

## A new species of *Boehlkea* (Characiformes: Characidae: Stevardiinae) from the rio Japurá, Amazon basin, Brazil

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A new species of *Boehlkea* is described from rio Japurá, Amazon basin. The new species differs from *B. fredcochui* by the presence of a vertically elongate humeral spot (*vs.* absence), complete lateral line (*vs.* incomplete), four rows of scales below lateral line (*vs.* three), and lower number of branched anal-fin rays (17-21 *vs.* 22-25), and from *B. orcesi* by the higher number of maxillary teeth (13-14 *vs.* 5-12), greater head length (27.9-29.9% *vs.* 24.3-27.5% of SL), and by the color pattern (basal half of dorsal-fin, distal portion of pelvic-fin, lower caudal-fin lobe and anal-fin with black chromatophores *vs.* absence of black chromatophores in the fins).

**Keywords:** Characidae “Clade A”, Color pattern, *Hemibrycon*, Lateral line length, Taxonomy.

Uma nova espécie de *Boehlkea* é descrita do rio Japurá, bacia Amazônica. A espécie nova difere de *B. fredcochui* pela presença de uma mancha umeral verticalmente alongada (*vs.* ausência), linha lateral completa (*vs.* incompleta), quatro séries de escamas abaixo da linha lateral (*vs.* três), e menor número de raios ramificados na nadadeira anal (17-21 *vs.* 22-25), e de *B. orcesi* pelo maior número de dentes no maxilar (13-14 *vs.* 5-12), maior comprimento da cabeça (27,9-29,9% *vs.* 24,3-27,5% do CP), e pelo padrão de colorido (porção inferior da nadadeira dorsal, porção distal da nadadeira pélvica, lobo inferior das nadadeiras caudal e anal com cromatóforos pretos *vs.* ausência de cromatóforos pretos nas nadadeiras).

**Palavras-chave:** Characidae “Clado A”, Comprimento da linha lateral, *Hemibrycon*, Padrão de colorido, Taxonomia.

### Introduction

The genus *Boehlkea* was proposed by Géry (1966) and considered to be similar to *Hemibrycon* Günther, 1864 but differing by its smaller size (about 40 mm SL) and by the regression of the lateral line and scales on caudal-fin base. The type-species of the genus, *Boehlkea fredcochui* Géry was described from 19 specimens from Paramount Aquarium fish importers with uncertain type-locality; “...it is probable that the species occurs along the Upper Amazon (or Marañon) from Iquitos to Leticia downstream”, according to Géry (1966: 213).

Géry (1966) grouped *Boehlkea* along with *Bryconacidnus* Myers, *Bryconamericus* Eigenmann, *Ceratobranchia* Eigenmann, *Coptobrycon* Ellis, *Hemibrycon*, *Knodus* Eigenmann, *Microgenys* Eigenmann, *Nematobrycon*

*Eigenmann*, *Piabarchus* Myers, *Rhinobrycon* Myers, and *Rhinopetitia* Géry, in a new subtribe, Hemibryconini, which consists of a group of Tetragonopterinae (*sensu* Géry, 1977) with four inner premaxillary teeth, frequently having a greatly developed third infraorbital, and, quite often, an irregular implantation of the outer premaxillary row of teeth.

Malabarba, Weitzman (2003) assigned *Boehlkea* to a large clade inside Characidae (“Clade A”), based on the putative derived presence of four teeth in the inner row of the premaxilla and reduced number of dorsal-fin rays (ii,8). Since no specializations related to insemination, development of glands along fins, or modifications on teeth and jaw related to a ventral mouth, which are features found in the majority genera of Clade A, Malabarba, Weitzman (2003) considered *Boehlkea* and *Hemibrycon* as the most basal genera in that clade.

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Mirande (2010) elevated the rank of Stevardiinae to include the members of the Clade A, with the addition of *Aulixidens* Böhlke and *Nantis* Mirande, Aguilera & Azpelicueta. Although Mirande (2010) did not analyze specimens of *Boehlkea* in his phylogenetic matrix of Characidae, he pointed out that the genus can be related to *Hemibrycon* but differing from it by the presence of scales on caudal-fin base. Based mainly on this character, Bertaco, Malabarba (2010) transferred *Hemibrycon orcesi* Böhlke, 1958 to *Boehlkea*. In a comparative study of the spermiogenesis and sperm ultrastructure of some stevardiine genera including *Boehlkea*, Baicere-Silva *et al.* (2011) concluded that the stevardiines share homologous sperm characteristics, which was considered as an additional evidence supporting the monophyly of the subfamily.

Recently, as part of a molecular-based phylogenetic study of the Stevardiinae, Thomaz *et al.* (2015) recognized Hemibryconini as a monophyletic group consisting of *Acrobrycon* Eigenmann & Pearson, *Boehlkea*, and *Hemibrycon*, which restricted the tribe to these three genera instead of the 12 that had been proposed by Géry (1966). Despite not including samples of *Boehlkea* in the study, Thomaz *et al.* (2015) tentatively classified the genus in the Hemibryconini based on its morphological resemblance with *Acrobrycon* and *Hemibrycon*, especially the shared presence of teeth along more than one-half the length of the toothed margin of the maxilla.

The rio Japurá, which drains the northwestern portion of the Amazon basin (near the supposed type-locality of *B. fredcochui*), is one of the largest rivers in the world regarding water discharge (Latrubesse *et al.*, 2005) and is the fourth major tributary of the rio Amazonas (McClain, Naiman, 2008). The rio Japurá has its headwaters in the Cordillera Oriental of Colombia, where is called as the río Caquetá and lies around two thirds of the Caquetá-Japurá basin; the other one third lies in Brazil (Goulding *et al.*, 2003). Due to the difficulty of access to the rio Japurá, its ichthyofauna is scarcely known, with large sampling gaps mainly on the Brazilian side. Here we describe a new species of *Boehlkea* based on numerous specimens collected during a recent expedition to the Brazilian stretch of that river, close to the Brazil-Colombia border.

### Material and Methods

Counts and measurements were taken as described by Fink, Weitzman (1974), with the exception of the number of scale rows below lateral line, which were counted from the scale row ventral to lateral line to the scale row nearest the first pelvic-fin ray. Measurements were taken point-to-point with an electronic caliper with 0.1 mm of precision on the left side of specimens whenever possible. In the description, counts are followed by the number of specimens examined in parentheses; holotype is indicated by an asterisk. Measurements are given as percent of standard length (SL), except subunits of the head, which are given as percent of head length (HL).

Vertebrae, supraneurals, and procurrent caudal-fin rays counts were taken from cleared and stained specimens (c&s) prepared according to the method of Taylor, Van Dyke (1985). Total vertebral counts include Weberian apparatus, which was counted as four elements, and fused preural centrum 1 plus ural centrum 1 (PU1+U1) counted as a single vertebral element. Teeth and gill-rakers counts included all type-specimens. The gill-raker at the junction of the ceratobranchial and the epibranchial is included in the counting of gill-rakes of lower limb. Scanning electron micrographs (SEM) of teeth and jaws were taken from c&s dissected specimens.

The collected material was preserved in 10% formalin and further stored in ethanol 70%; some specimens were preserved in 95% ethanol for molecular analyses. Examined specimens are deposited in the following institutions: ANSP, Academy of Natural Sciences of Drexel University, Philadelphia, USA; INPA, Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil; MCN, Museu de Ciências Naturais da Fundação Zoobotânica do Rio Grande do Sul, Porto Alegre, Brazil; MZUSP, Museu de Zoologia da Universidade de São Paulo, São Paulo, and USNM, National Museum of Natural History, Smithsonian Institution, Washington D.C., USA.

### Results

#### *Boehlkea weitzmani*, new species

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#### Figs. 1-4, Tabs. 1 and 2

**Holotype.** INPA 53202, male, 33.7 mm SL, Brazil, Amazonas State, rio Japurá, stream at 500 m of the left margin of the river, 01°42'52"S 69°07'41"W, 8 Sep 2014, P. M. Ito & R. Collins.

**Paratypes. Brazil, Amazonas State, rio Japurá:** ANSP 203166, 2, 25.4-31.2 mm SL, collected with the holotype; INPA 48539, 1, 27.1 mm SL, stream on left margin of the river, 01°43'8"S 69°07'38"W, 1 Sep 2014, J. Zuanon, I. M. Soares, P. M. Ito; INPA 48540, 9, 16.6-30.2 mm SL (2, 23.4-30.2 mm SL), collected with the holotype; INPA 48541, 7, 14.0-34.8 mm SL (3, 31.1-34.8 mm SL; 1 c&s, 32.8 mm SL), stream on left margin of the river, 01°42'52"S 69°02'55"W, about 400 m, 31 Aug 2014, J. Zuanon, I. M. Soares, P. M. Ito & R. Collins; INPA 48542, 4, 23.8-28.5 mm SL (2, 24.8-28.5 mm SL), stream on left margin of the river, 01°43'08"S 69°07'37"W, 7 Sep 2014, P. M. Ito & R. Collins; INPA 48543, 5, 17.8-30.9 mm SL (2, 25.8-30.9 mm SL; 1 c&s, 26.7 mm SL), stream on left margin of the river, about 400 m of the access track, 01°50'56"S 69°01'45"W, 6 Sep 2014, P. M. Ito & R. Collins; INPA 48544, 15, 16.6-25.0 mm SL (4, 22.3-25.0 mm SL; 2 c&s, 26.4-29.4 mm

SL), about 500 m of access track, on left track, right margin of the river, 01°42'52"S 69°02'51"W, 30 Aug 2014, J. Zuanon, I. M. Soares & P. M. Ito; INPA 48545, 8, 22.7-31.7 mm SL (4, 25.5-31.7 mm SL), stream on left margin of the river, 01°42'43"S 69°07'10"W, 1 Sep 2014, J. Zuanon, I. M. Soares, P. M. Ito & R. Collins; MCN 19980, 2, 30.3-31.2 mm SL, stream on left margin of the river, about 400 m of the access track, 01°50'56"S 69°01'45"W, 6 Sep 2014, P. M. Ito & R. Collins; MCN 19981, 2, 24.3-30.6 mm SL, about 500 m of access track, on left track, right margin of the river, 01°42'52"S 69°02'51"W, 30 Aug 2014, J. Zuanon, I. M. Soares & P. M. Ito; MCN 19982, 1, 28.5 mm SL, stream on left margin of the river, 01°42'43"S 69°07'10"W, 1 Sep 2014, J. Zuanon, I. M. Soares, P. M. Ito & R. Collins; MZUSP 117172, 1, 28.1 mm SL, about 500 m of access track, on left track, right margin of the river, 01°42'52"S 69°02'51"W, 30 Aug 2014, J. Zuanon, I. M. Soares & P. M. Ito; USNM 432545, 1, 30.1 mm SL, stream on left margin of the river, 01°42'43"S 69°07'10"W, 1 Sep 2014, J. Zuanon, I. M. Soares, P. M. Ito & R. Collins.

**Diagnosis.** *Boehlkea weitzmani* is differentiated from *B. fredcochui* by having a complete lateral line (*vs.* incomplete), four rows of scales below lateral line (*vs.* three), presence of a conspicuous vertically elongated humeral spot (*vs.* absence of a humeral spot), and by lower number of branched anal-fin rays (17-21 *vs.* 22-25), and from *B. orcesi* (*sensu* Bertaco, Malabarba, 2010) by the higher number of maxillary teeth (13-14 *vs.* 5-12), greater head length (27.9-29.9% *vs.* 24.3-27.5% of SL), and by the color pattern (basal half of dorsal fin, distal portion of pelvic fin, lower caudal-fin lobe and anal-fin with black chromatophores *vs.* unpigmented fins).

**Description.** Morphometric data for *Boehlkea weitzmani* presented in Tab. 1. Body compressed and elongate; greatest body depth located anteriorly to dorsal-fin origin. Dorsal profile of head convex from tip of snout to anterior naris, straight from latter point to tip of supraoccipital spine. Dorsal profile of body slightly convex from tip of supraoccipital spine to dorsal-fin origin; slanted from this point to adipose-fin origin and slightly concave along caudal peduncle. Ventral profile of body convex from tip of lower jaw to anal

fin; slanted along anal-fin base and slightly concave along caudal peduncle.

Mouth rounded. Mouth terminal; slit nearly at horizontal through middle of eye. Premaxillary teeth in two rows. Outer row with 4\*(6), 5(21), or 6(4), tricuspid teeth with central cusp slightly longer; inner row with 4\*(32) pentacusp teeth, gradually decreasing in size from anteriormost teeth. Maxillary almost fully toothed with 5(1), 6(1), 7(5), 8(7), 9(10), 10\*(6), 11(1), or 12(1) uni- to tricuspid teeth, with central cusp longer. Three anteriormost dentary teeth larger, with five cusps, followed by a medium-sized tooth with three cusps, and 7(1), 8\*(2), 9(5), 10(4), 11(3), 12(6), 13(3), 14(2), 15(2), 16(3), or 17(1) smaller conical teeth (Fig. 2).

Dorsal-fin rays ii,8(32); first unbranched ray smaller than half length of second unbranched ray. Dorsal-fin origin slightly posterior to body midlength and posterior to vertical through pelvic-fin origin. Adipose fin present. Pectoral-fin rays i,9\*(4), 10(20), or 11(8); pectoral-fin tip reaching pelvic-fin origin. Pelvic-fin rays i,6(31); pelvic fin reaching anal-fin origin. Anal-fin rays iii\*(18), iv(13) or v(1), 17(1), 18(3), 19(12), 20\*(13) or 21(3); anal-fin origin approximately at vertical through insertion in last dorsal-fin insertion rays. Principal caudal-fin rays i,9\*(31) or i,10(1) + 8,i\*(31) or 9,i(1). Dorsal procurrent caudal-fin rays 10(1), 11(2), or 12(1) and ventral procurrent caudal-fin rays 11(3) or 12(1). Caudal fin forked, lobes similar in size.

Scales cycloid. Lateral line complete, slightly curved anteriorly, with 36(2), 37(10), 38(11), 39\*(7), or 40(2) perforated scales. Longitudinal scale rows between dorsal-fin origin and lateral line 5\*(30) or 6(2); longitudinal scale rows between lateral line and pelvic-fin origin 3\*(31) or 4(1). Predorsal scales row with 9(2), 10(5), 11\*(9), or 12(16) scales. Circumpeduncular scales 14\*(30). Scale sheath along anal-fin base with 13\*(3), 14(3), 15(6), 16(5), 17(7), 18(5), 19(2), or 21(1) small scales in single series, overlying almost entire length of basal portion of anal-fin rays. Small scales covering one third of base of caudal-fin lobes.

Supraneurals 5(4), "I"-shaped. Precaudal vertebrae 15(3) or 16(1); caudal vertebrae 21(2), 22(1) or 23(1); total vertebrae 36(1), 37(2), or 38(1). First gill arch with 5(3) or 6\*(25) gill-rakers on upper limb and 8(1), 9(3), 10\*(20), or 11(4) on lower limb.



**Fig. 1.** Holotype of *Boehlkea weitzmani*, INPA 53202, 33.7 mm SL, male, rio Japurá basin, Amazonas State, Brazil.



**Fig. 2.** *Boehlkea weitzmani*, INPA 48541, 32.8 mm SL, paratype. Scanning electron micrograph of left side upper and lower jaws. Scale bar = 100 $\mu$ m.

**Color in alcohol.** Overall ground color of body pale yellow. Upper jaw, anterior portion of maxilla, snout, top of head and dorsal portion of opercle with dense concentration of small dark chromatophores. Lower jaw, gular area and infraorbitals clearer. Dorsal surface of body with dark chromatophores from posterior region of supraoccipital spine to caudal peduncle, resulting in dark stripe on the dorsum. One conspicuous humeral spot vertically oriented, extending horizontally from second through third lateral-line scales,

and over three scale rows dorsal to lateral line. Longitudinal dark stripe along body midline, originating at end of humeral spot, extending to middle of caudal-fin rays, covering two rows of scales. Scattered dark chromatophores above anal-fin base. Distal portion of first to fourth dorsal-fin rays hyaline. Interradial membranes of dorsal fin with dense concentration of dark chromatophores, resulting in dark band. Adipose, pectoral and pelvic fins hyaline. Proximal portion of anal fin with few scattered dark chromatophores or hyaline. Distal portion of interradial membranes of anal fin with dense concentration of dark chromatophores, resulting in dark stripe-like pigmentation. Caudal fin with dark pigmentation along its lateral borders forming broad transversal stripe on both lobes. Tips of caudal-fin lobes hyaline. Middle portion of lower caudal-fin lobe with dark chromatophores forming vertical stripe-like blotch in interradial membranes along lower border without reaching tip of rays.

**Color in life.** Overall body color silvery on flanks, with dorsum light olive to yellow from snout tip to near insertion of adipose fin; ventral area silvery white. Black vertically elongated humeral blotch. Scattered melanophores forming faint band along midline just above lateral line scales of posterior half of body. Upper portion of iris red, with some small red markings also on its lower edge. Purple to bluish sheen on scales of caudal peduncle extending to the scales over caudal-fin base. Pectoral fin hyaline; pelvic fin hyaline to whitish. Adipose fin with basal two-thirds opaque white and hyaline outer edge. Dorsal, anal and caudal fins with scattered red chromatophores over interradial membranes, more pronounced on caudal-fin base (Fig. 3).

**Tab. 1.** Morphometric data of the holotype and paratypes of *Boehlkea weitzmani* (INPA 53202), *B. fredcochui* (holotype ANSP 111675, and paratypes ANSP 111668 (A) and 111676 (B)), and *B. orcesi* (holotype USNM 164064, and paratypes ANSP 75904, USNM 175128). Range includes the holotype. SD= Standard Deviation.

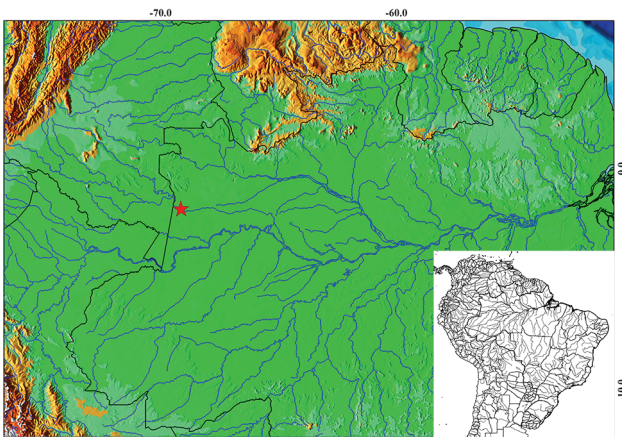
	<i>Boehlkea weitzmani</i>					<i>Boehlkea fredcochui</i>			<i>Boehlkea orcesi</i>			
	holotype	n	range	mean	SD	holotype	A	B	holotype	n	range	mean
Standard length (mm)	33.7	32	22.3-34.8	28.4		39.3	31.8	29.8	47.5	4	44.2-48.7	46.5
Percentages of standard length												
Predorsal distance	51.9	32	49.7-56.8	52.8	1.6	54.9	55.8	53.6	54.0	4	53.1-54.4	53.8
Prepectoral distance	26.1	32	24.3-27.5	25.8	0.9	26.8	25.7	26.8	30.2	4	28.1-30.2	29.0
Prepelvic distance	47.1	31	43.9-50.7	47.0	1.4	48.2	46.9	46.2	49.6	4	47.8-51.0	49.2
Preanal distance	59.9	32	56.9-63.6	60.9	1.7	62.4	59.7	60.2	62.5	4	60.9-66.2	63.3
Depth at dorsal-fin origin	30.3	32	24.9-31.3	28.1	1.5	33.0	30.2	29.3	38.2	4	35.0-39.0	37.2
Caudal-peduncle depth	11.1	32	8.6-12.1	10.6	0.7	11.4	11.4	10.5	12.2	4	11.5-12.2	11.8
Caudal-peduncle length	10.9	32	7.3-12.4	9.8	1.3	10.8	11.0	8.4	16.9	4	14.8-17.2	16.4
Dorsal-fin length	22.8	32	20.0-24.1	22.3	0.9	24.4	24.8	23.8	25.0	4	24.2-25.2	24.7
Pectoral-fin length	21.2	32	18.4-22.2	20.7	1.0	20.5	20.4	19.9	22.2	4	21.0-22.9	22.0
Pelvic-fin length	14.6	31	11.6-15.0	13.5	0.8	12.8	14.2	13.9	15.7	4	14.1-15.7	15.3
Anal-fin base	28.3	32	24.3-31.8	28.5	1.6	32.3	35.3	31.9	28.3	4	24.8-29.2	26.8
Head length	25.1	32	24.3-27.5	25.7	0.8	24.8	26.0	25.8	29.9	4	27.9-29.9	28.7
Percentages of head length												
Snout length	21.6	32	18.0-28.4	23.0	2.4	21.7	23.6	22.3	20.6	4	20.4-20.9	20.6
Upper jaw length	47.0	32	41.5-50.7	46.3	2.3	47.4	45.3	46.2	49.8	4	48.0-49.8	49.0
Orbital diameter	43.1	32	37.7-45.7	41.2	1.7	32.3	35.6	37.0	31.4	4	31.4-35.8	33.0
Interorbital width	34.5	32	27.0-35.1	32.2	2.1	35.6	36.6	32.8	33.2	4	31.2-33.3	32.7



**Fig. 3.** *Boehlkea weitzmani*, unsexed, live specimen, rio Japurá basin, Amazonas State, Brazil (specimen not cataloged). Photo: D. Bastos.

**Sexual dimorphism.** Mature males of *Boehlkea weitzmani* have slightly curved bony hooks on the pelvic- and anal-fin rays. Pelvic fin has one hook per segment, which are arranged on the distal portion of the first to fifth (rarely on the sixth) branched rays. One or two pairs of hooks per segment located on the distal portions of the last unbranched anal-fin ray and up to the eighth or ninth (sometimes tenth) branched anal-fin rays.

**Geographic distribution.** *Boehlkea weitzmani* is currently known only from streams of the rio Japurá basin, a left margin tributary of the rio Solimões basin, Amazonas State, Brazil (Fig. 4).



**Fig. 4.** Distribution map of *Boehlkea weitzmani* in the rio Japurá basin, Amazon State, Brazil.

**Ecological notes.** Specimens of *Boehlkea weitzmani* were collected in small upland forest streams (width: 1.1-2.7 m; depth: 0.07-0.33 m; current velocity 0.20-0.42 m/s) draining to both margins of the rio Japurá (Fig. 5). The water was clear to yellowish, acidic (pH <6.6), cool (23.8-25.3°C),

well oxygenated (3.49-7.8 mg/l), and with low electrical conductivity (<33.3  $\mu$ S/cm). The streams were almost completely shaded by the forest canopy, and the channel substrate was predominantly composed by white silica sand and pebbles, with interspersed litter banks. *Boehlkea weitzmani* co-occurred in the streams with other fishes such as characids *Bario steindachneri* (Eigenmann, 1893), *Bryconella pallidifrons* (Fowler, 1946), *Hemigrammus bellottii* (Steindachner, 1882), *H. marginatus* Ellis, 1911, *Knodus orteguasae* (Fowler, 1943), *Moenkhausia agnesae* Géry, 1965, *Tyttocharax madeirae* Fowler, 1913; lebiasinid *Pyrrhulina semifasciata* Steindachner, 1876; heptapterid *Nannoglanis fasciatus* Boulenger, 1887, and *Myoglanis koepcke* Chang, 1999; cetopsids *Denticetopsis seducta* Vari, Ferraris & de Pinna, 2005, and *Helogenes marmoratus* Günther, 1863; rhamphichthyid knifefish *Gymnorhamphichthys rondoni* (Miranda Ribeiro, 1920), and some cichlids *Aequidens pallidus* (Heckel, 1840), and *Bujurquina* cf. *robusta* Kullander, 1986. The rio Japurá region still has large areas of intact forests, favoring the conservation of the fish fauna that depends on the input of organic material from riparian vegetation.

**Etymology.** The specific epithet *weitzmani* is a patronym in honor of Stanley H. Weitzman, in recognition of his remarkable contributions to the knowledge of the characiform taxonomy.

**Conservation status.** Considering the overall good environmental conditions of the known area of occurrence of *Boehlkea weitzmani* and the absence of signs of imminent impacts, and according to the International Union for Conservation of Nature (IUCN) categories and criteria (IUCN Standards and Petitions Subcommittee, 2016), we suggest that *Boehlkea weitzmani* can be classified as a Least Concern (LC) species.



**Fig. 5.** Type-locality of *Boehlkea weitzmani*, tributary of the rio Japurá, Amazonas State, Brazil: a. small stream from right margin of rio Japurá, with litter banks; b. small stream from left margin of the river, predominantly composed by pebbles and sand.

### Discussion

Géry (1966) proposed *Boehlkea* based on the presence of two rows of teeth on the premaxilla, four broad pentacuspoid teeth in the inner premaxillary row, maxilla generally toothed nearly to its end, dentary with four anteriormost broad, quincuspoid teeth, caudal-fin base conspicuously scaled, no apparent caudal gland, and lateral line very rarely complete. Additionally, Géry (1966) noted that *Boehlkea* has the maxilla moderate in length, without (apparently) a positive allometry in the differential growth as in some *Hemibrycon*. Other characteristics include body of medium depth and compressed, and head short with cheek entirely covered by the largest suborbital.

Among the Stevardiinae only *Boehlkea* and *Hemibrycon* share the presence of an edentulous portion of maxilla smaller than the toothed portion, associated with the largest number of teeth in the maxilla (Bertaco, Malabarba, 2010; Mirande, 2010). *Boehlkea* differs from *Hemibrycon* mainly by the presence of a caudal fin scaled (vs. naked), and by having few vertebrae (36 vs. 38-43) (Bertaco, Malabarba, 2010). Although *B. weitzmani* has 36 to 38 vertebrae, the vertebral count of *Boehlkea* still remains smaller to that present in *Hemibrycon*. Since the systematics of *Boehlkea* and *Hemibrycon* are still

unresolved, with both genera lacking a phylogenetic diagnosis, the new species is assigned herein to the genus *Boehlkea* according to the diagnostic characters discussed by Bertaco, Malabarba (2010:767).

In a review of the cis-Andean species of *Hemibrycon*, Bertaco, Malabarba (2010) transferred *H. orcesi* to *Boehlkea*, arguing that the characters observed in the type-specimens (e.g. caudal fin scaled, short lateral line, small number of vertebrae, and color pattern of the fins) are shared with *Boehlkea*. However, despite all these characteristics, the species was considered as belonging to *Hemibrycon* by Román-Valencia *et al.* (2010) (Fig. 6b).

We have analyzed the holotype (ANSP 111675) and two paratypes of *Boehlkea fredcochui* (Fig. 6a); the holotype and one of the paratypes (ANSP 111668) have the lateral line interrupted (14 perforated scales plus 23 remaining scales; last scales perforated or unperforated; totalizing 37 longitudinal series scales), but the other examined paratype (ANSP 111676) has a complete lateral line with 36 perforated scales. Therefore, the main differences between the new species and the types of *B. fredcochui* were observed in the maxillary teeth (5-12 vs. 14-15) (Tab. 2) and number of branched anal-fin rays (17-21 vs. 23-25). Finally, although the types of *B. fredcochui* have lost most of its coloration, it is possible to notice a large stripe from the posterior border of the orbit to the median region of the lower caudal-fin lobe, but we found no signs of a humeral spot. Conversely, *Boehlkea weitzmani* presents a large humeral spot, more conspicuous than the faint lateral stripe.

Apparently, *Boehlkea* is a relatively rare fish. Recent papers about the ichthyofauna of rivers and streams from Colombia, even those sampling localities near the type locality of *B. fredcochui*, did not report any species of *Boehlkea* (Mojica *et al.*, 2005; Sanabria-Ochoa *et al.*, 2007; Maldonado-Ocampo *et al.*, 2008). The ichthyofauna of the rio Japurá in Brazilian's territory is scarcely represented in fish collections; most of the preserved samples were obtained from near to the confluence of rio Solimões, at Mamirauá Reserve (Hercos *et al.*, 2008; Slobodian, Bockman, 2013). However, it is possible that *Boehlkea weitzmani* have a broader distribution in the Western Amazon (the same inferred distribution of *B. fredcochui*), a kind of aquatic habitat that is much less sampled than larger and more easily assessed rivers, which could partially explain its rarity in ichthyological collections.

According to our field observations related to the species' habitat, *Boehlkea weitzmani* has an apparently restricted geographical distribution, similar to *Moenkhausia agnesae* (Characidae), *Nannoglanis fasciatus* (Heptapteridae), and *Bujurquina cf. robusta* (Cichlidae). Despite the scarcity of ichthyological records, these results indicate that the sampled region is part of a biogeographical province corresponding to

the Western Amazon Piedmont freshwater ecoregion (Abell *et al.*, 2008; ecoregion 313) that advances to the Brazilian portion of the rio Japurá basin.

It seems that there is a relatively low economic interest in *Boehlkea fredcochui* as an ornamental fish (Sanabria-Ochoa *et al.*, 2007; Mancera-Rodríguez, Álvarez-León, 2008), which suggests a currently low fishing pressure on the natural populations of the *Boehlkea* species. This fact, together with the remoteness of large portions of the rio Japurá basin, have resulted in a high degree of

preservation of the forest and its aquatic habitats, which indicates positive conservation perspectives for the regional fish fauna.

**Comparative material examined.** *Boehlkea fredcochui*. ANSP 111675, holotype, male (x-ray), 39.3 mm SL. ANSP 111668, paratype, male, 31.8 mm SL. ANSP 111676, 1 of 2 paratypes, 29.8 mm SL. *Hemibryon orcesi*. USNM 164064, holotype, male (x-ray), 47.4 mm SL. ANSP 75904, 2 paratypes (x-ray), 44.2-45.5 mm SL. USNM 175128, 1 paratype (x-ray), 48.7 mm SL.



**Fig. 6.** **a.** Paratype of *Boehlkea fredcochui*, ANSP 111668, 31.8 mm SL, upper Amazon from surroundings of Leticia, Colombia; **b.** Holotype of *Boehlkea orcesi*, USNM 164064, 47.4 mm SL, río Macuma, northern tributary of upper rio Morona, upper Amazon, Santiago-Zamora, Ecuador.

**Tab. 2.** Frequency distribution of maxillary teeth of *Boehlkea* species. Data of *B. fredcochui* and *B. orcesi* were obtained from Géry (1966), Böhlke (1958), and from comparative material examined.

	Total teeth																
	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
<i>Boehlkea fredcochui</i>								1	5	4	3	1	2	1			1
<i>Boehlkea orcesi</i>									2	1		1					
<i>Boehlkea weitzmani</i>	1	1	5	7	10	6	1	1									

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