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A new species of *Hyphessobrycon* (Characiformes, Characidae) from the Esteros del Iberá wetlands, Argentina

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A new species of *Hyphessobrycon* (Characiformes, Characidae) from the Esteros del Iberá wetlands, Argentina.- *Hyphessobrycon auca* sp. n. is described from the Esteros del Iberá wetlands. *Hyphessobrycon auca* differs from the remaining species of the genus by the presence of one maxillary tooth with 5 cusps; dentary low with teeth decreasing in size anteroposteriorly; males with hooks in all fins; mature females with hooks on pelvic-fin rays; one humeral spot vertically elongated, bounded by a light area; a second lateral spot may be faint or well developed; a wide lateral band ending in a conspicuous caudal spot.

Keywords: Characiformes - Characidae - *Hyphessobrycon* - Esteros del Iberá wetlands - new species - Argentina.

INTRODUCTION

Nine species of the genus *Hyphessobrycon* were recorded for the Río de la Plata basin in Argentina, eight of them inhabit the Esteros del Iberá wetlands system (Almirón *et al.*, 2003). The Esteros del Iberá wetlands is one of the freshwater environments which has a high diversity of fishes in Argentina. More than 126 species have been recorded from this wetland, a number that represents about one third of the fish fauna known for Argentina (Casciotta *et al.*, 2003).

The aim of this paper is to describe a new species of the genus *Hyphessobrycon* from the Esteros del Iberá wetlands.

MATERIAL AND METHODS

The specimens examined in this study were cleared and counterstained (C&S) following Taylor & Van Dyke (1985). Measurements are straight distances taken with calliper to the nearest 0.1 mm. Peduncle length is the distance between last branched anal-fin ray and hypural joint. Vertebral count includes four vertebrae corresponding to the Weberian apparatus and also the complex centrum as one element. Asterisk indicates holotype.

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Material is deposited in the Asociación Ictiológica, La Plata, Argentina (AI); Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata, Argentina (MLP); Museo Argentino de Ciencias Naturales Bernardino Rivadavia, Argentina (MACN-Ict); Muséum d'histoire naturelle, Genève, Switzerland (MHNG).

COMPARATIVE MATERIAL (standard length, SL): *Hyphessobrycon anisitsi* (Eigenmann, 1907): MHNG 2493.72, 8 ex., 41.4-42.7 mm SL, (2 C&S), Paraguay, Caazapa, Arroyo Moroti 15 km SE from Tavai. MHNG 2493.063, 6 ex., 35.1-46.5 mm SL, Paraguay, Caazapa, Arroyo Yvyra-pary, 2 km from Tavai. MHNG 2493.86, 2 ex., 29.5-31.0 mm SL, Paraguay, Caaguazu, small affluent of the rio Güyrau-gua. MHNG 2054.2-44, 5 ex., 28.0-38.3 mm SL, Paraguay, Asunción, stream in Colonia Thompson. MHNG 2493.88, 2 ex., 28.2-29.4 mm SL, Paraguay, Guaira, stream Ovie, near of the road from Villarica. AI 133 (ex MHNG 2493.063) 2 ex., 23.0-37.6 mm SL, Paraguay, Caazapa, Arroyo Yvyra-pary, 2 km from Tavai. *Hyphessobrycon arianae* Uj & Géry, 1989: MHNG 2412.79 (holotype), 22.7 mm SL, Paraguay, Dept. Caaguazu, río Güyrau-gua, affl. of the río Monday, 3 km East of Juan Frutos. MHNG 2412.80-81 (paratypes), 12 ex., 17.6-23.6 mm SL, (2 ex. C&S), same locality as holotype. *Hyphessobrycon elachys* Weitzman, 1984: MLP 6431, 3 ex., 16.0-20.0 mm SL, Argentina, Corrientes Province, San Cosme. *Hyphessobrycon eques* (Steindachner, 1882): MLP 8999, 3 ex., 23.3-27.9 mm SL, Argentina, Corrientes, río Santa Lucía. JRC Pers. Collection, 2 ex., 28.7-29.6 mm SL (C&S), Argentina, Corrientes Province, Bella Vista, Riacho Carrizal. *Hyphessobrycon guarani* Mahnert & Géry, 1987: MHNG 2366.99 (holotype), 29.8 mm SL, Paraguay, río Alto Paraná in Puerto Bertoni, Dept. Alto Paraná. MHNG 2366.100 (paratypes), 7 ex., 23.5-29.4 mm SL, (2 ex. C&S), same locality as holotype. *Hyphessobrycon igneus* Miquelarena, Menni, López & Casciotta, 1981: JRC Pers. Collection, 3 ex., 25.9-29 mm SL Argentina, Esteros del Iberá, Laguna Fernández. *Hyphessobrycon luetkeni* (Boulenger, 1887): MLP 8796, 9 ex., 24.4-35.0 mm SL, Argentina, Formosa Province, creek in the national road Formosa-Clorinda, 37 Km far from Clorinda. MLP 6451, 13 ex., 14.2-21.6 mm SL, Argentina, Formosa Province. *Hyphessobrycon meridionalis* Ringuelet, Miquelarena & Menni, 1978: MLP 8407, 2 ex., 32.2-34.0 mm SL, Argentina, Corrientes Province, pond in road Bella Vista-San Roque. JRC Pers. collection, 3 ex., 33.0-40.9 mm SL (C&S), Argentina, Buenos Aires Province, Berisso, Los Talas ponds. *Hyphessobrycon wajat* Almirón & Casciotta, 1999: MLP 9321, (holotype), 27.6 mm SL, Argentina, Corrientes Province, río Paraná basin, Laguna Brava. MLP 9322, 5 paratypes, 29.2-31.0 mm SL, Argentina, Corrientes Province, Laguna Iberá. MHNG 2593.96, 5 paratypes, 28.5-30.0 mm SL, Argentina, Corrientes Province, Laguna Iberá.

RESULTS

Hyphessobrycon auca sp. n. Figs 1-8, Table 1

Holotype. MACN-Ict 8647, 51.2 mm SL, female, Argentina, Corrientes, Esteros del Iberá, pond in San Juán Poriahú farm (27°41'53"S-57°12'17"W), coll. J. Casciotta, A. Almirón & F. Ruiz Díaz, March 2003.

Paratypes. AI 129, 6 ex. (1 C&S), 42.0-49.9 mm SL, Argentina, Corrientes, Esteros del Iberá, pond in San Juán Poriahú farm (27°41'39"S-57°12'56"W), coll. J. Bechara, J. Ortíz & S. Sánchez, May 2001. MHNG 2644.023, 4 ex., 42.4-52.8 mm SL, Argentina, Corrientes, Esteros del Iberá, pond in San Juán Poriahú farm (27°41'39"S-57°12'56"W), coll. J. Bechara, J. Ortíz & S. Sanchez, May 2001. AI 130, 5 ex., 42.6-50.0 mm SL, Argentina, Corrientes, Esteros del Iberá, pond in San Juán Poriahú farm (27°42'S-57°11'W), coll. J. Casciotta, A. Almirón & F. Ruiz Díaz, March 2003.

Non type material: AI 131, 4 ex. (C&S), 43.7-48.9 mm SL, Argentina, Corrientes, Esteros del Iberá, pond in San Juán Poriahú farm (27°42'S-57°11'W), coll. J. Casciotta, A. Almirón & F. Ruiz Díaz, March 2003.

DIAGNOSIS

Hyphessobrycon auca is distinguished from its congeners by the following combination of characters: one maxillary tooth with 5 cusps; dentary low (dentary

depth 40.7-47.6 in % of dentary length) with teeth decreasing in size anteroposteriorly; males with hooks in all fins; mature females with hooks on pelvic-fin rays; one humeral spot vertically elongated, bounded by a light area; a second lateral spot may be faint or well developed; a wide lateral band ending in a conspicuous caudal spot.

DESCRIPTION

Morphometrics of holotype and paratypes are presented in table 1. Maximum body depth located immediately anterior to dorsal-fin origin (Fig. 1). Females slightly convex on snout, concave between eye to posterior tip of supraoccipital spine, and convex from supraoccipital to base of first dorsal-fin ray. Males with dorsal profile straight from snout to posterior tip of supraoccipital spine, slightly convex from this point to base of first dorsal-fin ray. Dorsal profile slanting ventrally from dorsal-fin origin to caudal peduncle in both sexes. Dorsal and ventral profile of caudal peduncle straight or scarcely concave. Ventral profile of body arched from tip of lower jaw to anal-fin origin, posterodorsally slanted along anal-fin base. Vent between bases of pectoral and pelvic fins transversally rounded, compressed between pelvic and anal fins.

Dorsal-fin origin almost equidistant from tip of snout and base of caudal fin. Pelvic-fin base before anterior to vertical through dorsal-fin origin. Adipose fin slightly anterior to base of last branched anal-fin rays. Females with tip of pectoral fin reaching pelvic-fin origin, males with tip of pectoral fin surpassing pelvic-fin origin. Females with tip of pelvic fin not reaching anal-fin origin; males with tip of pelvic-fin surpassing that origin.

TAB. 1: Morphometric data of the holotype and 15 paratypes of *Hyphessobrycon auca* sp. n. Minimum, maximum, and average between parenthesis. Standard length expressed in mm.

	holotype	males		females	
SL	51.2	42.0-45.7		45.7-52.8	
Percents of SL					
Predorsal distance	55.7	53.0-54.2	(53.3)	53.5-55.7	(54.3)
Preventral distance	48.4	46.9-48.5	(47.3)	46.8-50.2	(48.6)
Preanal distance	63.1	59.7-63.7	(62.0)	63.1-66.3	(64.8)
Body depth	36.1	31.7-34.7	(33.4)	34.1-38.3	(36.4)
Dorsal-fin base	13.5	12.8-14.4	(13.8)	13.1-14.6	(13.8)
Anal-fin base	30.7	30.8-33.3	(32.1)	27.8-31.9	(30.3)
Pectoral-fin length	22.1	23.0-26.2	(24.1)	21.8-25.2	(23.4)
Pelvic-fin length	17.6	18.5-21.2	(19.6)	17.0-19.9	(18.1)
Distance between pectoral and pelvic-fin origins	21.1	20.6-22.6	(21.4)	19.0-23.7	(21.5)
Distance between pelvic and anal-fin origins	19.3	14.8-18.9	(17.4)	17.6-20.7	(19.0)
Head length	28.9	28.4-30.5	(29.6)	28.3-30.4	(29.4)
Peduncle depth	11.1	11.2-12.0	(11.7)	10.4-12.0	(11.4)
Percents of HL					
Snout length	23.6	23.1-25.6	(23.9)	20.7-27.1	(23.6)
Eye diameter	39.9	37.7-40.0	(38.7)	36.7-42.9	(39.3)
Interorbital length	31.1	30.8-35.3	(32.2)	30.0-32.8	(31.0)
Postorbital length	43.9	41.7-46.8	(44.0)	40.7-46.9	(43.5)
Maxillary length	29.7	27.7-31.3	(29.3)	27.7-32.2	(30.1)

FIG. 1

Hyphessobrycon auca sp. n., holotype: MACN-Ict 8647, 51.2 mm SL, female, Argentina, Corrientes, Esteros del Iberá, pond in San Juán Poriahú farm.

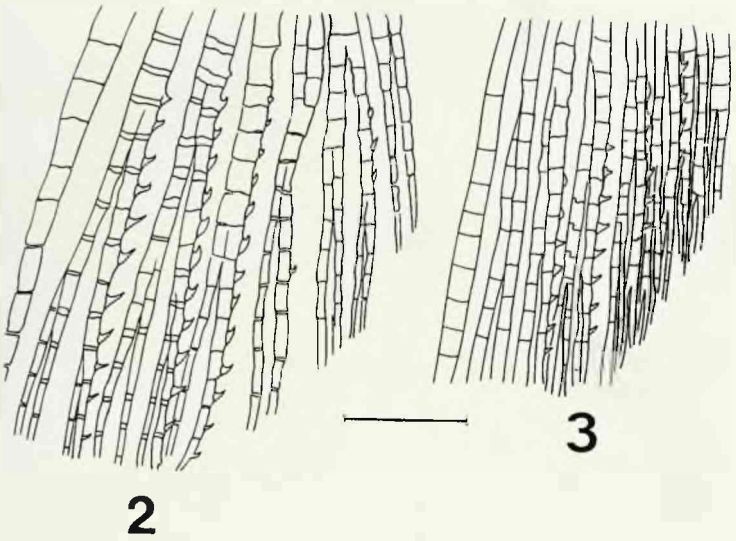
Dorsal fin with ii, 9 rays; posterior margin of dorsal fin straight, last unbranched and first branched dorsal-fin rays longest. Males with hooks on last unbranched and first eight branched rays. Hooks very small, directed ventrally. One hook by segment, maximum 12 hooks on 5th ray.

Anal fin with iii-v, 21-25 rays; 21(2), 22(10), 23(9), 24(5), 25(2*). Males with posterior margin almost straight; females with last unbranched and first six branched rays produced forming a lobe. Males bearing small hooks on last unbranched and the first 21 branched rays. Hooks directed outward and curved dorsally; one pair of hooks on each segment, maximum 14 pairs on each ray. Branched rays with hooks on posterior branch, few hooks, very small, on distal portion of anterior arm.

Caudal-fin with 1 unbranched and 9 branched principal rays in upper lobe; 8 branched and 1 unbranched principal rays in lower lobe. Males (2 ex.) with few small hooks on distal tips on middle caudal-fin rays. Lower lobe slightly longer.

Pectoral fin with i,11*-12 rays. Posterior margin of pectoral fin slightly rounded. Males (3 ex.) with small hooks on rays, one specimen with hooks on all branched rays.

Pelvic fin with i,6-7* rays, posterior margin of fin slightly rounded. Males with hooks on unbranched and branched rays. One pair of hooks on each segment curved rostrally, maximum 14 hooks on each ray. Mature females with hooks on pelvic fins, rather smaller than those of males (Figs 2-3). Head short, less than 1/3 of SL, mouth terminal and horizontal; snout short, blunt. Third infraorbital not reaching sensory tube of preopercle. Lower jaw slightly longer than upper jaw. Five specimens (C&S) with premaxillary ascending process triangular; alveolar process bearing two series of teeth, each tooth with a central cusp larger. Outer row with 4 (4 ex.), 5 (1 ex.) teeth, with 3 (4 ex.) to 5 (1 ex.) cusps (Fig. 4). Inner series of premaxilla with 5 wide teeth; symphysial tooth slender, with 4 to 5 cusps; remaining teeth with 4 to 9 cusps (Fig. 5), central cusp longer than the others. Maxilla with long anterodorsal and laminar processes, the last one surpassing vertical through anterior orbital margin. One wide maxillary



FIGS 2-3

Hyphessobrycon auca sp. n., left pelvic-fin rays in dorsal view showing the bony hooks: 2. males: 3, females. Scale= 1 mm.

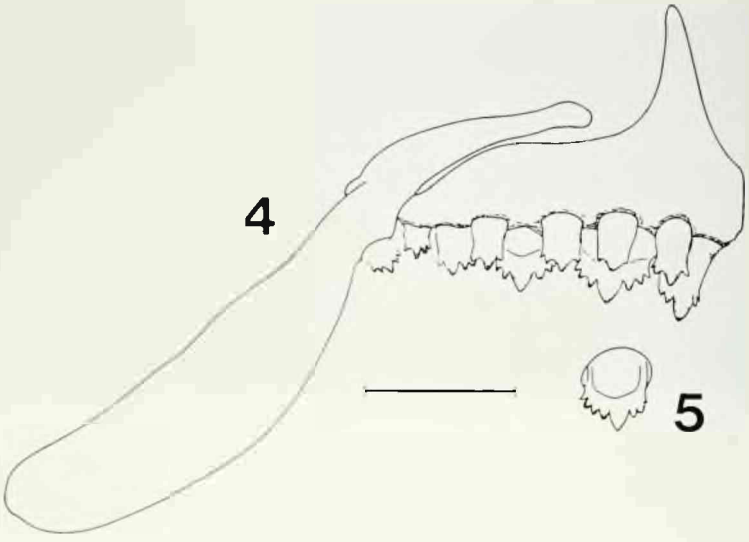
tooth with 5 cusps (Fig. 4). Dentary low (40.7-47.6% dentary depth/dentary length) with 8 to 12 teeth decreasing in size anteroposteriorly. Four large teeth with 5 to 8 cusps, 1 or 2 smaller one with 3 to 5 cusps, usually 5 cusps, and 3 to 7 much smaller with 1 to 3 cusps, usually 3 cusps (Fig. 6).

Lateral series with 32-36 scales; 32(1), 33(1), 34(8), 35(6*), and 36(1). Lateral line with 5 to 22 perforated scales; 5(1), 7(1), 8(2), 9(4*), 10(2), 11(1), 12(4), 13(4), 15(1), 22(1); two specimens with complete lateral line (34). Five to six scales between dorsal-fin origin and lateral line; 4 or 5 scales between lateral line and ventral-fin origin. Ten to twelve scales between supraoccipital process and dorsal-fin origin. Six to eleven rectangular scales placed on anal-fin base. Scales covering basal fifth of caudal lobes. Pelvic axillary scale without hooks on its posterior area in males.Gill rakers: 6-10/10-12. Vertebral counts: 33-34.

Coloration upon capture: Upper half of body darker, wide silvery lateral band ending in a caudal spot, lower half silvery. Base of caudal- fin lobes black and yellow; most of the lobe red, distal margin of them hyaline; middle caudal rays black surrounded by yellow. Most of anal fin red, distal margin gray or hyaline. Dorsal fin pale yellow, pectoral fin hyaline and pelvic fin reddish (Fig. 7).

Coloration in alcohol preserved specimens: Background pale brown, dorsal region of flanks and head darker, one dark midline along body on dorsum. Dark humeral spot vertically elongated, bounded by a clear area. Second lateral spot faint. Dark wide lateral band ending in a caudal spot. Dorsum of head, premaxilla, and dorsal half of maxilla, dark.

Dorsal fin hyaline with black chromatophores on the unbranched rays, dark chromatophores on anterior and posterior margins of branched rays. Anal fin hyaline



FIGS 4-5
Hyphessobrycon auca sp. n., 4, upper jaw in lateral view; 5, detail of third tooth of inner premaxillary series in medial view. Scale= 1 mm.

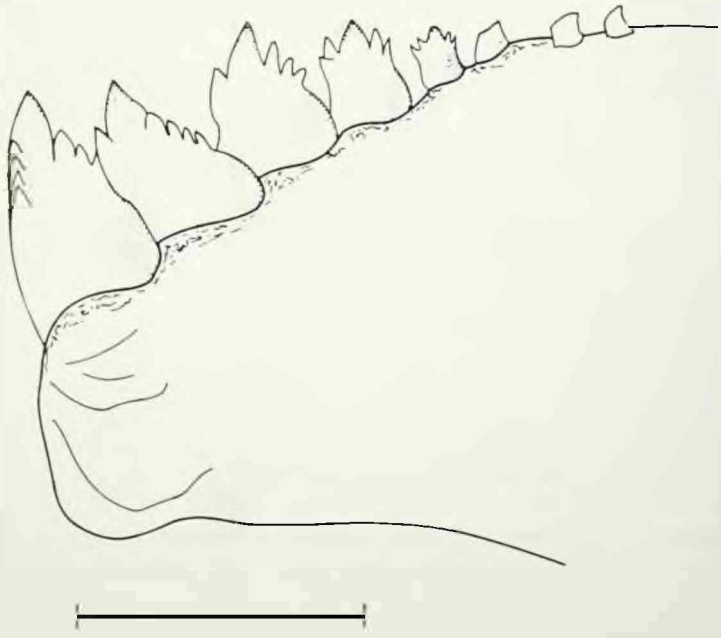


FIG. 6
Hyphessobrycon auca sp. n., right lower jaw in medial view. Scale= 1 mm.

FIG. 7
Hyphessobrycon auca sp. n., upon capture, pond in Esteros del Iberá wetlands.

with large black chromatophores on distal margin of anal fin, forming a faint band in some specimens. Black caudal spot on caudal peduncle extended on middle caudal-fin rays; remaining caudal-fin rays with dark chromatophores on their margins. Pectoral and pelvic fins hyaline, few chromatophores along ray surfaces.

Chromatophores completely covering scales surface on upper half of flank, more dense on posterior margin. Scales on lower half of flanks with scattered chromatophores on their surface.

Sexual dimorphism: Males of *Hyphessobrycon auca* have a preanal distance shorter (59.7-63.7 vs. 63.1-66.3% SL) and lower body depth (31.7-34.7 vs. 34.1-38.3% SL), and caudal peduncle depth (100.0-108.2 vs. 107.5-118.4% caudal peduncle length). Also they bear bony hooks on all fin rays; hooks present on dorsal and caudal fin are tiny, thus they are difficult to see in alcoholic preserved specimens. Mature females bear hooks on pelvic-fin rays, they are smaller than those present on pelvic fin of males (Fig. 3). Also, females have a small lobe on first six branched anal-fin rays, absent in males.

ETYMOLOGY

The invariable specific epitet *auca* is a Mapuche word meaning rebel.

DISTRIBUTION

Hyphesobrycon auca sp. n. is known from two isolated ponds placed inside of the farm San Juán Poriahú in the northwest of Esteros del Iberá wetlands (Fig. 8).

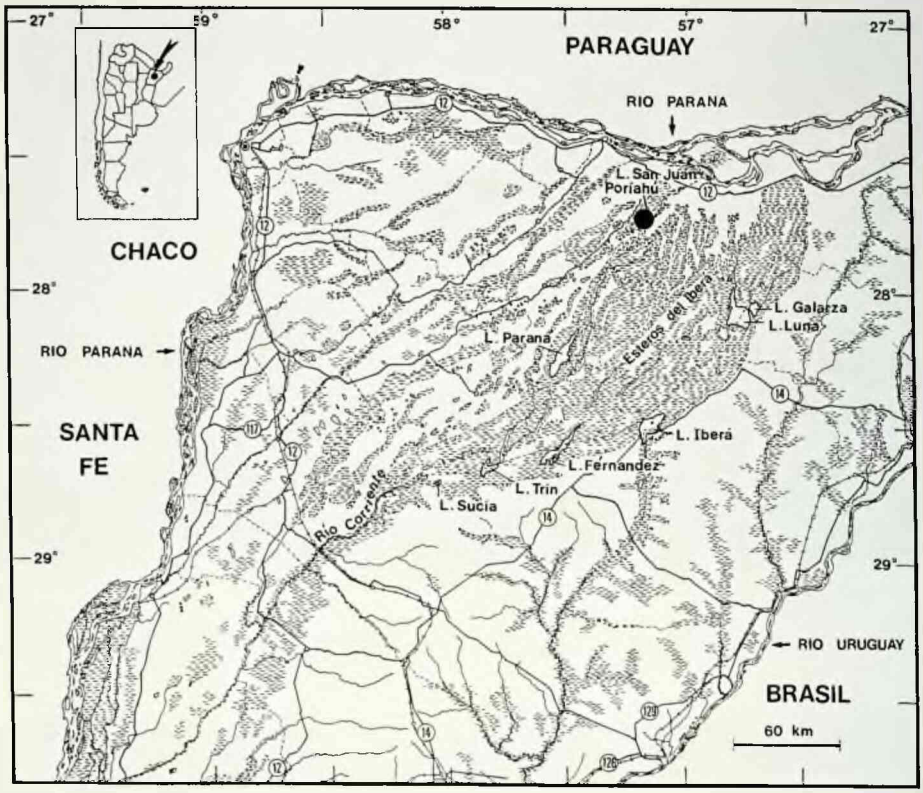


FIG. 8

Geographical distribution of *Hyphessobrycon auca* sp. n., black circle show the localities in the Esteros del Iberá.

HABITAT AND ASSOCIATED ICHTHYOFAUNA

Hyphessobrycon auca sp. n. was collected in two small lentic waterbodies located on a large sand bar (150 km long), that was deposed by the río Paraná during the Pliocene. From a topographic standpoint, ponds are placed at the headwaters of the Iberá basin and make part of a complex of interconnected small lakes dispersed over the sand bar. As many others in the area, ponds were probably generated by eolic and pseudokarstic processes. Sampled ponds have a surface of about 1.5 and 12.5 ha, their form is near circular, with a sandy bottom covered by submerged macrophytes dominated by *Egeria naias*. In the littoral areas, patches of the water hyacinth *Eichhornia azurea* and some unidentified Gramineae were observed.

Ponds and the connected aquifer are fed only by rain water, and they have low conductivity (11.6-20.8 μS cm^{-1}) and acidic pH (5.6-6.8). Waters are very soft (hardness 2-5 mg $CaCo_3$ l^{-1}), low in chloride (0.8 to 1.9 mg l^{-1}), as well as in alkalinity (2-9 mg $CaCo_3$ l^{-1}). Nutrient content was also negligible (less than 10 μg l^{-1} of dissolved orthophosphate). Transparency is high, being impossible to estimate with

Secchi disk due to the low depths in sampling areas (0.6-1.3 m). Dissolved oxygen concentrations were generally high during sampling (6.7-10.2 mg l^{-1}, 86.1-110.9% saturation), and water temperature varied from 13.5 to 20.8°C.

Although different kinds of environments were sampled in the area, including larger lakes, marshes, and small creeks, the new species was only found in the two described ponds. The other fish caught with a purse seine in the same samples belonged to the following species: *Acestrorhynchus pantaneiro*, *Aphyocharax rathbuni*, *Characidium rachovii*, *Characidium* cf. *zebra*, *Cyphocharax* cf. *spilotus*, *Hyphessobrycon eques*, *Hoplias malabaricus*, *Metynnis mola*, *Moenkhausia intermedia*, *Serrasalmus spilopleura*, *Serrapinnus kriegi*, *Apistogramma borelli*, *Apistogramma commbrae*, *Crenicichla lepidota*, *Cichlasoma dimerus*, *Gymnogeophagus balzanii*, *Laetacara dorsigera*, and *Phalloceros caudimaculatus*.

REMARKS

The following species of the genus *Hyphessobrycon* were recorded from the Río de la Plata basin in Argentina: *H. anisitsi*, *H. elachys*, *H. eques*, *H. guarani*, *H. igneus*, *H. luetkeni*, *H. meridionalis*, *H. reticulatus*, and *H. wajat*. All of them were registered from the Esteros del Iberá wetlands except *H. guarani*. The color pattern of *H. eques*, *H. elachys*, *H. guaraní*, *H. igneus*, and *H. reticulatus* differenciate these species from *H. auca*. *Hyphessobrycon eques* has the ground colour of body red and *H. elachys* is greenish with yellow whereas *H. auca* is mostly silvery. *Hyphessobrycon guarani* bear a black spot on dorsal-fin rays, absent in *H. auca*; *H. igneus* has the caudal fin red whereas in *H. auca* is black, yellow and red. Finally, *H. reticulatus* has a narrow lateral band and a dark line along the base of anal fin whereas *H. auca* has a wide lateral band and it lacks a line along the anal-fin base. *Hyphessobrycon guarani* has 2 to 5 maxillary teeth, *Hyphessobrycon luetkeni* has 2 to 3, and *H. wajat* 3 to 5, whereas *H. auca* has only one. *Hyphessobrycon meridionalis* has 26 to 30 branched anal-fin rays whereas *H. auca* has 21 to 25.

Hyphessobrycon auca is similar to *H. anisitsi*, however the new species differs from *H. anisitsi* in having always one maxillary tooth with 5 cusps instead of 3 to 5 cusps. The dentary of *H. auca* is lower than those of *H. anisitsi* (dentary depth 40.7-47.6 vs. 50.0-53.3 in % of dentary length), and the teeth decrease in size antero-posteriorly whereas in *H. anisitsi* the dentary bears 4 large teeth followed by 4 to 8 much smaller. Males of *H. auca* bear hooks on dorsal-fin rays (3 ex.) and hooks on caudal and pectoral-fin rays (2 ex.), hooks on dorsal, caudal, and pectoral-fin rays were not found in males of *H. anisitsi*.

Hyphessobrycon auca is the only species of the genus with some males bearing hooks on all fins. Hooks on pelvic-fin rays in mature females of *H. auca*, appear to be a feature shared with *H. anisitsi* (1 female with pelvic-fin hooks). Within characids, females bearing hooks on pelvic-fin rays was only reported for the genus *Cheirodon* (Malabarba, 1998). As this author noted, hooks are usually visible in large females and they are smaller than those of males.

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