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New species of *Moenkhausia* Eigenmann (Ostariophysi: Characidae) from the upper rio Tocantins basin in Central Brazil

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Moenkhausia dasalmas is described from the upper rio Tocantins basin, in the Chapada dos Veadeiros region, Goiás State, Central Brazil. The new species differs from all congeners by the presence of iii,9 rays in the dorsal fin. It can also be distinguished from its congeners by the presence of two humeral spots (first one vertically elongate and second one faint), by the number of branched anal-fin rays (17-19), lateral line scales (36-37), maxillary teeth (4-5), and a vertical dark spot in the caudal peduncle end.

Moenkhausia dasalmas é descrita da bacia do alto rio Tocantins, Chapada dos Veadeiros, Goiás, Brasil Central. A espécie nova difere de todas as suas congêneres pela presença de iii,9 raios na nadadeira dorsal. Ela também se distingue das suas congêneres por apresentar duas manchas umerais (a primeira verticalmente alongada e a segunda tênue), 17-19 raios ramificados na nadadeira anal, 36-37 escamas na linha lateral, quatro a cinco dentes no maxilar e uma mancha vertical e escura no final do pedúnculo caudal.

Key words: Brazilian Cerrado, Chapada dos Veadeiros, Characiformes, Tocantins-Araguaia basin.

Introduction

The genus *Moenkhausia* Eigenmann is a speciose group of characid fishes comprising 71 valid species widespreadly distributed in the Neotropical Cis-Andean river basins, except for those in Patagonia (Lima *et al*., 2003; Eschmeyer & Fricke, 2010; Marinho, 2010). None of the diagnostic characters presently used to recognize *Moenkhausia* is unique to the genus, *e.g*. premaxillary teeth in two rows, five or more teeth on the inner premaxillary row, complete lateral line, and caudal fin scaled, but shared with other *incertae sedis* Characidae such as *Astyanax* Baird & Girard, *Hemigrammus* Gill, and *Hyphessobrycon* Durbin.

Eigenmann (1917) is still the most complete reference to the taxonomy of *Moenkhausia*, and Géry (1977) made the last survey on the genus presenting a comparative key and brief diagnosis to the species. Those authors recognized species groups based mainly on similarities of body depth, scale counts and color pattern. No hypothesis of intrageneric relationships of *Moenkhausia* species is available at the moment, and the genus is probably non-monophyletic according to Mirande (2010), whose weighted parsimony phylogenetic analysis of Characidae presented *Moenkhausia* as a paraphyletic genus with *Bario* Myers, inside of a new redefined Tetragonopterinae.

The new species was collected in rivers and streams of the upper rio Tocantins basin, in the Chapada dos Veadeiros region, during a recent expedition, and is herein described.

Material and Methods

Counts were taken as described by Fink & Weitzman (1974), with the exception of the number of scale rows below the lateral line, which were counted from the scale row ventral to lateral line to the scale row nearest the first pelvic-fin ray. Counts of vertebrae, supraneurals, gill rakers on the first arch, branchiostegal rays, procurrent caudal-fin rays, and small dentary teeth were taken from cleared and stained (c&s) specimens prepared according to Taylor & van Dyke (1985). The count of unbranched dorsal-fin rays does not include the tiny ray commonly observed only in cleared and stained specimens. Vertebral counts include the four vertebrae of the

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Weberian apparatus, and the terminal centrum as a single element. Drawings of the upper and lower jaws and the infraorbital series of one c&s specimen were prepared under a stereomicroscope with camera lucida.

Measurements were made with an electronic caliper from the left side of the specimens, and presented as percents of the standard length (SL) or the head length (HL). In the description, the asterisk indicates the value presented by the holotype. In the list of paratypes and material examined, the whole number of specimens in the lot is followed by the number of those counted and measured, and cleared and stained (c&s), in parentheses.

Specimens examined belong to the following institutions: ANSP, Academy of Natural Sciences, Philadelphia; CAS, California Academy of Sciences, San Francisco; INPA, Instituto Nacional de Pesquisas da Amazônia, Manaus; MCP, Museu de Ciências e Tecnologia, Pontifícia Universidade Católica do Rio Grande do Sul, Porto Alegre; MNRJ, Museu Nacional, Rio de Janeiro; MZUSP, Museu de Zoologia da Universidade de São Paulo, São Paulo; UFRGS, Departamento de Zoologia, Universidade Federal do Rio Grande do Sul, Porto Alegre, and USNM, National Museum of Natural History, Smithsonian Institution, Washington D.C.

Moenkhausia dasalmas, new species
Figs. 1-5

Holotype. UFRGS 11221, 1, 42.9 mm SL, Brazil, Goiás, Cavalcante, tributary of the rio das Almas about 8 km North of Cavalcante on GO 241 road, upper rio Tocantins basin, between Cavalcante and Minaçu, 13º43''13''S 47º27'20''W, 8 Sep 2009, V. A. Bertaco, F. C. Jerep & F. R. Carvalho.

Paratypes. Brazil, Goiás, Cavalcante, upper rio Tocantins basin. UFRGS 11194, 24 (10; 3 c&s), 20.5-35.8 mm SL, MCP 45679, 10 (5), 23.0-30.5 mm SL, MZUSP 106076, 8 (2), 22.3-32.9 mm SL, córrego Grotão or Rita Maria about 4 km North of Cavalcante on GO 241 road, between Cavalcante and Minaçu, 13º45'18''S 47º27'20''W, 6 Sep 2009, V. A. Bertaco, F. R. Carvalho & G. L. C. Frainer. UFRGS 11589, 4 (4), 21.5-31.0 mm SL, same locality of UFRGS 11194, 25 May 2008, F. C. Jerep & T. P. Carvalho.

Diagnosis. *Moenkhausia dasalmas* is distinguished from all congeners by the presence of iii,9 rays in the dorsal-fin, Fig. 2 (*vs*. ii,9). Additionally, *M. dasalmas* can be distinguished from most congeners by the presence of two humeral spots, in which the first one is vertically elongate (except from *M. diamantina* Benine, Castro & Santos, *M. diktyota* Lima & Toledo-Piza, *M. eigenmanni* Géry, *M. georgiae* Géry, *M. inrai* Géry, *M. levidorsa* Benine, *M. moisae* Géry, Planquette & Le Bail, *M. naponis* Böhlke, *M. pankilopteryx* Bertaco & Lucinda, and *M. surinamensis* Géry) (*vs*. absent, or horizontally elongate or diffuse humeral spot). *Moenkhausia dasalmas* differs from the remaining species by the number of branched anal-fin rays (17-19 *vs*. 20-35). It can be further distinguished from *M. diktyota*, *M. eigenmanni*, *M. georgiae*, *M. inrai*, *M. levidorsa*, *M. moisae*, and *M. naponis* by the number of the lateral line scales (36-37 *vs*. 41-47 in *M. moisae*, and 31-35 in the remaining species), and from *M. pankilopteryx* by the number of maxillary teeth (4-5 *vs*. 2-3) and the shape of the caudal peduncle spot (vertically elongate *vs*. horizontally elongate in *M. pankilopteryx*).

Description. Morphometric data summarized in Table 1. Body compressed, moderately short, greatest body depth usually located anterior to dorsal-fin origin. Dorsal profile of head convex from tip of upper jaw to vertical through anterior nostril; slightly straight or convex from that point to tip of supraoccipital spine. Dorsal profile of body slightly convex from posterior tip of supraoccipital spine to base of last dorsal-fin ray, and straight to adipose-fin origin. Ventral profile of body convex from tip of lower jaw to pelvic-fin origin, straight or slightly convex from that point to anal-fin origin, and straight and posterodorsally slanted along anal-fin base. Dorsal and ventral profile of caudal peduncle straight to slightly concave.

Mouth terminal, jaw isognathous. Maxilla extending posteroventrally to vertical through anterior half of orbit, aligned approximately at 45 degree angle relative to longitudinal axis of body. Maxilla slightly widened anteroposteriorly.

Two tooth rows in the premaxilla: outer row with three* to four tri- to pentacuspid teeth (mode = 3, n = 22), central cusp longer; inner row with five teeth, gradually decreasing in length from first to fourth, last distinctly smaller, with five to seven cusps; central cusp twice as long and broad as others cusps. Maxilla with four to five* teeth (mode = 4, n = 22), three to five cusps, with central cusp slightly longer. Four anteriormost dentary teeth larger, with five or seven cusps, followed by one medium-sized tooth with five cusps, and five or seven teeth with one to three cusps. Central cusp in all teeth two to three times as long and broad as other cusps. All cusp tips slightly curved posteriorly towards inside mouth (Fig. 3).

Dorsal-fin rays iii,9* (n = 22); first unbranched ray approximately one-fifth to one-seventh of second unbranched ray, which is approximately half-length of third unbranched ray. First branched rays longest. Distal margin of dorsal fin nearly straight to somewhat convex. Adipose fin origin approximately at vertical through last anal-fin ray insertion. Anal-fin rays iv-v,17-19 (iv,18*, mode = iv,18, n = 22). First unbranched ray usually apparent only in c&s specimens. Distal profile of anal fin distal profile smoothly concave in the specimens smaller than 34.0 mm SL, and concave in the specimens larger than 34.9 mm SL. Anal fin origin posterior to vertical through base of last dorsal-fin ray. Pectoral-fin rays i,12-13* (mode = 12, n = 22). Pelvic-fin rays i,7* (n = 22). Pelvic-fin origin slightly anterior to vertical through dorsal-fin origin. Tip of pelvic fin trespassing genital opening but not reaching anal-fin origin. Caudal fin forked, lobes similar in size, 19* principal rays (n = 22). Dorsal and ventral procurrent caudal-fin rays 12-13 and 11-12, respectively (n = 3).

Lateral line complete, with 36-37* perforated scales (mode = 37, n = 19). Scale rows between dorsal-fin origin and lateral line 7-8* (mode = 7, n = 22); scale rows between lateral line

Fig. 1. *Moenkhausia dasalmas*, holotype, UFRGS 11221, 42.9 mm SL, tributary of rio das Almas, Cavalcante, Goiás, Brazil.

and pelvic-fin origin 6-7* (mode = 7, n = 22). Predorsal scales 13-14* (mode = 13, n = 16) arranged in regular series. Scale rows around caudal peduncle 16-18* (mode = 16, n = 16). Axillary scale on pelvic fin origin covering 1-2 scales posteriorly. Scale sheath along anal-fin base 7-10 scales (9*, mode = 8, n = 19), in single series, covering base of anteriormost rays. Caudal fin scaled, scales over base of upper and along first third of lower caudal-fin lobes; scales gradually decreasing in size posteriorly.

Infraorbitals bones 5 (n = 22), fourth and/or fifth absent or fused (Fig. 4). Precaudal vertebrae 17; caudal vertebrae 18; total vertebrae 35 (n = 3). Supraneurals 5 (n = 3). Branchiostegal rays 4 (n = 3). First gill arch with six rakers on epibranchial, one between epibranchial and ceratobranchial, eight in ceratobranchial, and two on hypobranchial (n = 3).

Color in alcohol. Overall ground color of body varying from whitish to dark yellowish (Figs. 1 and 5). Dorsal portion of snout, head and body darker than remaining regions. Small melanophores scattered all over head and body, including abdominal region. Larger melanophores scattered over orbital series and opercular apparatus. Scales of longitudinal rows above lateral line series with reticulated color pattern, due to higher concentration of melanophores on their distal margin. Specimens larger than 35.0 mm SL also with a reticulated pattern on most anterior scales of longitudinal rows bellow lateral line series. Two vertically elongate humeral spots, separated by a less pigmented, but not completely pale area. First humeral spot conspicuous, three to four scales wide, narrowing ventrally, and vertically extending over four longitudinal scale rows above lateral line series, and three longitudinal scale rows bellow it. Second humeral spot diffuse, not as dense pigmented as first one, two to three scales wide, fainting posteriorly and ventrally, and extending vertically over four longitudinal scale rows above lateral line series, and at most one longitudinal scale row bellow it. Longitudinal stripe brownish, thinner than scales depth or absent, generally with a denser amount of scattered melanophores along its length. Longitudinal stripe, when present, extending from second humeral spot and contacting caudal peduncle spot on larger specimens, or falling short vertical through adipose-fin insertion on smaller. Chevron-shaped striae (chevron-shaped bars) posteriorly diverging from longitudinal line, following mioseptum lines, more evident on specimens with longitudinal line not well pigmented (Fig. 5). Caudal peduncle spot faint and vertically expanded, sometimes overlapping base of caudal-fin rays, reaching at most six longitudinal scale lines on larger specimens, but not reaching dorsal and ventral margins of caudal peduncle. All fins hyaline with some melanophores scattered along interradial membranes. Adipose fin hyaline, rarely with dispersed melanophores.

Table 1. Morphometric data for holotype and 15 paratypes of *Moenkhausia dasalmas* from the upper rio Tocantins basin. The range includes the holotype. SD = Standard deviation.

	H	Range	Mean	SD
Standard length (mm)	42.9	26.3-42.9	31.2	-
Percents of Standard length				
Predorsal distance	55.2	54.0-57.8	55.5	1.0
Prepelvic distance	51.4	51.4-55.6	53.4	1.0
Prepectoral distance	29.4	29.0-33.1	30.7	1.1
Preanal distance	68.3	66.7-70.6	68.7	1.0
Depth at dorsal-fin origin	36.1	33.4-36.9	35.1	1.1
Caudal peduncle depth	13.4	11.6-13.4	12.2	0.4
Caudal peduncle length	14.2	13.5-16.1	14.5	0.7
Anal-fin base	22.4	21.1-24.1	22.7	0.9
Dorsal-fin length	24.6	24.6-30.1	27.0	1.5
Pelvic-fin length	15.6	14.4-16.9	15.5	0.7
Pectoral-fin length	21.8	21.5-24.6	22.0	0.8
Head length	30.2	28.9-33.0	30.5	1.1
Percents of Head length				
Snout length	20.8	20.8-25.3	23.6	1.3
Upper jaw length	48.6	45.3-51.6	49.1	1.4
Orbital diameter	29.7	29.7-38.2	35.1	2.0
Interorbital width	28.6	25.3-28.7	27.1	1.1

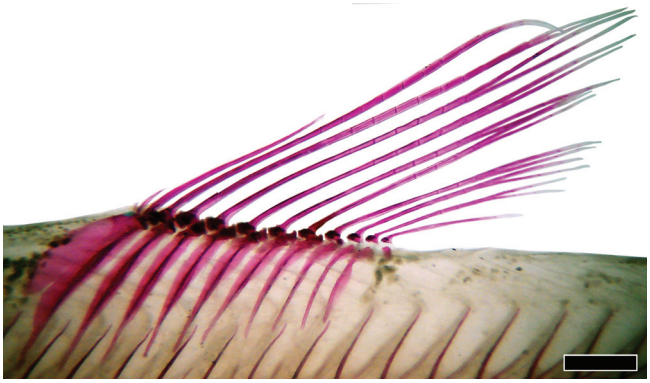

Fig. 2. Left lateral view of the dorsal fin of *Moenkhausia dasalmas*, paratype, UFRGS 11194, 23.3 mm SL, c&s; showing the unbranched and branched rays. Scale bar = 1 mm.

Sexual dimorphism. Secondary sexual characters were not found on examined specimens. Immature gonads were observed in one dissected and c&s specimen (UFRGS 11194, 27.3 mm SL).

Distribution. *Moenkhausia dasalmas* is known from tributaries of the rio das Almas, rio Paranã drainage, upper rio Tocantins basin, in the Chapada dos Veadeiros region, Brazilian Cerrado, Goiás, Brazil.

Etymology. The name *dasalmas* is a reference to the occurrence in the rio das Almas basin, where the new species inhabit. A noun in apposition.

Ecological notes. The collection locality is around 800 m above sea level. *Moenkhausia dasalmas* inhabits streams, and occurs in semi-lentic and lotic shallow areas (up to 1.0 m deep) with riparian vegetation composed by trees and shrubs (Fig. 6). The streams have transparent water, and bottom with rocks, stones, and some stretches with sand. The new species was collected syntopically with *Aspidoras albater* Nijssen & Isbrücker, *Astyanax* sp., *Characidium stigmosum* Melo & Buckup, *Corumbataia veadeiros* Carvalho, *Hemigrammus tocantinsi* Carvalho, Bertaco & Jerep, and *Trichomycterus* sp. Stomach contents of three specimens (UFRGS 11194, 24.4-27.3 mm SL) were mainly composed by Hymenoptera, Coleoptera (adults) and some fish scales, but autochthonous insects and digested vegetal organic matter (seeds) was also found.

Discussion

The new species, *Moenkhausia dasalmas*, is herein assigned to *Moenkhausia* according to the traditional definition of the genus given by Eigenmann (1917, 1918) and followed by Géry (1977), which is still in use (Bertaco & Lucinda, 2006; Lucinda *et al*., 2007; Marinho, 2010; Sousa *et al*., 2010) due to the lack of a cladistic definition of the genus. Among the subdivisions based on body depth and number of scales above and below the lateral line that Géry (1977) assigned to the genus, *Moenkhausia dasalmas* is included in the *M. chrysargyrea* species-group, whose species possess seven or more scales above, and five or more scales below the lateral line, and a relatively deeper body. The new species differs from the representatives of that group of species, which includes *M. chrysargyrea* (Günther), *M. comma* Eigenmann, *M. doceana* (Steindachner), *M. eigenmanni*, *M. jamesi* Eigenmann, *M. justae* Eigenmann, *M. metae* Eigenmann, *M. miangi* Steindachner, *M. naponis*, *M. pittieri*, and *M. surinamensis* Géry, by the number of branched anal-fin rays (17-19 *vs*. more than 20).

Subsequently to Géry (1977), three other species of *Moenkhausia* that could be assigned to the *M. chrysargyrea* species-group were described: *M. margitae* Zarske & Géry, from the rio Ucayali drainage in Peru, *M. moisae* from the rio Maroni and Mana drainages in French Guiana, and *M. pankilopteryx* from rio Tocantins drainage. *Moenkhausia*

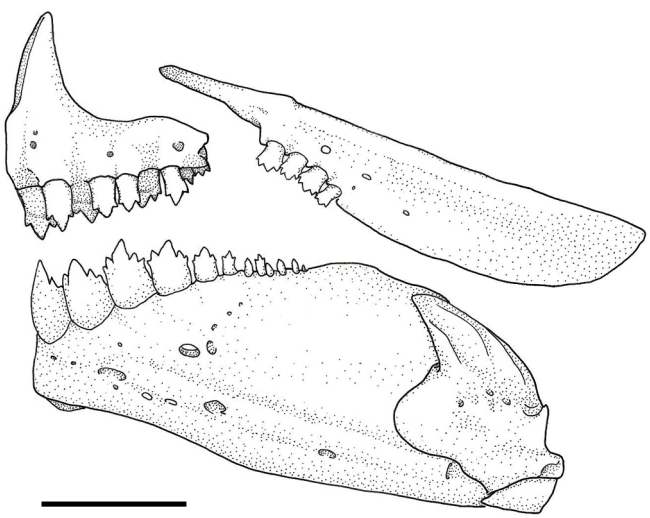

Fig. 3. Drawing of upper and lower jaws; left lateral view. *Moenkhausia dasalmas*, paratype, UFRGS 11194, 27.3 mm SL. Scale bar = 1 mm.

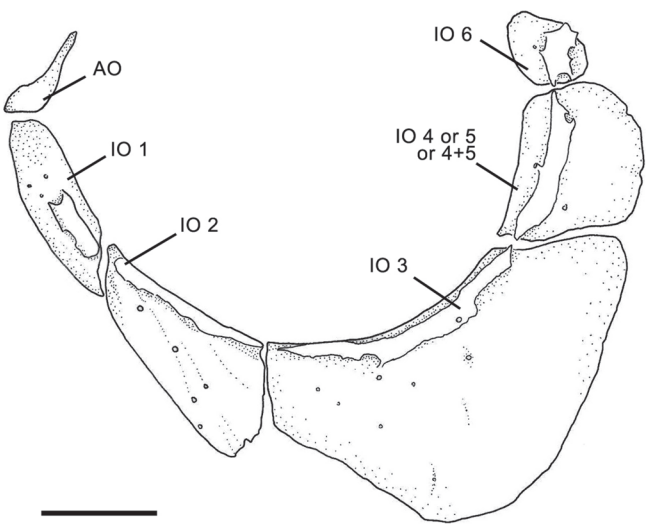

Fig. 4. *Moenkhausia dasalmas*, paratype, UFRGS 11194, 23.3 mm SL. Infraorbital series (IO1-6), and antorbital (AO); left lateral view. Scale bar = 1 mm.

Fig. 5. *Moenkhausia dasalmas*, paratype, UFRGS 11194, 28.6 mm SL, tributary of rio das Almas, Cavalcante, Goiás, Brazil.

dasalmas can be distinguished from all these species by the number of branched anal-fin rays (17-19 *vs*. 25-34). Additionally, it can be distinguished from *M. margitae* by the shape of the first humeral spot (vertically elongate *vs*. horizontally elongate); and from *M. moisae* by number of lateral line scales (36-37 *vs*. 41-47).

Moenkhausia dasalmas possesses a reticulated color pattern over the body, and a vertically elongate humeral spot. These two characters are color based diagnostic features for the *M. oligolepis* species complex (Costa, 1994; Lima & Toledo-Piza, 2001; Benine, 2002; Lima *et al*., 2007; Benine *et al*., 2009; Sousa *et al*., 2010) when associated with the presence of a conspicuous and broad caudal peduncle spot preceded by a pale light area (except *M. diktyota*), and frequently, reddish eyes on live specimens. This group consists of *M. oligolepis* Günther, *M. sanctaefilomenae* Steindachner, *M. cotinho* Eigenmann, *M. pyrophthalma* Costa, *M. diktyota*, and *M. forestii* Benine, Mariguela & Oliveira. *Moenkhausia dasalmas* does not belong to the *M. oligolepis* species complex by the absence of a conspicuous and broad caudal peduncle spot and reddish eyes on live specimens, and also differs from the species of this group by the larger number of perforated scales on the lateral line (36-37 *vs*. at most 34), and longitudinal scale rows above (7-8 *vs*. at most 6) and bellow (6-7 *vs*. less than 4) the lateral line.

The dorsal fin in the characid species is commonly constituted by unbranched and branched rays, generally the common condition is two unbranched rays followed by nine branched rays (ii,9), or by eight branched rays (ii,8), as found in the integrants of the "clade A" (*sensu* Malabarba & Weitzman, 2003). Most characids present two evident anteriormost unbranched rays, but sometimes a tiny and barely developed ray can be present just anterior to these ones, which can be seen externally or under the skin on cleared and stained specimens. *Moenkhausia dasalmas* however, present one tiny unbranched ray under the skin, followed by three larger posteriorly increasing in length unbranched rays in the dorsal fin. A similar pattern, constituted by the presence of three developed unbranched rays in the dorsal fin, is also found in in *Astyanax hermosus* Miquelarena, Protogino & López (iii,8-10), *H. notidanos* Carvalho & Bertaco (iii,8 or ii,9), *Hyphessobrycon fernandezi* Fernández-Yépez (iii,8), *H. oritoensis* García-Alzate, Román-Valencia & Taphorn (iii,8), *H. paucilepsis* García-Alzate *et al*. (iii,8), and *H. ocasoensis* García-Alzate & Román-Valencia (iii,8). The tiny ray that precedes the unbranched rays in *M. dasalmas* presents the same shape and position as the tiny ray of the other characids with two exposed unbranched rays. However, its evolutionary history still needs deeper investigation.

Moenkhausia dasalmas inhabits headwater environments and has reduced number of branched anal-fin rays and lower body depth, two of the main characters of the *Astyanax scabripinnis* species complex (Bertaco & Lucena, 2006). It

Fig. 6. Type locality of *Moenkhausia dasalmas*, tributary of rio das Almas, Cavalcante, Goiás, Brazil.

can be distinguished from the species of the genus *Astyanax* and from this species complex by the number of dorsal-fin rays (iii,9 *vs*. ii,9), presence of scales on base of upper and along first third of lower caudal-fin lobes, and middle caudal-fin rays unpigmented.

Five *Moenkhausia* species have previously been described from the rio Tocantins-Araguaia basin: *M. loweae* Géry and *M. pyrophthalma* Costa from the rio Araguaia drainage; *M. hysterosticta*, *M. pankilopteryx*, and *M. tergimacula* Lucena & Lucena from the rio Tocantins drainage. *Moenkhausia dasalmas* differs from the aforementioned species by the number of branched anal-fin rays (17-19 *vs*. 24-30, except *M. pyrophthalma*), by the number of humeral spot (2 *vs*. 1, except *M. pankilopteryx*), and from *M. pyrophthalma* by the number of lateral line scales (36-37 *vs*. 27-28).

The region of the type locality of *Moenkhausia dasalmas*, Chapada dos Veadeiros, in the Brazilian Cerrado, holds undoubtedly enormous biologic diversity (Bertaco *et al*., 2010). For freshwaters fishes, besides the 35 species mentioned in Bertaco & Carvalho (2010), adds up now *Astyanax courensis* Bertaco, Carvalho & Jerep, *Hasemania kalunga* Bertaco & Carvalho, *Hemigrammus tocantinsi*, *Moenkhausia dasalmas* described here (Characidae), *Hypoptopoma muzuspi* Aquino & Schaefer (Loricariidae), *Sternarchorhynchus mesensis* Campos-da-Paz (Apteronotidae), and *Rivulus tocantinensis* Costa (Rivulidae). This corroborates this area as holder of high biodiversity to neotropical freshwater fishes.

Comparative material. In addition to the comparative material listed in Bertaco & Lucinda (2006), the following specimens were analyzed: Brazil: *Moenkhausia cosmops*, MZUSP 93494, holotype, 42.4 mm SL, Mato Grosso, córrego Vinte e Cinco de Maio, near its mouth at the rio Papagaio. *Moenkhausia diamantina*, MNRJ 21995, 2 of 17 paratypes, 57.2-58.3 mm SL, Bahia, Lençóis, foz do rio Toalhas, rio Paraguaçu basin. *Moenkhausia diktyota*, MZUSP 62614, holotype, 52.3 mm SL; INPA 16200, paratype, 49.6 mm SL, Amazonas, Santa Isabel do Rio Negro, rio Negro, igarapé at São João, near Santa Isabel do Rio Negro. *Moenkhausia heikoi*, MZUSP 83536, holotype, 46.5 mm SL, Pará, rio Iriri, a left-hand tributary of the rio Xingu well above Altamira, about 10 km below mouth of River Novo. *Moenkhausia hemigrammoides*, MZUSP 30531, 2 of 1586, 30.3-31.6 mm SL, Roraima, Rio Branco, cachoeira do Bem Querer. *Moenkhausia latissimus*, USNM 120277, 3 syntypes, 50.7-66.7 mm SL, Amazonas, Tabatinga. *Moenkhausia pyrophtalma*, MZUSP 45290, 1 of 7 paratypes, 30.4 mm SL, stream crossing road between Água Boa and Cocalinho, rio Araguaia-Tocantins basin. Colombia: *Moenkhausia eigenmanni*, USNM 198640, holotype, 49.3 mm SL, río Manacacias into upper río Meta, at Restrepo, *ca*. 200 miles E of Bogotá. Ecuador: *Moenkhausia naponis*, USNM 164067, holotype, 53.0 mm SL, Napo-Pastaza, río Arajuno, upper Napo, few kilometers NE of El Puyoand; ANSP 75901, 3 paratypes, 53.9-58.4 mm SL, Napo-Pastaza, río Oglan, from headwaters, río Napo system. French Guiana: *Moenkhausia georgiae*, ANSP 139714, 2 paratypes, 37.1-48.9 mm SL, between 'Saut-Chien' and 'Saut-Topi-Topi', middle Mana River. Venezuela: *Moenkhausia pittieri*, CAS 62059, holotype, 44.1 mm SL, and CAS 62060, 10 of 27 paratypes, 32.6-41.5 mm SL, Concejo, rio Tiquirito.

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Literature Cited

Benine, R. C. 2002. *Moenkhausia levidorsa*, a new species from rio Aripuanã, Amazon basin, Brazil (Characiformes: Characidae). Ichthyological Exploration of Freshwaters, 13(4): 289-294.

Benine, R. C., T. C. Mariguela & C. Oliveira. 2009. New species of *Moenkhausia* Eigenmann, 1903 (Characiformes: Characidae) with comments on the *Moenkhausia oligolepis* species complex. Neotropical Ichthyology, 7(2): 161-168.

Bertaco, V. A. & C. A. S. Lucena. 2006. Two new species of *Astyanax* (Ostariophysi: Characiformes: Characidae) from eastern Brazil with a synopsis of the *Astyanax scabripinnis* species complex. Neotropical Ichthyology, 4(1): 53-60.

Bertaco, V. A. & P. H. F. Lucinda. 2006. *Moenkhausia pankilopteryx*, new species from rio Tocantins drainage, Brazil (Ostariophysi: Characiformes, Characidae). Zootaxa, 1120: 57-68.

Bertaco, V. A. & F. R. Carvalho. 2010. New species of *Hasemania* (Ostariophysi: Characiformes: Characidae) from Central Brazil, with comments on the endemism of upper rio Tocantins basin, Goiás State. Neotropical Ichthyology, 8(1): 27-32.

Bertaco, V. A., F. R. Carvalho & F. C. Jerep. 2010. *Astyanax goyanensis* (Miranda-Ribeiro, 1944), new combination and *Astyanax courensis*, new species (Ostariophysi: Characiformes): two Characidae from the upper rio Tocantins basin, Central Brazil. Neotropical Ichthyology, 8(2): 265-275.

Burns, J. R. & S. H. Weitzman. 1996. Novel gill-derived gland in the male swordtail characin, *Corynopoma riisei* (Teleostei: Characidae: Glandulocaudinae). Copeia, 1996(3): 627-633.

Carvalho, T. P. & V. A. Bertaco. 2006. Two new species of *Hyphessobrycon* (Teleostei: Characidae) from upper rio Tapajós basin on Chapada dos Parecis, Central Brazil. Neotropical Ichthyology, 4(3): 301-308.

Carvalho, F. R., V. A. Bertaco & F. C. Jerep. 2010. *Hemigrammus tocantinsi*: a new species from the upper rio Tocantins basin, Central Brazil (Characiformes: Characidae). Neotropical Ichthyology, 8(2): 247-254.

Costa, W. J. E. M. 1994. Description of two new species of the genus *Moenkhausia* (Characiformes, Characidae) from central Brazil. Zoologischer Anzeiger, 232 (1/2): 21-29.

Eigenmann, C. H. 1917. The American Characidae [Part 1]. Memoirs of the Museum of Comparative Zoology 43(1): 1-102.

Eigenmann, C. H. 1918. The American Characidae [Part 2]. Memoirs of the Museum of Comparative Zoology 43(1): 103-208.

Eschmeyer, W. N. & R. Fricke. 2010. Catalog of Fishes. Electronic version - July 12, 2010. California Academy of Sciences. Avalaible at: http://research.calacademy.org/ichthyology/catalog/fishcatmain.asp. Accessed July 15, 2010.

Fink, W. L. & S. H. Weitzman. 1974. The so-called cheirodontin fishes of Central America with descriptions of two new species (Pisces: Characidae). Smithsonian Contributions to Zoology, 172: 1-46.

García-Alzate, C. A. & C. Román-Valencia. 2008. *Hyphessobrycon ocasoensis* sp. n. (Teleostei, Characidae) una nueva especie para el Alto Cauca, Colombia. Animal Biodiversity and Conservation, 31(2): 11-23.

García-Alzate, C. A., C. Román-Valencia & D. C. Taphorn. 2008. Revision of the *Hyphessobrycon heterorhabdus*-group (Teleostei: Characiformes: Characidae), with description of two new species from Venezuela. Vertebrate Zoology, 58(2): 139-157.

Géry, J. 1977. Characoids of the World. T. F. H. Publications, Neptune City, NJ, 672p.

Lima, F. C. T., L. R. Malabarba, P. A. Buckup, J. F. Pezzi da Silva, R. P. Vari, A. Harold, R. Benine, O. T. Oyakawa, C. S. Pavanelli, N. A. Menezes, C. A. S. Lucena, M. C. S. L. Malabarba, Z. M. S. Lucena, R. E. Reis, F. Langeani, L. Casatti, V. A. Bertaco, C. Moreira & P. H. F. Lucinda. 2003. Genera *incertae sedis* in Characidae. Pp. 106-169. In: Reis, R. E., S. O. Kullander & C. J. Ferraris (Eds.). Check List of the Freshwater Fishes of South and Central America. Porto Alegre, Edipucrs, 729p.

Lima, F. C. T. & M. Toledo-Piza. 2001. New species of *Moenkhausia* (Characiformes: Characidae) from the rio Negro of Brazil. Copeia, 2001(4): 1058-1063.

Lima, F. C. T., H. A. Britski & F. A. Machado. 2007. A new *Moenkhausia* (Characiformes: Characidae) from central Brazil, with comments on the area relationship between the upper rio Tapajós and upper rio Paraguai systems. Aqua, International Journal of Ichthyology, 13(2): 45-54.

Lucinda, P. H. F., L. R. Malabarba & R. C. Benine. 2007. On a new species of the genus *Moenkhausia* Eigenmann (Ostariophysi: Characidae). Zootaxa, 1525: 61-68.

Malabarba, L. R. & S. H. Weitzman. 2003. Description of new genus with six new species from southern Brazil, Uruguay and Argentina, with a discussion of a putative characid clade (Teleostei: Characiformes: Characidae). Comunicações do Museu de Ciências e Tecnologia da PUCRS, Série Zoologia, 16(1): 67-151.

Marinho, M. F. 2010. A new species of *Moenkhausia* Eigenmann (Characiformes: Characidae) from the rio Xingu basin, Brazil. Neotropical Ichthyology, 8(3): 655-659.

Miquelarena, A. M., L. C. Protogino & H. L. López. 2005. *Astyanax hermosus*, a new species from the Primero River basin, Córdoba, Argentina (Characiformes, Characidae). Revue suisse de Zoologie, 112(1): 13-20.

Mirande, J. M. 2010. Phylogeny of the family Characidae (Teleostei: Characiformes): from characters to taxonomy. Neotropical Ichthyology, 8(3): 385-568.

Sousa, L. M., A. L. Netto-Ferreira & J. L. Birindelli. 2010. Two new species of *Moenkhausia* Eigenmann (Characiformes: Characidae) from Serra do Cachimbo, Pará, Northern Brazil. Neotropical Ichthyology, 8(2): 255-264.

Taylor, W. R. & G. C. van Dyke. 1985. Revised procedures for staining and clearing small fishes and other vertebrates for bone and cartilage study. Cybium, 9(2): 107-119.

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