Two new species of *Pseudopimelodus* Bleeker, 1858 (Siluriformes: Pseudopimelodidae) from the Magdalena Basin, Colombia

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The family Pseudopimelodidae is widely distributed in South America and includes 51 described species organized in seven genera. Only two of four species of the genus *Pseudopimelodus* have been recorded for the trans-Andean basins of Colombia, *Pseudopimelodus bufonius* and *P. schultzi*, whose similarity in external morphology make their identification difficult. We performed a phylogenetic analysis using a fragment of the Cytochrome C Oxidase subunit 1 gene (COI), and analyzed osteological and traditional morphometric characters to study *Pseudopimelodus* from the Colombian trans-Andean region. Results provided strong support for two clades phylogenetically related to *Pseudopimelodus*, that showed clear-cut molecular, osteological, and morphometric differences from previously described bumblebee catfishes. Based on these results, we describe two *Pseudopimelodus* species from the Magdalena-Cauca River Basin: *P. magnus* sp. nov. with 43 – 44 vertebrae, dorsal-fin spine with serrations on its anterior margin; lateral margin of transverse process of the fourth vertebra of the Weberian complex forming an acute angle in ventral view and *P. atricaudus* sp. nov. with 39 vertebrae, dorsal-fin spine smooth on its anterior margin and a dark, vertical band covering ¾ of the caudal fin with base of rays and tip of caudal-fin lobes hyaline.
Two new species of *Pseudopimelodus* Bleeker, 1858 (Siluriformes: Pseudopimelodidae) from the Magdalena Basin, Colombia

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Abstract

The family Pseudopimelodidae is widely distributed in South America and includes 51 described species organized in seven genera. Only two of four species of the genus *Pseudopimelodus* have been recorded for the trans-Andean basins of Colombia, *Pseudopimelodus bufonius* and *P. schultzi*, whose similarity in external morphology make their identification difficult. We performed a phylogenetic analysis using a fragment of the Cytochrome C Oxidase subunit 1 gene (COI), and analyzed osteological and traditional morphometric characters to study *Pseudopimelodus* from the Colombian trans-Andean region. Results provided strong support for two clades phylogenetically related to *Pseudopimelodus*, that showed clear-cut molecular, osteological, and morphometric differences from previously described bumblebee catfishes. Based on these results, we describe two *Pseudopimelodus* species from the Magdalena-Cauca River Basin: *P. magnus* sp. nov. with 43 – 44 vertebrae, dorsal-fin spine with serrations on its anterior margin; lateral margin of transverse process of the fourth vertebra of the Weberian complex forming an acute angle in ventral view and *P. atricaudus* sp. nov. with 39 vertebrae, dorsal-fin spine smooth on its anterior margin and a dark, vertical band covering ¾ of the caudal fin with base of rays and tip of caudal-fin lobes hyaline.
Introduction

The order Siluriformes is a highly diverse group encompassing at least 3975 valid species (Fricke, Eschmeyer & Fong, 2020) and a growing number of new species are being described (Shibatta, 2016; Ruiz, 2016; Shibatta & Vari, 2017; Shibatta, 2019; Tobes et al., 2020). Within this order, Pseudopimelodidae (Bumblebee catfishes) is a small monophyletic family of Neotropical catfishes, broadly distributed across different river basins in South America, from the Atrato River in Colombia to the Río de la Plata in Argentina (Ferraris, 2007) and it is considered one of the least known families among the Neotropical freshwater catfishes (Shibatta, 2013).

Members of Pseudopimelodidae were originally included in family Pimelodidae; furthermore, Lundberg, Bornbusch & Mago-Leccia (1991) demonstrated its monophyly based on several synapomorphies, and its family rank was proposed by Shibatta (2003). These synapomorphies include: 1) lack of spike-like membranous wings of bone projecting beyond the palatine condyle on the lateral ethmoid; 2) a short metapterygoid, broader (at least twice) than long, deflected inward and usually subtended by a ridge or crest; 3) endopterygoid with a sharp anterolateral process and a comma-shaped ectopterygoid, both broad and loosely linked between the neurocranium, from near the lateral ethmoid-orbitosphenoid suture and the palatine; 4) third to seventh proximal radials of the dorsal fin wide and adjacent radials in full contact for their entire lengths (Batrochoglanis, Cephalosilurus, Cruciglanis, Lophiosilurus, and Pseudopimelodus) or only narrowly separated (Microglanis), and 5) absence of dorsal hypohyals.

In a phylogenetic analysis based on 440 characters and 87 taxa representing all extant catfish families, Diogo, Chardon & Vandewalle (2004) confirmed the above mentioned synapomorphies and described two additional features: 1) a markedly bifurcated mesethmoid and 2) a spoon-shaped autopalatine with a roundish, dorso-ventrally expanded posterior tip. Subsequent molecular studies based on mitochondrial and nuclear gene sequences (Hardman, 2005; Sullivan, Lundberg & Hardman, 2006; Lundberg, Sullivan & Hardman, 2011; Sullivan, Muriel-Cunha & Lundberg, 2013) showed that the family Pseudopimelodidae forms a well-supported monophyletic assemblage along with Heptapteridae, Pimelodidae, and Phreatobius.
In addition to the above-mentioned synapomorphies, five additional characters were proposed for the family Pseudopimelodidae (Shibatta & Vari, 2017).

Until very recently, six genera including at least 51 species were recognized in Pseudopimelodidae: Batrochoglanis Gill, 1858; Cephalosilurus Haseman, 1911; Cruciglanis Ortega-Lara & Lehmann, 2006; Lophiosilurus Steindachner, 1876; Microglanis Eigenmann, 1912; and Pseudopimelodus Bleeker, 1858 (Fricke, Eschmeyer & Fong, 2020). Shibatta & Vari (2017) described Rhyacoglanis from cis-Andean South America, comprising four new species and Pseudopimelodus pulcher Boulenger, 1887, from the Western Amazon Basin as the type species.

So far, records in Colombia include a total of six of the seven formally recognized genera of Pseudopimelodidae and only two of the four species of Pseudopimelodus (DoNascimento et al., 2017). Although it was thought that the species P. bufonius (Valenciennes, 1840) and P. schultzi (Dahl, 1955) had overlapping distribution ranges in the Magdalena-Cauca River Basin, in a recently published checklist (DoNascimento et al., 2017), the presence of P. bufonius was restricted to the Amazon, Orinoco and Caribbean basins, while the species P. schultzi was restricted to both the Magdalena-Cauca and Caribbean basins, including the Sinú River, type locality of this species.

In addition to the difficulties to define their distribution, a phylogeographic study revealed the presence of five separate evolutionary lineages of Pseudopimelodus in trans- and cis-Andean rivers of Colombia (Rangel-Medrano, Ortega-Lara & Marquez, 2020). Thus, to test the hypothesis that undescribed species are currently classified in Colombia under the names P. schultzi and P. bufonius, this study integrated molecular and morphological analyses, including osteology and external morphology, to address the taxonomic status of Pseudopimelodus species inhabiting the Magdalena-Cauca River Basin. Results identified two new species of the family Pseudopimelodidae from northwestern South America, both described in this study.

Material and Methods

Material studied
The material examined is deposited in museums and institutions as described below and institutional abbreviations used in the present study are listed in Sabaj (2019).

**Pseudopimelodus bufonius**: Guyana: Upper Essequibo River Basin: Takutu River: AUM 38248, 1, 72.3 mm SL; Rupunini River: AUM 38292, cleared and stained (C&S) specimen, 58.6 mm SL; AUM 48352, 1, 74.3 mm SL; Potaro-Siparuni: AUM 45384, 1, 87.6 mm SL. Colombia: Upper Amazon River Basin: Vaupés River: IMCN 8230, 5, 137.4 – 221.7 mm SL. Orinoco River Basin: Upper Meta River Drainage: Negro River: IMCN 8231, 13, 118.3 – 191.0 mm SL. Venezuela: Orinoco River Basin: Apure River Drainage: Boconó River: MCNG 5307, 4, 103.4 – 123.5 mm SL.

**Pseudopimelodus schultzi**: Colombia: Sinú River: IMCN 8241, 12 (2 C&S), 174 – 305 mm SL.

**Pseudopimelodus manguurus**: Argentina: Upper La Plata River Basin: Paraná River: IMCN 8441, 2, 117.7 – 137.9 mm SL.

**Pseudopimelodus charus**: Brazil: São Francisco river drainage: LBP10489, 1, 123.1 mm SL; LBP 11308, 1, 154.5 mm SL.

In addition, the morphological comparisons with *Pseudopimelodus charus* were based on the figure of Valenciennes published in Mees (1974).

**Phylogenetic analyses**

Phylogenetic analysis was conducted with MrBayes (MB) v3.2 (Ronquist et al., 2012) using COI haplotype sequences from *Pseudopimelodus* specimens (Table 1), belonging to lineages 1 and 5 described by Rangel-Medrano, Ortega-Lara & Márquez (2020). Haplotypes were compared with GenBank COI sequences of remaining members of the family Pseudopimelodidae (Table 1), using HKY+G as the best-fit evolutionary model estimated in IQ-TREE software (Kalyaanamoorthy et al., 2017). Two Pimelodid species (*Pimelodus yuma* and *Pseudoplatystoma magdaleniatum*) were used as outgroups. Chain parameters included two independent Markov Chain Monte Carlo (MCMC) iterations for 20 million generations sampled every 1000 generations, discarding the first 25% sampled generations as burn-in; remaining parameters were left as default. Convergence of the MCMC was assessed based on the Potential Scale Reduction Factor which
should approach 1.0 as runs converge and considering the standard deviation of split frequencies which
should approach 0. Trees were summarized according to their estimated posterior probability to produce a
consensus tree, using the same burn-in as the MCMC. The final tree was visualized with the program
FigTree v1.4.2 (Rambaut, 2014). Nodes were considered well supported with posterior probabilities \( \geq 0.95 \)
(Wilcox et al., 2002). Finally, following the DNA barcoding of freshwater fishes (Hubert et al., 2008), the
pair-wise divergences of *Pseudopimelodus* haplotype sequences was estimated using the Kimura 2
parameter model in MEGA v6.06 (Tamura et al., 2013).

Morphological analyses

Measurements followed standard procedures of Shibatta & Vari (2017) using dial calipers to 0.1 mm on
the left side of specimens. Standard length is expressed in mm. Except for subunits of the head which are
expressed as percentages of head length, all measurements are expressed as percentages of standard length.
Counts were made on the left side of the body when possible. Counts of dorsal, pectoral, pelvic, and anal
fin rays, as well as principal and procurrent caudal-fin rays were taken from dried skeletons (DS), cleaned
using dermestid beetles, C&S specimens following Taylor & Van Dyke (1985) and radiographs (RX) of
paratypes. Vertebral counts include the five fused vertebrae of the Weberian apparatus and one single
element of the compound caudal centrum (pleural 1 + ural 1 centrum). Length of the posterior process of
cleithrum was measured from dorsal origin to its posterior end. Width of the pectoral-fin spine was
measured at its base. Length of the Weberian complex was measured in ventral view, longitudinally from
anterior to posterior mesial ends of centrum and was related to the length of the neurocranium, which was
measured from the mesial anterior margin of the mesethmoid to posterior margin of the basioccipital.
Osteological nomenclature follows Arratia (2003a, b).

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**Results**

**Molecular analysis**

Phylogenetic tree based on Bayesian Inference (Fig. 1), showed well-supported clades corresponding to samples here proposed as new species (*Pseudopimelodus magnus* and *P. atricaudus*). *Pseudopimelodus magnus* was recovered sister to *P. schultzi* from the Sinú River (H25 and H26) and both clades along with *P. bufonius* from the Orinoco, appear as the sister-clade to *P. bufonius*, *P. mangurus*, and *P. charus*. In contrast, *P. atricaudus* is sister to the remaining *Pseudopimelodus* species analyzed.

Kimura 2 parameters genetic distance was relatively small for *P. atricaudus* (0.003 – 0.006), *P. magnus* (0.003 – 0.020), and *P. schultzi* (0.020), whereas was larger between *P. bufonius* samples (0.011 – 0.068). The smallest Kimura 2 parameters genetic distance was observed between *P. bufonius* from Orteguaza and *P. mangurus* (0.026), whereas the largest genetic distance was observed between *P. schultzi* and *P. atricaudus* (0.113).

*Pseudopimelodus magnus*, sp. nov. (Fig. 2)

*Pseudopimelodus bufonius* [not Valenciennes, 1840]. — Steindachner, 1880: 59 [Cauca River; description].

— Miles, 1947: 64 [Magdalena River Basin; check list]. — Dahl, 1971: 54 [Magdalena River Basin; check list]. — Maldonado-Ocampo et al., 2005: 159 Fig. 150 [Magdalena-Cauca River basin; check list].

*Pseudopimelodus schultzi* [not Dahl, 1955]. — Ortega-Lara et al., 2006: 49 [upper Cauca Basin; check list]. — Ortega-Lara et al., 2011: 447 [fishery: Magdalena River Basin].
*Pseudopimelodus zungaro* [not Humboldt, 1833]. — Eigenmann & Eigenmann, 1890: 112 [Goiás, Brazil]. — Eigenmann, 1922: 32 [in part, Magdalena-Cauca River Basin; identification key].

**Holotype.** CIUA 5142, 750 mm SL, Colombia, Antioquia, Magdalena River Basin, Cauca River in Venecia, 6°39’47.6” N, 75°50’9” W, Feb 2018, Restrepo-Gómez A.M.

**Paratypes.** ANDES I210, 2, 232.9 – 248.5 mm SL, Colombia, Antioquia, Magdalena River Basin, Cauca River in Venecia, 6°39’47.6” N, 75°50’9.5” W, Feb 2016, Restrepo-Gómez A.M. CIUA 5163, 1, 531.7 mm SL, Colombia, Antioquia, Magdalena River Basin, Cauca River in Venecia, 6°39’47.6” N, 75°50’9” W, Nov 2014, Olaya G. CP-UCO 3860, 1, 217.7 mm SL, Colombia, Antioquia, Magdalena River Basin, Cauca River in Venecia, 6°39’47.6” N, 75°50’9” W, Nov 2015, Restrepo-Gómez A.M. CP-UCO 3861, 1 230.1 mm SL, Colombia, Bolívar, Magdalena River Basin, Cauca River in Achi, 8°34’8.1” N, 74°33’10.9” W, Oct 2015, Restrepo-Gómez A.M. CP-UCO 3862, 1, 177.9 mm SL, Colombia, Antioquia, Magdalena River Basin, Cauca River in Venecia, 6°39’47.6” N, 75°50’9” W, Feb 2016, Restrepo-Gómez A.M. ICN-MHN 24386, 1, 326.84 mm SL, Colombia, Antioquia, Magdalena River Basin, Cauca River in Venecia, 6°39’47.6” N, 75°50’9.5” W, Dec 2015, Restrepo-Gómez A.M. IMCN 0060, 1, 106 mm SL, Colombia, Valle del Cauca, Upper Cauca River Basin, Cauca River in Tuluá town, *ca* 4°6’55” N, 76°17’47” W, Nov 1995, Victoria P. IMCN 0285, 1, 228 mm SL, Colombia, Cauca, Upper Cauca River Basin, Ovejas River in Suárez, *ca* 2°57’41” N, 76°40’39” W, Nov 1995, Usma S. IMCN 2349, 2 DS, 157.4 – 408 mm SL, Colombia, Cauca, Upper Cauca River Basin, Cauca River in El Hormiguero, Municipality of Puerto Tejada, *ca*. 3°18’05” N, 76°28’39” W, 5 Nov 2002, Ortega-Lara A. IMCN 3885, 2, 57.3 – 62.5 mm SL, Colombia, Valle del Cauca, Upper Cauca River Basin, La Vieja River in Cartago town, *ca*. 4°45’48” N, 75°55’27” W, 31 Aug 2004, Ortega-Lara A. IMCN 8234, 6, 1 DS, 268.1 – 340 mm SL, Colombia, Huila, Magdalena River Basin, Magdalena River in El Quimbo dam, Municipality of Garzón, *ca*. 2°11’05” N, 75°39’44” W, 29 Aug 2015, Ortega-Lara A. IMCN 8239, 1 C&S, not measured, Colombia, Cauca, Cauca River Basin, Cauca River in El Hormiguero, Municipality of Puerto tejada, *ca*. 3°18’25” N, 76°28’26” W, 1 Mar 2003, Ortega-Lara A. IMCN 8265, 1 DS, 213.7 mm SL, Colombia,
Diagnosis. *Pseudopimelodus magnus* differs from its congeners by the total number of vertebrae (43 – 44, Fig. 3a vs. 39 in *P. atricaudus* Fig. 3b; 38 in *P. bufonius*; 38 – 40 in *P. mangurus*; 41 in *P. schultzi*) and by the deeply acute notch on lateral margins of transverse process of the fourth vertebra of the Weberian complex (Fig. 4a vs. shallowly concave in *P. atricaudus*, *P. bufonius*, *P. mangurus*, *P. schultzi*). It differs from *P. atricaudus* by the angle of < 90° formed by the medial junction of the posterior arm of the transverse process of the fourth vertebra (Figs. 4 and 5 vs. angle almost right). It differs from *P. atricaudus*, *P. bufonius*, and *P. mangurus* by length ratio of Weberian complex and neurocranium (32.1 – 36.3%, Fig. 5 vs. 46.9 – 55.5 in *P. atricaudus* and 42.7% in *P. mangurus*). It differs from *P. atricaudus*, *P. bufonius*, and *P. mangurus* by having shorter maxillary barbels, not surpassing the opercular margin (vs. reaching).
Additionally, *P. magnus* differs from the remaining species, except *P. atricaudus*, by the length of the posterior process of cleithrum (1.32 – 1.59 times the wide of the pectoral-fin spine base vs. 0.57 – 0.75 in *P. bufonius*, 2.22 – 2.76 in *P. schultzi*, 2.24 – 2.30 in *P. mangurus*). It differs from *P. bufonius*, *P. charus*, and *P. mangurus* by having a heart-shaped gas bladder (vs. dumbbell-shaped bladder; Fig. 6; Shibatta & Vari, 2017). It differs from *P. atricaudus* by having the anterior margin of the dorsal-fin spine serrated (vs. smooth). *Pseudopimelodus magnus* differs from congeners except *P. bufonius* and *P. schultzi* by having a narrow vertical dark band along the center of caudal fin, although in some specimens is hardly visible (vs. broad vertical dark band covering ≤ ½ caudal fin in *P. charus* and *P. mangurus* or ¾ of the caudal fin with base of rays and tip of caudal-fin lobes hyaline in *P. atricaudus*).

**Description.** Morphometric data in Table 2. Body depressed from snout tip to dorsal-fin origin; progressively compressed towards caudal-fin base. Snout rounded in dorsal view. Head trapezoidal, depressed, slightly longer than wide. Head covered by thick skin hiding fontanel and cranial roof bones. Eye small, covered by skin and positioned latero-dorsally. Prognathous jaw. Teeth small and villiform; premaxilla laterally projected backwards and reaching lateral process of lateral ethmoid. Anterior nostril tubular located lateroposteriorly to maxillary barbel base (Fig. 2). Posterior nostril equidistant from anterior nostril and eye. Maxillary barbel not reaching opercular margin. Mental barbel anteriorly inserted to gular apex. Inner mental barbel reaching gular apex. Outer mental barbel not reaching branchial opening. Gular fold V-shaped, with conspicuously pointed apex (Fig. 2). Branchiostegal membrane free from isthmus. Posterior process of vomer bifurcated. Posterior process of cleithrum triangular, its length 1.25 – 1.59 times width of pectoral-spine base. Vomer T-shaped, in contact with parasphenoid, mesethmoid, and lateral ethmoid. Posterior region of mesethmoid wider than base of parieto-supraoccipital process (Fig. 5a). Transverse process of fourth vertebra of Weberian complex forming an angle > 90° between anterior and lateral margins and < 90° between lateral and posterior margins, in ventral view (Fig. 4). Length of Weberian complex in relation to length of neurocranium 32.2 – 36.3%. Anterior fontanel elongated, not reaching transverse line through opening of infraorbital sensory canal in...
sphenotic. Posterior fontanel small and oval-shaped, located at center of parieto-supraoccipital (Fig. 5a).

Parieto-supraoccipital process with bifurcated tip in contact with supraneural (Fig. 5a). Heart-shaped gas bladder (Fig. 6). Lateral line complete, reaching caudal-fin base. Number of total vertebrae 43 – 44. Ribs 13. Axillary pore present. Dorsal-fin origin at anterior third of body. Posterior margin of fin convex.

Dorsal-fin spine strongly ossified with distal end pointed, shorter than next branched ray and with serrations on anterior margin. Dorsal-fin rays I, 6. Adipose-fin origin anterior to anal-fin origin. Pectoral-fin spine serrated, covered by skin; anterior margin with 18 – 41 serrations of similar size and posterior margin with 17 – 27 larger serrations. Posterior edge of pectoral fin convex. Axillary pore present.

Pectoral-fin rays I, 7. Posterior margin of pelvic fin rounded; origin inserted behind posterior end of dorsal-fin base. Pelvic-fin rays i, 5. Anal fin with posterior edge rounded and inserted below 20th vertebra. Anal-fin rays iii, 7. Caudal fin bifurcated, with pointed lobes, upper lobe slightly narrower and longer than ventral lobe. Caudal-fin rays i, 8, 7, i; dorsal procurent rays 14; ventral procurent rays 14.

**Color in life and alcohol.** Background of body of variable color from yellow to light brown with four vertical dark bands (Fig. 7). First predorsal band partially cojoined with subdorsal band at level of upper corner of branchial margin. Subdorsal band connected dorsally with sub-adipose band, almost reaching anal-fin base. Dark band on caudal-fin base, completely fused or separated from sub-adipose band in dorsal region. In some specimens, bands less evident and faint. Region between bands with small, scattered and irregularly-shaped spots. Body covered by bright yellow mucus. Pectoral, ventral, and dorsal fins reddish with two transverse dark bands, at base and last-third of each fin. Adipose-fin of same color as body, occasionally covered by sub-adipose band in middle region. Caudal fin pale brown with or without narrow dark band along the center of caudal fin. Color in alcohol (Fig. 2) similar to live coloration, except regions lacking superficial mucus, becoming darker (grey to brown).

**Distribution.** Magdalena River, from upper sector at El Quimbo dam to the confluence with the Gualí River in Honda town. Cauca River throughout the entire basin (Fig. 8).
Etymology. The specific name *magnus* is from the Latin, meaning “great” and refers to the fact that is the largest species of *Pseudopimelodus* described so far (see Shibatta, 2003; Ortega-Lara, 2012; de Oliveira et al., 2015; Vicentin, Silva-Ferreira & Rondón-Suarez, 2019).

**Pseudopimelodus atricaudus**, sp. nov. (Fig. 9)

*Pseudopimelodus schultzi* [not Dahl, 1955]. — Ortega-Lara & Lehmann, 2006: 155 [Magdalena Basin; comparative material]. — Mojica et al. 2006: 33 [middle Magdalena basin; check list]. — Villa-Navarro et al., 2006: 15 [upper Magdalena basin; check list].

*Pseudopimelodus* cf. *bufonius* [not Valenciennes, 1840]: — Jiménez-Segura & Ortega-Lara, 2011: 545 [Magdalena River Basin; fisheries].

**Holotype.** CIUA 5141, 143.7 mm SL, Colombia, Sucre, Magdalena River Basin, Cauca River in Guaranda, 8°19’04.6” N, 74°31’56.9” W, Feb 2018, Restrepo-Gómez A.M.

**Paratypes.** ANDES I211, 1, 185.3 mm SL, Colombia, Antioquia, Magdalena River Basin, Cauca River in Barrio Chino, Caucasia, 8°00’35.2” N, 75°00’0” W, Dec 2015, Restrepo-Gómez A.M. ANDES I212, 1, 203.5 mm SL, Colombia, Antioquia, Magdalena River Basin, Cauca River in Paloma, Caucasia, 7°59’31.7” N, 74°58’35.6” W, Dec 2015, Restrepo-Gómez A.M. CIUA 5159, 1, 241.0 mm SL, Colombia, Antioquia, Magdalena River Basin, Cauca River in Barrio Chino, Caucasia, 08°00’35.3” N, 75°00’0” W, Dec 2015, Restrepo-Gómez A.M. CIUA 5160, 1, 190.0 mm SL, Colombia, Antioquia, Magdalena River Basin, Cauca River in La Ilusión, Caucasia, 8°1’50” N, 75°00’0.9” W, Dec 2015, Restrepo-Gómez A.M. CIUA 5161, 1, 205.0 mm SL, Colombia, Bolívar, Magdalena River Basin, Cauca River in Punta Cartagena, Pinillos, 8°53’37.3” N, 74°28’28.4” W, Feb 2014, Olaya G. CIUA 5162, 1, 250.0 mm SL, Colombia, Antioquia, Magdalena River Basin, Cauca River in Venecia, 6°39’47.6” N, 75°50’9” W, Dec 2015, Olaya G. CP-UCO 3857, 3, 131.8 –198.9 mm SL, Colombia, Antioquia, Magdalena River Basin, Cauca River in Barrio Chino,
Caucasia, 8°0’35.3” N, 75°0’0” W, Dec 2015, Restrepo-Gómez A.M. CP-UCO 3858, 3, 153.8 – 192.6 mm SL, Colombia, Bolivar, Magdalena River Basin, Cauca River in Punta Cartagena, Pinillos, 8°53’37.3” N, 74°28’28.4” W, Jan 2015, Olaya G. CP-UCO 3859, 1, 109.0 mm SL, Colombia, Bolivar, Magdalena River Basin, Caribona River in Montecristo, 8°19’6.1” N, 74°31’7.9” W, Dec 2015, Restrepo-Gómez A.M. CZUT-IC 1785, 2, 136 – 178 mm SL, Colombia, Tolima, Magdalena River Basin, Magdalena River in Honda, 5°14’05” N, 74°43’43” W, 15 Jan 2005. ICN-MHN 24387, 1, 147.9 mm SL, Colombia, Bolivar, Magdalena River Basin, Cauca River in Punta Cartagena, Pinillos, 8°53’37.3” N, 74°28’28.4” W, Jan 2015, Olaya G. IMCN 0324, 2, 139.7 – 185.3 mm SL, Colombia, Santander, Magdalena River Basin, Magdalena River in Puerto Wilches, ca. 7°19’39” N, 73°54’41” W, 27 Jun 1996, Aldana J. IMCN 4196, 1 C&S, 6, 90.08 – 210.3 mm SL, Colombia, Bolivar, Magdalena River Basin, Magdalena River in Hatillo de la Loba, Oct 2006, Ardila C. IMCN 8232, 3, 153.8 – 180.4 mm SL, Colombia, Tolima, Magdalena River in Honda, ca. 5°14’05” N, 74°43’43” W, 12 Jan 2007, Ortega-Lara A. IMCN 8233, 6, 99.4 – 275.0 mm SL, Colombia, Córdoba, San Jorge River in La Balsa, Corregimiento La Apartada, ca. 8°01’40” N, 75°23’04” W, 20 Jan 2016, Vallecilla-Valencia V., Ortega-Lara A. IMCN 8237, 7, 202 – 225 mm SL, Colombia, Santander, Magdalena River Basin, Magdalena River in Barrancabermeja, 7°01’56” N, 73°52’35” W, 26 Sep 2011, Ortega-Lara A. IMCN 8238, 1, 62.6 mm SL, Colombia, Bolivar, Magdalena River Basin, Yanacue stream in the Yanacue town, 7°18’14” N, 74°01’16” W, 15 Aug 2010, Ortega-Lara A. IMCN 8266, 1 DS, 203.5 mm SL, Colombia, Antioquia, Magdalena River Basin, Cauca River in Barrio Chino, Caucasia, 8°0’35.3” N, 75°0’0” W, Dec 2015, Restrepo-Gómez A.M. IMCN 8268, 1 DS, 160 mm SL, Colombia, Bolivar, Magdalena River Basin, Cauca River in San Jacinto del Cauca, 8°12’7.5” N, 74°45’15.5” W, Dec 2015, Restrepo-Gómez A.M. IMCN 8271, 1, 198.6 mm SL, Colombia, Bolivar, Magdalena River Basin, Cauca River in Punta Cartagena, Pinillos, 8°53’37.4” N, 74°28’28.5” W, Apr 2015, Olaya G.

Non-type material.
CIUA 366, 95 mm SL, Colombia, Cesar, Magdalena River Basin, Tucuy River in Becerril, 9°41’35” N, 73°27’42.1” W, May 2006, Montoya A.F. CIUA 367, 120 mm SL, Colombia, Cesar, Magdalena River
322 Basin, Maracas River in Becerril, 9°44’46.2” N, 73°10’38” W, May 2006, Montoya A.F. CIUA 528 3, 210
323 – 245 mm SL, Colombia, Valle del Cauca, Cauca River Basin, in Río Frío, 4°07’52.4” N, 76°16’22.1” W,
324 Jan 2007, Ochoa L., Ospina J.G. CIUA 840, 8 DS, Colombia, Antioquia, Magdalena River Basin,
325 Magdalena River in Puerto Berrios, 6°30’27.8” N, 74°23’49.3” W, Aug 2006, Cano J.M. CIUA 841, 7 DS,
326 Colombia, Antioquia, Magdalena River Basin, Magdalena River in Puerto Berrió, 6°30’27.8” N,
327 74°23’49.2” W, Aug 2006, Cano J.M. CIUA 1151, 4, 135 – 160 mm SL, Colombia, Antioquia, Magdalena
328 River Basin, Magdalena River in Puerto Berrio, 6°30’27.8” N, 74°23’49.3” W, Aug 2009, Jiménez L.F.
329 CIUA 2029, 2, 81.2 – 82.1 mm SL, Colombia, Santander, Magdalena River Basin, Sogamoso River in
330 Betulia, 7°05’14.2” N, 73°23’52” W, Jan 2011, Pelayo P. CIUA 2987, 195 mm SL, Colombia, Santander,
331 Magdalena River Basin in El Llanito floodplain lake, 7°10’12.2” N, 73°51’43.8” W, Aug 2010, Carvajal
332 J.D., Hernández A. CIUA 3240, 250, 200 mm SL, Colombia, Antioquia, Magdalena River Basin, Magdalena
333 River in Puerto Berrio, 6°30’27.8” N, 74°23’49.3” W, Jun 2013, Jiménez L.F. CIUA 3291, 2,
334 145 – 190 mm SL, Colombia, Antioquia, Magdalena River Basin, Magdalena River in Puerto Berrio,
335 6°30’27.8” N, 74°23’49.2” W, Jun 2013, Jiménez L.F. CIUA 3668, 190 mm SL, Colombia, Antioquia,
336 Magdalena River Basin, Magdalena River in Puerto Berrio, 6°29’50” N, 74°23’53” W, Aug 2014, Jiménez
337 L.F. CIUA 4797, 190 mm SL, Colombia, Antioquia, Magdalena River Basin, Magdalena River in Puerto
338 Berrio, 6°29’50” N, 74°23’53” W, May 2015, Londoño J.

339 Diagnosis. Pseudopimelodus atricaudus (Fig. 9) differs from the other Pseudopimelodus species by
340 having a dark band covering ¾ of the caudal fin with base of rays and tip of caudal-fin lobes hyaline (vs.
341 narrow vertical dark band along the center of caudal fin in P. bufonius, P. magnus, and P. schultzi,
342 although in some specimens is hardly visible; base of rays hyaline and broad band covering ≤½ caudal
343 fin in P. charus and P. mangurus), anterior margin of the dorsal-fin spine smooth (vs. serrated; Fig. 10).
344 Pseudopimelodus atricaudus differs from other Pseudopimelodus species except P. mangurus by having a
345 total of 39 vertebrae (vs. 38 in P. bufonius; 43 – 44 in P. magnus, Fig. 3; 41 in P. schultzi). It differs from
346 P. magnus by having a shallowly concave lateral margin of the transverse process of the fourth vertebra

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of the Weberian complex (Fig. 4 vs. deeply acute notch). Junction of the posterior margin of the transverse process of the fourth vertebra at angle approaching 90° (vs. < 90°; Figs. 4 and 5). It differs from *P. magnus*, *P. bufonius*, and *P. mangurus* by having a longer Weberian complex in relation to the length of the neurocranium (46.9 – 55.5%, Fig. 5 vs. 32.1 – 36.3% in *P. magnus*, 33.5% in *P. bufonius*, and 42.7% in *P. mangurus*). It differs from *P. bufonius* and *P. mangurus* by having shorter maxillary barbels, not surpassing the opercular margin (vs. surpassing). It differs from other *Pseudopimelodus* species except *P. magnus* by the length of the posterior process of cleithrum (1.25 – 1.62 times the width of the pectoral-fin spine base vs. 0.57 – 0.75 in *P. bufonius*, 2.22 – 2.76 in *P. schultzi*, 2.24 – 2.30 in *P. mangurus*). It differs from other *Pseudopimelodus* species except *P. magnus* and *P. schultzi* by having a heart-shaped gas bladder (vs. dumbbell-shaped; Fig. 6).

Description. Morphometric data in Table 3. Body depressed from snout to dorsal-fin origin; progressively compressed towards caudal-fin base. Snout rounded in dorsal view. Head as long as wide and covered by thick skin hiding fontanel and cranial roof bones. Eye small, covered by skin and positioned latero-dorsally. Prognathous jaw. Teeth small and villiform. Premaxilla laterally projected backwards, surpassing lateral process of lateral ethmoid. Anterior nostril tubular, located lateroposteriorly to maxillary barbel base (Figs. 8 and 10). Distance from anterior nostril to eye greater than distance to posterior nostril. Maxillary barbel reaching opercular margin. Mental barbel inserted anterior to gular apex. Inner mental barbel surpassing gular apex. Outer mental barbel surpassing branchial opening. Gular fold V-shaped, with rounded apex (Fig. 8). Branchiostegal membrane free from isthmus. Posterior process of cleithrum triangular, 1.25 – 1.62 of width of pectoral-fin spine base.

Vomer T-shaped, with bifurcated posterior process (Fig. 4b) and in contact with parasphenoid, mesethmoid, and lateral ethmoid. Posterior region of mesethmoid wider than base of parieto-supraoccipital process. Lateral margin of transverse process of fourth vertebra of Weberian complex smoothly-concave joining posteriorly to vertebral centra at right angle. Length of Weberian complex in relation to length of neurocranium 32.2 – 36.3%. Anterior fontanel elongated, reaching a transverse line through anterolateral
process of lateral ethmoid (Fig. 5b). Posterior fontanel small and oval-shaped, located at center of parieto-supraoccipital (Fig. 5b). Parieto-supraoccipital process rectangular, slightly wider at base, with bifurcated tip in contact with supraneural (Fig. 5b). Heart-shaped gas bladder (Fig. 6). Lateral line complete, reaching caudal-fin base. Total number of vertebrae 39. Dorsal-fin origin at anterior third of body, posterior margin straight, dorsal-fin spine strongly ossified, of equal length to first branched ray. Anterior margin of dorsal-fin spine smooth with its distal end pointed. Dorsal-fin rays I, 6. Adipose-fin origin at level of anal fin origin. Pectoral-fin spine with serrations and covered by skin, anterior and posterior margins with 17 – 19 and 13 – 17 serrations, respectively. Serrations on posterior margin slightly larger than those on anterior margin. Posterior edge of pectoral fin straight. Axillary pore present. Pectoral-fin rays I, 7. Pelvic fin emarginated, inserted behind end of dorsal-fin base. Pelvic-fin rays i, 5. Anal fin with rounded posterior edge and inserted below 17th vertebra. Anal-fin rays v, 7. Caudal-fin bifurcated, with pointed lobes, upper lobe slightly narrower and longer than ventral lobe. Caudal-fin rays i, 8, 7, i; dorsal procurent rays 17; ventral procurent rays 17.

**Color in life and alcohol.** Body covered by yellowish mucus with four irregularly-shaped dark bands on pre-dorsal, subdorsal, sub-adipose region, and caudal-fin base, clearly visible in juveniles (Fig. 11), but faint in adult specimens. Pre-dorsal and subdorsal bands not joined. Remaining bands variably joined at different levels without defined pattern. Body with small dark and scattered spots and belly whitish. Dorsal and anal fins brown with posterior margin pale. Caudal-fin base hyaline, dark brown on its posterior three-quarters. Pectoral and pelvic fins reddish with dark band at base. Color in alcohol similar to color in life.

**Distribution.** It is found on the Magdalena River below 200 m asl from the confluence of the Guali River in the city of Honda and in the middle and lower basins of the Cauca River, close to the mouth (Fig. 8).

**Etymology.** The specific name *atricaudus* is from the Latin, “ater” (black) and “cauda” (tail) and refers to the diagnostic black caudal fin.
Discussion

Molecular and morphological approaches were used in this study to test the hypothesis that undescribed species of *Pseudopimelodus* occur in Colombia. Available COI sequences allowed phylogenetic comparisons of samples studied here with members of all *Pseudopimelodus* species and other genera of Pseudopimelodidae. In contrast to the remaining *Pseudopimelodus* species, some osteological features remained unaddressed in *P. charus*, due to the lack of skelotonized specimens, although we could analyze its external morphology and coloration patterns.

This study provides evidence of two new species of *Pseudopimelodus* from the Magdalena-Cauca River Basin, which due to similarities in the external morphology and lack of adequate taxonomic studies, were formerly identified as *P. bufonius* or *P. schultzi* (see synonymy of new species). *Pseudopimelodus magnus* shows a well-supported sister group relationship with *P. schultzi*, whereas *P. atricaudus* is the sister group to all *Pseudopimelodus* species. Additionally, the genetic distances in *Pseudopimelodus* species (see section molecular analyses) are concordant with intraspecific variation reported in Siluriformes (Hubert et al., 2008), except for *P. bufonius* from the Orinoco River Basin that showed larger genetic distances from its conspecifics from the Vaupés and Orteguaza rivers. A recent study indicates that *P. atricaudus* (lineage 1) diverged from *P. magnus* (lineage 5) about 16 mya, resulting from the uplift of the Antioqueño Plateau (Rangel-Medrano, Ortega-Lara & Márquez, 2020).

The new *Pseudopimelodus* species present three synapomorphies (thick skin on pectoral-fin spine, tip of pectoral-fin spine bifurcated and, small pseudotympanum opening) for the clade [*Cruciglanis*, *Pseudopimelodus*] *Rhyacoglanis*] and two synapomorphies for *Pseudopimelodus* (triangular mesacoracoid and a short posterior cleithral process) previously reported by Shibatta & Vari (2017).

Additionally, juveniles of *P. atricaudus* shows clearly visible bands while adult specimens exhibit faint or no bands with small dark and scattered spots, supporting one of the synapomorphies of Pseudopimelodidae.
However, the findings of heart-shaped gas bladder in the two new species described herein, *P. mangurus*, and *P. schultzi*, do not provide support to the dumbbell-shaped gas bladder (Birindelli, Shibatta, 2011) as synapomorphy of the clade [*Cruciglanis, Pseudopimelodus*] *Rhyacoglanis* (Shibatta & Vari, 2017). Compared with Shibatta & Vari (2017), this study also found a wider range of number of vertebrae (38 – 44 vs. 41 – 42), partial fusion between predorsal and subdorsal bands (vs. absent), and short maxillary barbels, falling short of vertical through dorsal-fin origin, although they are shorter in *P. magnus* and do not reach the opercular margin in *P. atricaudus*. Moreover, the anteriorly smooth dorsal-fin spine in *P. atricaudus* contrasts with the anteriorly serrated dorsal-fin spine described in *Pseudopimelodus* and *Rhyacoglanis* (Shibatta & Vari, 2017). This character, along with the pigmentation pattern of the caudal fin, represent autapomorphies for *P. atricaudus*. The largest body size and the highest number of vertebrae allow the discrimination of *P. magnus* from congeners, including *P. mangurus*, the longest *Pseudopimelodus* species known until now (see Shibatta, 2003). Likewise, the angles formed, in ventral view, between anterior and lateral margins of transverse process of the fourth vertebra of the Weberian complex also provided a diagnostic trait for *P. magnus*. *Pseudopimelodus* now includes six species (*P. atricaudus, P. bufonius, P. charus, P. magnus, P. mangurus, P. schultzi*), although this number is expected to increase, given the high genetic divergence observed among its members (Rangel-Medrano, Ortega-Lara & Márquez, 2020). The high genetic divergence observed among specimens from the Sinú River (type locality of *P. schultzi*) and other *Pseudopimelodus*, suggests that *P. schultzi* is restricted to only the Caribbean river basin and therefore its presence in the Magdalena-Cauca River Basin must be questioned. These results contribute to redefine the geographical distribution of *Pseudopimelodus* in northwestern South America and may support further studies in phylogenetics, fisheries, reproduction, and population genetics to eventually elucidate the basic biology of these species and their conservation status.

**Conclusions**
Based on molecular and morphological analyses, this study describes two new species of *Pseudopimelodus* Bleeker, 1858 (Siluriformes: Pseudopimelodidae) from the Magdalena-Cauca River Basin, Colombia. These results show the taxonomical complexity of *Pseudopimelodus* in an area where the presence of only two of four members of this genus have been recorded. Thus, further taxonomic as well as phylogenetic studies of *Pseudopimelodus* are needed to clarify the status of divergent lineages currently included in this genus.

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**Table 1** (on next page)

List of COI sequences of species of Pimelodoidea used for phylogenetic analysis.

1Rangel-Medrano, Ortega-Lara & Márquez (2020); 2Oliveira, pers comm; 3de Carvalho et al., 2011.
| Species                                      | Geography                      | GenBank accession                  | Sample size |
|---------------------------------------------|--------------------------------|-----------------------------------|-------------|
| *Pseudopimelodus atricaudus* H1             | Cauca River lower sector       | MH553571                          | 1           |
| *Pseudopimelodus atricaudus* H8             | Cauca River lower sector       | MH553578, MH800618- MH800636      | 20          |
| *Pseudopimelodus atricaudus* H11            | Cauca River lower sector       | MH553581                          | 1           |
| *Pseudopimelodus atricaudus* H21            | Magdalena River lower sector   | MH553591                          | 1           |
| *Pseudopimelodus magnus* H12               | Cauca River middle sector      | MH553582                          | 1           |
| *Pseudopimelodus magnus* H13               | Cauca River middle sector      | MH553583                          | 1           |
| *Pseudopimelodus magnus* H14               | Cauca River middle sector      | MH553584                          | 1           |
| *Pseudopimelodus magnus* H16               | Cauca River middle sector      | MH553586                          | 1           |
| *Pseudopimelodus magnus* H17               | Magdalena River upper sector   | MH553587, MH800728- MH800730      | 4           |
| *Pseudopimelodus magnus* H18               | Cauca River middle sector      | MH553588, MH800711- MH800714      | 5           |
| *Pseudopimelodus magnus* H19               | Cauca River middle sector      | MH553589                          | 1           |
| *Pseudopimelodus magnus* H20               | Cauca River middle sector      | MH553590                          | 1           |
| *Pseudopimelodus magnus* H23               | Cauca River upper sector       | MH553593                          | 1           |
| *Pseudopimelodus magnus* H24               | Cauca River upper sector       | MH553594                          | 1           |
| *Pseudopimelodus schultzi* H25              | Sinú River                     | MH553595                          | 1           |
| *Pseudopimelodus schultzi* H26              | Sinú River                     | MH553596                          | 1           |
| *Pseudopimelodus bufonius* H27             | Vaupés River                   | MH800834                          | 1           |
| *Pseudopimelodus bufonius* H28             | Orteguaza River                | MH553598, MH800832                | 2           |
| *Pseudopimelodus bufonius* H33             | Orinoco River                  | MH553603                          | 1           |
| *Pseudopimelodus mangurus*                  | Paranapanema River             | EU179816                          | 1           |
| *Pseudopimelodus charus*                   | São Francisco River            | EU179815                          | 1           |
| *Cruciglanis* sp. AOL81                    | Mira River                     | MH553609                          | 1           |
| *Cruciglanis pacifici* AOL094              | Anchicayá River                | MH553607                          | 1           |
| *Rhyachoglanis annullatus* AOL097-98        | Meta River                     | MH553605-06                       | 2           |
| *Rhyachoglanis pulcher*                    | ---                            | EU179812                          | 1           |
| *Cephalosilurus apurensis*                 | Orinoco River                  | EU179818                          | 1           |
| *Batrochoglanis raninus*                   | Aquarium                       | EU179809                          | 1           |
| *Lophiosilurus alexandri*                  | São Francisco River            | HM405152                          | 1           |
| *Microglanis* sp. AOL095                   | Acacias River                  | MH553604                          | 1           |
| *Pimelodus yuma*                           | Cauca River lower sector       | MH553610                          | 1           |
| *Pseudoplatystoma magdaleniatum*            | Cauca River lower sector       | MH553611                          | 1           |
Table 2 (on next page)

Morphometric data of *Pseudopimelodus magnus* (32 specimens).
| Measure                                                                 | Holotype | Max   | Min   | Mean  | SD   |
|------------------------------------------------------------------------|----------|-------|-------|-------|------|
| Standard length (mm)                                                   | 750      | 531.7 | 168   | 279.4 | 86   |
| **Percentages of standard length**                                     |          |       |       |       |      |
| Head length                                                            |          | 23.3  | 32.1  | 23.3  | 30.0 | 1.4 |
| Pre-dorsal distance                                                    |          | 30.0  | 36.8  | 30.0  | 34.5 | 1.2 |
| Pre-pectoral distance                                                  |          | 24.0  | 27.6  | 23.7  | 25.2 | 1.0 |
| Pre-pelvic distance                                                    |          | 41.3  | 58.8  | 41.3  | 53.2 | 2.9 |
| Distance between pectoral-fin origin and dorsal-fin origin            |          | 21.3  | 25.2  | 21.3  | 22.8 | 1.0 |
| Distance between pectoral-fin origin and pelvic-fin origin            |          | 22.0  | 35.7  | 22.0  | 31.4 | 2.5 |
| Distance between dorsal-fin origin and pelvic-fin origin              |          | 26.7  | 30.7  | 23.8  | 26.7 | 1.8 |
| Dorsal-fin base length                                                |          | 8.4   | 14.1  | 8.4   | 12.5 | 1.0 |
| Distance between adipose-fin origin and pelvic-fin origin             |          | 24.7  | 33.9  | 24.7  | 28.8 | 2.0 |
| Distance between pelvic-fin origin and anal-fin origin                |          | 19.7  | 27.9  | 19.7  | 25.4 | 1.6 |
| Distance between anal-fin origin and adipose-fin origin               |          | 19.3  | 19.3  | 13.1  | 15.7 | 1.4 |
| Adipose-fin base length                                               |          | 9.8   | 14.7  | 9.8   | 13.0 | 1.2 |
| Anal-fin base length                                                  |          | 13.6  | 13.6  | 7.9   | 9.8  | 1.1 |
| Pectoral-fin base length                                              |          | 18.7  | 27.8  | 18.7  | 25.5 | 1.7 |
| Pelvic-fin base length                                                |          | 14.0  | 19.2  | 11.8  | 14.4 | 1.7 |
| **Percentages of head length**                                         |          |       |       |       |      |
| Orbital diameter                                                      |          | 5.6   | 9.1   | 4.6   | 6.0  | 1.1 |
| Snout length                                                          |          | 41.7  | 41.7  | 24.5  | 33.6 | 2.8 |
| Distance between maxillary barbels                                    |          | 53.1  | 53.1  | 39.6  | 46.2 | 2.6 |
| Distance between anterior most mesial point of snout and left anterior nostril | 11.6 | 18.8  | 9.3   | 14.0  | 2.6 |
| Distance between maxillary barbel and eye                             |          | 14.0  | 19.1  | 13.3  | 15.8 | 1.3 |
| Distance between anterior nostrils                                    |          | 29.2  | 29.2  | 19.7  | 24.0 | 2.0 |
| Distance between posterior nostrils                                   |          | 34.5  | 34.5  | 23.0  | 27.2 | 2.3 |
| Distance between anterior and posterior nostrils                       |          | 7.0   | 8.9   | 5.0   | 7.2  | 0.9 |
| Distance between posterior nostril to eye                              |          | 9.0   | 9.0   | 4.4   | 7.1  | 1.0 |
| Interorbital distance                                                 |          | 49.6  | 49.6  | 34.3  | 41.1 | 2.7 |
| Mouth width                                                           |          | 73.2  | 82.7  | 60.1  | 71.9 | 5.9 |
| Distance between outer mental barbels                                 |          | 42.4  | 46.9  | 34.0  | 39.1 | 2.9 |
| Distance between inner mental barbels                                 |          | 23.3  | 24.5  | 16.3  | 21.0 | 2.2 |
**Table 3 (on next page)**

Morphometric data of *Pseudopimelodus atricaudus* (41 specimens).

| Measurement | Mean | Std Dev | Minimum | Maximum |
|-------------|------|---------|---------|---------|
| Length      |      |         |         |         |
| Width       |      |         |         |         |
| Height      |      |         |         |         |

(continued on next page)
| Parameters                                                   | Holotype | Max    | Min    | Mean  | SD   |
|--------------------------------------------------------------|----------|--------|--------|-------|------|
| **Standard length (mm)**                                     | 143.7    | 278.3  | 87.7   | 173   | 38.7 |
| **Percentages of standard length**                           |          |        |        |       |      |
| Head length                                                 | 30.1     | 33.4   | 26.3   | 29.9  | 1.8  |
| Pre-dorsal distance                                         | 37.5     | 40.6   | 35.2   | 37.6  | 1.5  |
| Pre-pectoral distance                                       | 29.5     | 30.8   | 24.6   | 26.8  | 1.6  |
| Pre-pelvic distance                                         | 52.9     | 59.6   | 51.3   | 54.9  | 2.2  |
| Distance between pectoral-fin origin and dorsal-fin origin  | 23.9     | 27.4   | 21.6   | 24.7  | 1.2  |
| Distance between pectoral-fin origin and pelvic-fin origin  | 25.6     | 37.7   | 25.6   | 32.3  | 2.5  |
| Distance between dorsal-fin origin and pelvic-fin origin     | 25.7     | 30.5   | 21.6   | 26.5  | 2.1  |
| Dorsal-fin base length                                      | 14.8     | 16.9   | 13.1   | 14.8  | 0.8  |
| Distance between adipose-fin origin and pelvic-fin origin   | 24.8     | 36.8   | 24.1   | 29.1  | 2.4  |
| Distance between pelvic-fin origin and anal-fin origin       | 23.4     | 30.5   | 21.8   | 24.7  | 1.7  |
| Distance between anal-fin origin and adipose-fin origin      | 17.9     | 19.0   | 14.4   | 16.9  | 1.2  |
| Adipose-fin base length                                     | 17.8     | 17.8   | 11.9   | 15.1  | 1.6  |
| Anal-fin base length                                         | 11.7     | 13.3   | 9.5    | 10.8  | 0.9  |
| Pectoral-fin base length                                    | 23.7     | 32.1   | 20.4   | 25.5  | 3.1  |
| Pelvic-fin base length                                       | 17.2     | 23.3   | 13.4   | 17.6  | 2.2  |
| **Percentages of head length**                               |          |        |        |       |      |
| Orbital diameter                                            | 8.2      | 11.1   | 5.6    | 8.3   | 1.3  |
| Snout length                                                | 36.8     | 40.4   | 20.7   | 30.8  | 4.8  |
| Distance between maxillary barbels                          | 45.3     | 56.5   | 42.2   | 48.9  | 3.3  |
| Distance between anteriormost mesial point of snout and anterior nostril | 9.5      | 16.0   | 6.5    | 10.1  | 2.5  |
| Distance between maxillary barbel and eye                    | 11.3     | 18.1   | 10.9   | 14.3  | 1.6  |
| Distance between anterior nostrils                           | 26.9     | 30.5   | 20.9   | 25.8  | 2.3  |
| Distance between posterior nostrils                          | 30.2     | 33.5   | 21.3   | 28.6  | 2.7  |
| Distance between anterior and posterior nostrils             | 7.1      | 9.4    | 4.2    | 7.0   | 1.0  |
| Distance between posterior nostril to eye                    | 6.9      | 10.5   | 6.4    | 8.6   | 1.2  |
| Interorbital distance                                       | 43.0     | 49.4   | 34.5   | 43.2  | 3.9  |
| Mouth width                                                 | 67.2     | 93.7   | 60.8   | 77.2  | 7.6  |
| Distance between outer mental barbels                       | 47.8     | 51.2   | 38.6   | 44.4  | 2.9  |
| Distance between inner mental barbels                       | 25.1     | 31.7   | 18.7   | 25.4  | 2.5  |
Figure 1

Bayesian phylogenetic tree based on partial sequences of COI gene, showing the phylogenetic position of *Pseudopimelodus magnus* and *P. atricaudus* within Pseudopimelodidae.
Figure 2

*Pseudopimelodus magnus*, holotype, CIUA 5142, 750 mm SL, Colombia, Antioquia, Magdalena River basin, Cauca River in Venecia.

a, b, c: dorsal, lateral, and ventral view, respectively. Scale bar = 5 cm. Photography: Giovany Olaya Betancur. Photographic edition: Mauricio Urrego Tobón.
Figure 3

Dried skeletons of *Pseudopimelodus magnus*, paratype, IMCN 8265, 213.7 mm SL (a) and *P. atricaudus*, paratype, IMCN 8266, 203.5 mm SL (b).

Scale bar = 1 cm. Photography: Anderson Cardona Ruiz. Photographic edition: Mauricio Urrego Tobón.
Figure 4

Neurocranium and Weberian complex in ventral view of *Pseudopimelodus magnus*, paratype, IMCN 8265, 213.7 mm SL (a) and *P. atricaudus*, paratype, IMCN 8266, 203.5 mm SL (b).

TP4: transverse process of fourth vertebra, TP5: transverse process of fifth vertebra. Scale bar: 1 cm. Photography: Anderson Cardona Ruiz. Photographic edition: Mauricio Urrego Tobón.

*Note: Auto Gamma Correction was used for the image. This only affects the reviewing manuscript. See original source image if needed for review.*
Figure 5

Neurocranium and Weberian complex in dorsal view of *Pseudopimelodus magnus*, paratype, IMCN 8265, 213.7 mm SL (a) and *P. atricaudus*, paratype, IMCN 8266, 203.5 mm SL (b).

Mes: mesethmoid; PP-SO: parieto-supraoccipital; TP4: transverse process of fourth vertebra; TP5: transverse process of fifth vertebra. Scale bar: 1 cm. Photography: Anderson Cardona Ruiz. Photographic edition: Mauricio Urrego Tobón.

*Note: Auto Gamma Correction was used for the image. This only affects the reviewing manuscript. See original source image if needed for review.*
Figure 6

Gas bladder in ventral view of *Pseudopimelodus magnus*, IMCN 8939, 361 mm SL (a), *P. atricaudus*, IMCN 4196, 104.1 mm SL (b) and *P. bufonius*, Vaupés IMCN 8230, 137.4 mm SL (c).
Figure 7

Live individuals of *Pseudopimelodus magnus* from Colombia, Antioquia, Magdalena River basin, Cauca River in Venecia.

a. Specimen not collected, showing alternative coloration pattern. b. holotype. Scale bar: 5 cm. Photography: Ana M. Restrepo Gómez. Photographic edition: Mauricio Urrego Tobón.

*Note: Auto Gamma Correction was used for the image. This only affects the reviewing manuscript. See original source image if needed for review.*
Figure 8

Map of the Magdalena-Cauca River Basin showing the geographic distribution of *Pseudopimelodus magnus* (circles) and *P. atricaudus* (stars).

Red symbols denote type locality, black symbols denote additional collection sites. Map image layer by NOAA National Centers for Environmental Information (NCEI)
Figure 9

*Pseudopimelodus atricaudus*, holotype, CIUA 5141, 143.7 mm SL, Colombia, Sucre, Magdalena River basin, Cauca River in Guaranda.

a, b, c: dorsal, lateral, and ventral view, respectively. Scale bar = 1 cm. Photography: Giovany Olaya Betancur. Photographic edition: Mauricio Urrego Tobón.

*Note: Auto Gamma Correction was used for the image. This only affects the reviewing manuscript. See original source image if needed for review.*
Figure 10

Dorsal-fin spine of *Pseudopimelodus magnus*, paratype, IMCN 8265, 213.7 mm SL (a) and *P. atricaudus*, paratype, IMCN 8266, 203.5 mm SL (b).

Scale bar: 1 cm. Photography: Anderson Cardona Ruiz. Photographic edition: Mauricio Urrego Tobón.

*Note: Auto Gamma Correction was used for the image. This only affects the reviewing manuscript. See original source image if needed for review.*
Figure 11

Juvenile live individual of *Pseudopimelodus atricaudus* (not collected) from Colombia, Sucre, Cauca River in Guaranda.

Scale bar: 1 cm. Photography: Ana M. Restrepo Gómez. Photographic edition: Mauricio Urrego Tobón.

*Note: Auto Gamma Correction was used for the image. This only affects the reviewing manuscript. See original source image if needed for review.*