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The species of *Hemiancistrus* (Siluriformes: Loricariidae) from Ecuador

FRANCISCO PROVENZANO R.^{1,2} & RAMIRO BARRIGA S.¹

¹Instituto de Ciencias Biológicas, Escuela Politécnica Nacional, Quito Ecuador.

E-mail: fprovenz@gmail.com & ramiro.barriga@epn.edu.ec

²Centro Museo de Biología UCV, Instituto de Zoología y Ecología Tropical, Universidad Central de Venezuela. Caracas, Venezuela.

Abstract

At the Fish Collection of the Instituto de Ciencias Biológicas, Escuela Politécnica Nacional, Quito, three species traditionally grouped in the genus *Hemiancistrus* were identified: *H. annectens* (Regan 1904), *H. landoni* Eigenmann 1916, and a new specie described here. The new species inhabits exclusively in the Esmeraldas River Basin, Pacific slope, northwestern Ecuador. It is easily recognized by the completely naked abdomen, with rounded, dark spots, and a different color pattern on the dorsal and caudal fins. A comparative analysis of bones related to the opercular mobility, shows important differences between *H. annectens*, *H. landoni*, and the new species, suggesting that *H. annectens* does not belong to the genus *Hemiancistrus* or the Ancistrini group. According to the characteristics observed in these bones, *H. annectens* shows greater similarity to those reported in species of the Hypostomini group, supporting its inclusion in this group, but placing it in the genus *Hypostomus* requires further analysis. On the other hand, the conditions observed on the bones of *Hemiancistrus landoni* and the new species suggest that both are inside of the Ancistrini group. The new species is placed in the genus *Hemiancistrus* tentatively, pending future analysis.

Resumen

En la Colección de Peces del Instituto de Ciencias Biológicas, Escuela Politécnica Nacional, Quito se identificaron tres especies que tradicionalmente son agrupadas en el género *Hemiancistrus*: *H. annectens* (Regan 1904), *H. landoni* Eigenmann 1916, y una nueva especie que se describe aquí. La nueva especie habita exclusivamente en la cuenca del río Esmeraldas, vertiente del Pacífico, noroeste de Ecuador. Se reconoce fácilmente por presentar el abdomen completamente desnudo, con manchas oscuras redondeadas, y un patrón de color en las aletas dorsal y caudal diferente. Un análisis comparativo de los huesos relacionados con la movilidad del opercular muestra diferencias importantes entre *H. annectens*, *H. landoni* y la nueva especie, sugiriendo que *H. annectens* no pertenece al género *Hemiancistrus* y al grupo Ancistrini. Según las características observadas en dichos huesos, *H. annectens* muestra mayor similitud con las reportadas en especies del grupo Hypostomini, apoyando su inclusión en ese grupo, pero su colocación en el género *Hypostomus* requiere análisis adicionales. Por otra parte, las condiciones observadas en los huesos de *H. landoni* y la nueva especie sugieren que ambas están dentro del grupo Ancistrini. La nueva especie se coloca provisionalmente en el género *Hemiancistrus*, pendiente de análisis futuros.

Key words: fishes, taxonomy, systematic, freshwater, biodiversity

Introduction

The genus *Hemiancistrus* was created by Bleeker (1862) based on the species *Ancistrus medians*, described by Kner (1854), from Surinam. Since then, several species from different regions of South America have been included in this genus. The species come from the Guyana Shield, the Caribbean Sea Basin (Lake Maracaibo, Magdalena, Atrato), the Pacific slope of Panama, Colombia and Ecuador, the basins of the Uruguay River, the Tocantins River and other watersheds in southeastern Brazil (Kner 1854; Günther 1867; Regan 1904, 1913; Eigenmann 1916, 1918; Schultz 1944; Cardoso & Malabarba 1999; Cardoso & Lucinda 2003; Cardoso 2004; Cardoso & Pezzi 2004; Werneke *et al.* 2005a, b; de Souza *et al.* 2008). Four species described from Ecuador,

original or subsequently were placed in this genus, the four species were collected on the Pacific slope. In chronological order they are: *Hemiancistrus annectens* (Regan 1904), described from the Río San Javier and Rio Durango, Santiago River system, Esmeraldas Province. *Hemiancistrus landoni* Eigenmann 1916, described from Naranjito, Guayas River system. *Hemiancistrus hammarlundi* Rendahl 1937, described for Clementina River near Babahoyo, Guayas River system. *Hemiancistrus hammarlundi* is considered synonymous with *H. landoni* (Armbruster *et al.* 2015) and, *Hemiancistrus fugleri* Ovchynnyk 1971, described from the Bogota River, Cadondelet, Santiago river system, Esmeraldas, considered synonymous of *H. annectens* (Armbruster *et al.* 2015). Since 1999, there has been a remarkable increase in the number of species, mostly from Brazil and Venezuela (Cardoso & Malabarba 1999; Cardoso & Lucinda 2003; Cardoso 2004; Cardoso & Pezzi 2004; Werneke *et al.* 2005a, b; Lujan & Chamon 2008; de Souza *et al.* 2008). Hypotheses of phylogenetic relationships inside the subfamily Hypostominae (Armbruster 2004, 2008; Covain & Fisch-Muller 2012; Lujan *et al.* 2015) point out that some of the species in the genus *Hemiancistrus* show close relationships with species of the genera *Hypostomus*, *Pterygoplichthys*, *Pseudancistrus*, *Baryancistrus*, *Hypancistrus*, and *Peckoltia*. Therefore, Armbruster (2004, 2008) put some species in the genus *Pseudancistrus* or in a new genus not described, inside Pterygoplichthyini group. Recently, Armbruster *et al.* (2015) highlight the taxonomic complexity of *Hemiancistrus* and consider that *H. medians* is the only valid species of *Hemiancistrus*. They use the results obtained by Lujan *et al.* (2015), and transferred to the genus *Hypostomus*, the species *H. aspidolepis*, *H. annectens*, *H. maracaiboensis*, and *H. wilsoni*. Propose three species groups, '*H.*' *chlorostictus* group for '*H.*' *cerrado*, '*H.*' *chlorostictus*, '*H.*' *fuliginosus*, '*H.*' *megalopteryx*, '*H.*' *meizospilos*, '*H.*' *punctulatus*, and '*H.*' *votouro*, '*H.*' *landoni* group with only '*H.*' *landoni*, and the '*H.*' *guahiborum* group, with '*H.*' *guahiborum* and '*H.*' *subviridis*. Armbruster *et al.* (2015) established that *H. fugleri* and, *H. hammarlundi* are synonyms of *H. annectens* and, *H. landoni* respectively. Finally, they place *H. micrommatos*, *H. spinosissimus* and *H. spilomma* in genus *Ancistomus*, *Hemiancistrus pankimpuju* in genus *Peckoltia*, and *H. macrops* as synonym of '*Pseudancistrus*' *megacephalus*. This arrangement determines that *Hemiancistrus sensu stricto* has a single species, *H. medians* and there are 10 or more species with an uncertain status at the genus level. On the other hand, the holotype of *Hemiancistrus medians* is lost and some debate arises about the precise identity of the species and the type of the genus. Fisch-Muller *et al.* (2012) analyzed this problem and established a neotype and, a new redescription for *H. medians*. Before, Günther (1864) based on two specimens, presented a description of *H. medians*, and he indicates that there is no doubt that these specimens are identical to those described by Kner (1854), although the two specimens have a partially covered abdomen. Günther stated that the specimens were sent to London by the same person who sent them to Stuttgart, Mr. Kappler. Regan (1904) presented another description using the same specimens of Günther (1864), and gave a clear description of the abdominal covering on the adult specimen. These two descriptions agree with the redescription of Fisch-Muller *et al.* (2012).

There are three morphotypes of *Hemiancistrus* group in western drainages in Ecuador, *H. annectens*, *H. landoni*, and a third species, whose external morphological characteristics do not match with those observed in the species included in *Hemiancistrus sensu lato* or with those indicated in the original descriptions of *H. hammarlundi*, and *H. fugleri*. In this paper, the new species is described, and is tentatively located in the genus *Hemiancistrus* ('*H.*' *landoni* group), additionally some data from *Hypostomus annectens* and *Hemiancistrus landoni* are included. A phylogenetic analysis between species grouped in the family Loricariidae, mostly in Hypostominae, was performed using osteological analysis (Schaefer 1987, Armbruster 2004 2008). In order to bring additional data about generic allocations of the three species studied, a comparative analysis of the bones related to the mobility of the opercular is presented.

Material and methods

The Fish Collection (MEPN), Ichthyology Section, Instituto de Ciencias Biológicas of the Escuela Politécnica Nacional, in Quito, has 35 cataloged lots of species traditionally included in the genus *Hemiancistrus*. The species identifications were made using the original descriptions and figures, and in some cases other additional references and figures were used, and when possible were compared with specimens from the type localities. For comparisons and identifications, morphological, morphometric and meristic data were taken, on a variable number of specimens. Observations, measurements and counts were performed using a Zeiss, Stemi 1000 stereomicroscope

and an analogic Mitutoyo calipers. Measurements and counts were those proposed by Boeseman (1968). Measurements are expressed as percentage of standard length. Dry skeletons (Provenzano & Nass, in prep.) of each species were prepared for comparison of bones related to the mobility of the opercular region. The locality of each of the lots identified is established to know the geographical distribution of species.

Results

The analysis of the MEPN fish collection, shows that three species traditionally included in the genus *Hemiancistrus*, are recognizable. The external morphology, the color pattern and the having a dentary angle greater than 90° suggest they are more similar to species included in *Hypostomus* (*H. annectens*) or *Hemiancistrus* (*H. landoni* and a new species). These species inhabit solely Pacific Ocean drainages. The first species is *H. annectens* (Regan 1904) collected exclusively in the Santiago River basin, province of Esmeraldas, northern Ecuador. The second species is *H. landoni* Eigenmann 1916, collected in the Guayas, Arenillas, Puyango and Zaracay Rivers, provinces of Manabí, Los Ríos, Guayas and El Oro. The third species inhabits only the Esmeraldas River basin, provinces of Pichincha and Esmeraldas, its external characteristics don't match with the original descriptions of all other species in the genus *Hemiancistrus sensu lato* (Armbruster *et al.* 2015) or with the original descriptions of *H. fugleri* Ovchynnyk 1971 and *H. hammarlundii* Rendahl 1937. Therefore, it is considered a new species, named here as *Hemiancistrus furtivus* n. sp.

Key to the species commonly referred to as *Hemiancistrus* in Ecuador

- 1a Cheek region with four to eight, small, scarcely developed odontodes, visible mostly on adult specimens. These odontodes are associated with a bony plate, with reduced mobility or immobile. Dorsal fin folded reaches the origin of adipose fin in juveniles, or very close in adults. Caudal fin furcate. Santiago River Basin, province of Esmeraldas, NW of Ecuador *Hypostomus annectens*
- 1b Cheek region with 12 or more developed odontodes, very small in juveniles. These odontodes are associated with connective tissue, they are located behind a bony plate or bony granulations, and are always mobile. Dorsal fin folded does not reach adipose-fin origin. Caudal fin emarginate 2
- 2a Ventral surface of the head and abdomen covered with small plates or granulations in specimens with 80 mm SL or more. Cheek odontodes 15 or more, well developed, longest (most posterior) greater than eye diameter. Dorsal fin with rounded dark dots arranged in vertical lines just in the middle of interradial membrane. Guayas, Arenillas, Puyango and Zaracay Rivers systems, provinces of Manabí, Los Ríos, Guayas and El Oro *Hemiancistrus landoni*
- 2b Ventral surface of the head and abdomen completely naked in specimens 85 mm SL. Cheek odontodes 12–15, very few developed, longest less than eye diameter. Dorsal fin with irregular dark dots arranged in vertical lines on the interradial membrane close to the rays. Esmeraldas river system, provinces of Pichincha and Esmeraldas. *Hemiancistrus furtivus*

Hemiancistrus furtivus new species

Tables 1 & 2, Figures 1 & 2

Holotype. MEPN 11569, 83.0 mm SL, Ecuador, Pichincha Province, Esmeraldas River Basin, Río Silanche, río Blanco tributary, close to San Francisco de Silanche town, approx. 00°08'45''N 79°16'38''W, R. Barriga S. and A. Villacis, 07 November 2005, RBS05-24.

Paratypes. All from Ecuador, Esmeraldas River Basin: MEPN 18411, 1 ex., 99.8 mm SL, Same data as holotype. MEPN 4475, 1 ex., 79.2 mm SL, C&S, Esmeraldas Province, Estero Chipó a 11 km de Quinindé, vía Golondrinas-Buenos Aires, afluente del Río Blanco, approx. 00°16'28"N 79°24'11"W, R. Barriga, and C. Cerón, 13 March 1985, RBS85-96. MEPN 4488, 1 ex., mm SL, Esmeraldas Province, Estero Mendoza, in front to Estero Cole a 1 km de la población del mismo nombre, approx. 00°27'00" N 79°24'09"W, R. Barriga, C. Cerón, and J. Caicedo, 10 March 1985, RBS85-91. MEPN 11421, 1 ex., 54.4 mm SL, Esmeraldas Province, Río Quinindé. 00°18'49"N 79°29'01"W, R. Barriga S. and A. Villacis, 05 November 2005, RBS05-29. MEPN 11497, 1 ex., 70.3 mm SL, Esmeraldas Province, Río Chamba, a 5 km de la vía Quinindé-Esmeraldas, approx. 00°15'04"N 79°21'07"W, R. Barriga S. and A. Villacis, 01 November 2005, RBS05-25. MCZ 48772, 13 ex., (12 Alc. 1 C&S), 55–97 mm SL, Esmeraldas Province, Río Tabuche, (Riachuelo) 49 km SE Esmeraldas, approx. 00°43'07"N

79°32'57"W, T. Roberts, C. Gilbert, and M. Silva, 20 October 1971. AUM 4242 (out MCZ 48772), 1 ex., 75.7 mm SL, same data MCZ 48772. MEPN-19058 (out MCZ 48772), 2 ex., (1 Alc. 1 C&S), 88.3–100.5 mm SL, same data MCZ 48772.



FIGURE 1. *Hemiancistrus furtivus*, in lateral, dorsal, and ventral view. MEPN 11569, holotype, 83.0 mm SL.

Diagnosis. *Hemiancistrus furtivus* is distinguished from its unique geographical congener *H. landoni* and from *H. medians* by the totally naked abdomen and the color pattern of the dorsal and caudal fins. The dorsal fin has vertical rows of nearly rounded spots, dark (black or brown), on the interradyal membranes, very near or attached to the rays, in *H. landoni* the dorsal fin has vertical rows of dark dots in the middle of the interradyal membrane (Fig. 2), while in *H. medians* the dorsal fin has vertical rows of dark dots on the interradyal membrane near and, over the

rays. In *H. furtivus*, the dots are smaller, near the diameter of eye or less, whereas the dots are greater than eye diameter in *H. landoni* and *H. medians*. On the caudal fin, *H. furtivus* has transverse rows of spots nearly rounded, dark (black) randomly dispersed on the interradial membrane and rays, mostly on the distal area, where they have the appearance of transverse dark bands. In *H. landoni*, the caudal fin color pattern is similar to the dorsal fin. In *H. furtivus* there are between 12–15 cheek odontodes, each odontode emerges from a fleshy sheath, only its tip protrudes and is visible, the length of the longest odontode is less than eye diameter. In *H. landoni* there are more than 15 cheek odontodes, with a similar condition as *H. furtivus*, but around half of each odontode is visible, the length of longest (most posterior) is greater than the eye diameter. The new species can be recognized from all other species of *Hemiancistrus sensu lato* (Armbruster *et al.* 2015) except *H. medians* and *H. landoni* by the presence of dark rounded dots on the belly vs. belly whitish or with pale color homogeneous, without dots or spots. Finally, the species grouped in the '*H. chlorostistus*' group from Brazil have patches of small plates on the abdomen while *H. furtivus* has the abdomen completely naked.

TABLE 1. Morphometric data of *Hemiancistrus furtivus*. Measurements are expressed as percentage of standard length. N=5.

Character	Holotype	Average	STD	Min.	Max.
SL (mm)	83.0			54.4	99.8
Head length	31.9	31.8	1.0	30.4	33.0
Predorsal length	40.0	39.3	0.9	37.9	40.0
Postdorsal length	42.7	42.5	0.9	41.4	43.9
Interdorsal length	21.3	20.6	1.3	19.5	22.6
Preanal length	63.1	62.8	0.7	61.7	63.8
Postanal length	36.6	34.9	1.2	33.3	36.6
Thoracic length	25.9	24.5	0.8	23.9	25.9
Abdominal length	20.8	20.0	0.9	19.0	21.0
Dorsal fin base	22.9	22.6	0.9	21.1	23.4
Dorsal spine length	29.1	27.6	1.3	25.9	29.1
Pectoral spine length	30.1	29.0	0.7	28.2	30.1
Pelvic spine length	23.4	23.0	0.7	21.9	23.5
Cleithral width	28.7	28.4	0.3	28.1	28.7
Caudal peduncle depth	8.5	8.6	0.1	8.5	8.8
Head depth	18.5	17.5	0.8	16.4	18.5
Snout length	18.5	17.9	0.6	17.2	18.5
Interorbital width	10.9	11.0	0.4	10.7	11.6
Orbital diameter	6.0	5.8	0.2	5.6	6.0
Mandibular ramus length	4.9	4.8	0.1	4.6	4.9

Description. Morphometric data given in Table 1. Body robust, progressively compressed posteriorly. Caudal peduncle compressed, deep and robust. Dorsal profile of body from tip of snout through eyes, straight, with a slope close to 45°, from eyes to dorsal-fin origin gently convex, then gradually descending straight to caudal-fin origin. Ventral profile of body flat and straight or slightly concave. Ventral surface of head and belly naked to anus. From the anus to anal-fin origin, a straight naked band is present bordered by end of lateral plates. Urogenital papilla absent, the cloaca is a small but evident fleshy tube. Head wide and little depressed. Snout not projected with naked, oval tip. Eyes in dorsolateral position, orbits raised. Interorbital space broad. Supraoccipital slightly convex, posterior border rounded.

TABLE 2. Comparative morphometric data for *Hemiancistrus furtivus*, N=5, and *H. landoni* N=5.

	<i>H. furtivus</i>		<i>H. landoni</i>	
	Min.	Max.	Min.	Max.
SL (mm)	54.4	99.8	56.3	86.5
Character	Average	STD	Average	STD
Head length	31.8	1.0	32.7	1.2
Predorsal length	39.3	0.9	39.4	1.2
Postdorsal length	42.5	0.9	41.2	1.3
Interdorsal length	20.6	1.3	21.8	1.3
Preanal length	62.8	0.7	63.0	0.4
Postanal length	34.9	1.2	33.8	0.9
Thoracic length	24.5	0.8	22.9	0.6
Abdominal length	20.0	0.9	19.7	0.6
Dorsal fin base	22.6	0.9	22.5	1.3
Dorsal spine length	27.6	1.3	28.7	1.0
Pectoral spine length	29.0	0.7	29.7	1.2
Pelvic spine length	23.0	0.7	25.0	0.5
Cleithral width	28.4	0.3	30.3	0.7
Caudal peduncle depth	8.6	0.1	9.1	0.2
Head depth	17.5	0.8	18.4	0.6
Snout length	17.9	0.6	18.7	0.4
Interorbital width	11.0	0.4	11.5	0.6
Orbital diameter	5.8	0.2	6.3	0.6
Mandibular ramus length	4.8	0.1	4.6	0.5

Cheek mobile odontodes 12–15, tiny and thin. Each odontode arises from fleshy cylindrical base, and only tip protrudes. Tips orange or amber. Mobile odontodes roughly arranged in rosette pattern. Opercular bone exposed, visible externally, its lateral margin with small odontodes.

Mouth oval or rounded. Upper lip narrow, usually covering premaxilla and only external surface is visible, edge is almost horizontal with very minute undulations. Internal surface papillose. Lower lip broad, its border crenulated. Lower lip surface papillose. Papillae smaller near border of lip increasing in size near lower jaws. Papillae of anterior lip similar in size to those near lower jaws. Maxillary barbels short, united to lower lip, leaving only tip free. Premaxilla slightly longer than dentary. Premaxillae nearly straight forming $\sim 180^\circ$ angle. Dentaries separate, forming open “V” between them, with angle 95° – 105° between rami. Teeth numerous and minute, 25–35 teeth in each hemimandible. Premaxillary and dentary teeth of same size. Teeth incisor type, asymmetrically bifid, medial cusp longer and wider than lateral cusp. Medial cusp rounded or straight truncated, lateral cusp pointed. Tooth apex curved toward interior of mouth. Tooth apex yellowish, stalk whitish. Premaxillary and dentary with posterior small papillae.

Plates on sides of body with keels. Lateral line plates 27 or 28. Post-anal plates 15 or 16. Inter-dorsal plates seven or eight, just in front of adipose-fin soine one small plate with keel. Dorsal-fin origin anterior to vertical passing through pelvic-fin origin. Dorsal-fin with one spinelet, one spine, and seven branched rays; when depressed tip does not reach adipose-fin origin. Adipose-fin well developed and always present. Spine of adipose fin wide, and straight. Pectoral-fin with one spine, and six branched rays. When depressed, pectoral-fin spine reaches less than one third of pelvic-fin spine length. Spine of pectoral-fin with a fleshy tip, and slightly shorter than first branched ray. Pelvic-fin with one spine and five branched rays; its posterior margin surpassed anal-fin base when depressed. Anal-fin with one flexible spine and four branched rays. Caudal-fin rays i,14,i. Caudal-fin emarginate.

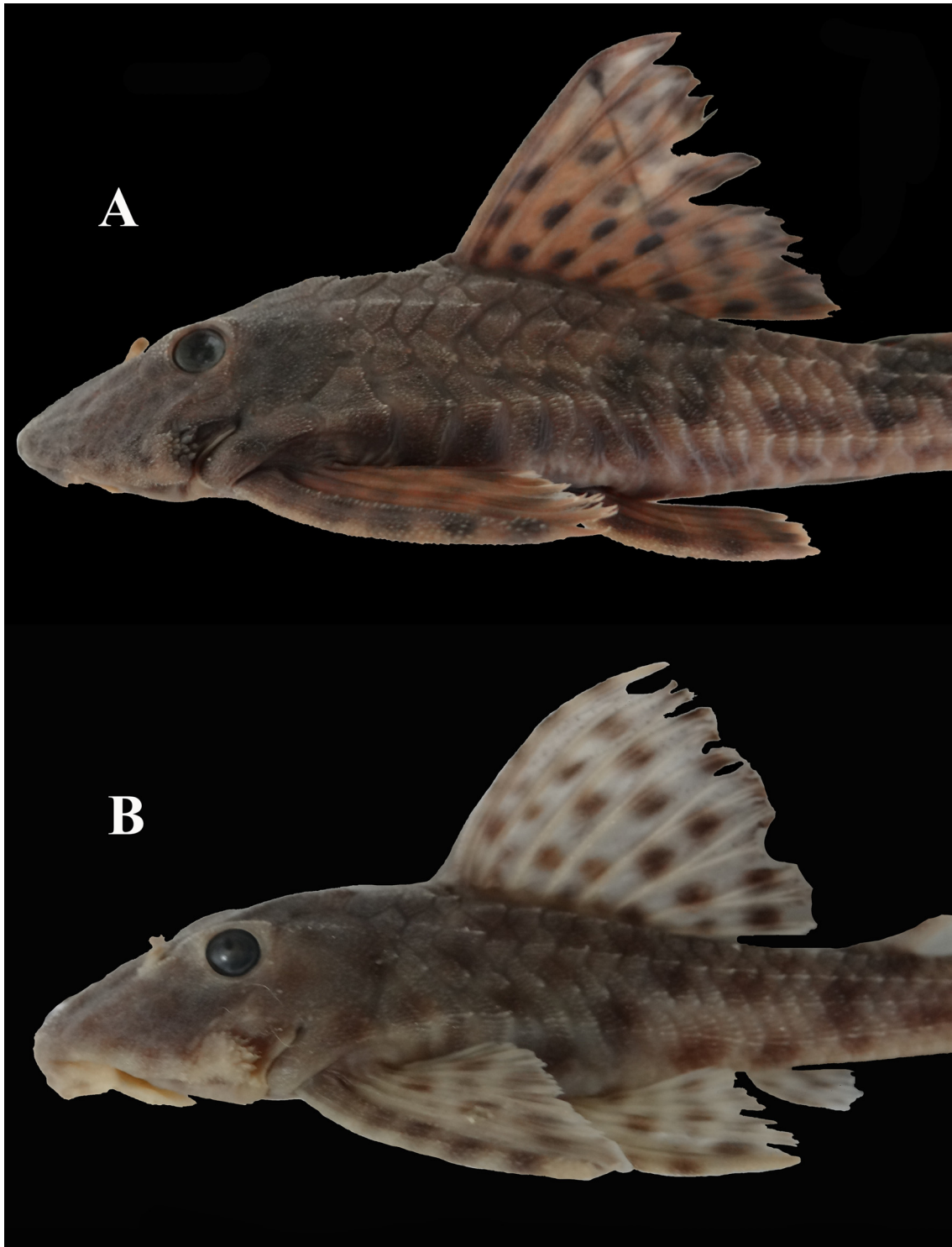


FIGURE 2. Partial lateral view of A) *Hemiancistrus furtivus*, MEPN 18411, 99.8 mm SL, and B) *H. landoni*, MEPN 17952, 78.9 mm SL.

Color. Specimens preserved in 70% ethanol show little variation in base color. General color of head and dorsolateral surfaces of body dark brown. Dark (black), rectangular, ovals or rounded spots, of different sizes, and randomly arranged on head and body. Spots became smaller, concentrated, and faint or diffuse on snout. Two or three transverse, dark (black), and irregular saddles, anteriorly oriented, first at end of dorsal-fin base, second at adipose fin origin, and last at caudal-fin origin; saddles more visible in dorsal view. Patch of dark spots at caudal-fin origin. Base color of abdomen uniform, creamy or whitish, with irregular, dark (black) spots. Dorsal fin with longitudinal rows of nearly rounded spots, dark (black or brown), on interradial membrane, near or attached to the

rays. Caudal fin with transverse rows of spots nearly rounded, dark (black) randomly dispersed on interradial membrane and rays, mostly at distal area, where they appear to combine in transverse dark bands. Rest of fins with brown base color with dark (black) spots on spines, branched rays and interradial membranes (Figs. 1–2). Smallest specimen (54.4 mm SL) with dorsal and caudal fins with longitudinal or transverse, respectively, dark bands.

Geographical distribution. The specimens were caught in the Esmeraldas River Basin, Provinces of Esmeraldas and Pichincha (Fig. 5).

Etymology. The name of the species is taken from the Latin word *furtivus* meaning: attempting to pass unnoticed or hidden, and alludes to the fact that the species was not detected before despite being in the Ecuadorian Pacific region, one of the best known ichthyologically. An adjective.

***Hypostomus annectens* (Regan 1904)**

Figure 3

Ancistrus annectens Regan, 1904: 225, pl. 11 (fig. 2). Type locality: St. Javier and the Río Durango, N. W. Ecuador.

Hemiancistrus annectens (Regan 1904), Eigenmann, 1910; Isbrücker 1980; Fisch-Muller 2003; Ferraris, 2007.

Hemiancistrus fugleri Ovchynnyk 1971:108, Figs. 12–15. Type locality: Río Bogota, Parroquia Cadondelet, 1°06'N, 78°45'W, Province Esmeraldas, Ecuador.

Hypostomus annectens (Regan 1904), Armbruster *et al.* 2015

Material examined. All from Ecuador, Esmeraldas Province, Santiago River Basin. MEPN-3423, 3 ex., 43.0–75.2 mm SL, Puerto Libre, río San Miguel, Manuel Olalla, February 1969. MEPN-4080, 1 ex., 69.6 mm SL, Río Toachi, cerca de Santo Domingo de los Colorados, km 6 de la vía a Esmeraldas, J. Ayala *et al.*, 14 September 1967. MEPN-4262, 1 ex., 40.7 mm SL, Estero Chapiro, a 1 km de la desembocadura del río San Miguel en el río Cayapas, R. Barriga *et al.*, 24 September 1984. MEPN-4263, 1 ex., 37.01 mm SL, Estero Chapiro, a 1 km de la desembocadura del río San Miguel en el río Cayapas, R. Barriga *et al.*, 24 September 1984. MEPN-4265 1 ex., 152.8 mm SL, Río Cayapas, a 2 km aguas abajo de la casa del MAG, R. Barriga *et al.*, 22 September 1984. MEPN-4489, 2 ex., 89.4–95.5 mm SL, Estero La Comunidad, a 20 minutos aguas arriba de la boca del río Onzole, approx. 00°57'54"N 79°00'48"W, R. Barriga & R. León, 19 August 1985. MEPN-12779, 1 ex., 214.1 mm SL, Estero La Comunidad, a 20 min aguas arriba de la boca del Onzole, approx. 00°57'54"N 79°00'48"W, R. Barriga, 20 August 1985. MEPN-17951, 3 ex., 163.8–175.2 mm SL, Muelle campamento forestal, approx. 01°04'39"N 78°59'38"W, R. Barriga, 10 August 1995.



FIGURE 3. Lateral and ventral view of *Hypostomus annectens*, MEPN 17951, 163.8 mm SL.

Hypostomus annectens has fourteen branched rays on caudal fin, and seven branched rays on dorsal fin. The caudal fin is furcate or markedly emarginate. The dorsal fin depressed reaches the origin of the adipose fin, in juveniles; in adults it does not reach, but is very close. The adipose fin is always present. The abdomen is almost completely covered, in adults; there are naked areas in front and in the inner side of the pelvic fins. Juveniles, have small plates on the ventral region of the head, at the level of the pectoral girdle, and sides of the abdomen, but the central region of the abdomen until behind the anus is complete naked. The species has few cheek odontodes (4–8), somewhat developed (straight, and thick compared with normal odontodes). The cheek odontodes are associated with a bony plate with reduced mobility or immobile. The color of the body and fins is brown with rounded dark or black spots. The spots on the caudal fin are smaller than in the rest of the body and fins. The abdomen has dark rounded spots. The species inhabits the Pacific slope, in NW Ecuador, exclusively in aquatic systems draining the river Santiago, Province of Esmeraldas.

***Hemiancistrus landoni* Eigenmann 1916**

Figure 4

Hemiancistrus landoni Eigenmann 1916:84. Type locality: Naranjito, Ecuador.

Hemiancistrus hammarlundi Rendahl 1937:2, Fig. 1. Type locality: Río Clementina system, northwest of Babahoyo, Los Ríos, Ecuador.

Material examined. All from Ecuador, El Oro Province, MEPN-5948, 1 ex., 171.5 mm SL, La Cuca, canal de riego, río Arenillas, Granja PREDESUR, approx. 03°30'00"S 80°04'20"W, R. Barriga *et al.*, 13 April 1979. MEPN-5954, 1 ex., 88.6 mm SL, Río Piedras, curso superior del río Arenillas, approx. 03°38'10"S 79°55'40"W, R. Barriga *et al.*, 12 April 1979. MEPN-17505, 1 ex. 68.7 mm SL, Río Zaracay, approx. 03°38'55"S 79°52'180"W, P. Tufiño & R. Barriga, 20 November 2010. Guayas Province, MEPN-9820, 1 ex., 59.9 mm SL, Río Minas, donde cruza la cooperativa 23 de Noviembre, 9 km S de Naranjal, approx., 02°41'26"S 79°38'16"W, R. Barriga, 22 September 1992. MEPN-15118, 1 ex., 134.9 mm SL, Río Minas, donde cruza la cooperativa 23 de Noviembre, 9 km S de Naranjal, approx., 02°41'26"S 79°38'16"W, R. Barriga, 22 September 1992. Los Ríos Province, MEPN-9926, 8 ex. (7 Alc. 1 Dry skeleton), 128.4–205.8 mm SL, Río Catarama, cerca de la población Corona, approx. 01°37'23"S 79°28'20"W, R. Barriga, 15 February 1997. MEPN-10389, 1 ex., 214.6 mm SL, Río Quevedo, approx. 01°02'04"S 79°27'43"W, C. Estrella, May 1953. MEPN-17049, 1 ex., 60.6 mm SL, Río Jujan, cerca de la población de Jujan, approx. 01°53'04S 79°33'06"W, S. Abril, 23 June 1986. MEPN-17050, 1 ex., 84.8 mm SL, Quevedo, G. Onore, November 1983. MEPN-18151, 3 ex., 192.3–213.4 mm SL, Río Las Juntas, afluente del río Babahoyo, approx. 01°52'06"S 79°22'43"W, M. Olalla, 12 March 1964. Manabí Province, MEPN-9099, 1 ex., 135.6 mm SL, Río Portoviejo, Laguna de Poza Honda, parte inferior, approx., 01°04'55"S 80°09'16"W, R. Barriga, 05 February 1993. MEPN-17952, 6 ex., 56.3–183.9 mm SL, Río Portoviejo, 1 km aguas abajo de la primera compuerta, approx., 01°06'21"S 80°09'41"W, R. Barriga *et al.*, 03 October 1992.

Hemiancistrus landoni is recognized among all species of *Hemiancistrus sensu lato*, except for *H. medians* by its abdomen, which is completely covered by small bony plates, and has a peculiar color pattern, rounded dark spots (*vs.* abdomen naked with light spots or plain). According to the figures and redescription indicated by Fisch-Muller *et al.* (2012), *H. landoni* can be recognized from *H. medians*, by its dorsal fin when folded does not reach the origin of the adipose fin *versus* the dorsal fin folded reaches the origin of the adipose fin. Further recognized by its head shape, which is less deep, and by its supraoccipital without a keel. In *H. medians*, the head is massive, and the supraoccipital has a keel. The eye is smaller in *H. landoni* than in *H. medians*, 15%–16% HL *versus* 18%–27% HL, respectively. Finally, the number of cheek odontodes is smaller in *H. landoni* than in *H. medians*, 10–20 *vs.* 20–60. Some large specimens show highly developed, long and pointed odontodes, on distal and dorsal portion of pectoral spines. This condition, as in other cases, may occur in sexually active adult males. *Hemiancistrus landoni* is an endemic species of the Pacific slope of Ecuador, and is found exclusively in aquatic systems of the Guayas River Basin and other water courses related to this basin.

Comparative osteology. On the three species identified, we examined the bones that are related to the mobility of the opercular bone. The bones are the sphenotic, the compound pterotic (from now the pterotic), the hyomandibular and the opercular. The observed changes in the state or condition of each bone are related to the development of the musculature involved in the movement of the opercular and concomitant of the developed odontodes associated.

The observed changes on the sphenotic occur on the posterior surface. Two conditions are perceived; in the first condition, the posterior region has an excavation or canal, extending from the middle of the bone to the ventral region of the bone; the area from the middle of the bone towards the dorsal region is massive (Fig. 6A). The second condition is an excavation or canal that runs along the entire posterior surface, from the dorsal to the ventral. This channel is open in the ventral region, but towards the dorsal border it may be totally or partially open (Fig. 6B). In *H. annectens* the first condition is observed, while in *H. landoni* and in *H. furtivus*, the second condition is observed, the canal is almost occluded at the dorsal border.



FIGURE 4. Lateral and ventral view of *Hemiancistrus landoni*, MEPN 17952, 135.4 mm SL.

The pterotic bone has on its anterior surface something similar to that indicated for the sphenotic. In the first condition we can observe the presence of a canal that is occluded or closed towards the dorsal region of the bone (Fig. 7A). In the second condition the canal runs all or nearly all of the entire anterior surface of the pterotic bone (Fig. 7B). By articulating the sphenotic and pterotic bones, the canal partially becomes a tunnel. The tunnel may be closed or open dorsally. In *H. annectens*, the first condition is observed, the pterotic canal is occluded or the tunnel is closed. In *H. landoni* and in *H. furtivus*, the second condition is observed, here the channel and tunnel runs almost all the anterior surface of the pterotic and the posterior surface of the sphenotic. In this case the tunnel closes towards the dorsal region.

On the ventral and anterior border of the pterotic there is a fossa and a process (anterior process of the pterotic-supracleitrum according to Armbruster 2004). Again, two conditions related to this region are observed. In the first condition, the fossa and the process are slightly developed (Fig. 7A). In the second, there is an appreciable development of the fossa and the process (Fig. 7B). In *H. annectens*, the first condition is observed, while in *H. landoni* and in *H. furtivus*, the second condition is observed.

On the analyzed species, the opercular bone presents two different forms (Fig. 8). In the first condition, the general shape or contour of the bone is almost triangular, similar to that described by Schaefer (1987) for *Hypostomus plecostomus* and *Cochlidon cochliodon* and Armbruster (2004) for *Hemiancistrus maracaiboensis* and *Hypostomus taphorni* (condition 0). In the second condition, the opercular has the contour of the opercular in the form of a paddle with a posterior dorsal projection, similar to that described by Schaefer (1987) for *Peckoltia niveata* and by Armbruster (2004) for *Peckoltia* sp. (Condition 1, Type-*Peckoltia*). The first condition of the opercular is present in *H. annectens* (Fig. 8A), while the second condition is observed in *H. landoni* and *H. furtivus*

(Fig. 8B). The changes in opercular shape can be related to the increase in its rotational capacity at the point of support (condyle of articulation with the hyomandibular) and its properties as a lever. The conditions or states observed could be used to include the species under study into the Hypostomini or Ancistrini *sensu* Armbruster (2004).

The changes noted in the three bones are linked to increased development (increased diameter or muscle thickness) and increased surfaces of origin and insertion of the *levator operculi* and *dilatator operculi* muscles, which was evidenced during the preparation of skeletons.

Discussion. The status of the genus *Hemiancistrus* is still controversial. The loss of the holotype of *H. medians*, and the way Kner (1854) presented the original description, generated doubts and discrepancies about the correct identity of this species. Fisch-Muller *et al.* (2012) established the taxonomic status and the identity of the type species, in spite of the descriptions provided by Günther (1864) and Regan (1904). We do not have specimens of *H. medians*, however, as indicated by Fisch-Muller *et al.* (2012) and Armbruster *et al.* (2015), *H. medians* and *H. landoni* share some external morphological characteristics not observed in the other species included in *Hemiancistrus sensu lato*, such as the presence of keels in the lateral plates of the body and a similar coloration pattern. The way the abdomen is covered appears to have some difference between *H. medians* and *H. landoni*, but none of the other species included in the group has such an extended abdominal covering. According with Armbruster *et al.* (2015) only *H. medians* is included in the genus *Hemiancistrus*. Therefore, the generic status of *H. landoni* and the other species remains uncertain.

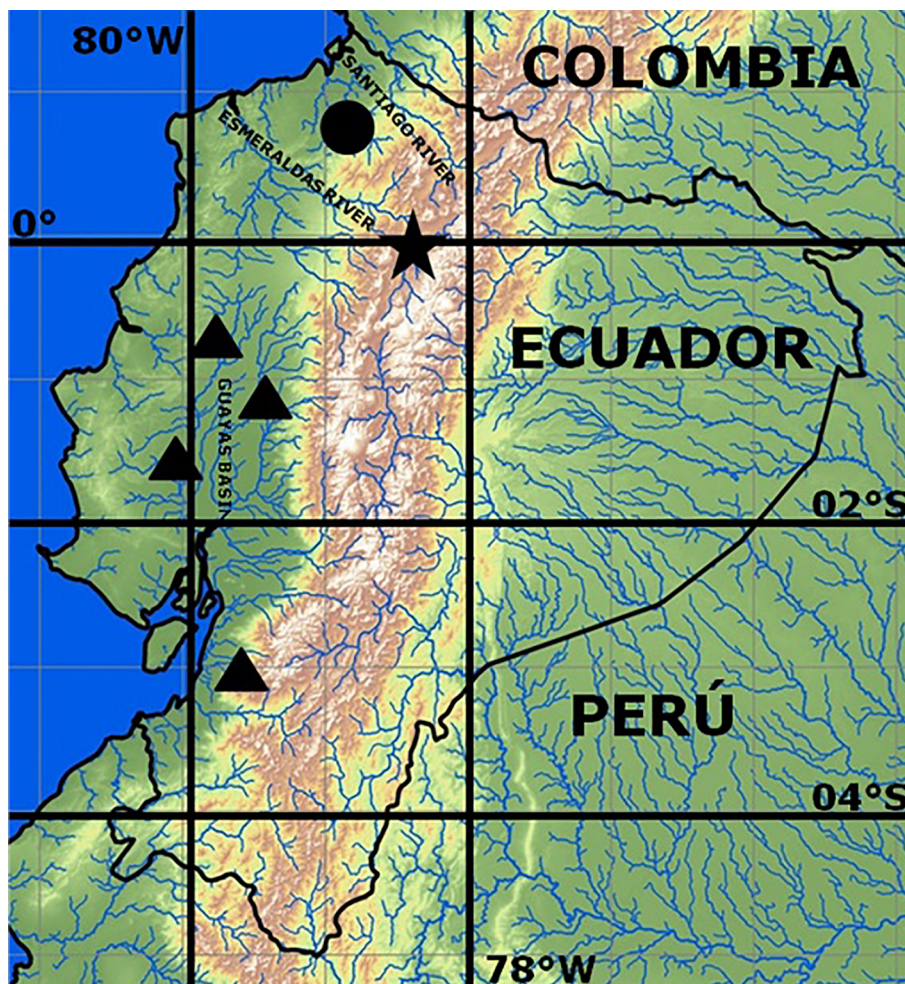


FIGURE 5. Geographical distribution of *Hypostomus annectens* (circle), *Hemiancistrus furtivus* (star), and *Hemiancistrus landoni* (triangle). Symbols may represent more than one lot.

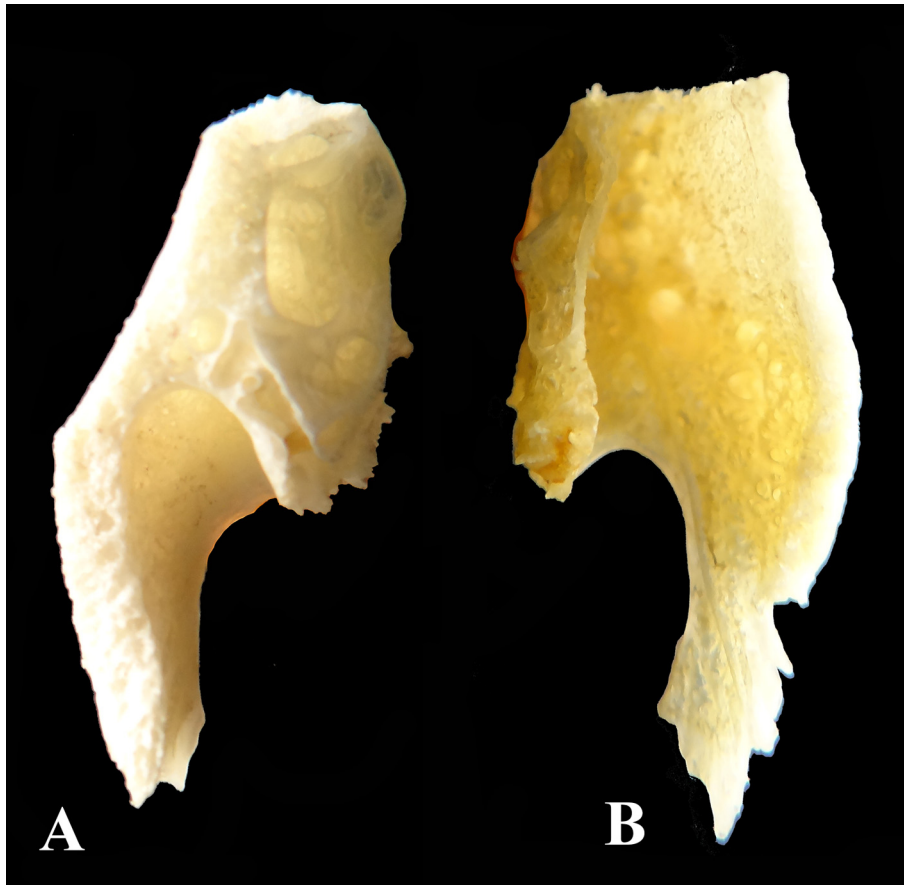


FIGURE 6. Posterior view of sphenotic. A) *Hypostomus annectens*, specimen of 190.0 mm SL, left, and B) *Hemiancistrus landoni*, specimen of about 210.0 mm SL, without data, right.

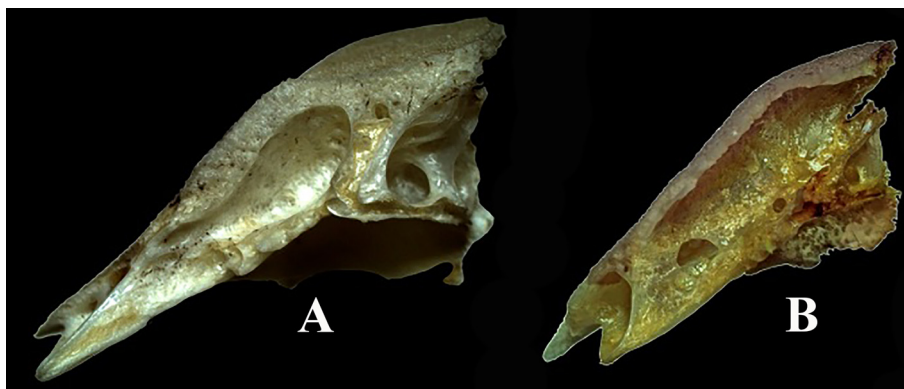


FIGURE 7. Frontal view of right pterotic. A) *Hypostomus annectens*, specimen of 190.0 mm SL, and B) *Hemiancistrus landoni*, specimen of about 210.0 mm SL, without data.

Hemiancistrus furtivus is represented at the MEPN by seven specimens in five cataloged lots. Only four are in good conditions, and/or with an appreciable standard length. Comparisons with original descriptions of the geographically nearest species were made carefully, and the external characters observed on *H. furtivus* shows that it is a new species. The belly is totally naked, the dorsal and caudal fins have a distinctive color pattern, and the small movable cheek odontodes differ from that of other Pacific Coast species described or placed in *Hemiancistrus*. In spite of this, the body color pattern observed on our specimens is very close with that reported by Eigenmann (1916) in the original description of *H. landoni*. He pointed out that the body has four oblique transverse saddles, the first behind the eyes, the second at the end of the dorsal fin, the third at the level of adipose fin, and the fourth at the caudal-fin origin. On our specimens of *H. landoni*, the presence of saddles is variable in

that some are very evident while in others they are very faint or no traces are observed (Fig. 2). Two more species, were originally described from the Pacific versant of Ecuador, *H. hammarlundi* Rendahl 1937, and *H. fugleri* Ovchynnyk 1971. We agree with they are synonymous with *H. landoni* and *H. annectens*, respectively. The original description of *H. hammarlundi* was made on a unique specimen of 70.4 mm SL (Armbruster per. comm.). This specimen has small patches of granular plates on belly, and 20 movable odontodes developed in the cheek area. This is clearly different to that observed in *H. furtivus*. On the other hand, Ovchynnyk (1971) in the original description of *H. fugleri*, points out that the folded dorsal fin reaches or is very close to adipose-fin origin, and that the belly has small patches of granular plates. The specimen used was 91 mm SL. Only the examined juveniles of *H. annectens* show that the folded dorsal fin reaches the adipose-fin origin, and they also have small patches of granular plates on belly. The first character is useful to distinguish juveniles from *H. landoni* and *H. furtivus*, but the character changes with size; in large specimens of the three species, the folded dorsal fin does not reach the adipose-fin origin. Also, the figures provided by Ovchynnyk (1971) show a color pattern of the body and fins similar to *H. annectens*, and different to that observed in *H. furtivus*. Additionally, there are no developed cheek odontodes in *H. fugleri*. These results support the synonymy proposed by Armbruster *et al.* (2015) between the species previously described from Ecuador, and confirms the presence of the new species. The completely naked abdomen, the dark rounded dots on it, and the small movable cheek odontodes distinguish *H. furtivus* from all other species included in *Hemiancistrus sensu lato* (Armbruster *et al.* 2015). Finally, Armbruster *et al.* (2015) established at least three groups within *Hemiancistrus sensu lato*. The groupings are based on morphological similarity of species. The species *H. landoni* and *H. furtivus* are similar in overall body shape and the color pattern, but the cover of the abdomen and the degree development of mobile cheek odontodes are different. Despite these facts both species are included in the *H. landoni* group.

Hemiancistrus annectens, *H. aspidolepis*, *H. maracaiboensis*, *H. holostictus* and *H. wilsoni*, inhabit the trans-Andean region, Panamá, Maracaibo lake basin, the rivers Magdalena, Cauca, Atrato, San Juan (Colombia), and Santiago (Ecuador). When comparing the original descriptions of all species, and specimens of *H. annectens*, it is evident that the external morphology, the meristic and morphometric data, and the color pattern are similar. This fact was previously detected by Schultz (1944), and mentioned by Regan (1913) and Eigenmann (1918). Some morphometric differences can be related with the size, the fixation and preservations conditions of the type specimens. At this moment, we do not have specimens of the other species on hand, and we are unable to offer diagnostics characters to recognize each species. A study to establish the status of each species is necessary, using direct comparison of fresh and well preserved specimens from each basin. In the meantime, the use of the names proposed to each basin is suggested. Recently, Armbruster *et al.* (2015) reassign to the genus *Hypostomus* the five species, as a consequence of the results obtained on phylogenetic analyses. The external morphology of the five trans-Andean species of *Hypostomus* seems to indicate that they do not belong in the genus *Hemiancistrus* or even to the Ancistrini group, as pointed in morphological and molecular phylogenies (Armbruster 2004, 2008; Lujan *et al.* 2015).



FIGURE 8. External lateral view of right opercular. A) *Hypostomus annectens*, specimen of 190.0 mm SL, and B) *Hemiancistrus landoni*, specimen of about 210.0 mm SL, without data.

The comparative analysis of the bones related to the movement of the opercular, support the placement of *H. annectens* in the Hypostomini and *H. landoni* and *H. furtivus* in the Ancistrini. In order to establish the proper generic allocation of *H. annectens* a project is being carried out which includes a comparative analysis of the indicated bones, between this species and species traditionally included in the genus *Hypostomus*. In an analogous way, it is hoped to be able to compare osteologically the species included in the genus *Hemiancistrus sensu lato* to indicate its appropriate taxonomic status.

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