

Ichthyological Exploration of Freshwaters

An international journal for field-orientated ichthyology

This pdf file may be used for research, teaching and private purposes.

Exchange with other researchers is allowed on request only.

Any substantial or systematic reproduction, re-distribution, re-selling in any form to anyone, in particular deposition in a library, institutional or private website, or ftp-site for public access, is expressly forbidden.



Verlag Dr. Friedrich Pfeil · München

A new driftwood catfish species of *Tatia* (Teleostei: Auchenipteridae) from the western Amazon River basin in Colombia

Carlos DoNascimento*, Juan Gabriel Albornoz-Garzón*
and Jorge Enrique García-Melo**,***

Tatia caudosignata, new species, is described from terra firme streams of the Colombian Amazon. The new species is distinguished from congeners by its unique coloration pattern consisting of dorsal region of head and body cloaked in dark pigment, fading to pale towards ventral region; dorsal fin almost completely dark (excepting distal margin and last ray); narrow white bilobed band along base of caudal fin; and posterior margin of caudal fin with uniformly, darkly pigmented interradial membranes. Comments are provided on the phylogenetic affinities of *Tatia caudosignata*.

Tatia caudosignata, especie nueva, es descrita de arroyos de terra firme del Amazonas colombiano. La especie nueva se distingue de sus congéneres por su patrón de coloración único, consistiendo de región dorsal de la cabeza y cuerpo oscura, difuminándose hacia la región ventral pálida; aleta dorsal casi completamente negra (exceptuando el margen distal y el último radio); banda estrecha blanca, bilobulada, a lo largo de la base de la aleta caudal; y porción distal de la aleta caudal con membranas interradiales uniformemente oscuras. Comentarios sobre las afinidades filogenéticas de *Tatia caudosignata* son ofrecidos.

Introduction

The Centromochlinae is a monophyletic group of auchenipterid catfishes characterized by mature males having an anal fin modified to form an intromittent organ (Soares-Porto, 1998; Birindelli et al., 2015). As remaining auchenipterids, centromochlins are inseminating fishes, a unique feature that distinguishes this family among catfishes

(Ferraris, 2003; Birindelli, 2014). Centromochlins are defined by three exclusive synapomorphies, all related to anatomical modifications of the anal fin of males (Soares-Porto, 1998; Birindelli, 2014): (1) anal fin obliquely oriented relative to body axis; (2) anal-fin proximal radials oblique relative to the body axis and not interdigitated with hemal spines of the adjacent vertebrae; and (3) anal-fin proximal radials partially or entirely fused together-

* Instituto de Investigación de Recursos Biológicos Alexander von Humboldt, Villa de Leyva, Colombia. E-mail: cdonascimento@humboldt.org.co, jalbornoz@humboldt.org.co

** Unidad de Ecología y Sistemática (Unesis), Pontificia Universidad Javeriana, Bogotá, Colombia.

*** Grupo de Investigación en Zoología, Universidad del Tolima, Ibagué, Tolima, Colombia.
E-mail: jgarcia-m@javeriana.edu.co



Fig. 1. *Tatia caudosignata*, IAvH-P 17812, holotype, male, 111.6 mm SL; Colombia: Amazonas: Amazon River basin.

er, forming a single ossification. The subfamily currently comprises four genera: *Centromochlus* with 17 valid species broadly distributed in the main hydrographic basins of cis-Andean South America (Amazon, Orinoco, Paraná, and Guiana and Brazilian shields rivers); *Gelanoglanis* with 5 species restricted to the Amazon and Orinoco basins; *Glanidium* with 7 species distributed in coastal rivers between Suriname in the north to Laguna dos Patos in southern Brazil, and Paraná and Uruguay River basins; and *Tatia* with 16 spe-

cies widely distributed in the Orinoco, Amazon, and Paraná-Paraguay basins, and coastal rivers from the Essequibo to Amapá and Marajó island in Brazil (Sarmiento-Soares & Martins-Pinheiro, 2008; Birindelli et al., 2015; Fricke et al., 2018). In this paper, we describe a distinctive new species of *Tatia* from the western Amazon basin in Colombia, raising the number of species known from Colombia to nine and from the Colombian Amazon to six (DoNascimento et al., 2017).



Fig. 2. *Tatia caudosignata*, IAvH-P 8932, paratype, female, 101.3 mm SL; Colombia: Amazonas: Amazon River basin.

Material and methods

Counts of fin rays and measurements follow Sarmiento-Soares & Martins-Pinheiro (2008) and Vari & Calegari (2014). Measurements were made point-to-point and recorded to the nearest 0.1 mm with a digital caliper. Antrorse and retrorse definitions for serrations of the dorsal and pectoral-fin spines follow Sarmiento-Soares & Martins-Pinheiro (2008). Osteological features were examined in cleared and stained (CS) specimens prepared

according to the procedures described by Taylor & Van Dyke (1985). Counts of branchiostegal rays, gill rakers, procurrent caudal-fin rays, vertebrae, and ribs were performed only on CS specimens. Vertebral counts only included free vertebrae (five anterior elements incorporated into the Weberian complex were omitted) and the compound caudal centrum (PU1 + U1) was considered as a single element. Values for the holotype are indicated by asterisk or enclosed in parenthesis in the text. Nomenclature of osteological structures is

based on Birindelli (2014). Morphological data on species of *Tatia* compared in the diagnosis were obtained from specimens listed in the comparative material section or literature accounts (Royero, 1992; Sarmento-Soares & Martins-Pinheiro, 2008; Pavanelli & Bifi, 2009; Vari & Ferraris, 2013; Vari & Calegari, 2014; Sarmento-Soares et al., 2016). Abbreviations used in the text are: SL, standard length; and HL, head length. Institutional abbreviations follow Sabaj (2016).

Results

Tatia caudosignata, new species

(Figs. 1–2; Table 1)

Holotype. IAvH-P 17812, male, 111.6 mm SL; Amazon River basin, Colombia, Amazonas Department, Leticia, quebrada Sufragio, in front of the Reserva Biológica El Zafire, 04°00'19"S 69°53'55"W; F. Arbeláez, 7 September 2005.

Paratypes. All from Amazon River basin, Colombia, Amazonas Department, Leticia: IAvH-P 8932, 1 female, 101.3 mm SL; 1 CS, 91.4 mm SL; collected with the holotype. – IAvH-P 9133, 1 female, 82.2 mm SL; tributary stream to the río Calderón, 45 min N from Reserva Biológica El Zafire, 03°58'40"S 69°53'31"W; F. Arbeláez, 13 December 2005. – IAvH-P 9394, 2 females, 67.3–123.7 mm SL; 1 male, 106.3 mm SL; 1 CS, 67.3 mm SL; tributary stream to the río Pureté, 3 hours from Salado Varios, Parque Nacional Natural Amacayacu, 03°41'54"S 70°12'24"W; F. Arbeláez, 24 March 2006. – IAvH-P 9411, 1 male, 84.6 mm SL; second tributary stream to the río Pureté, 3 hours from Salado Varios, Parque Nacional Natural Amacayacu, 03°41'37"S 70°12'26"W; F. Arbeláez, 24 March 2006. – IAvH-P 9437, 1 female, 84.6 mm SL; same locality as IAvH-P 9394; F. Arbeláez, 26 March 2006. – IAvH-P 9459, 1 female, 86.2 mm SL; 1 male, 111.6 mm SL; same locality as IAvH-P 9394; F. Arbeláez, 27 March 2006. – IAvH-P 9082, 1 male, 89.4 mm SL; same locality as IAvH-P 9133; F. Arbeláez, 11 December 2005.

Diagnosis. *Tatia caudosignata* is distinguished from its congeners by its unique coloration pattern (Figs. 1–2) consisting of dorsal region of head and body cloaked in dark pigment, fading to pale towards ventral region; dorsal fin almost completely dark (excepting distal margin and

last ray); narrow white bilobed band along base of caudal fin; and distal portion of caudal fin with uniformly, darkly pigmented interradiation membranes [vs. a variety of alternative coloration patterns in congeners, none of which are readily comparable; see illustrations in Royero (1992: fig. 1), Sarmento-Soares & Martins-Pinheiro (2008), Pavanelli & Bifi (2009: fig. 1), Vari & Ferraris (2013: figs. 1–2), Vari & Calegari (2014: fig. 1)]. The new species is also distinguished by its relative large body size, reaching a maximum standard length of 123.7 mm (vs. 72.2 mm or less in *T. boemia*, *T. carolae*, *T. caxiuanensis*, *T. gyrina*, *T. jaracatia*, *T. marthae*, *T. meesi*, *T. melanoleuca*, and *T. strigata*). The number of post-Weberian vertebrae also differentiates *T. caudosignata* from most of its congeners: 35–37 vs. 38–39 in *T. aulopygia*, 34 in *T. boemia*, 30–31 in *T. carolae*, 32 in *T. caxiuanensis*, 32–33 in *T. galaxias*, 29–30 in *T. gyrina*, 31–32 in *T. jaracatia*, 30–31 in *T. marthae*, 34 in *T. meesi*, 29 in *T. melanoleuca*, 30 in *T. musaica*, 31–33 in *T. neivai*, 32 in *T. nigra*, and 29–30 in *T. strigata*.

The presence of an anterior nuchal plate in *Tatia caudosignata* distinguishes it from *T. carolae*, *T. melanoleuca*, and *T. musaica* which lack this element between the parieto-supraoccipital and middle nuchal plate. *Tatia caudosignata* further differs from *T. caxiuanensis*, *T. gyrina*, and *T. meesi* by having the nasal bone sutured to the mesethmoid through a wide medial flange (Fig. 3) (vs. nasal tubular, not sutured to the mesethmoid) and by a deeper caudal peduncle, depth 15.8–18.5 % SL (vs. less than 13.1). *Tatia caudosignata* is further distinguished from *T. boemia* and *T. neivai* by having five (vs. usually 4) branched pectoral-fin rays and by all vertebrae bearing ribs consecutively placed (vs. ribs absent from vertebra immediately anterior to last ribbed vertebra). *Tatia caudosignata* further differs from *T. intermedia* and *T. nigra* by having posterior process of cleithrum reaching (vs. not reaching) vertical through dorsal-fin origin (Figs. 1–2). The new species can be distinguished from *T. aulopygia*, *T. brunnea*, *T. dunni*, and *T. intermedia* by having a shorter snout, length 31–36 % HL (vs. 37–41 in *T. aulopygia*, 36–43 in *T. brunnea*, 36–42 in *T. dunni*, 39–44 in *T. intermedia*) and a smaller eye, diameter 18–21 % HL (vs. 23–26 in *T. aulopygia*, 21–26 in *T. brunnea*, 20–26 in *T. dunni*, 21–26 in *T. intermedia*). *Tatia caudosignata* further differs from *T. brunnea* by males having the first unbranched ray of the anal fin unsegmented (Fig. 4) (vs. divided into 3–5 segments) and the posterior most branched ray longer than half the

length of preceding ray (vs. reduced to half-length or less of preceding ray); narrower head, width 71–80 % HL (vs. 87–93); and narrower mouth, width 43–48 % HL (vs. 54–60). The new species can be further distinguished from *T. intermedia* by having an edentulous vomer at all sizes (vs. toothed vomer in specimens larger than 74 mm SL). *Tatia caudosignata* also differs from *T. dunni* by having a narrower mouth, width 43–48 % HL (vs. 48–52), five antrorse spinules along the distal anterior margin of the third unbranched ray of the modified anal fin of mature males (Fig. 4) (vs. 1–3),

and pectoral-fin spine banded (vs. uniformly dark brown, without transverse bands). Finally, *T. caudosignata* is further distinguished from *T. musaica* by having a deeper caudal peduncle, depth 15.8–18.5 % SL (vs. 7.7–12.0), maxilla short, not extending into the maxillary barbel (vs. long, extending into the maxillary barbel), ventrolateral process of infraorbital 1 short, not forming anterior border of orbit (vs. long, forming anterior border of orbit), and a sutured articulation between the metapterygoid and quadrate (Fig. 5) (vs. joined only by a cartilaginous contact).

Table 1. Morphometric data for holotype and paratypes (n=10) of *Tatia caudosignata*.

	Holotype	Mean	Range	Standard deviation
Standard length (mm)	111.6	95.8	67.3–123.7	–
In percent of standard length				
Body depth at anterior nuchal plate	23.0	22.5	20.1–26.4	2.0
Body width at cleithrum	19.7	20.3	18.8–21.4	1.0
Caudal peduncle length	24.7	23.4	20.2–26.3	1.9
Caudal peduncle depth	17.6	17.2	15.8–18.5	0.8
Predorsal length	31.1	31.2	30.0–32.3	1.0
Postdorsal length	73.3	72.7	70.6–75.4	1.6
Preanal length	69.2	68.7	66.7–72.3	2.0
Prepelvic length	53.9	52.9	51.5–54.5	0.9
Dorsal-fin to pectoral-fin distance	22.9	23.7	21.3–25.3	1.2
Dorsal-fin to pelvic-fin distance	31.6	31.4	28.0–34.7	2.0
Pectoral-fin to pelvic-fin distance	37.7	35.2	33.8–37.7	1.1
Pelvic-fin to anal-fin distance	12.9	13.3	12.2–15.1	1.1
Prepectoral length	19.7	19.6	17.5–20.7	1.2
Dorsal-fin base length	7.5	8.4	7.4–9.2	0.6
Adipose-fin base length	4.7	4.3	3.7–5.1	0.4
Anal-fin base length	3.1	6.1	2.7–9.1	2.7
Dorsal-fin spine length	13.2	14.8	11.5–16.8	1.5
Pectoral-fin spine length	20.7	19.6	17.2–21.4	1.4
Postcleithral process length	15.3	15.9	14.1–17.9	1.1
First branched pelvic-fin ray length	13.3	13.0	11.6–15.1	1.1
Longest anal-fin ray length	6.1	7.6	4.6–9.4	1.7
Maxillary-barbel length	24.2	27.6	24.2–30.3	1.6
Lateral mental-barbel length	7.1	7.0	5.5–8.1	0.8
Medial mental-barbel length	3.7	4.5	3.5–5.7	0.7
Head length	23.6	25.0	23.3–25.8	0.8
In percent of head length				
Head depth	46	46.0	44–49	1.6
Head width	78	74.9	71–80	2.7
Snout depth	31	29.7	27–33	1.7
Interorbital distance	58	55.5	51–60	2.6
Anterior-posterior narial width	17	15.7	12–17	1.7
Anterior internarial distance	37	33.7	32–37	1.5
Posterior internarial distance	31	28.7	25–31	1.7
Snout length	36	33.7	31–36	1.5
Orbital diameter	20	20.1	18–21	0.9
Mouth width	46	45.0	43–48	1.8
Prenasal length	18	20.3	18–22	1.4

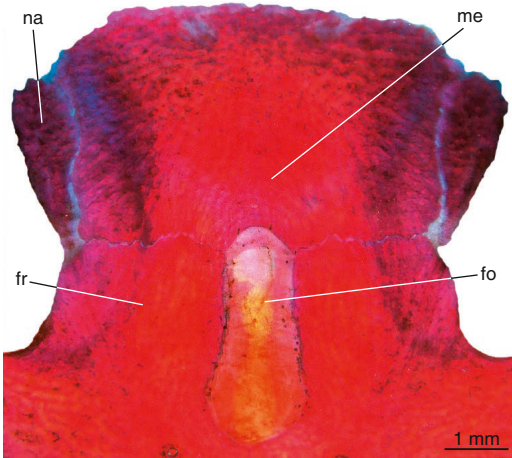


Fig. 3. Dorsal view of anterior region of neurocranium of *Tatia caudosignata*, IAvH-P 8932, paratype, 91.4 mm SL. Abbreviations: fo, fontanel; fr, frontal; me, mesethmoid; na, nasal.

Description. Morphometric data in Table 1. Body approximately cylindrical from rear of head through abdomen, then increasingly compressed towards caudal fin (Figs. 1–2). Body depth approximately constant behind pelvic-fin origin. Body width greatest at pectoral-fin origin; width greater than body depth at that point; caudal peduncle deep and compressed. Dorsal profile scarcely convex along snout region, continuing straight along posterior region of head to dorsal-fin origin, straight to slightly convex from this point to adipose-fin origin, then scarcely concave to anterior dorsal procurent rays of caudal fin. Ventral profile slightly convex along head, then slightly convex to straight to anal-fin origin, and scarcely concave along caudal peduncle.

Anus located at posterior fourth of pelvic-fin length. Post-Weberian vertebrae 35–37. First 10–11 vertebrae bearing well-developed ribs that decrease in size posteriorly.

Head robust, slightly depressed (Figs. 1–2). Maximum head width at transverse through opercular hinge; width at hinge approximately equal to maximum head depth but less than maximum body depth. Head profile very gently convex both dorsally and ventrally in lateral view. Head and snout broadly rounded in dorsal view. Opercular margin wide and attached to isthmus. Mouth terminal. Premaxillary teeth small, recurved, conical, arranged in 3–5 irregular rows. Lower jaw not prognathous. Dentary with 3–5 irregular

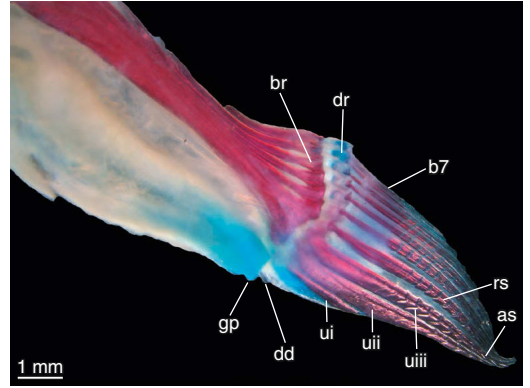


Fig. 4. Left lateral view of modified anal fin in mature male of *Tatia caudosignata*, IAvH-P 8932, paratype, 91.4 mm SL. Abbreviations: as, antrorse spinule; b7, seventh anal-fin branched ray; br, basal radial; dd, deferent duct; dr, distal radial; gp, genital papilla; rs, retorse spinule; ui, first unbranched anal-fin ray; uii, second unbranched anal-fin ray; uiiii, third unbranched anal-fin ray.

rows of conical teeth, similar in size and shape to those of premaxilla. Eye large, midlateral, partially visible in both dorsal and ventral views. Anterior naris located slightly posterior to anterior margin of snout and surrounded by short, anteriorly directed tube. Posterior naris remote from anterior naris; situated anterodorsal to orbit and along vertical through anterior margin of orbit. Posterior naris with very short, fleshy flap anteriorly. Maxillary barbel long, slender, and extending to vertical through anterior one-third of dorsal-fin base. Lateral mental barbel about twice length of medial mental barbel and scarcely surpassing posterior rim of eye.

Mesethmoid wider than longer; rostral margin curved. Cranial fontanel large, ellipsoidal (Fig. 3); anterior margin delimited by concavity in mesethmoid; lateral and posterior margins delimited by paired frontals; opening reaching posteriorly ca. 40 % of frontal bone length. Nasal well ossified, with medial bony flange sutured to mesethmoid (Fig. 3). Vomer with conspicuous broad lateral process, almost rectangular, its distal tip sutured with ventral surface of lateral ethmoid. Vomer edentulous with short posterior process. Epiotic process short, visible dorsally (Fig. 6). Posttemporo-supracleithrum well-developed, its ventral posterior end almost contacting dorsal margin of posterior process of cleithrum. Anterior nuchal plate variable in shape

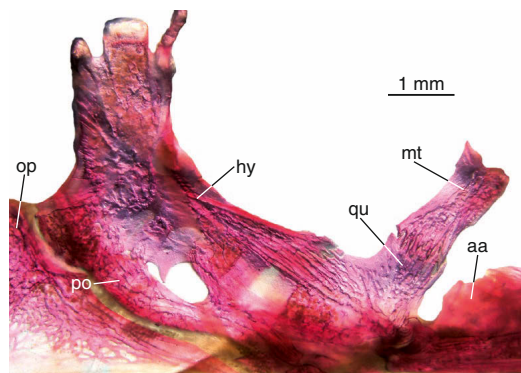


Fig. 5. Medial view of left suspensorium of *Tatia caudosignata*, IAvH-P 8932, paratype, 91.4 mm SL. Abbreviations: aa, angulo-articular; hy, hyomandibula; mt, metapterygoid; op, opercle; po, preopercle; qu, quadrate.

from pentagonal to hexagonal (Fig. 6). Posterior nuchal plate with lateral process anteroventrally directed (Fig. 7), reaching horizontal level of preopercular canal exit at pterotic. Maxilla similar in length to autopalatine. Autopalatine oriented along longitudinal axis of body. Suprapreopercle as short well-ossified lamina. Metapterygoid narrow, deeply sutured with quadrate and not contacting hyomandibula (Fig. 5). Branchiostegal rays slender, articulated with hyoid arch: four with anterior ceratohyal and two with posterior ceratohyal; last ray gradually expanded distally. Basibranchials 2 and 3 weakly ossified. Cartilaginous cap of posterior end of basibranchial 2 not contacting cartilaginous tip of anterior end of basibranchial 3, separated by a gap. Basibranchial 3 with posterior tip narrower than anterior tip. Ceratobranchial 1 with 5 gill rakers, ceratobranchial 2 with 4-5 gill rakers, ceratobranchial 3 with 4-6 gill rakers, ceratobranchial 4 with 4-5 gill rakers, ceratobranchial 5 with 2-4 gill rakers. Posterior process of cleithrum reaching vertical through base of dorsal-fin spine (Figs. 1-2).

Infraorbital canal continuous. Infraorbital 1 enclosing anterior section with a single terminal sensory pore, anterolaterally adjacent to supraorbital pore emerging between limit of nasal and frontal bones. Infraorbital canal continuing posteriorly with a short membranous tubule, horizontally aligned below anteroventral region of eye and ending in a terminal pore. Posterior section leaving sphenotic with two short, vertically oriented and weakly ossified tubules, connected

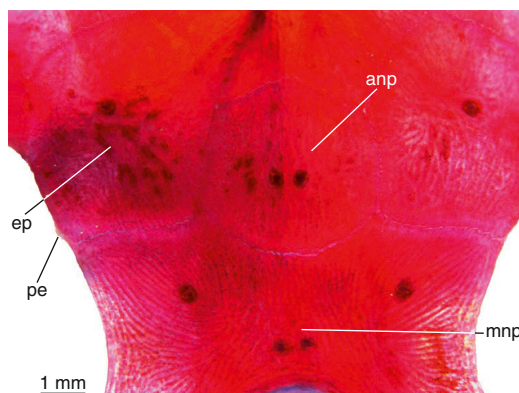


Fig. 6. Dorsal view of posterior region of neurocranium of *Tatia caudosignata*, IAvH-P 8932, paratype, 91.4 mm SL. Abbreviations: ep, epiotic; anp, anterior nuchal plate; mnp; middle nuchal plate; pe, posterior process of epiotic.

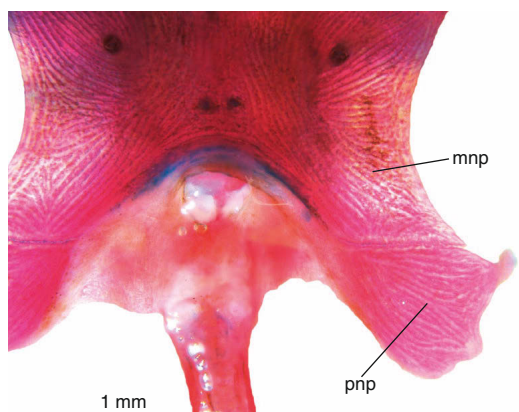


Fig. 7. Dorsal view of posterior region of nuchal shield of *Tatia caudosignata*, IAvH-P 8932, paratype, 91.4 mm SL. Abbreviations: mnp; middle nuchal plate; pnp, posterior nuchal plate.

anteriorly with long membranous horizontal tubule. Lateral line canal of body complete, ending just dorsal to base of inner ray of lower caudal-fin lobe. Posterior most section of lateral line slightly deflected dorsally.

Dorsal fin II,5. Dorsal-fin height greater than body depth at dorsal-fin origin. Tip of adpressed dorsal fin finishes beyond posterior end of pectoral fin. Dorsal-fin spine stout with up to 14-15 serrations along anterior margin, serrations progressively larger and antrorse towards spine tip; posterior margin smooth. First branched dorsal-fin ray longer than dorsal-fin spine; remaining

fin-rays progressively shorter posteriorly. Last fin-ray without posterior membranous attachment to body.

Pectoral fin I,5. Tip of adpressed fin finishes slightly beyond vertical through posterior end of dorsal-fin base, but far from vertical through pelvic-fin origin. Pectoral-fin spine with up to 28 (26*) antrorse serrations along entire anterior margin and 21 (19*) retrorse serrations along distal three fourths of posterior margin, extending almost to end of spine and giving bifid aspect to spine tip. Branched pectoral-fin rays progressively shorter posteriorly.

Pelvic fin i,5. Pelvic fin with rounded distal margin. Third and fourth branched rays longest. Pelvic-fin origin located posterior to vertical through distal tip of adpressed dorsal fin (at level of post-Weberian vertebra 8). Distal margin of pelvic fin falling slightly short of anal-fin origin. Adipose-fin base relatively short, origin at vertical through base of penultimate anal-fin ray in females.

Anal fin with 3 unbranched rays and 6* (7) or 7 (4) branched rays. Small and slender bony rudiment anterior to base of first unbranched ray. First unbranched ray unsegmented. Anal-fin origin posterior to pelvic-fin distal margin. Tip of adpressed anal fin falling distinctly short of anterior most procurrent caudal-fin ray. Base short and largely located anterior to vertical through adipose-fin origin. Fin margin slightly convex with fin rays similar in length in females. Last fin ray lacking membranous attachment to body. Anal-fin pterygiophores composed by seven distal radials. Last two distal radials cartilaginous. Hemal spines adjacent to anal-fin pterygiophores longer and slightly expanded distally.

Caudal fin forked, lobes somewhat pointed; $i,7+8,i$ principal rays, 20 upper procurrent and 19–20 lower procurrent rays.

Color in alcohol. Dorsum dark brown, gradually fading to white towards abdominal region (Figs. 1–2). In some specimens, dark pigmentation extends to insertion of anal fin and sides of caudal peduncle. Dorsal surface of snout similarly dark as dorsum. Dorsal bones of neurocranium posterior to snout, cranial fontanel, region encircling eye, posttemporo-supracleithrum, and posterior nuchal plate lighter brown, contrasting with darker adjacent areas. Lateral processes of posterior nuchal plate conspicuously lighter than and sharply contrasting surrounding dark areas

of dorsum. Ventral region of head white. Dorsal surface of maxillary barbel dark and ventral surface white. Mental barbels white. Dorsal fin uniformly dark brown as dorsum, except distal margin of branched rays and entire last dorsal-fin ray hyaline. Adipose fin with base dark brown as dorsum and posterodistal margin hyaline. Pectoral fin darkly pigmented above and lighter below. Pectoral fin spine with transverse dark brown bands. Pelvic and anal fins hyaline. In some specimens, chromatophores clustered into small spots at distal region of branched rays of pelvic fin and interradiial membrane of anterior most rays of anal fin. Basalmost region of caudal fin dark, posteriorly delimited by a narrow white bilobed stripe that extends vertically across basal half of caudal-fin rays. Interradiial membrane of distal portion of caudal fin uniformly dark.

Sexual dimorphism. Genital papilla of mature male not swollen, elongate and oblique to anteroposterior axis of body, running parallel to anterior margin of first anal-fin pterygiophore (Fig. 4). Short tip of deferent duct visible externally, through tip of genital papilla at level of first anal-fin ray base. Anal fin of mature males modified and short, with three unbranched anal-fin rays, associated with first pterygiophore. First unbranched ray unsegmented. Longer second and third unbranched rays and first branched ray forming conspicuous posteriorly curved and pointed tip. Anterior margin of second unbranched ray with five retrorse spinules. Anterior distal margin of third unbranched ray with four antrorse spinules. Anterior margin of first branched anal-fin ray with six retrorse spinules. First branched ray slightly longer than second and third branched rays, giving a slightly convex profile to distal margin of posterior region of anal fin. Posterior branched rays normally developed, with last ray not reduced, but similar in size to remaining rays. Anal-fin pterygiophores of male partially fused, proximally with seven pointed tips between hemal spines of vertebrae 17–19, distally with anteriormost one compound, followed by five distinguishable pterygiophores. Caudal fin symmetrical in females and with upper lobe slightly longer in mature males (ca. 12 % longer than lower lobe) (Figs. 1–2).

Distribution. *Tatia caudosignata* is known only from the Colombian Amazon. Specimens were collected at a few sites in the Pureté River (a direct

tributary to lower Putumayo River) and in an unnamed direct tributary to Amazon/Solimões (Fig. 8). These streams drain dense forests on terra firme and have yielded other notable discoveries such as the type series of *Chrysobrycon mojicai* (Vanegas-Ríos & Urbano-Bonilla, 2017), new species records for Colombia (e.g. *Trochilocharax ornatus*), and a presumably undescribed species of the characid genus *Hemigrammus* (F. C. T. Lima, pers. com. 2018).

Etymology. From *caudo* (tail) and *signatus* (marked), in reference to the distinctive color pattern of the caudal fin, consisting of a narrow, white, bilobed band along its base and the uniformly darkly pigmented interradiation membrane of the distal portion of the fin. Used as an adjective.

Discussion

Tatia caudosignata exhibits the three autapomorphies proposed by Sarmiento-Soares & Martins-Pinheiro (2008) to diagnose *Tatia* among Centromochlinae, i. e. (1) hyomandibula anterodorsally elongate and not contacting the narrow metapterygoid (Fig. 5); (2) caudal peduncle compressed and deep, depth 10.1–18.6 % SL (15.8–18.5 in *T. caudosignata*); and (3) adult males with short anal-fin base less than 8.0 % SL (2.8–3.5 % in *T. caudosignata*) (Fig. 1). Soares-Porto (1998) listed a fourth autapomorphy (hypothesized as reversed in *T. brunnea*): segments of first unbranched anal-fin ray fused in adult males, a condition verified here for the species herein described. *Tatia caudosignata* does not exhibit any of the autapomorphies proposed to diagnose the similar looking genus *Centromochlus*, such as maxilla elongated, extending into maxillary barbel; ventrolateral process of first infraorbital elongated, forming anterior margin of orbit; and parasphenoid and orbitosphenoid with longitudinal keel for attachment of *adductor arcus palatini* muscle (Soares-Porto, 1998; Sarmiento-Soares & Porto, 2006). In spite of some doubts recently raised on the monophyletic status of *Tatia* (Sarmiento-Soares et al., 2016), assignment of the new species to this genus appears to be warranted.

Inference on the phylogenetic position of *Tatia caudosignata* is largely limited to the single phylogenetic hypothesis available at present (Soares-Porto, 1998) which assessed only seven of the 17 valid species of *Tatia*. In this hypothesis, two main

clades were recovered, one comprising *T. gyrina* + *T. creutzbergi* (treated as a junior synonym of *T. gyrina* in Sarmiento-Soares & Martins-Pinheiro, 2008) and a larger clade composed of the remaining species (*T. aulopygia*, *T. boemia*, *T. brunnea*, *T. intermedia*, *T. neivai*, and *T. strigata*). *Tatia caudosignata* shares two of three synapomorphies proposed for the larger clade: nasal with lateral flanges of bone, partially sutured to mesethmoid (Fig. 3) and retrorse spinules along the anterior margin of first branched anal-fin ray (Fig. 4). In members of the larger clade, the upper caudal-fin lobe is 30–40 % longer than lower lobe in mature males (vs. only about 12 % longer in *T. caudosignata*). A subclade comprising *T. aulopygia*, *T. boemia*, *T. brunnea*, *T. intermedia*, and *T. neivai* was diagnosed by a well-developed supracleithrum (about 40–50 % HL) and antrorse spinules present on the anterior margin of third unbranched anal-fin ray. Both conditions are shared by *T. caudosignata*. Within this subclade, *Tatia brunnea* and *T. intermedia* were proposed as sister species based on the presence of a posterior nuchal plate with lateral processes recurved anteriorly (Fig. 7) (homoplastically found in *T. strigata*) and pectoral-fin spine with transverse dark bands (a feature later found to be variable within both species; Sarmiento-Soares & Martins-Pinheiro, 2008). *Tatia caudosignata* exhibits both putatively derived conditions. But, given the intraspecific variation or equivocal taxonomic distribution of these character states, their phylogenetic signal renders ambiguous the resolution of this region of the cladogram. Thus, a more comprehensive assessment of phylogenetic relationships within *Tatia* is necessary, especially since its known taxonomic diversity has increased 40 % since Soares-Porto (1998).

Comparison material. All from Colombia: *Centromochlus altae*. Amazon River basin: CZUT-IC 12064, 1, 23.5 mm SL; Caquetá, Morelia, quebrada Aguas Calientes.

C. existimatus. Amazon River basin: IAvH-P 15985, 1, 78.2 mm SL; Amazonas, La Pedrera, río Caquetá.

C. heckelii. Amazon River basin: IAvH-P 508, 8, 55.1–63.2 mm SL; Amazonas, Leticia, río Amazonas. – IAvH-P 5303, 1, 112.7 mm SL; Amazonas, La Chorrera, río Igará-Paraná, lago Murizi. – IAvH-P 5655, 3, 79.0–82.9 mm SL; Amazonas, La Pedrera, río Caquetá. Orinoco River basin: IAvH-P 1055, 15, 78.6–87.9 mm SL; Meta, Puerto Gaitán, laguna La Española. – IAvH-P 10964, 4, 77.1–85 mm SL; Meta, río Meta.

C. macracanthus. Amazon River basin: CZUT-IC 3632, 1, 81.9 mm SL; Vaupés, Yavaraté, río Papurí. – IAvH-P 14318, 2, 68.2–69.9 mm SL; Vaupés, Yavaraté, río Papurí.

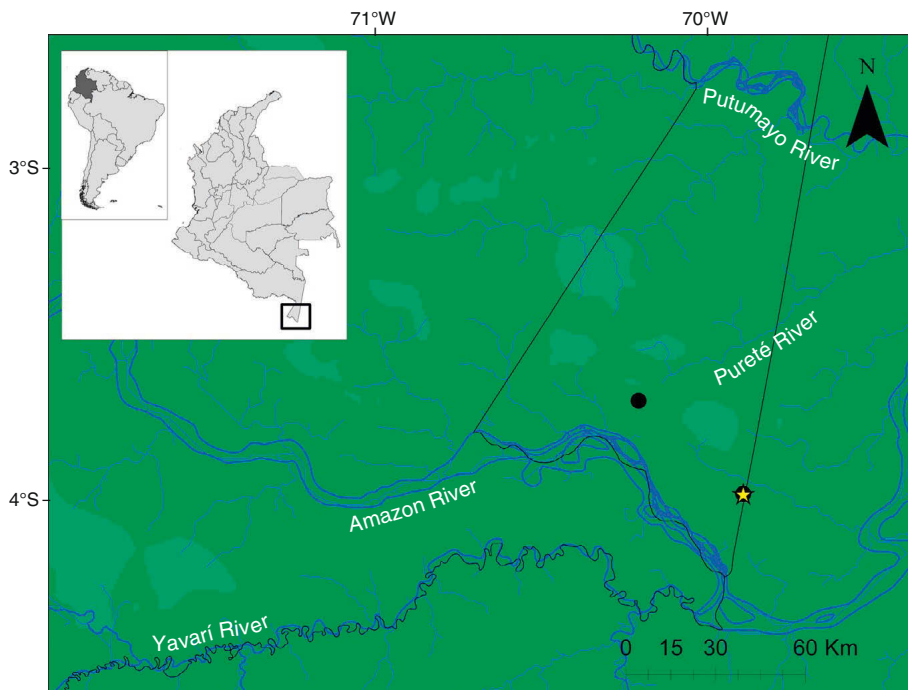


Fig. 8. Map of southern portion of Colombia showing type locality (☆) and collecting localities of paratypes (●) of *Tatia caudosignata*. Some symbols represent more than one lot and/or locality.

C. perugiae. Amazon River basin: IAvH-P 9301, 7, 19.6–38.0 mm SL; Amazonas, Leticia, Parque Nacional Natural Amacayacu, quebrada Matamatá. – IAvH-P 9379, 17, 17.8–39.9 mm SL; Amazonas, Leticia, Parque Nacional Natural Amacayacu, quebrada Matamatá.

C. reticulatus. Orinoco River basin: IAvH-P 12886, 1, 78.2 mm SL; Vichada, Puerto Carreño, caño Juriepe, tributary to the río Meta.

C. romani. Orinoco River basin: CZUT-IC 6922, 32, 21.3–30 mm SL; Meta, Acacías, río Orotoy. – CZUT-IC 11348, 5, 11.8–18.1 mm SL; Casanare, Maní, río Cusiana, caño Materro. – IAvH-P 13204, 1, 23.9 mm SL; Casanare, Hato Corozal, caño El Oso. – IAvH-P 13361, 7, 27.2–28.5 mm SL; Casanare, Hato Corozal, río Chire Nuevo.

Tatia aulopygia. Amazon River basin: IAvH-P 9108, 1, 120.7 mm SL; and IAvH-P 9134, 2, 85.1–147.6 mm SL; Amazonas, Leticia, stream tributary to the río Calderón.

T. brunnea. Amazon River basin: CIACOL 867, 15, 31.2–86.4 mm SL; Vaupés, Mitú, creek on the road Mitú-Monfor.

T. dunni. Amazon River basin: CZUT-IC 3631, 1, 81.6 mm SL; Vaupés, Yavaraté, río Papurí. – IAvH-P 12669, 1, 21.3 mm SL; Amazonas, quebrada Pichuna.

T. galaxias. Orinoco River basin: CZUT-IC 3230, 3, 13.1–31.1 mm SL; Casanare. – IAvH-P 12887, 15, 27.3–48.1 mm SL; Vichada, Puerto Carreño, caño Juriepe, tributary to the río Meta. – IAvH-P 12906, 10, 23.79–67.48 mm SL; Vichada, Puerto Carreño, Bojonawi.

T. gyrina. Amazon River basin: CZUT-IC 4311, 4, 19.1–23.8 mm SL; Vaupés, caño Jipaba. – CZUT-IC 4350, 1, 24.8 mm SL; Vaupés, caño Jipaba.

T. intermedia. Amazon River basin: CZUT-IC 4526, 1, 30.1 mm SL; Vaupés, río Cuduyarí, Piramiri. – CZUT-IC 4495, 8, 17.3–30.5 mm SL; Vaupés, río Cuduyarí, Piramiri. – IAvH-P 2352, 1, 45.5 mm SL; Amazonas, La Chorrera, río Igará-Paraná, lago Murizi. Orinoco River basin: IAvH-P 1232, 1, 97.2 mm SL; Guainía, Puerto Inírida, caño Guaribén.

T. marthae. Orinoco River basin: IAvH-P 12473, 206, 11.4–22.2 mm SL; Vichada, caño Mosco, tributary to the río Bitá. – IAvH-P 14822, 63, 10.0–15.7 mm SL; Vichada, Puerto Carreño, Madre Vieja.

T. nigra. Amazon River basin: CZUT-IC 4441, 2, 59.7–63.0 mm SL; Vaupés, río Cuduyarí. – CZUT-IC 4544, 3, 57.3–66.5 mm SL; Vaupés, río Cuduyarí, Piramiri. – CZUT-IC 4986, 6, 31.1–66.4 mm SL; Guainía, río Guainía, caño Maimachí. Orinoco River basin: IAvH-P 12474, 57, 18.7–49.5 mm SL; Vichada, caño Mosco. – IAvH-P 14887, 22, 23.8–45.2 mm SL; Vichada, Puerto Carreño, Madre Vieja.

T. strigata. Orinoco River basin: IAvH-P 12577, 16, 15.0–28.0 mm SL; and IAvH-P 12579, 18, 14.5–19.4 mm SL; Vichada, Cumaribo, caño Mataven.

Acknowledgements

Thanks are due to Astrid Acosta-Santos and Edwin Agudelo (CIACOL), and Francisco A. Villa-Navarro and Diana C. Montoya-Ospina (CZUT-IC) for access and loan of specimens under their care. We thank Cristhian C. Conde-Saldaña for the map. Mark H. Sabaj made valuable comments to improve the manuscript.

Literature cited

- Birindelli, J. L. O. 2014. Phylogenetic relationships of the South American Doradoidea (Ostariophysi, Siluriformes). *Neotropical Ichthyology*, 12: 451–564.
- Birindelli, J. L. O., L. M. Sarmiento-Soares & F. C. T. Lima. 2015. A new species of *Centromochlus* (Siluriformes, Auchenipteridae, Centromochlinae) from the middle Rio Tocantins basin, Brazil. *Journal of Fish Biology*, 87: 860–875.
- DoNascimento, C., E. E. Herrera-Collazos, G. A. Herrera-R, A. Ortega-Lara, F. A. Villa-Navarro, J. S. Usma-Oviedo, J. A. Maldonado-Ocampo. 2017. Checklist of the freshwater fishes of Colombia: a Darwin Core alternative to the updating problem. *ZooKeys*, 708: 25–138.
- Fricke, R., W. N. Eschmeyer & R. van der Laan (eds.). 2018. Catalog of fishes: genera, species, references. Available from <http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp>. (accessed 25 September 2018).
- Ferraris, C. J., Jr. 2003. Auchenipteridae. Pp. 470–482 in: R. E. Reis et al. (eds.), Check list of the freshwater fishes of South and Central America. Edipucrs, Porto Alegre.
- Pavanelli, C. S. & A. G. Bifi. 2009. A new *Tatia* (Ostariophysi: Siluriformes: Auchenipteridae) from the rio Iguacu basin, Paraná State, Brazil. *Neotropical Ichthyology*, 7: 199–204.
- Royero, R. 1992. *Tatia musaica*, una nueva especie de bagre auqueniptérico (Siluriformes-Auchenipteridae) de la cuenca del río Orinoco, Territorio Federal Amazonas, Venezuela. *Acta Científica Venezolana*, 43: 300–306.
- Sabaj, M. H. 2016. Standard symbolic codes for institutional resource collections in herpetology and ichthyology: an online reference. Version 6.5 (16 August 2016). American Society of Ichthyologists and Herpetologists, Washington, DC. Available from <http://www.asih.org> (accessed 25 September 2018).
- Sarmiento-Soares, L. M. & R. F. Martins-Pinheiro. 2008. A systematic revision of *Tatia* (Siluriformes: Auchenipteridae: Centromochlinae). *Neotropical Ichthyology*, 6: 495–542.
- Sarmiento-Soares, L. M. & M. Porto. 2006. Comparative anatomy of the cheek muscles within the Centromochlinae subfamily (Ostariophysi, Siluriformes, Auchenipteridae). *Journal of Morphology*, 267: 187–197.
- Sarmiento-Soares, L. M., H. Lazzarotto, L. H. Rapp Py-Daniel & R. P. Leitão. 2016. A new *Centromochilus* Kner, 1858 (Siluriformes: Auchenipteridae: Centromochlinae) from the transition between Amazon floodplain and Guiana shield, Brazil. *Neotropical Ichthyology*, 14: e160030.
- Soares-Porto, L. M. 1998. Monophyly and interrelationships of the Centromochlinae (Siluriformes: Auchenipteridae). Pp. 331–350 in: L. R. Malabarba et al. (eds.), Phylogeny and classification of Neotropical fishes. Edipucrs, Porto Alegre.
- Taylor, W. R. & G. C. Van Dyke. 1985. Revised procedures for staining and clearing small fishes and other vertebrates for bone and cartilage study. *Cybiurn*, 9: 107–119.
- Vanegas-Ríos, J. A. & A. Urbano-Bonilla. 2017. A new species of *Chrysobrycon* (Characiformes, Characidae, Stevardiinae) from the Amazon River basin in Colombia, with a new diagnostic characteristic for the genus. *Journal of Fish Biology*, 90: 2344–2362.
- Vari, R. P. & B. B. Calegari. 2014. New species of the catfish genus *Tatia* (Siluriformes: Auchenipteridae) from the rio Teles Pires, upper rio Tapajós basin, Brazil. *Neotropical Ichthyology*, 12: 667–674.
- Vari, R. P. & C. J. Ferraris Jr. 2013. Two new species of the catfish genus *Tatia* (Siluriformes: Auchenipteridae) from the Guiana Shield and a reevaluation of the limits of the genus. *Copeia*, 2013: 396–402.

Received 29 September 2018
 Revised 30 October 2018
 Accepted 26 January 2019

