

A new species of *Hemibrycon* (Characiformes: Characidae), a freshwater fish from the Sierra Nevada of Santa Marta, Caribbean drainage, Colombia

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ABSTRACT: *Hemibrycon* is a group of freshwater characid fish species first recognized by Günther (1864) as a subgenus of *Tetragonopterus*, and now included in the subfamily Stevardiinae. There are 21 species recorded from the rivers of Colombia, but only one species, *H. santamartae*, has been reported previously in drainages of the Sierra Nevada de Santa Marta. *Hemibrycon sierraensis* n. sp. is described from the Río Gaira, Caribbean coastal drainage. It is distinguished from all congeners by having in life a bright red adipose fin (vs. hyaline or transparent) that turns dark brown in specimens preserved in alcohol. It differs from *Hemibrycon beni*, *H. boQUIAE*, *H. brevispini*, *H. colombianus*, *H. mikrostiktos*, *H. metae*, *H. microformaa*, *H. palomae* and *H. rafaELENSE* in having a vertically elongate humeral spot that extends 3-4 longitudinal scale series below the lateral line. It differs from *H. divisorensis*, *H. pautensis* and *H. santamartae* by having the last dorsal-fin ray unbranched; and from *H. pautensis* by the number of scale series between the lateral line and the pelvic-fin insertions. It differs from *H. divisorensis* in the number of unbranched anal-fin rays, and the number of teeth on the dentary and maxilla. It differs from *H. santamartae* in the number of supraneurals, caudal peduncle depth, head length and orbital diameter.

Key words: Biodiversity; tropical fish; new taxon.

RESUMEN: Una nueva especie de *Hemibrycon* (Characiformes: Characidae) de la Sierra Nevada de Santa Marta, Cuenca del Caribe, Norte de Colombia. *Hemibrycon* es un grupo de especies de peces carácidos de agua dulce inicialmente reconocido por Günther (1864) como un subgénero de *Tetragonopterus*, actualmente incluido en la subfamilia Stevardiinae y con 21 especies que se distribuyen en los ríos de Colombia, y sólo una de ellas *H. santamartae*, se ha reportado previamente en los drenajes de la Sierra Nevada de Santa Marta. Describimos una nueva especie hallada en Río Gaira en la Sierra Nevada de Santa Marta, vertiente del Caribe Colombiano: *Hemibrycon sierraensis*. La nueva especie se distingue de sus congéneres por presentar, en vivo, la aleta adiposa roja brillante (vs. hialina o transparente) y en alcohol la aleta adiposa marrón oscura. También se distingue de *H. beni*, *H. boQUIAE*, *H. brevispini*, *H. colombianus*, *H. mikrostiktos*, *H. metae*, *H. microformaa*, *H. palomae* y *H. rafaELENSE* por presentar una mancha humeral que alcanza 3-4 escamas por debajo del canal latero sensorial. *H. sierraensis* se separa de *H. divisorensis*, *H. pautensis* y *H. santamartae* por presentar el último radio de la aleta dorsal simple, y se diferencia de *H. pautensis* por el número de escamas entre la línea lateral y las aletas pélvicas. Difiere de *H. divisorensis* en el número de radios simples de la aleta anal, el número de dientes del maxilar y dentario. *H. sierraensis* se separa de *H. santamartae* por el número de supraneurales, por la profundidad y la longitud del pedúnculo caudal, por la longitud de la cabeza y por el diámetro del ojo.

Palabras clave: Biodiversidad; pez tropical; nuevo taxón.

The genus *Hemibrycon* is a group of freshwater characid fish species first recognized by Günther (1864) as a subgenus of *Tetragonopterus*. Subsequently the subgenus was defined by Eigenmann (1927) as a new genus of Characidae and species were added and subtracted by several authors (Géry, 1962; Bertaco, Malabarba,

Hidalgo & Ortega, 2007; Bertaco & Malabarba, 2010; Román-Valencia & Arcila-Mesa, 2010; Román-Valencia, Ruiz-C, Taphorn, Mancera-Rodriguez & García-Alzate, 2013). Mirande (2010) placed *Hemibrycon* in the subfamily Stevardiinae in his hypothesis of phylogenetic relationships of the Characidae, but only two species were

included in that analysis. Javonillo, Malabarba, Weitzman & Burns (2010) used DNA sequencing techniques and found evidence for the monophyly of the group.

Fishes of the genus *Hemibrycon* are typically found in clear freshwater habitats in rivers of the Pacific watersheds in Panama, coastal Caribbean drainages, Lake Maracaibo and Orinoco River basins in Venezuela, streams of Trinidad and Tobago, coastal basins of French Guiana and Suriname, coastal Caribbean and Pacific drainages, Catatumbo, Andes and Orinoco drainages in Colombia and upper Amazon River drainages of Bolivia, Peru and Ecuador (Bertaco et al., 2007; Bertaco & Malabarba, 2010; Román-Valencia et al., 2013). Today there are 36 species reported in the genus (Eschmeyer & Fricke, 2013). Of these, 21 species are distributed in the rivers of Colombia, but only one species, *H. santamartae*, has been reported previously in drainages of the Sierra Nevada de Santa Marta.

This description of a new species of *Hemibrycon* from the La Sierra Nevada de Santa Marta in Colombia is a result of an ongoing revision (C.G-A and collaborators) of the genus, and is further proof of the as yet undocumented biodiversity of the genus by Central and South America.

MATERIAL AND METHODS

Fishes were captured using seines and were preserved with 10% formalin and later stored in 70% ethanol. Measurements and counts follow Román-Valencia, García-Alzate, Ruiz-C & Taphorn (2010). Measurements were made with digital calipers to 0.01mm precision and are expressed as percentages of standard (SL) and head length (HL). In count ranges, values for the holotype are indicated with an asterisk (*). Counts and measurements were taken on the left side of specimens when possible. Osteological observations were made on cleared and stained specimens (C&S) prepared according to Taylor & Van Dyke (1985) and Song & Parenti (1995). Bone nomenclature follows Weitzman (1962), Vari (1995), and Ruiz-C. & Román-Valencia (2006). Type specimens are deposited in the University of Atlántico Caribbean Region, Dept. Biology, Museum Collection, Barranquilla, Colombia (UARC-IC), Collection of Fishes of Auburn University Natural History Museum, Auburn, Alabama (AUM) and the Ichthyology Laboratory at the Universidad del Quindío, Armenia, Colombia (IUQ). In the lists of paratypes, the number of individuals is given in parentheses immediately after the catalog number. Institutional acronyms follow Sabaj-Perez (2010).

We performed a canonical discriminant analysis on the covariance matrix of morphometric characters with the software program R version 2.15.3 (available free at the website <http://cran.r-project.org/bin/windows/base/>). The Burnaby method to eliminate the influence of overall size, with the Past program, version 3.0 for Windows.

Comparative material examined. ***Hemibrycon beni***: UMSS 09585, (18) (35.2-82.6mm SL), Bolivia, Amazonas/Madera/Beni/Bopo, Río Pekheñkhara, Imanblaya, 3 Jan. 1990; UMSS 0890, 50, 47.3-75.4mm SL, Bolivia, Amazonas/Beni/Madera/Kaka, afluyente Taipiplaya-Taipiplaya, 3 Oct. 2008; UMSS 8895, (25) (46.3-77.7mm SL), Amazonas / Madera/Beni/Bopi, Puri bridge, 4 Dec. 2008. ***H. boQUIAE*** (see Román-Valencia, 2001;). ***H. colombianus***: (see Román-Valencia & Arcila-Mesa., 2010). ***H. dariensis***: (see Román-Valencia & Ruiz, 2007). ***H. guppyi***: (see Román-Valencia & Ruiz-C., 2007). ***H. helleri***: (see Arcila-M., 2008). ***H. jelskii***: (see Román-Valencia & Arcila-Mesa., 2010) MUSM 36126,(7) (30.2-85.1mm SL), Peru, Cusco state, Amazonas, La Convención, Echarate, Urubamba, Río Perotoni, 28 May 2009; MUSM 35492, (13) (32.8-56mm SL), Peru, Ucayali state, Amazonas, Atalaya, Sepaliva, quebrada Lazaro tributario Río Mishahua, 28 May 2009. ***H. jabonero***: (see Román-Valencia & Arcila-Mesa., 2010). ***H. metae***: (see Román-Valencia & Ruiz-C., 2007) IAvH 3122, (10) (47.6-93.9mm SL), Colombia, Casanare, Aguazul, Orinoco, Chichaca Creek, tributary of Río Cachiza, V. Ortiz-Muñoz, 1 Mar. 1994; IAvH 3125, (33) (51.1-71.4mm SL) Colombia, Casanare, Aguazul, Orinoco, Unete, Cravo Sur and Tua River drainage, V. Ortiz-Muñoz, 4 May 1996; IAvH 3129, (50) (49.3-78.7mm SL) Colombia, Casanare, Aguazul, Orinoco, Quebrada Cupiagu, Río Unete drainage, V. Ortiz-Muñoz, 4 Mar. 1994. All from Venezuela: MCNG 26774, (2) (38.1-47.1mm SL), Barinas, Río Santa Barbara, 3Km NE, Santa Barbara, Apure drainage; L. Page, 1 Jan. 1992; MCNG 26774, (26) (38.1-47.1mm SL), Barinas, Río Santa Barbara, 3Km NE Santa Barbara, Apure drainage; L. Page, 1 Jul. 1992; MCNG 7916, (1) (59.4mm SL), Barinas, Apure, Dtt. Pedraza, Caño Ticoporo at bridge on road from Acequia River, Apure; D.C. Taphorn, 7 Dec. 1982; MCNG 50011, (1) (54.9mm SL), Río Ventuari, Salto Tencua 58Km. E of San Juan de Manapiare 5°2.86' N, 65°36.95' W, N. Lujan, O. León, A. Luna, A. Valmore, 21 Apr. 2004; MCNG 41903, (2) (59.5-65.2mm SL) Barinas, upper La Yuca River; D.C. Taphorn, 3 Nov. 1998; MCNG 32396, (30) (30.5-57.9mm SL), creek NE of San Antonio, Hwy. 5, Río Curito; D.C. Taphorn, L. Page, 3 Feb. 1993. ***H. santamartae***: (see Román-Valencia, R. Ruiz-C, García-Alzate & Taphorn, 2009b) ICNMNH 10839, (22) (39.8-64.3mm SL), Guajira, Río Ranchería, Río Marocaso, 26 Oct. 2004; ICNMNH 8878, (4) (64.6-72.0mm SL), Guajira, Río Ranchería, Chorreras, Paso Ancho, 18 Feb. 2004; ICNMNH

10881, (25) (34.9-57.5mm SL), Guajira, Río Ranchería Marocaso, Río Marocaso, 26 Oct. 2004; ICNMMNH 11598, (20) (44.9-80.6mm SL), Guajira, Río Ranchería Marocaso, Río Marocaso, 1 Mar. 2005. *H. virolinica* (see Román-Valencia & Arcila-Mesa, 2010) ICNMMNH 16028, (39) (43.4-77.7mm SL), Santander, El Carmen, Magdalena River system, Quebrada El Carmen, 20 Feb. 2005.

RESULTS

Hemibrycon sierraensis

new species (Figs. 1-6)

Holotype. UARC-IC 134, 67.2mm SL, female, Colombia, Magdalena, Caribbean slope, Río Gaira beneath the bridge at Minca, 11°08'37.8"N - 74°07'08.1"W, 120 m.a.s.l., 25 Aug. 2013, C. García-Alzate.

Paratypes. All from Colombia, Magdalena, Sierra Nevada de Santa Marta and collector C. García-Alzate: AUM 61620, (2) (77.2-87.3mm SL), IUQ 3689, (4) (67.3-88.3mm SL), and IUQ 3629 (2 C&S) (58.9-76.3mm SL), collected with holotype. UARC-IC 135, (20) (50.3-72.1mm SL), Quebrada el Congo, afluente del Río Frío, vereda el Congo, 10°58'37.9"N - 74°04'16"W, 557 m.a.s.l., 24 Nov. 2012; ICNMMNH 5749, (12) (49.7-58.9mm SL), Vereda El Congo, Quebrada El Congo, 500 m.a.s.l, tributary of Río Frío, 1 Feb. 2002; ICNMMNH 6439, (4) (51.9-60.8mm SL), Vereda El Congo, Quebrada El Congo, 500m.a.s.l, tributary of Río Frío, 16 Jan. 2002; ICNMMNH 6931, (3) (71.5-83.3mm SL), Río Manzanares, 1 Feb. 2002; ICNMMNH

5748, (4) (55.7-85.6mm SL), Río Cordoba, elevation 450 m.a.s.l. 1 Feb. 2002; UARC-IC 136, (2) (48.8-56.5mm SL), Caribe versant, Río Gaira beneath the bridge at Minca, 11°08'37.8"N - 74°07'08.1"W, 120 m.a.s.l., 10 May 2013; UARC-IC 137, (15) (44.5-88.3mm SL), collected with holotype; UARC-IC 138, (2 C&S), Vereda El Congo, Quebrada El Congo, tributary of Río Frío, 10°58'37.9"N - 74°04'16"W, 557 m.a.s.l., 24 Nov. 2012; UARC-IC 139, (93) (58.8-85.9mm SL), Caribe versant, Río Gaira beneath the bridge at Minca, 11°08'37.8"N - 74°07'08.1"W, 120 m.a.s.l., 10 May 2013.

Diagnosis. *Hemibrycon sierraensis* n. sp. is distinguished from all other species of the genus by having an iridescent red adipose fin in life (vs. hyaline or transparent in life, except *H. divisorensis* that has a reddish adipose fin) and by having a dark brown adipose fin in alcohol (vs. hyaline or transparent in alcohol). It differs from *H. divisorensis*, *H. pautensis* and *H. santamartae* in having the last dorsal-fin ray unbranched. It further differs from *H. beni*, *H. boquiae*, *H. brevispini*, *H. colombianus*, *H. mikrostiktos*, *H. microformaa*, *H. metae*, *H. palomae* and *H. rafaelse* in having a vertically elongate humeral spot that extends three to four scale rows below the lateral line series (vs. humeral spot roughly circular not extending ventrally three to four scales rows below lateral line series, or with inconspicuous, diffuse vertical extensions). It differs from *H. pautensis* by the number of scale series between the lateral line and the pelvic-fin insertions (four-five vs. six-seven). It differs from *H. divisorensis* in the number of unbranched anal-fin rays (iii vs. iv), number of dentary teeth (ten vs. 13-16) and the number of maxillary teeth (six-seven vs. ten-13). In addition to the above characters, we found the following differences



Fig. 1. *Hemibrycon sierraensis*, Holotype just after fixation, UARC-IC 134, 67.2mm SL, male, Río Gaira Sierra Nevada de Santa Marta. Bar = 1cm.

that distinguish this new species from those that occur in the same basin (and in allopatry with *H. santamartae*): fewer supraneurals (six vs. eight), greater caudal peduncle depth (16.5-17.7 vs. 8.7-15.6% SL), longer head length (25.0-29.6 vs. 18.4-25.2% SL) and smaller orbital diameter (23.9-34.8 vs. 33.1-45.7% SL).

Description. Morphometric data are in Table 1. Body slender and elongate (mean maximum body depth 31.4% SL). Area between orbits slightly convex. Dorsal profile of head straight to supraoccipital, then slightly convex from supraoccipital to dorsal origin and from last dorsal-fin ray to caudal peduncle, then straight to base of caudal fin. Ventral profile of body convex from snout to base of pelvic fin, oblique along anal-fin base, then straight to base of caudal fin. Head and snout large, mandibles equal; mouth terminal, lips soft and flexible, not covering outer row of premaxillary teeth; ventral border of upper mandible oblique; posterior edge of

maxilla reaching anterior edge of orbit; opening of posterior nostrils vertically ovoid.

Premaxilla with two rows of teeth, outer row with four to five tricuspid teeth; internal row with four, the first three pentacuspoid and the last tricuspid, diminishing gradually in size laterally. Maxilla extends beyond posteroventral edge of the second infraorbital, and has 6-8 tricuspid teeth in a series not reaching anteroventral margin of that bone. Four anterior most dentary teeth larger, with five cusps, followed by six medium-sized tricuspid teeth (Fig. 2).

Lateral line complete, perforated scales 38(3), 39(15), 40(52), 41(4) or 42*(12). Scale rows between dorsal-fin origin and lateral line seven*(40) or eight (46); scale rows between lateral line and anal-fin origin six*(28) or seven (58); scale rows between lateral line and pelvic-fin insertion four (30) or five*(56). Predorsal scales 14(4), 15*(44), 16(30) or 17(8), arranged in regular series. Anal-fin rays

TABLE 1
Morphometric data of *Hemibrycon sierraensis* n. sp (n=86)

	Holotype	Paratypes	SD
Standard length (mm)	67.2	50.3-72.1 (59.7)	5.4
Total length	81.6	62.8-84.9 (73.2)	6.0
Percentages of SL:			
1. Body depth	32.5	29.9-33.1 (31.4)	1.5
2. Snout-dorsal fin origin distance	51.6	36.9-70.4 (52.3)	2.1
3. Snout-pectoral fin insertion distance	25	22.3-28.6 (24.9)	1.4
4. Snout-pelvic fin insertion distance	44.4	41.1-46.8 (43.8)	5.6
5. Dorsal-fin origin-pectoral-fin distance	40.7	36.9-70.4 (52.3)	1.3
6. Snout-anal fin origin distance	60.2	55.6-64.1 (58.9)	0.9
7. Dorsal fin origin-hypurals plate length	54.6	49.5-54.8 (52.3)	2.1
8. Dorsal fin origin-anal fin origin length	24.1	27.8-31.6 (29.6)	1.0
9. Dorsal fin length	23.1	21.1-24.3 (22.4)	1.4
10. Pectoral fin length	19.5	17.6-24.7 (21.4)	1.5
11. Pelvic fin length	13.5	12.7-17.2 (15.1)	0.9
12. Anal fin length	17.1	14.3-22.4 (17.7)	0.7
13. Caudal peduncle depth	10.1	7.64-14.1 (10.9)	2.0
14. Caudal peduncle length	14.5	14.5-17.7 (16.4)	1.2
15. Head length	25.6	25.0-29.6 (27.2)	0.8
Percentages of HL:			
16. Snout length	20.3	18.2-28.8 (23.4)	3.2
17. Orbital diameter	30.3	23.9-34.8 (29.5)	2.5
18. Postorbital distance	50.5	38.9-51.7 (45.2)	5.0
19. Maxilla length	30.4	28.8-35.8 (32.2)	2.4
20. Interorbital distance	48.2	32.7-50.9 (43.7)	2.2
21. Upper jaw length	33.1	26.1-34.4 (29.5)	2.0

Standard and total lengths in mm. Mean values in parenthesis. SD = Standard deviation.

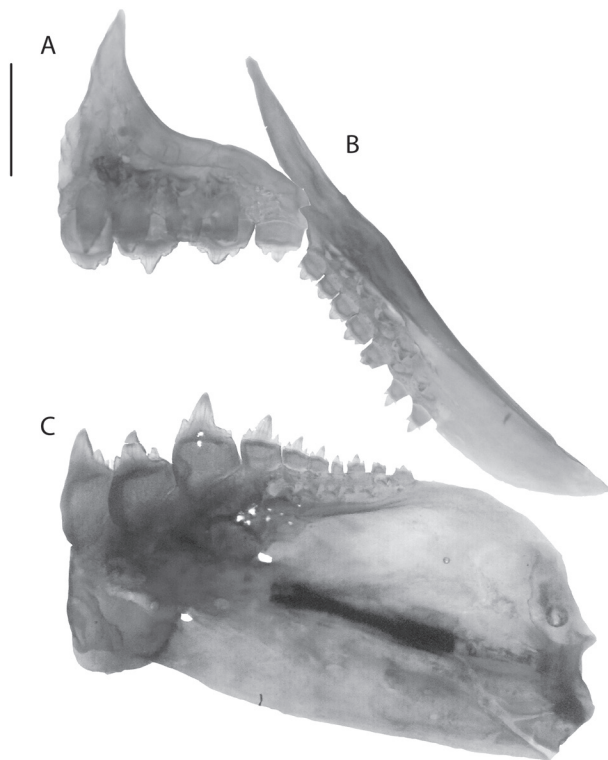


Fig. 2. *Hemibrycon sierraensis*, UARC-IC 138, paratype, 62.2mm SL. Photograph of the premaxilla (A), maxilla (B) and dentary (C), left side. Bar = 1 cm.

iii, 26*(28) or 27(58). Anal-fin origin posterior to vertical through base of first dorsal-fin ray. Pectoral-fin rays i,10*,i (46) or 11(40). Dorsal-fin rays ii,7,i*; Pelvic-fin rays i,6,i*; in both fins the last ray is simple; first unbranched ray approximately one-half length of second ray, its tip reaching first bifurcation of first branched ray. Pelvic-fin insertion anterior to vertical through dorsal-fin origin. Caudal fin forked with short pointed lobes not covered with scales. Total number of vertebra 40-41 (n=4).

Six infraorbitals; first infraorbital extending over dorsal surface of maxilla, bearing laterosensorial canal pores, its anterior portion has short process with blunt tip, that does not extend towards antorbital; its posterodorsal margin not modified. Seven supraneurals between head and first proximal pterygiophores of dorsal fin, with cartilage on upper and lower margins. Four proximal radials, third postcleitrum with a small laminar lateral process on medial surface. Pelvic bone short, straight, blunt with cartilage at anterior tip. Pelvic bone ischial process with cartilage. Fifth and sixth hypurals united, posterior margin of hypurals without cartilage. Medial and proximal pterygiophores of first four anal-fin rays fused.

Color in alcohol. Body dark brownish-yellow, chromatophores more densely concentrated on dorsum, most intense on head and extending to anterior part of dentary. Midlateral body with dark stripe from posterior margin of eye, interrupted at humeral spot and then continuing posteriorly onto middle caudal-fin rays. Humeral spot vertically elongate, located near posterior margin of opercle, extending from second to fifth scale of lateral line series and extending three to five scale rows below the lateral line series. Ventral part of body light yellow. Posterior margin of scales on dorsal region of body dark. Dorsal and anal fin with strong concentration of chromatophores along distal margin. Adipose dark brown. Caudal-fin with dark chromatophores on middle rays. Pectoral and pelvic fins as well as caudal-fin lobes hyaline. Dorsal fin with chromatophores concentrated mostly on interradial membranes and distal margins of anterior rays.

Color in life. Counter-shaded and with silvery lateral stripe highlighted in iridescent yellowish-green, more conspicuous along dorsal margin of stripe. Dorsal margin of opercle anterior to lateral stripe intense violet. Dorsal margin of eye yellow. Infraorbital along posterior margin of orbit violet, this color extending along dorsal half of opercle. Head beneath orbit intense blue. Scales on sides of body without melanophores, giving it a whitish or silvery appearance. Dorsal region dark violet. Wide dark humeral spot, conspicuous beneath silvery lateral stripe, extending through it but with less intensity. Posterior part of caudal peduncle with dark midlateral stripe that extends on to middle caudal-fin rays; ventral margin of lateral stripe reddish on caudal peduncle. Ventral posterior portion of caudal peduncle red. Pectoral and pelvic fins hyaline, anal and dorsal fins with reddish bar crossing middle sections of rays, more notable in males, distal tips of dorsal and caudal fins dark. Adipose fin iridescent red.

Sexual dimorphism. Males have hooks on anal, pelvic and pectoral-fin rays. There are five to nine pairs of hooks located on the middle and distal portions of last unbranched and first to seventh branched anal-fin rays. All branched pelvic-fin rays have ten to 20 small hooks all along most of ray's length, no hooks on unbranched rays. There are small, poorly developed hooks on the extreme distal portions of the pectoral-fin rays.

Etymology. Named for the collection locality, in the Sierra Nevada of Santa Marta drainage, north from Colombia.

Distribution and ecological notes: This species is so far known from the upper Gaira and Río Frío drainages, in the Sierra Nevada of Santa Marta, Caribbean coastal drainages of northern Colombia (Fig. 3). *Hemibrycon*

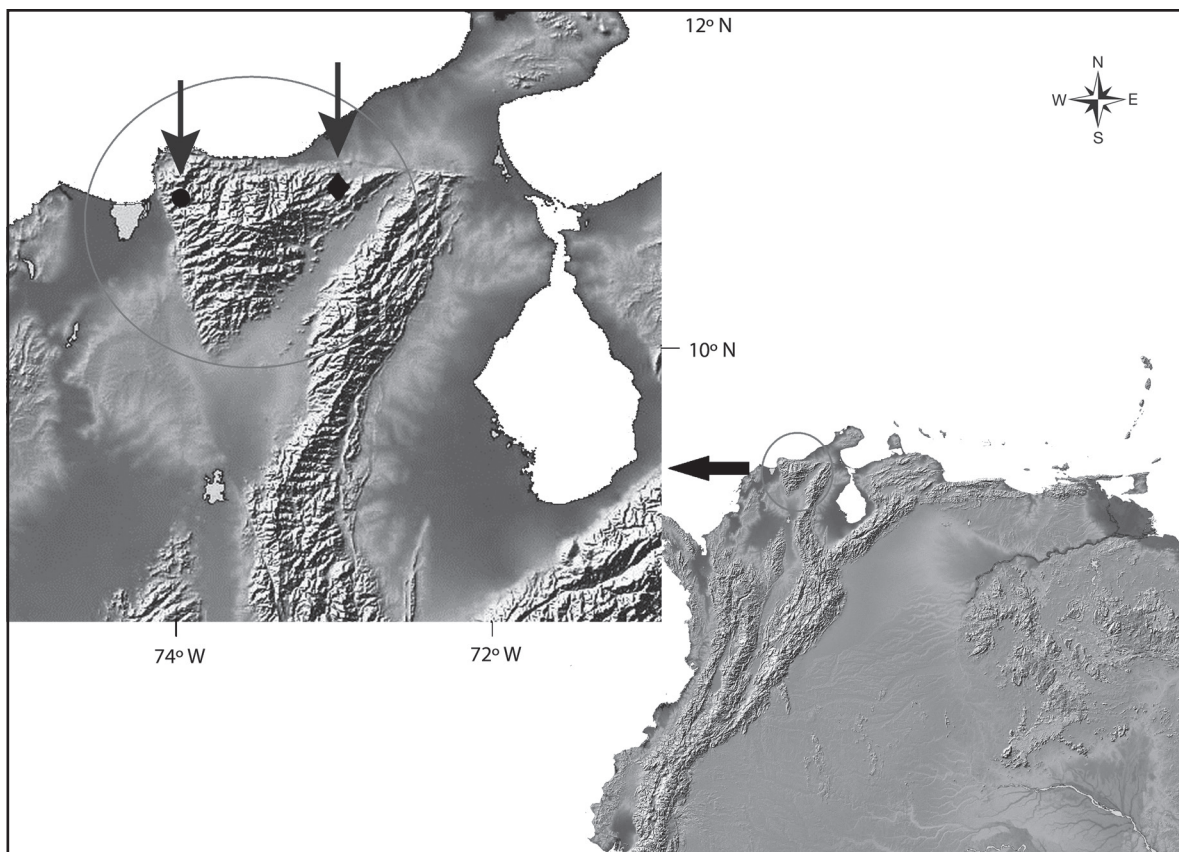


Fig. 3. Distribution of *Hemibrycon sierraensis* (●) and *H. santamartae* (◆) in Northeastern South America, Colombia.

sierraensis was captured in streams characterized by relatively rapid water current, running over rocky and sandy bottoms with high transparency (Fig. 4). The pH was near neutral, dissolved oxygen and percent saturation of oxygen values were high (Table 2) typical of oligotrophic environments. The new taxon is allopatric with *Hemibrycon santamartae*, a species found in the more eutrophic waters of the Ranchería River and its tributaries. Analysis of stomach contents of four specimens revealed presence of filamentous algae, fragments of vascular plants, adults and larvae of two different species of Trichoptera (Hydropsychidae), adult Formicidae and fragments of unidentified arthropods. The presence of allochthonous and autochthonous items suggests that this species is omnivorous.

Comments: A discriminant analysis that included species from adjacent watersheds did not distinguish among most species based on morphology, but did separate *Hemibrycon sierraensis*. *H. sierraensis* is distinguished from *H. boquiae*, *H. colombianus*, *H. santamartae*, *H. dariensis*, *H. cardalensis*, *H. metae*, *H. palomae*, *H. polyodon*, and *H. jabonero* along canonical axis one by differences in interorbital distance, postorbital distance, head

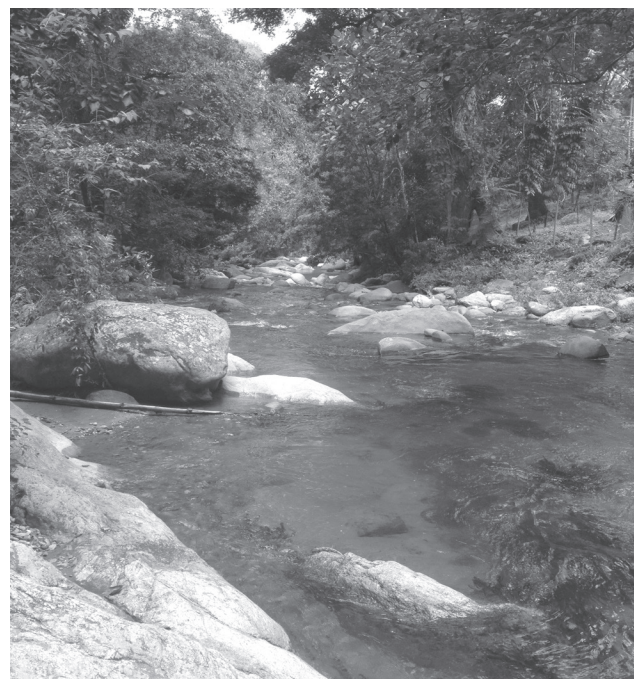


Fig. 4. Type locality of *Hemibrycon sierraensis*. Río Gaira in the village of Minca, Sierra Nevada de Santa Marta, Colombia.

TABLE 2
Physical and chemical variables recorded from the habitat of *Hemibrycon sierraensis*.
Data taken in November 2012 and March of 2013

Locality	El Congo Creek	Gaira River
Water temperature (°C)	23,8	21,5
Ambient temperature (°C)	23,7	20
Dissolved oxygen (mg/l)	5,8	5,6
Oxygen saturation (%)	50,4	50,1
pH	5,9	6,7
Depth (m)	0,7-1	4-6
Width (m)	3-7	1-1,3
Color	Clear-transparent	Clear-transparent
Caudal (m/s)	0,23	0,5
Substrate	Stones and sand	Stones, sand and detritus

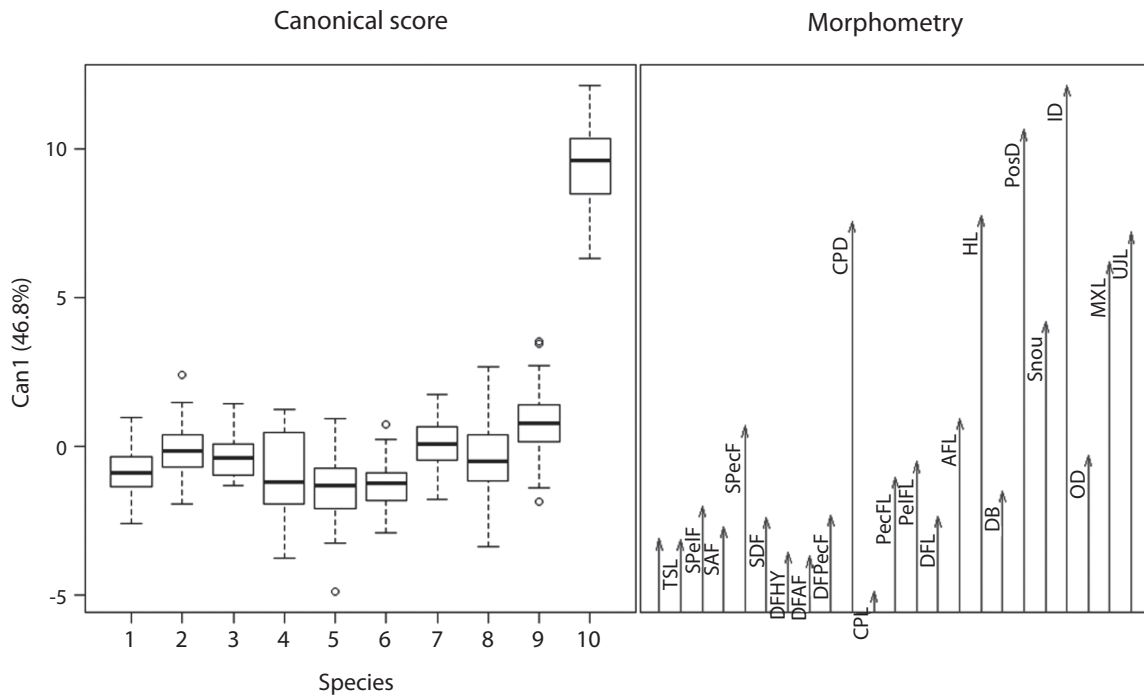


Fig. 5. Canonical scores of the morphometric data for *Hemibrycon boquiae* (1), *H. colombianus* (2), *H. santamartae* (3), *H. dariensis* (4), *H. cardalensis* (5), *H. metae* (6), *H. palomae* (7), *H. polyodon* (8), *H. jabonero* (9) and *Hemibrycon sierraensis* n. sp. (10). The abbreviations correspond to the 23 morphometric measurements given in Table 1.

length and caudal peduncle depth (Fig. 5). The first canonical axis explained 46,8% of the total variability and the second 19,8%, between the first and third canonical axis explained the 81% of the variation (Fig. 6).

DISCUSSION

Hemibrycon sierraensis has all of the synapomorphies observed in other *Hemibrycon* (Mirande, 2010; Arcila-M.

2008). Although most species of *Hemibrycon* are similar in color pattern throughout their geographic distribution, subtle differences in the concentration and distribution of black pigment in the humeral and caudal regions, have been used to identify new diversity (Bertaco & Malabarba, 2010; Román-Valencia, Vanegas-Ríos & García, 2009a; Román-Valencia et al., 2009b; Román-Valencia & Arcila-Mesa, 2010). In addition to a red adipose fin, *Hemibrycon sierraensis* has a red spot on the ventral portion of the caudal peduncle, a character that also been

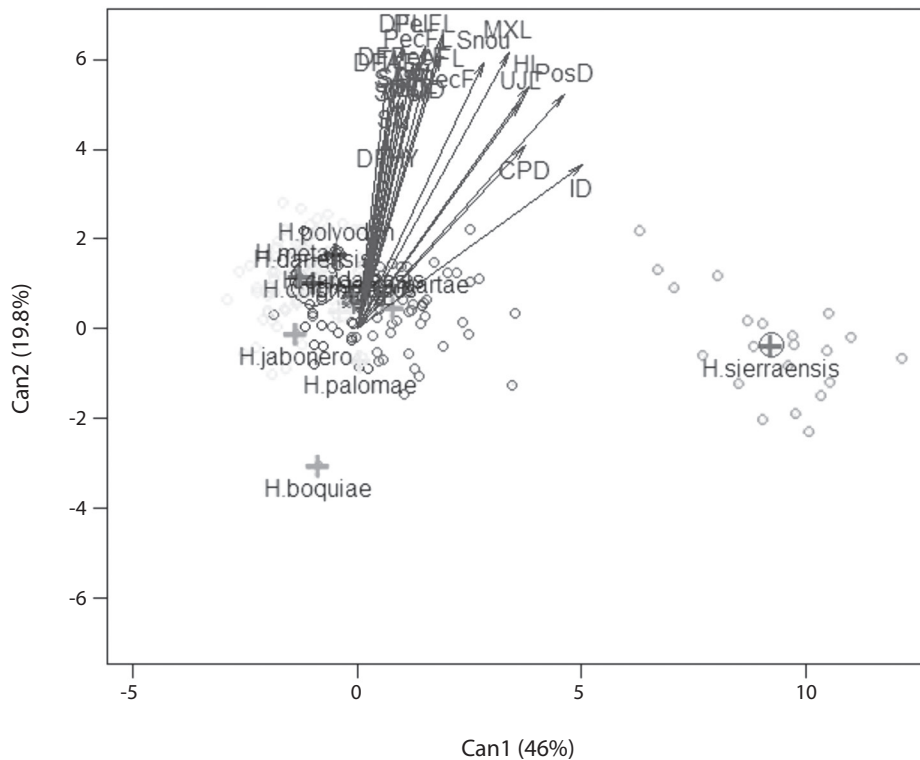


Fig. 6. Representation of the first two canonical axes, from morphometric data of *Hemibrycon boquiae* (n=71), *H. colombianus* (n=37), *H. santamartae* (n=122), *H. dariensis* (n=16), *H. cardalensis* (n= 29), *H. metae* (n=81), *H. palomae* (n=32), *H. polyodon* (n=33), *H. jabonero* (n=72) and *Hemibrycon sierraensis* n. sp. (n=23). The abbreviations correspond to the 23 morphometric measurements given in Table 1.

observed in several other species of *Hemibrycon* (Bertaco et al., 2007; Román-Valencia et al., 2010), leading us to infer that it represents a synapomorphy for the genus as suggested by Arcila-M (2008). The bright red adipose fin is a possible autapomorphy for this new species and has not been observed in other species of the genus.

The character traditionally used to define *Hemibrycon* is having the toothed portion of anterior margin of the maxilla longer than the untoothed portion (Eigenmann, 1927). However, this character is probably homoplastic and is present in other genera of Characidae such as *Brycon*, *Roeboides* and *Pseudochalceus*.

One species, *H. santamartae*, has been reported previously from the Sierra Nevada de Santa Marta (Román-Valencia et al., 2009b). It is similar to and probably related phylogenetically to *H. sierraensis*, but is distinguished from it by: the number of supraneurals, caudal peduncle depth, head length and orbital diameter, and also by the pigmentation pattern observed in alcohol preserved specimens (see Román-Valencia et al., 2009b)

Contrary to Bertaco & Malabarba (2010), we consider *Hemibrycon pautensis* Román-Valencia, Ruiz C. & Barriga (2006), one of the species we compared to the new species, to be a valid species, not a synonym of *H. polyodon* (Günther 1864). Román-Valencia et al., (2013) noted the following differences between *H. pautensis* and *H. polyodon*: *H. pautensis* has a longer caudal peduncle (8,07-11,07% vs. 14,4-16,6% SL) and longer upper jaw (23,4-30,8 vs. 43,7-45,6% SL); and a smaller orbital diameter (29,5-34,1 vs. 39,51-44,06% SL).

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