

# A New Species of *Corumbataia* (Siluriformes: Loricariidae: Hypoptopomatinae) from Upper Rio Tocantins Basin, Central Brazil

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***Corumbataia veadeiros*, new species, is described from the upper Rio Tocantins basin at the Chapada dos Veadeiros formation, Goiás State, central Brazil. The new species is distinguished from all other species of *Corumbataia* by its lack of a raised tuft of enlarged odontodes on the supraoccipital, an infraorbital canal entering the infraorbital series via the sphenotic, and by the color pattern of the caudal fin, which is composed of vertical dark bars.**

***Corumbataia veadeiros*, nova espécie, é descrita da bacia do alto rio Tocantins na Chapada dos Veadeiros, Goiás, Brasil central. A nova espécie se diferencia das demais do gênero *Corumbataia* pela ausência de um tufo de odontódeos alongados no supraoccipital; canal infraorbital entrando na série infraorbital via esfenótico e pelo padrão de colorido da nadadeira caudal, que é composto por barras verticais escuras.**

**C**ORUMBATAIA is part of Hypoptopomatinae, a monophyletic group of loricariids that includes more than 100 species grouped in 18 genera (Schaefer, 2003; Reis and Carvalho, 2007). Hypoptopomatinae are small fishes distributed widely through the cis-Andean drainages of South America from Venezuela to northern Argentina (Schaefer, 2003). *Corumbataia* was proposed by Britski (1997) and was first included in a phylogenetic scheme by Gauger and Buckup (2005). In that analysis the genus appears, in the most resolved hypothesis using successive weighting, as sister to *Microlepidogaster* in a clade that also includes *Pseudotocinclus*, *Schizolecis*, *Pseudotothyris*, and *Otothyris*.

Until now, three species of *Corumbataia* have been recognized as valid, all from Brazil: *C. cuestae*, from creeks of the upper Rio Paraná basin, *C. tocantinensis*, from creeks of the Rio Tocantins basin, and *C. britskii*, from a tributary of the Rio Sucuriú in the upper Rio Paraná basin (Ferreira and Ribeiro, 2007). In this paper another species of *Corumbataia* is described, from the upper Rio Tocantins drainage on the Chapada dos Veadeiros formation.

## MATERIALS AND METHODS

Measurements were made to the nearest 0.1 mm with digital calipers under a stereomicroscope on the left side of specimens following Boeseman (1968:fig. 5), with the exception of thoracic length, which was measured as the distance from the origin of pectoral-fin spine to the origin of the pelvic-fin spine. Additional measurements are suborbital depth, the distance between the lower margin of the bony orbit and the ventrolateral limit of the head and mandibular ramus, the transverse width of the dentary. Morphometric data are expressed as percents of standard length (SL), except subunits of the head which are expressed as percents of head length. Plate counts and nomenclature follow the schemes of serial homology proposed by Schaefer (1997). Vertebral counts include all vertebrae (including the first five

vertebrae incorporated into the Weberian apparatus), with the compound caudal centrum (PU1 + U1) counted as one element (Lundberg and Baskin, 1969). Cleared-and-stained specimens (CS) were prepared according to the method of Taylor and Van Dyke (1985). Scanning electron microscope pictures of predorsal region and pectoral-fin spine were taken from dissected alcohol preserved specimens and cleared-and-stained specimens, respectively. Accessory patch of teeth is that described by Reis and Schaefer (1992). Institutional abbreviations are as listed at <http://www.asih.org/codons.pdf> with the addition of LBP, for Laboratório de Biologia de Peixes, Departamento de Morfologia, Instituto de Biociências, U.N.E.S.P., Botucatu, Brazil.

## *Corumbataia veadeiros*, new species

Figure 1, Table 1

**Holotype.**—MCN 18571, 32.9 mm SL, male, Brazil, Goiás, Teresina de Goiás, creek at highway GO-241, km 2, tributary of Ribeirão dos Bois, tributary of Rio Paranã, Rio Tocantins basin, 13°47'39"S, 47°17'28"W, 6 November 1996, W. R. Koch and K. M. Grosser.

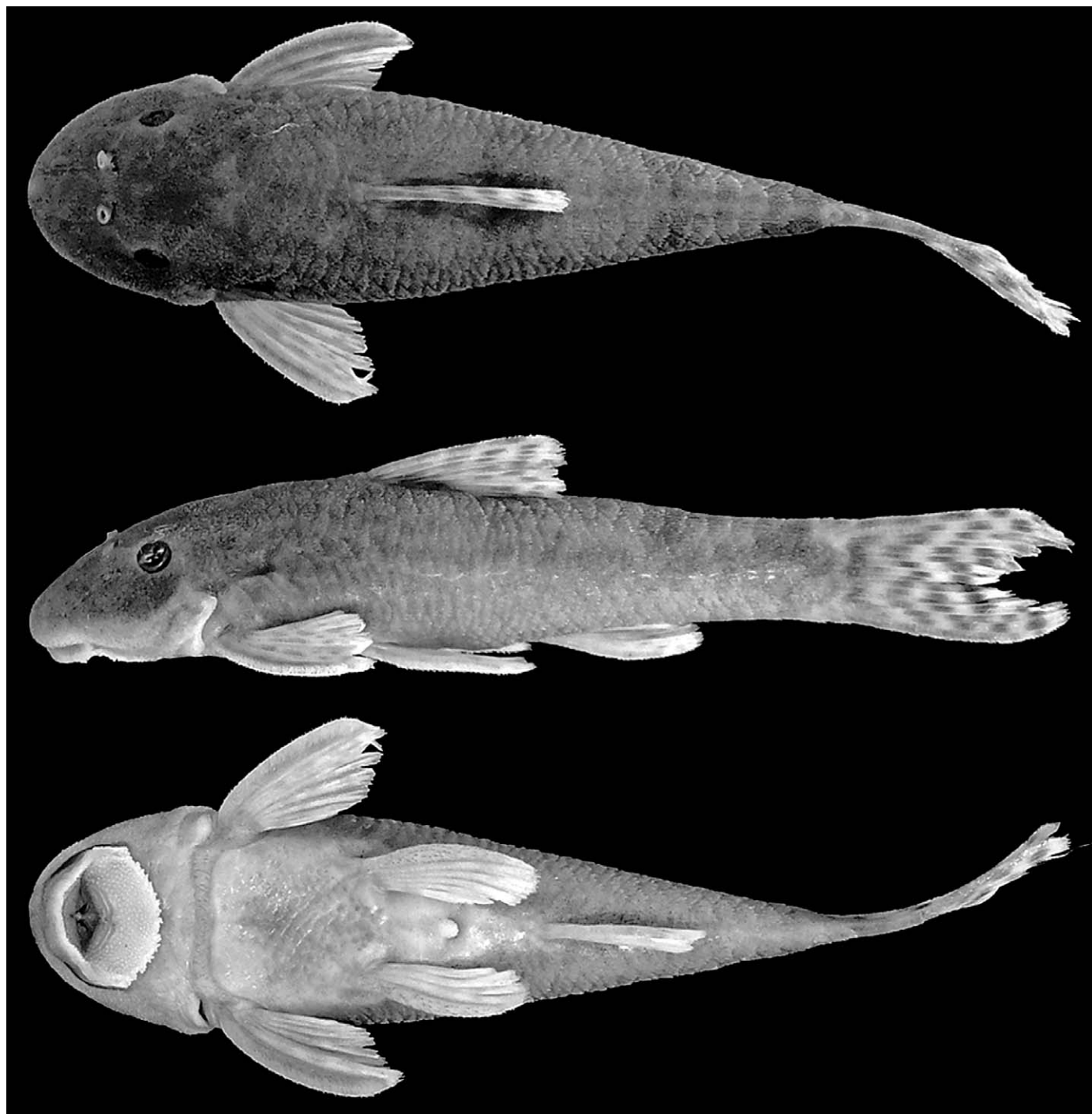
**Paratypes.**—All from Brazil, Goiás: MCN 13441, 6, 26.5–34.1 mm SL, MCP 41477, 5, 26.3–33.2 mm SL + 3 CS, 27.9–33.7 mm SL, collected with holotype; MCN 13147, 12, 21.3–27.7 mm SL, Cavalcante, Córrego Dois Irmãos, at highway GO-241, tributary of Ribeirão dos Bois, 13°47'37"S, 47°20'04"W, 2 August 1996, W. R. Koch, P. C. C. Milani, and K. M. Grosser; MCN 13435, 58, 14.4–29.2 mm SL + 3 CS, 19.3–30.1 mm SL, ANSP 187126, 5, 27.2–32.4 mm SL, MZUSP 94427, 5, 27.5–29.3 mm SL, Teresina de Goiás, creek at highway GO-241, km 7, tributary of Ribeirão dos Bois, 13°47'09"S, 47°18'51"W, 6 November 1996, W. R. Koch and K. M. Grosser.

**Non-type material.**—All from Brazil, Goiás, Cavalcante: MCN 13136, 12, 25.2–36.8 mm SL, creek at Fazenda Veredas,

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**Fig. 1.** *Corumbataia veadeiros*, holotype, MCN 18571, male, 32.9 mm SL, creek at highway GO-241, km 2, tributary of Ribeirão dos Bois, Rio Tocantins basin, Teresina de Goiás, Goiás, Brazil.

tributary of Rio das Almas, tributary of Rio Paranã, Rio Tocantins basin, 13°50'25"S, 47°28'08"W; MCN 13141, 4, 20.5–27.3 mm SL, Rio das Almas at highway GO-241, 13°46'36"S, 47°25'19"W; MCN 13422, 1, 27.8 mm SL, Rio das Almas at highway GO-241, 13°46'36"S, 47°25'19"W; MZUSP 40816, 4, 24.6–35.2 mm SL, small creek tributary of Rio das Almas, 6 km north of urban area of Cavalcante, 13°48'S, 47°27'W.

**Diagnosis.**—*Corumbataia veadeiros* differs from its congeners in its lack of a raised tuft of enlarged odontodes on the supraoccipital (vs. presence of a raised tuft of enlarged

odontodes on the supraoccipital; Fig. 2), an infraorbital canal entering the infraorbital series via the sphenotic (vs. infraorbital canal entering the infraorbital series via the pterotic-supracleithrum), and by the color pattern of the caudal fin, which is composed of vertical dark bars (vs. middle caudal-fin rays pigmented or one pair of hyaline areas on the dark background of the ventral and dorsal lobes).

**Description.**—Morphometrics and meristics given in Table 1. Adult body size large compared to other species of *Corumbataia* (maximum size 36.8 mm of SL). Body robust,

**Table 1.** Morphometrics and Meristics of *Corumbataia veadeiros*. SD = standard deviation, and *n* = number of specimens.

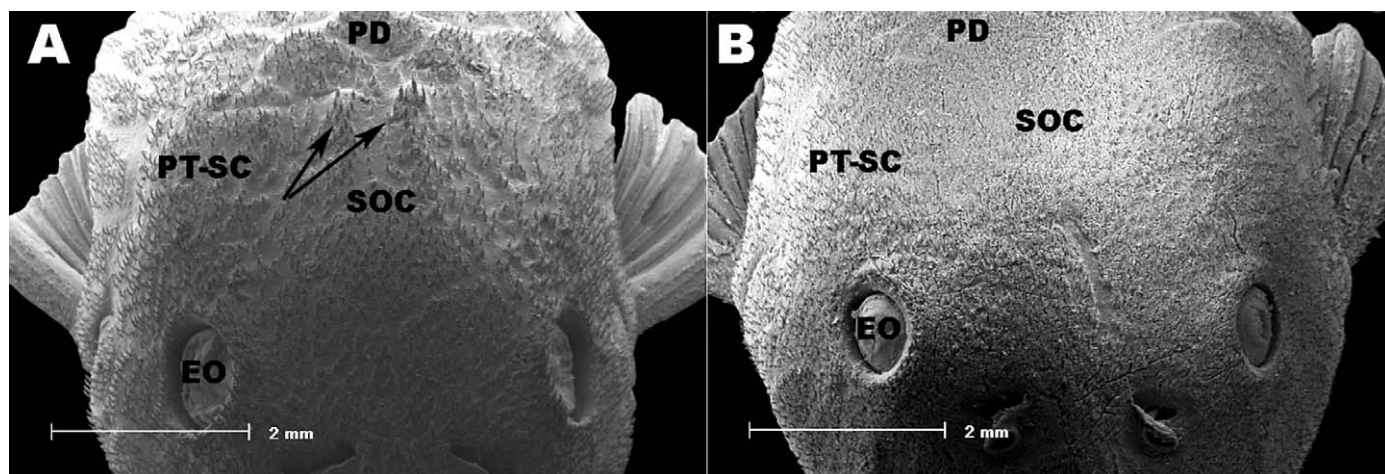
	Holotype	<i>n</i>	Low	High	Mean	SD
Standard length (mm)	32.9	33	26.5	36.8	31.2	—
Percents of standard length						
Head length	32.1	33	30.8	35.3	32.8	1.10
Predorsal length	46.5	33	43.3	48.3	45.8	1.24
Dorsal-spine length	23.3	29	20.4	26.9	24.2	1.30
Anal-spine length	20.1	26	18.4	22.4	20.7	0.95
Pectoral-spine length	21.7	33	20.3	25.4	22.3	1.30
Pelvic-spine length	22.0	33	18.4	23.7	20.7	1.40
Cleithral width	27.1	33	25.0	29.2	27.3	0.99
Thoracic length	18.6	33	15.9	20.1	18.4	1.06
Abdominal length	23.0	33	20.3	25.3	23.1	1.21
Body depth at dorsal-fin origin	20.7	33	20.0	24.1	21.4	1.02
Caudal-peduncle length	27.6	33	25.4	31.8	29.3	1.51
Depth of caudal peduncle	12.7	33	10.0	13.3	12.1	1.03
Percents of head length						
Snout length	57.5	33	49.2	60.2	54.8	2.85
Orbital diameter	15.4	33	15.0	18.3	16.5	0.91
Interorbital width	45.1	33	40.0	45.9	42.8	1.56
Head depth	59.4	33	52.6	59.6	57.0	1.64
Suborbital depth	30.4	33	25.9	31.6	28.6	1.46
Mandibular ramus	11.4	33	7.1	14.7	11.3	1.56
Meristics						
Left premaxillary teeth	29	33	16	38	29	4.92
Right premaxillary teeth	30	32	19	37	30	4.87
Left dentary teeth	30	33	14	39	32	5.04
Right dentary teeth	29	31	14	40	30	5.09

without conspicuous keels. Caudal peduncle rounded in cross section. Dorsal head profile strongly convex from snout to tip of supraoccipital bone, almost straight from that point to nuchal plate and posterodorsally inclined from that point to dorsal-fin origin; straight and posteroventrally sloped along dorsal-fin base. Body profile almost straight and posteroventrally sloped from end of dorsal-fin base to caudal-fin origin. Ventral profile almost straight, slightly

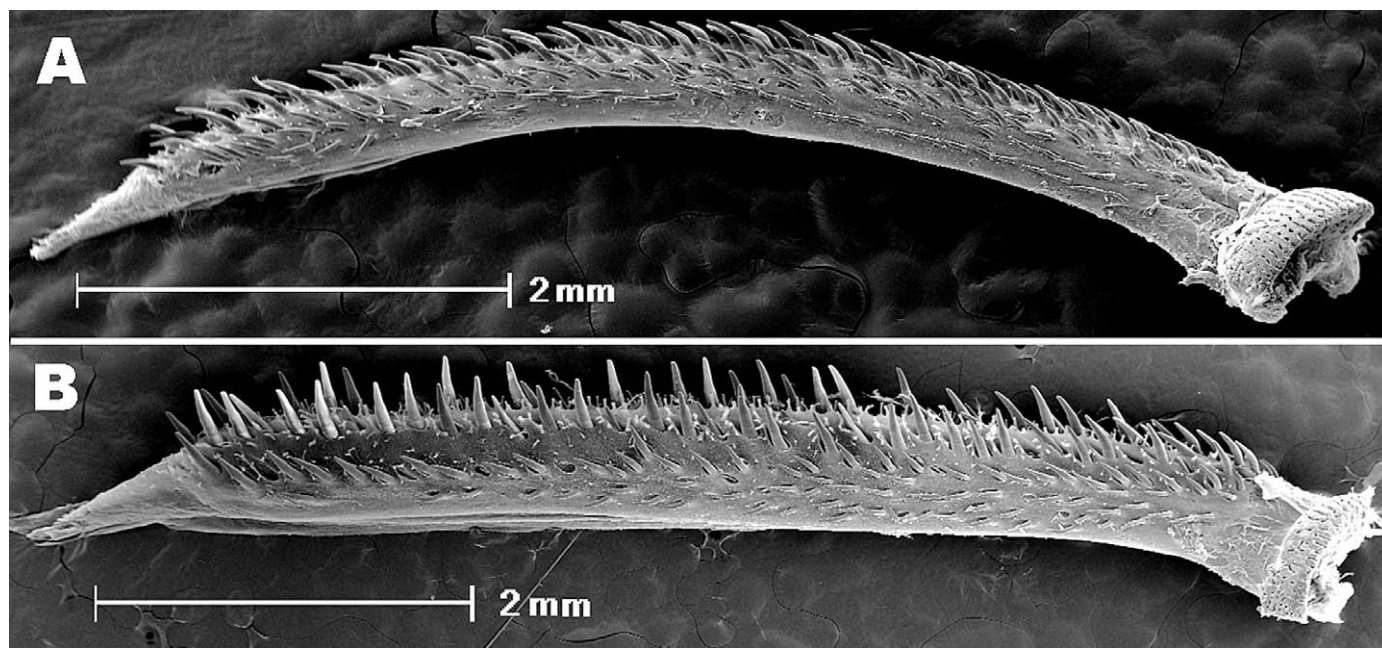
concave from ventral tip of snout to posterior border of head, straight from that point to origin of pelvic fin and straight posterodorsally inclined from that point to caudal-fin base. Ventral surface of body transversely flattened at bases of pectoral and pelvic fins. Greatest body depth at dorsal-fin origin. Least body depth at end of caudal peduncle. Body progressively narrower posteriorly, starting at pelvic-fin insertions. Head and snout broad. Snout rounded in dorsal view. Interorbital region slightly convex. Upper margin of orbit not elevated. Eye small and positioned dorsolaterally. Iris diverticulum present.

Pectoral fin of moderate size, I,6, distal fin margin slightly rounded. Tip of depressed fin reaching anterior one-third of pelvic fin. Soft portion of pectoral-fin spine, comparatively long, about one-fifth of spine length. Pectoral-fin axillary slit present, small, and located below ventral margin of cleithral process. Pelvic fin moderately short, I,5. Depressed fin reaching first anal-fin ray in males, but falling short of that point in females. Adult males with fleshy flap along dorsal margin of first thickened pelvic-fin ray; flap wider basally and progressively reduced distally. Dorsal fin, II,7. Dorsal-fin spinelet rectangular in shape. Fin origin located at vertical line through pelvic-fin origin. Anal fin I,5. First anal-fin pterygiophore not exposed anterior to anal-fin origin. Adipose fin absent, some specimens with slightly pronounced keel in adipose-fin region. Two to four unpaired platelets at typical adipose-fin position. Caudal fin I,14,I, emarginate.

Body entirely covered by plates except for rostrum, region overlying opening of swim bladder capsule, and areas around anus, base of anal fin, and insertions of paired fins. Cheek plate not extending medially and somewhat convex medially. Six or seven irregularly-arranged predorsal plates. Lateral plate series irregularly arranged. Lateral line complete in most specimens, some individuals with small gap in poring of lateral line along midlength of body. Abdominal plates small, several in number, irregularly arranged between posterior margin of coracoid and region between pelvic-fin insertions. Lateral abdominal plates slightly larger but not forming regular series, nor contacting lateral plates. Abdominal plates absent in young specimens. Coracoids and cleithra exposed ventrally, covered by odontodes, except for median regions of cleithra. Pectoral girdle with enclosed arrector fossae. Head without crests. Odontodes on



**Fig. 2.** Scanning electron microscope images of predorsal region: (A) *Corumbataia tocantinensis*, MCN 13462, 25.7 mm SL; (B) *Corumbataia veadeiros*, MCN 13435, 25.3 mm SL. Arrows indicate paired tuft of odontodes at the supraoccipital. EO = eye orbit; PD = predorsal plates; PT-SC = pterotic-supracleithrum; SOC = supraoccipital.



**Fig. 3.** Scanning electron microscope images of left pectoral-fin spine of *Corumbataia veadeiros*. MCP 41477, (A) female, 29.1 mm SL; (B) male, 30.1 mm SL.

supraoccipital uniform in size, not enlarged. Pterotic-supracleithrum with small perforations along median and inferior margins. Infraorbital canal entering infraorbital series via sphenotic. Body plates and fin rays covered with odontodes. Larger odontodes present on anterior surfaces of fin spines. Odontodes on rostral plates, head, and trunk of uniform size and distribution, not arranged in distinct rows. Lips roundish, papillose, moderate in size. Maxillary barbel atrophied. Teeth slender and bifid with medial cusp large, lateral cusp minute and pointed. Accessory patch of teeth absent on dentary and premaxilla.

Posterior margin of caudal-fin skeleton with slight median notch. Compound hypurals 1–2 not completely fused to compound hypurals 3–5. Total vertebrae 28–29.

**Color in alcohol.**—Ground color of dorsal and lateral surface of head and body light to dark brown. Head and body almost unpigmented ventrally except for region around anal-fin insertion more pigmented than adjoining areas. Dorsal surface of head darker than dorsal surface of body. Ventrolateral margins of head and trunk yellowish. Longitudinal dark stripe on each side of body, situated above lateral line. Three dark saddles present on dorsal portion of body. Saddles start ventrally at longitudinal stripe and extend to middorsal line. Anterior limit of anteriormost saddle beginning at posterior end of dorsal-fin base and extending posteriorly to point approximately at tip of adpressed dorsal fin. Second saddle beginning in region usually occupied by adipose fin and posterior saddle towards rear of caudal peduncle. All fins mostly hyaline, other than for chromatophores forming pattern of transverse dark bands. Bands most conspicuous in dorsal, and caudal fins with three to four thin bands on each fin.

**Sexual dimorphism.**—Sexual dimorphism characterized by presence of urogenital papilla, just after anus in males, vs. absence of papilla in females. Adult males possessing fleshy flap along dorsal surface of first thickened pelvic-fin ray.

Flap smaller or absent in juvenile males. Males with slightly longer pelvic-fin spine extending to anal-fin origin, vs. falling short of that point in females. Males with hypertrophied odontodes on anterior margin of pectoral-fin spine (Fig. 3), rostral, and postrostral plates. Odontodes on pectoral-fin spine in males more transversely-oriented, vs. distally-aligned in females.

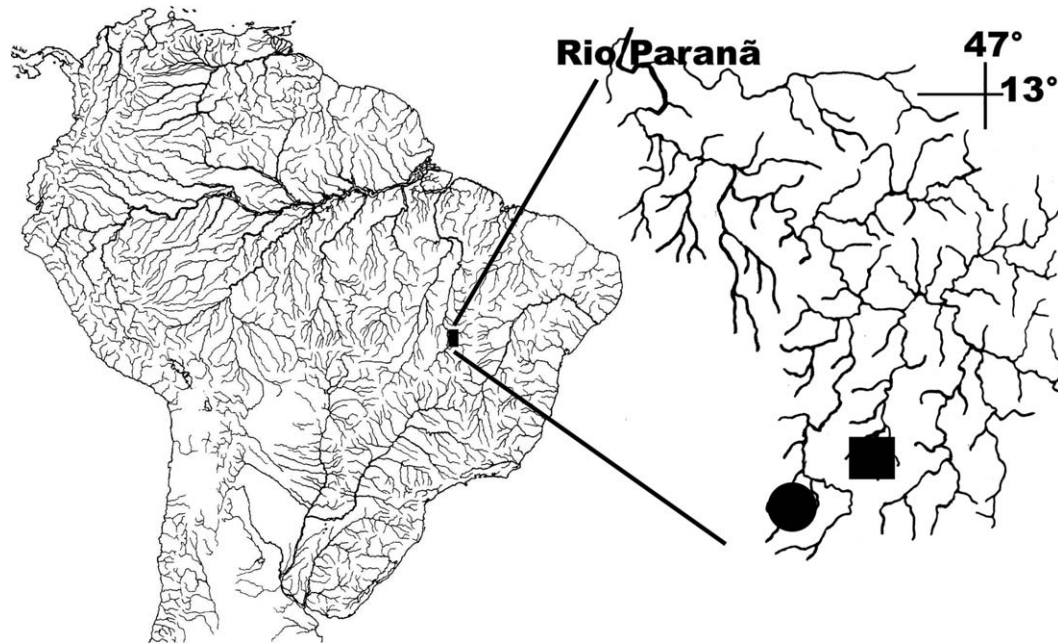
**Distribution.**—*Corumbataia veadeiros* is known from tributaries of the Rio das Almas and the Ribeirão dos Bois, both of which are tributaries of the Rio Paranã, in the headwaters of the Rio Tocantins basin, Goiás, central Brazil (Fig. 4).

**Geographic variation.**—Populations of the species in the Rio das Almas and Ribeirão dos Bois differ to a degree in morphometrics and pigmentation patterns. The population from Ribeirão dos Bois possess a deeper caudal peduncle (12.3–13.3% SL vs. 10.0–11.9% SL in Rio das Almas) and a longer snout (53.1–60.2% HL, mean 56.7% vs. 49.2–55.2% HL, mean 51.9% in Rio das Almas population). The populations in Ribeirão dos Bois are darker, relative to those of Rio das Almas. Specimens from Rio das Almas have dark rounded blotches on trunk, especially on the caudal peduncle region which are absent in specimens from Ribeirão dos Bois. For these reasons, the type series is limited to specimens from the Ribeirão dos Bois drainage.

**Etymology.**—The epithet *veadeiros* refers to the Chapada dos Veadeiros, a formation characterized by flat-topped plateaus, situated to the south of the tributaries where the new species was discovered. The name is treated as a noun in apposition.

## DISCUSSION

*Corumbataia veadeiros* possesses two of the four characters used to diagnose *Corumbataia* (Britski, 1997): middle exposed portion of the pectoral girdle formed only by the



**Fig. 4.** Geographic distribution of *Corumbataia veadeiros* in the upper Rio Tocantins basin. 1—mouth of the Rio das Almas drainage into the Rio Paranã, 2—mouth of the Ribeirão dos Bois drainage into the Rio Paranã, square represents type-locality and dot represents non-type collecting sites.

coracoids and the maxillary barbel atrophied. The new species lacks the other two proposed diagnostic character states of *Corumbataia*: compound hypurals 1–2 completely fused to the compound hypurals 3–5 and infraorbital canal entering the infraorbital series via pterotic-supracleithrum. In *Corumbataia veadeiros* compound hypurals are not completely fused and this character is variable in the genus. Specimens of *C. tocantinensis* from Arroio Moquém (MCN 13462), for example, do not have hypurals completely fused and have an elongated posterior notch between them. The polymorphic nature of this feature makes it inappropriate as a diagnosis for the genus.

In *Corumbataia veadeiros* and all other loricariids the infraorbital canal enters the infraorbital series via the sphenotic, which is the plesiomorphic condition (the sphenotic of *Otothyris* does not have a portion of the laterosensory canal). On the other hand, the remaining *Corumbataia* species are diagnosed by the derived condition of the laterosensory canal entering the infraorbitals via the pterotic-supracleithrum.

The most distinctive feature of *Corumbataia veadeiros* relative to its congeners is the absence of a tuft of enlarged odontodes on the supraoccipital. The presence of a raised tuft of odontodes on the supraoccipital was previously reported for some hypoptopomatines (Steindachner, 1877; Ihering, 1928; Britski and Garavello, 1984) and is found in immature individuals of several species of the subfamily (Schaefer, 1997). Juvenile hypoptopomatines usually have three longitudinal crests of enlarged odontodes on the supraoccipital (crests retained in adults of *Otothyris* and *Pseudotothyris*), a pair of crests positioned more anteriorly, and a single crest located at the tip of the supraoccipital process. In all *Corumbataia* except *C. veadeiros*, there is a tuft of odontodes formed from the anterior paired crests. This is most likely a synapomorphy for a group consisting of all *Corumbataia* except *C. veadeiros*.

*Corumbataia veadeiros* has sexual dimorphism in the hypertrophied odontodes on the anterior margin of the

pectoral-fin spine, rostral, and postrostral plates of adult males that are absent in females. These features were not reported previously among hypoptopomatines, although the presence of comparable sexual dimorphism occurs in other loricariid genera (Py-Daniel and Cox Fernandes, 2005). Other examined species of *Corumbataia* also present hypertrophied odontodes on the pectoral-fin spine. Given the position of *Corumbataia* in the phylogeny of Gauger and Buckup (2005), hypertrophied odontodes on pectoral-fin spines can be considered a synapomorphy for *Corumbataia*.

#### MATERIAL EXAMINED

*Corumbataia cuestae*: MZUSP 51222, holotype, Brazil, São Paulo, Analândia, Cachoeira de Analândia, Rio Corumbataí; LBP 911, 30, Brazil, São Paulo, Botucatu, Rio Capivara; LBP 1309, 47 + 3 CS, Brazil, São Paulo, Bofete, Córrego da Jacutinga.

*Corumbataia tocantinensis*: MZUSP 51223, holotype, Brazil, Goiás, Rio Vermelho; MZUSP 23150, 27, collected with the holotype; MZUSP 89039, 10, Brazil, Goiás, Rio Vermelho on highway GO-164; MCN 13462, 21 + 3 CS, Brazil, Goiás, Cavalcante, Arroio Moquém on the road from Colinas do Sul to Cavalcante; MCN 13183, 6, Brazil, Goiás, Cavalcante, Arroio Moquém on the road Colinas do Sul to Cavalcante; MCN 13505, 1, Brazil, Goiás, Colinas do Sul, creek on highway GO-327, 18 km from Colinas do Sul.

*Epactionotus bilineatus*: MCP 29293, 29 + 3 CS, Brazil, Rio Grande do Sul, Itati, Arroio das Bananeiras.

*Eurycheilichthys pantherinus*: MCP 35042, 17 + 3 CS, Brazil, Rio Grande do Sul, Bom Jesus, Rio dos Touros, on road Rondinha to Silveira.

*Hisonotus notatus*: MCP 18098, 204 + 4 CS, Brazil, Espírito Santo, Rio São José dos Torres on highway BR-101.

*Lampiella gibosa*: MCP 31588, 1 + 1 CS, Brazil, São Paulo, Barra do Turvo, Rio Bonito, tributary to Rio Pardo.

*Kronichthys subterres*: MCP 20152, 118 + 2 CS, Brazil, São Paulo, Iporanga, Córrego Seco at Bairro da Serra.

*Microlepidogaster perforatus*: MCP 17717, 4 + 1 CS, Brazil, Minas Gerais, Carandaí, Rio Carandaí.  
*Otocinclus flexilis*: MCP 17414, 11 + 2 CS, Brazil, Rio Grande do Sul, Capão do Leão, Arroio Itaeté at Passo das Pedras.  
*Otothyris travassosi*: MCP 1805, paratypes, 28 + 2 CS, Brazil, Espírito Santo, Boa Esperança, Rio Braço Norte at highway ES-130.  
*Otothyris rostrata*: MCP 36786, 3 + 1 CS, Uruguay, Maldonado, creek tributary to Rio Cebollatí.  
*Otothyropsis marapoama*: MCP 38303, paratypes, 9 + 1 CS, Brazil, São Paulo Catanduva, Córrego Cubatão.  
*Pareiorhaphis hypselurus*: MCP 26108, 9, Brazil, Rio Grande do Sul, Maquiné, Arroio Pinheiro.  
*Parotocinclus maculicauda*: MCP 31591, 50 + 4 CS, Brazil, São Paulo, Barra do Turvo, Rio Bonito, tributary to Rio Pardo.  
*Pseudotocinclus tietensis*: MCP 20090, 2 + 1 CS, Brazil, São Paulo, Salesópolis, Riacho Paraitinguinha on road from Salesópolis to Jacareí.  
*Pseudotothyris obtusa*: MCP 31728, 7 + 2 CS, Brazil, São Paulo, Itanhaém, creek tributary to Rio Preto, about 2 km from airport.  
*Schizolecis guentheri*: MCP 31558, 100 + 3 CS, Brazil, Rio de Janeiro, Parati, Rio São Roque on highway BR-101 near Tarituba.

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