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Re-description of *Laetacara curviceps* (Teleostei: Cichlidae: Cichlinae)

Felipe P. Ottoni [1], José L. O. Mattos [1] & Ingo Schindler [2]

[1] Laboratório de Ictiologia Geral e Aplicada, Departamento de Zoologia, Universidade Federal do Rio de Janeiro, Cidade Universitária, Caixa Postal 68049, CEP 21994-970, Rio de Janeiro, RJ, Brasil
fpottoni(at)yahoo.com.br; jlomattos(at)gmail.com
[2] Warthestr. 53a, 12051 Berlin, Germany
ingoschindler(at)web.de

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> Abstract

Laetacara curviceps is re-described based both on the types and additional material. *Laetacara curviceps* is similar to both *L. dorsigera* and *L. araguaiae* in general appearance and body shape and comparative small size. It is distinguished from its congeners, except for *L. dorsigera*, by having a dark spot on dorsal fin above trunk bar 5. *Laetacara curviceops* differs from *L. dorsigera* by having a deeper head, a longer pelvic-fin spine and no conspicuous red belly in breeding specimens.

> Resumo

Laetacara curviceps é redescrita com base no material tipo e material adicional. *Laetacara curviceps* é semelhante à *L. dorsigera* e *L. araguaiae* na aparência geral, forma do corpo e no menor tamanho comparado às demais espécies do gênero. Ela difere das demais espécies do gênero, exceto *L. dorsigera* por possuir uma mancha na nadadeira dorsal acima da barra 5 do corpo; e difere de *L. dorsigera* por possuir uma cabeça menos alta, espinho da pélvica mais longo e não apresentar barriga avermelhada na época de reprodução.

> Key words

Acara freniferus, *Laetacara flavilabris, Laetacara fulvipinnis*, *Laetacara thayeri*, Amazon basin, South America, taxonomy.

Introduction

Laetacara Kullander, 1986 is a South American cichlid fish genus currently comprising six valid species: *Laetacara flavilabris* (Cope, 1870) (the type species of *Laetacara*), *L. thayeri* (Steindachner, 1875), *L. dorsigera* (Heckel, 1840), *L. curviceps* (Ahl, 1924), *L. fulvipinnis* Staeck & Schindler, 2007 and *L. araguaiae* Ottoni & Costa, 2009. Kullander (1986) re-described *L. flavilabris* and *L. thayeri* in his book about the cichlid fishes of Peru and synonymized *Acara freniferus* Cope, 1872 (which was a valid taxon within the *"Aequidens" dorsiger* group) to *L. flavilabris*, because its description was based on specimens not distinguisable from *L. flavilabris*. Populations of *Laetacara dorsigera* from Argentina were described by Casciotta (1998), and more recently Ottoni & Costa (2009) re-described *L. dorsigera* based on specimens from Brazil. *Laetacara dorsigera* is distributed in the rio Guaporé and the lower rio Mamoré drainages of the Amazon basin and in the rio Paraguay and the middle rio Paraná of the rio Paraná basin in Argentina, Brazil and Paraguay (Ottoni & Costa, 2009). However, *Laetacara curviceps* is taxonomically not well known. This species was introduced to the German aquarium trade in 1909 as "*Acara thayeri*". Later it was recognized as a new species and was described by Ahl (1924), the former curator of Herpetology in the Berlin Museum, as *Acara curviceps* based on specimens obtained from the tropical aquarium-fish trade from "Amazonenstrom".

In this paper we present a re-description of *Laetacara curviceps* based both on the types and additional material from Município Parintins and Município de Óbidos, rio Amazon basin.

Materials and Methods

Material is deposited in MNRJ, Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro; MTD F, Museum für Tierkunde Dresden Fish Collection, Dresden, Deutschland; UFRJ, Instituto de Biologia, Universidade Federal do Rio de Janeiro, Rio de Janeiro and ZMB, Museum für Naturkunde, Berlin.

We followed the species delimitation method proposed by DAVIS & NIXON (1992). Measurements and counts follow OTTONI & COSTA (2008), with the addition of last anal-fin spine length, which is a measurement from the beginning to the end of the last anal-fin spine; number of proximal radial on dorsal-fin base; number of scales along the transversal series of the peduncle depth; number of scales between lateral lines; number of scales between the end of upper lateral line and dorsal-fin base. Measurements are presented as percentages of standard length (SL), except for those related to head morphology, which are expressed as percentages of head length (HL). Measurements were taken on the left side of each specimen with digital calipers under a binocular microscope. Osteological studies were made on cleared and counterstained (C&S) specimens prepared according to TAYLOR & VAN DYKE (1985). Vertical bars are numbered from the caudal fin to the snout. Spots are similarly numbered. Since the type specimens are very stiff, overgrown and not well preserved, it was not possible to obtain accurately all measurements and counts. Examined material of *L. curviceps* is listed under species account. Comparative material used is listed in STAECK & SCHINDLER (2007) and OTTONI & COSTA (2009).

Key for the *Laetacara* species

1. Caudal fin without basal spot (KULLANDER, 1986: plate XXXIV 2 and 3), ctenoid scales on sides of head. ..... ***L. thayeri***

1a. Caudal fin with basal spot and cycloid scales on sides of head. **2**

2. No dark spot on dorsal fin above trunk bar 5. .. **3**

2a. Dark spot on dorsal fin above trunk bar 5. ..... **5**

3. With less than 15 scales in upper lateral line. ..... ***L. araguaiae***

3a. With 15 or more scales in upper lateral line. **4**

4. Presence of a dark dot at the edge of each scale on the midlateral portion of the flank (Staeck & Schindler, 2007: fig. 5). ..... ***L. fulvipinnis***

4a. Absence of a dark dot at the edge of each scale on the midlateral portion of the flank (STAECK & SCHINDLER, 2007). ..... ***L. flavilabris***

5. 9–10 dorsal-fin rays, 21–22 scales in longitudinal series, breeding males and females with conspicuous red cheeks, gill covers and belly. ..... ***L. dorsigera***

5a. 8–9 dorsal-fin rays, 22–24 scales in longitudinal series, no conspicuous red belly in breeding specimens. ..... ***L. curviceps***

Laetacara curviceps (AHL, 1924)

Fig. 1 and 2

Acara curviceps AHL, 1924: 44.

Type locality: Amazonenstrom.
Holotype: ZMB 31324.

Examined material. Brazil: Amazon basin: ZMB 31324, 1 holotype, 46.8 mm SL, Amazonenstrom; ZMB 32398, 3 paratypes, 39.2–46.9 mm SL; ZMB 32399, 2 paratypes, 35.6–39.6 mm SL; ZMB 32400, 1, 40.4 mm SL; UFRJ 4350, 6, 27.2–34.5 mm SL; lago Parananema, Amazon basin, ilha Município Parintins; C. FIGUEIREDO & C. CODEÇO, 11 Sep. 1996; UFRJ 4358, 11, 20.3–27.3 mm SL; lago Parananema, Amazona basin, ilha do Município Parintins; C. FIGUEIREDO & C. CODEÇO, 11 Sep. 1996; UFRJ 4361, 7, 23.3–29.4 mm SL; lago Parananema, Amazon basin, ilha Município Parintins; C. FIGUEIREDO & C. CODEÇO, 11 Sep. 1996; UFRJ 7522, 4 C&S, 29.5–25.2 mm SL; lago Parananema, Amazon basin, ilha do Município Parintins; C. FIGUEIREDO & C. CODEÇO, 11 Sep. 1996; UFRJ 4234, 1, 21.1 mm SL; lago Máximo, bacia do rio Amazon, Município Parintins; C. FIGUEIREDO & C. CODEÇO, 14 Sep. 1996; and Pará: Município de Óbidos: UFRJ 4225, 7, 14.2–32.9 mm SL; lago Paunis, Amazon basin, near mouth of igarapé Paunis; C. FIGUEIREDO & C. CODEÇO, 07 Sep. 1996.

Diagnosis. *Laetacara curviceps* differs from its congeners, except from *L. dorsigera* by having a dark spot on the dorsal fin above trunk bar 5 (*vs*. no spots on the dorsal fin). *Laetacara curviceps* differs from *L. thayeri* by having cycloid scales on the head sides (*vs*. ctenoid scales) and by the presence of a caudal-fin base spot (*vs*. absence); from *L. flavilabris* by having fewer total vertebrae (24 *vs*. 26); from *L. araguaiae* by having more proximal radials on dorsal-fin base (22–23 *vs*. 21); from *L. fulvipinnis* by the lack of a dark dot at the edge of each scale on the midlateral portion of the flank (*vs*. presence); and from *L. dorsigera* by having a deeper head (head depth 84.6–88.9 % of HL *vs*. 90.2–96.3 % of HL), a longer pelvic-fin spine (pelvic-fin spine length 15.5–19.7 % of SL vs. 11.7–15.4 % of SL), fewer teeth along posterior margin of cerato-

Fig. 1. *Laetacara curviceps*, live specimen (male) from Santarem, not preserved. Photo R. Stawikowski.

Fig. 2. *Laetacara curviceps*, live specimen (female) from Santarem, not preserved. Photo R. Stawikowski.

branchial 5 (19–20 *vs*. 21–24) and no conspicuous red belly in breeding specimens (*vs*. breeding males and females with conspicuous red cheeks, gill covers and belly).

Tab. 1. Morphometric data of *Laetacara dorsigera* AHL, 1924.

	Non type series			Type specimens		
	Range (n = 10)	Mean (n = 10)	SD (n = 10)	Range (n = 7)	Mean (n = 7)	SD (n = 7)
Standard length (mm)	26.0– 32.5	28.2	3.9	35.6–46.9	42.0	4.4
Percents, standard length						
Body depth	42.2–45.8	43.8	1.2	44.1–50.6	46,3	2.2
Predorsal length	42.0–50.2	44.7	2.7	–	–	–
Prepelvic length	43.3–49.3	44.9	2.2	–	–	–
Caudal-peduncle depth	15.6–19.1	18.0	1.2	19.1–20.7	19.9	0.8
Caudal-peduncle length	8.5–12.3	10.2	1.4	7.9-9.9	8.6	0.9
Dorsal-fin base length	55.0–58.0	56.4	1.0	58.4–62.4	60.4	1.6
Anal-fin base length	19.9–22.7	21.1	1.1	23.1–25.5	24.1	0.9
Pelvic-fin spine length	15.5–19.7	16.9	1.5	–	–	–
Pelvic-fin length	30.8–49.8	39.0	6.5	–	–	–
Last dorsal-fin spine length	15.1–19.4	16.3	1.6	–	–	–
Last anal-fin spine length	13.5–16.0	14.7	0.9	–	–	–
Caudal-fin length	29.9–33.6	31.5	1.3	28.8–35.2	33.4	2.1
Pectoral-fin length	27.5–30.8	29.1	1.1	23.4–27.4	26.1	1.4
Head length (mm)	7.8–12.6	10.7	1.6	12.8–15.1	13.8	0.9
Percents, head length						
Head depth	84.6–88.9	87.2	1.7	–	–	
Orbital diameter	32.7–38.5	34.6	2.0	25.9–33.4	31.0	2.5
Snout length	29.5–34.6	31.9	2.2	–	–	–
Head width	55.4–58.8	57.5	1,4	–	–	–
Interorbital width	44.5–49.2	46.5	1.6	30.5–39.9	36.5	3.3
Preorbital depth	57.7–63.9	61.2	2.2	–	–	–
Upper jaw length	25.9–29.4	27.4	1.2	–	–	–
Lower jaw length	17.2–19.8	19.0	0.9	–	–	–

Description (based on non type specimens with SL > 26.0 mm). Morphometric data are summarized in Table 1, meristic data in Table 2. Dorsal profile slightly convex from snout to caudal-peduncle origin, leaner between snout and dorsal-fin origin. Ventral profile slightly convex from snout to caudal-peduncle origin. Caudal peduncle approximately straight ventrally and dorsally. Body profile elongate, laterally compressed. Lower jaw slightly shorter than upper one. Jaw teeth caniniform. Teeth hyaline to red at tip. Opercle not serrated. Urogenital papilla externally visible, rounded.

Anterior portion of the dorsal fin rounded and the posterior region pointed. Tip of dorsal fin reaching vertical through middle of caudal fin. Anal fin rounded anteriorly, pointed posteriorly. Tip of anal fin reaching vertical through middle of caudal fin. Caudal fin not particularly long, subtruncate. Pectoral fins pointed. Pectoral-fin base on vertical through dorsal-fin origin. Tip of pectoral-fin reaching vertical through vertical trunk bar 4. Pelvic fin pointed. Pelvic-fin base on vertical through third spine of dorsal fin. Tip of pelvic fin reaching vertical through base of first spine of anal fin. Trunk and caudal peduncle covered with ctenoid scales. Head covered with cycloid scales.

Ceratobranchials 1–4 without tooth plates. Two supraneurals and a wide ectopterygoid.

Ceratobranchial 5 partly sutured and relatively robust, with 5–8 teeth along midline and 19–20 teeth along posterior margin. Posterior teeth usually more compressed. Posterior and medial teeth larger than lateral and anterior teeth. Posterior teeth bicuspid, curved forward. Large laterally compressed teeth bicuspid (Fig. 3).

Colouration (in alcohol). Side of body light brown with seven dark brown bars between posterior limit of caudal peduncle and posterior margin of opercle. Trunk bars usually forked. Two dark spots; first spot elliptical on base of caudal fin through lower lateral line; second one on junction between longitudinal stripe and vertical trunk bar 5. Interrupted longitudinal stripe brown

Table 2. Meristic variation data of *Laetacara curviceps* (non type specimens). pc=procurrent rays.

Dorsal-fin spines	14–16	(n = 7)
Dorsal-fin rays	8–9	(n = 7)
Anal-fin spines	3	(n = 7)
Anal-fin rays	8–9	(n = 7)
Pelvic-fin spines	1	(n = 7)
Pelvic-fin rays	5	(n = 7)
Caudal-fin rays	22 (3pc + 8 + 8 + 3 pc)	(n = 4)
Pectoral-fin rays	12	(n = 4)
Gill-rakers on first ceratobranchial	2–3 + 9–10	(n = 4)
Total vertebrae	24	(n = 4)
Rib pairs	9	(n = 4)
Precaudal vertebrae	12	(n = 4)
Caudal vertebrae	12	(n = 4)
Scales of upper lateral line serie	12–15	(n = 12)
Scales of lower lateral line serie	6–7	(n = 12)
Scales of longitudinal serie	22–24	(n = 12)
Scales of dorsal fin origin serie	3	(n = 12)
Scales of anal fin origin serie	7	(n = 12)
Scales between lateral lines	2	(n = 12)
Scales of peduncle depth	7	(n = 12)
Proximal radial on dorsal-fin base	22–23	(n = 4)
Proximal radial on anal-fin base	8–9	(n = 4)

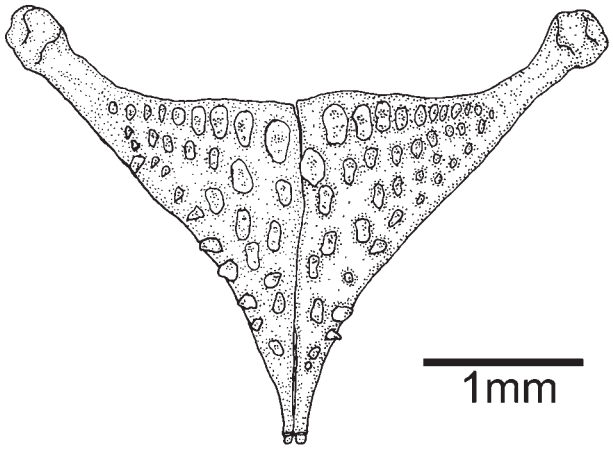

Fig. 3. Ceratobranchial 5 of *L. curviceps*.

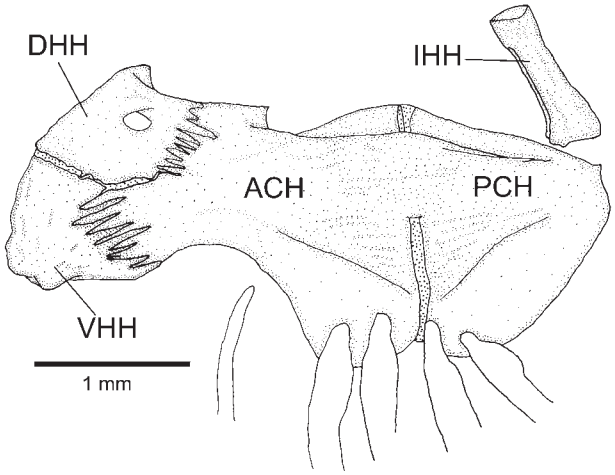

Fig. 4. Hyoid of *L. curviceps;* ACH = anterior ceratohyal, DHH = dorsal hypohyal, IHH = interhyal, PCH = posterior ceratohyal, and VHH = ventral hypohyal.

between trunk bar 1 and margin of opercle, lighter and inconspicuous between bars. Side of head light brown with darker colouration on opercle. Dorsal fin with one black spot above trunk bar 5 and usually a spot above trunk bar 4, in both sexes. Dorsal and anal fins light brown, with dots on posterior portion of fins. Caudal fin light brown, with dots usually between base and middle of caudal fin, darker near caudal peduncle. Pectoral fin hyaline, pelvic fin brown.

Colouration (in life). For general appearance and colour pattern see Fig. 1 and 2. Live colouration variable, depending on mood. Adult specimens with bluish or turquoise ground colour. Nape and dorsal region dark grey. On snout and interorbital region alternating dark and light stripes, below the eyes red and greenish iridescent stripes. Gill covers grey with some light greenish or turquoise iridescent dots. Scales on anterior body sides with thin dark posterior margin. Body sides with a dark horizontal mid-lateral band, extending from posterior margin of orbit to upper part of caudal-fin base. Dark bars and posterior part of horizontal band often not clearly visible. Bright light zones above and below the dark band extending to the mid-lateral spot. Above dark lateral band a reddish stripe often disrupted into widely spaced small blotches. Dorsal fin grey to bluish, with narrow lighter margin and a dark spot above the bar of the mid-lateral spot, in females more conspicuous than in males. Posterior soft part with light dots. Anal fin bluish, posterior orange, with dark margin and light dots. Pectoral fins hyaline. Pelvic fins greyish, blue with greenish iridescent stripes. Caudal fin bluish, posterior dark yellowish with conspicuous pattern of light dots and dark margin.

Type specimens. Selected measurements of the type specimens are given in Tab.1. The holotype is figured in Ahl (1924: fig.5). The types are aquarium specimens and are larger (slightly overgrown) than wild caught ones (SL 35–47mm). The specimens have lost all colours and dark pigments. Ground colour evenly dirty yellowish to pale brownish. Dorsal-fin spines

14–16; dorsal-fin rays 7–8; anal-fin spines 3; anal-fin rays 7–8.

Habitat and ecological notes. Field observations (STAWIKOWSKI & WERNER, 1998) indicate that the habitats where *L. curviceps* occurs are the clearwaters of the Amazon basin. Clearwaters contain only a small amount of suspended matter, have a relative high transparency and are characterised by a pH value of 4.5 to 7.8 (LOWE-MCCONNELL, 1987). The biotopes near Santarem are described by STAWIKOWSKI & WERNER (1998) as small clearwater creeks with low current, ponds and small lakes. The beds were covered densely with leaf litter. There were also a plenty of water plants like *Cabomba*, *Myriophylum* and *Eichhornia*. The water data are given as: pH 5.2, 10 μS/cm and 26 °C. Observations in the aquarium showed that *L. curviceps* is a monogamous substrate spawner. Both male and female take care of the brood.

Distribution. South America: Amazon, in lower portions of tributaries of the Amazon river drainage in Brazil.

Discussion

Laetacara curviceps is similar to both *L. dorsigera* and *L. araguaiae* in general appearance, body shape and comparative small size (usually < 50mm SL versus > 50 mm in *L. thayeri, L. flavilabris* and *L. fulvipinnis*). From the remaining species of the genus it is distinguished by character states given in the diagnoses and in the key. The year of the description of the taxon *Acara curviceps* Ahl is often given as 1923 (e.g. ESCHMEYER & FRICKE, 2009; KULLANDER, 2003). However, on the cover page of the "Mitteilungen aus dem zoologischen Museum in Berlin" it is mentioned that the issue, including the original description, was distributed in February 1924. On the first page of AHL's paper (AHL, 1924) there is only a remark "Eingesandt im Juni 1923" (received in June 1923). Thus, the year of the publication is 1924.

In the description, AHL (1924) mentioned eight type specimens: one type (the holotype) and 7 cotypes (paratypes). However, there are only seven specimens inventoried by PAEPKE (1995) and re-examined by us for the current study. It seems that one specimen (one paratype) is lost.

There are differences in measurements and counts between the type specimens and the fresh material. However, we consider these differences as artificial instead of natural ones, because the types are overgrown (they were kept in aquaria for years before fixation) and not well preserved (possibly dead before preservation).

Laetacara curviceps, as reported by KULLANDER (1986) and OTTONI & COSTA (2008), posseses the hyoid with a deep notch on the dorsal margin of the anterior ceratohyal. A character proposed by KULLANDER (1986) as a synapomorphy of the species of the genus *Laetacara* (although KULLANDER (1986) examined osteological characters in *L. flavilabris* and *L. curviceps* only). However, neither CASCIOTTA (1998) for *L. dorsigera* nor STAECK & SCHINDLER (2007) for *L. fulvipinnis* observed such a deep notch. This character was later confirmed by OTTONI & COSTA (2009) in *L. dorsigera*, *L. curviceps* and *L. araguaiae*. During this study, however, there were specimens of *L. curviceps* osteologically analysed which possess a deep notch on the dorsal margin of the anterior ceratohyal only in one hyoid (two specimens), and others in both (two specimens) (Fig. 4). Therefore, it seems doubtful to use this character state as a diagnostic synapomorphy of the genus *Laetacara*.

Following SMITH *et al*. (2008), *Laetacara* is a component of the subfamily Cichlinae and the tribe Cichlasomatini, closely related to *Nannacara* REGAN, 1905 and *Cleithracara* KULLANDER & NIJSSEN, 1989. Discussion about relationship of the *Laetacara* species can not be done presently, since phylogenetics studies on *Laetacara* are not available yet. A study about the systematics of the genus is required.

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