

Description of a new species of the catfish genus *Trichomycterus* (Teleostei: Siluriformes: Trichomycteridae) from the rio Paraíba do Sul basin, southeastern Brazil)

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> Abstract

Trichomycterus maculosus, new species is described from the upper rio Paraíba do Sul basin, southeastern Brazil. It is hypothesized to be closely related to *T. itatiayae*, *T. nigroauratus*, and *T. diabolus* based on the presence of a broad metapterygoid, which is wider than deeper. *Trichomycterus maculosus* differs from all those three species by having 45 to 52 interopercular odontodes; distinguished from *T. itatiayae* and *T. diabolus* by having seven branchiostegal rays, and 17 to 18 opercular odontodes. It is also distinguished from *T. itatiayae* by having eight pectoral-fin rays, ten anal-fin rays, anal-fin origin in the vertical through the posterior portion of the dorsal-fin base, opercular and interopercular odontodes conical, caudal fin subtruncate, and color pattern exhibiting a dark gray row of blotches horizontally elongated along lateral midline of body; from *T. nigroauratus*, by having more slender head, narrower caudal peduncle, color pattern showing a dark gray row of blotches horizontally elongated along lateral midline of body, and by absence of golden stripes on the flank; and from *T. diabolus*, by having caudal fin subtruncate, absence of osseous articulation between metapterygoid and quadrate, presence of the pectoral-fin filament, and absence of unpigmented zone on proximal region of caudal fin.

> Resumo

Trichomycterus maculosus, espécie nova é descrita para a bacia do alto rio Paraíba do Sul, sudeste do Brasil. Ela é hipotetizada como intimamente relacionada à *T. itatiayae*, *T. nigroauratus* e *T. diabolus* baseado na presença de um amplo metapterigóide, que é mais largo do que alto. *Trichomycterus maculosus* difere de todas as três espécies referidas por possuir 45 a 52 odontódeos interoperculares; difere de *T. itatiayae* e *T. diabolus* por possuir sete raios branquiostegais e 17 a 18 odontódeos operculares. Ele também se distingue de *T. itatiayae* por possuir oito raios na nadadeira peitoral, dez raios na nadadeira anal, origem da nadadeira anal na vertical através da porção posterior da base da nadadeira dorsal, odontódeos operculares e interoperculares cônicos, nadadeira caudal subtruncada e pelo padrão de colorido apresentando fileira de máculas horizontalmente alongadas ao longo da linha média lateral do corpo; de *T. nigroauratus* por possuir menor altura da cabeça, pedúnculo caudal mais estreito, e pelo padrão de colorido apresentando fileira de máculas horizontalmente alongadas ao longo da linha média lateral do corpo; e de *T. diabolus* por possuir nadadeira caudal subtruncada, ausência de articulação óssea entre o metapterigóide e o quadrado, presença de filamento peitoral, e pela ausência de área não pigmentada na região proximal da nadadeira caudal.

> Key words

Catfishes, Siluriformes, Trichomycteridae, *Trichomycterus*, new species, southeastern Brazil, taxonomy.

Introduction

Trichomycterus VALENCIENNES, the most diverse and complex genus of the family Trichomycteridae, is presently diagnosed by a combination of plesiomorphies not found in other trichomycterid genera (COSTA, 1992;

DE PINNA, 1998). This enormous assemblage is composed of over 110 nominal species (FERRARIS, 2007), distributed in the river basins of Central and South America, including the Andes, at about 4.000 meters of

altitude (ARRATIA, 1998; DE PINNA, 1998). Within this wide geographic distribution, a remarkable diversity of species is found in the headwaters of river basins of southeastern and southern Brazil, with a great number of species being collected in recent years (BARBOSA & COSTA, 2003a, b; BARBOSA & COSTA, 2008; BARBOSA & COSTA, 2010; ALENCAR & COSTA, 2004; BOCKMANN, CASATTI & DE PINNA, 2004; LIMA & COSTA, 2004). The species here described was collected in the upper drainage of the rio Paraíba do Sul basin, and seems to be closely related to two other species endemic to the same basin, *T. itatiayae* MIRANDA RIBEIRO, 1906 and *T. nigroauratus* BARBOSA & COSTA, 2008, and to *T. diabolus* BOCKMANN, CASATTI & DE PINNA, 2004 from the rio Paranapanema basin.

Material and Methods

Measurements and counts follow BARBOSA & COSTA (2003b). Measurements are presented as percentages of standard length (SL), except for subunits of head, which are presented as percentage of head length (HL). Counts of procurrent caudal-fin rays, vertebrae, branchiostegal rays, teeth and odontodes were made only in cleared and stained specimens (c&s) prepared according to TAYLOR & VAN DYKE (1985). Morphological data for *T. diabolus* are based on literature (BOCKMANN *et al.*, 2004). Abbreviation for institution is: UFRJ, Universidade Federal do Rio de Janeiro, Rio de Janeiro.

The method for species delimitation follows DAVIS & NIXON (1992), which is based on the presence of unique combination of non-overlapping character states. Comparative material is listed in BARBOSA & COSTA (2008) and BARBOSA & COSTA (2010).

Trichomycterus maculosus new species

Fig. 1; Tab. 1

Holotype. UFRJ 6033, 61.5 mm SL; Brazil: Estado de São Paulo: Município de São José dos Campos: São Francisco Xavier: Cachoeira Pedro David, tributary of river do Peixe, Paraíba do Sul river basin, 22°55'29.5" S 45°58'49.6" W, altitude about 800 m; W.J.E.M. COSTA, B.B. COSTA & C.P. BOVE, 23 Jan 2003.

Paratypes. Brazil: Estado de São Paulo: Município de São José dos Campos: São Francisco Xavier Paraíba do Sul river basin: UFRJ 5693, 2, 30.8–39.6 mm SL; collected with holotype. UFRJ 677, 6, 33.7–52.4 mm SL; UFRJ 5168, 1, 64.0

C&S; UFRJ 5169, 2, 53.2–76.9 mm SL C&S; same locality; W.J.E.M. COSTA & C.P. BOVE, 17 Mar 1991.

Diagnosis

Similar to *T. itatiayae*, *T. nigroauratus*, and *T. diabolus* and distinguished from all other species from southeastern Brazil by possessing a broad metapterygoid (Fig. 2). It differs from all species mentioned above by having 45 to 52 interopercular odontodes (*vs.* 25–40); distinguished from *T. itatiayae* and *T. diabolus* by having seven branchiostegal rays (*vs.* eight), and 17 to 18 opercular odontodes (*vs.* 10–16). It is also distinguished from *T. itatiayae* by having a dark gray row of blotches horizontally elongated along lateral midline (*vs.* black stripe), eight pectoral-fin rays (*vs.* seven), 10 anal-fin rays (*vs.* nine), anal-fin origin in vertical through posterior portion of dorsal-fin base, between base of dorsal-fin rays 10–11 (*vs.* through middle of dorsal-fin base, between base of dorsal-fin rays 7–8), opercular and interopercular odontodes conical (*vs.* incisiform), presence of first two infraorbital pores (*vs.* absence), caudal fin subtruncate (*vs.* rounded), more slender caudal peduncle (caudal peduncle depth 11.2–11.4 % SL *vs.* 12.7–14.8 % and caudal peduncle width 1.8–2.4 % SL *vs.* 2.6–3.3 %) shorter predorsal length (58.8–63.0 % SL, *vs.* 63.6–64.0 %), longer pectoral fin (pectoral-fin length 12.3–13.5 % SL *vs.* 10.1–11.5 %), and larger eye (eye diameter 8.9–10.9 % of head length, *vs.* 7.4–8.2 %); from *T. nigroauratus* by having a row of dark grey blotches horizontally elongated on lateral midline of body (*vs.* black stripe), absence of golden stripes on flank (*vs.* presence), more slender head (head depth 34.9–44.5 % of head length *vs.* 44.8–50.8 %), and a narrower caudal peduncle (caudal peduncle width 1.8–2.4 % SL, *vs.* 2.4–3.3%); from *T. diabolus* by having fewer dorsal procurrent rays (15–18 *vs.* 19–20), more ventral procurrent rays (13–14 *vs.* 10–11), caudal fin subtruncate (*vs.* truncate), absence of contact zone between metapterygoid and quadrate (*vs.* presence), moderate pectoral-fin filament, about 20 % of pectoral-fin length (*vs.* pectoral-fin filament absent), and absence of white and black bars on the caudal fin (*vs.* presence).

Description

Morphometric data for holotype and paratypes given in Table I. Body moderately deep, subcylindrical on anterior portion, compressed on caudal peduncle. Dorsal profile slightly convex between snout and end of dorsal-fin base, straight to slightly convex on caudal peduncle. Ventral profile straight to slightly convex



Fig. 1. *Trichomycterus maculosus*, UFRJ 6033, live holotype, 61.5 mm SL; Brazil: São Paulo: São Francisco Xavier.

Tab. 1. Morphometric data of *Trichomycterus maculosus*. H = holotype, n = 5.

	H	Range
Standard length (mm)	61.5	40.7–61.5
Percentage of standard length		
Body depth	13.0	12.8–13.8
Caudal peduncle depth	11.4	11.2–11.4
Body width	6.5	6.2–7.1
Caudal peduncle width	2.3	1.8–2.4
Dorsal fin base length	10.6	10.6–11.9
Anal fin base length	8.9	7.9–8.9
Pelvic fin length	8.3	8.3–10.0
Distance between pelvic fin base	1.3	0.9–1.3
Pectoral fin length	12.3	12.3–13.5
Predorsal length	61.9	58.8–63.0
Prepelvic length	55.8	54.0–58.1
Head length	19.1	19.1–22.3
Percentage of head length		
Head depth	43.9	34.9–44.5
Head width	74.8	70.5–75.4
Interorbital width	27.3	25.7–29.1
Preorbital length	47.5	40.8–47.5
Eye diameter	8.9	8.9–10.9

between lower jaw and end of anal-fin base, straight on caudal peduncle. Greatest body depth in vertical immediately in front of pelvic-fin origin. Skin papillae minute. Urogenital papilla spherical, in vertical through anterior third of dorsal-fin base. Dorsal and anal fins approximately triangular. Dorsal-fin origin in vertical between centrum of 18th and 19th vertebrae. Anal-fin origin in vertical through base of dorsal-fin ray 10 to 11 and between centrum of 23rd vertebrae. Pectoral fin about triangular, lateral and posterior edges slightly convex. First pectoral-fin ray terminating in short filament, about 20 % of pectoral-fin length. Pelvic fin shorter than anal fin, not covering urogenital pore, tip not reaching anal fin, in vertical just anterior to dorsal-

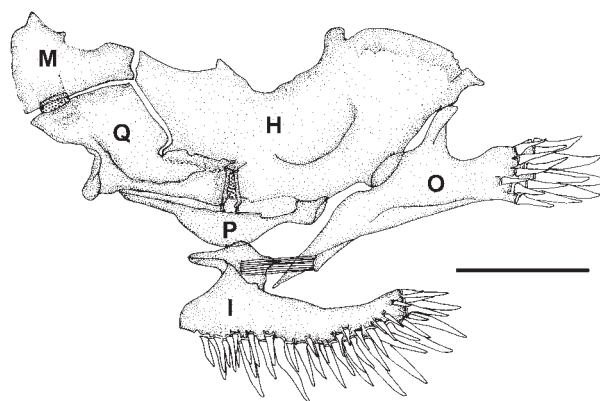


Fig. 2. Left jaw suspensorium and opercular series of *Trichomycterus maculosus*, UFRJ 5169, lateral view. Abbreviations: H, hyomandibula; I, interopercle; M, metapterygoid; O, opercle; P, preopercle; Q, quadrate.

fin origin; pelvic-fin bases separated by interspace; pelvic-fin origin in vertical through centrum of 16th or 17th vertebra. Caudal fin subtruncate. Dorsal-fin rays 11–12; anal-fin rays 10; pectoral-fin rays 8; pelvic-fin rays 5; caudal-fin principal rays 13, dorsal procurvent rays 15–18, ventral procurvent rays 13–14. Total vertebrae 36–37; pleural ribs 13–14. Upper hypural plates separated, dorsal plate equal in width or slightly wider than ventral plate.

Head subtriangular in dorsal view. Snout blunt. Mouth subventral. Maxilla shorter than premaxilla. Teeth incisor in outer rows, conic in innermost row. Eye at middle of head or slightly nearer to snout than to posterior edge of head. Barbels well developed. Tip of nasal barbel reaching posterior portion of interopercular patch of odontodes. Tip of maxillary barbel reaching posterior portion of opercular patch of odontodes. Tip of rictal barbel reaching posterior portion of interopercular patch of odontodes. Seven branchiostegal rays. Interopercular odontodes 45–52; opercular patch of odontodes wide, with 17–18; odontodes conical; opercular odontodes about equal in width to interopercular odontodes; opercular odontodes approximately arranged in vertical line. Medial margin of autopala-



Fig. 3. Stream tributary of rio do Peixe (Brazil: São Paulo: São Francisco Xavier), type locality of *Trichomycterus maculosus*.

tine slightly concave; posterior process of autopalatine about equal in length to autopalatine without posterior process. Lacrimal about one fourth supraorbital length; supraorbital rod-shaped. Metapterygoid moderate in length, broad, much wider than deep, without distinct processes. Anterodorsal surface of hyomandibula with weak concavity. Urohyal foramen elliptical, often 8-shaped; distal portion of lateral arm of urohyal truncate.

Supraorbital canal continuous, with three pores; first pore in transverse line through anterior nostril, second in transverse line just posterior to posterior nostril, third supraorbital pore paired, each pore nearer to symmetrical pore than to orbit in transverse line just posterior to orbit. Infraorbital divided into two sections, each with two pores; first infraorbital pore in transverse line through anterior nostril, second in transverse line just anterior to posterior nostril, third and fourth posterior to orbit. Preopercular canal with one pore, in vertical through anterior margin of opercular patch of odontodes. Lateral line of body short, with three pores, posteriormost pore in vertical just posterior to pectoral-fin base.

Coloration. Side of body and head light purplish brown, with dark gray row of blotches along lateral midline between opercular region and caudal peduncle end; anterior blotches horizontally elongated, posterior ones rounded; sometimes blotches join together in the lateral middle of flank forming thick dark stripe; round spots above midline to the dorsum, round dots below midline; venter white; dark gray to black stripe

between nasal barbel and eye; round golden spot on middle of snout, and another similar but smaller anterior to nasal barbel; nasal barbel dark gray, maxillary and rictal barbels light gray. Iris gray. Fins yellowish almost transparent, with brown dots on bases; pectoral-fin filament white. In juveniles, dark gray row of spots horizontally elongated along lateral midline, dark pigmentation extending to posterior margin of caudal fin, and faint gray spots on dorsum.

Distribution. Upper rio do Peixe drainage, serra da Mantiqueira, upper rio Paraíba do Sul basin, southeastern Brazil.

Habitat. This new species was found in a clearwater stream with rapid flow and green colour (Fig. 3). Juveniles and adults were observed actively swimming during the day in shallow places (10–50 cm depth) along the margins, on the gravel substrate.

Etymology. From the Latin *maculosus* (spotted), in reference to the colour pattern of the new species.

Discussion

A great effort has been undertaken to establish the species diversity of *Trichomycterus* in southeastern and southern Brazil, but this purpose is still far from being reached. Many new species of the genus has been col-

lected in recent years, among which several of them are still waiting to be described.

The large number of species of the genus has been a challenge for taxonomists, but other events also contribute. It is worth mentioning the absence of any synapomorphy able to group all the included species of *Trichomycterus* and more, the difficulty with some of the oldest descriptions very superficial and inaccurate (EIGENMANN, 1918). Furthermore some research tentatively addressed the relationships between some species of the genus (e.g. COSTA, 1992; BARBOSA & COSTA, 2003a, b; BARBOSA & COSTA, 2008; BARBOSA & COSTA, 2010; BOCKMANN & SAZIMA, 2004), through the delimitation of species groups, but probably for the same reasons this approach is yet incomplete.

BARBOSA & COSTA (2008) described *T. nigroauratus* from the rio Paraíba do Sul basin and considered this species closely related to *T. itatiayae* from the same basin by both exhibiting a broad metapterygoid, which is wider than deeper and a black stripe along lateral midline of the body. *Trichomycterus maculosus* herein described and *T. diabolus* from the rio Parapanema basin seems to be closely related to the two former species by, all the four species possessing a broad metapterygoid (BOCKMANN *et al.*, 2004: fig. 6). Consequently, *T. itatiayae*, *T. nigroauratus*, *T. maculosus* and *T. diabolus* form a group here named as the *T. itatiayae* species complex.

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