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New species of *Scleromystax* Günther, 1864 (Siluriformes: Callichthyidae) - extending the meridional distribution of genera endemic to the Atlantic Forest

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The genus *Scleromystax* includes species occurring in several coastal river basins from southern Bahia to southern Santa Catarina States. Examination of *Scleromystax* specimens sampled from the laguna dos Patos drainage revealed a new taxon, further extending the distribution of the genus to the southern border of the Atlantic forest. The new species differs from its congeners by the second infraorbital ventrally expanded. It is also distinct, except from *S. macropterus* and *S. salmacis*, by roughly oblique, elongate, dark brown blotches along body; large specimens displaying cranial fontanel completely occluded, leaving just a shallow fossae; and sexually dimorphic features inconspicuous, *i.e.* preopercular (cheek) region similar in males and females, and dorsal and pectoral fins of males slightly longer than in females. Herein, we also extend the record of *Scleromystax salmacis* to the rio Tramandaí drainage.

O gênero *Scleromystax* inclui espécies distribuídas nas diversas bacias hidrográficas costeiras entre o sul do Estado da Bahia e o sul do Estado de Santa Catarina. O exame de exemplares de *Scleromystax* coletados nos sistema da laguna dos Patos revelou um novo táxon, estendendo a distribuição do gênero para o limite austral da Mata Atlântica. A nova espécie difere de seus congêneres pelo segundo infraorbital expandido ventralmente. Também se distingue, exceto de *S. macropterus* e *S. salmacis*, por manchas castanho-escuras alongadas e oblíquas ao longo do corpo; espécimes grandes apresentando a fontanela craniana completamente oclusa, restando somente uma depressão superficial; e características de dimorfismo sexual inconspícuas, *i.e.* região pré-opercular semelhante em machos e fêmeas, e nadadeiras dorsal e peitoral dos machos sutilmente mais longa que das fêmeas. No presente estudo, o registro de *S. salmacis* é estendido até a drenagem do rio Tramandaí.

Keywords: Araranguá River, Endemism, Mampituba River, Sexual dimorphism, Tramandaí River.

Introduction

The fish fauna from the coastal river drainages in Brazil shows a high endemism (Vari, 1988; Weitzman *et al*., 1988; Bizerril, 1994; Buckup, 2011), not only in species composition, but also observable at the level of genera. Some genera (*Deuterodon* Eigenmann, *Hollandichthys* Eigenmann, *Listrura* de Pinna and *Scleromystax*) have their species distribution fully contained in the Atlantic Forest Biome, that extends from near Porto Alegre, Rio Grande do Sul State, to near Natal, Rio Grande do Norte State, and are found inhabiting rivers and creeks running through forested areas (Menezes *et al*., 2007).

Until recently, only the genus *Deuterodon* was known to occur in the southern limit of the Atlantic Forest in the rio Maquiné, rio Tramandaí drainage (Gomes, 1947), but in the last few years the three other genera have had their southern distributional limits extended farther south through the description of recently discovered populations of new species. These records includes the description of a new species of *Scleromystax* from the rio Mampituba drainage (Britto & Reis, 2005), a new *Hollandichthys* from the rio Maquiné, rio Tramandaí drainage (Bertaco & Malabarba, 2013), and a new *Listrura* from the laguna dos Patos drainage (Villa-Verde *et al*., 2013). In all these cases, these peripheral populations seems to be small and hardly represented in collections, when compared to the species of those genera found in the central areas of the Atlantic forest.

We herein extend the record of *Scleromystax salmacis* Britto & Reis to the rio Tramandaí drainage and describe a new species of *Scleromystax* from the laguna dos Patos drainage, further extending the distribution of the genus to the southern border of the Atlantic forest.

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Material and Methods

Morphometric and meristic data were taken following Reis (1997) and Britto & Reis (2005). Measurements were obtained with calipers to 0.1 mm. Teeth and vertebral counts were taken from cleared-and-stained (cs) specimens, prepared according to Taylor & Van Dyke (1985). In the description, values for the holotype are marked with an asterisk. Nomenclature of latero-sensory canals follows Schaefer & Aquino (2000), and that of preopercular pores follows Schaefer (1988). Osteological terminology follows Reis (1998), except for the use of parieto-supraoccipital instead of supraoccipital (Arratia & Gayet, 1995), compound pterotic instead of pterotic-supracleithrum (Aquino & Schaefer, 2002), and scapulocoracoid instead of coracoid (Lundberg, 1970), as adopted in Britto & Lima (2003). Homologies of barbels follow Britto & Lima (2003). Institutional abbreviations are according to Reis *et al.* (2003).

In order to investigate the phylogenetic affinities of the new taxa, a parsimony analysis was performed using the morphological character data matrix published by Britto (2003), but restricted to *Scleromystax* species and a selected outgroup (*Callichthys callichthys* (Linnaeus), *Aspidoras albater* Nijssen & Isbrücker, *Corydoras difluviatilis* Britto & Castro and *C. aurofrenatus* Eigenmann & Kennedy), including just the characters that vary among this sample (46 characters: 2, 6, 7, 15-30, 32-34, 37-40, 42, 43, 45-50, 52, 54, 56, 60, 62, 65, 66, 68, 72, 80-82), with the same codification. The analysis was performed using the T.N.T. software (Goloboff *et al.*, 2008) via a traditional heuristic search performed using the stepwise addition algorithm associated with tree bisection reconnection in a total amount of 10.000 samples. Attributes of connectivity and ambiguity among character-states were treated in the same way as in Britto (2003).

Results

Scleromystax reisi, new species

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Figs. 1-7

Scleromystax sp. Carvalho *et al.*, 2012 [listed; first record to the laguna dos Patos drainage].

Holotype. MCP 49070, 49.3 mm SL, Brazil, Rio Grande do Sul State, Gravataí, arroio Demétrio, Morungava, 29°47’26”S 50°51’51.55”W, 14 Apr 2014, P. Lehmann.

Paratypes. Brazil, Rio Grande do Sul State. MCP 48177, 2, 13.7-14.4 mm SL, Viradouro, Capela Santana, rio Caí drainage, 29°38’51”S 51°49’12”W, 8 Nov 2013, P. Lehmann. MCP 48178, 2, 18.8-46.5 mm SL, same locality of the holotype, 23 Nov 2012, P. Lehmann. MCP 48179, 4, 35.8-41.5 mm SL, collected with the holotype. MNRJ 43857, 4, 2 cs, 38.3-47.2 mm SL, Amaral Ferrador, stream at Fazenda Ferraria, 30°50’54”S 52°23’19”W, Nov 2006, J. Anza & R. Hirano. UFRGS 8747, 1, 26.9 mm SL, same data as MNRJ 43857. UFRGS 8754, 4, 21.4-49.9 mm SL, same data as MNRJ 43857. UFRGS 9228, 1, 34.8 mm SL, Camaquã, stream at Fazenda Capela Velha, 30°51’36”S 51°53’07”W, Jun 2007, J. Anza & J. Ferrer. UFRGS 18002, 1, 39.8 mm SL, Mariana Pimentel, stream near Morro Cerro Negro, 30°20’44”S 51°34’08”W, 28 Nov 2012, M. Almeirão. All following lots from Eldorado do Sul, Estação Experimental Agronômica, Universidade Federal do Rio Grande do Sul (EEA-UFRGS): MNRJ 43858, 6, 21.6-35.7 mm SL, small stream tributary to arroio Calombos, 30°06’44.3”S 51°40’44.2”W, 23 Jan 2013, J. Ferrer, C. Fukakusa & J. P. Miranda. UFRGS 17414, 6, 19.8-36.0 mm SL, same data as MNRJ 43858. UFRGS 17416, 3, 29.7-45.5 mm SL, same locality as UFRGS 17414, 6 Oct 2012, C. K. Fukakusa, J. P. S. Miranda & V. R. Lampert. UFRGS 14964, 2, 46.8-54.1 mm SL, swamp close to water reservoir, 30°05’56”S 51°40’11”W, 6 May 2011, F. R. Carvalho & C. Fukakusa. UFRGS 14968, 1, 49.6 mm SL, same data as UFRGS 14964. UFRGS 14965, 1, 33.5 mm SL, creek below small water reservoir, 30°05’12”S 51°40’57”W, 25 Apr 2011, R. Dala-Corte & C. Fukakusa. UFRGS 16590, 1, 31.2 mm SL, arroio Calombos, 30°06’03”S 51°41’42”W, 1 Apr 2008, C. Fukakusa. UFRGS 18254, 1, 47.7 mm SL, 30°05’52.2”S 51°41’26.3”W, 1 Nov 2013, L. R. Malabarba. UFRGS 19188, 5, 25.4-38.9 mm SL, 30°06’49.10”S 51°41’0.01”W, 20 Sep 2013, C. K. Fukakusa, J. P. Miranda, A. Langoni & L. A. Donin. UFRGS 19189, 3, 42.1-46.1 mm SL, same data as UFRGS 19188. UFRGS 19191, 12, 19.2-44.6 mm SL, unnamed creek, 30°06’49.10”S 51°41’0.01”W, 30 Nov 2013, C. Fukakusa & J. P. S. Miranda. UFRGS 19657, 2, 23.3-24.3 mm SL, arroio Calombos, 30°06’02”S 51°41’41.2”W, Nov 2009, L. R. Malabarba.

Diagnosis. *Scleromystax reisi* differs from its congeners by infraorbital 2 expanded ventrally, adjacent to small, almost imperceptible, naked area between sphenotic, compound pterotic, opercle and preopercle (*vs.* infraorbital 2 narrow, leaving a somewhat large area between those bones). The new taxon is also distinct from its congeners, except *Scleromystax macropterus* (Regan) and *S. salmacis*, by roughly oblique, elongate, dark brown blotches along body (*vs.* large, dark brown blotches, often coalesced, mainly on almost all dorsolateral body plates, in *S. barbatus*; or ground color yellowish white, with a dark brown stripe along junctions of dorso- and ventrolateral body plates, in *S. prionotos* (Nijssen & Isbrücker)). It is also distinguished, except from *S. macropterus*, by large specimens displaying cranial fontanel completely occluded, leaving just a shallow fossae, delimited by frontal bones, and reaching anterior tip of parieto-supraoccipital (*vs.* wide or narrow fontanel between frontals). *Scleromystax reisi* differs from *S. macropterus* mainly by the absence of a black dot on the base of median caudal-fin rays (*vs.* presence), and sexually dimorphic features inconspicuous, *i.e.* cheek region similar in males and females, with only minute, scattered odontodes in the former (*vs.* males with developed odontodes inserted in fleshy papillae), dorsal and pectoral fins of males slightly longer than in females (*vs.* dorsal and pectoral fins of males 2-3 times longer than those fins in females). It is also distinguished from *S. salmacis* by the tip of snout roughly truncate (*vs.* slightly continuous and smoothly tapered).

Fig. 1. *Scleromystax reisi*, holotype, male, MCP 49070, 49.3 mm SL, arroio Demétrio, Morungava, Gravataí, RS, Brazil.

Description. Morphometric data presented in Table 1. Head compressed with slightly convex dorsal profile until posterior tip of parieto-supraoccipital process; roughly triangular in dorsal view. Snout straight and relatively blunt, roughly truncate (Fig. 2). Profile slightly convex along dorsal-fin base. Postdorsal-fin body profile nearly straight to first preadipose unpaired platelet; slightly convex along preadipose platelets and base of adipose-fin spine. Ventral profile nearly straight from isthmus to anal-fin origin, with pronounced convexity just anterior to pelvic fins. Profile markedly concave from first anal-fin ray to caudal-fin base. Body roughly elliptical in cross section at pectoral girdle, gradually becoming more compressed toward caudal fin.

Eye round, located dorso-laterally on head; orbit delimited dorsally by frontal and sphenotic, ventrally by infraorbitals. Anterior and posterior nares close to each other, only separated by flap of skin. Anterior naris tubular. Posterior naris close to anterodorsal margin of orbit, separated from it by distance equal to diameter of naris. Mouth small, subterminal, width slightly larger than bony orbit diameter. Maxillary barbel reaching anteroventral limit of gill membrane in some individuals. Maxillary barbel slightly longer than outer mental barbel, with nearly same length. One specimen (UFRGS 8754, 49.9 mm SL) only with outer mental barbel. Inner mental barbel fleshy, nearly one-third of outer mental barbel length. Small rounded papillae covering entire surface of all barbels, upper and lower lips, and isthmus; more evident on lips and barbels. Minute odontode-bearing platelets scattered on ventral surface, between pectoral and pelvic girdles. Side of snout (cheek, preopercular region just below first infraorbital) conspicuously fleshy; males with several minute, scattered odontodes somewhat larger than those ones over body. Gill membranes united to isthmus. Four branchiostegal rays covered by thick layer of skin; distal two rays united at their tips by branchiostegal cartilage. Teeth on upper pharyngeal tooth plate 32, roughly arranged in two rows, and on fifth ceratobranchial 27, restricted to one row at mesial margin.

Sphenotic, parieto-supraoccipital, and frontal bones visible externally, all covered by thin layer of skin and bearing minute scattered odontodes. Cranial fontanel completely occluded in large specimens (Fig. 3), leaving shallow fossae, covered by thin skin, delimited by frontal bones, and reaching anterior tip of parieto-supraoccipital; small specimens (up to 38.3 mm SL) with opened fontanel restricted to region between frontal bones. Sphenotic trapezoid in shape, contacting parieto-supraoccipital dorsally, compound pterotic posteriorly, and second infraorbital ventrally. Parieto-supraoccipital quadrangular with posterior expansion triangular and elongate, but not reaching nuchal plate, leaving naked area with scattered, minute odontode-bearing platelets. Unpaired odontode-bearing platelets between parieto-supraoccipital posterior process and nuchal plate.

Table 1. Morphometric data of *Scleromystax reisi*. Range includes holotype and paratypes.

	Hol.	N	Min	Max	Mean	SD
Standard length (mm)	49.3	57	18.8	54.1	33.9	-
			Percents of Standard Length			
Depth of body	30.6	57	26.7	37.6	30.7	1.78
Predorsal distance	45.9	57	44.8	55.1	48.4	2.14
Prepelvic distance	46.8	57	44.4	52.7	47.9	1.80
Preanal distance	78.9	57	72.9	81.7	77.3	1.85
Preadipose distance	82.6	57	77.2	86.9	82.6	2.11
Length of dorsal spine	13.2	57	11.1	19.1	14.5	1.55
Length of pectoral spine	16.9	57	14.4	26.0	20.8	2.66
Length of adipose-fin spine	10.6	57	8.0	14.6	10.5	1.52
Depth of caudal peduncle	13.6	57	12.6	16.6	14.5	0.94
Dorsal to adipose distance	21.2	57	16.5	27.2	22.0	1.98
Length of dorsal-fin base	19.7	57	15.0	20.8	18.0	1.43
Maximum cleithral width	6.4	53	5.9	15.2	10.8	1.80
Length of maxillary barbel	14.4	57	3.7	18.9	11.3	4.00
Head length	39.6	57	35.5	49.3	40.4	2.30
			Percents of Head Length			
Length of maxillary barbel	36.3	57	9.0	50.5	28.0	10.00
Head depth	72.2	57	61.6	79.8	70.2	4.12
Least interorbital distance	28.2	57	25.2	38.7	32.4	2.30
Horizontal orbit diameter	13.7	57	12.5	20.3	17.2	1.85
Snout length	42.7	57	31.6	45.9	39.0	2.95
Least internareal distance	13.5	57	9.2	21.8	15.8	2.77

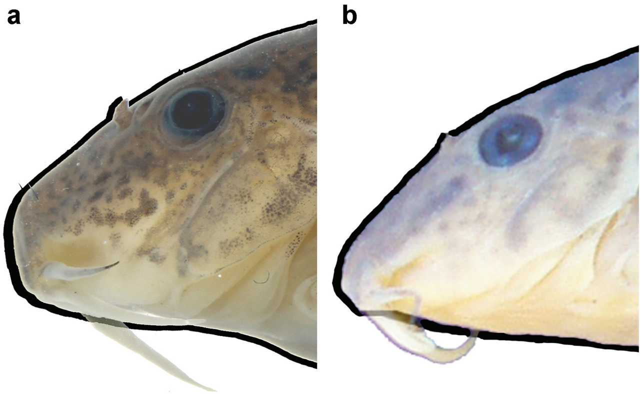

Fig. 2. Lateral view of head, left side, showing the snout profile of *Scleromystax reisi*, holotype, MCP 49070, 49.3 mm SL (a), and *S. salmacis*, holotype, MCP 38388, 36.7 mm SL (b; modified from Britto & Reis, 2005: fig. 1).

Two infraorbital bones, externally visible, covered by thin layer of skin; both bearing few minute odontodes. First infraorbital with anterior expansion just surpassing vertical through anterior naris. Second infraorbital expanded ventrally, leaving small, almost absent, naked area between sphenotic, compound pterotic, opercle and preopercle (Fig. 4). Opercle exposed, ovoid in shape and roughly elongate, with free border variably smooth or angulated. Preopercle externally visible, slender and covered by thin layer of skin. Opercle and preopercle with minute odontodes scattered over their surfaces.

Trunk lateral-line composed of one perforated dorsolateral-body plate and two laterosensory canals, reduced to small ossicles. Lateral-line canal entering neurocranium through compound pterotic, splitting into three branches before entering sphenotic: pterotic, preoperculomandibular, and posterolateral, each with single pore. Posterolateral branch opened in compound pterotic itself, just above upper margin of opercle. Sensory canal continuing through compound pterotic, entering sphenotic as temporal canal, which splits into two branches: one branch giving rise to infraorbital canal, other branch entering frontal through supraorbital canal. Supraorbital canal not branched, running through nasal bone. Epiphyseal pore opening at supraorbital main canal. Nasal canal with single opening at each end. Infraorbital canal running through entire second infraorbital, extending to infraorbital 1 and opening into four pores; one pore at second infraorbital just before articulation point with infraorbital 1, remaining pores opened in first infraorbital. Preoperculomandibular branch not connected to preoperculomandibular canal, which runs through entire preopercle with three openings, leading to pores 3, 4, and 5, respectively.

Body plates with minute, scattered odontodes, larger on posterior margin of plates. Nuchal plate exposed. Cleithrum exposed laterally. Scapulocoracoid not exposed. Dorsolateral body plates not touching counterparts at middorsal line, showing narrow, shallow groove from last dorsal-fin ray to first preadipose platelet. Ventrolateral body plates not touching counterparts at midventral line in all specimens, leaving shallow preanal fleshy skin ridge. Dorsolateral body plates 22(2), 23(20), 24*(13), 25(16) or 26(8); ventrolateral body plates 20(1), 21(16), 22*(28), 23(13) or 24(1); dorsolateral body plates along dorsal-fin base 5(11), 6*(24), or 7(24); dorsolateral body plates from adipose fin to caudal-fin base 5(3), 6(30), 7*(17), 8(7), or 9(1); preadipose platelets 2(2), 4(1), 5(6), 6(24), 7*(20), 8(4), 9(1). Precaudal vertebrae 9; caudal vertebrae 14; six pairs of ribs, first pair conspicuously larger than others.

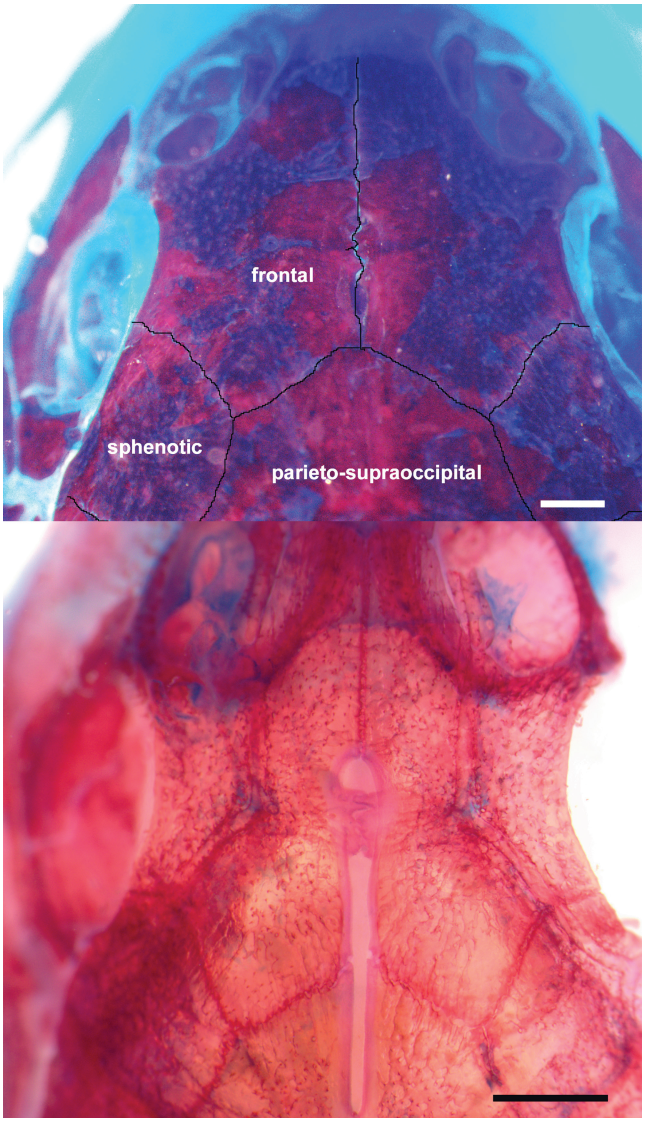

Fig. 3. Detail of dorsal view of cranium of *Scleromystax reisi*, paratype, female, MNRJ 43857 (top), and *S. salmacis*, male, MCP 28729 (bottom; flipped horizontally, left infraorbitals and suspensorium removed). Solid lines detaching limits of bone sutures. Scale bar: 1.0 mm.

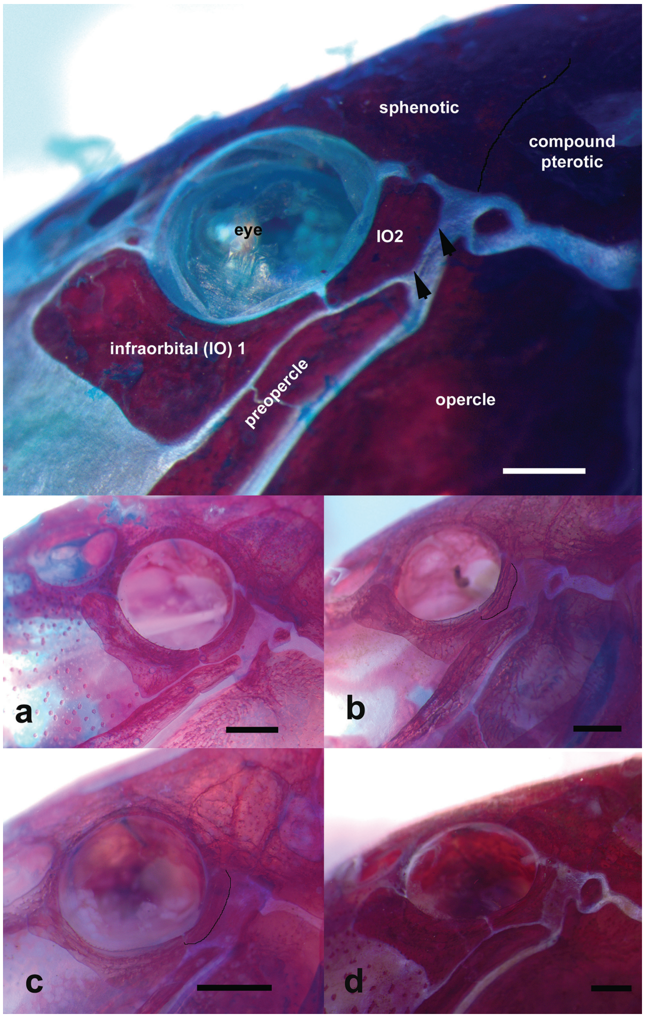

Fig. 4. Infraorbital series and adjacent cranial bones, lateral view, of: *Scleromystax reisi*, paratype, MNRJ 43857 (largest image, left side); a. *S. salmacis*, MCP 28729 (right side, flipped horizontally); b. *S. macropterus*, UFRJ 4442 (left side); c. *S. prionotos*, UFRJ 4428 (right side, flipped horizontally); d. *S. barbatus*, UFRJ 4440 (right side, flipped horizontally). Arrowheads showing ventral expansion of infraorbital 2. Solid lines detaching ventral margin of infraorbital 2 and bone sutures. Eye removed from specimens in a-d. Scale bar: 1.0 mm.

Dorsal fin roughly ovoid; its origin just posterior to third dorsolateral body plate. Dorsal spinelet not embedded in adjacent dorsal spine. Ossified portion of dorsal spine shorter than first five-six branched rays; second branched ray longest. Distal tip of dorsal spine with short, segmented unossified portion. Anterior and posterior border of dorsal spine smooth. Dorsal-fin rays I,7(5), I,8*(54). Adipose fin roughly triangular; its origin separated from base of last dorsal-fin ray by 7(1), 8(19), 9*(23), or 10(11) dorsolateral body plates. Anal fin roughly triangular; its origin located just posterior to 13th ventrolateral body plate, at vertical through posterior margin of penultimate preadipose platelet. Anal-fin rays ii,4(1), ii,5(13), ii,5,i(3), or ii,6*(42). Pectoral fin roughly triangular; its origin located just posterior to gill opening. Ossified portion of pectoral spine shorter than first three branched rays; first branched ray the longest one. Distal tip of spine with short, segmented unossified portion (Fig. 5). Pectoral spine with 15-20 well-developed proximally-orientated dentations along entire posterior border. Males with thicker pectoral spines, bearing plentiful, randomly scattered odontodes; females with odontodes roughly arranged in longitudinal rows. Small, whiskerlike odontodes on dorsal surface of pectoral spine just adjacent to fin membrane in males. Pectoral-fin rays I,7(11), I,8*(46) or I,9(2). Pelvic fin ellipsoid; its origin just below second ventrolateral body plate, at vertical through base between first and second branched dorsal-fin ray. Pelvic-fin rays i,5. First pelvic-fin ray (unbranched) thickened anteriorly and flattened; its tegument thick, with embedded minute odontodes. Caudal fin bilobed; both lobes equal in size. Principal caudal-fin rays i,5/5,i(1), i,5/6,i(7), i,6/5,i(1) or i,6/6,i*(50); five upper and lower procurrent caudal-fin rays, respectively. All fins with minute odontodes scattered over all rays; pectoral and pelvic fins with odontodes restricted to ventral side.

Fig. 5. Right pectoral spine of *Scleromystax reisi*, paratype, male, MNRJ 43857. Small, whiskerlike odontodes removed. Scale bar: 1.0 mm.

Coloration in alcohol. Ground coloration of head light brown. Several small, irregular, dark brown blotches distributed over dorsal and lateral surface of head, snout, preopercle and opercle. Series of chromatophores forming thin, faint brown ring on skin around orbit. Maxillary barbel yellowish white, with minute, scattered, irregular, small dark brown blotches on base. Inner mental barbel yellowish white, with few chromatophores on tip. Outer mental barbel with light brown coloration. Series of chromatophores forming thin line along profile of parieto-supraoccipital process on both sides, extending to unpaired predorsal platelets. Ventral region of head yellowish white. Ground color of trunk yellowish light brown. Fainted brown coloration along dorsum. Diffuse, dark brown blotch on cleithrum. Two series of small blotches from region just posterior to cleithrum to caudal peduncle, along ventral portion of dorsolateral body plates and dorsal portion of ventrolateral body plates, respectively; nearly close to midlateral plate junctions; more evident in males (Fig. 1) than in females (Fig. 6) and absent in juveniles (Fig. 7). Inner coloration layer on plate junction. Four oblique, trespassing, rough bars on side of trunk, more evident in juveniles with less than 19 mm SL (Fig. 7). In males, bars variably restricted to dorsolateral body plates, or extending through plate junctions to ventrolateral body plates (Fig. 1). In females, bars shape variable, usually present on dorsolateral body plates and extending to ventrolateral body plates, sometimes forming a zigzag pattern (Fig. 6). Ventral surfaces of body yellowish white.

Dorsal spine light brown. Anterior portion of dorsal fin with several chromatophores, coalesced in diffuse, elongated blotch along the membrane between the first and second branched rays and along proximal portion of the membrane between third and fourth branched rays; remaining interradial membranes hyaline. Roughly two series of brown blotches restricted to rays, except by interradial space between first-second, and second-third branched rays (Figs. 1, 6). Juveniles with dorsal spine and two anterior branched rays black pigmented, as well as the membrane between the first and second branched rays and along proximal portion of the membrane between third and fourth branched rays; remaining interradial membranes hyaline; branched dorsal fin rays 2 or 3 to 8 or 9 with small black dots along half-distal length (Fig. 7).

Ground color of anal-fin rays faintly yellowish white, almost hyaline. Interradial anal-fin membranes in the midlength of anal-fin rays hyaline to light gray with scattered chromatophores on rays and membrane (Figs. 1, 6) and dark gray to black in juveniles (up to 20 mm SL; Fig. 7). Adipose-fin spine brown in adults (Figs. 1, 6) and black in juveniles (Fig. 7). Adipose-fin membrane with scattered chromatophores; more concentrated on free border. Pectoral spine light brown. Pectoral-fin rays with dark brown chromatophores restricted along first four branched rays; interradial membrane hyaline. Pelvic fin hyaline, with diffuse series of scattered chromatophores on middle region of fin in smaller specimens. Caudal fin with three-four series of small, dark-brown blotches restricted to principal rays.

Coloration in life. General color pattern of black marks similar to that described for specimens in alcohol. Region of opercle and side of scapular girdle iridescent green (Fig. 6).

Sexual dimorphism. Male representatives of *Scleromystax* with a well-distinguishable genital papillae display some dimorphic features that help to distinguish them (Britto, 2003). The most useful characteristics are the elongate pectoral and dorsal fins, and the sides of snout (cheek region) bearing pointed, relatively long odontodes embedded in fleshy papillae. Notwithstanding, those features show a variable degree of development within the genus (Britto & Reis, 2005: 486-487), and *S. salmacis* displays none of the dimorphic conditions in addition to the shape of the genital papillae (Britto & Reis, 2005: figs. 1-2). *Scleromystax reisi* shared with its congener, *S. prionotos*, these sexually dimorphic features less evident, *i.e.* males with only minute, scattered odontodes in the sides of snout (although inserted in fleshy tissue in some specimens of *S. prionotos*), and dorsal and pectoral fins slightly longer than in females; conditions even less conspicuous in *S. reisi*. Males of *S. reisi* present thicker pectoral spines, with plentiful, randomly scattered odontodes, while females display odontodes roughly arranged in longitudinal rows. Also, males bear small, whiskerlike odontodes on dorsal surface of pectoral spine just adjacent to fin membrane.

Fig. 6. *Scleromystax reisi*, paratype, female, UFRGS 19189, 46.1 mm SL, Estação Experimental Agronômica, Universidade Federal do Rio Grande do Sul, Eldorado do Sul, RS, Brazil.

Fig. 7. *Scleromystax reisi*, paratypes. Changes in the color pattern during early stages of the ontogenesis. MCP 48177, 13.5 mm SL (top); MCP 48178, 18.8 mm SL (middle); UFRGS 19191, 19.4 mm SL (bottom).

Habitat and ecological notes (based on material from EEA-UFRGS). *Scleromystax reisi* was found mainly in very small (0.5-2 m wide) and shallow streams (30-60 cm depth), with slow current water and surrounded by relatively preserved riparian vegetation. The bottom was sandy, sometimes covered with a thin layer of mud or fallen leaves. Although there were rocky bottom stretches in the same creeks, the species was never found there. The streams may have a small amount of submerged vegetation. Other species collected along with *Scleromystax reisi* were *Astyanax eigenmanniorum* (Cope), *Cheirodon interruptus* (Jenyns), *Corydoras paleatus* (Jenyns), *Heptapterus mustelinus* (Valenciennes), *H. sympterygium* (Buckup), *Mimagoniates inequalis* (Eigenmann), *Phalloceros caudimaculatus* (Hensel), *Pseudobunocephalus iheringii* (Boulenger), *Rhamdia* sp. and *Scleronema* sp.

Distribution. Mainly first order streams of tributaries of the rio Jacuí and rio Camaquã, laguna dos Patos drainage, Rio Grande do Sul, Brazil (Fig. 8).

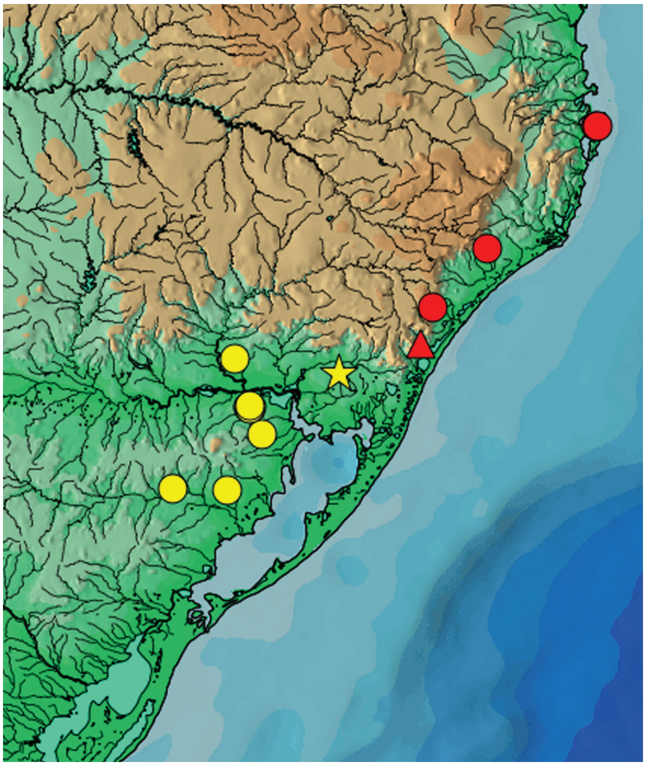

Fig. 8. Map of northern Rio Grande do Sul State and southern Santa Catarina State, Brazil, showing the distribution of *Scleromystax reisi* in the laguna dos Patos drainage (yellow symbols; star = type locality) and the distribution of *S. salmacis* (red symbols; triangle = first record to the rio Tramandaí drainage).

Etymology. The specific name is given in honor to our colleague Roberto Esser dos Reis, for his many contributions to Neotropical ichthyology, including studies in callichthyid fish. A noun in the genitive case.

Conservation status. *Scleromystax reisi* is known from an Extent of Occurrence (EOO) of approximately 9,400 km^2 and occurs only in forested streams with preserved riparian vegetation, a habitat naturally fragmented in the southern border of the Atlantic forest. There are no additional treats and it can be categorized as Least Concern (LC) according to IUCN criteria (IUCN, 2016).

Discussion

Conservation notes. The discovery of *Scleromystax reisi* is recent, but although the species is relatively rare in fish collections, it has been successfully collected in different occasions in at least one locality (EEA-UFRGS: 1 Apr 2008, UFRGS 16590; 25 Apr 2011, UFRGS 14965; 6 May 2011, UFRGS 14964, UFRGS 14968; 6 Oct 2012, UFRGS 17416; 23 Jan 2013, UFRGS 17414; 20 Sep 2013, UFRGS 19189, UFRGS 19188; 1 Nov 2013, UFRGS 18254; 30 Nov 2013, UFRGS 19191). This suggests that the species is well stablished but in very selective habitats associated with preserved riparian vegetation (see "Habitat and ecological notes" above).

The same seems to be true for *Scleromystax salmacis*. That species was described from the rio Mampituba and rio Araranguá, in Santa Catarina State (Britto & Reis, 2005) based on a few lots. These two rivers form, along with the rio Tramandaí drainage, an area of endemism in southern Brazil, sharing a number of endemic fish species (Malabarba & Isaia, 1992; Reis & Schaefer, 1998; Hirschmann *et al*., 2015), and historically united in a single palaeodrainage in the area exposed with the retreat in sea level during the Last Glacial Maximum (Thomaz *et al*., 2015). Surprisingly, *S. salmacis* was not recorded from the rio Maquiné or rio Três Forquilhas in the rio Tramandaí drainage, regardless the extensive collections of fishes from rio Tramandaí drainage (*e.g*., see map of distributional records of *Corydoras paleatus* in this drainage at Malabarba *et al*., 2013: 65). The re-identification of one lot of callichthyid catfish from a dense fragment of wetland forest located in the rio Tramandaí drainage (UFRGS 6575), however, allowed the recognition of a single lot of *S. salmacis* from this southern drainage in the Rio Grande do Sul State, Brazil. Likewise *Scleromystax reisi*, *S. salmacis* seems to inhabit very restricted habitats associated to forested streams, a kind of habitat that is naturally fragmented in the southern border of the Atlantic forest.

Similar results have been obtained by Villa-Verde *et al*. (2013) that discovered and described a new trichomycterid, *Listrura depinnai* (known only from two specimens of a single dense fragment of wetland forest from the laguna dos Patos drainage), a genus with six species previously known to occur from Santa Catarina to Rio de Janeiro States. All these results points out that forested fragments at the southern border of the Atlantic forest are especially critical for conservation. The fishes found in these habitats are not border populations of species with broader areas of occurrence in this biome, but otherwise species with small populations and small areas of occurrence associated with the remaining fragments at the southern limits of the Atlantic Forest.

Phylogenetic notes. The new taxon could be easily assigned to *Scleromystax*, displaying the character-states that defines the genus, such as a slender palatine, an elongate lateral ethmoid (Britto, 2003), presence of minute odontode-bearing platelets between posterior tip of parieto-supraoccipital and nuchal plate, and posterior process of parieto-supraoccipital and nuchal plate both elongate, almost reaching, but not touching each other (Britto, 2003; Britto & Reis, 2005). Besides, *S. reisi* presents the sexually dimorphic conditions found in almost all *Scleromystax* representatives, although in a less-conspicuous form.

A diagnostic feature of *Scleromystax reisi* is the second infraorbital expanded ventrally, adjacent to small, almost imperceptible, naked area between sphenotic, compound pterotic, opercle and preopercle (Fig. 4). Although a ventral expansion on the infraorbital 2 could be observed in some *Corydoras* species (Britto, 2003: 129-130), such conditions are somewhat different. In those *Corydoras*, the expansion fully contacts the compound pterotic, while the contact is limited to the sphenotic in the new taxon. Interestingly, the infraorbital series seems to be a useful source of taxonomic features for Corydoradinae (Tencatt *et al*., 2013).

Another interesting condition of *Scleromystax reisi* concerns the cranial fontanel completely occluded in large specimens, leaving just a shallow fossae between frontals and anterior tip of parieto-supraoccipital (Fig. 3). Examination of several representatives of *Scleromystax* reveals that this feature is shared only with fully-grown specimens of *S. macropterus*. In the other species, even the largest individuals of *S. barbatus* (Quoy & Gaimard), the cranial fontanel is always wide or narrowly opened.

The inclusion of *Scleromystax reisi* in the data matrix of Britto (2003) grouped this species close to *S. salmacis* and *S. macropterus*, with *S. barbatus* and *S. prionotos* as successive sister-clades of this assemblage. The group recovered by the former three species is based on characters as a wide posterior portion of the mesethmoid, a slender lateral ethmoid, and a deep opercle. Although preliminary, this hypothesis partially corroborates Britto & Reis (2005) that suggested (p. 487) a close relationship between *S. salmacis* and *S. macropterus*. Besides, it brings interesting insights about the distributional pattern of representatives of this clade of *Scleromystax* species. As cited above, *S. reisi* and *S. salmacis* inhabit habitats associated to forested streams in the southern border of the Atlantic forest. This kind of habitat restriction is also shared with *S. macropterus*, whose representatives are recorded from São Paulo to Santa Catarina states in fragments of the Atlantic forest.

Comparative material. Specimens listed by Britto & Reis (2005) and the following lots: *Scleromystax barbatus*, UFRJ 4440, 1 cs, Rio de Janeiro, São Pedro de Lumiar, rio Macaé basin. *Scleromystax macropterus*, UFRJ 4442, 2 cs, Santa Catarina, creek at São Francisco do Sul. *Scleromystax prionotos*, UFRJ 4428, 2 cs, Minas Gerais, Ipatinga, córrego Braúna, rio Doce basin. *Scleromystax salmacis*, UFRGS 6575, creek crossing the Reserva Biológica da Mata Paludosa, Terra de Areia, 29°30'41.14"S 50°23'56.12"W, Jun 2007, J. Anza & T. Gonçalves.

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