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Hasemania piatan, a new characid species (Characiformes: Characidae) from headwaters of rio de Contas, Bahia, Brazil

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Hasemania piatan is described from the upper rio de Contas drainage, Bahia, northeastern Brazil. It can be easily distinguished from its congeners by having 18 principal caudal-fin rays. The new species differs further from congeners by a combination of seven branched dorsal-fin rays, six branched pelvic-fin rays, anal-fin base not covered by scales, presence of only five infraorbitals, and presence of a humeral blotch. It also can be distinguished by having 10-13 branched anal-fin rays, 27-32 scales on longitudinal series, 10-12 circumpeduncular scales, and one to three maxillary teeth.

Hasemania piatan é descrita para a bacia do alto rio de Contas, Bahia, nordeste do Brasil. Esta pode ser facilmente diferenciada das congêneres pela presença de 18 raios principais na nadadeira caudal. A espécie nova difere ainda das congêneres pela combinação de sete raios ramificados na nadadeira dorsal, seis raios ramificados na nadadeira pélvica, base da nadadeira anal sem escamas, presença de apenas cinco infraorbitais e presença de uma mancha umeral. Pode ainda ser diferenciada por ter 10-13 raios ramificados na nadadeira anal, 27-32 escamas na linha longitudinal, 10-12 escamas ao redor do pedúnculo caudal e um a três dentes maxilares.

Key words: Coastal drainage, Chapada Diamantina, Freshwater fish.

Introduction

Hasemania is a small characid genus restricted to rivers draining the Brazilian Shield. The genus was proposed by Ellis (1911) who defined it as "like a *Hyphessobrycon*, but without an adipose". *Hasemania* was thus originally characterized by the absence of an adipose fin, presence of two rows of premaxillary teeth, absence of maxillary teeth or with a few in its upper angle, lateral line incomplete, caudal fin naked, and pectoral fin frequently archaic in small specimens. The genus presently includes seven species: *Hasemania nana* (Lütken) from the rio São Francisco basin, *H. melanura* Ellis (type species) and *H. maxillaris* Ellis, both from the rio Iguaçu basin, *H. hanseni* (Fowler) from Goiás (precise locality unknown), *H. crenuchoides* Zarske & Géry from upper rio Paraná basin, *H. nambiquara* Bertaco & Malabarba from upper rio Tapajós basin, and *H. kalunga* Bertaco & Carvalho from upper Tocantins basin. Ongoing taxonomic and phylogenetic studies of *Hasemania* by one of us (JPS) will possibly result in a redefinition of the genus and rearrangement of the number of its species.

A recent expedition to headwaters of rio de Contas, an area poorly known ichthyologically and representing the highest point on northeastern Brazil (around 1.300 m a.s.l.), revealed a small characid, distinguishable by a series of morphological and meristic characters. We herein describe this new distinctive characid in *Hasemania* according to Ellis' definition.

Material and Methods

Counts and measurements were taken according to Fink & Weitzman (1974) and Menezes & Weitzman (1990), except for horizontal scale rows below lateral line which are counted to the pelvic-fin insertion. Upper scales count of transverse series represents the number of rows of scales between median dorsal row and the lateral line, not including the median dorsal row or the small scale just below dorsal-fin rays insertion. The half scale between the lateral line and pelvic fin was only counted when more than half scale is above pelvic fin origin. In the description, the frequency of each count is given in parentheses after the respective count. An asterisk indicates

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counts of the holotype. Vertebrae, supraneurals, procurrent caudal-fin rays, branchiostegal rays, gill-rakers, and dentary teeth counts and cusp numbers were taken only from cleared and stained paratypes (c&s), prepared according to Taylor & van Dyke (1985). Vertebrae of the Weberian apparatus were counted as four elements, included in the vertebral counts, and the fused PU1+U1 of the caudal region as a single element. Pattern of *circuli* and *radii* was defined on scales sampled from the region between the lateral line and the insertion of dorsal-fin. In the material listed, the total number of specimens and its size range comes first, followed by the number and size range of measured specimens (in parentheses), if different. Institutional abbreviations follow Ferraris (2007), with the inclusion of Departamento de Zoologia, Universidade Estadual Paulista, São José do Rio Preto, SP, Brazil (DZSJRP) and Universidade Federal da Bahia, Salvador, BA, Brazil (UFBA).

Hasemania piatan, new species
Figs. 1-3

Holotype. MZUSP 104538, 54.0 mm SL, Brazil, Bahia, município de Piatã, riacho Três Morros around bridge on road between Piatã and Núbia, tributary of rio de Contas, 13°04'43"S 41°51'44"W, 1.340 m a.s.l., 13 Sep 2007, A. M. Zanata, P. Camelier & A. G. A. Borges.

Paratypes. UFBA 4299, 57, 21.6-44.7 mm SL (20, 21.6-44.7 mm SL), collected with holotype. UFBA 4298, 126, 3 c&s, 22.4-41.4 mm SL, (20, 22.4-41.4 mm SL); DZSJRP 11933, 20, 3 c&s, 23.1-33.5 mm SL; MZUSP 104539, 20, 21.2-44.4 mm SL, Brazil, Bahia, município de Piatã, córrego das Piabas, south of Fazenda Piabas, tributary of rio de Contas, 13°08'49"S 41°50'33"W, 1.336 m a.s.l., 13 Sep 2007, A. M. Zanata, P. Camelier & A. G. A. Borges.

Diagnosis. *Hasemania piatan* can be distinguished from its congeners by having eighteen principal caudal-fin rays (*vs*. nineteen). It differs further from the majority of its congeners by the absence of scales covering the anal-fin base (*vs*. presence, except in *H. kalunga* and *H. maxillaris*), presence of only five infraorbitals (*vs*. six infraorbitals, except in *H. crenuchoides*), and presence of a humeral spot (*vs*. absence, except in *H. kalunga* and *H. nambiquara*). The new species can be further distinguished from *H. hanseni*, *H. maxillaris* and *H. nambiquara* by having 10-13 branched anal-fin rays (*vs*. 16-19), and from *H. crenuchoides*, *H. kalunga*, *H. maxillaris*, *H. melanura*, and *H. nambiquara* by having 10-12 circumpeduncular scales (*vs*.14 or 16). *Hasemania piatan* differs further from *H. hanseni* by having six branched pelvic-fin rays (*vs*. seven), from *H. maxillaris* by having six branched pelvic-fin rays (*vs*. five) and the majority of teeth with three or more cusps (*vs*. conical teeth), and from *H. nambiquara* by the absence of a broad black lateral band (*vs*. presence). The new species differs also from *H. nana* by having 27-32 scales in the longitudinal series (*vs*. 20-26) and 10-13 branched anal-fin rays (*vs*. 13-16), and from *H. melanura* by having 27-32 scales in the longitudinal series (*vs*. 23-26) and one to three maxillary teeth (*vs*. none). From *H. crenuchoides* the new species differs further by the absence of black blotch extending to median caudal-fin rays (*vs*. presence) and ossification in the position primitively occupied by infraorbitals three and four relatively small, not reaching the preopercle sensory canal posteriorly (*vs*. ossification large, reaching the preopercle sensory canal). *Hasemania piatan* differs also from *H. kalunga* by having 27-32 scales on longitudinal series (*vs*. 33-36) and absence of caudal blotch (*vs*. presence).

Description. Morphometric data of holotype and paratypes in Table 1. Body relatively elongated and transversely rounded, somewhat flattened posterior to terminus of dorsal fin base. Greatest body depth at dorsal-fin origin. Dorsal profile of head distinctly convex from margin of upper lip to

Fig. 1. *Hasemania piatan*, holotype, MZUSP 104538, 54.0 mm SL; Brazil, Bahia, Piatã, riacho Três Morros, tributary of rio de Contas drainage.

Fig. 2. *Hasemania piatan*, freshly preserved paratype showing living color pattern, UFBA 4299, 37.5 mm SL; Brazil, Bahia, Piatã, riacho Três Morros, tributary of rio de Contas drainage.

region around vertical through anterior nostril, nearly straight or slightly convex from that point to posterior tip of supraoccipital spine. Dorsal profile of body slightly convex from tip of supraoccipital spine to dorsal-fin origin, posteroventrally-inclined along dorsal-fin base, nearly straight from posterior terminus of dorsal-fin base to origin of dorsalmost procurrent caudal-fin ray. Ventral profile of head and body distinctly convex from anterior tip of dentary to isthmus, gently convex from this point to anal-fin origin, nearly straight and posterodorsally inclined along anal-fin base. Ventral profile of caudal peduncle nearly straight. Head obtusely rounded anteriorly in lateral profile.

Jaws equal, mouth terminal. Posterior terminus of maxilla slightly trespassing vertical through anterior border of orbit on smaller specimens or reaching vertical near or to center of eye on larger ones. Premaxillary teeth in two rows. Outer row with 2(5), 3*(32), or 4(2) uni- or tricuspid teeth. Inner row with 4(8) or 5*(31) teeth bearing three to five cusps. Symphyseal tooth of inner series asymmetrical, with lower number of cusps on anteromedial side; symphyseal tooth with four cusps and posteriormost tooth with three cusps. Maxilla with 1(17), 2*(21), or 3(1) teeth bearing one to three cusps. Dentary with four or five larger teeth anteriorly, with three to five cusps, followed by four or five distinctly smaller conical ones (5); anteriormost teeth usually with three cusps, except in largest specimen with five cusps (Fig. 3).

Scales cycloid, *circuli* absent on exposed area of scales, with various divergent *radii* extending to posterior margin of scales. Lateral line incomplete, pored scales 5(1), 6(3), 7*(13), 8(13), 9(2), 10(4), 11(2) or 14(1). Longitudinal scale series including perforated scales 27(2), 28*(4), 29(11), 30(7), 31(4) or 32(2). Scale rows between dorsal-fin origin and pelvic-fin insertion 9*(25), 10(10) or 11(2). Scales along middorsal line between tip of supraoccipital process and origin of dorsal fin 10(7), 11*(7) or 12(9) when not desorganized. Horizontal scale rows around caudal peduncle 10*(14), 11(20) or 12(3). Caudal fin not scaled.

Dorsal-fin rays ii,7*(36) or 8(4). Distal margin of dorsal fin usually rounded. Dorsal-fin origin slightly posterior to middle of standard length. Base of last dorsal-fin ray slightly anterior to vertical through anal-fin origin. First dorsal-fin pterygiophore inserting behind neural spine of 11th(2) or 12th(2) vertebra. Adipose fin absent. Anal-fin rays iii-iv,10(4), 11*(25), 12(9), or 13(1). Distal margin of anal fin straight. First anal-fin pterygiophore inserting behind haemal spine of 18th(1) or 19th(1) vertebra. Basal portion of anal-fin rays not covered by sheath of scales. Pectoral-fin rays i,9(3), 10(18), 11*(13) or 12(6). Tip of

Table 1. Morphometric data of holotype and paratypes of *Hasemania piatan* (n = 40). The range includes the holotype. SD = standard deviation.

	Holotype	Range	Mean	SD
Standard length (mm)	54.0	21.6-54.0	-	-
Percents of standard length				
Depth at dorsal-fin origin	29.3	28.5-34.4	31.2	1.4
Snout to dorsal-fin origin	57.4	53.7-59.9	57.3	1.2
Snout to pectoral-fin origin	26.7	25.3-29.6	27.9	0.9
Snout to pelvic-fin origin	51.7	48.9-55.5	52.2	1.3
Snout to anal-fin origin	68.3	64.4-71.5	68.0	1.4
Caudal peduncle depth	12.8	12.5-17.0	13.9	0.8
Caudal peduncle length	17.8	13.0-18.3	16.2	1.3
Pectoral-fin length	18.7	15.3-23.0	20.3	1.6
Pelvic-fin length	14.1	13.4-18.8	15.4	1.1
Dorsal-fin base length	10.7	9.3-13.2	10.8	1.0
Dorsal-fin heigth	20.2	20.2-26.6	23.1	1.4
Anal-fin base length	16.7	15.7-23.9	18.1	1.7
Anal-fin lobe length	17.8	15.4-21.4	18.4	1.2
Eye to dorsal-fin origin	45.4	41.9-47.1	44.7	1.1
Dorsal-fin origin to caudal-fin base	47.2	43.7-49.1	46.5	1.2
Head length	27.2	26.2-30.6	28.0	1.0
Percents of head length				
Horizontal eye diameter	24.5	24.5-36.9	31.1	3.0
Snout length	21.8	18.2-25.0	21.2	1.5
Least interorbital width	29.3	25.5-34.4	28.5	2.0
Upper jaw length	39.5	32.3-41.8	37.2	2.4

pectoral fin not reaching vertical through pelvic-fin insertion. Pelvic-fin rays i,6(40). Caudal fin forked, lobes rounded, similar in size. Principal caudal-fin rays 9+9 (40). Eight(1) or 9(3) dorsal procurrent caudal-fin rays, and 7(1) or 8(3) ventral procurrent caudal-fin rays. First gill arch with 5(2) or 6(2) epibranchial, 8(4) ceratobranchial, 1(4) on cartilage between ceratobranchial and epibranchial, and 1(4) hypobranchial gill-rakers. Vertebrae 34(1) or 35(3). Supraneurals 5(1) or 6(2). Branchiostegal rays 4(4).

Color in alcohol. Preserved specimens lack guanine on body and head (Fig. 1). Overall ground color tan. Small dark chromatophores distributed over entire scales, slightly more concentrated on middorsal surface of head and body. Area of third to fifth infraorbitals and opercle with somewhat larger, scattered dark chromatophores. Ventral portion of body from head to origin of anal fin yellowish, usually with scattered, small dark chromatophores. Humeral region with vertically-elongated, relatively narrow blotch, well defined in some specimens but somewhat less conspicuous in others. Dorsal portion of humeral blotch broader, covering two scales. Blotch anteroventrally inclined, with its anteriormost ventral portion overlapped by opercle membrane. Midlateral dark line extending from vertical through base of first dorsal-fin ray to or nearly to end of caudal peduncle. All fins with small dark chromatophores over rays and interadial membranes, more concentrated over rays and along its borders. Pectoral and pelvic fins somewhat less pigmented.

Color in life. Freshly collected specimens had overall coloration tan, with yellowish ventral portion of body (Fig. 2). Silvery hue present over some scales, major portion of iris, posterior infraorbitals, preopercle, and opercle. Dorsal portion of iris darkened. Humeral blotch usually not as conspicuous as in preserved specimens. Dark lateral longitudinal line most evident posterior to vertical through base of first dorsal-fin ray and extending to end of caudal peduncle. Dorsal, anal, and caudal fins with proximate areas of rays and interradial membranes yellowish or reddish-orange. Distal portion of those fins clearer. Pectoral and pelvic fin hyaline to yellowish.

Sexual dimorphism. Bony hooks were observed over first to sixth branched anal-fin rays in various male specimens of 26.0 to 37.2 mm SL. One to six hooks occurs per ray, being two or three hooks the usual condition. Two specimens have one or two hooks also over the longest unbranched ray. The observed hooks are relatively small, similar in size, and distributed on distal portion of rays.

Geographic distribution. *Hasemania piatan* is known from the streams riacho Três Morros and córrego das Piabas, small tributaries of upper rio de Contas drainage, Piatã, Bahia, northeastern Brazil (Fig. 4).

Ecological notes. The riacho Três Morros is a clear headwater stream, with low to medium water current, sandy bottom, greatest depth of 1.30 m, width of 0.8 to 4.5 m and with a relatively large amount of riparian and submerged vegetation. The córrego das Piabas, a smaller stream nearby, had small amount of water (less than 50 cm deep) probably in consequence of the dry season, and several specimens where trapped in a small sandy pool. On the smallest stream only *H. piatan* was sampled and on riacho Três Morros only *Hoplias* sp. occurs syntopically. The analysis of the stomach contents of four specimens revealed presence of larvae and adult fragments of Trichoptera, adult Diptera, fragments of unidentified arthropods, large amount of filamentous algae, and organic debris.

Etymology. Named after Piatã, the county where the species is found. A noun in apposition.

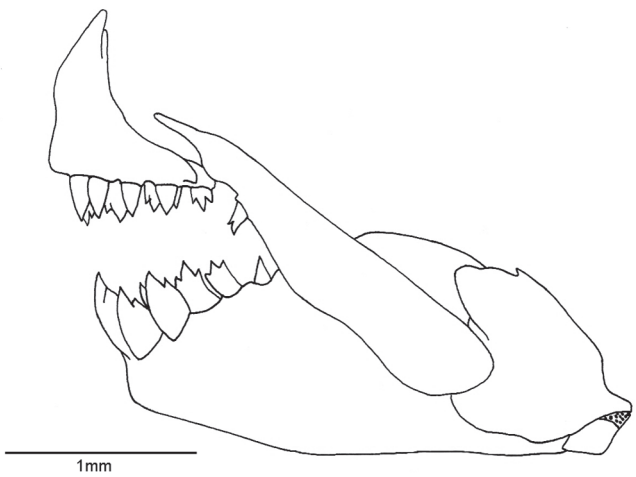

Fig. 3. *Hasemania piatan*, paratype, DZSJRP 11933, 26.9 mm SL, premaxillary, maxillary and dentary; left side, lateral view.

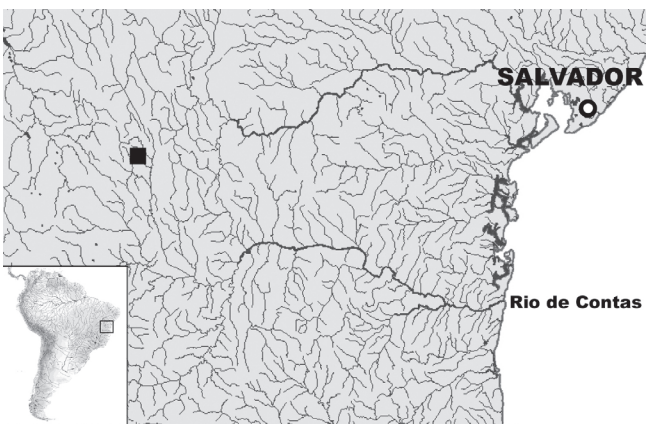

Fig. 4. Rio de Contas basin, Bahia, northeastern Brazil, showing collection locality of *Hasemania piatan* (square = two close localities).

Discussion

The monophyly of *Hasemania*, traditionally based mainly on the lack of an adipose fin, has been questioned by several authors (Böhlke, 1958; Géry, 1972, 1977; Weitzman & Malabarba, 1999; Lima & Gerhard, 2001). However, preliminary results of a phylogenetic study of the genus ongoing by one of us (JPS) apparently suggest the group as monophyletic, based on a series of morphological characters. The phylogenetic position of *Hasemania piatan* within the genus is also under evaluation and the results so far indicate a putative close relationship with *H. crenuchoides*. These two species share some apparently derived characters, as presence of five infraorbital bones and absence of a rhinosphenoid. This last structure, present in congeners and other small characids, is not ossified in *H. crenuchoides* and *H. piatan*, with a cartilage lying in that position. *Hasemania piatan* and *H. crenuchoides* possess a single ossification in the position primitively occupied by infraorbitals three and four, possibly due to fusion of these two ossifications or loss of one of these bones.

Hasemania piatan do not share the synapomorphies used to define other characid groups that lacks an adipose fin (*e.g.* a few Cheirodontinae, Malabarba, 1998; a few Xenurobryconini, Weitzman & Fink, 1985; *Nematobrycon* Eigenmann, 1911; *Grundulus* Valenciennes, 1846, and *Coptobrycon* Géry, 1966). *Hyphessobrycon negodagua* Lima & Gerhard and *Hyphessobrycon taurocephalus* Ellis also lack an adipose fin. However, *H. piatan* can be easily distinguished from *H. negodagua* by having 18 principal caudal-fin rays (*vs*. 19), seven branched dorsal-fin rays (*vs*. typically nine), 10-13 branched anal-fin rays (*vs*. 14-17), mature males with overall coloration tan (*vs*. mature males predominantly dark), and humeral spot present (*vs*. humeral spot lacking). The new species also differs from *Hyphessobrycon taurocephalus* by having 18 principal caudal-fin rays (*vs*. 19) and presence of humeral spot (*vs*. humeral spot absent). The relationships of the two cited *Hyphessobrycon* species and *Hasemania* was shortly addressed previously (Lima & Gerhard, 2001; Bertaco & Malabarba, 2007) and is under evaluation by one of us (JPS).

Contrary to the common condition of members of the family Characidae that possess 19 principal caudal-fin rays, all examined specimens of *Hasemania piatan* have only 18 rays, a pattern unique to the species among congeners. Presence of seven branched dorsal-fin rays is also unusual within small characids lacking the supraorbital, being cited previously only for a few Xenurobryconins (Malabarba & Weitzman, 2003:82). The possession of six or fewer branched pelvic-fin rays is also rare among characids but usual among *Hasemania* species, except in *H. hanseni*.

Some of the characters observed in *H. piatan*, such as the reduction in the number of infraorbital bones, were previously cited for other small characids from headwaters of Paraguaçu and Itapicuru rivers, both also described for elevated areas of Chapada Diamantina (Zanata & Akama, 2004; Zanata & Camelier, 2008). *Hasemania piatan* also does not have a sheath of scales covering the anal-fin base, a condition shared only with *H. kalunga* and *H. maxillaris* within the genus, but cited previously for various characids, including *Astyanax epiagos* Zanata & Camelier and *Myxiops aphos* Zanata & Akama. Although the phylogenetic relationships between *Hasemania*, *Myxiops* and the cited species of *Astyanax* are not known, the last two taxa do not share the features used to define *Hasemania*. Furthermore, *H. piatan* does not possess the features cited by Zanata & Akama (2004) in the definition of the genus *Myxiops*.

Comparative material. Brazil. *Hasemania crenuchoides*: MZUSP 52732, holotype, 63.7 mm SL, Distrito Federal, córrego Planaltina, rio São Bartolomeu. MHNG 2594.044, 2 of 5 paratypes, 28.0-38.0 mm SL, Distrito Federal, córrego Planaltina, rio São Bartolomeu. DZSJRP 11039, 47, 4 c&s, 29.6-41.5 mm SL, Distrito Federal, córrego Paranoazinho, rio São Bartolomeu. *Hasemania hanseni*: ANSP 72105, 3 paratypes, 27.7-28.3 mm SL, Goiás. MZUSP 35676, 268, 2 c&s, 21.8-33.0 mm SL, Distrito Federal, córrego Pipiripau. *Hasemania maxillaris*: FMNH 54303, holotype, 24.4 mm SL, Paraná, rio Iguaçu. *Hasemania melanura*: FMNH 54385, 39 paratypes, 2 c&s, 18.2-35.4 mm SL, Paraná, rio Iguaçu. *Hasemania nambiquara*: MCP 38038, 2 paratypes of 4, 1 c&s, 21.6-23.1 mm SL, Mato Grosso, rio Mutum, rio Juruena. *Hasemania nana*: MZUSP 39171, 23, 1 c&s, 19.4-25.5 mm SL, Minas Gerais, ribeirão do Gado, rio São Francisco. MZUSP 39184, 30, 2 c&s, 19.4-23.8 mm SL, Minas Gerais, córrego Gameleira, rio São Francisco.

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