

*Trichomycterus pradensis*, a new catfish from southern Bahia coastal rivers, northeastern Brazil (Siluriformes: Trichomycteridae)

Luisa M. Sarmiento-Soares \*, Ronaldo F. Martins-Pinheiro \*\*, Arion T. Aranda \*\*\* and Carine C. Chamon \*\*\* \*

\* Setor de Ictiologia, Departamento de Vertebrados, Museu Nacional, Quinta da Boa Vista, 20940-040 Rio de Janeiro, RJ, Brasil. e-mail: luisa@nossacasa.net

\*\*Projeto BIOBAHIA. Alto do rio do peixe pequeno, quadra 2, lote 14, Cumuruxatiba, 45983-000 Prado, BA, Brasil. e-mail: ronaldo@nossacasa.net

\*\*\*Curador Técnico da Coleção de Simulídeos/LSO. Convênio FAPERJ/FIOCRUZ. Laboratório de Referência Nacional em Simulídeos e Oncocercose. Pavilhão Carlos Chagas, 4º andar, sala 07. Instituto Oswaldo Cruz/FIOCRUZ. Rio de Janeiro, RJ, Brasil. e-mail: arion@ioc.fiocruz.br

\*\*\*\*Setor de Ictiologia, Departamento de Vertebrados, Museu Nacional, Quinta da Boa Vista, 20940-040 Rio de Janeiro, RJ, Brasil. e-mail: carinechamon@yahoo.com.br

**Abstract**

*Trichomycterus pradensis*, a new species, is described from the upper and middle course of coastal river drainages running from Minas Gerais state towards Bahia state, in the rio Peruípe, rio Itanhém, and rio Jucuruçu basins. It is distinguished from its congeners by a combination of characters: supraorbital sensory pores s6 placed close together, a narrow opercular patch of developed odontodes, with 8-10 odontodes and 8 branched pectoral rays. These features make *T. pradensis* unique within *Trichomycterus*.

*Trichomycterus pradensis*, nova espécie, é descrita para o alto e médio curso de drenagens fluviais costeiras com águas correndo do estado de Minas Gerais em direção ao estado da Bahia, nos rios Peruípe, rio Itanhém e rio Jucuruçu. A nova espécie distingue-se prontamente de seus congêneres por uma combinação de caracteres: poros sensoriais supraorbitais s6 posicionados proximamente entre si, estreita placa opercular de odontóides desenvolvidos, com 8-10 odontóides; contagem de raios da peitoral elevada, com 8 raios ramificados. Este conjunto de caracteres faz da nova espécie única dentre os *Trichomycterus*.

**Keywords:** South America, Atlantic Forest, coastal streams, systematic, new species.

## **Introduction**

The catfish family Trichomycteridae includes more than 200 small sized species, arranged in eight subfamilies (de Pinna, 1998). The most comprehensive overview of the whole family is by still that of Eigenmann (1918). The first explicit phylogenetic treatment of Trichomycteridae is by Baskin (1973), who provided hypotheses on the relationships of most genera in each of the subfamilies. In spite of the Trichomycteridae forming a well-corroborated monophyletic group, the subfamily Trichomycterinae is a noticeably non-monophyletic assemblage without derived characters (Baskin, 1973; de Pinna, 1989; Costa & Bockmann, 1993). Although there is disagreement (Arratia et al., 1978; Arratia, 1990). The Trichomycterinae include six genera: *Bullockia*, *Eremophilus*, *Hatcheria*, *Rhizosomichthys*, *Silvinichthys*, and *Trichomycterus* (de Pinna & Wosiacki, 2003). The subfamily is being progressively fragmented, with the removal of a relative large subset of *Trichomycterus* to form the monophyletic genus *Ituglanis* and also the removal of *Scleronema* by Costa & Bockmann (1993).

The genus *Trichomycterus* was proposed by Valenciennes in Humboldt (1832: 348). It

includes the majority of the species of the subfamily Trichomycterinae and is the largest of the family with about a hundred species (de Pinna, 1989). *Trichomycterus* is the only freshwater fish genus occurring from Central America to southern South America (Arratia, 1990). It includes species generally with a high level of endemism and restricted habitats in headwaters and occasionally in subterranean environments (Arratia, 1990; de Pinna, 1992; Barbosa & Costa, 2003). There are few wide-ranging *Trichomycterus* species such as the *T. brasiliensis* complex, recently investigated by Vianna (2000) and Barbosa & Costa, (2003) and currently recorded for upper São Francisco and coastal drainages at southeastern Brazil (de Pinna & Wosiacki, 2003). *T. brasiliensis* species complexes is composed of a number of similar species difficult to tell apart, what is a common trend within the genus (Casatti & Castro, 1998; de Pinna, 1998; Bockmann & Sazima, 2004).

There is a high diversity of *Trichomycterus* species in the Brazilian East Atlantic basin, with species recorded to the rio São Francisco, rio Jequitinhonha, rio Doce, rio Paraíba do Sul and smaller coastal river drainages. They are usually small sized, inhabit headwaters, and sometimes occur sympatrically or syntopically with other *Trichomycterus* species (Costa, 1992; Vianna, 2000). There are 23 *Trichomycterus* species recorded to the Brazilian East Atlantic basin. In spite of such a large taxonomic diversity, this may be only a fraction of the species richness, as there are several river systems not investigated yet and the tendency is the discovery of more new *Trichomycterus* species.

The following *Trichomycterus* species occur in eastern Brazil: *T. albinotatus*, *T. auroguttatus*, *T. florensis*, *T. immaculatus*, *T. itatiayae*, *T. mimonha*, *T. mirissumba*, *T. paquequerensis*, and *T. vermiculatus* in hill streams draining to the rio Paraíba do Sul in Rio de Janeiro, Minas Gerais and São Paulo; *T. potschi* in small coastal streams in Rio de Janeiro; *T. goeldii* in coastal hill streams in Rio de Janeiro; *T. alternatus* in rio Doce in Espírito Santo, in rio Jequitinhonha and also in coastal rivers in Rio de Janeiro; *T. longibarbatatus* in Santa

Tereza in Espírito Santo; *T. bahianus* in coastal rio Una basin in Bahia; *T. trefauti*, *T. brasiliensis*, *T. reinhardti* in rio das Velhas drainage of upper rio São Francisco basin; *T. variegatus*, *T. concolor* in upper rio São Francisco basin; *T. jequitinhonhae*, *T. itacambirussu* and *T. landinga*, all three from the rio Jequitinhonha. The *T. santaeritae* was not herein used in comparisons as this species likely belongs to the Sarcoglanidinae (de Pinna, 1989; Bockmann et al., 2004).

Recent ichthyological survey of northeastern Minas Gerais and southern Bahia rivers yielded a peculiar species of *Trichomycterus* which is described herein.

## **Material and methods**

**Study area.** The east Brazilian zoogeographical region is defined by Géry (1977) as corresponding to river drainages with fish faunal affinities along Brazilian coast. Several authors recognized affinities within the freshwater fish fauna along those rivers. Bizerril (1994) separated this region in a sub province, ranging from the rio Paraíba do Sul to the rio São Francisco, also recognizing endemism of fish fauna within the area. The region between latitudes 10° to 23° S and longitudes 37° to 46° W is widely recognized as the East Brazilian Atlantic basin and includes river systems draining to the Atlantic between the rio São Francisco to the rio Paraíba do Sul (CODESE, 1978). This definition of the East Brazilian Atlantic basin is adopted herein for species comparison.

**Morphometric features.** Measurements were taken point to point under a stereomicroscope with a digital caliper, and recorded in tenths of a millimeter. Measurements followed Trajano & de Pinna (1996). Standard length (SL) is expressed in mm and all other measurements are expressed as percents of standard length, except subunits of the head, which are expressed as percents of head length (HL).

**Meristic features.** Fin-rays count in pectorals, ventral and caudal fins include all branched rays plus the number of unbranched ones. The dorsal and anal-fin ray counts included two anterior unbranched rays plus all branched following rays. The two posterior most closely placed rays were counted separately. Vertebral counts included all rib-bearing centra but do not include the first five vertebrae modified into Weberian complex, and included the compound caudal centrum (PU1+U1) as the last element. Branchiostegal rays counts were verified in cleared and stained specimens.

**Osteological examination.** Osteological examination was based on cleared and stained (c&s) specimens according to the procedures of Taylor & Van Dyke (1985). Nomenclature and homologies for osteological information and sensory canal systems follows Arratia & Huaquin (1995) and Arratia (2003). Terminology for cephalic laterosensory canals follows Northcutt (1989). Morphological data about *Trichomycterus auroguttatus*, *T. bahianus*, *T. concolor*, *T. florensis*, *T. itacambirussu*, *T. giganteus*, *T. jequitinhonhae*, *T. landinga*, *T. longibarbatus*, *T. mimonha*, *T. mirissumba*, *T. pantherinus*, *T. potschi*, *T. trefauti*, *T. variegatus*, *T. vermiculatus* and also the distributional information for *T. santaeritae* were based on literature (Alencar & Costa, 2004; Barbosa & Costa, 2003; Costa, 1992; Eigenmann, 1917, 1918; Lima, 1997; Lima & Costa, 2004; Miranda Ribeiro, 1911, 1943; de Pinna & Wosiacki, 2003; Triques & Vono, 2004; Vianna, 2000; Wosiacki, 2004). The specimens verified for the statistical analysis are *T. itacambirussu*, *T. jequitinhonhae*, and *T. landinga*, being the morphometric data obtained from literature (Triques & Vono, 2004).

**Multivariate analysis.** A multivariate data analysis was employed with the aid of PAST-PAlaeontological STatistics, version 1.34 (Ryan et al., 1995; Hammer et al., 2005). There were employed methods of Principal component analysis (PCA) (Davis, 1986; Harper, 1999) and Cluster Analysis for comparison of morphometric data among different species. The Cluster Analysis was implemented with the aid of Paired Group and Ward's Method

algorithms. The data for the analysis are in percentage of SL and of HL. The PCA and CA were employed for evaluation of variation in morphometric characters and for evaluation of similarity patterns among *T. pradensis*, *T. jequitinhonhae*, *T. itacambirussu* and *T. landinga* all from a geographically close area: the extreme southern Bahia.

**Institutional abbreviations.** The following acronyms are used to specify the repositories of material examined: AMNH, American Museum of Natural History, New York; ANSP, Academy of Natural Sciences of Philadelphia, Philadelphia; AUM, Auburn University Museum, Auburn; FLMNH, Florida Museum of Natural History, Florida; MNRJ, Museu Nacional, Rio de Janeiro.

***Trichomycterus pradensis*, new species**  
(Fig. 1)

**Holotype.** MNRJ 28483, 65.0 mm SL; Brazil: Bahia: Jucuruçu, rio Jucuruçu, 2 km before the city of Jucuruçu on road Itamaraju- Jucuruçu, middle rio Jucuruçu basin, 16°50'10"S 40°08'40"W; L. M. Sarmiento-Soares, A. T. Aranda, C. C. Chamon & R. F. Martins-Pinheiro, 26 Oct 2004.

**Paratypes.** MNRJ 28484, 17, 1 c&s, 40.2-112.1 mm SL; AUM 42734, 2, 37.7-40.2 mm SL; same data as holotype. - MNRJ 28485, 6, 1 c&s, 45.7-68.3 mm SL; Brazil: Bahia: Caravelas; stream on road BR-418, about 27 km from BR-101 in direction of Caravelas, lower Peruípe basin, 17°46'34"S 39°36'09"W; L. M. Sarmiento-Soares et al., 22 Oct 2004. - MNRJ 28486, 1, 52.9 mm SL; Brazil: Bahia: Itamaraju; Jundiá creek on road Itamaraju- Jucuruçu, middle rio Jucuruçu basin, 17°01'35"S 39°35'57"W, L.M. Sarmiento-Soares et al., 25 Oct 2004. -MNRJ 28487, 9, 1 c&s, 44.3-67.6 mm SL; Brazil: Bahia: Itamaraju; córrego São Pedro on road Itamaraju- Jucuruçu, near Pau d'Alho village, middle rio Jucuruçu basin, 16°54'24"S

39°45'15"W, L.M. Sarmiento-Soares et al., 25 Oct 2004. -MNRJ 28488, 12, 1 c&s, 49.7-101.0 mm SL, Brazil: Minas Gerais: Palmópolis: rio Dois de Abril, in Dois de Abril village, upper rio Jucuruçu basin, 16°50'21"S 40°19'11"W, L.M. Sarmiento-Soares et al., 26 Oct 2004. -MNRJ 28489, 2, 51.3-70.0 mm SL; Brazil: Minas Gerais: Palmópolis; rio Jururuçu on periphery of Palmópolis, upper rio Jucuruçu basin, 16°44'02"S 40°25'35"W, L.M. Sarmiento-Soares et al., 26 Oct 2004. -AMNH 236101, 3, 51.2-54.7 mm SL; ANSP 180783, 3, 45.9-59.1 mm SL; AUM 42733, 1, 51.1 mm SL; FLMNH 148993, 3, 53.8-55.3 mm SL; MNRJ 28490, 16, 1 c&s, 51.2-75.2 mm SL; Brazil: Bahia, Itanhém; córrego da Água Preta, on road Jeribá-Itanhém, near Santa Rita village; upper rio Itanhém basin, 16°59'41"S 40°23'52"W, L.M. Sarmiento-Soares et al., 27 Oct 2004. -MNRJ 28491, 1, 35.1 mm SL; Brazil: Bahia: Itanhém; córrego da Água Fria in Medeiros Neto, middle Itanhém basin, 17°11'35"S 40°12'55"W, L.M. Sarmiento-Soares et al., 29 Oct 2004.



**Fig. 1.** *Trichomycterus pradensis*, holotype, MNRJ 28483, 48.6 mm SL; Brazil: Bahia: rio Jucuruçu.

**Diagnosis.** *Trichomycterus pradensis* is distinguished from its congeners by the combination of the following characters: supraorbital sensory pores s6 placed closely together (Fig. 2); a narrow opercular patch of robust odontodes (Fig. 3) with 8-10 odontodes; a high pectoral fin ray count, with 8 branched rays. These features make the new species unique within the genus *Trichomycterus*.

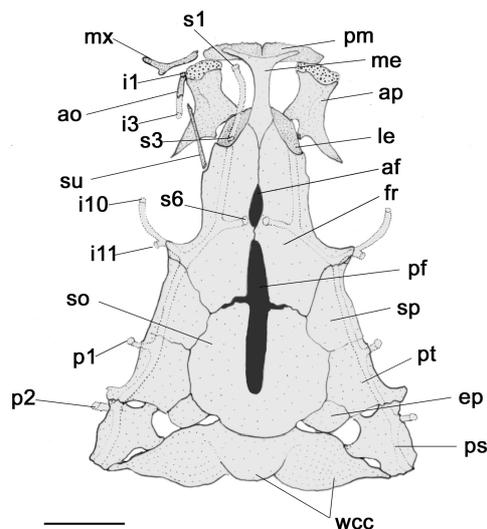


Fig. 2. Neurocranium of *Trichomycterus pradensis*, MNRJ 28487, 53.3 mm SL. Dorsal view. Abbreviations: af, anterior fontanel; ao, antorbital; ap, autopalatine; ep, epioccipital; fr, frontal; i1, infraorbital sensory branch 1; i3, infraorbital sensory branch 3; i10, infraorbital sensory branch 10; i11, infraorbital sensory branch 11; le, lateral ethmoid; me, mesethmoid; mx, maxilla; p1, postotic sensory branch 1; p2, postotic sensory branch 2; pf, posterior fontanel; pm, premaxilla; ps, posttemporosupraclitrum; pt, pterotic; s1, supraorbital sensory branch 1; s3, supraorbital sensory branch 3; s6, supraorbital sensory branch 6; so, parieto-supraoccipital; sp, sphenotic; su, supraorbital tendon bone; wcc, weberian complex and capsule. Scale bar 1.5 mm.

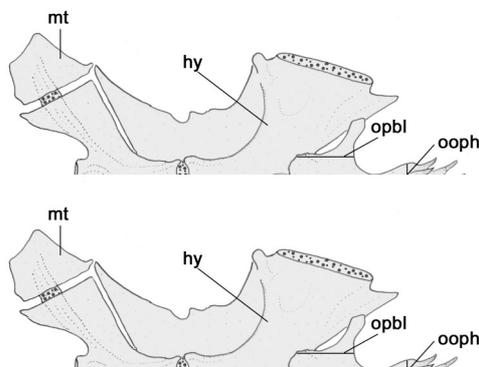


Fig. 3. – Left suspensorium of *Trichomycterus pradensis*, MNRJ 28484, 41.0 mm SL. Lateral view. Abbreviations: hy, hyomandibula; io, interopercle; mt, metapterygoid; op, opercle; ooph, opercular odontode plate posterior projection height; opbl, opercle dorsal projection base length; po, preopercle; qu, quadrate. Scale bar= 1.5 mm.

**Description.** Morphometric data for type series presented in Table 1. Body slim, trunk compressed, caudal peduncle laterally flattened. Dorsal profile of body gradually ascending from tip of snout to anterior portion of trunk, approximately straight from that point to base of dorsal fin, slightly descending along dorsal fin base and straight on caudal peduncle until caudal fin. Ventral profile of head gently convex. Ventral profile of body almost straight.

**Table 1- Morphometric and meristic data of the holotype (H) and paratypes of *Trichomycterus pradensis* (n=59 including the holotype).**

	H	Range	Mean	Stand. Dev.
Standard length	65.0	112.1-40.2	60.0	13.93
<b>Percents of standard length</b>				
Total length	113.5	121.0-110.4	113.0	1.66
Body depth	13.4	15.3-11.4	13.3	0.98
Body width	11.8	14.3-10.0	11.9	0.85
Caudal peduncle depth	10.2	10.7-7.5	9.2	0.70
Caudal peduncle length	20.5	23.9-16.9	20.1	1.39
Predorsal length	59.7	65.2-53.7	60.9	1.76
Preanal length	67.7	74.7-62.6	70.6	2.34
Prepelvic length	50.8	56.1-46.3	52.7	1.82
Dorsal-fin base length	13.1	13.7-9.9	11.6	0.99
Anal-fin base length	12.8	12.8-7.6	9.7	1.17
Nasal barbel length	9.4	12.9-7.9	10.4	1.14
Maxillary barbel length	11.2	14.1-7.8	11.6	1.12
Rictal barbel length	7.8	11.2-6.1	8.8	1.03
Head length	20.6	22.7-18.9	20.9	0.86
<b>Percents of head length</b>				
Head width	80.6	84.6-73.6	78.8	3.23
Head depth	38.8	50.8-34.8	40.5	2.84
Interorbital distance	29.9	31.6-24.2	27.0	1.64
Internarial distance	13.4	18.2-9.3	13.0	2.32
Internarial width	20.1	24.2-15.2	19.1	2.36
Snout length	47.0	50-38.5	44.1	2.65
Orbital diameter	14.2	16.7-11.3	14.3	1.28
Mouth width	32.8	39.1-27.4	33.6	3.01
<b>Rays Count</b>				
Dorsal fin	ii+7	i-iii+6-8	9.0	0.00
Pectoral fin	i+8	i+7-9	9.0	0.26
Ventral fin	i+4	i+4	5.0	0.00
Anal fin	ii+5	ii+3+5	6.9	0.29
Caudal fin	i+11+i	i+10-11+i	13.0	0.13

Head small and slightly depressed. Eyes small, orbital margin not free. Skin covering eye thin and transparent. Anterior nostril small, surrounded by fleshy tube-shaped flap of integument. Posterior nostril larger than anterior nostril, surrounded anteriorly by a raised fleshy flap and located slightly closer to anterior nostril than to eye. Mouth inferior, lower lip

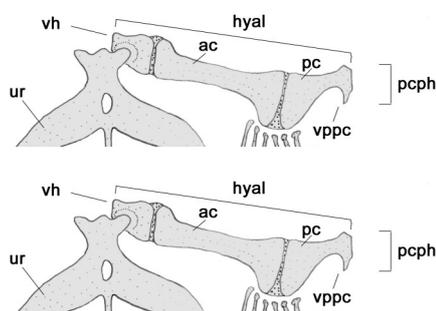
contoured by a conspicuous fleshy lobe medial to origin of rictal barbels. Upper lip with a fleshy rictal fold. Nasal barbel originating on posterolateral portion of integumentary flap around anterior nostril; tips of barbel not reaching opercular odontode plate. Maxillary and rictal barbel short, limited to head. Autopalatine very large, with a pronounced posterior process; maxilla well developed and curved. Premaxilla compact, transversely elongated, meeting its counterpart medially. Jaws subequal; premaxilla and dentary almost straight with four regular rows of conical teeth. Post-cleithral process very small imbedded within skin and hidden laterally by the opercle. Branchial membranes thick, united to isthmus only anteriorly. Branchiostegal rays not discernible through thick skin.

Mesethmoid long, narrow, with anterior border slightly concave, premaxillary held underneath narrow anterior cornua through a synchondral articulation. Anterior cranial fontanel elliptical, narrow, bounded by frontals. In a smaller size c&s specimen (MNRJ 28484), fontanel is extended anteriorly through a narrow anterior projection along frontals suture. No such opening in specimens over 50.0 mm SL. Epiphyseal bar osseous, sutured medially. Posterior cranial fontanel very long and narrow, expanded laterally along sutures between frontals and parieto-supraoccipital (Fig. 2). Antorbital short, somewhat straight, distal portion less ossified. Fronto-lachrymal tendon-bone straight, long, rod-like, with no lateral projection. Infraorbital canal incompletely present and not ossified. Anterior portion of sphenotic directed laterally in dorsal view. Pterotic laterally projected. Posttemporosupraclathrum with a straight lateral margin, giving off supraorbital laterosensory branch. Vomer arrow-shaped, narrow, with a pronounced anterior process and a long posterior process. Parasphenoid large, projected posteriorly until the middle of basioccipital. Anterior portion of Weberian complex fused to basioccipital.

Suspensorium with a robust hyomandibula, projected anteriorly as a concave membranous outgrowth. Laminar projection of hyomandibula anteriorly sutured to quadrate

only (Fig. 3). Metapterygoid laminar, trapezoid, loosely joined to quadrate via anterior cartilage block only. Quadrate with a broad base, connected to hyomandibula through cartilage, in contact to both hyomandibula and metapterygoid through an anterior laminar projection. Short preopercle sutured to ventral margins of both quadrate and hyomandibula. Opercular patch of odontodes small and somewhat rounded. Opercular plate posterior projection depth 53.5-72.2 % in length of opercular base (Fig. 3). Opercle with 8-10 elongate odontodes, middle or posterior ones longest. Interopercular patch of odontodes large, with a conspicuous dorsal projection (Fig. 3). Interopercle with 32-36 odontodes arranged into two irregular rows, about 14 to 17 large odontodes in the posterior row and 14-18 smaller odontodes on the anterior row.

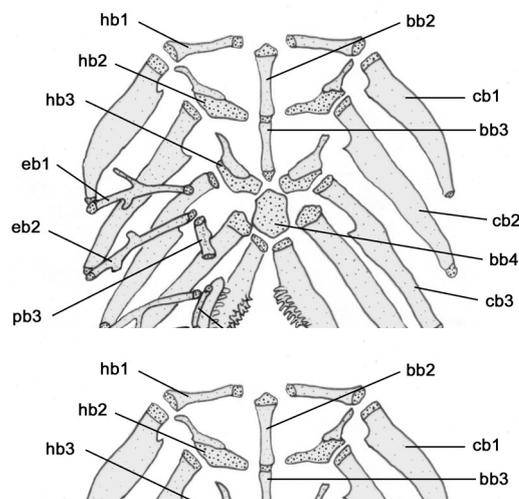
Urohyal wide with a conspicuous foramen and a long thin pointing dorsal process and wide laminar surface. Hyoid arch with large ventral hypohyal, elongate anterior ceratohyal and a markedly angulose posterior ceratohyal. Posterior ceratohyal with a developed ventro-posterior process, depth 16-21 % of length of hyoid arch. Seven branchiostegal rays articulated with hyoid arch: two or three with anterior ceratohyal, two or three with interceratohyal cartilage between bones, and two with posterior ceratohyal. Branchiostegal rays 5-7 distally expanded and notched (Fig. 4).



**Fig. 4.** – Right hyoid arch of *Trichomycterus pradensis*, MNRJ 28487, 53.3 mm SL. Ventral view. Abbreviations: ac, anterior ceratohyal; br, branchiostegal rays; hyal, hyoid arch length; pc, posterior ceratohyal; pcph, posterior ceratohyal process height; vh, ventral hypohyal; ur, urohyal. Scale bar= 1mm.

Basibranchial 1 absent; basibranchial 2 and 3 with cartilaginous anterior and posterior tips, connected to each other, forming a thin elongate osseous rod. Anterior cartilaginous tip of basibranchial axis reaching close to hypobranchial 1; posterior osseous tip nearly in contact with contralateral hypobranchials 3. Cartilage between basibranchial 2 and 3 bordered laterally by cartilaginous head of hypobranchials 2. Basibranchial 4 hexagonal and completely cartilaginous, bordered anteriorly by cartilaginous head of hypobranchials 3, laterally by ceratobranchials 4 and posteriorly by cartilaginous head of ceratobranchials 5. Hypobranchial 1 osseous, rod like, with cartilage on its proximal and distal tips. Hypobranchial 2 elongate, cartilaginous, almost trapezoid, with a long osseous anterodistal process. Hypobranchial 3 approximately trapezoidal, mostly cartilaginous and closely positioned relative to its counterpart, and also with an osseous anterodistal process. Hypobranchial 4 absent. Five ceratobranchials, mostly ossified, with cartilage on their extremities. First and second ceratobranchials almost straight, with a shallow short concavity, supporting four to five diminute rakers. Third ceratobranchial with shallow long concavities at its proximal margins and a mesial laminar extension. Fourth ceratobranchial almost straight. Fifth ceratobranchial large and slightly expanded posteromedially to support dorsally the lower pharyngeal toothplate, with fine conical teeth arranged in two rows, with about 8-10 teeth in mesial row. Five epibranchials, the first three rod like, somewhat flattened, ossified; except for its cartilaginous extremities. Epibranchial 1 with an elongate uncinat process on anterior border; posterior border with small process. Epibranchial 2 with small process on its anterior and posterior margins. Epibranchial 3 with small anterior process and large posterior process. Epibranchial 4 broad, somewhat rectangular. Epibranchial 5 reduced, completely cartilaginous, placed between posterior cartilaginous tips of epibranchial 4 and ceratobranchial 4. Pharyngobranchial 1 and 2 absent. Pharyngobranchial 3 flattened, ossified, with cartilaginous tips. Pharyngobranchial 4 ossified, giving support to upper pharyngeal

tooth plate, with long conical teeth arranged in two rows; 10 to 12 teeth on the main row (Fig. 5).



**Fig. 5.** – Branchial skeleton of *Trichomycterus pradensis*, MNRJ 28487, paratype, 53.3 mm SL. Dorsal view. Abbreviations: bb2 to bb4, basibranchials 2 to 4; cb1 to cb5, ceratobranchials 1 to 5; dp, dentigerous plate; eb1 to eb5, epibranchials 1 to 5; hb1 to hb3, hypobranchials 1 to 3; pb3 to pb4, pharyngobranchials 3 and 4. Scale bar= 1.5 mm.

Head sensory canals with simple tubes ending in single pores. Supraorbital sensory canal with three pairs of supraorbital pores (s1, s3, s6). Infraorbital sensory canal with four paired pores (i1, i3, i10, i11). Preopercular sensory canal with one single paired pore (pop1), between pterotic and hyomandibula. Lateral line canal very short, with three pores (l1, l2, l3), extending from posttemporosupracleitrum to about the level of the first anterior vertebrae.

Dorsal fin margin somewhat rounded, with rays three anterior unbranched and unsegmented, two unbranched and segmented plus seven branched rays. Basal dorsal-fin radials eight; with the last basal radial in connection to the last two branched dorsal-fin rays. Origin of dorsal fin on vertical of about 17<sup>th</sup> (in 2 c&s) or 18<sup>th</sup> (in 3 c&s specimens) vertebra. Pectoral fin with one unbranched plus eight branched rays. Tip of first unbranched pectoral fin ray prolonged in a filamentous portion. Pelvic-fin very small, with one unbranched plus four branched rays and margin rounded. Anal fin with three anterior vestigial rays; two visible unbranched rays plus five branched rays. Anal fin pterygiophores arranged in six elongate thin proximal radials and five small distal radials. Last two, smallest branched, anal fin rays in

connection to sixth proximal radial. Caudal fin truncated, with eleven branched rays; principal rays 6+7; dorsal lobe procurrent 15 or 16; ventral lobe procurrent 10 or 11. Total vertebrae count 36 (in 3 c&s specimens) or 37 (in 2 c&s specimens). Paired pleural ribs 10 or 11, becoming progressively small antero-posteriorly. First pleural rib slightly thick in comparison to following ones; a last 11<sup>th</sup> (in 2 c&s specimens) or 12<sup>th</sup> (in 3 c&s specimens) unpaired rib being present only on one side of the body, right or left side, in all c&s examined specimens.

**Live coloration.** Head pale yellow to orange yellow with scattered grayish brown chromatophores and small grayish blotches (Fig. 6). Trunk latero-dorsally covered with spots proportionally larger than those of head. Rounded or vertically elliptical spots along latero-dorsal sides of trunk arranged in three longitudinal rows in largest specimens, or four rows, in smallest ones. Latero-ventral parts of body never spotted, pigmented with gray chromatophores in large specimens, or completely yellowish in the smallest ones, with approximately less than 40.0 mm SL. Belly yellowish to white. Fins yellowish with almost hyaline tips. Nasal barbel fully colored in dark gray. Rictal and maxillary barbel less pigmented with chromatophores concentrated on proximal tip; distal tip hyaline. Variation in coloration pattern was observed (see discussion).



**Fig. 6.** – *Trichomycterus pradensis*, live specimen, 76.4 mm SL, whole specimen, and 68.3 mm SL, head, shortly after collection, Brazil: lower Peruípe basin, MNRJ 28485.

**Color in alcohol.** In ethanol, ground color of dorsal part of head and body pale yellow, mottled with grayish to brown spots or blotches. In some specimens, specially smaller ones, the blotches coalesce along lateral line forming an inconspicuous midlateral stripe. Overall pigmentation pattern remains visible after fixation. Pigmentation pattern arranged in two layers. Lower layer with vertically oriented blotches or regular spots. Upper layer with loosely arranged chromatophores. With growth, upper layer becoming thick and, in association to mucous layer, spotted pattern in large individuals turns faint. In smaller specimens, with less than 60.0 mm SL, skin layers not dense, coloration more vivid. Ventral surface of head and belly white. Dorsal, pectoral and anal fin base grayish, caudal fin with a grayish base in large individuals. Nasal barbels gray; rictal and maxillary ones hyaline, with a grayish base.

Most specimens with a spotted pattern, but specimens from one locality (MNRJ 28488) at rio Dois de Abril, upper Jucuruçu basin, completely black, except for hyaline tip of all fins. Belly yellowish from lower lip to insertion of pelvic. The color pattern is not diagnostic, as many specimens have spots along latero-dorsal sides of trunk only. Some specimens, in certain localities, have a dark body coloration, meaning that there is a population variation regarding the coloration.

**Distribution.** *Trichomycterus pradensis* was collected at the lower course of rio Peruípe; upper and middle rio Jucuruçu and upper rio Itanhém, in southeastern Bahia and in northeastern Minas Gerais states (Fig. 7).

**Etymology.** Named for the type locality, rio do Prado, the name of rio Jucuruçu upstream.

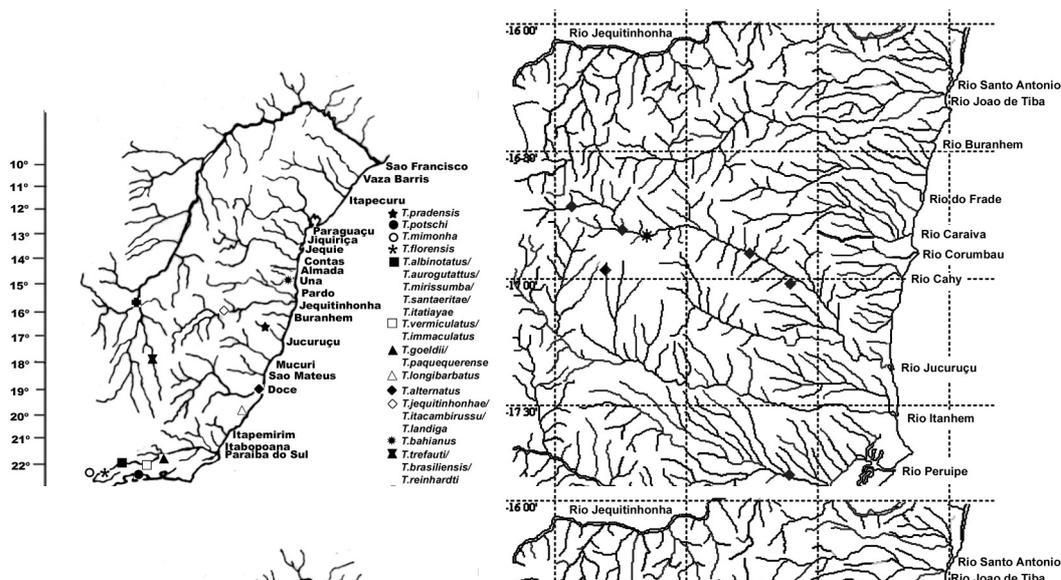


Fig. 7. – (a) Drainage map of eastern Brazil between rio São Francisco and rio Paraíba do Sul illustrating the distribution of the *Trichomycterus* species in the area. Symbols may represent more than one locality. (b) Detail of collecting localities of *T. pradensis*.

**Ecological notes.** The river systems of southern Bahia cross a relatively plain relief with sediments from Tertiary to Quaternary, responsible for the formation of “Tabuleiros”, meaning plateau in figurative Portuguese speaking. The regional name is due to the long plains left on landscape. Geologically those coastal tabuleiros from the area of the study belongs to the “Formação Barreiras”, dated from the Pliocene, extending from the coast up to 110 km inland from Ilhéus, at Bahia until the mouth of rio Doce, at Espírito Santo. The whole study area was originally covered by the Atlantic Forest, but nowadays the vegetation around river drainages is reasonably preserved in a few localities and much impacted in many others (cf. MMA, 2000). The rio Jucuruçu, in its upper portion called rio do Prado, is one of the heaviest impacted rivers, being much deforested along its margins. Much of the river bench is occupied with pastures over decades, where no remnants of vegetation are left.

The new *Trichomycterus* species was collected mostly in fast moving clear waters. On the upper and middle course of rio Jucuruçu this catfish was found in waterfalls over large

rocks, in a gentle slope, ending in large pools of about 1.5 m depth (Fig.8). The surrounding vegetation was mostly removed in the area, and the river banks were occupied by grass. On the lower rio Peruípe, in a locality with 22 m high, catfishes were found, over a gravel bottom, in a narrow, shallow river, with 1 m depth, in a valley rounded by abundant vegetation with macrophytes and floating meadows around margins. *Trichomycterus pradensis* was mostly found inhabiting transparent shallow rapid running waters. The rio Água Preta is in the mountains separating the valleys of rio Jucuruçu from rio Itanhém. It is the highest collecting locality in which *T. pradensis* was found, with 547 m high. This stream corresponds to one of the headwaters of rio Itanhém, flowing in moderate current across clay or sandy bottom and acidic brown shallow waters. The waters have lots of aquatic herbs, the broadleaf cattail (Typhaceae). Cattail are characteristic aquatic herbs found along headwaters riffles in coastal “tabuleiros” river basins.

The stomach contents of five c&s specimens MNRJ 28484, young, 41.0 mm SL; MNRJ 28485, young, 51.0 mm SL; MNRJ 28487, young female, 53.3 mm SL; MNRJ 28488, maturing female, 69.0 mm SL; and MNRJ 28490, mature male, 64.2 mm SL were examined. In the analyzed stomachs it was possible to identify small aquatic Chironomidae larvae, nymphs, Nematoda and fragments of insects. The content of one of the stomachs was in advanced rate of digestion, with insect parts and organic matter.

**Discussion.** *Trichomycterus pradensis* is the first record of a member of the genus in extreme southern Bahia rivers.

The *Trichomycterus* species geographically much closer to *T. pradensis* are *T. alternatus*, *T. bahianus*, *T. jequitinhonhae*, *T. itacambirussu*, and *T. landinga*. *Trichomycterus pradensis* differs from *T. alternatus* by a short nasal barbel, not reaching opercular odontode plate (versus long and reaching); the pectoral fin ray filament short than head length (versus long). The new species differs from *T. bahianus* by a short pectoral fin filament, measuring 15

to 25% in pectoral fin length (versus long, measuring 50%); low number of odontodes on opercular patch, 8-10 (versus more than 14). *Trichomycterus pradensis* can be differentiated from *T. jequitinhonhae*, *T. itacambirussu*, and *T. landinga* by the number of branched pectoral fin rays, 8 (versus 7); the short nasal barbels, not reaching opercular odontode plate (versus long, reaching beyond opercular odontode plate) and distinct color patterns. *T. pradensis* has spots larger than eye diameter and not concentrated over a mid-lateral series of dots on flank (versus spots smaller than eye, concentrated on a mid-lateral series on flanks in *T. landinga*); no dark masks on flanks (versus a series of dorso-lateral dark marks in *T. jequitinhonhae*); and spots of identical size (versus decreasing backward from the middle of body length in *T. itacambirussu*).



**Fig. 8.** – Rio Jucuruçu, a small stream at município of Jucuruçu, Bahia, northeastern Brazil, type locality of *Trichomycterus pradensis*

In comparison to the species in the Brazilian East Atlantic basin, *T. pradensis* combine features uniquely found in the *T. brasiliensis* species complex, and features uniquely found in a second monophyletic *Trichomycterus* group.

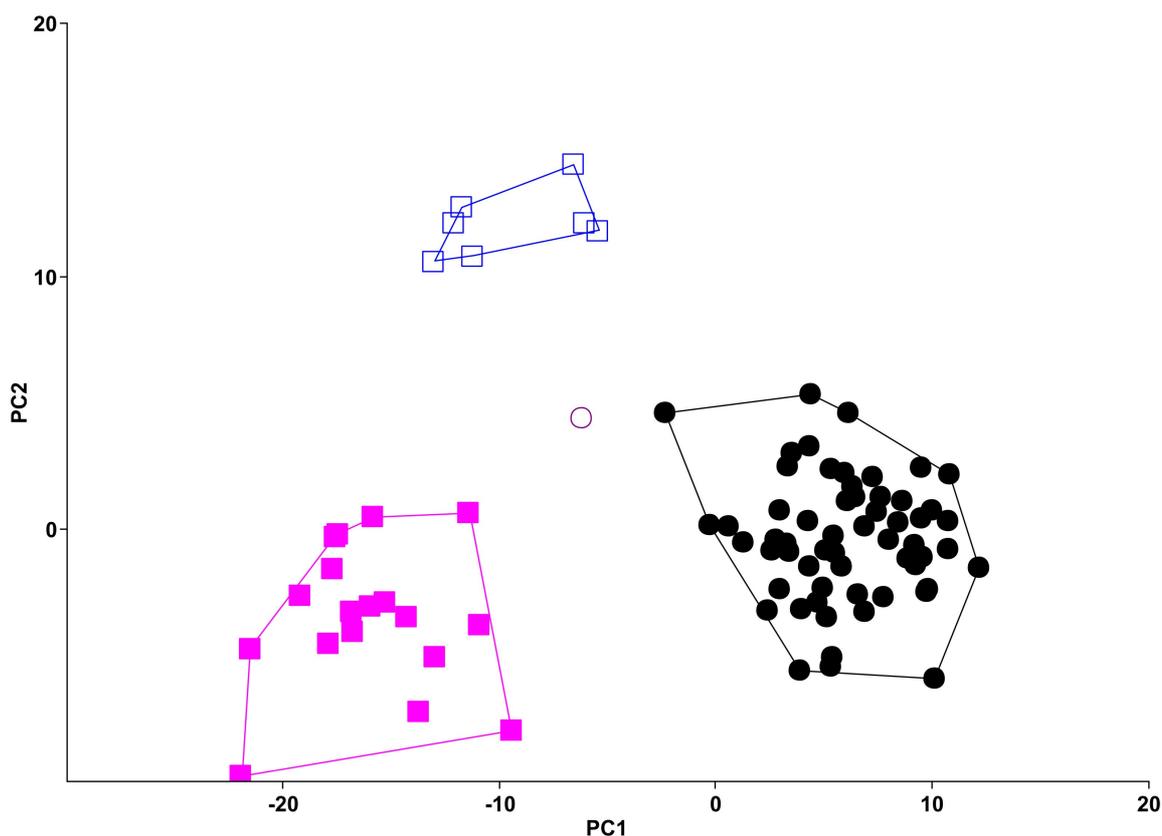
Between the 23 *Trichomycterus* species in the Brazilian East Atlantic basin, 5 of them belong to the *T. brasiliensis* complex: *T. brasiliensis*, *T. mimonha*, *T. mirissumba*, *T. potschi*, *T. vermiculatus* plus *T. candidus* from river Paraná basin (Vianna, 2000; Barbosa & Costa, 2003; Bockmann & Sazima, 2004). *Trichomycterus pradensis* shares with the *T. brasiliensis* species complex a narrow opercular patch of odontodes (depth 44.0-73.7 in base length of the opercular dorsal projection), plus a short to medium pectoral fin filament (less than 30% in pectoral fin length). A narrow opercular patch of odontodes is postulated as a derived feature, and uniquely found among the *T. brasiliensis* species complex (Vianna, 2000; Barbosa & Costa, 2003).

Besides the *T. brasiliensis* complex, some smaller monophyletic assemblages are recognized within the East Atlantic basin area. *Trichomycterus pradensis* is distinct from one of these assemblages, composed of *T. variegatus* and *T. concolor* (according to Costa, 1992), by a triangular head shape (versus quadrangular) and the anteriormost segment of the infraorbital laterosensory canal (i1, i3) present (versus absent).

*Trichomycterus pradensis* is distinct from a second monophyletic assemblage with *T. albinotatus*, *T. auroguttatus*, *T. bahianus*, *T. longibarbatus* (according to Costa, 1992), plus *T. immaculatus* and *T. trefauti*, by a low number of 8-10 odontodes on opercular patch (versus more than 14). The new species shares with this second monophyletic group a cephalic pore pattern, with paired supraorbital pores s6 placed more close to each other than to orbital rim. This last monophyletic group comprises the species that best approach morphologically to *T. pradensis*, such as *T. immaculatus*, which is the only known species in the Brazilian East Atlantic basin area to have 8 branched pectoral fin rays. The new species differs from *T.*

*immaculatus* regarding the short nasal barbels, not reaching opercular odontode plate (versus reaching); branched dorsal fin rays 7 (versus 6) and an overall pigmentation spotted (versus uniformly grayish).

Body shape differences between *T. pradensis* and three species from the rio Jequitinhonha basin were verified by the principal component which reflects the general variation of size account of morphometric traits (Fig. 9). The first principal component reflects the 59,50% of the variance while the second principal component reflects variation for 13,35% of the variance. (Table 2). In the formation of both components the head dimensions are the most significant ones.

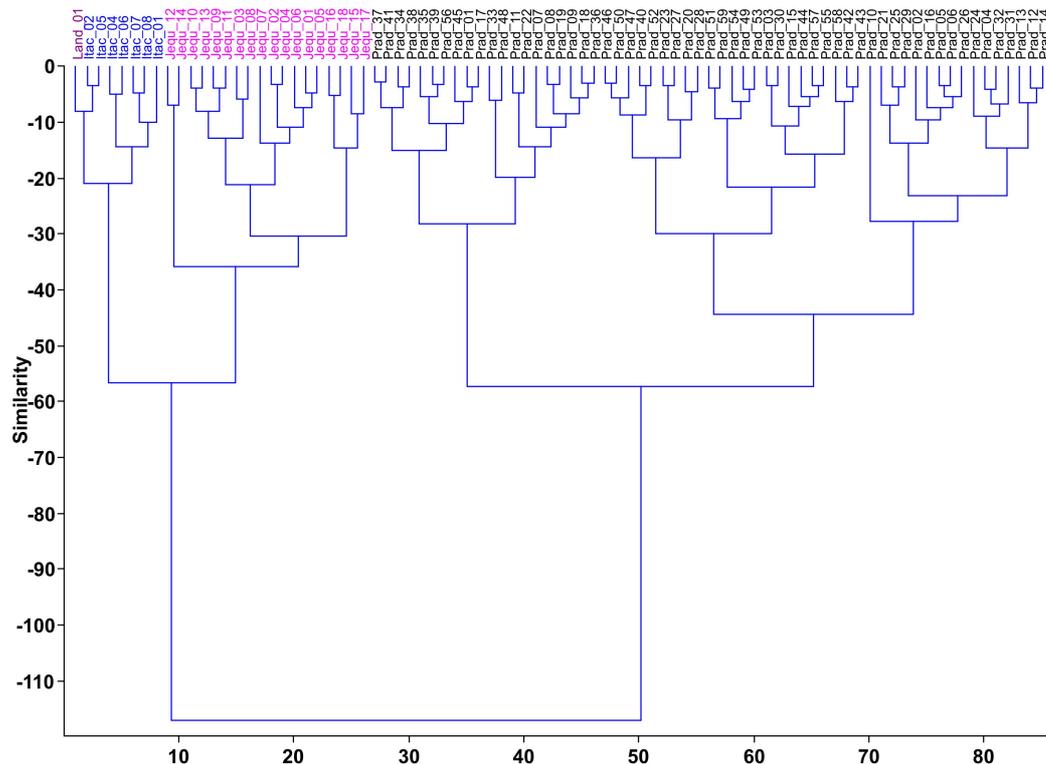


**Fig. 9.** – Scatter plots of scores on first two principal components from morphometric analysis of *T. pradensis* (filled circle), *T. itacambirussu* (open square), *T. jequitinhonhae* (filled square), and *T. landinga* (open circle).

**Table 2- Principal components analysis of *T. pradensis*. (n=59), *T. itacambirussu* (n=8), *T. jequitinhonhae* (n=18), and *T. landinga* (n=1). Variable loadings for components 1 and 2.**

Variable	PC1	PC2
Percent variance	59.501	13.352
Total length	-0,1377	0,1636
Body depth	-0,1313	0,03792
Caudal peduncle depth	-0,2	0,05489
Caudal peduncle length	-0,01463	0,06785
Predorsal length	-0,2094	0,137
Preanal length	-0,04868	0,2414
Prepelvic length	-0,2672	0,2081
Dorsal-fin base length	0,06392	-0,08096
Anal-fin base length	0,08571	-0,09033
Head length	0,3828	0,4125
Head width	-0,5127	-0,4943
Head depth	-0,5738	0,4974
Interorbital distance	0,06437	0,1715
Internarial width	0,1585	-0,149
Snout length	0,1443	0,313
Orbital diameter	0,07632	-0,1326

The Cluster Analysis also clearly shows the similarity between *T. pradensis* (similarity index= -58) and dissimilarity (similarity index= -118) with the species of the rio Jequitinhonha, *T. itacambirussu*, *T. jequitinhonhae* and *T. landinga* (Fig.10).



**Fig. 10. – Dendrogram of cluster analysis employing Ward method applied to *T. pradensis* (Prad\_01 to Prad\_59), *T. itacambirussu* (Itac\_01 to Itac\_08), *T. jequitinhonhae* (Jequ\_01 to Jequ\_18), and *T. landinga* (Land\_01)**

### Comparative material

*Trichomycterus albinotatus*: MNRJ 21182, 33, Brazil: Rio de Janeiro: Nova Friburgo, locality of João Brande, rio Grande headwaters. *T. alternatus*: MNRJ 17167, 1, Brazil: Minas Gerais: rio Doce basin, córrego Curral Velho, tributary on left margin of rio Gualaxo do Sul, tributary on the right margin of rio do Carmo. MNRJ 17265, 1, Brazil: Espírito Santo: rio Itaúnas basin, rio do Sul. MNRJ 21467, 17, Brazil: Minas Gerais: river tributary of Doce basin, southeast from road Ouro Branco-Ouro Preto. *T. brasiliensis*: MNRJ 11346, 1, paralectotype, Brazil: Rio de Janeiro: Itatiaia, Mont Serrat, ribeirão da Tapera. MNRJ 11347, 1, paralectotype, Brazil: Rio de Janeiro: Itatiaia, Mont Serrat, ribeirão da Tapera. MNRJ 21425, 1, Brazil: Minas Gerais: rio Paraopeba, in Cristiano Otoni, close to the old bridge, approximately 100m west from BR-040. MNRJ 21554, 1, Brazil: Minas Gerais: tributary on headwaters of rio Ouro Branco, rio Paraopeba basin, road Ouro Branco-Santa Rita do Ouro Preto. *T. goeldii*: MNRJ 14020, 38, Brazil: Rio de Janeiro: rio Paquequer. *T. immaculatus*: MNRJ 18045, 6, Brazil: Minas Gerais: ribeirão Pitangas, 2 km from mouth, tributary on the left margin of rio Santo Antônio, tributary on the left margin of rio Doce. MNRJ 18396, 2, Brazil: Minas Gerais: rio Carangola, tributary on the left margin of rio Muriaé, left margin of rio Paraíba do Sul, between Alvorada and Carangola. *T. itatiayae*: MNRJ 6041, 7, Brazil: Rio de Janeiro: Itatiaya, fazenda Penedo, riacho Frio. MNRJ 20049, 1, Brazil: Rio de Janeiro: Parque Nacional de Itatiaia. *T. mirissumba*: MNRJ 24079, 2, Brazil: Rio de Janeiro: rio Preto, downstream from Camping do Torto. MNRJ 24083, 2, Brazil: Rio de Janeiro: poço do escorrega in Maromba, downstream from limits of Parque Nacional de Itatiaia. *T. paquequerense*: MNRJ 12841, 4, Brazil: Rio de Janeiro: rio Paquequer drainage, córrego do Quebra-Frasco, upstream from road Teresópolis-Petrópolis. MNRJ 12842, 3, Brazil: Rio de Janeiro: rio Piabanha drainage, córrego do Jacó, tributary of rio Santo Antônio, upstream from road Petrópolis – Teresópolis. MNRJ 14349, 1, Brazil: Rio de Janeiro: rio Paquequer,

tributary on the left margin of rio Preto, tributary on the right margin of rio Piabanha, close to the Parque Nacional de Serra dos Órgãos. *T. reinhardti*: MNRJ 17059, 1, Brazil: Minas Gerais: córrego Debaixo da Serra, tributary on the right margin of rio Água Limpa, tributary on the right margin of córrego das Painas, tributary on the left margin of córrego Beijinho. MNRJ 21416, 2, Brazil: Minas Gerais: river crossing road MG-030, between Engenheiro Correia and Miguel Burnier, tributary of rio Itabira. *Trichomycterus* sp.: MNRJ 28492, 1, Brazil: Bahia: tributary of córrego Água Preta on road Jeribá-Itanhém, between Santa Rita village and Itanhém.

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