Two new species of *Rineloricaria* (Siluriformes: Loricariidae) from the rio Iguaçu basin, southern Brazil

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*Rineloricaria langei* and *R. maacki*, new species, are described from upper and middle regions of the rio Iguaçu basin, a left bank tributary of the rio Paraná basin, southern Brazil. *Rineloricaria langei* has narrow body and is similar to *R. quadrensis*, which is found in coastal rivers of Rio Grande do Sul State and is distinguishable by several morphometric characters. *Rineloricaria maacki* is distinguishable from all other congeners by the shape and extension of the naked area of the ventral region of pectoral girdle and other morphological characters. The presence of a naked region on the abdominal surface is shared with other species from the rio Paraná and rio Uruguay basins and coastal drainages from southeastern and southern Brazil. This may indicate a close phylogenetic relationship among these species. Similarities between the two new species and species from the aforementioned drainages also suggest close biogeographic relationship between the Paraná basin and other Brazilian coastal Atlantic drainages throughout the rio Iguaçu basin.


Key words: Ostariophysi, Loricariinae, Neotropical Region, Rio Paraná basin, Systematics.

Introduction

*Rineloricaria* Bleeker includes 32 valid species inhabiting the rio Paraná basin, rio Uruguay basin, and coastal Atlantic rivers from eastern Brazil to Uruguay (Ferraris, 2007; Ghazzi, 2008; Rodriguez & Reis, 2008). The genus is considered one of the most species-rich within the Loricariinae. Species of *Rineloricaria* occurs in a great variety of aquatic environments, and has been recorded from relatively polluted waters (Reis & Cardoso, 2001; Flores-Lopes et al., 2001).

Despite the diversity and widespread distribution of the genus, the available descriptions are old and incomplete. In addition, the absence of types of some species, including *Rineloricaria lima* (Kner) and *R. cubataonis* (Steindachner) (Isbrücker, 1979), intraspecific variation of some characters, and the existence of many undescribed species, render *Rineloricaria* as one of the most complex and poorly understood genera of the subfamily (Reis & Cardoso, 2001). This situation is made worse by the fact that the only revision of the genus was performed more than a century ago by Regan (1904) as part of a comprehensive study of the Loricariidae, which had a very different composition at that time.

Isbrücker et al. (2001) revalidated *Hemiloricaria* Bleeker and created two new genera (*Fonchiiichthys* Isbrücker & Michels and *Leliella* Isbrücker) in order to allocate many species of *Rineloricaria* based only on sexual dimorphism differences. Such decision was not adopted by Ferraris (2003), who kept 47 species in *Rineloricaria*. More recently, Ferraris (2007)...

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in his siluriform catalog has revalidated the genera *Hemiloricaria* and *Fonchiichthys* accepting the composition originally proposed by Isbrücker et al. (2001), however, without justifying his decision. Later, Covain & Fisch-Muller (2007) published a revisionary study of the genera of the subfamily Loriciarinae pointing out that the characteristics proposed by Isbrücker et al. (2001) to validate *Fonchiichthys, Hemiloricaria* and *Leliella* were insufficient to diagnose those genera, and then, considered them as junior synonym of *Rineloricaria*. Rodriguez & Reis (2008) accepted part of the phenetic groups proposed by Isbrücker et al. (2001) and distinguished *Rineloricaria* from *Hemiloricaria* by having wide body (vs. narrow body), dorsal caudal-fin rays not prolonged in a filament, except by some species (vs. dorsal and ventral rays produced in a filament), abdomen variably covered with platelets (vs. abdomen completely covered), typically a uniform body color pattern with five darker bands (vs. very spotted dark color pattern), and sexual dimorphism where males have hypertrophied odontodes on the cheeks and the pectoral-fin rays (vs. hypertrophied odontodes on the top of head to the predorsal area, on the cheeks and the pectoral-fin rays).

The two species described in this paper and *R. nigricauda* (Regan), widely distributed in the rio Paraíba do Sul on the Rio de Janeiro State, exhibit the characteristics of the genus *Rineloricaria* as reported by Rodriguez & Reis (2008). Because that, *R. nigricauda* was not considered in the genus *Hemiloricaria* like treated by Isbrucker et al. (2001), Ferraris (2007) and probably by Rodriguez & Reis (2008) due to omission of this species in the text.

Recent studies about the ichthyofauna from rio Iguaçu basin revealed the presence of three or four species of *Rineloricaria* in that basin (Reis & Cardoso, 2001; Vitule & Abilhoa, 2003; Ingenito et al., 2004). In this study two of these species of *Rineloricaria* are described from the upper and middle/lower courses of rio Iguaçu drainage (sensu Ingenito et al., 2004).

**Material and Methods**

Morphological measurements were made point-to-point, to the nearest 0.1 mm with digital calipers, on the left side of the specimens whenever possible. Morphometric and meristic data followed Reis & Cardoso (2001), plus counts of vertebrae and ribs, which were taken from cleared and double-stained specimens prepared according to the methodology proposed by Taylor & Van Dyke (1985). Head depth was measured at the anterior margin of the parieto-supraoccipital bone. Plate nomenclature follows Schaefer (1997). Number of lateral plates was counted at the mid-ventral series. Counts are presented in the text followed by their frequency in parenthesis. An asterisk indicates counts for the holotype. Vertebral counts include the fused Weberian complex, counted as five elements, and the compound urocentrum, counted as one element. Specimens of less than 50 mm of standard length (SL) were not used for morphometric and meristic data. Proportions of head structures are expressed as percent of head length (HL).

The examined specimens are deposited in the fish collection of the Academy of Natural Science, Philadelphia (ANSP); Natural History Museum, London (BMNH); Instituto Fundacion Miguel Lillo, Tucuman (FML); Museu Anchieta, Porto Alegre (MAPA); Museu de Ciências e Tecnologia da Pontifícia Universidade Católica do Rio Grande do Sul, Porto Alegre (MCP); Museu de História Natural Capão da Imbuia, Curitiba (MHNCT); Museu Nacional, Rio de Janeiro (MNJ); Museu Paraense Emílio Goeldi, Belém (MPEG); Museu de Zoologia da Universidade de São Paulo, São Paulo (MZUSP); Naturhistorisches Museum, Vienna (NMW); Núcleo de Pesquisas em Limnologia, Ictiologia e Aquicultura da Universidade Estadual de Maringá, Maringá (NUP); Departamento de Zoologia da Universidade Federal do Rio Grande do Sul, Porto Alegre (UFRGS). All examined specimens are ethanol preserved, except those labeled with c&s, which indicates cleared and double stained specimens and are preserved in glycerin.

**Rineloricaria langei**, new species

Figs. 1-2

*Rineloricaria* sp.; Ingenito et al., 2004: key, picture and comments (in part, only MHNCT 8937). [Picture shows a specimen from MHNCT 8937, but legend erroneously indicates MHNCT9133].

**Holotype.** MCP 42506, male, 114.9 mm SL, Brazil, Paraná, Quatro Barras, rio Irai, at Fazenda Moura-Daz, downstream Reservoir of rio Irai – SANEPAR, 49°05′26″W 25°29′23″S, Jan 2003, V. Abilhoa.

**Paratypes.** MCP 23459, 4 (1 male, 3 females), 71.7-116.5 mm SL. MHNCT 8937, 10 (1 male, 9 females), 51.7-111.9 mm SL. MNJR 31157, 5 (females, 1 c&s), 81.1-106.2 mm SL. All specimens collected with the holotype.

**Diagnosis.** *Rineloricaria langei* can be distinguished from all species of the genus except *R. catamarcensis*, *R. longicauda*, *R. maquinensis*, *R. misionera*, *R. nigricauda*, *R. quadrens*, and *R. steindachneri* by its narrow body (cleithral width 13.0-15.7% of SL; vs. 17.9-22.4% in *R. aequalucisps*, 20.0-22.2% in *R. anhaguapitan*, 17.8-19.2% in *R. anilae*, 18.0-21.8% in *R. baliola*, 16.0-19.1% in *R. cadeae*, 18.3-22.6% in *R. capitonia*, 17.7% in *R. felipponei*, 21.7-22.0% in *R. jaraguensis*, 17.1-20.6% in *R. kornei*, 19.1-20.6% in *R. latirostris*, 16.8-19.3% in *R. malabarbari*, 18.3-24.0% in *R. microlepidogaster*, 17.9% in *R. pareiacanthus*, 18.7-19.9% in *R. pentamaculata*, 18.3-23.6% in *R. reisi*, 17.6-19.6% in *R. tropeira*, 16.0-18.1% in *R. sangue*, 17.6-19.9% in *R. setepovos*, 16.6-19.9% in *R. stellata*, 15.8-21.4% in *R. strigilata*, 18.2% in *R. thrissaepeps*, and 16.2-21.6% in *R. zaina*). *Rineloricaria langei* differs from *R. catamarcensis*, *R. nigricauda* and *R. steindachneri* by having the dorsal caudal ray not prolonged
Fig. 1. *Rineloricaria langei*. a-c: holotype, male, MCP 42506, 114.9 mm SL; d-f: paratype, female, MCP 23459, 89.2 mm SL, rio Iraí, Quatro Barras, Paraná, Brazil.
as a filament (vs. dorsal caudal ray produced as a short fila-
ment). It is distinguished from *R. quadrensis* by having larger
interorbital width (19.7-24.0% vs. 18.5-19.3% of HL) and longer
dorsal-spine length (18.3-22.2% vs. 17.4-18.6% of SL); differs
from *R. longicauda* by elliptical naked area at tip of snout,
not reaching most anterior pore of the infraorbital sensory
canal (vs. elongate naked area at tip of snout reaching the
most anterior pore of the infraorbital sensory canal). In addi-
tion, *R. langei* can be easily distinguished from *R. maquinensis*
(with abdomen almost naked) and *R. misionera* (with pecto-
ral girdle not covered by plates) by abdomen and pectoral
girdle completely covered by plates.

**Description.** Morphometric data in Table 1. Head and body
deeply depressed. Head narrow in females and immature males,
and broad in mature males. Body narrow. Body depth greatest
at dorsal-fin origin. Head triangular in dorsal view. Dorsal pro-
file of head convex from snout tip to anterior margin of parieto-
supraoccipital, thereafter slightly concave to posterior margin
of first predorsal plate. Predorsal region straight. Trunk almost
straight and gradually depressed from dorsal-fin origin to cau-
dal-fin base. Ventral profile of body nearly straight from snout
tip to anal-fin origin, then becoming more depressed towards
caudal-fin base. Caudal peduncle depressed forming lateral
keels with 12(1), 13(9), 14(8*), or 15 (2) coalesced plates from
29(6*), 30(13) or 31(1) total lateral plates in middle series. Four
lateral series of plates, mid-dorsal series absent. Abdomen and
ventral region of pectoral girdle completely covered by plates,
even in specimens smaller than 85.5 mm SL; plates almost reach-
ing transverse line crossing through anterior margin of bran-
chial openings. Ventral region of scapular girdle covered by
several irregularly arranged platelets smaller than abdominal
plates. One (2), two (1), three (16*) or four (1) series of abdomi-
nal plates, usually regularly distributed in adults. Abdominal
plates of irregular shapes and sizes. Pre-anal plate present and
anteriorly rounded by three polygonal plates. Lateral abdomi-
nal plates four (1), five (9*), six (9) or seven (1). Dorsal-fin base
with five plate rows. Anal-fin base with two (8) or three (12*)
plate rows. Two (9) or three (11*) rows of plates between uro-
genital pore and anal fin. Plate counts on opposite sides of
body usually different, except at dorsal- and anal-fin bases.

Top of head and parieto-supraoccipital wrinkled, with well-
developed ridges. Ridges of parieto-supraoccipital diverging
posteriorly in adult specimens and nearly parallel in young.
Predorsal ridges parallel. Plates of first three mid-dorsal se-
ries with evident ridges. Upper edge of orbit raised. Postor-
bital notch shallow, short and wide, not surpassing one third
of orbital diameter.

Head and body covered by small odontodes, somewhat
more developed on top of head. Mature males with hypertri-
angled odontodes distributed only on lateral margins of head
and dorsum of pectoral fin (Fig. 2). Snout tip with small ellipt-
ical naked area, not reaching most anterior pore of infra-
orbital ramus of sensory canal. Naked area of snout sepa-
rated from upper lip by two to four series of inconspicuous
odontodes. Lips well developed and covered by papillae;
only one irregular row of papillae at anterior most area of
upper lip. Two rows of inconspicuous papillae separating
upper and lower lips. Maxillary barbel thin and shorter than
orbital diameter. Notch present in lower lip. Teeth bicuspid
with lateral cusp smaller than medial. Premaxilla with five (3),
six (8), seven (7) or eight (2*) teeth. Dentary with five (2), six
(6), seven (6) or eight (6*) teeth. Total number of vertebrae 33.
Four ribs attached to vertebrae 7 to 10.

Pectoral-fin rays seven (1,6); fin margin reaching pelvic-
fin origin when adpressed. Pelvic-fin rays six (1,5). Dorsal-fin
rays eight (i,7); first ray shorter than head length; its origin
located dorsal of pelvic-fin base. Anal-fin rays six (i,5). Cau-
dal-fin rays 12 (i,10,i); its distal margin slightly concave; dor-
sal principal rays longer than ventral rays; in some speci-
mens dorsal unbranched ray slightly elongated, extending
distally less than one-third of orbital diameter and not pro-
longed as filament.

**Color in alcohol.** Ground color of dorsal surface of adults
dark brown; specimens smaller than 85.5 mm SL light brown
with small dark spots or vermiculated lines, mainly on snout.
Dorsum of head with inconspicuous and scattered dark brown
blotches, sometimes forming two weak longitudinal stripes
extending from snout tip to anterior region of orbit, passing
medially through nares. Longitudinal stripes usually join with
greater number of chromatophores laterally and between eyes
forming darker region on top of head. Five (4) or six (16*) dark
brown transverse bars across body; first on dorsal-fin origin,
second on distal margin of dorsal-fin rays, third immediately
after vertical line passing through tip of anal-fin rays, fourth
and fifth on caudal peduncle, and sixth at end of caudal pe-
duncle, very close to base of caudal fin. Fourth and fifth
transverse bars sometimes slightly wider. Fourth and fifth or
fifth and sixth bars sometimes join into wider bar (forming
five bars instead of six). Some pores of laterosensory system
with dark chromatophores, more evident at anterior half of
side of body. Color of sensory pores of head indistinct from
background. Ventral surface of body pale yellowish. Some
specimens with scattered chromatophores on median region
of ventral surface of caudal peduncle, at anal-fin origin, and
at base of pectoral and pelvic fins.

Fins yellowish with interradial skin hyaline and small dark-
brown blotches on its rays. Pectoral fin with interradial skin
dark brown, in most specimens its blotches usually expand
from rays to interradial skin, mainly on branched portion. Pel-
vic fin hyaline in most of proximal and medial regions, becom-
ing darker at its branched portion. Dorsal fin with blotches
from distal region of first two to four fin rays expanded and
joined on interradial skin, forming singular vertical elongated
blotch with wider upper region. Anal fin hyaline, with blotches
on its distal region. Blotches from distal margin of caudal fin
very expanded and joined over interradial skin, forming one
or two wide bars occupying most area of body. Caudal fin with
darkish base.
Distribution and habitat. *Rineloricaria langei* is known from the rio Iraí (a headwater river of upper rio Iguaçu drainage), at the metropolitan region of Curitiba, Paraná State (Fig. 6). This species inhabits small streams with light to moderate streamflow, over a substrate of sand, some rocks and vegetal debris.

Etymology. The specific name *langei* is given in honor of Professor Rudolf Bruno Lange, one of the first curators of the zoological collections of Museu de História Natural Capão da Imbuia (MHNCI) during the forties of the Twentieth Century, in which the ichthyological collection is included.

Remarks. The paratypes MHNCI 8937 and MNRJ 31157 exhibit an artificial green color, easily seen on ventral surface of the specimens. That unnatural coloration was caused by an artifact during process of fixation and/or preservation in alcohol.

*Rineloricaria maacki*, new species

Figs. 3-5

Holotype. MNRJ 31158, male, 108.4 mm SL, Brazil, Paraná, União da Vitória, rio Iguaçu, 51°10'31"W 26°10'16"S, 25 May 2003, G. Otto.

Paratypes. MHNCI 11457, 2 (1 male, 1 female), 113.0-128.0 mm SL, collected with the holotype. MHNCI 11455, 1 (female), 102.8 mm SL, Brazil, Paraná, Lapa, areal Água Azul, rio Iguaçu, 50°11'34"W 25°47'34"S, 22 Feb 2001, L. F. Duboc, L. F. S. Ingenito & F. Wegbecher. MHNCI 11682, 1 (female), 79.7 mm SL, Brazil, Paraná, Lapa, areal Água Azul, rio Iguaçu, 50°11'34"W 25°47'34"S, 10 Nov 2000, L. F. Duboc & L. F. S. Ingenito. NUP 2540, 3 (1 male, 1 female, 1 c&$ female), 110.8-133.5 mm SL, Brazil, Paraná, Cruz Machado/Bituruna, Foz do Areia reservoir, rio Iguaçu, approx. 51°37'W 26°00'S, 26 Oct 1998, NUPELIA. NUP 3059, 1 (male), 136.2 mm SL, Brazil, Paraná, Cruz Machado/Bituruna, Foz do Areia reservoir, rio Iguaçu, approx. 51°37'W 26°00'0"S, 6 Oct 1999, COPEL.

Diagnosis. *Rineloricaria maacki* is easily distinguished from all *Rineloricaria* species except from *R. latirostris*, *R. microlepidogaster*, *R. misionera*, *R. baliola*, *R. tropeira*, and *R. anhaguapitan* by having a naked pectoral girdle and the abdomen covered by plates (vs. pectoral girdle and abdomen completely covered by plates). In addition, the complete covering of plates of the abdominal region of *Rineloricaria maacki* distinguish it from *R. setepovos* (that has the abdo-

**Table 1.** Morphometric data of *Rineloricaria langei* from upper rio Iguaçu. N = sample size; SD = Standard deviation. Range includes holotype.

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Holotype</th>
<th>Low</th>
<th>High</th>
<th>Mean</th>
<th>SD</th>
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<td>16.0</td>
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<td>Body width at anal-fin origin</td>
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<td>49.5</td>
<td>47.3</td>
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<td>43.2</td>
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<td>13.6</td>
<td>13.6</td>
<td>10.3</td>
<td>13.6</td>
<td>1.3</td>
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</table>
Two new species of *Rineloricaria* from the rio Iguaçu basin

Men naked); from *R. aequalicuspis*, *R. maquinensis*, and *R. malabarbai* (that have the abdomen variably covered, sometimes naked); and from *R. reisi* (that has the abdomen almost naked with few irregular platelets). *Rineloricaria maacki* can be distinguished from *R. latirostris* by the presence of five dorsal transverse bands (vs. six bands) and by having the dorsal unbranched caudal-fin ray not prolonged (vs. dorsal unbranched caudal-fin ray produced as a long filament); from *R. misionera*, it is distinguished by having the pectoral girdle completely naked (vs. pectoral girdle with a few small, well-

Fig. 3. *Rineloricaria maacki*, holotype, male, MNRJ 31158, 108.4 mm SL, rio Iguaçu, União da Vitória, Paraná, Brazil.
defined lateral plates). It can be distinguished from both *R. anhaguapitan* and *R. baliola* by its snout having a naked area not reaching to anterior most pore of infraorbital ramus of sensory canal species (vs. snout with a naked area reaching to anterior most pore of infraorbital ramus of sensory canal) and by having all fins, except the dorsal fin, without a distal dark band (vs. wide dark band covering the distal one-half of all fins in *R. baliola* and the same color pattern on dorsal, anal and caudal fins in *R. anhaguapitan*); and from *R. microlepidogaster*, by having abdominal plates between lateral abdominal bones arranged in four (vs. five to six) series and larger than abdominal plates of this species. Furthermore, *R. maacki* can be distinguished from *R. microlepidogaster* by having the pectoral fin usually not reaching the pelvic-fin origin (vs. pectoral fin surpassing pelvic-fin origin).

**Description.** Morphometric data in Table 2. Head and body deeply depressed. Body depth greatest at dorsal-fin origin. Head triangular in dorsal view. Dorsal profile slightly convex from the tip of the snout to dorsal-fin origin, thereafter gradually depressed up to caudal-fin base. Ventral profile of body nearly straight from snout tip to anal-fin origin, then becoming more depressed towards caudal-fin base. Caudal peduncle depressed forming lateral keels with 11 (3*), 12 (4) or 13 (2) coalesced plates from 28 (1), 29 (4*) or 30 (4) total lateral plates in middle series. Five lateral series of plates, mid-dorsal series present. Scapular bridge completely naked. Abdomen completely covered by plates. Four series of abdominal plates irregularly distributed. Pre-anal plate present and anteriorly rounded by three polygonal plates. Lateral abdominal plates four (3*), five (3) or six (3). Dorsal-fin base with five plate rows. Anal-fin base with two (2) or three (7*) plate rows. Two
Two new species of *Rineloricaria* from the rio Iguazu basin

(2) or three (7*) rows of plates between urogenital pore and anal fin. Plate counts on opposite sides of body usually different, except at dorsal- and anal-fin bases.


Head and body covered by very small odontodes, making fish somewhat smooth. Mature males with small hypertrophied odontodes distributed only on lateral margins of the head and weakly on dorsum of pectoral fin (Fig. 5). Snout tip with wide naked area, not reaching last pore of infra-orbital ramus of sensory canal. Snout tip ventrally naked, without odontodes between it and upper lip. Lips well developed and covered by papillae; only one irregular papillae row at anterior most area of the upper lip. Two rows of inconspicuous papillae separating upper and lower lips. Maxillary barbel thin and shorter than orbital diameter. Notch present in lower lip. Teeth bicuspid with lateral cusp smallest than medial. Premaxilla with five (2*), six (1), seven (3) or eight (3) teeth. Dentary with five (2), six (1), seven (1) or eight (5*) teeth. Total number of vertebrae 32. Five ribs attached to vertebrae 7 to 11.

Pectoral-fins rays seven (i,6); fin margin sometimes reaching pelvic-fin origin when adpressed. Pelvic-fin rays six (i,5). Dorsal-fin rays eight (i,7); first ray shorter than head length; its origin located dorsal of pelvic-fins base. Anal-fin rays six (i,5). Caudal-fin rays 12 (i,i0,i); its distal margin slightly concave; dorsal principal rays longer than ventral rays; in two

Fig. 5. Sexual dimorphism and plate distribution on abdomen and ventral region of pectoral girdle of *Rineloricaria maacki*. a-b: holotype, male, MNRJ 31158, 108.4 mm SL; c-d: paratype, female, MHNCI 11457, 113.00 mm SL.
specimens dorsal unbranched ray slightly elongated, extending distally less than one-third of orbital diameter and not prolonged as filament.

**Color in alcohol.** Ground color of dorsal surface light brown with darker small spots or vermiculated lines. Parieto-supraoccipital dark brown. Five dark brown transverse bars across body; first on dorsal-fin origin, second on distal margin of dorsal-fin rays, third near vertical line surpassing through tip of anal-fin rays, fourth and fifth over caudal peduncle. Pores of laterosensory system without evident dark chromatophores. Ventral surface of the body pale or yellowish.

Fins yellowish with interradial skin hyaline and small dark-brown blotches on its rays. Blotches of distal margin of caudal fin very expanded and jointed over interradial skin, forming one bar occupying only its distal third. Caudal fin with darkish base.

**Distribution and habitat.** *Rineloricaria maacki* is known from middle and lower rio Iguazu, a tributary of the rio Paraná basin (Fig. 6). This species inhabits the main channel and tributaries of rio Iguazu, which has light brown muddy water with medium to fast flow over a sandy bottom. The habitat has little or no marginal vegetation, mainly formed by grass or bushes.

**Etymology.** The specific name *maacki* is given in honor of Reinhard Maack, a geologist who made some of the most important contributions to the knowledge of the geology and physiography of the rio Iguazu basin and Paraná State.

**Discussion**

The rio Iguazu is the last large left-bank tributary of rio Paraná. Its basin extends through a total area about 72,000 km² occupying the States of Paraná and Santa Catarina in southern Brazil, and the province of Misiones in Argentina (Maack, 2002). The ichthyofauna of rio Iguazu includes about 83 species (Ingenito et al., 2004; present study) and a high level of endemism, with a rate of about 75% of exclusive species (Zawadzki et al., 1999).

Reis & Cardoso (2001) were the first authors to report the presence of species of *Rineloricaria* in the rio Iguazu basin, when they cited the presence of one or two undescribed species. Recent studies conducted by us revealed the existence of four possibly undescribed species of *Rineloricaria* at this basin. Two of those species are *Rineloricaria maacki* and *Rineloricaria langei*, which are described here. As for the other two undescribed species, we did not have success in

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**Fig. 6.** Distribution of *Rineloricaria langei* (circle) and *Rineloricaria maacki* (square: holotype; triangles: paratypes) in rio Iguazu basin. One symbol may represent more than one collecting locality. Vertical bars indicate biogeographic barriers of rio Iguazu according to Ingenito et al. (2004) (A: Salto Caiacanga falls; B: Salto Grande falls).
finding consistent diagnostic characters to describe them. Those two species can only be assigned at present to a generic description of *Rineloricaria lima*, which is taxonomically problematic (see below).

The specimens mentioned by Reis & Cardoso (2001) were not available for examination during the present study. However, information provided by Wolmar B. Wosiacki (MPEG) indicates that the lot MCP 17455 examined by those authors is composed by at least one of the two new species assigned as *Rineloricaria aff. lima* by us. This species was also cited by Vitule & Abihihoa (2003) for rio Piraquara (a headwater river of the rio Iguacu basin), and it was part of a series of specimens cited by Ingento et al. (2004) for upper Iguacu basin (MHNCI 9113 and MHNCI 9212). The fishes assigned here to *Rineloricaria sp. aff. lima* are widely distributed in the river basins rio Piraquara, rio Negro and rio da Várzea, and are sympatric to *R. langei* in the rio Irai. Moreover, comparisons carried out by us with *Rineloricaria* specimens from coastal drainages indicate that *Rineloricaria sp. aff. lima* seems to be widely distributed along the coastal drainages of Paraná State, where it is found with a new species under description by us, which is characterized by having a short body and naked thoracic and abdominal regions.

*Rineloricaria lima*, the type species of the genus, was collected by Johann Natterer from “Brazilian rivers” during the 18 years that he lived in Brazil (1817-1835) (Riedl-Dorn, 2000; Vanzolini, 2004). The type specimen of *R. lima* has been lost and the original description, which was based on a dry specimen, is poor and characterizes most of species of the genus. With the loss of the type specimen of *R. lima* (Isbrücker, 1979), and the extensive nature of Natterer’s travels (including the Amazon basin, rio Paraguay, rio Paraná, rio Paraíba do Sul, and to the cities of Curitiba (rio Iguacu) and Paranaguá (coastal Atlantic drainages of Paraná State)), it is not easy to associate any specimen to this name until the designation of a neotype, what is beyond the scope of this study. The distribution of *Rineloricaria* through rio Iguacu, that strengthens the hypotheses of Ingento et al. (2004) and Torres et al. (2008). Such hypotheses also may explain the morphological similarities among *R. langei* and *R. quadrensis*.

The species herein described do not corroborate the statement proposed by Rodriguez & Reis (2008), who recognized two ecomorphological groups of *Rineloricaria* inhabiting sandy or rocky habitats. Both *R. langei* and *R. maacki* inhabit mostly sandy environments. However, the two new species have the naked area of the tip of snout not reaching the most anterior pore of the infraorbital ramus of sensory canal, which was reported to be a characteristic of the “rocky group” according to Rodriguez & Reis (2008). Such incongruence also occurs in some of the species assigned by those authors to the “sandy group” (e. g. *R. krombe, R. misionera, R. quadrensis*, *R. steindachneri*, and *R. strigilata*). Moreover, the presence of the mid-dorsal series of lateral plates in *R. maacki*, a character of the “rocky group”, also contradicts those authors’ statement. The variation evidenced here may indicate that such characters are not informative to distinguish the “sandy” and “rocky” species groups, or that the morphological characters proposed by Rodriguez & Reis (2008) are not associated to specific habitats.

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