ones. As this apparently is a malformation, I excluded it from counts.

Table 2. Meristic data of *L. dorsigera* and *L. flamannellus*. Pc = procurrent rays.

	L. dorsigera	***L. flamannellus***
Dorsal-fin spines	14 (10)–15 (35)–16 (1)	15 (40)–16 (4)
Dorsal-fin rays	8 (5)–9 (18)–10 (5)	8 (14)–9 (28)
Proximal radials on dorsal-fin base	21 (1)–22 (3)–23 (2)	22 (5)
Supra neurals	2 (6)	2 (5)
Anal-fin spines	3 (18)	3 (44)
Anal-fin rays	7 (1)–8 (10)–9 (17)	8 (19)–9 (27)
Proximal radials on anal-fin base	8 (2)–9 (4)	9 (5)
Pectoral-fin rays	11 (1)–12 (5)–13 (8)	12 (2)–13 (3)
Pelvic-fin spines	1 (14)	1 (44)
Pelvic-fin rays	5 (14)	5 (44)
Caudal-fin rays	3 (6) Pc + 8 (6) + 8 (6) + 3 (6) Pc	3 (5) Pc + 8 (5) + 8 (5) + 3 (5) Pc
Precaudal vertebrae	12 (5)	12 (5)
Caudal vertebrae	12 (5)	12 (5)
Pleural rib pairs	9 (5)	9 (3)–10 (2)
Gill-rakers on first branchial arch	1 (2)–2 (4) + 1 (2)–2 (4) + 9 (2)–10 (4)	2 (1)–3 (3) + 2 (4) + 9 (2)–10 (1)–12 (2)
Teeth on posterior margin of ceretobranchial 5	20 (1)–21 (3)–22 (1)–25 (1)	20 (1)– 21 (2)– 22 (1)– 23 (1)
Teeth on mid-line of ceretobranchial 5	6 (1)–7 (5)	6 (1)–7 (3)– 8 (1)
Scales of upper lateral line series	13(2)–14 (8)–15 (13)–16(2)	13 (3)–14 (19)–15 (11)–16 (1)
E2	19 (14)–20 (3)	19 (22)–20 (12)
Scales of lower lateral line series	6 (7)–7 (7)–8 (3)	6 (7)–7 (16)–8 (11)–9 (1)
E0	23 (9)–24 (7)–25 (1)	22 (5)–23 (13)–24 (13)–25 (3)
Scales of dorsal-fin origin series	3 (30)	3 (34)
Scales of the end of upper lateral line to dorsal fin series	2 (17)	2 (34)
Scales between lateral lines	2 (17)	2 (34)
Scales of peduncle depth	7 (17)	7 (34)
Cheek scales rows	2 (17)	2 (34)

Laetacara flamannellus Ottoni, Bragança, Amorim & Gama, 2012

Fig. 7; table 2

Laetacara flamannellus Ottoni, Bragança, Amorim & Gama, 2012: 183. Type locality: Brazil: Amapá state: lago Curiaú, following the road AP-70 to Santo Antônio da Pedreira, Macapá municipality, 0°0'54" N 51°2'26" W. Holotype: UFRJ 8060: 34.0 mm SL.

Diagnosis. *Laetacara flamannellus* differs from all its congeners (except *L. dorsigera* and *L. curviceps*) by possessing a brown dorsal-fin base spot, just above the trunk bar 5 in preserved and live specimens (fig. 7) (*vs*. absence). In addition, *L. flamannellus* is distinguished from *L. flavilabris* and *L. fulvipinnis* by possessing 24 total vertebrae (*vs*. 25–27); from *L. araguaiae* by absence of longitudinal stripes on the mid-ventral portion of flank, below lateral band, in both, preserved as well as live specimens (fig. 7) (*vs*. presence of longitudinal stripes on the mid-ventral portion of flank, below lateral band, light brown in preserved, yellowish brown to golden in live specimens; fig. 1); from *L. thayeri* by having flank spot approximately rounded, without intense dorsal extension to the dorsal-fin base both in preserved and live specimens (fig. 7) (*vs*. flank spot with intense dorsal extension to the dorsal-fin base both in preserved and live specimens; fig. 10), and absence of brown suborbital bar in adult specimens (fig. 7) (*vs*. presence; fig. 10); from *L. fulvipinnis* by possessing dots on the caudal fin, brown in preserved, bluish brown in live specimens (fig. 7) (*vs*. absence; fig. 9). In addition, *Laetacara flamannellus* differs from *L. dorsigera* by having red pigmentation of the caudal fin restricted to the upper corner of posterior margin in live specimens (fig. 7) (*vs*. on entire posterior margin; figs. 5 and 6), and chin, chest and belly never with red pigmentation in live specimens (fig. 7) (*vs*. with red or reddsish pigmentation, mainly in breeding specimens; figs. 5 and 6) (Schmettkamp, 1982; Linke & Staeck, 1984; Koslowski,1985; Stawikowski & Werner, 1998; Staeck, 2003; Ottoni *et al*., 2009); and from *L. curviceps* by having a yellow stripe at dorsal-fin mid-portion, along the whole fin of live specimens (fig. 7) (*vs*. restricted to the posterior portion of fin in specimens with about 34 mm SL or over; fig. 3), absence of a red or purple region on the anal-fin base (fig. 7) (*vs*. presence; Fig. 3), and absence of a red region on the caudal-fin base (fig. 7) (*vs*. presence of red region the on caudal-fin base in specimens with about 34 mm SL or over; fig. 3).

Distribution. *Laetacara flamannellus* is known from coastal river basins of Amapá state, northern Brazil and the border area between Brazil and French Guiana. The southernmost record is the córrego Areal in the municipal

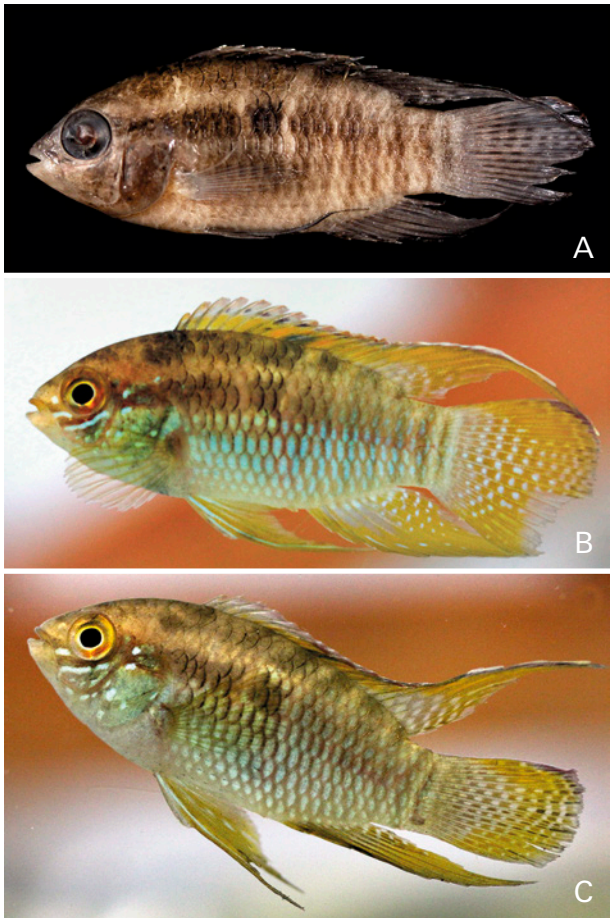

Fig. 7. *L. flamannellus*: (A) UFRJ 8060, 34.0 mm SL, holotype; (B) and (C) paratypes collected with holotype, between 35.0 and 38.2 mm SL. A, B & C Photographed by P. Bragança.

area of Manzagão, and the northernmost the Oiapoque river in the municipal area of Oiapoque (fig. 4).

Remarks. *Laetacara flamannellus* originally was considered being conspecific with *L. curviceps* (Stawikowski, 1991; Le bail *et al*., 2000; Araújo, 2010; Le Bail *et al*., 2012). However, *Laetacara flamannellus* exhibits a yellow stripe along the whole dorsal-fin mid-portion of adults and juveniles (fig. 7), whereas in *L. curviceps*, its most closely related congener, this yellow stripe of the dorsal-fin mid-portion is incomplete, restricted to the posterior portion of the fin in adults (specimens with about 34 mm SL or more). This is the main character which distuinguishes these species from each other.

In Ottoni *et al*. (2012) and Ottoni & Mattos (2015) the counts of E0 and E2 was erroneously inverted for *L. flamannellus* and *Rondonacara hoehnei* (Ribeiro, 1918).

Laetacara flavilabris (Cope, 1870)

Fig. 8; table 3

Acara flavilabris Cope, 1870: 570. Type locality: "near Pebas, Ecuador" [currently Peru]. Holotype: ANSP 9156: 91 mm TL.

Acara freniferus Cope, 1872: 255. Type locality: "The Ambyiacu" [Peru]. Lectotype: ANSP 9157: 110.7 mm TL.

Fig. 8. *Laetacara flavilabris*: not preserved from (A) drainage of the Napo river, in the vicinity of the town Cocain in Ecuador; (B) Drainage of the Juruá, near Cruzeiro do Sul in Brazil. Photographed by W. Staeck.

Diagnosis. *Laetacara flavilabris* differs from all its congeners by having two exclusive character states: presence of 26 or 27 total vertebrae (*vs*.23–25) and more radial proximal on the dorsal-fin base (25 *vs*. 20–24). In addition, *L. flavilabris* is distinguished from *L. curviceps, L. dorsigera* and *L. flamannellus* by absence of brown dorsal-fin base spot in all specimens examined (fig. 8) (*vs*. presence; figs. 3, and 5–7); from *L. araguaiae* by missing of longitudinal stripes on the mid-ventral portion of flank, below lateral band, in all specimens (fig. 8) (*vs*. presence of longitudinal stripes on the mid-ventral portion of flank, below lateral band, light brown on preserved, yellowish brown to golden in live specimens; fig. 1); from *L. thayeri* by having flank spot approximately rounded, without intense dorsal extension to the dorsal-fin base (fig. 8) (*vs*. flank spot with intense dorsal extension to the dorsal-fin base; fig. 10), and absence of brown suborbital bar in adult specimens (fig. 8) (*vs*. presence; fig. 10); and from *L. fulvipinnis* by the presence of brown dots on the caudal fin, more conspicuous in live specimens (fig. 8) (*vs*. absence; fig. 9).

Distribution. *Laetacara flavilabris* is known from upper tributaries of the Solimões river drainage, of the Amazon river basin of Brazil, Colombia, Ecuador and Peru (fig. 4).

Remarks. *Laetacara flavilabris* is the type species of the genus. In addition to the character states cited in the diagnosis, it is also easily distinguished from all its congeners by possessing 16–17 dorsal-fin spines, instead of

Table 3. Meristic data of *L. flavilabris* and *L. fulvipinnis*. Pc = procurrent rays

	L. flavilabris	***L. fulvipinnis***
Dorsal-fin spines	16 (20)–17 (6)	15 (26)
Dorsal-fin rays	9–(1)–10 (13)–11 (8)	10 (17)–11 (9)
Proximal Radials on dorsal-fin base	25 (5)	24 (4)
Supra neurals	2 (7)	2 (4)
Anal-fin spines	3 (26)	3 (24)
Anal-fin rays	8 (9)–9 (12)–10 (1)	8 (16)–9 (9)
Proximal Radials on anal-fin base	8 (2)–9 (2)–10 (1)	8 (2)–9 (2)
Pectoral-fin rays	13 (13)–14 (8)	13 (12)–14 (12)
Pelvic-fin spines	1 (23)	1 (24)
Pelvic-fin rays	5 (23)	5 (24)
Caudal-fin rays	3 (5) Pc + 8 (5) + 8 (5) + 3 (5) Pc	3 (3)–4 (1) Pc+ 8 (4) + 8(4) + 3 (4) Pc
Precaudal vertebrae	13 (5)–14 (2)	13 (4)
Caudal vertebrae	13 (7)	12 (4)
Pleural rib pairs	10 (1)–11 (4)	10 (4)
Gill-rakers on first branchial arch	1 (2)–2 (1)–3 (1) + 2 (3)–3(1) + 12 (1)–13(3)	1 (1)–2 (3) + 1 (3)–2 (1) + 12 (1)–13 (1) –14 (1)–15 (1)
Teeth on posterior margin of ceretobranchial 5	21 (1)–22 (3)	21 (3)–24 (1)
Teeth on mid-line of ceretobranchial 5	7 (1)–8 (3)	5 (1)–6 (2)–7 (2)
Scales of upper lateral line series	15(1)–16 (10)–17(9)–18(1)	14 (1)–15 (15)–16 (9)
E2	21 (2)–22(14)–23(2)	19 (2)–20 (17)–21 (5)
Scales of lower lateral line series	7(2)–8 (10)–9(7)–10(2)	6 (1)–7 (1)–8 (14)–9 (7)
E0	24 (1)–25(13)–26(3)–27 (1)	23 (7)–24 (12)–25 (3)
Scales of dorsal-fin origin series	3 (18)	3 (24)
Scales of the end of upper lateral line to dorsal fin series	2 (18)	2 (24)
Scales between lateral lines	2 (18)	2 (24)
Scales of peduncle depth	7 (17)-8 (1)	7 (21)
Cheek scales rows	2 (21)	2 (24)

15 or less (16 dorsal-fin spines occurs rarely in the other congeners).

In the present work we agreed with the previous synonymization of *A. freniferus* with *L. flavilabris* proposed by Kullander (1986). Examining both holotype of *L. flavilabris* and lectotype of *Acara freniferus*, it was observed that both possess vertebrae coutns included in the same range. Additionally, it was not possible to observe any clear differences between these species, and both type localities are geographically close.

The material of *L. flavilabris* herein examined does not present a row of scales between the rays of dorsal- and anal fins. However, Kullander (1986) reported the presence of a row of scales between the rays of that fins, containing one or two scales, in some specimens over 69.2 mm SL. The caudal fin dots of *L. flavilabris* are pale brown, more evident on the posterior portion of the fin, being more conspicuous in well preserved or live specimens.

Laetacara fulvipinnis Staeck & Schindler, 2007

Fig. 9; table 3

Laetacara fulvipinnis Staeck & Schindler, 2007: 64. Type locality: lagoon at the village Arigua, 01°50'13" N, 67°02'29" W, a few km South of San Carlos de río Negro in Venezuela. Holotype: MTD F 30607: 74.6 mm SL.

Diagnosis. *Laetacara fulvipinnis* is distinguished from all its congeners by having two exclusive character states: presence of 25 total vertebrae (*vs*. 26-27 in *L. flavilabris* and 23–24 in the other congeners) and absence of dots on the caudal-fin of both preserved and live specimens (fig. 9) (*vs*. presence). In addition, *L. fulvipinnis* differs from *L. curviceps, L. dorsigera* and *L. flamannellu*s by absence of brown dorsal-fin base spot in all specimens (fig. 9) (*vs*. presence; figs. 3, and 5–7); from *L. araguaiae* by absence of longitudinal stripes on the mid-ventral portion of flank, below lateral band, in all specimens (fig. 9) (*vs*. presence of longitudinal stripes on the mid-ventral portion of flank, below lateral band, light brown on preserved, yellowish brown to golden in live specimens; fig. 1); and from *L. thayeri* by having flank spot approximately rounded, without intense dorsal extension to the dorsal-fin base of any specimen (fig. 9) (*vs*. flank spot with intense dorsal extension to the dorsal-fin base; fig. 10), and absence of brown suborbital bar in adult specimens (fig. 9) (*vs*. presence; fig. 10).

Distribution. *Laetacara fulvipinnis* occurs in several locations in the upper-middle Orinoco, Casiquiare and upper-middle Rio Negro river basins in Brazil and Venezuela (fig. 4).

Remarks. *Laetacara fulvipinnis* was first collected by Alfred Russel Wallace in the half of the 19th century,

Fig. 9. *Laetacara fulvipinnis*: (A) UFRJ 9076, 42.7 mm SL; tributary of the rio Caurés in Barcelos, Photographed by P. Bragança; and (B) not preserved, about 50.0 mm TL; Casiquiare river in Venezuela. Photographed by W. Staeck and I. Schindler immediately after captured.

during his voyage which explored the Rio Negro and Uaupés, between 1848 and 1852 (see Toledo-Piza, 2002; p.472–473 and fig. 205). Before its formal description, several aquarium publications also recorded this species (Prick, 1978; Koslowski, 1985; Schindler, 1991; Römer, 1992; 1994; Linke & Staeck, 1994; Staeck, 2003). However, just in 2007 the species was formally described, based on six specimens, collected in the upper Negro, Casiquiare and Orinoco river basins (Staeck & Schindler, 2007). Information on *L. fulvipinnis* presented in this study is based on 26 wild specimens, as well as, on information and photographs of the type series and original description. *Laetacara fulvipinnis* also posses a distinct yellow or orange colouration surrounding the flank spot in live specimens (Fig. 9), which is typical of this species.

Laetacara thayeri (Steindachner, 1875)

Fig. 10; table 4

Acara thayeri Steindachner, 1875: 68. Type locality: Im Amazonenstrom und dessen Ausständen bei Cudajas, in den See Hyanuary bei Manaos und im Lago Maximo bei Alemquer. Syntypes: NMW 33723, NMW 33726-46 and NMW 33752.

Diagnosis. *Laetacara thayeri* differs from all its congeners by two exclusive character states in both preserved and live specimens: flank spot with intense dorsal extension to the dorsal-fin base (fig. 10) (*vs*. flank spot approximately rounded, without intense dorsal extension to the dorsal-fin base), and presence of brown suborbital bar (fig. 10) (*vs*. absence). In addition, *L. thayeri* is distinguished from *L. flavilabris* and *L. fulvipinnis* by possessing 24 total vertebrae (*vs*. 25–27); from *L. curviceps,*

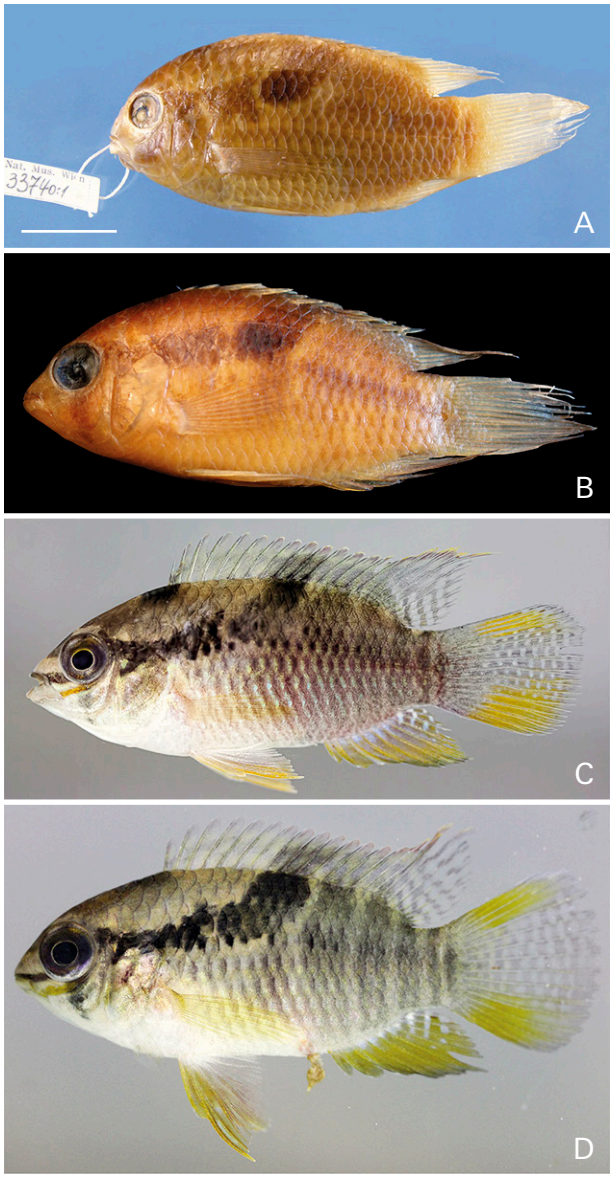

Fig. 10. *Laetacara thayeri*: (A) NMW 33740, syntype; (B) MNRJ 29471, 47.1 mm SL, Manacapuru lake. Photographed by F. Ottoni; (C) UFRJ 9060, 37.6 mm SL, Igarapé Salgado, Barcelos; (D) UFRJ 9078, 64.9 mm SL, triburaty of Caurés river, Barcelos. C & D photographed by P. Bragança. Scale bar = 2 cm.

L. dorsigera and *L. flamannellus* by absence of brown dorsal-fin base spot in both preserved and live specimens (fig. 10) (*vs*. presence; figs. 3, and 5–7); and from *L. fulvipinnis* by presence of brown dots on the caudal fin of preserved specimens and pale brown of live specimens (fig. 10C and D) (*vs*. absence; fig. 9); and from *L. araguaiae* by the absence of longitudinal stripes on the mid-ventral portion of flank, below lateral band, in all specimens (fig. 10) (*vs*. presence of longitudinal stripes on the mid-ventral portion of flank, below lateral band, light brown on preserved specimens and yellowish brown to golden in live specimens; fig. 1).

Distribution. *Laetacara thayeri* is known from several tributaries of the lower Amazon, Madeira, Solimões

Table 4. Meristic data of *L. thayeri*. Pc = procurrent rays

	L. thayeri
Dorsal-fin spines	14 (1)–15 (35)–16 (2)
Dorsal-fin rays	9 (14)–10(22)–11 (3)
Proximal Radials on dorsal-fin base	23 (6)
Supra neurals	2 (6)
Anal-fin spines	3 (37)
Anal-fin rays	7 (10)–8 (23)–9 (6)
Proximal Radials on anal-fin base	8 (3)–9 (3)
Pectoral-fin rays	13 (9)–14 (10)
Pelvic-fin spines	1 (14)
Pelvic-fin rays	5 (14)
Caudal-fin rays	3 (4)–4 (2) Pc +8 (6)+8 (6) + 3 (5)–4 (1) Pc
Precaudal vertebrae	12 (6)
Caudal vertebrae	12 (6)
Pleural rib pairs	9 (6)
Gill-rakers on first brachial arch	1 (1)–2 (4)–3 (1) + 2 (5)–3 (1) + 11 (1)–13 (3)–14 (1)–15 (1)
Teeth on posterior margin of ceretobranchial 5	21 (1)–22 (2)–23 (1)–24 (1)–27 (1)
Teeth on mid-line of ceretobranchial 5	6 (1)–7 (4)–8 (1)
Scales of upper lateral line series	13 (1)–14(9)–15(10)
E2	18 (1)–19(4)–20(15)
Scales of lower lateral line series	7 (6)–8 (9)–9 (3)–10 (2)
E0	22 (5)–23 (12)–24 (2)
Scales of dorsal-fin origin series	3 (20)
Scales of the end of upper lateral line to dorsal fin series	2 (20)
Scales between lateral lines	2 (20)
Scales of peduncle depth	7 (20)
Cheek scales rows	2 (20)

and Negro river drainages, of the Amazon river basin in Brazil and Peru (fig. 4).

Remarks. *Laetacara thayeri* is the most widely distributed species of *Laetacara*, occurring in several tributaries of the lower Amazonas, Madeira, Solimões and Negro river drainages within the Amazonas river basin. Nevertheless, its morphology, including colouration in life of different populations is quite constant. The unique difference recorded among populations is that some specimens from the upper Negro river basin have more anal-fin rays (9) [*vs*. always 7–8 in other populations, including the data provided by Kullander (1986)].

In addition to the character states cited in the diagnosis, *L. thayeri* can be distinguished from its congeners by the presence of a row of scales between the rays of dorsal and anal fins; contaning a maximum of five scales on each row between rays of dorsal fin, and one or two scales on each row between rays of anal fin (Kullander, 1986; fig. 154). The unique exception is *L. flavilabris*, for which Kullander (1986) has reported the presence of a row of scales between the rays of that fins, containing one or two scales, in some specimens over 69.2 mm SL. However, the material of *L. flavilabris* herein examined does not present these rows of scales between the rays of dorsal and anal fins.

Key for species identification of Laetacara

1a With conspicuous suborbital bar; flank spot with intense dorsal extension to the dorsal-fin base (fig. 10) ..... ***L. thayeri***

1b Without suborbital bar in adults; flank spot approximately rounded, without intense dorsal extension to the dorsal-fin base (figs. 1, 3, 5, 6, 7, 8 and 9) **2**

2a Without brown dorsal-fin base spot above trunk bar 5 ..... **3**

2b With brown dorsal-fin base spot above trunk bar 5 ..... **5**

3a with brown longitudinal stripes below lateral band in preserved specimens, and yellowish brown or golden in live specimens (fig. 1) ..... ***L. araguaiae***

3b Without brown longitudinal stripes below lateral band in preserved specimens, and yellowish brown or golden in live specimens (figs. 3, 5, 6, 7, 8, 9 and 10) **4**

4a 15 dorsal-fin spines; 25 total vertebrae; without dots on caudal fin (fig. 9) ..... ***L. fulvipinnis***

4b 16–17 dorsal-fin spines; 26 to 27 total vertebrae; with dots on caudal fin, more conspicuous in live specimens (fig. 8) ..... ***L. flavilabris***

5a Red pigmentation of caudal fin restricted to upper corner of posterior margin in live specimens; chest and belly allways missing red pigmentation in live specimen (figs. 3 and 7) **6**

5b Red pigmentation of caudal fin on entire posterior margin in live specimens; belly and chest with red pigmentation, mainly in breeding specimens (figs. 5 and 6) ..... ***L. dorsigera***

6a with yellow stripe at dorsal-fin mid-portion incomplete, restricted to posterior portion of fin in live specimens from about 34 mm SL or more; with red or purple region on anal-fin base; presence of red region on the caudal-fin base (fig. 3) ..... ***L. curviceps***

6b with yellow stripe at dorsal-fin mid-portion complete in live specimens; missing any red or purple region on anal-fin base; missing red region on the caudal-fin base (fig. 7) ..... ***L. flamannellus***

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Appendix:

Material examined

Laetacara araguaiae

Brazil: Estado de Goiás: UFRJ 7557, 32.1 mm SL (holotype); buriti palm near rio Verde, 32 km north of São Miguel do Araguaia, rio Araguaia basin; W. Costa *et. al*., 25 Jul. 1993. UFRJ 1477, 14 (paratypes), 15.9–34.9 mm SL; buriti palm near rio Verde, 32 km north of São Miguel do Araguaia, rio Araguaia basin; W. Costa *et. al*., 25 Jul. 1993. MCP 42589, 2 (paratypes), 26.5–28.3; buriti palm near Verde river, 32 km east from São Miguel do Araguaia, rio Araguaia basin; W. Costa *et. al*., 25 Jul. 1993. UFRJ 1447, 8 (paratypes), 19.0–34.0 mm SL; buriti palm 21 km South from São Miguel do Araguaia, rio Araguaia basin; W. Costa *et. al*., 28 Jul. 1993. UFRJ 7552, 4 (C&S-paratypes), 24.3–34.2 mm SL; buriti palm 21 km south from São Miguel do Araguaia, rio Araguaia basin; W. Costa *et. al*., 28 Jul. 1993. UFRJ 8521, 1 (C&S), 21.5 mm SL; river 98 km west of Jussara, rio Araguaia basin; W. Costa *et al.*, 30 Aug. 1993. UFRJ 1545, 1(C&S), 35.4 mm SL; river 98 km west of Jussara, rio Araguaia basin; W. Costa *et al.*, 01 Sep 1993. UFRJ 8522, 2 (C&S), 27.7–32.5 mm SL; river 98 km west of Jussara, rio Araguaia basin; W. Costa *et al.*, 30 Aug. 1993. UFRJ 1562, 2, 33.3–35.3 mm SL; river 98 km weast of Jussara, rio Araguaia basin; W. Costa *et al*., 30 Aug. 1993. UFRJ 1725, 4, 17.0–33.0 mm SL; flooded area 18 km south of Aruanã, rio Araguaia basin; W. Costa *et al*., 29Aug. 1993. UFRJ 1899, 2, 20.7–29.3 mm SL; pounds in Aruanã, rio Araguaia basin; W. Costa, 18 Jan. 1986. UFRJ 1675, 1 (C&S), 23.6 mm SL; stream 21 km south of Aruanã, rio Araguaia basin; W. Costa *et al*., 29 Aug. 1993. UFRJ 1585, 2 (C&S), 29.4–30.7 mm SL; buriti palm 15 km east of Aruanã, rio Araguaia basin; W. Costa *et al*., 29 Aug. 1993. UFRJ 8708, 7, 21.3–26.2 mm SL; buriti area in the GO-530, 38 km from Araguapaz in the road to Aruanã, rio Araguaia basin, 14°57'40" S 50°56'41" W, alt. 228 m; F. Ottoni and P. Bragança, 24 Apr. 2012. UFRJ 8705, 4, 26.1–31.5 mm SL; buriti palm area about 75 km after Nova Crixás, near São Miguel do Araguaia, rio Araguaia basin, 13°26'17" S 50°17'12" W, alt. 312 m; P. Bragança and F. Ottoni, 26 Apr. 2012. UFRJ 8751, 10, 26.3–36.4 mm SL; flooded área between Aruanã and Britânia on GO-173, 20 km South of Aruanã, rio Araguaia basin, 15°06'33" S 51°05'25" W, alt. 270 m; P. Bragança and F. Ottoni, 24 Apr. 2012. UFRJ 8756, 10, 25.7–39.6 mm SL; buriti palm area on GO-164, about 3 km south of Nova Crixás, rio Araguaia basin, 14°07'47" S 50°21'04" W, alt. 277 m; F. Ottoni and P. Bragança, 26 Apr. 2012. UFRJ 8755, 10, 18.9–27.2 mm SL; buriti palm area on road GO-164, about 3 km south of Nova Crixás, rio Araguaia basin, 14°07'47" S 50°21'04" W; F. Ottoni and P. Bragança, 26 Apr. 2012. UFRJ 8312, 2, 30.2–38.7 mm SL; flooded area of rio Monte Verde river, on GO-174, 18 km south of Montividiu, Município de Rio Verde, rio dos Bois drainage, Upper rio Paraná basin, 17°35'7" S 51°05'21" W, alt527; W. Costa *et al*, 15 Sep. 2011. UFRJ 7523, 27, 17.5–37.9 mm SL; Município de Terezópolis on GO-468, Upper rio Paraná basin, 16°28'24" S 49°06'42" W; G. Campello, 17 Mar. 2007. UFRJ 8333, 13, 24.3–42.0 mm SL; BR-060 between Indiara and Rio Verde, about 5 km east of Acreuna, between rios Verdão and Turvo, Upper rio Paraná basin, 17°22'18" S 50°20'37" W; W. Costa *et al.*, 15 Sep. 2011. UFRJ 8366, 4 (C&S), 27.5–35.6 mm SL; BR-060 between Indiara and Rio Verde, about 5 km east of Acreuna, between rios Verdão and Turvo, Upper rio Paraná basin, 17°22'18" S 50°20'37" W; W. Costa *et al.*, 15 Sep. 2011. UFRJ 8344, 22, 18.4–41.9 mm SL; tributary of rio Claro, BR-364 between Aparecida do Rio Doce and Cachoeira Alta, 11, 5 km from Aparecida do Rio Doce, Upper rio Paraná basin, 18°24'46" S 51°05'48" W, alt 546 m; W. Costa *et al.*, 20 Sep. 2011. UFRJ 8345, 5 (C&S), 26.4–36.8 mm SL; tributary of rio Claro, BR-364 between Aparecida do Rio Doce and Cachoeira Alta, 11, 5 km from Aparecida do Rio Doce, Upper rio Paraná basin, 18°24'46" S 51°05'48" W, alt. 546 m; W. Costa *et al.*, 20 Sep. 2011. UFRJ 8336, 60, 16.8–40.0 mm SL; flooded área of the rio Verde on GO-184, Município de Serranópolis, Upper rio Paraná basin, 18°22'29" S 52°00'58" W, alt. 527 m; W. Costa *et al*., 17 Sep. 2011. UFRJ 8337,

7 (C&S), 29.8–36.4 mm SL; flooded área of the rio Verde on GO-184, Município de Serranópolis, Upper rio Paraná basin, 18°22'29" S 52°00'58" W, alt. 527 m; W. Costa *et al*., 17 Sep. 2011. UFRJ 8332, 1, 34.8 mm SL; buriti palm area of the rio Paranaíba drainage, Município de Piracanjuba, Upper rio Paraná basin, 17°19'11" S 48°58'41" W, alt. 723 m; W. Costa *et al*., 14 Sep. 2011. UFRJ 8331, 8, 24.1–40.8 mm SL; buruti palm area between Cristianópolis and Piracanjuba, Upper rio Paraná basin, 17°19'13" S 48°58'04" W, alt 710 m; W. Costa *et al*., 14 Se. 2011. UFRJ 8368, 3 (C&S), 24.9–27.4 mm SL; buruti palm area between Cristianópolis and Piracanjuba, Upper rio Paraná basin, 17°19'13" S 48°58'04" W, alt 710 m; W. Costa *et al*., 14 Sep. 2011. UFRJ 8369,1 (C&S), 31.0 mm SL; buriti palm area of the rio Paranaíba drainage, Município de Piracanjuba, Upper rio Paraná basin, 17°19'11" S 48°58'41" W, alt. 723 m; W. Costa *et al*., 14 Sep. 2011. UFRJ 8334, 1, 59.0 mm SL; flooded area of the rio Monte Alegre on Go-174, 18 km south of Montividiu, Município de Rio Verde, Upper rio Paraná basin, 17°35'7" S 51°05'21" W, alt 781 m; W. Costa *et al*., 15 Sep. 2011**. Estado do Tocantins**: UFRJ 5078, 1 (C&S), 23.9 mm SL; rio Javaés, near Projeto Quelônios, near Município de Cangaçu, rio Araguaia basin; D. Almeida, R. D'Arrigo and G. Brasil, Feb. 1999. UFRJ 1428, 1, 31.2 mm SL; stream tributary of the rio Javaés, 40 km north from Araguaçu, rio Araguaia basin; W. Costa *et al*., 25 Aug. 1993. UFRJ 5013, 4, 24.6–31.9 mm SL; Ilha do Bananal, rio Araguaia basin; G. Brasil, no date. UFRJ 8520, 2 (C&S), 20.9–24.7 mm SL; Ilha do Bananal, rio Araguaia basin; G. Brasil, no date. UFRJ 8706, 2, 20.1–22.1 mm SL; flooded área of rio Araguaia on BR-230, near the bridge in the boundary between Estados do Pará and Tocantins, 05°42'48" S 48°10'05" W, alt. 116 m; F. Ottoni and P. Bragança, 30 Apr. 2012. UFRJ 8704, 5, 22.5–35.1 mm SL; flooded area on TO-181, 55 km from Araguaçu, near Sandolândia, rio Araguaia basin, 12°30'08" S 49°53'48" W, alt. 250 m; F. Ottoni and P. Bragança, 27 Apr. 2012. UFRJ 8749, 19, 17.2–35.4 mm SL; flooded area between Xambioá and Araguaina, Município de Xambioá, rio Araguaia basin, 06°31'50"S 48°35'45" W, alt. 171; F. Ottoni and P. Bragança, 01 May 2012. UFRJ 8710, 5, 25.2–41.5 mm SL; córrego Feliciano between Gurupi and Nova Rosalândia on BR-153, Município de Santa Rita do Tocantins, rio Tocantins basin, 10°50'36" S 48°54'16" W, alt 284 m; F. Ottoni and P. Bragança, 27 Apr. 2012. UFRJ 2182, 1, 34.7 mm SL; stream 10 km north of Silvanópolis, rio Tocantins basin; W. Costa, G. Brasil and C. Campinha, 15 Feb. 1994. UFRJ 8715, 1 (C&S), 27.3 mm SL; córrego Feliciano between Gurupi and Nova Rosalândia on BR-153, Município de Santa Rita do Tocantins, rio Tocantins basin, 10°50'36" S 48°54'16" W, alt 284 m; F. Ottoni and P. Bragança, 27 Apr. 2012. UFRJ 8707, 3, 21.7–24.3 mm SL; river on TO-335, between Colina do Tocantins and Palmeirante, rio Tocantins basin, 07°58'54" S 48°07'15" W, alt. 202 m; F. Ottoni and P. Bragança, 29 Apr. 2012. UFRJ 8709, 2, 24.8–37.9 mm SL; buruti palm area on TO-373, about 21 km of Município de Peixe, rio Tocantins basin, 12°13'29" S 48°34'16" W, alt. 282 m; P. Bragança and F. Ottoni, 02 May 2012. UFRJ 8713, 8, 21.8–36.6 mm SL; flooded area on BR-242 between Natividade and Peixe, rio Tocantins basin, 12°07'49" S 48°26'01" W, alt. 268 m; P. Bragança and F. Ottoni, 02 May 2012. UFRJ 8714, 3 (C&S), 19.6–28.6 mm SL; flooded area on BR-242 between Natividade and Peixe, rio Tocantins basin, 12°07'49" S 48°26'01" W, alt. 268 m; P. Bragança and F. Ottoni, 02 May 2012. UFRJ 8695, 6, 29.9–42.7 mm SL; buriti palm area on TO-070, between Aliança do Tocantins and Brejinho de Nazaré, rio Tocantins basin, 11°03'19" S 48°45'13" W, alt. 281 m; F. Ottoni and P. Bragança, 02 May 2012. UFRJ 8717, 3 (C&S), 27.6–39.7 mm SL; buriti palm area on TO-070, between Aliança do Tocantins and Brejinho de Nazaré, rio Tocantins basin, 11°03'19" S 48°45'13" W, alt. 281 m; F. Ottoni and P. Bragança, 02 May 2012. UFRJ 8711, 33, 13.9–39.7 mm SL; flooded area of the rio Tocantins on TO-050, between Porto Nacional and Silvanópolis, 10°51'27" S 48°21'19" W, alt. 240 m; P. Bragança and F. Ottoni, 02 May 2012. UFRJ 8712, 4 (C&S), 25.6–33.1 mm SL; flooded area of the rio Tocantins on TO-050, between Porto Nacional and Silvanópolis, 10°51'27" S 48°21'19" W, alt. 240 m; P. Bragança and F. Ottoni, 02 May 2012. UFRJ 8700, 22, 18.7–41.9 mm SL; flooded area on TO-409, between São Miguel do Tocantins and Sítio Novo, about 3 km of Sítio Novo, rio Tocantins basin, 05°35'15" S 47°36'52" W, alt. 192 m; F. Ottoni and P. Bragança, 30 Apr. 2012. UFRJ 8716, 4 (C&S), 22.0–31.9 mm SL; flooded area on TO-409, between São Miguel do Tocantins and Sítio Novo, about 3 km of Sítio Novo, rio Tocantins basin, 05°35'15" S 47°36'52" W, alt. 192 m; F. Ottoni and P. Bragança, 30 Apr. 2012. UFRJ 8685, 3, 15.9–19.9; pound on TO-255, near Lagoa da Confusão, rio Araguaia basin, 10°43'50" S 49°32'29" W, alt. 234 m; F. Ottoni and P. Bragança, 27 Apr. 2012**. Estado de Mato Grosso**: UFRJ 7531, 1, 36.8 mm SL; Left side of the rio Xingú on MT-322; W. Costa et. al, 18 Feb. 1993. UFRJ 1335, 3, 21.1–35.7 mm SL; Left side of the rio Xingú on MT-322; W. Costa et. al, 18 Feb. 1993. MCP 42588, 1, 26.9 mm SL; Left side of the rio Xingú on MT-322; W. Costa et. al, 18 Feb. 1993. UFRJ 9722, 3 (C&S), 21.2–34.9 mm SL; Left side of the rio Xingú on MT-322; W. Costa et. al, 18 Feb. 1993. MZUSP 95813, 2, 25.4–28.2 mm SL; stream tributary of the rio Teles Pires, Município de Itaúba, rio Tapajós basin, 11°05'41" S 55°17'40" W; J. Birindelli and P. Hollanda-Carvalho, 30 Sep. 2007. MZUSP 98435, 3, 25.2–32.2 mm SL; rio Teles Pires in Paranaíta, rio Tapajós basin, 09°25'03" S 56°33'13" W; M. Loeb and A. de Castro, 22 Jan 2008. UFRJ 9393, 16, 21.0–38.1 mm SL; rio Suia Miçu on BR-158 near Querência, Município de Cascalheira, rio Xingú basin, 12°45'57" S 51°46'56" W, alt. 328 m; F. Ottoni and P. Bragança, 07 Apr. 2013. UFRJ 9362, 5, 13.6–39.5 mm SL; rio Suiazinho on MT-243, Querência municipality, rio Xingú basin, 12°38'36" S 51°56'44" W, alt. 317 m; P. Bragança and F. Ottoni, 07 Apr. 2013. UFRJ 9387, 39, 19.6–33.4 mm SL; flooded area of the rio Teles Pires on BR-153, about 82 km north from Sinop, Município de Itaúba, rio Tapajós basin, 11°06'39" S 55°18'16" W, alt. 277; F. Ottoni and P. Bragança, 10 Apr. 2013. UFRJ 9409, 6 (C&S), 27.3–29.0 mm SL; flooded area of the rio Teles Pires on BR-153, about 82 km north from Sinop, Município de Itaúba, rio Tapajós basin, 11°06'39" S 55°18'16" W, alt. 277; F. Ottoni and P. Bragança, 10 Apr. 2013. UFRJ 7658,1, 33.3 mm SL; stream 13 km west of the rio das Mortes between Água Boa and Cocalinho, rio Araguaia basin; W. Costa, C. Bove, R. Cunha and C. Muratori, 20 Nov. 1993. UFRJ 1255, 32, 19.5–31.1 mm SL; stream 13 km weast of the Rio das Mortes between Água Boa and Cocalinho, rio Araguaia basin; W. Costa, C. Bove, R. Cunha and C. Muratori, 20 Nov. 1993. UFRJ 7659, 7 (C&S), 20.0–28.5 mm SL; stream 13 km weast of the rio das Mortes between Água Boa and Cocalinho, rio Araguaia basin; W. Costa, C. Bove, R. Cunha and C. Muratori, 20 Nov. 1993. UFRJ 1373, 2, 21.2–28.5 mm SL; pound 2 km west of the rio das Mortes, between Água Boa and Cocalinho, rio Araguaia basin; W. Costa, C. Bove, R. Cunha and C. Muratori, 20 Nov. 1993. UFRJ 8742, 14, 26.1–38.0 mm SL; buriti palm area on BR-158, 94 km south of Nova Xavantina, rio Araguaia basin, 15°28'39"S 52°12'10" W, alt. 340; F. Ottoni and P. Bragança, 25 Apr. 2012. **Estado do Pará**: MZUSP 22062, 31, 19.3–35.4 mm SL; lago Santa Clara, Monte Cristo municipality, rio Tapajós basin; Expedição Permanente da Amazônia, 06 Dec. 1970. MZUSP 16154, 1, 26.4 mm SL; Ilha Tapaiúna, rio Tapajós; Expedição Permanente da Amazônia, 28 Oct. 1970. Mato Grosso do Sul state: UFRJ 10073, 3, 31.0–38,2 mm SL; tributary of the rio Paraná, Município de Santa Rita do rio Pardo; W. Costa *et al*., 25 Jul. 2014. UFRJ 3018, 14, 24.2–37.3 mm SL; Três Lagoas, Upper rio Paraná river; no informations about collectors, 18 Oct. 1994. UFRJ 6094, 1 (C&S), 36.9 mm SL; buriti palm área 15 km from Aparecida do Taboado, Upper rio Paraná basin; W. Costa *et al*., 18 Sep. 1994. UFRJ 6093, 1 (C&S), 36.4 mm SL; buriti palm área 15 km from Aparecida do Taboado, Upper rio Paraná basin; W. Costa *et al*., 18 Sep. 1994. UFRJ 8343, 13, 33.1–38.5 mm SL; tributary of the rio Aporé, road Cassilândia-Itajá, Upper rio Paraná basin, 19°22'29" S 52°00'58" W, alt. 527 m; Costa *et al*., 15 Sep. 2011. UFRJ 8367, 4 (C&S), 26.0–31.5 mm SL; tributary of the rio Aporé, road Cassilândia-Itajá, Upper rio Paraná basin, 19°22'29" S 52°00'58" W, alt. 527 m; Costa *et al*., 15 Sep. 2011.

Laetacara curviceps

Brazil: ZMB 31324, 46.8 mm SL (holotype), lower rio Amazonas. ZMB 32398, 3 (paratypes), 39.2–46.9 mm SL; lower rio Amazonas. ZMB 32399, 2 (paratypes), 35.6–39.6 mm SL, lower rio Amazonas. ZMB 32400, 1 (paratype), 40.4 mm SL, lower rio Amazonas. **Estado do Amazonas**: UFRJ 10637, 2, 21.9–40.1 mm SL; flooded área on BR-319, about 30 km from Careiro da Várzea (03°25'18"S 59°56'08"W); J. Mattos, 23 Jul. 2015. UFRJ 4350, 6, 27.2–34.5 mm SL; lago Parananema, Município de Parintins, rio Amazonas basin; C. Figueiredo & C. Codeço, 11 Sep. 1996. UFRJ 4358, 11, 20.3–27.3 mm SL; lago Parananema, Município de Parintins, rio Amazonas basin; C. Figueiredo & C. Codeço, 11 Sep. 1996. UFRJ 4361, 7, 23.3–29.4 mm SL; lago Parananema, Município de Parintins, rio Amazonas basin; C. Figueiredo & C. Codeço, 11 Sep. 1996. UFRJ 7522, 4 (C&S), 25.2–29.5 mm SL; lago Parananema, Município de Parintins, rio Amazonas basin; C. Figueiredo & C. Codeço, 11 Sep. 1996. UFRJ 4234, 1, 21.1 mm SL; lago Máximo, Município de Parintins, rio Amazonas basin; C. Figueiredo & C. Codeço, 14 Sep. 1996. **Estado do Pará**: UFRJ 4239, 4, 12.0–35.9 mm SL; rio Ipajós, praia Vera Paz, Município de Santarém, rio Amazonas basin; C. Figueiredo and C. Codeço, 14 Sep 1996. UFRJ 4379, 8, 13.4–19.1 mm SL; Igarapé Irurá, tributary of the rio Tapajós on PA-457, Município de Santarém; C. Figueiredo and C. Codeço, 04 Sep. 1996. UFRJ 4225, 7, 14.2–32.9 mm SL; lago Paunis, near mouth of igarapé Paunis, Município de Óbidos, rio Amazonas basin; C. Figueiredo & C. Codeço, 07 Sep. 1996. UFRJ 7971, 22, 24.9–40.4 mm SL; lago Utinga, Município de Belém; D. O. Castro, 12 Oct 2010. UFRJ 8058, 2 (C&S), 24.8–38.1 mm SL; lago Utinga, Município de Belém; D. O. Castro, 12 Oct 2010.

Laetacara dorsigera

Brazil: Estado de Mato Grosso: NMW 33669, approximately 40 mm SL (photograph of holotype); marshes near the rio Paraguay basin at Villa Maria (currently Cáceres). UFRJ 9401, 4, 30.0–32.8 mm SL; flooded area of the rio Bento Gomes on MT-060, Município de Poconé, rio Paraguay basin, 16°0'0.53"S 56°28'50"W; F. Ottoni and P. Bragança, 05 Apr. 2013. UFRJ 9400, 14, 18.6–25.7 mm SL; flooded area of the rio Bento Gomes on MT-060, Município de Poconé, rio Paraguay basin, 16°0'0.53"S 56°28'50"W; F. Ottoni and P. Bragança, 05 Apr. 2013. UFRJ 9410, 2 (C&S), 26.0–28.3 mm SL; flooded area of the rio Bento Gomes on MT-060, Município de Poconé, rio Paraguay basin, 16°0'0.53"S 56°28'50"W; F. Ottoni and P. Bragança, 05 Apr. 2013. UFRJ 3708, 10, 22.3–30.6 mm SL; temporary pool near Casal Vasco, rio Guaporé drainage; W. Costa *et. al.*, 29 Apr. 1996. UFRJ 7521, 4 (C&S), 23.3–36.9 mm SL; temporary pool near Casal Vasco, rio Guaporé drainage; W. Costa *et. al.*, 29 Apr. 1996. UFRJ 3711, 5, 20.9–28.2 mm SL; temporary pool between km 23 and 29 from the road between Casal Vasco and Vila Bela, rio Guaporé drainage, W. Costa *et. al.*, 29 Apr.1996. UFRJ 3714, 2, 23.3–29.3 mm SL; flooded area 7.7 km from the road between Pontes and Lacerda and Vila Bela, rio Guaporé drainage; Costa *et. al.*, 28 Apr. 1996. UFRJ 5538, 1, 22.7 mm SL; temporary pool on the road from Estância Ecológica Sesc Pantanal, rio Paraguay basin, Costa *et. al.*, 12 Apr. 2002. UFRJ 3716, 1, 21.9 mm SL; temporary pool on km 16–19 from the road between Santo Antônio do Leverger and Barão de Melgaço, rio Paraguay basin; Costa *et. al.*, 26 Apr. 1996. MNRJ 14868, 1, 30.8 mm SL; Cáceres, córrego Carrapato, fazenda Pantanalzinho, rio Paraguay basin; 22 Sep. 1984. MNRJ 14873, 2, 28.2–36.9 mm SL; córrego Sangradourozinho, rio Paraguay basin; Expedição Polonoroeste, 3 Jul. 1984. MNRJ 14874, 2, 33.3–36.8 mm SL; rio Vermelho, Município de Rio Branco. Expedição Polonoroeste, 28 Nov. 1984. MNRJ 14885, 10, 28.2–40.0 mm SL; córrego Carrapato, fazenda Pantanalzinho, Município de Cáceres, rio Paraguai basin; Expedição Polonoroeste, 22 Nov. 1984; MNRJ 14938, 9, 23.7–33.6 mm SL; fazenda Pantanalzinho, Porto Esperidião, Município de Cáceres, rio Paraguai basin; Expedição Polonoroeste, 24 Nov. 1984. MNRJ 17450, 2, 26.9–33.6 mm SL; fazenda Pantanalzinho, Porto Esperidião, Município de Cáceres, rio Paraguai basin; Expedição Polonoroeste. 23 and 24 Nov. 1984. MNRJ 17452, 11, 19.5–25.1 mm SL; lagoon near Transpantaneira, km 110; U. Caramaschi, 06 Out. 1987. **Estado do Mato Grosso do Sul**: UFRJ 10076, 5, 37.0–40.4 mm SL; flooded área of Aquidauana river on MS-170, 14 km north from Aquidauana, rio Paraguay basin, 20°19'28"S 55°50'31"W; alt. 123 m; W. Costa *et al.*, Jul. 2014. UFRJ 7541, 1, 31.8 mm SL: temporary pool in Estrada do Taboco, 80 km north of Aquidauana, rio Paraguay basin; F. Costa *et. al.*, 23 Apr. 1996. MCP 42590, 1, 28.2 mm SL; temporary pool in Estrada do Taboco, 80 km north of Aquidauana, rio Paraguay basin; W. Costa *et. al.*, 23 Apr. 1996. UFRJ 3709, 5, 18.1–21.3 mm SL; temporary pool in Estrada do Taboco 80 km north from Aquidauana, rio Paraguay basin; W. Costa *et. al.*, 23 Apr. 1996. UFRJ 3710, 4, 22.3–25.6; stream in Estrada Boiadeiro, about 100 km north from Aquidauna, rio Paraguay basin; W. Costa *et al*., 22 Apr. 1996. UFRJ 1913, 5, 19.8–28.3 mm SL; Corumbá, rio Paraguay basin; W. Costa and K. Tanizaki, Sep. 1989. **Argentina**: photograph of a not preserved specimen, 1; Arrroyo Saladas situated in the province of Corrientes, some kilometers south of the town of Corrientes, at the Ruta Nacional 12 between San Lorenzo and San Roque, Paraná river basin.

Laetacara flamannellus

Brazil: Estado do Amapá: UFRJ 8060, 34.0 mm SL (holotype); lago Curiaú on AP-70 to Santo Antônio da Pedreira, Município de Macapá, 0°0'54" N 51°2'26" W; P. Bragança and P.F. Amorim, 10 Jan. 2011. UFRJ 8005, 16 (paratypes), 10.4–38.2 mm SL; lago Curiaú on AP-70 to Santo Antônio da Pedreira, Município de Macapá, 0°0'54" N 51°2'26" W; P. Bragança and P.F. Amorim, 10 Jan. 2011. UFRJ 8057, 3 (C&S–paratypes), 26.7–37.8 mm SL; lago Curiaú on AP-70 to Santo Antônio da Pedreira, Município de Macapá, 0°0'54" N 51°2'26" W; P. Bragança and P.F. Amorim, 10 Jan. 2011. UFRJ 8010, 4 (paratypes), 15.6–17.3 mm SL; flooded area on BR-156, 4 km before Tartarugal, Município de Tartarugalzinho, 1° 21' 45" N 50° 55' 34" W; P. Bragança and P.F. Amorim, 16 Jan. 2011. UFRJ 8056, 2 (C&S – paratypes), 21.4–29.1 mm SL; flooded area on BR-156, 4 km before Tartarugal, Município de Tartarugalzinho, 1° 21' 45" N 50° 55' 34" W; P. Bragança and P.F. Amorim, 16 Jan. 2011. UFRJ 8038, 1 (paratype), 35.8 mm SL; Igarapé do Davi, Município do Amapá, 1° 56' 39" N 50° 51' 52" W; P. Bragança and P. Amorim, 16 Jan. 2011. MNRJ 14570, 1 (paratype), 20.4 mm SL; Igarapé de lago, tributary from the left side of rio Vila Nova or rio Anauerapucu, near Babolândia; G. Nunan and D. Moraes, Apr. 1987. IEPA 1090, 2 (paratypes), 22.3–31.9 mm SL; IEPA 1092, 2 (paratypes), 29.6–34.9 mm SL; IEPA 0199, 6 (paratypes), 32.8–37.0 mm SL; lago Pracuúba, Município de Pracuúba; M. Lima, 18 Jul. 1984. IEPA 1764, 4 (paratypes), 20.2–30.5 mm SL; rio Araguari, AMCEL area, Município de Ferreira Gomes, 0° 50' 46'' N 51° 4' 42'' W; C. Gama and D. Halboth, 2 Jun. 2002. IEPA 2751, 8 (paratypes), 21.2–33.1 mm SL; córrego Areal near BR-156, Município de Mazagão, 0° 6' 52" S 51° 50' 55" W; J. da Silva *et al*., 15 Jul. 2008. UFRJ 8829, 1, 28.7 mm SL; stream on the right margin of Oiapoque river, after Vila Taparabu, Município de Oiapoque; P. Bragança and E. Henschel, 31 Jul. 2012.

Laetacara flavilabris

Peru: ANSP 9156, 91 mm TL (photograph and radiograph of the holotype); near Peabas, Ecuador (currently Peru); J. Hauxwell. ANSP 9157, 110.7 mm TL (photograph and radiograph of the lectotype of *Acara freniferus*); the Ampiyacu; J. Hauxwell. MZUSP 26094, 11 (3 C&S), 29.8–61.3 mm SL; Ucayali, Ivita, Pucallpa, Província Coronel Portillo; H. Ortega, 17 Feb. 1976. MZUSP 16211, 9, 23.1–45.1 mm SL; Loreto, Requena, Arboretum Jenaro Herrera; H. Ortega, 4 Jul. 1979. **Brazil**: Estado do Amazonas: MZUSP 42669, 6 (1 C&S), 32.2–55.9 mm SL; Município de

Fonte Boa; Expedição Permanente da Amazônia, 25 Oct. 1968. **Colômbia:** UFRJ 10432, 3 (1 C&S), 58.1–61.8 mm SL; locality between Letícia (Colômbia) and Tabatinga (Brazil), Solimões river basin; E. Henschel and P. Bragança, 15 Mar. 2015. UFRJ 10386, 3, 48.3–61.3 mm SL; locality between Letícia (Colômbia) and Tabatinga (Brazil), Solimões river basin; E. Henschel and P. Bragança, 15 Mar. 2015

Laetacara fulvipinnis

Venezuela: MTDF 30607, 74.6 mm SL (photograph of holotype), lagoon at the village Arigua, a few Km south of San Carlos de río Negro, 1° 50' 13"N 67° 02' 29"W; W. Staeck, Feb. 2006 W. **Brazil: Estado do Amazonas**: MZUSP 59200, 3, 27.7–40.4 mm SL; stream in São João, near Santa Isabel do Rio Negro (=Tapurucuara), 00°24'00" S 065°02'00" W; Expedição Permanente da Amazônia, 23 Oct. 1972. MZUSP 84752, 1, 60.6 mm SL; stream in São João, near Santa Isabel do Rio Negro (=Tapurucuara), 00°24'00" S 065°02'00" W; Expedição Permanente da Amazônia, 26 Oct. 1972. MZUSP 58648, 13 (2 C&S), 28.7–45.8 mm SL; lake on the rio Aiuanã, rio Negro basin; Expedição Permanente da Amazônia, 29 Oct. 1972. MZUSP 95230, 2, 47.7–47.8 mm SL; Paricatuba, Município de Santa Isabel do Rio Negro; Expedição Permanente da Amazônia, 11 Nov. 1972. MZUSP 55138, 5, 29.7–41.5 mm SL; stream in São João, near Santa Isabel do Rio Negro (=Tapurucuara); Expedição Permanente da Amazônia, 27 Oct. 1972. UFRJ 9076, 1 (C&S), 42.7 mm SL; Igarapé do Cajarazinho, tributary of the rio Caurés, in the comunity of Balaio, Município de Barcelos, 01°06'17" S 062°58'42" W; F. Ottoni, P. Bragança and P. Amorim, 17 Nov. 2012. UFRJ 9075, 1 (C&S), 44.9 mm SL; island in a tributary of the rio Daraã, Município de Santa Isabel do Rio Negro, 00°27'17" S 064°46'01" W; F. Ottoni, P. Bragança and P. Amorim, 15 Nov. 2012.

Laetacara thayeri

Brazil: Estado do Amazonas: NMW 33726–27, 29,33–34, 37 40 (photographs of seven syntypes); in the rio Amazononas and its tributaries at Cudajas, in the lago Hyanuary at Manaus and in the Lago Maximo at Alemquer. MNRJ 29470, 4, 34.6–57.5 mm SL; Igarapé do Ananás, lago Tefé; Mission Amazonie, 19 Nov. 1962. MNRJ 29471, 15 (1 C&S), 41.8–59.1 mm SL; tributary of rio Jacitara, Grande do lago Manacapuru; Mission Amazonie, 12 Nov. 1962. MZUSP 6655, 1, 51.0 mm SL; tributary of the lago Manacapuru; Expedição Permanente da Amazônia, 19 Nov. 1967. MZUSP 6845, 160 (3 C&S), 25.7–60.3 mm SL; tributary of rio Tarumazinho, north of Manaus; Expedição Permanente da Amazônia, 18 Nov. 1967. MZUSP 27206, 3, 28.3–33.8 mm SL; rio Negro, Pedra do Gavião; Município de Moura; L. Portugal, 14 Nov. 1982. MZUSP 47934, 1, 37.4 mm SL; stream on the lago Manacapuru; Expedição Permanente da Amazônia, 13 Nov. 1967. MZUSP 58427, 1, 40.8 mm SL; Município de Tapera; Expedição Permanente da Amazônia, 1 Nov. 1972. MZUSP 7365, 21, 31.0–56.2 mm SL; igarapé Limaozinho, Município de Maués; Expedição Permanente da Amazônia, 4 Dec. 1967. MZUSP 7491, 63, 35.4–62.6 mm SL; tributary of the rio Sanabani, Município de Silves; Expedição Permanente da Amazônia, 07 Dec. 1967. MZUSP 101022, 1, 30 mm SL; Parana do lago Amanã; R. Barthem, 1 Oct. 1979. MZUSP 87435, 1, 25.7 mm SL; Paraná do Baré, lago Amanã; 22 Sep. 1979. MZUSP 5834, 1, 18.2 mm SL; lago Saracá, Município de Silves; Expedição Permanente da Amazônia, 17 and 18 Mar. 1967. MZUSP 42671, 8, 22.2–48.0 mm SL; lago Miuá, Município de Codajás; Expedição Permanente da Amazônia, 25 Sep. 1968. MZUSP 35560, 2, 38.2–38.4 mm SL; igarapé Banheiro, tributary of the middle rio Madeira, Município de Humaitá; U. Caramaschi, 29 Jul. 1975. MZUSP 59169, 8, 40.7–45.6 mm SL; flooded áreas of rio Negro, Município de Cantagalo; Expedição Permanente da Amazônia, 28 Jan 1972. MZUSP 7418, 2, 32.5–45.1 mm SL; stream on the lago Sacará, Município de Silves; Expedição Permanente da Amazônia, 6 Dec. 1967. MZUSP 42670, 1, 28.9 mm SL; rio Solimões, Município de Coari; Expedição Permanente da Amazônia, 28 Sep. 1968. MZUSP 6934, 88, 34.7–65.3 mm SL; streamon the lago Puraquequara; Expedição Permanente da Amazônia, 23 Nov. 1967. UFRJ 9078, 1 (C&S), 64.9 mm SL; Igarapé do Cajarazinho, tributary of rio Caurés in the Comunidade do Balaio, Município de Barcelos, 01°06'17"S 62°58'42"W; F. Ottoni, P. Bragança and P. Amorim, 17 Nov. 2012. UFRJ 9077, 1 (C&S), 62.9 mm SL; rio Tibarrá, Município de Santa Isabel do Rio Negro, 0°24'46"S 64°56'57"W; F. Ottoni, P. Bragança and P. Amorim, 14 Nov. 2012. UFRJ 8304, 1, 20.1 mm SL; Igarapé do Baré, tributary of Igarapé São Sebastião, lago Amanã system, rios Japurá-Solimões basin, S 2.26658 W 64.68045; H. Lazzarotto, E. Caramaschi and F. Oliveira, 21 Aug. 2011. UFRJ 8301, 2, 28.6–29.4 mm SL; Igarapé do Kalafate, lago Amanã system, rio Solimões basin; H. Lazzarotto, E. Caramaschi and F. Oliveira, 23 Aug. 2011. UFRJ 8300, 1, 25.4 mm SL; Igarapé do Ubim, lago Amanã system, rios Japurá-Solimões basin, S 2.47081 W 64.60253; H. Lazzarotto, E. Caramaschi and F. Oliveira, 20 Aug. 2011. UFRJ 8303, 1, 30.2 mm SL; trilha do Ubim, lago Amanã system, rio Solimões basin, S 2.49817 W 64.61611; H. Lazzarotto, E. Caramaschi and F. Oliveira, 20 Aug. 2011. UFRJ 8299, 2, 26.7–39.2 m SL; Igarapé do Baré, trilha da Capoeirinha, lago Amanã system, rios Japurá-Solimões basin, S 2.47081 W 64.60252; H. Lazzarotto, E. Caramaschi and F. Oliveira, 22 Aug. 2011. UFRJ 9059, 2, 33.9–34.6 mm SL; Igarapé do Cajarazinho, tributary of the rio Caurés in the Comunidade do Balaio, Município de Barcelos, 01°06'17"S 62°58'42" W; F. Ottoni, P. Amorim and P. Bragança, 17 Nov. 2012. UFRJ 9060, 2, 30.4–37.6 mm SL; Igarapé Salgado, in the beginning of the road to the rio Caurés, Município de Barcelos, 00°58'40"S 62°55'49"W; F. Ottoni, P. Bragança and P. Amorim, 17 Nov. 2012. UFRJ 9058, 3, 38.5–38.7 ; rio Tibarrá, rio Negro basin, Município de Santa Isabel do Rio Negro, 00°24'46"S 64°56'57" W; F. Ottoni, P. Amorim and P. Bragança, 14 Nov. 2012. **Estado de Rondônia state**: MZUSP 85529, 2, 33.6–47.6 mm SL; rio Madeira basin, Município de Calama, 08°03'00" S 062°53'00" W; Expedição Permanente da Amazônia, 20 Nov. 1975.