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J Casciotta and A Almirón

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Crenicichla tesay, a new species of cichlid (Perciformes: Labroidei) from the río Iguazu basin in Argentina

Jorge CASCIOTTA[1] & Adriana ALMIRÓN[2]

[1] CIC, División Zoología Vertebrados, Facultad de Ciencias Naturales y Museo, UNLP, Paseo del Bosque s/n, 1900 La Plata, Argentina. E-mail: jrcas@fcnym.unlp.edu.ar

[2] División Zoología Vertebrados, Facultad de Ciencias Naturales y Museo, UNLP, Paseo del Bosque s/n, 1900 La Plata, Argentina.

***Crenicichla tesay*, a new species of cichlid (Perciformes: Labroidei) from the río Iguazu basin in Argentina.** - *Crenicichla tesay* sp. n. differs from its congeners by the following combination of characters: posterior border of preopercle serrated, 48-59 scales on E1 row, snout length 2.6-2.8 times in head length, presence of conspicuous suborbital stripe, flanks with 4 to 6 blotches below the upper lateral line, posteriormost blotch extending on caudal peduncle. Colour pattern with numerous irregularly scattered dots, and absence of vertical stripes on flanks.

Keywords: Neotropical - Cichlidae - *Crenicichla* - Argentina - freshwater fish - new species.

INTRODUCTION

The río Iguazu is a tributary of the rio Parana that originates at the Serra do Mar in Brazil. This river runs in an east-west direction for 1.320 km of which the final 115 km flow between the Argentina and Brazil border. About 32 km before it joins the río Parana, the Iguazú falls produce a 78 m high drop (Severi & Cordeiro, 1994). These falls have been an effective fish-fauna barrier since their formation in the Oligocene-Miocene period.

The poorness of the fish fauna of the rio Iguazu was noted by Haseman (1911) and Godoy (1979); however, very few studies have focused on its ichthyofauna. Out of seventy five species that have been recorded for the río Iuazú basin, 60% are endemic (Agostinho *et al.*, 2005). However this number is probably an underestimation, given the description of several new species in recent years (Garavello, 2005; Casciotta *et al.*, 2006a; 2006b; Garavello & Shibatta, 2007).

The genus *Crenicichla* inhabits tropical, subtropical and temperate Cis-Andean environments from Northern South America to río Negro, in Patagonia, Argentina (Casciotta, 1987). *Crenicichla* comprises about 78 species and represents the most speciose genus of cichlid fishes (Kullander & Lucena, 2006). In spite of this great number of species, only two *Crenicichla* species have been recorded in the rio Iguazu basin *C. iguassuensis* Haseman, 1911 and *C. yaha* Casciotta *et al.*, 2006. The number of species of *Crenicichla* in the río Iguazu could increase in the future if some *C. iguassuensis* morphs are given species status (Renesto *et al.*, 2001 and Mizoguchi *et al.*, 2007).

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The aim of this paper is to describe a new species of the genus *Crenicichla* from tributaries of the río Iguazu upstream from Iguazu falls (Fig. 1).

MATERIAL AND METHODS

Specimens were cleared and counterstained (C&S) following the method of Taylor & Van Dyke (1985). Measurements and counts were taken as described by Kullander (1986). Pharyngeal teeth description and counts of frashed zone concavities follow Casciotta & Arratia (1993). Holotype values are indicated by an asterisk. Body length is expressed as standard length (SL). El scale counts refer to the scales in the row immediately above that containing the lower lateral line (Lucena & Kullander, 1992).

Institutional abbreviations are as listed in Leviton *et al.* (1985), except fo Al (Asociación Ictiológica, La Plata, Argentina) and PNI (Parque Nacional Iguazú, Misiones, Argentina).

Comparative material: A list of comparative material of *Crenicichla niederleinii*, *C. scottii*, *C. vittata* and *C. celidochilus* is available in Casciotta (1987).

In addition, the following material was studied: *Crenicichla hadrostigma*: Argentina. Al 220, 1 ex., 72.8 mm, Misiones, Itacaruare, río Uruguay basin. *Crenicichla iguassuensis*: Brasil. FMNH 54159 (holotype), 137 mm, Porto Uniao da Victoria, Rio Iguassu. *Crenicichla jupiaensis*: Argentina. Al 226, 2 ex., 87.7-93.0 mm, Corrientes, río Parana at Yahape. Al 227, 1 ex., 60.7 mm, Corrientes, río Parana at Yahape. *Crenicichla lepidota*: Argentina. MACN ict 5067, 4 ex., 67.7-113.4 mm, Misiones, Represa Estación Experimental Cerro Azul. FML 00528, 1 ex., 111.5 mm, Salta, Luna Muerta, Hickman. MACN-ict 3656, 2 ex., 116.0-165.7 mm, Formosa, Riacho de Oro. MACN-ict 7275, 1 ex., 151.6 mm. Chaco, Esteros del Palmar. FML 00312, 1 ex., 138.0 mm, Corrientes, Isla Apipé Grande, Ituzaingó. MACN-ict 4091, 1 ex., 98.4 mm, Entre Ríos, río Uruguay, Concepción del Uruguay. MACN-ict 2314, 6 ex., 59.9-104.2 mm, Buenos Aires, Isla Martín García, Uruguay. MNHNM 2087, 1 ex., 72.9 mm. Departamento Colonia, arroyo Limetas. *Crenicichla semifasciata*: Argentina. MACN-ict 3683, 1 ex., 68.8 mm. Formosa, Riacho de Oro. MACN-ict 6239, 1 ex., 176.6 mm, Entre Ríos, arroyo Curupí. *Crenicichla ocellata*: Paraguay. MSNG 33700 (holotype), 257.5 mm, Puerto 14 de Mayo, Bahía Negra, Chaco Boreal. *Crenicichla yaha*: Argentina. Misiones Province. MACN-Ict 8924 (holotype), 103.7 mm, arroyo Urugua-í in Isla Palacios. Al 199, 1 ex., 116.6 mm, río Iguazú basin, arroyo Benavente. MTD-F 30606 (paratype), 1 ex., 105.9 mm, arroyo Urugua-í in ruta provincial 19, Parque Provincial Islas Malvinas. Al 200 (paratype), 1 ex., 135.8 mm SL, arroyo Uruzú (affluent of A. Urugua-í) in ruta provincial 19, Parque Provincial Islas Malvinas. Al 202 (paratypes), 4 ex., 1 (C&S) 37.4-48.5 mm, arroyo Urugua-í in Isla Palacios.

RESULTS

Crenicichla iguassuensis sp. n. Figs 1-4, Table 1

HOLOTYPE: MACN-ict 9016, 115.1 mm, Argentina, Misiones, río Iguazu basin, arroyo Verde (25°40'15.0"S-53°56'00.8"W), coll: F. Nunez, February 2002.

PARATYPES: All from Argentina. MACN-ict 9017, 1 ex., 124.2 mm, Misiones, río Iguazu basin, arroyo Deseado (25°47'08.1"S-54°01'45.0"W), coll: F. Nunez, February 2002. MACN-ict

FIG. 1

Crenicichla tesay sp. n., holotype: MACN-Ict 9016, 115.1 mm SL, Argentina, Misiones, río Iguazu basin, arroyo Verde.

9018, 5 ex., 55.7-252.0 mm, Misiones, río Iguazú basin, arroyo Tateto (25°47'12.8"S-53°58'12.9"W), coll: F. Nunez, February 2001. MHNG, 2708.062, 3 ex., 86.9-119.5 mm, same data as holotype. AI 213, 1 ex., 156.7 mm, Misiones, río Iguazu basin, arroyo Deseado Chico (in road 101) (25°47'19.7"S-54°01'45.0"W), coll: F. Nunez, February 2002. AI 214, 4 ex., 75.8-116.6 mm, Misiones, río Iguazu basin, arroyo Tateto (25°47'12.8"S-53°58'12.9"W), F. Nuñez, February 2001.

NON-TYPES SPECIMENS: Argentina, Misiones Province, AI 215, 1 ex., C&S 69.0 mm, río Iguazu basin, arroyo Tateto (25°47'12.8"S-53°58'12.9"W), coll: F. Nunez, February 2001. MLP 6-III-49-6- 7, 2 ex., 97.0-133.0 mm, alto río Iguazu. PNI unreg., 1 ex., 103.2 mm, Parque Nacional Iguazu, arroyo Nandú. PNI unreg., 1 ex., 267.7 mm, Misiones, arroyo Ibicui.

DIAGNOSIS: *Crenicichla tesay* is distinguished from the other species of the genus by the following combination of characters: posterior border of preopercle serrated, 48-59 scales on E1 row, snout length 2.6-2.8 times in head length, presence of conspicuous suborbital stripe, flanks with 4 to 6 blotches below the upper lateral line, posteriormost blotch extending on caudal peduncle. Colour pattern with numerous irregularly scattered dots and absence of vertical stripes on flanks.

DESCRIPTION: Body elongate, depth four to five times in SL (Fig. 1). Head slightly deeper than wider. Snout short, bluntly pointed in lateral view. Jaws isognathous or lower jaw slightly prognathous. Maxilla almost reaching anterior margin of orbit. Lower lip folds widely separated anteriorly. Nostrils dorsolateral, nearer anterior margin of orbit than snout tip. Posterior margin of preopercle serrated (smooth in one specimen). Scales on flank strongly ctenoid. Head scales cycloid. Predorsal scales small, superficially embedded in skin. Prepelvic scales smaller than predorsal ones. Cheek scaled, 6 to 7 scales below eye embedded in skin. Scales in E1 row 48(1), 52(1), 53(3), 55(4*), 56(1), 57(2), 58(1), 59(2). Scales in transverse row 11/14(1), 11/16(3), 12/14(1*), 12/15(2), 12/16 (4), 12/17(2), 12/18(1). Three scale rows between lateral lines. Upper lateral line scales slightly larger than the adjacent scales 22(1), 23(1), 24(6*), 25(3), 26(2), 27(1), 28(1). Lower lateral line scales equally in size than adjacent ones 7(1), 10(1), 13(4*), 14(2), 15(5), 16(2). Dorsal, anal, pectoral and pelvic fins naked. Dorsal fin XXI.11(3*), XXI,12(2); XXII,9(1); XXII.11(4); XXII.12(5). Anal fin III,8 (4*); III,9(11). Pectoral fin 17(9), 18(6*). Caudal fin squamation

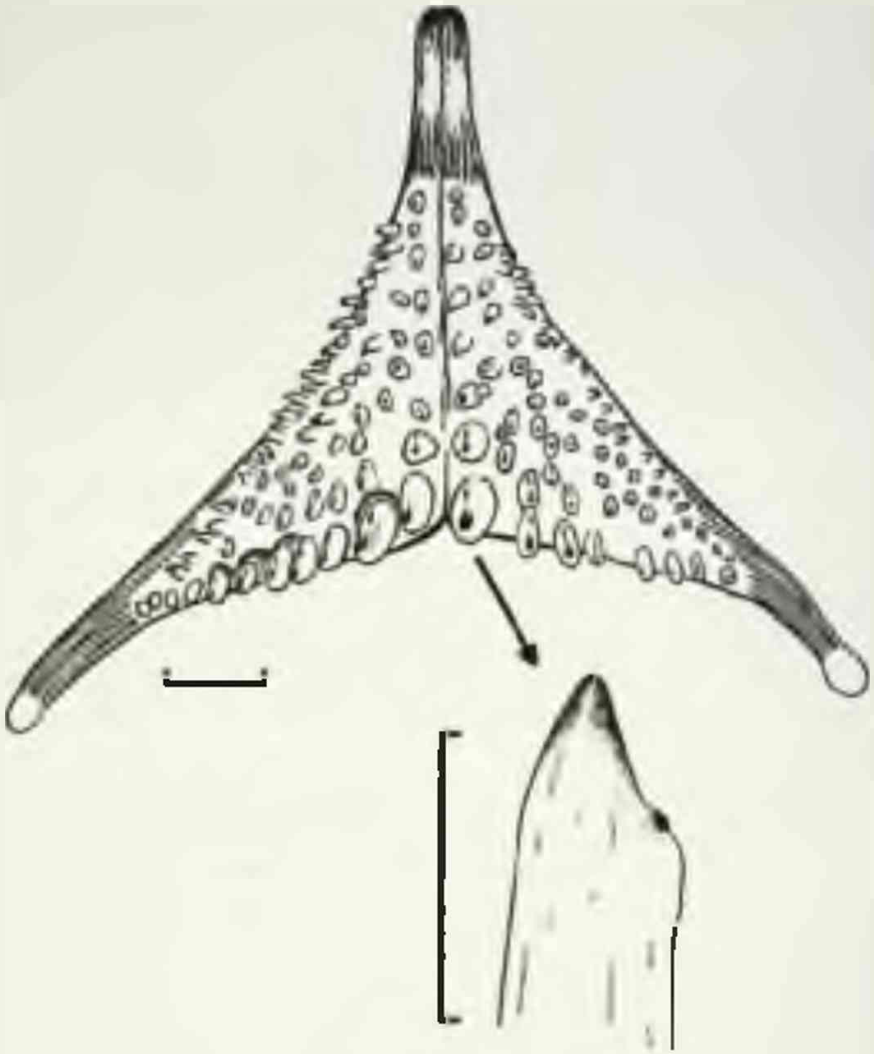

Fig. 2

Crenicichla tesay sp. n., lower pharyngeal tooth plate in occlusal view, AI 215, 69.0 mm SL. Scale bar: 1 mm.

extending almost to middle of fin. Soft-dorsal fin rounded or pointed tip, reaching or scarcely surpassing the caudal-fin base. Soft-anal fin not reaching the caudal-fin base. Caudal fin rounded. Pectoral fin rounded, reaching 75% of pelvic-fin length. Microbranchiospines present on second trough fourth gill arches. Nine gill rakers on ceratobranchial. Four or six patches of unicuspidate teeth on fourth ceratobranchial. Lower pharyngeal tooth plate with unicuspidate recurved and bicuspidate crenulated curved anteriorly teeth, those of posterior row much larger than the remaining ones (Fig. 2). Upper pharyngeal tooth plate with unicuspidate and bicuspidate teeth. Frashed zone bearing one concavity with small unicuspidate teeth. Premaxillary ascending process longer than dentigerous one. Premaxilla with 28 unicuspidates teeth on outer row, larger than the inner ones. Five teeth rows near symphysis. Dentary with 30 unicuspidate teeth on outer row, 4 rows near symphysis. Total vertebrae: 38 (1 C&S ex.). Premaxillary and dentary outer row teeth slightly movable or fixed, inner ones fully depressible.

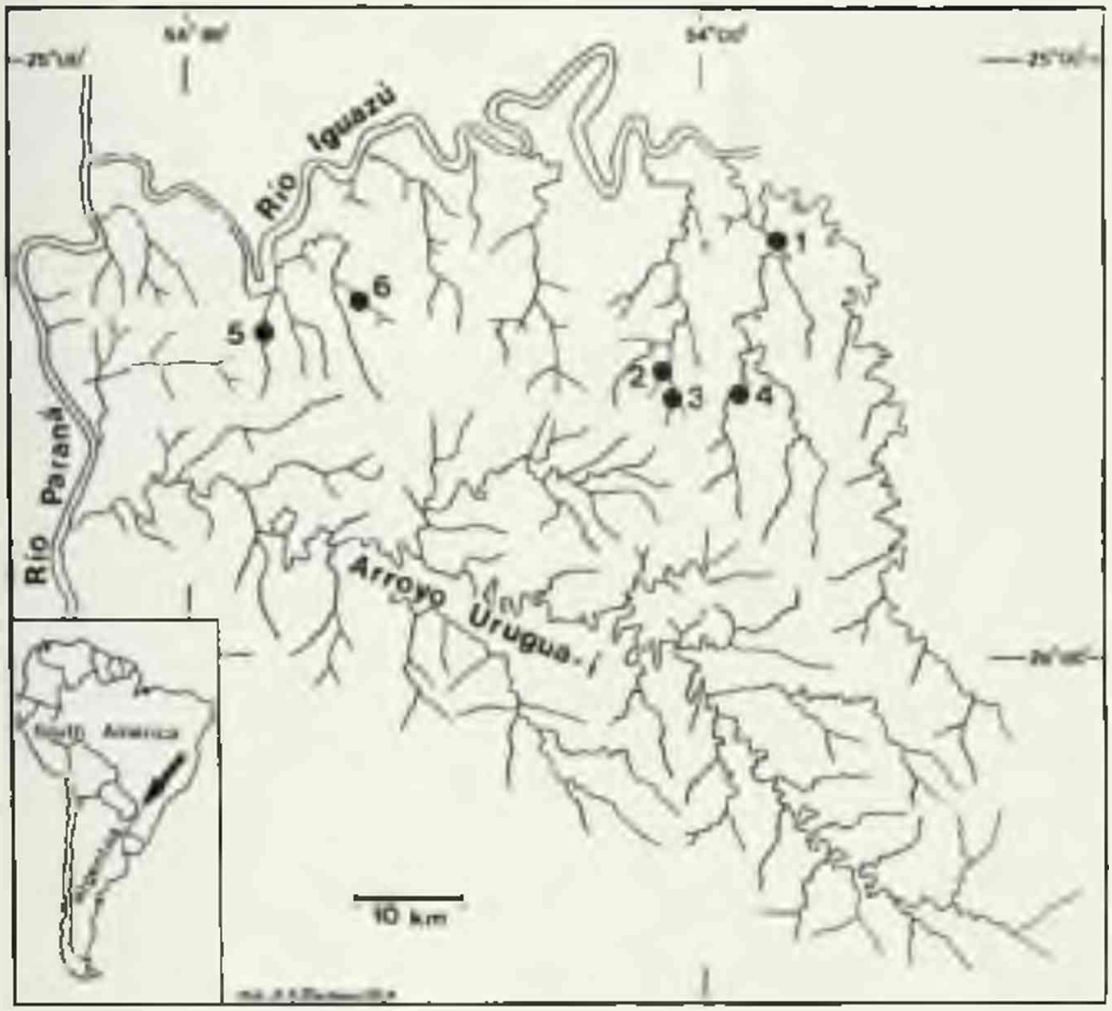

FIG. 3

Geographical distribution of *Crenicichla tesay* sp. n.: 1. arroyo Verde (type locality), 2. arroyo Deseado; 3. arroyo Deseado Chico; 4. arroyo Tateto; 5, arroyo Ñandú; 6. arroyo Ibicui.

COLOUR IN ALCOHOL: There is no obvious sexual dichromatism. Lateral line scales lighter that the adjacent ones. Grey preorbital stripe between anterior margin of orbit to snout tip, more conspicuous in smaller specimens (55.7-81.4 mm SL). Wide and greyish, postorbital stripe between posterior margin of orbit to preopercle distal margin, only one specimens with postorbital stripe reaching tip of opercle (75.8 mm SL). Suborbital stripe black, reaching almost the ventral margin of cheek, proximally entire, distally fragmented. Nuchal markings faint in adults, more conspicuous in smaller specimens. Flank with numerous irregularly scattered dark dots; few dots on cheek and opercular region in four specimens. Four to six dark rectangular or subcircular blotches just below the upper lateral line. Posteriormost blotch extending onto caudal peduncle, except in one specimen. Dorsal, anal, and caudal-fins smoky, with numerous dark scattered dots on their surface. Caudal fin with a black subcircular spot well separated from the base of the fin, just above of midline of caudal fin. That spot bears a narrow light ring. Pectoral fin smoky, pelvic fin whitish.

ETYMOLOGY: The specific epithet tesay, a noun in apposition, is a Guaraní word that means tears in allusion to the shape of suborbital stripe.

DISTRIBUTION: *Crenicichla tesay* inhabits streams tributaries of the río Iguazu above Iguazu falls in Argentina (Fig. 3).

HABITAT: The depth of the streams was variable, averaging about 80 cm. The bottom was composed of mud, sand and mostly stones, and the stream has falls and pools, with clear, rapidly flowing water. Some areas had scarce submerged vegetation (Fig. 4).

COMPARISON OF SPECIES: Thirteen species of *Crenicichla* have been recorded from freshwater environments in Argentina (Casciotta, 1987; Casciotta *et al.*, 2007; Lucena, 2007; Lucena & Kullander, 1992): *C. celidochilus* Casciotta, 1987; *C. gaucho* Lucena & Kullander, 1992; *C. hadrostigma* Lucena, 2007; *C. jupiaensis* Britski & Luengo, 1968; *C. lepidota* Heckel, 1840; *C. minuano* Lucena & Kullander, 1992; *C. missioneira* Lucena & Kullander, 1992; *C. niederleinii* (Holmberg, 1891); *C. scottii* (Eigenmann, 1907); *C. semifasciata* (Heckel, 1840); *C. tendybaguassu* Lucena & Kullander, 1992; *C. vittata* Heckel, 1840; and *Crenicichla yahu* Casciotta *et al.*, 2006.

Crenicichla tesay differs from *C. celidochilus*, *C. tendybaguassu*, *C. minuano*, and *C. missioneira* by having preopercle serrated and a suborbital stripe vs. preopercle smooth and suborbital stripe absent or reduce. *Crenicichla tesay* can be distinguished from *C. vittata* by E1 row scales counts, 48-59 vs. 78-85.

The flanks of the new species *C. tesay* have numerous small dots and rectangular or subcircular blotches just below the upper lateral line, a combination of features not present in *C. jupiaensis*, *C. lepidota*, *C. niederleinii*, or *C. scottii*. Besides, *C. lepidota* has humeral spot, *C. scottii* has flanks with several regular parallel rows of small dark spots, *C. niederleinii* bears narrow vertical bars and a lateral band on the flank, and *C. jupiaensis* bears 14 to 17 narrow vertical bars; all these characters are absent in *C. tesay*.

Crenicichla tesay is easily distinguished from *C. semifasciata* by having half of the caudal fin scaled and the ascending premaxillary process longer than the dentigerous one, vs. an almost completely scaled caudal fin and shorter ascending process. It can be distinguished from *C. gaucho* by the postorbital stripe not reaching the tip of opercle and by the absence of a lateral band (Lucena & Kullander, 1992).

Crenicichla tesay is easily differentiated from *C. hadrostigma* because the latter species bears a conspicuous ocellated posttemporal spot larger than half orbital diameter, which is not found in any other *Crenicichla* species.

Lucena (2007) described *C. empheres* from the rio Uruguay drainage in Brasil. The colour pattern of this species resemble that of *C. tesay*, however the new species can be distinguished from *C. empheres* by having flanks with four to six blotches vs. six to eight, and a well developed suborbital stripe that almost reaches the ventral margin of the cheek vs. either reduced to a spot at margin of orbit or two to five small dots below orbits.

The species *C. lacustris* (Castelnau, 1855), *C. maculata* Kullander & Lucena, 2006, and *C. punctata* Hensel, 1870 from the Atlantic coastal rivers of southeastern Brazil share with *C. tesay* the presence of numerous scattered dots on the flanks.

FIG. 4. Habitat of *Crenicichla tesay* sp. n., arroyo Verde, type locality.

TABLE 1. Morphometry of the holotype and 14 paratypes of *Crenicichla tesay* sp. n. expressed as percentage of SL. SD: standard deviation.

	Holotype	Range	Mean	SD
Standard length (mm)	115.1	55.8-252.7		
Head length	32.0	31.9-36.3	33.1	1.29
Snout length	13.2	11.5-14.3	12.3	0.77
Head depth	17.5	14.0-17.9	16.0	1.06
Body depth	24.4	19.2-24.5	21.5	1.52
Orbital diameter	7.2	4.8-8.4	7.2	1.03
Interorbital width	8.5	5.8-9.3	7.2	0.92
Pectoral fin length	22.9	16.1-22.9	20.5	1.83
Caudal peduncle depth	10.6	9.4-11.6	10.2	0.63
Caudal peduncle length	16.2	15.3-16.9	16.2	0.55

However *C. tesay* differs from those species in having a lower E1 row scales counts. *Crenicichla tesay* can be distinguished from *C. lacustris* by the absence of a continuous lateral band, dark dots on head and E1 row scales counts (48-59 vs. 57-75 [Lucena & Kullander, 1992]). *Crenicichla maculata* has 58-75 scales in the longitudinal series whereas *C. tesay* has 48-59 (Lucena & Kullander, 1992). *Crenicichla punctata* has numerous small dots on the head and 56-70 scales in E1 row (Lucena & Kullander, 1992) whereas most specimens of *C. tesay* lack dots on the head (4 ex. with few of them on cheek and opercular region) and 48-59 scales in the E1 row.

Three species have been recorded from the upper río Paraná in Brazil and were not present in the portion of this river that traverse Argentina: *C. britskii* Kullander, 1982; *C. haroldoi* Luengo & Britski, 1974; and *C. jaguarensis* Haseman, 1911. *Crenicichla britskii* has a humeral spot which is absent in *C. tesay*; *C. haroldoi* has brown dots on each lateral line scale which are absent in *C. tesay*. Finally, *C. jaguarensis* has 6 to 7 gill-rakers on the lower anterior arch and eleven vertical bars whereas *C. tesay* has nine gill-rakers and lacks such bars.

Currently only two *Crenicichla* species have been described from the río Iguazú basin: *C. iguassuensis* Haseman, 1911 from upper portion of this river and *Crenicichla yaha* Casciotta *et al.*, 2006, from the arroyo Benavente, just above the Iguazú falls. *Crenicichla tesay* differs from *C. iguassuensis* by having longer snout (2.6-2.8 vs. 3.0-3.5 in head length), lower number of E1 row (48-59 vs. 54-64), and having rectangular or subcircular blotches on the flank not extended onto its dorsum. Finally, *C. tesay* can distinguished from *C. yaha* by having isognathous jaws or slightly prognathous lower jaws vs. isognathous or slightly prognathous upper jaw; head depth 14.0-17.9 vs. 17.9-20.8 % of SL; and (numerous scattered) dots on the flank which are absent in both sexes of *C. yaha*.

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