

## A new pale-spotted species of *Hypostomus* Lacépède (Siluriformes: Loricariidae) from the rio Tocantins and rio Xingu basins in central Brazil

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A new species of the genus *Hypostomus* Lacépède (Siluriformes, Loricariidae) from rio Tocantins and rio Xingu basins in central Brazil, is described. The new species is distinguished from its congeners by a unique combination of pale blotches over a darker background on head, body and fins, and conspicuous keels on head, predorsal region and lateral plates. Comments on the pale-spotted species of *Hypostomus* are provided.

Uma nova espécie do gênero *Hypostomus* Lacépède (Siluriformes, Loricariidae) é descrita das bacias dos rios Tocantins e Xingu no Brasil central. A nova espécie distingue-se de suas congêneres pela combinação única de manchas claras sobre fundo escuro na cabeça, corpo e nadadeiras, e quilhas conspícuas na cabeça, região predorsal e placas laterais. Comentários sobre as espécies de *Hypostomus* de manchas claras são fornecidos.

**Key words:** *Hypostomus faveolus*, *Hypostomus plecostomus* group, Taxonomy.

### Introduction

*Hypostomus* Lacépède is the second most species-rich genus of the order Siluriformes, with 119 species currently recognized as valid (Armbruster *et al.*, 2007; Birindelli *et al.*, 2007; Ferraris, 2007; Jerep *et al.*, 2007), and is distributed from Costa Rica (Bussing, 1987) to the río de La Plata in Argentina. Currently, there is no consensus on the delimitation of *Hypostomus*. Armbruster (2004) undertook a broad morphological phylogenetic analysis of Hypostominae and concluded that the genera *Cochliodon*, *Aphanotolurus*, *Isorineloricaria*, *Cheirododus*, *Squaliforma*, and *Watawata* are synonyms of *Hypostomus*. Weber (2003) and Ferraris (2007), based on a molecular phylogeny of Hypostominae by Montoya-Burgos *et al.* (2002), considered *Aphanotolurus*, *Isorineloricaria*, and *Squaliforma* as valid genera, distinct from *Hypostomus*. There are some propositions of groups of species within the genus (*e.g.*, Muller & Weber, 1992; Montoya-Burgos, 2003; Zawadzki *et al.*, 2005) but the only group explicitly hypothesized as monophyletic within *Hypostomus* is the *Hypostomus cochliodon* group (Armbruster, 2003). The alpha-taxonomy of *Hypostomus* remains poorly documented and papers dealing with the genus consist either in regional revisions (*e.g.*,

Reis *et al.*, 1990; Mazzoni *et al.*, 1994; Oyakawa *et al.*, 2005) or revisions of monophyletic subunits of the genus (Armbruster, 2003; Hollanda Carvalho & Weber, 2005).

The new species reported herein was already known in the aquaristic literature as *Hypostomus* sp. “honeycomb-pleco” (L37a, L161; Stawikowski, 1989; Glaser & Glaser, 1995; Stawikowski *et al.*, 2004). During recent expeditions in central Brazil, a large number of specimens of this singular pale-spotted *Hypostomus* species was collected in the upper portions of rio Araguaia and rio Xingu basins, southern Brazilian tributaries of the lower portion of rio Amazonas. The aim of the present contribution is to describe the aforementioned undescribed species.

### Material and Methods

Methodology and terminology for measurements follow Boeseman (1968) with the inclusion of the following measurements: preanal length, taken from snout tip to anal-fin origin; upper caudal-fin length, taken from last non-elongate dorsal caudal-peduncle plate to distal tip of uppermost caudal-fin ray; lower caudal-fin length, taken from last non-elongated ventral caudal-peduncle plate to distal tip of lower caudal-fin

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ray; adipose-fin spine length; body depth at dorsal-fin origin; snout-opercle distance, taken from snout tip to upper most portion of gill opening; mandibular-ramus length; premaxillary-ramus length; maxillary-barbel length, taken from anterior insertion of barbel to its tip. Plate counts and nomenclature follow schemes of serial homology proposed by Schaefer (1997), with the modifications of Oyakawa *et al.* (2005). Standard length (SL) is expressed in millimeters and all other measurements are expressed as percentage of standard length or head length. Measurements are presented in the table, whereas the meristics counts are given in the description, with an asterisk indicating data of the holotype, and the number of specimens of each meristic counts in parenthesis.

Specimens examined belong to the following institutions: ANSP, Academy of Natural Sciences, Philadelphia; INPA, Instituto Nacional de Pesquisas da Amazônia, Manaus; LBP, Laboratório de Biologia e Genética de Peixes, Universidade Estadual Paulista, Botucatu; MHNG, Museum de Histoire Naturelle de Genève, Genève; MNRJ, Museu Nacional, Rio de Janeiro; MZUSP, Museu de Zoologia da Universidade de São Paulo, São Paulo; NUP, Nupélia, Universidade Estadual de Maringá, Maringá; UNT, Universidade Nacional do Tocantins, Porto Nacional; ZMA, Zoologisch Museum, Universiteit van Amsterdam, Amsterdam.

## Results

### *Hypostomus faveolus*, new species

Figs. 1-2

*Hypostomus* sp. "Honeycomb-pleco" (L 037a): Glaser & Glaser, 1995: 22 (photo; "Brazil").

*Hypostomus* sp. "Xingu-Hypostomus" (L 161): Glaser & Glaser, 1995: 63 (photo; "rio Xingu/Brazil").

*Hypostomus* sp. Stawikowski, 1989: 458 ("L37", photo 4; "rio Araguaia"); Melo *et al.*, 2005: 100-101 (photo; Mato Grosso, rio da Mortes, tributary of the rio Araguaia); Stawikowski *et al.*, 2004: 44 (L 37; "Brasilien, Pará, rio Tocantins, rio Araguaia (nahe Marabá) und Maranhão, rio Lageado").

**Holotype.** MZUSP 90722 (206.0 mm SL), Brazil, Mato Grosso, Cocalinho, Corixo da Saudade (Corixinho), 25 km NO of Cocalinho on road MT 326, rio Araguaia drainage (rio Tocantins basin), 14°17'20.6"S 51°09'12.1"W, 13 Oct 2004, J. L. O. Birindelli, O. Oyakawa, C. R. Moreira, M. I. Landim, A. C. Oliveira, A. Datovo, C. Nolasco.

**Paratypes.** Brazil (rio Tocantins basin): MZUSP 86231 (1, 148.6 mm SL), collected with holotype. MNRJ 25476 (1, 107.6 mm SL), Mato Grosso, Nova Xavantina, córrego Cachoeirinha, tributary of rio Pindaíba, 30 Jan 2002, P. A. Buckup *et al.* MZUSP 4871 (2, 135.5-158.3 mm SL), ANSP 187418 (1, 148.0 mm SL), Goiás, Aruanã, rio Araguaia, 14°54'S 51°05'W, Sep 1966, Excursão Depto. de Zoologia. MZUSP 26534 (1, 170.0 mm SL), Goiás, rio Resende, tributary of rio Vermelho, ca. 10 km of Buenolândia, 15°48'S 50°17'W, Nov 1981, J. C. Garavello *et al.* MZUSP 52128 (1, 180.7 mm SL), INPA 28859 (1, 147.8 mm SL), Tocantins, Araguaçu, rio

Água Fria, Fazenda Praia Alta 2, road Araguaçu/Barreira do Piqui, 27 km N of Araguaçu, 12°44'S 49°56'W, 6 Jul 1997, F. C. T. Lima *et al.* MZUSP 86790 (1, 77.1 mm SL), Mato Grosso, Canarana, rio Água Suja (or Curuá), tributary of rio das Mortes, on road BR 158, approximately 13 km S of Serra Dourada, 13°49'47"S 52°02'15"W, Oct 2004, O. T. Oyakawa *et al.* MZUSP 89041 (10, 23.8-39.8 mm SL), Goiás, Goiás, rio Vermelho 2, on road GO 164, 15°54'11"S 50°06'55"W, 23 Jul 2005, C. Chamon *et al.* MZUSP 89267 (4, 31.4-39.8 mm SL), Goiás, Crixás, rio Preto, on road GO 334 between Cocalinho and Nova Crixás, 14°22'18"S 50°39'13"W, 26 Jul 2005, C. Chamon *et al.* MZUSP 89387 (8, 43.0-145.3 mm SL), NUP 5560 (1, 93.7 mm SL), Goiás, Crixás, Córrego da Taboca, tributary of rio Crixás-Mirim, on road GO 336, between Crixás and Nova Crixás, 14°19'27"S 50°12'32"W, 28 Jul 2005, C. Chamon *et al.* MZUSP 89622 (1, 168.0 mm SL), Goiás, Luís Alves, rio Verde, tributary of rio Araguaia, 13°09'28"S 50°30'22"W, 10 Apr 2004, A. Akama. MHNG 2691.077 (5, 53.5-81.3 mm SL), small tributary of rio Tocantins, N. Estreito (= "Paranadij"), 1993, U. Werner. UNT 310 (3, 147.0-180.0 mm SL), Maranhão, Imperatriz, rio Mosquito, 5°32'S 47°29'W, 30 Jun 2000, NEAMB/UFT.

**Non-types.** Brazil (rio Tocantins basin): LBP 1523 (7, 22.9-33.1 mm SL), Mato Grosso, Barra do Garça, rio Insula, tributary of rio das Mortes, 15° 40'57"S 52° 13'24"W, Dec 2002, C. Oliveira. LBP 1839 (2, 36.9-67.5 mm SL), Mato Grosso, Barra do Garça, rio Insula, tributary to rio das Mortes, Araguaia, 15°32'54"S 52°12'17"W, Aug 2003, C. Martins *et al.* MZUSP 19279 (1, 162.3 mm SL), rio Araguaia and Tocantins, Sudepe, 1975-1977. MZUSP 22813 (1, 81.2 mm SL), Mato Grosso, Santa Terezinha, rio Araguaia, Oct 1964, H. A. Britski. MZUSP 89076 (2, 52.4-83.4 mm SL), Goiás, Goiás, rio Bugre, tributary of rio Vermelho, on road GO 164, 25 km NW of Goiás, 15°47'13"S 50°07'53"W, 24 Jul 2005, C. Chamon *et al.* MZUSP 89334 (2, 26.5-27.7 mm SL), Goiás, Nova Crixás, Córrego Pitomba, tributary of rio Crixás-Mirim, on road GO 336 near Nova Crixás, 14°08'35"S 50°20'13"W, 27 Jul 2005, C. Chamon *et al.* MZUSP 89390 (3, 93.0-113.9 mm SL), Goiás, Santa Terezinha de Goiás, rio Crixás-Açu, on road GO 465, 14°26'26"S 49°42'37"W, 28 Jul 2005, C. Chamon *et al.* MZUSP 89482 (1, 44.0 mm SL), Goiás, Nova Crixás, rio Palmital, tributary of rio Crixás, on road GO 156, 13°46'28"S 50°16'00"W, 29 Jul 2005, C. Chamon *et al.* MZUSP 90721 (1, 142.6 mm SL), Goiás, Crixás, ribeirão d'Anta, tributary of rio Crixás-Açu, on road GO 336, 14°32'06"S 50°02'12"W, Jul 2005, C. Chamon *et al.* UNT 246 (2, 77.3-90.8 mm SL), Maranhão, Imperatriz, rio Mosquito, 5°32'S 47°29'W, NEAMB/UFT. UNT 309 (1, 101.1 mm SL), Maranhão, Porto Franco, córrego Lajeado, 5°32'S 47°29'W, 28 Jun 2000, NEAMB/UFT. UNT 312 (4, 97.1-142.9 mm SL), Maranhão, Porto Franco, ribeirão Sucupira, 6°22'S 47°27'W, 28 Jun 2000, NEAMB/UFT. UNT 325 (1, 67.3 mm SL), Maranhão, Ribamar Fiquene, ribeirão Sumaúma, 5°56'S 47°26'W, 28 Jun 2000, NEAMB/UFT. UNT 326 (4, 27.5-48.8 mm SL), UNT 1051 (5, 28.8-44.5 mm SL), UNT 1115 (11, 15.5-113.5 mm SL), Tocantins, Guaraí, córrego Barreiro, 8°50'S 48°31'W, 26 Jun 2000, NEAMB/UFT. UNT 366 (1, 96.6 mm SL), Goiás, UHE Serra da Mesa, 13°46'58"S 48°25'00"W, 6 Jun 1997, NEAMB/UFT. UNT 391 (1, 146.9 mm SL), UNT 392 (1, 149.4 mm SL), UNT 393 (1, 140 mm SL), Tocantins, Paranã, rio Paranã, 12°30'S 48°12'W, 9 May 2001, NEAMB/UFT. UNT 507 (1, 151.4 mm SL), Tocantins, Santa Fé do Araguaia, rio Araguaia, 6°53'S 49°08'W, 12 Oct 2003, NEAMB/UFT. UNT 508 (1, 84.2 mm SL), Tocantins, Araguaína, creek between Filadélfia and Araguaína, 7°25'S 47°35'W, 2 Nov 2003, NEAMB/UFT. UNT 509 (1, 40.1 mm SL), Tocantins, Araguaína, creek between Filadélfia and Araguaína, on road BR153, 7°26'S



**Fig. 1.** *Hypostomus faveolus*, holotype, Brazil, Mato Grosso, Cocalinho, Corixo da Saudade (Corixinho), 25 km NO of Cocalinho on road MT 326, rio Araguaia drainage. MZUSP 90722, 206.0 mm SL.

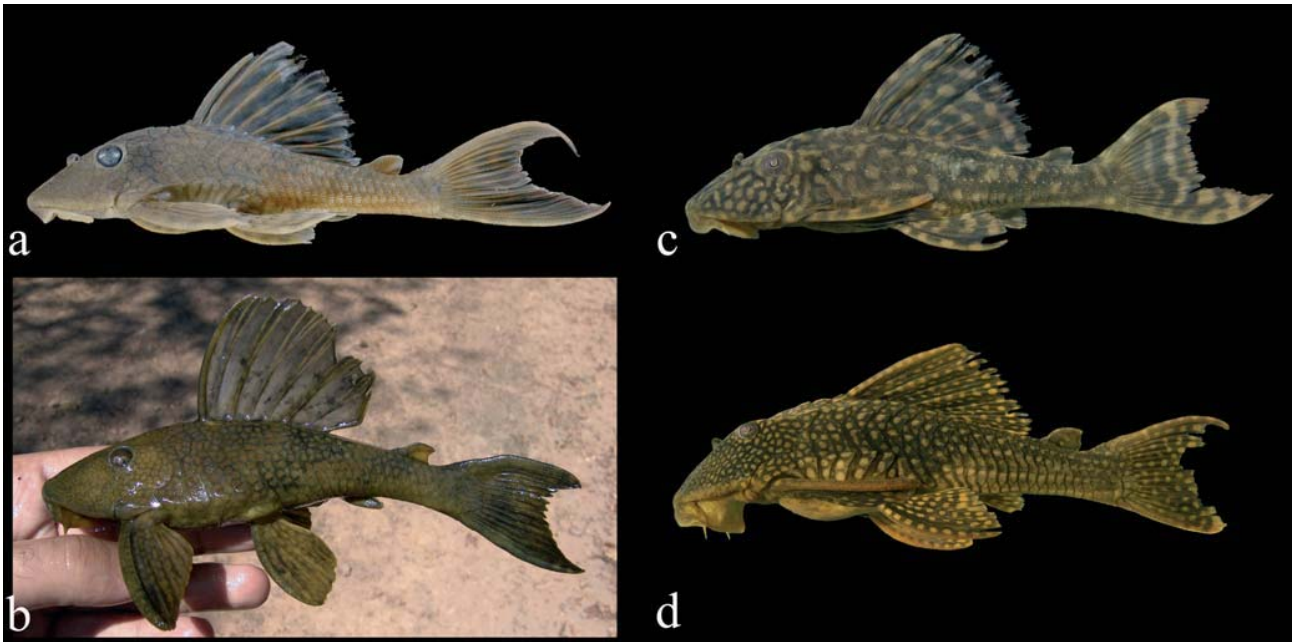
47°30'W, 2 Nov 2003, NEAMB/UFT. UNT 1028 (8, 22.1-52.4 mm SL), UNT 1041 (6, 31.3-69.7 mm SL), UNT 3216 (14, 15.6-74.3 mm SL), Tocantins, Tocantinópolis, córrego Tobasa, 6°19'S 47°26'W, 29 Jun 2000, NEAMB/UFT. Brazil (rio Xingu basin): MNRJ 24823 (1, 28.7 mm SL), Mato Grosso, São José do Xingu, córrego do Moacir, tributary of ribeirão Capivara, tributary of rio Preto, rio Suiá-Miçu drainage, Jan 2006, P. Backup *et al.* MZUSP 34286 (2, 163.9-177.4 mm SL), ZMA 120.228 (1, 187.6 mm SL), ZMA 120.129 (1, 175.2 mm SL), Mato Grosso, Gaúcha do Norte, confluence of the rios Culuene and Sete de Setembro, 12°56'S 52°49'W, 23 Aug 1984, M. Goulding. MZUSP 76873 (3, 102.1-140.2 mm SL), Mato Grosso, Paranatinga, Córrego Corgão, tributary of rio Culuene, km 65 of MT 130 from Paranatinga to Sorriso, 13°58'38"S 54°11'49"W, 24 Jan 2002, N. A. Menezes *et al.* MZUSP 86851 (5, 44.4-66.0 mm SL), Mato Grosso, ribeirão Cascalheira, rio Turvo, tributary of rio Suiá-Miçu, approximately 30 km N of Canarana, 13°13'28"S 51°55'50"W, 16 Oct 2004, O. T. Oyakawa *et al.* MZUSP 86901 (1, 156.0 mm SL), Mato Grosso, Canarana, rio Coronel Vanick, tributary of rio Sete de Setembro, 58 km SO of Canarana, on road MT 120, 13°33'32"S 52°33'51"W, 18 Oct 2004, O. T. Oyakawa *et al.* MZUSP 87012 (5, 119.0-155.7 mm SL), Mato Grosso, Gaúcha do Norte, rio Culuene, 13°30'52"S 53°05'34"W, 19 Oct 2004, O. T. Oyakawa *et al.* MZUSP 87043 (1, 64.7 mm SL), Mato Grosso, Gaúcha do Norte, rio Curisevo, Porto do Vitória, close to ribeirão Kevuaieli, 13°02'05"S 53°25'19"W, 19 Oct 2004, C. R. Moreira *et al.* MZUSP 87078 (1, 108.3 mm SL), Mato Grosso, Gaúcha do Norte, rio Batovi (Tamitotoala), Fazenda Dois Netos in Salto da Alegria, 13°14'46"S 54°01'30"W, 21 Oct 2004, O. T. Oyakawa *et al.* MZUSP 87092 (5, 56.0-102.6 mm SL), Mato Grosso, Paranatinga, rio Jatobá, tributary of rio Ronuro, 12°49'19"S 54°09'24"W, 22 Oct 2004, O. T. Oyakawa *et al.* MZUSP 89732 (5, 63.6-81.5 mm SL), Mato Grosso, Campinópolis, rio Culuene, between rapids and ribeirão Corgão, 13°49'S 53°15'W, 15 Jan 2006, A. Akama & J. L. O. Birindelli. MZUSP 89747 (10, 34.7-188.5 mm SL), Mato Grosso, Campinópolis, rio Culuene, at rapids (future area of PCH Paranatinga II), 13°51'08"S 53°15'22"W, Jan 2006, A. Akama & J. L. O. Birindelli. MZUSP 89797 (1, 53.4 mm SL), Mato Grosso, Campinópolis, rio Sucuri, tributary of the right margin of rio Culuene, close to its mouth, 13°55'40"S 53°17'10"W, Jan 2006, A. Akama & J. L. O. Birindelli. MZUSP 91780 (1, 49.3 mm SL), Mato Grosso, Campinópolis, tributary of rio Culuene, 13°59'35"S 53°20'28"W, 21 Aug 2006, J. L. O. Birindelli *et al.* MZUSP 91831 (3, 42.4-57.5 mm SL), Mato Grosso, Campinópolis, rio Sucuri, tributary of rio Culuene, 13°55'40"S 53°17'10"W, 21 Aug 2006, J. L. O. Birindelli *et al.* MZUSP 91885 (3, 35.7-47.5 mm SL), Mato Grosso, Campinópolis, tributary of rio Culuene, 13°50'22"S 53°14'59"W, 21 Aug 2006, J. L. O. Birindelli *et al.* MZUSP 91971 (14, 22.6-202.0 mm SL), Mato Grosso, Campinópolis, rio Culuene, in the rapids (future area of PCH Paranatinga II), 13°51'08"S 53°15'22"W, 21 Aug 2006, J. L. O. Birindelli *et al.* MZUSP 94133 (11, 92.0-145.7 mm SL), Mato Grosso, Campinópolis, rio Culuene, 13°30'53"S 53°05'40"W, May 2007, F. C. T. Lima *et al.* MZUSP 94193 (10, 24.0-110.0 mm SL), Mato Grosso, Campinópolis, rio Culuene, at PCH Paranatinga II, 13°49'S 53°15'W, May 2007, F. C. T. Lima *et al.* MZUSP 94258 (1, 42.4 mm SL), Mato Grosso, Campinópolis, tributary of rio Culuene, 13°50'22"S 53°14'59"W, 20 May 2007, F. C. T. Lima *et al.* MZUSP 94305 (3, 48.8-55.0 mm SL), Mato Grosso, Campinópolis, marginal lake of rio Culuene, 13°30'51"S 53°05'49"W, 22 May 2007, F. C. T. Lima *et al.* MZUSP 94851 (73, 23.0-190.0 mm SL), Mato Grosso, Campinópolis, rio Culuene, cofferdam of PCH Paranatinga II, 13°49'00"S 53°15'00"W, 2 Jul 2007, L. M.

Sousa *et al.* MZUSP 98139 (6, 36.0-189.0 mm SL), Mato Grosso, Campinópolis, rio Culuene, Cachoeira do Adelino, 13°47'50"S 53°14'46"W, 2-14 Oct 2007, F. C. T. Lima *et al.* Brazil (upper rio Paraná basin): NUP 5060 (3, 143.2-174.8 mm SL), Goiás, Rochedo, rio Meia Ponte, tributary of rio Paranaíba, 17°27'35"S 49°15'43"W, May 2006, F. L. T. Garro *et al.*

**Diagnosis.** *Hypostomus faveolus* is distinguished from its congeners by the unique combination of pale blotches over a darker background in body and fins (*vs.* dark blotches over paler background in body and fins, in most congeners), and conspicuous keels on head, predorsal region and lateral plates (*vs.* conspicuous keels absent in all remaining pale-spotted species of *Hypostomus*). See Discussion for additional notes on its diagnosis.

**Description.** Standard length of 234 examined specimens 22.6 to 206.0 mm. Measurements of holotype and paratypes in Table 1. Overall view of body in Figures 1 and 2. Dorsal profile convex from snout tip to dorsal-fin origin and almost straight from that point to end of adipose fin, then concave to caudal fin. Ventral profile almost straight from snout tip to caudal fin. Caudal peduncle in cross-section from trapezoidal on its anterior portion to elliptical posteriorly, slightly flattened dorsally and ventrally. Body width at cleithral region greater than head depth. Head broad, narrow anteriorly, covered dorsolaterally with dermal ossifications, except for small naked area on snout tip. Median elongated bulge associated with mesethmoid usually conspicuous from snout tip to transverse line between nares. Eye dorsolateral. Interorbital space slightly concave in transversal section view due to supraorbital arching. Conspicuous ridge originating laterally to the nares, passing through supraorbital, and extending to posterior portion of pterotic-supracleitrum. Pterotic-supracleitrum not distinctly granular. Parieto-supraoccipital with conspicuous median ridge, and relatively well-developed posterior process bordered by single, wide plate. Oral disk longitudinally ellipsoidal. Lower lip not reaching transverse line between gill openings, its ventral surface covered with numerous papillae, decreasing in size posteriorly. Maxillary barbel moderately developed, about same size as orbital diameter (smaller than orbital diameter in specimens less than 100 mm SL). Mouth relatively small. Nineteen to 34 (mode 21, holotype 28) teeth in premaxilla, 21 to 35 (mode 29, holotype 28) teeth in dentary. Teeth long, moderately slender, bicuspid, and curved distally inward; mesial cusp with elongated crown and about twice length of lateral cusp, similar to *Hypostomus* aff. *derbyi* (Muller & Weber, 1992: fig 2f). Dentary rami forming angle of approximately 90°. Buccal papillae weakly to moderately developed.

Body covered with five lateral rows of moderately spinulose dermal plates. Dorsal-fin base naked. Predorsal region with two conspicuous keels, area between keels flat. Dorsal series of lateral plates with keel from first plate to azygous plate before adipose fin. Mid-dorsal series of lateral plates with keel interrupted between third and fourth plate by ventral extension of first plate of dorsal series. Median series



**Fig. 2.** *Hypostomus faveolus*, (a) MZUSP 86790, 77.1 mm SL, rio Araguaia basin, (b) MZUSP 90721, 140.5 mm SL, rio Araguaia basin, (c) MZUSP 91971, 75.0 mm SL, Xingu basin, (d) MZUSP 91971, 158.0 mm SL, rio Xingu basin; (b-d) photographed alive, (a) preserved specimens.

of plates with weak keel and bearing lateral line. Mid-ventral series of plates with keel more developed from first to fifth or sixth plate. Ventral surface of head covered with minute scutelets, except for area dorsal to lower lip. Scutelets present in proximal portion of upper lip. Abdomen completely covered with minute scutelets in specimens larger than 110 mm SL, with exception of small areas around pectoral and pelvic fin origins and at urogenital opening. Preanal plate ranging from completely exposed to completely covered with skin. Twenty-five (34) or 26\*(4) dorsal plates, 25(29) or 26\*(9) mid-dorsal plates, 24(1), 25(8), 26\*(27) or 27(2) median plates, 25(9), 26\*(8) or 27(1) mid-ventral plates, 21(7), 22(21) or 23\*(10) ventral plates. Three predorsal plates, eight plates below dorsal fin, six plates between dorsal fin and adipose fin.

Dorsal fin I,7, its origin situated approximately at midpoint between pectoral and pelvic fins, or slightly posterior to that point; its distal border convex. Last dorsal-fin ray reaching or almost reaching pre-adipose plate when adpressed. Adipose-fin spine compressed and curved inward (spine more or less straight in specimens up to 70 mm SL). Pectoral fin I,6, its posterior border straight. Pectoral-fin spine slightly curved inward, covered with weak-developed odontodes, slightly more developed on its distal portion in larger specimens. Tip of adpressed pectoral fin reaching one-third of pelvic-fin spine length. Pelvic fin I,5, posterior border straight to slightly rounded. Pelvic-fin spine round in cross section, just surpassing anal-fin origin when adpressed. Anal fin I,4, tip reaching the fifth or sixth plate posterior to origin. Caudal-fin margin concave, 16 principal rays, inferior lobe longer than superior one.

**Color in alcohol.** Based only on specimens from the rio Tocantins basin. Dorsal and lateral surface of head and body with large, variously shaped but mainly rounded, paler blotches limited by narrow dark lines forming distinct net (or honeycomb) appearance (Figs. 1, 2a-b). Blotches on head slightly smaller than those on body, and less distinct towards caudal peduncle. All fins usually with similar color pattern (distal margins of fins with faded blotches or completely dark in some specimens). Color pattern of ventral surfaces of head and body ranging from similar to that on dorsal and lateral surfaces to uniformly grey, without blotches. Some specimens (e.g., MZUSP 87092, MZUSP 89390) showing two to five conspicuous oblique dark bars (called “stress coloration”; see picture in Glaser & Glaser, 1995: 63), first bar on posterior portion of head, originating at middle of orbit, second bar at first dorsal-fin branched rays, third bar at last dorsal-fin branched rays, fourth bar at adipose-fin and fifth at procurrent caudal-fin rays; these same specimens with pale band across interorbital area.

**Color in life.** Color pattern of living specimens similar to preserved specimens, but blotches more conspicuous and yellowish (see Figs. 2a-c; Glaser & Glaser, 1995: 22, 63; Stawikowski *et al.*, 2004: 44).

**Geographical variation.** In the majority of the specimens from the rio Xingu basin the dark limits of coloration are larger when compared to specimens of the rio Tocantins basin, and the limits between pale blotches are about same size or slightly larger than the blotches (compare Figs. 2a-b to 2c-d). In

**Table 1.** Morphometric data of *Hypostomus faveolus*. Letters in parenthesis correspond to measurements in Boeseman (1968: fig. 5).

	N	Mean	Range	SD	Holotype
Standard length (mm)	234		22.6 - 206.0		206.0
Percents of standard length					
Predorsal length (D)	38	40.3	37.5 - 44.0	1.63	40.0
Preanal length	38	65.4	62.3 - 67.7	1.20	65.9
Head length (E)	38	34.0	31.0 - 37.5	1.73	32.2
Interdorsal length (M)	38	17.3	15.1 - 19.4	1.31	18.4
Thoracic length (N)	38	22.2	19.1 - 25.3	1.51	21.4
Abdominal length (P)	38	21.3	19.2 - 23.3	1.03	22.8
Caudal peduncle length (R)	38	29.8	25.2 - 32.5	1.58	29.2
Caudal peduncle depth (S)	38	10.2	8.7 - 11.1	0.52	10.2
Dorsal-fin spine length (K)	33	30.0	24.3 - 35.7	2.10	27.6
Dorsal-fin base length (L)	38	28.0	24.3 - 30.8	1.38	27.8
Pectoral-fin spine length (O)	38	30.9	28.6 - 33.6	1.31	32.0
Pelvic-fin spine length (Q)	38	25.7	23.6 - 28.6	1.14	26.0
Upper caudal-fin ray length	33	31.1	26.5 - 40.5	3.65	26.5
Lower caudal-fin ray length	31	35.1	27.0 - 42.9	3.70	30.9
Adipose-fin spine length	38	8.0	6.0 - 10.0	0.69	8.5
Cleithral width (F)	38	32.2	29.7 - 33.8	0.90	31.7
Body depth	38	22.9	20.3 - 25.1	1.30	25.1
Percents of head length					
Head depth (G)	38	62.7	55.0 - 70.2	3.99	69.4
Snout length (H)	38	62.6	58.1 - 69.6	2.50	63.6
Snout-opercle distance	38	77.9	75.0 - 81.0	1.66	77.6
Interorbital width (J)	38	41.8	36.2 - 46.9	2.50	43.7
Orbital diameter (I)	38	15.0	12.0 - 17.7	1.39	13.9
Mandibular ramus length	38	12.7	9.8 - 17.1	1.67	9.8
Premaxillary ramus length	38	13.2	10.3 - 17.7	1.63	10.5
Maxillary barbel length	38	11.8	7.6 - 15.6	1.73	10.5

addition, most small specimens (up to 50 mm SL) from the rio Xingu basin have pale blotches on the head forming vermiculations, whereas small specimens from the rio Tocantins basin show a pattern similar to that in adults. However, one lot of *Hypostomus faveolus* from the rio Suiá Miçu in the upper rio Xingu basin (MZUSP 86851) shows a color pattern more similar to specimens from the rio Araguaia basin.

**Distribution.** *Hypostomus faveolus* is known from several localities in the rio Tocantins basin and the upper rio Xingu basin in central Brazil. There is a single record for the species at the rio Meia Ponte, a tributary of rio Paranaíba, upper rio Paraná drainage in central Brazil. The rio Meia Ponte has its headwaters at the divide with the rio Araguaia basin, which might suggest a faunal interchange between the river basins. However, it is a common practice among recreational fishermen and ranchers from Goiânia area (the capital of Goiás state) to release fishes from the rio Araguaia basin in artificial ponds in the rio Meia Ponte catchment area (A.P. Fialho and F. Tejerina-Garro, pers. comm.). The eventual rupture of those ponds might explain why this and other fish species from the rio Araguaia basin, such as *Hyphessobrycon moniliger* (Characidae) and *Pterygoplichthys joselimaianus* (Loricariidae) were recorded in the last few years in the rio Meia Ponte basin. We have not included this locality in the

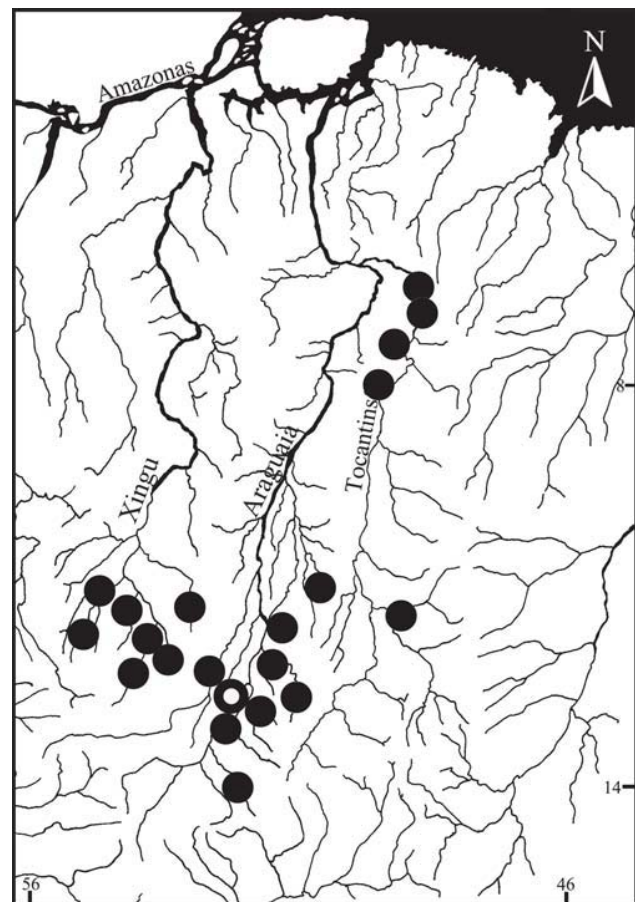
distribution map, since it likely represents an unnatural occurrence for the species (Fig. 3).

**Etymology.** From the latin *faveolus*, after *favus*, honeycomb. In allusion to the color pattern formed by the pale blotches with thin dark limits. An adjective.

**Ecological notes.** *Hypostomus faveolus* is a eurytopic species, and has been collected both in rapids and slow flowing portions of middle to large rivers, both in rocky and soft substrates. A few juvenile specimens were collected in small streams and oxbow lakes in the rio Culuene basin.

### Discussion

There were no previous records for *Hypostomus* species with pale blotches over the body and fins in the Amazon basin. *Hypostomus* species that were recorded so far for the area belong to three main groups of species: the *Hypostomus emarginatus* group sensu Armbruster (2004), the *Hypostomus cochliodon* group sensu Armbruster (2003) and the *Hypostomus plecostomus* group sensu Muller & Weber (1992).



**Fig. 3.** Map of rio Tocantins, rio Xingu, and adjoining river basins, showing the geographic distribution of *Hypostomus faveolus* (type locality represented by open circle).

All species assigned to these groups bear dark blotches over the body and fins. *Hypostomus* species bearing pale blotches in the body and fins were previously recorded only from the río de La Plata (including río Paraná, río Paraguay, and río Uruguay drainages), río São Francisco and río Paraguaçu basins. For the río São Francisco basin two pale-blotched species are reported: *H. alatus* Castelnau and *H. francisci* (Lütken). The greatest diversity of pale-spotted species of *Hypostomus* occurs in the Río de La Plata basin, where the following species are recorded: *H. albopunctatus* (Regan), *H. lexi* (Ihering), *H. luteomaculatus* (Devincenzi), *H. luteus* (Godoy), *H. margaritififer* (Regan), *H. myersi* (Gosline), *H. microstomus* Weber, *H. meleagris* (Marini, Nichols & La Monte), *H. multidentis* Jerep, Shibatta & Zawadzki, *H. niger* (Marini, Nichols & La Monte), *H. roseopunctatus* Reis, Weber & Malabarba, *H. scaphyiceps* (Nichols), *H. strigaticeps* (Regan), *H. tietensis* (Ihering), and *H. variipictus* (Ihering). The sole *Hypostomus* species with pale blotches recorded for the eastern Brazilian river drainages is *H. chrysostiktos* Birindelli, Zanata & Lima, from the río Paraguaçu basin in Bahia. All these pale-spotted *Hypostomus* species can be distinguished from *Hypostomus faveolus* by the absence of keels on the head, predorsal region and lateral plates.

There is currently little information on the phylogenetic relationships within the genus *Hypostomus*, and, as a consequence, it is not possible to confidently assign *Hypostomus faveolus* to any monophyletic group within the genus. Muller & Weber (1992) defined a *Hypostomus plecostomus* species group by the common possession of an intermediate-sized dentary and teeth with short crowns, within which they placed, several species, including, *H. commersoni*, *H. boulengeri*, and *H. plecostomus*. *Hypostomus faveolus* shares with these species not only a similar tooth morphology, but also conspicuous keels on the head, predorsal region and lateral plates, and a fully plated abdominal area in adult specimens. Montoya-Burgos (2003) recognized four monophyletic groups within *Hypostomus*, one of which, his "D2", includes *H. affinis*, *H. ancistroides*, *H. boulengeri*, *H. commersoni*, *H. plecostomus*, *H. punctatus*, and *H. watwata*. This group corresponds to a potentially monophyletic *Hypostomus plecostomus* species group. More detailed phylogenetic studies on the genus, using both morphological and molecular data, are needed to corroborate this hypothesis.

**Comparative material examined.** *Hypostomus alatus*: MZUSP 39663 (3: 101.2-161 mm SL), Brazil, Minas Gerais, Malhada, Cachoeira do rio Abaeté. MZUSP 39166 (13: 49.3-102.3 mm SL), Brazil, Minas Gerais, córrego Rio de Janeiro, tributary of rio São Francisco. *Hypostomus albomaculatus*: BMNH 1907.7.6.15 (syntypes, 2: 134.1-169.0 mm SL), Brazil, São Paulo, rio Piracicaba. MZUSP 87176 (2: 120.5-154.8 mm SL), Brazil, São Paulo, Nova Europa, rio Jacaré-Guaçu, rio Tietê basin. MZUSP 24458 (35: 56-260 mm SL), Brazil, Paraná, Ilha Solteira, rio Paraná. *Hypostomus boulengeri*: NUP 414 (3: 165.8-175.6 mm SL), Brazil, Mato Grosso, rio Manso. MZUSP 59313 (4: 109.2-140.6 mm SL), Brazil, Mato Grosso do Sul, Aquidauana, rio Novo. *Hypostomus commersoni*: MNHN A.9444 (holotype, 425.0 mm SL), Uruguay, rio de la Plata,

MZUSP 41075 (1: 197 mm SL), Brazil, Rio Grande do Sul, Iraí, rio Uruguai. *Hypostomus francisci*: MZUSP 28783 (8: 77.4-136 mm SL), Brazil, Bahia, Barreiras, rio Desidério. *Hypostomus lexi*: MZUSP 2126 (holotype, 353.0 mm SL), Brazil, São Paulo. *Hypostomus margaritififer*: BMNH 1907.7.6.14 (holotype, 120.7 mm SL), Brazil, São Paulo, rio Piracicaba. MZUSP 24759 (1: 166.7 mm SL), Brazil, São Paulo, Miguelópolis, Represa de Volta Grande, rio Grande. *Hypostomus meleagris*: AMNH 12249 (syntype, 1 of 4: 193.7 mm SL), South-eastern Brazil. *Hypostomus microstomus*: MHNG 2367.90 (holotype, 197.5 mm SL), Paraguay, Dpto. Itapua. MZUSP 24443 (2: 66.3-111.6 mm SL), Brazil, Paraná, Ilha Solteira, rio Paraná. *Hypostomus myersi*: NUP 2916 (1: 120.7 mm SL), Brazil, Paraná, rio Iguaçu. *Hypostomus regani*: BMNH 1905.6.7.2 (holotype, 174.2 mm SL), Brazil, São Paulo, rio Piracicaba. *Hypostomus roseopunctatus*: MHNG 2414.010 (paratype, 119.8 mm SL), Brazil, Rio Grande do Sul, rio Comandai. *Hypostomus strigaticeps*: BMNH 1907.6.10-11, (syntypes, 2: 110.9-160.0 mm SL), Brazil, São Paulo, rio Piracicaba. MZUSP 87181 (4: 83-103.3 mm SL), Brazil, São Paulo, Nova Europa, rio Tietê. MZUSP 53800 (2: 131.6-171.5 mm SL), Brazil, São Paulo, Paulínia, rio Jaguari, rio Tietê basin. *Hypostomus tietensis*: BMNH 1905.6.9.1 (holotype, 127.9 mm SL), Brazil, São Paulo, rio Tietê. MZUSP 22460 (2: 193.3-196 mm SL), Brazil, São Paulo, Itú, rio Tietê. *Hypostomus variipictus*: MZUSP 2114 (holotype, 298.0 mm SL), Brazil, São Paulo, rio Pardo.

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#### Literature Cited

- Armbruster, J. W. 2003. The species of the *Hypostomus cochliodon* group (Siluriformes: Loricariidae). *Zootaxa*, 249: 1-60.
- Armbruster, J. W. 2004. Phylogenetic relationships of the suckermouth armored catfishes (Loricariidae) with emphasis on the Hypostominae and the Ancistrinae. *Zoological Journal of the Linnean Society*, 141: 1-80.
- Armbruster, J. W., L. A. Tansey & N. K. Lujan. 2007. *Hypostomus rhantos* (Siluriformes: Loricariidae), a new species from southern Venezuela. *Zootaxa*, 1553: 59-68.

- Birindelli, J. L. O., A. M. Zanata & F. C. T. Lima. 2007. *Hypostomus chrysostiktos*, a new species of armored catfish (Siluriformes: Loricariidae) from rio Paraguaçu, Bahia State, Brazil. *Neotropical Ichthyology*, 5(3): 271-278.
- Boeseman, M. 1968. The genus *Hypostomus* Lacépède, 1803, and its Surinam representatives (Siluriformes, Loricariidae). *Zoologische Verhandelingen*, 99: 1-89.
- Bussing, W. A. 1987. Peces de las aguas continentales de Costa Rica. Editorial de la Universidad de Costa Rica, São José, 271 p.
- Ferraris Jr., C. J. 2007. Checklist of catfishes, recent and fossil (Osteichthyes: Siluriformes), and catalogue of siluriform primary types. *Zootaxa*, 1418: 628.
- Glaser, U. & W. Glaser. 1995. Loricariidae – all L-numbers. Aqualog, Verlag A. C. S. GmbH, 100p.
- Hollanda Carvalho, P. & C. Weber. 2005. Five new species of the *Hypostomus cochliodon* group (Siluriformes: Loricariidae) from the middle and lower Amazon System. *Revue suisse de Zoologie*, 4: 953-978.
- Jerep, F. C., O. A. Shibatta & C. H. Zawadzki. 2007. A new species of *Hypostomus* Lacépède, 1803 (Siluriformes: Loricariidae) from the upper rio Paraná basin, Southern Brazil. *Neotropical Ichthyology*, 5(4): 435-442.
- Mazzoni, R., U. Caramaschi & C. Weber. 1994. Taxonomical revision of the species of *Hypostomus* Lacépède, 1803 (Siluriformes, Loricariidae) from lower rio Paraíba do Sul, State of Rio de Janeiro, Brazil. *Revue suisse de Zoologie*, 101(1): 3-18.
- Melo, C. E., J. D. Lima, T. L. Melo & V. Pinto-Silva. 2005. Peixes do Rio das Mortes – identificação e ecologia das espécies mais comuns. Unemat editora, Cuiabá, MT. 147p.
- Montoya-Burgos, J. I. 2003. Historical biogeography of the catfish genus *Hypostomus* (Siluriformes: Loricariidae), with implications on the diversification of Neotropical ichthyofauna. *Molecular Ecology*, 12: 1855-1867.
- Montoya-Burgos, J. I., C. Weber & P.-Y. Le Bail. 2002. Phylogenetic relationships within *Hypostomus* (Siluriformes: Loricariidae) and related genera based on mitochondrial D-loop sequences. *Revue suisse de Zoologie*, 109(2): 369-382.
- Muller, S. & C. Weber. 1992. Les dents des sous-familles Hypostominae et Ancistrinae (Pisces, Siluriformes, Loricariidae) et leur valeur taxonomique. *Revue suisse de Zoologie*, 99(4): 747-754.
- Oyakawa, O. T., A. Akama & A. M. Zanata. 2005. Review of the genus *Hypostomus* Lacépède, 1803 from rio Ribeira do Iguape basin, with description of a new species (Pisces, Siluriformes, Loricariidae). *Zootaxa*, 921: 1-27.
- Reis, R. E., C. Weber & L. R. Malabarba. 1990. Review of the genus *Hypostomus* Lacépède, 1803 from Southern Brazil, with descriptions of three new species (Pisces, Siluriformes, Loricariidae). *Revue suisse de Zoologie*, 97: 729-766.
- Schaefer, S. A. 1997. The Neotropical cascudinhos: systematics and biogeography of the *Otocinclus* catfishes (Siluriformes: Loricariidae). *Proceedings of the Academy of Natural Sciences of Philadelphia*, 148: 1-120.
- Stawikowski, R. A. 1989. Vier Harnischwelse aus dem Araguaia und dem Tocantins. *Die Aquarien und Terrarien-Zeitschrift (DATZ)*, 42(8): 458.
- Stawikowski, R., A. Werner & I. Seidel. 2004. L-Nummern. Alle L-Nummern: Lebensräume, Pflege & Ernährung. *Die Aquarien und Terrarien-Zeitschrift (DATZ)*, Sonderheft L-Nummern: 130 pp.
- Weber, C. 2003. Subfamily Hypostominae. Pp. 351-372. In: R.E. Reis, S. O. Kullander & C. J. Ferraris Jr. (Eds.). *Check List of the Freshwater Fishes of South and Central America*. Porto Alegre, Edipucrs, 729 p.
- Zawadzki, C. H., E. Renesto, R. E. Reis, M. O. Moura & R. P. Mateus. 2005. Allozyme relationships in hypostomines (Teleostei: Loricariidae) from the Itaipu Reservoir, Upper Rio Paraná basin, Brazil. *Genetica*, 123: 271-283.

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