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Ituglanis mambai, a new subterranean catfish from a karst area of Central Brazil, rio Tocantins basin (Siluriformes: Trichomycteridae)

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Ituglanis mambai, new species, is described from a cave in the Mambaí karst area, State of Goiás, Central Brazil. The new species distinguishes from epigean and cave congeners by the combination of the following characteristics: posterior supraoccipital fontanel absent; pectoral-fin rays usually i,7; six pleural ribs; total vertebrae 37-38 behind Weberian apparatus; shorter predorsal length (65.1-70.8% SL); shorter caudal peduncle length (8.4-11.9% SL); shorter dorsal-fin base length (7.7-11.3% SL); wider interobital width (29.2-36.5% HL); larger mouth width (43.4-64.0% HL); intermediate between epigean and other cave *Ituglanis* species as regards to both eyes (diameter varying from 0.5 to1.0 mm in adults, 7.8-10.1 % HL) and pigmentation, composed by irregular light brown spots along the body. The latter indicate the troglobitic status for *I. mambai*. In addition, this species has the maxillae with a discrete medial-posterior projection; fronto-lacrimal one half-length of the maxillae and pointed backwards; posterior process of palatine half its length, with a tenuous medial concavity; 14 dorsal and 12 ventral procurrent rays. In the natural habitat, *I. mambai* displayed cryptobiotic habits, trying to hide in the graveled bottom or under boulders when disturbed, apparently showing a negative response to light. It was observed a preference to slow-moving waters. Recent flood marks were observed in the stream conduit in March/April 2007 (end of the rainy season) when less individuals were observed on 300 m of the subterranean stream compared to September 2004 (end of the dry season).

Ituglanis mambai, nova espécie, é descrita de uma caverna localizada na área cárstica de Mambaí, estado de Goiás, Brasil central. A nova espécie difere dos congêneres epígeos e cavernícolas pela combinação das seguintes características: fontanela posterior do supraoccipital ausente; raios da nadadeira peitoral usualmente i,7; seis costelas; número total de vértebras 37-38; comprimento pré-dorsal menor, 65.1-70.8% do comprimento-padrão; comprimento do pedúnculo caudal menor, 8.4-11.9% do comprimento-padrão; base da nadadeira dorsal menor, 7.7-11.3% do comprimento-padrão; altura maior da cabeça, 46.7-71.6% do comprimento da cabeça; largura da cabeça menor, 89.2-115.7% do comprimento da cabeça; largura interobital maior (29.2-36.5% do comprimento da cabeça); largura da boca maior (43.4-64.0% do comprimento da cabeça); olhos e pigmentação intermediários entre as espécies epígeas e cavernícolas de *Ituglanis* - diâmetro dos olhos variando entre 0.5 e 1.0 mm nos adultos, 7.8-10.1 % do comprimento da cabeça e pigmentação composta por manchas irregulares marrom-claras ao longo do corpo. Este último caráter indica o *status* de troglóbio de *I. mambai*. Adicionalmente, esta espécie apresenta maxila com uma discreta projeção medial-posterior; fronto-lacrimal 1,5 vezes o tamanho da maxilla e projetado posteriormente; comprimento do processo posterior do palatino metade do seu comprimento total, com uma tênue concavidade medial; 14 raios procurrentes dorsais e 12 ventrais. No ambiente natural, *I. mambai* mostrou hábitos criptobióticos. Quando perturbados, tentavam entocar-se sob os seixos e matacões. Aparentemente mostraram reação negativa à luz. Foi observada uma preferência por remansos. Marcas de enchentes recentes foram observadas no conduto do riacho subterrâneo em março/abril 2007 (fim da estação chuvosa) quando um número menor de indivíduos foi observado, comparando-se a setembro de 2004 (final da estação chuvosa).

Key Words: New cave catfish, Rio Tocantins basin, Taxonomy, Brazil.

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Introduction

Brazil has a remarkable subterranean ichthyofauna, similar to few other countries or geographically comparable karst areas, such as Mexico, China and the southeastern Asia. To date, nearly 21 species (several awaiting formal description) of Brazilian subterranean fishes are known to present reduction of eyes and pigmentation at least at some degree beyond that observed in their epigean congeners, suggesting a troglobitic (exclusively subterranean) status for these fishes, and this number is increasing every year (Trajano, 1997; Bichuette & Trajano, 2003; Trajano & Bichuette, 2004). The majority (all but two) are siluriformes belonging to three out of 12 catfish families found in Brazil. Catfish species are also predominant in groundwaters of other Neotropical countries, whereas troglobitic cypriniforms largely outnumber catfishes in subterranean habitats in China, Thailand and other Asian countries.

The Neotropical Trichomycteridae forms a monophyletic group of small-sized catfishes, with Cis- and Transandine species, representing one of the richest group of siluriforms with at least 200 nominal species in 35 genera (de Pinna, 1998; Wosiacki, 2002; de Pinna & Wosiacki, 2003). The genus *Trichomycterus* Valenciennes, 1833 is the largest of the family (over 100 species) and one of the catfish genera best represented in the cave environment, with several troglomorphic species. Up to now, at least eight species were reported: *T. chaberti* Durand, 1968 from Bolivia; *T. conradi* (Eigenmann, 1912) and *T. spelaeus* DoNascimento, Villarreal & Provenzano, 2001, both from Venezuela; *T. itacarambiensis* Trajano & de Pinna, 1996 from eastern Brazil; *T. santanderensis* Castellanos-Morales, 2007, and three undescribed species, one from Colombian Andes (Sket, 1988) and two respectively from northeastern and southwestern Brazil (unpubl. data).

Costa & Bockmann (1993) erected the genus *Ituglanis* to include nine species previously placed in *Trichomycterus*, based on three autapomorphies (supraoccipital fontanel reduced to a small round orifice, a palatine with a deep medial concavity, and the anterior extremity of the sphenotic directed anteriorly). The genus *Ituglanis* is distributed on the Cisandine South America, encompassing 18 described species (Costa & Bockmann, 1993; Fernández & Bichuette, 2002; de Pinna & Keith, 2003; Bichuette & Trajano, 2004; Datovo & Landim, 2005; Sarmento-Soares *et al.*, 2006; Campos-Paiva & Costa, 2007), of which four are restricted to the subterranean environment in the São Domingos karst area, Central Brazil presenting moderately to highly reduced eyes and melanic pigmentation: *I. passensis* Fernández & Bichuette, 2002, *I. bambui* Bichuette & Trajano, 2004, *I. epikarsticus* Bichuette & Trajano, 2004 and *I. ramiroi* Bichuette & Trajano, 2004.

The Mambaí karst area, upper rio Tocantins basin, State of Goiás is located to south of the São Domingos area. The latter is distinguished by its subterranean ichthyofauna, particularly rich in both troglomorphic and non-troglomorphic species. It is the Brazilian region with the highest diversity of subterranean fishes, including seven troglobitic species reported until now (Bichuette & Trajano, 2003; Trajano *et al*., 2004). During two fieldtrips carried out in 2004 and 2007 to the Mambaí karst area, three populations of cave trichomycterids were found in caves. Differences in the external morphology and anatomy were observed in the large population found in the Lapa do Sumidouro Cave when comparing to other *Ituglanis* cave species and epigean congeners, justifying the recognition of a distinct species. The new *Ituglanis* species described herein is characterized by the high individual variability in the cutaneous pigmentation and slightly, but statistically significantly, reduced eyes.

Study area

Mambaí is a carbonate karst area characterized by the presence of continuous limestone outcrops belonging to the Bambuí Group. This area is located in the left margin of the rio Paranã, which is part of upper rio Tocantins basin (Fig. 1). Characteristically, after an epigean reach, each stream enters into a cave through a sinkhole, cross hundreds of meters (the largest cave in the region, Gruna da Tarimba, is approximately 7 km long) through subterranean conduits, and emerges to the surface through a resurgence. This area lies in the Cerrado (the savannah-like Brazilian vegetation) domain and is characterized by a tropical semi-humid climate with 4-5 dry mo/yr (Nimer, 1979).

The Lapa do Sumidouro (14º19'21.0"S 46º14'41.0"W) is a 2,000 m long cave, formed by many dry and higher galleries and crossed by a shallow stream (depth varying from 10 to 90 cm during our visits; mean width = 1.5 m), with a graveled and soft (silt and clay) bottom interspersed with collapsed boulders.

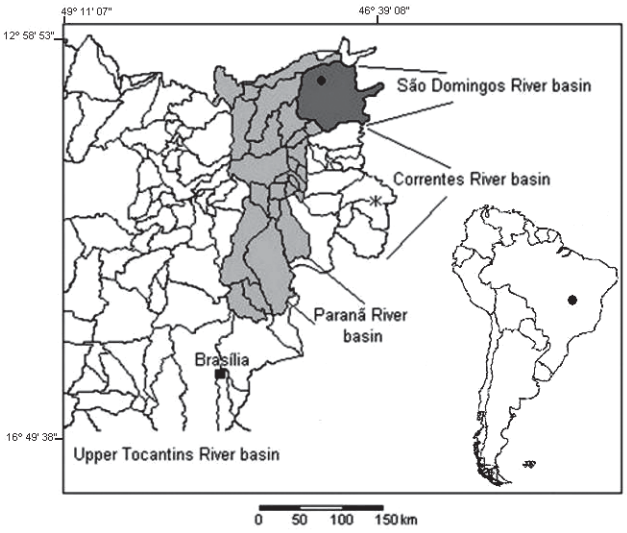

Fig. 1. Upper rio Tocantins basin and respective smaller drainages (divided by lines), showing the type-locality of *Ituglanis mambai*. Dot = rio Correntes basin, Mambaí karst area, Central Brazil) and the localities of the four troglobitic *Ituglanis* species from the neighbor São Domingos karst area, Central Brazil. Asterisk = Lapa do Sumidouro Cave, type-locality of *I. mambai.* Diamond = localities of *I. bambui, I. epikarsticus, I. passensis* and *I. ramiroi*.

Material and Methods

The study specimens were hand-netted, anesthetized in benzocain solution until death, preserved in formalin and then transferred to alcohol 70%.

All measurements were straight-line, taken under stereomicroscope with a dial caliper, 0.1 mm precision, on the left side of specimens. Measurements follow Tchernavin (1944), de Pinna (1992), and Trajano & de Pinna (1996). Counts of dorsal-, anal-fin rays and vertebrae follow the method proposed by de Pinna (1992). Two specimens (unregistered) were cleared and double-stained for bone and cartilage by the method of Taylor & Van Dyke (1985). Osteological terminology follows de Pinna (1989).

We considered adults those individuals longer than 30.0 mm SL, which is the minimum size of specimens with matured gonads. Minimum population densities were estimated with basis on visual censuses of adult individuals, taking into account the area of the cave stream inspected (300 m long and 1.5 m wide, about 450 m^2). The spatial distribution in the natural environment was described after *ad libitum* observations. Standard length and weight data of 12 adult individuals (paratypes) were used to calculate allometric condition factors ($K= 100.W.SL^{-b}$; Le Cren 1951). The power coefficient (b) for the growth equation was estimated from the slope of the regression of log weight on log standard length using the pooled data.

Abbreviations: MCP, Museu de Ciências e Tecnologia da PUCRS, Porto Alegre; MZUSP, Museu de Zoologia da Universidade de São Paulo; LISDEBE, Laboratório de Ictiologia Sistemática do Departamento de Ecologia e Biologia Evolutiva da UFSCar; SL, standard length; HD, head depth; HL, head length; HW, head width; IOW, interorbital width; C&S, cleared and stained.

Ituglanis mambai, new species

Fig. 2

Holotype. MCP 42538, 53.4 mm SL, Brazil, northeastern State of Goiás, Posse County, Lapa do Sumidouro Cave (14º19'21.0"S 46º14'41.0"W, elevation 792 m), upper rio Tocantins basin; M. E. Bichuette & S. Secutti col., 31 Mar 2007.

Paratypes. LISDEBE 2047, 6, 32.6-65.4 mm SL (C&S); same locality as holotype; M. E. Bichuette, E. Trajano & A. C. Barbosa col., 1 Sep 2004.MCP 42537, 3, 38.7-59.5 mm SL, same locality as holotype; M. E. Bichuette, E. Trajano & A. C. Barbosa col., 1 Sep 2004. MZUSP 94719, 4, 26.7-66.1 mm SL; same locality as holotype; M. E. Bichuette, E. Trajano & S. Secutti col., 31 March 2007.

Diagnosis. *Ituglanis mambai* is distinguished from both epigean (*I. cahyensis*, *I. laticeps, I. macunaima, I. metae, I. nebulosus, I. parahybae* and *I. proops*) and cave congeners (*I. bambui, I. epikarsticus, I. passensis* and *I. ramiroi*) by the combination of the following characteristics: posterior fontanel absent (except for *I. epikarsticus* and *I. macunaima*); pectoral-fin rays usually i,7 (except for *I. bambui, I. passensis* and *I. epikarsticus*); six pleural ribs (except for *I. bambui*, *I. parahybae and I. ramiroi*); total vertebrae 37-38 behind Weberian apparatus (except for *I. bambui*, *I. laticeps* and *I. macunaima*,); shorter predorsal length (65.1-70.8% in SL) (except when compared to *I. bambui*); shorter caudal peduncle (8.4-11.9% in SL); shorter dorsal-fin base (7.7-11.3% in SL); larger interobital width (29.2-36.5% in HL) (except to the cave species); wider mouth (43.4-64.0% in HL) (except for *I. bambui*); pigmentation intermediary between epigean and cave *Ituglanis* species, composed by irregular light brown spots along the body; eyes size variable and intermediate between those of epigean and formerly described cave-restricted congeners, with a diameter varying, in adults, from 0.5 to 1.0 mm (7.8-10.1 % in HL) (except for *I. cahyensis* – 7.0-8.1 % in HL). Additional diagnostic character states: the maxillae with a discrete medial-posterior projection; fronto-lacrimal one half-length of the maxillae and pointed backwards; posterior process of palatine half its length, with a tenuous medial concavity; 14 dorsal and 12 ventral procurrent rays.

Description. Morphometric and meristic data of holotype and paratypes given in Table 1. Body elongate, semi-cylindrical, becoming compressed toward caudal fin. Dorsal and ventral profiles of body, and caudal peduncle straight (Fig. 2a). Lips and barbels covered by papillae.

Head relatively wide and depressed, rounded in dorsal view. Eyes reduced in relation to epigean *Ituglanis* species, visible externally as round black spots, covered by thin skin (Fig. 2b). Anterior nostril transversally ovoid and slightly smaller than posterior one, surrounded laterally by nasal barbels. Posterior nostril rounded, surrounded anteriorly by thin flap of integument. Mouth subterminal, rictus laterally directed. When adpressed to body, maxillary barbel extending to middle of adpressed pectoral fin; submaxillary and nasal barbels extending to origin of pectoral fin.

Pectoral fin i,7, triangular in dorsal view, first ray longer, unbranched and filamentous. Dorsal fin ii,7, rectangular in lateral view. Anal fin i,5, semi-circular in lateral view, distal margin slightly rounded. Pelvic fin i,4, rectangular in ventral view. Margin of caudal fin straight, with 13 principal rays (7 in the upper and 6 in the lower lobe), 14 dorsal and 12 ventral procurrent rays.

General morphology of cranium: main body axis of mesethmoid with anterior width larger than posterior width, width of cornua 3/4 of its lenght, cornua with rounded distal extremity; posttemporosupracleithrum of medium size, with dorsal limb lying on pterotic. Two premaxillary tooth rows. Maxillae with discrete medial-posterior projection; fronto-lacrimal one half-length of maxillae and pointed backwards. Six branchiostegal rays. Base of laminar surface of urohyal four times longer than its distal extremity; urohyal dorsal process short. Length of posterior process of palatine half total palatine length, medial concavity tenuous. Vomer arrow-shaped with long posterior process. Opercle with 14-16 odontodes and interopercle with 24-26 odontodes.

Postcranial skeleton. Total vertebrae 37-38 behind Weberian apparatus, six pairs of ribs. Epural absent. Neural

spine (n = 1) of preural centrum with round tip. Upper hypural plate triangular, lower hypural plate trapezoidal. Uroneural with acute distal extremity.

Color in alcohol. Pale yellowish to light brown in adults and pale yellowish in juveniles, with irregular light brown spots in lateral and dorsal views (Figs. 2a and 2b). Eye black. Fins poorly pigmented, showing translucent aspect in those individuals with pale pigmentation. Dorsal portion of head light brown.

Color in life. Body in general pale yellowish, irregular light brown spots along dorsum and flanks of body. Eyes black. Dorsal portion of head darker than rest of body. Juveniles less pigmented than adults, dorsal region of skull darker.

Distribution. *Ituglanis mambai* is known from a single subterranean stream inside the Lapa do Sumidouro Cave. This stream reach at least 500 m of extension.

Etymology. The specific name makes reference to the karst region , Mambaí, where the species occurs.

Notes on ecology and behaviour. *Ituglanis mambai* inhabits a subterranean stream inside the Lapa do Sumidouro Cave. The stream reach where the fishes were observed is characterized by slow to fast-moving waters, 10-90 cm deep on average, and bottom formed basically by sand, silt, some gravels and boulders. Visual censuses, carried out in two occasions and covering an area approximately 300 m long and 1.5 m wide, resulted in minimum population densities varying from 0.12 inds.m^{-2} (September 2004, end of the dry season) to 0.04 inds.m^{-2} (April 2007, beginning of the dry season). Environmental variables measured in September 2004: water temperature, 23.4°C; pH, 7.9; conductivity, 0.141 mSm.cm^{-1}; dissolved oxygen, 7.4 mg.l^{-1}. All observed individuals were solitary, with swimming activity on the bottom and sometimes in the midwater. In the natural habitat, *I. mambai* catfish displayed cryptobiotic habits, trying to hide into the gravels and under boulders when disturbed, apparently showing a negative response to carbide and flashlight. It was observed a preference to slow-moving pools. Recent flood marks were observed

Table 1. Morphometric and meristic data of holotype and the 13 paratypes of *Ituglanis mambai*. SD, standard deviation.

	Holotype	Range (n=14)	Mean	SD
Standard length	53.4	26.7-68.3	49.3	13.8
	Percents of Standard length			
Total length	114.4	112.2-118.0	114.5	1.4
Predorsal length	68.9	65.1-70.8	67.3	1.5
Preanal length	72.3	65.5-72.7	69.3	2.3
Prepelvic length	59.6	53.0-60.2	57.5	1.8
Caudal peduncle length	9.7	8.4-11.9	9.9	1.1
Dorsal-fin base length	9.9	7.7-11.3	9.6	0.9
Anal-fin base length	8.1	6.7-12.1	8.7	1.5
Pectoral width	10.9	8.3-12.7	10.6	1.4
Head length	16.5	16.3-19.8	17.8	1.1
Body depth	14.8	11.3-14.8	12.5	0.8
	Percents of Head length			
Head depth	71.6	46.7-71.6	55.0	6.6
Head width	110.2	89.2-115.7	103.3	6.8
Interorbital width	36.4	29.2-36.4	33.1	2.4
Eye diameter	8.3	7.8-10.1	8.6	0.7
Snout length	39.8	28.7-40.7	36.0	3.6
Maxillary barbel length	93.2	79.7-123.2	92.1	11.1
Rictal barbel length	63.6	58.5-73.9	65.4	4.3
Nasal barbell length	103.4	64.0-103.4	83.9	10.0
Mouth width	60.2	43.4-64.0	54.0	6.0
	Ray counts			
Total dorsal fin	ii,7	ii,7		
Total pectoral fin	i,7	i,7		
Total pelvic fin	i,4	i,4		
Total anal fin	i,5	i,5		
Total caudal fin	7/6	7/6		

Fig. 2. *Ituglanis mambai*, holotype, MCP 42538, 53.4 mm SL. Lapa do Sumidouro Cave, Posse, Goiás, Brazil. Lateral (above) and dorsal (below) views.

in the base-level stream conduit in March/April 2007 (end of rainy season), when less individuals were observed along the 300 m reach inspected, when compared to September 2004. The average condition factor for 12 individuals of *I. mambai* captured at the end of the dry season (September 2004) was 2.1, showing, for two juvenile individuals (33.0 and 35.9 mm SL), values of 0.5, and varying from 0.7 to 3.4, for adults (40.2-72.0 mm SL).

Discussion

Taxonomy. According to Costa & Bockmann (1993), *Ituglanis* is defined by three autapomorphies: supraoccipital fontanel reduced to a small round orifice, palatine with a deep medial concavity and anterior extremity of the sphenotic directed anteriorly. *I. mambai* presented some variation as regards to these characters. The supraoccipital fontanel was absent in two claired and stained individual, a condition shared with some individuals of *I. epikarsticus* and *I. macunaima*. Datovo & Landim (2005) discussed this character-state and concluded that this tendency (reduction to absence of supraoccipital fontanel) can be considered a derived condition. From this point of view, *I. mambai* could be a more derived species. In relation to the medial concavity of the palatine, we observed that it is not as deep in *I. mambai* as in the other species. Therefore, only the third synapomorphy (anterior extremity of the sphenotic directed anteriorly) is explicitly present, showing a mosaic of character-states.

Some hypotheses have been proposed to clarify the relationships within the genus. Pinna & Keith (2003) proposed two putatively monophyletic groups within *Ituglanis*, commented by Datovo & Landim (2005) and Sarmento-Soares *et al.* (2006). One monophyletic group includes northern South American species, which are distributed in the rio Amazonas and its left tributaries and in the Guyanas, sharing a a reduced number of pleural ribs (2-3) and, within this clade, a subgroup sharing the widening of the mesethmoid shaft. The second monophyletic group includes southern species, distributed from the basins of the Paraná/Paraguai, Ribeira do Iguape and Paraíba do Sul rivers, southeastern drainages in Brazil and Uruguay, and two southern Amazonian forms, as well as two undescribed forms from Uruguay and Tocantins river basins. These species share a large number of pleural ribs (5-7), and, within this clade,, a subgroup shares the medial process on the fronto-lacrimal tendom bone. In *Ituglanis mambai*, there is a narrow mesethmoid shaft, no process in the fronto-lacrimal tendom bone and 6 pleural ribs, which approach *I. mambai* to the second monophyletic group, not surprisingly in view of its occurrence in the upper Tocantins basin.

Ituglanis mambai may be distinguished from the epigean and cave *Ituglanis* species mainly by the classical troglomorphic character states (Christiansen, 1962): eyes reduced when compared to epigean ones and pigmentation intermediary between epigean and cave *Ituglanis* species. The troglobitic status of *I. mambai* is further supported by the fact that no specimen of *Ituglanis* has been found in the epigean streams in the area, in spite of extensive collecting efforts (Bichuette & Trajano, 2003). The only record of an epigean species near Mambaí and São Domingos karst areas (right margin of Paranã basin) is represented by *Ituglanis* sp. (MZUSP 53222), from a tributary of the upper rio Tocantins basin (left margin of the rio Paranã). Based on this, we hypothesize that the cave *Ituglanis* species from São Domingos karst area (*I. bambui, I. epikarsticus, I. passensis* and *I. ramiroi*), as well as *I. mambai*, are geographic relicts (sensu Holsinger, 1988), i.e., the subterranean survivors of one or more lineages previously living in epigean streams in this area. Table 2 summarizes the differences between *I. mambai* and the other known *Ituglanis* cave species, which are geographically close, showing a mosaic distribution of character states. Although most character states are shared by two or more species, they may all be distinguished from the others by a particular combination of morphometric and osteological characteristics. For instance, there is some overlapping in

Table 2. Comparative data of *Ituglanis* subterranean species from northeastern Goiás State, Central Brazil. O, opercular; I, intraopercular.

	I. passensis	*I. bambui*	*I. epikarsticus*	*I. ramiroi*	*I. mambai*
maximum SL	62.6 mm	46.3 mm	34.0 mm	31.3 mm	68.3
body pigmentation	yellowish to light gray	pale light brown	pale yellowish	Pale yellowish to white	pale yellowish to light brown
eye diameter (% of HL)	0.4-0.5 mm (3.9-5.2)	0.2-0.3 mm (3.4-6.1)	0.1 mm (2.0-2.1)	0.2 mm (3.7-4.7)	0.5-1.0 mm (7.8-10.1)
Odontodes- O/I	16/24	11/26	9/20-21	12-13/24-25	14-16/24-26
pectoral fin rays	8	8	8	9	8
Maxilla shape	without medial-posterior projection	with proeminent medial-posterior projection	with discrete medial-posterior projection	without medial-posterior projection	with discrete medial-poterior projection
fronto-lacrimal bone	one half-length of maxilla, posteriorly pointed	one half-length of maxilla, posteriorly pointed	2/3 length of maxilla, anteriorly and posteriorly pointed	similar length of maxilla, posteriorly pointed	one half-length of maxilla, posteriorly pointed
Vomer shape	elongate, with an enlargement in medial region	elongate, with constriction in the neck	short, without constriction	short, with an enlargement in medial region	elongate, with an enlargement in medial region
Palatine shape	medial concavity rounded	medial concavity accentuated	medial concavity rounded	medial concavity rounded	medial concavity tenuous
caudal skeleton	15 and 11	16 and 14	14 and 10	16 and 12	14 and 12
pairs of ribs	seven	six (one juvenile - five)	five	six	six

the eye diameter (in % of HL) of *I. passensis, I. bambui* and *I. ramiroi* but these species differ in the vomer shape.

Several authors argue that there is correlation between the time of isolation in the subterranean habitat and the degree of reduction of eyes and pigmentation, with populations showing less reduced and/or variable eyes and pigmentation isolated for shorter times than those homogeneously anophthalmic and unpigmented (Wilkens, 1982, 1986; Trajano, 1995). From this, it may be concluded that *I. mambai*, which present a low degree of regression of body pigmentation and eyes, showing variability in these character-state, has been isolated in the subterranean environment for a shorter time than, for example, *I. bambui*, I. *passensis*, *I. ramiroi* and *I. epikarsticus*. As a matter of fact, *I. mambai* exhibits cryptobiotic habits, occasionally swimming in the midwater, traits usually also observed in epigean species of Trichomyctyeridae, but not in the most specialized troglobitic ones. Nevertheless, this assumption must be regarded cautiously because many factors are involved in the differentiation rates of each character (Trajano, 2007).

Ecological and conservation remarks. For cavefish standards (Trajano, 2001), the population densities recorded by visual censuses on two occasions, respectively at the beginning and at the end of the dry season, may be considered low (0.04 inds.m^{-2}, beginning of the dry season) to moderate (0.12 inds.m^{-2}, end of the dry season). The lower number of individuals visualized at the beginning of the dry season may be due to floods on the previous rainy season, washing away some fish and/or to a tendency to remain sheltered until heavy rains ceased. Lowered condition factor values at the end of the dry season, similar to the observed for *Ituglanis mambai* were also reported for *Pimelodella spelaea* (Trajano *et al*., 2004), indicating a food-limited regime, intensified along the dry season due to an accentuated shortage of water-carried nutrients. The lack of specializations to cope with the food shortage is another evidence of a relatively short time in isolation in the subterranean habitat for both species. In relation to the power coefficient for the growth equation (b), the value of 3.23 indicates a positive-allometric growth (increase in relative body thickness or plumpness) and is close to those registered for other Brazilian cave catfishes (Trajano *et al.*, 2004, Trajano & Bichuette, 2007).

Troglobitic species are generally fragile, highly vulnerable to environmental disturbance, due to their generally high degree of endemism, low population sizes, high sensitivity to stressors, and a K-selected life style leading to a slow population turnover (Trajano, 2000). As a matter of fact, many hypogean fishes are considered as endangered by different types of threats (Proudlove, 2001), among which human visitation cannot be neglected.

Mambaí is a poorly developed region, relatively well preserved, and there are no short- to medium-term big projects for the area. *Ituglanis mambai* presents a relatively large population, and the Lapa do Sumidouro Cave is not currently visited by tourists. Nevertheless, the fast growing speleotourism throughout Brazil, the relative proximity to a large city (Brasília, about 330 km far away), and the fact that these caves are not included in any conservation unit imposes some concern about the future of *I. mambai* in particular, as well as of the subterranean ecosystems in general situated in this region. The creation of a conservation unit encompassing all the Mambaí karst area is a highly recommendable preventive measure.

Comparative material. *Ituglanis bambui*, MZUSP 79860, holotype, Brazil: Goiás: São Domingos: Terra Ronca State Park: Angélica Cave. *Ituglanis epikarsticus*, MZUSP 79869, holotype, Brazil: Goiás: São Domingos: Terra Ronca State Park: São Mateus Cave. *Ituglanis passensis*: MZUSP 80097, 3, Brazil: Goiás: São Domingos, Passa Três Cave. *Ituglanis proops*: MZUSP 79576, 15, Brazil: Paraná: Cerro Azul, Ribeirão Bonito. *Ituglanis ramiroi*, MZUSP 79865, holotype, Brazil: Goiás: São Domingos: Terra Ronca State Park: São Bernardo Cave. *Ituglanis* sp.: MZUSP 53222, 6, Brazil: Goiás: Minaçú, tributary of Rio Tocantinzinho. *Trichomycetrus bahianus*: MZUSP 74655, 10, Brazil: Bahia: Livramento do Brumado, Rio Brumado. *Trichomycterus itacarambiensis*: MZUSP 50548, paratypes, 4, Brazil: Minas Gerais: Itacarambi, Olhos D'Água Cave. *Trichomycterus* sp.: MZUSP 60205, 10, Brazil: São Paulo: Barra do Turvo, Ribeirão Fria. *Trichomycterus zonatus*: MZUSP 68173, 20, Brazil: São Paulo: Cajati, Rio do Queimado. Due to difficulties to get additional loans from the Museu de Zoologia da USP, the comparison with other *Ituglanis* species (*I. parahybae, I. metae*, *I. laticeps*, *I. cahyensis* and *I. nebulosus*) was based on the literature (Costa & Bockmann, 1993; de Pinna & Keith, 2003; Datovo & Landim, 2005; Sarmento-Soares *et al.*, 2006).

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