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A new dwarf armored catfish *Pareiorhaphis* (Loricariidae: Hypoptopomatinae) from the Uruguai River basin, Southern Brazil

Correspondence:
Roberto E. Reis
reis@pucrs.br

Edson H. L. Pereira and Roberto E. Reis

A new, very distinctive species of *Pareiorhaphis* is described from the rio Uruguai basin, in Rio Grande do Sul State, southern Brazil. *Pareiorhaphis pumila*, new species, is a small bodied hypoptopomatine catfish with a maximum standard length barely reaching 50 mm. The specimens were captured from rock-bottomed habitats in various localities in the rio Ijuí basin. Despite occurring in rock-bottomed fast-flowing headwater stream tributaries as the other species of *Pareiorhaphis*, this is the first species collected also in the main channel of the middle stretch of a large tributary to the rio Uruguai. The new species is promptly diagnosed from all its congeners by the reduced number of anal-fin branched rays, possession of well-developed dorsal-fin spinelet, comparatively lower number of plates in median lateral series, and low number of teeth in each dentary. In addition, osteological features related to the caudal skeleton are also useful to distinguish the new species from most congeners.

Keywords: Biodiversity, Cascudo, Neotropical, New species, Taxonomy.

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Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), Laboratório de Sistemática de Vertebrados, Av. Ipiranga 6681, 90619-900 Porto Alegre, RS, Brazil. (EHLP) ehlpereira@gmail.com, (RER) reis@pucrs.br (corresponding author).

Uma nova e distinta espécie de *Pareiorhaphis* é descrita da bacia do rio Uruguai, no estado do Rio Grande do Sul, sul do Brasil. A nova espécie é um cascudo hypoptopomatíneo de pequeno tamanho, com comprimento padrão máximo inferior a 50 mm. Os espécimes foram capturados em habitats de fundo rochoso em várias localidades da bacia do rio Ijuí. Apesar de ocorrer em córregos de cabeceira de fluxo rápido com fundo rochoso como as demais espécies de *Pareiorhaphis*, esta é a primeira espécie coletada também no canal principal do trecho médio de um grande afluente do rio Uruguai. A nova espécie é prontamente diagnosticada de todos os seus congêneres pelo número reduzido de raios ramificados da nadadeira anal, presença de *spinelet* da nadadeira dorsal bem desenvolvido, número comparativamente menor de placas na série lateral média, e baixo número de dentes em cada dentário. Além disso, características osteológicas relacionadas ao esqueleto caudal também são úteis para distinguir a nova espécie da maioria das congêneres.

Palavras-chave: Biodiversidade, Cascudo, Neotropical, Nova espécie, Taxonomia.

INTRODUCTION

Pareiorhaphis Miranda Ribeiro, 1918 currently has 27 species distributed in coastal drainages of southern and eastern Brazil from the rio Maquiné in the Rio Grande do Sul State to the rio Paraguaçu in Bahia State, with additional species in the west-bound, headwaters of the Uruguai, Iguaçu, upper Paraná, and São Francisco rivers. The history of the genus *Pareiorhaphis* in the rio Uruguai basin begins with the description of *Hemipsilichthys vestigipinnis* Pereira & Reis, 1992, from a creek tributary to the rio Caveiras at the town of Painel, Santa Catarina State. Ten years later, *H. eurycephalus* Pereira & Reis, 2002 and *H. hystrix* Pereira & Reis, 2002 were also described from the upper Uruguai, the former from a creek tributary to the rio Canoas, near the Corvo Branco Range, Urubici, Santa Catarina State, and the later with a wider distribution in the middle and upper Uruguai, in both Rio Grande do Sul and Santa Catarina states. The genus *Hemipsilichthys* Eigenmann & Eigenmann, 1889 was later restricted to a few species by Pereira (2005) and the species above were transferred to *Pareiorhaphis.* The genus was subsequently redefined by Pereira *et al*. (2007) and is currently diagnosed by one exclusive synapomorphy, the cheek canal plate firmly articulated to the preopercle, and several non-exclusive synapomophies related to ornamentation associated with secondary sexual dimorphism (Pereira, Reis, 2017).

Despite being aware of additional diversity in the Uruguai basin, after 2002 we concentrated efforts in discovering and reporting unknown species of *Pareiorhaphis* from coastal basins in eastern and southeastern Brazil. Extensive fieldwork in the rio Uruguai basin during the past two decades revealed additional specimens of those undescribed forms, allowing us to focus on the rio Uruguai again. The new species we describe here is a highly distinctive, dwarf *Pareiorhaphis* with a maximum standard length barely reaching 50 mm. The specimens were captured from fast flowing creeks in rock-bottomed habitats along the rio Ijuí basin, a tributary to the middle rio Uruguai.

MATERIAL AND METHODS

Counts and measurements were taken according to Pereira *et al*. (2007). Procurrent caudal-fin rays and vertebrae were counted in three cleared and counterstained specimens (c&s) prepared according to Taylor, Van Dyke (1985) procedure. Vertebral counts include five centra in the Weberian Apparatus and the fused ural + preural centra, which was counted as one element according to Lundberg, Baskin (1969). Nomenclature and counts for body plates follow Schaefer (1997). Morphometric features were obtained with digital calipers to the nearest 0.1 mm and were made from point to point under a stereomicroscope. Standard length (SL) is expressed in millimeters while other measurements are given as percent of standard length or head length (HL). In the list of type material, museum abbreviation and catalog number come first, followed by the number and SL range of specimens in that lot, indication of preparation type (alc for specimens preserved in 70% ethanol, and tis for tissue samples preserved in 99% ethanol at -20°C), the number and SL range of specimens measured for the morphometric comparisons in parentheses, locality, date of collection, and collectors. Seven lots attributable to the new species were considered non-paratypes yet were mapped to compose the species distribution.

Conservation status of the new species was evaluated according to the categories and criteria of the International Union for Conservation of Nature (IUCN Standards and Petitions Subcommittee, 2022). The Extent of Occurrence (EOO) was calculated by the minimum convex polygon drawn around the micro-basins with species records, using Hydrosheds 8 level.

Comparative material of *Pareiorhaphis* species is listed in Pereira *et al*. (2012), with the addition of *Pareiorhaphis lophia* Pereira & Zanata, 2014, *P. proskynita* Pereira & Britto, 2012, *P. garapia* Pereira, Lehmann, Schvambach & Reis, 2015, *P. vetula* Pereira, Lehmann & Reis, 2016, *P. lineata* Pereira, Pessali, Andrade & Reis, 2017, *P. stephana* (Oliveira & Oyakawa, 1999), and *P. mucurina* Pereira, Pessali & Reis, 2018 (Pereira, Zanata, 2014; Pereira, Britto, 2012; Pereira *et al*., 2015, 2016, 2017, 2018, respectively). Specimens examined belong to institution whose acronyms are listed in Sabaj (2020).

RESULTS

Pareiorhaphis pumila, new species

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(Fig. 1; Tab. 1)

Holotype. MCP 54782, 48.2 mm SL, male, Brazil, Rio Grande do Sul, rio Ijuí below dam of Passo de São José hydropower reservoir, Cerro Largo, 28°10'38"S 54°48'56"W, 3–9 Nov 2010, J. F. Pezzi da Silva.

Paratypes. All lots from rio Ijuí basin, **Rio Grande do Sul State, Brazil.** MCP 45899, 212 alc, 3 tis, 24.1–51.1 mm SL (30 measured, 35.8–47.4 mm SL), MZUSP

126817, 5 alc, 30.5–41.6 mm SL, NUP 23488, 5 alc, 31.0–42.1 mm SL, UFRGS 29100, 5 alc, 32.7–40.7 mm SL, and ZUEC 17448, 5 alc, 32.5–42.2 mm SL, collected with holotype. MCP 16762, 1 alc, 40.7 mm SL, arroio Lageado do Moinho, tributary to rio Ijuizinho, 7 km SW of Entre-Ijuís, Entre-Ijuís, approx. 28°27'S 54°22'W, 14 Dec 1993, J. F. Pezzi da Silva, R. E. Reis & M. P. Barros. MCP 26903, 3 alc, 37.5–41.6 mm SL, rio Palmeira, Panambi, approx. 28°17'S 53°30'W, 5 Jan 1999, W. Bruschi & A. Cunha. MCP 41699, 20 alc, 20.2–43.7 mm SL, rio Potiribu downstream from Andorinhas Reservoir, tributary to rio Ijuí, Doutor Bozano, approx. 28°24'S 53°48'W, 6 Jun 2006, A. R. Cardoso & V. A. Bertaco. MCP 41705, 11 alc, 24.8–44.0 mm SL, rio Potiribu downstream from Andorinhas Reservoir, tributary to rio Ijuí, Doutor Bozano, approx. 28°24'S 53°48'W, 14 Feb 2007, A. R. Cardoso & V. A. Bertaco. MCP 47202, 2 alc, 41.8–44.6 mm SL, rio Ijuí *ca.* 800 m upstream from road RS-155 between Ijuí and

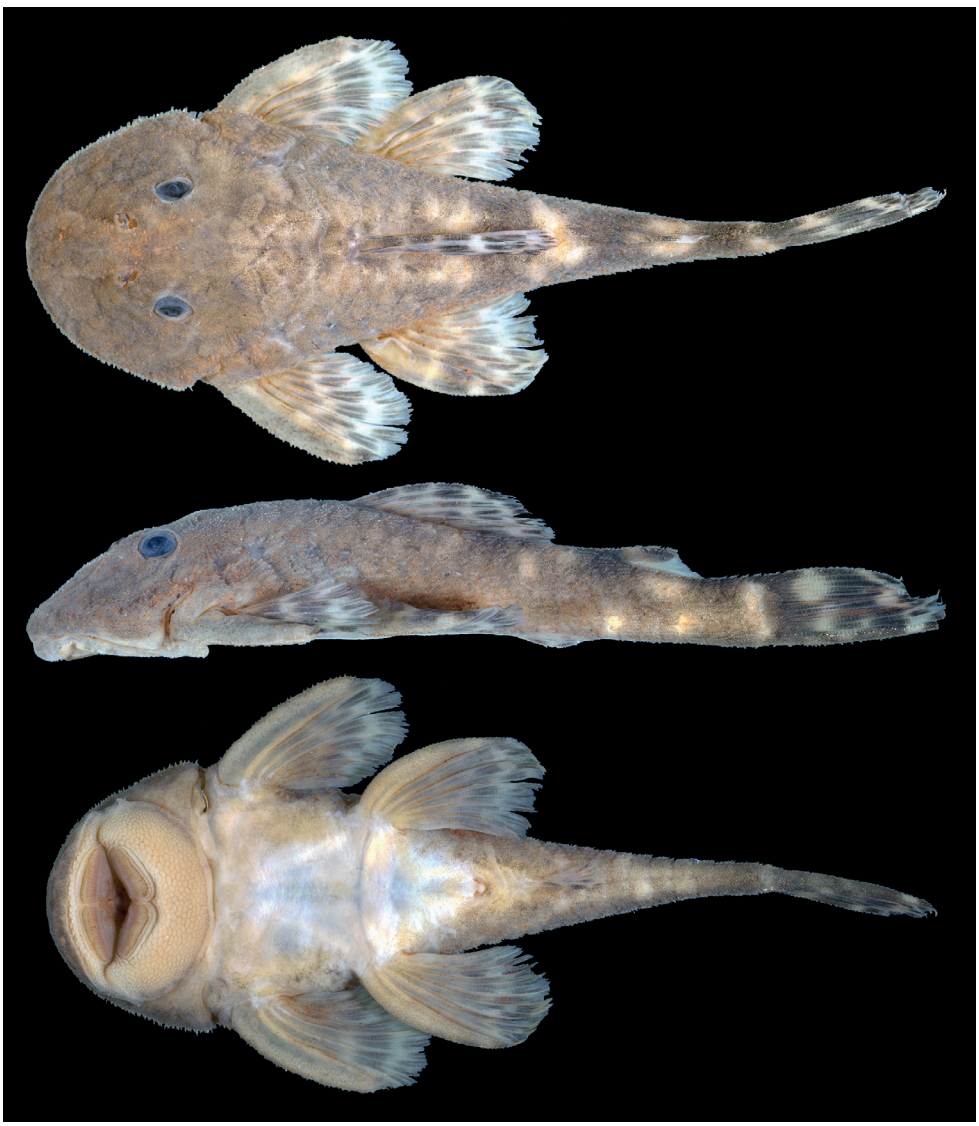

FIGURE 1 | *Pareiorhaphis pumila*, holotype, MCP 54782, 48.2 mm SL, male, rio Ijuí below dam of Passo de São José hydropower reservoir, Cerro Largo, Rio Grande do Sul, Brazil.

Ajuricaba, Ijuí, 28°18'14"S 53°53'45"W, 9 Jul 2012, J. F. Pezzi da Silva & R. Angrizani. MCP 48497, 4 alc, 19.2–24.1 mm SL, rio Ijuí near Passo São João hydroelectric plant, Roque Gonzales, 28°08'20"S 55°02'57"W, 7 May 2006, A. R. Cardoso & V. A. Bertaco. MCP 54662, 2 alc, 42.9–45.7 mm SL, rio Ijuizinho dowstream Igrejinha Resevoir, Boa Vista do Cadeado, 28°47'45"S 53°58'17"W, J. F. Pezzi da Silva, L. Fries & R. Angrizani. MCP 49202, 1 alc, 1 tis, 40.5 mm SL, rio Alegre, dowstream from Rio Alegre Reservoir, Condor, 28°12'10"S 53°26'39"W, 6 Oct 2015, J. F. Pezzi da Silva & R. Angrizani. MCP 53278, 5 alc, 1 tis, 33.4–44.3 mm SL, rio Palmeira on secondary road from Panambi to Condor, Palmeira Reservoir, Palmeira, 28°14'37"S 53°33'12"W, 9 Jan 2018, E. H. L. Pereira, R. E. Reis & P. C. Fagundes.

Non-types. All lots from rio Ijuí basin, **Rio Grande do Sul State, Brazil.** MCP 31720, 1 alc, 45.8 mm SL, rio Palmeira upstream from Rio Palmeira reservoir, Panambi, 28°14'35"S 53°33'12"W, 2 Nov 2002, J. F. Pezzi da Silva & J. Anza. MCP 41712, 6 alc, 34.8–43.8 mm SL, rio Potiribu downstream from Andorinhas Reservoir, tributary to rio Ijuí, Doutor Bozano, approx. 28°24'S 53°48'W, 1 Aug 2007, A. R. Cardoso & V. A. Bertaco. MCP 44991, 3 alc, 28.7–37.8 mm SL, rio Potiribu, tributary to rio Ijuí, Ijuí, 28°22'11"S 53°52'46"W, 8 Apr 2010, J. F. Pezzi da Silva. MCP 48643, 2 alc, 34.2–36.0 mm SL, rio Palmeira upstream from Rio Palmeira reservoir, Panambi, 28°14'35"S 53°33'12"W, 24 Mar 2015, J. F. Pezzi da Silva. MCP 49203, 7 alc, 7 tis, 35.8–49.8 mm SL, rio Palmeira upstream Rio Palmeira Reservoir, Panambi, 28°14'35"S 53°33'12"W, 6 Oct 2015, J. F. Pezzi da Silva & R. Angrizani. MCP 50935, 4 alc, 2 tis, 34.3–42.8 mm SL, rio Potiribu downstream waterfall near ELEGE factory, Ijuí, 28°22'10.4"S 53°52'43.1"W, 12 Oct 2016, T. Carvalho, R. Angrizani & J. Chuctaya. MCP 53267, 2 alc, 17.4–35.2 mm SL, creek tributary to rio Palmeira *ca*. 50 m W of Condor, on road from Condor to Ajuricaba, Condor, 28°12'31S 53°30'07"W, 9 Jan 2018, E. H. L. Pereira, R. E. Reis & P. C. Fagundes.

Diagnosis. *Pareiorhaphis pumila* is promptly distinguished from most species of *Pareiorhaphis* by the reduced number of anal-fin branched rays two or three (rarely four) (*vs*. five anal fin-branched rays in most species of *Pareiorhaphis*, except in *P. hypselurus* (Pereira & Reis, 2002), *P. nudula* (Pereira & Reis, 1999), and *P. stomias* (Pereira & Reis, 2002) with four anal-fin branched rays). The new species is readily distinguished from *P. hypselurus*, *P. nudula*, and *P. stomias* by having a well-developed first dorsal-fin spinelet (*vs*. first dorsal-fin spinelet absent), and by having the pectoral-fin spine of adult males slightly curved and covered with minute odontodes (*vs*. pectoral fin-spine distinctly straight and covered with short and thick hypertrophied odontodes in adult males). It is also distinguished from most congeners (except *P. bahiana* (Gosline, 1947), *P. togoroi* Oliveira & Oyakawa, 2019, and *P. vetula*) by having a deep notch between the hypurals 1–2 and hypurals 3–5 in the caudal-fin skeleton, reaching or almost reaching to the middle of the hypural plate (Fig. 2; *vs*. notch shallow, not reaching close to middle hypural plate). *Pareioraphis pumila* is distinguished from *P. bahianus*, *P. togoroi*, and *P. vetula* by having cheek hyperthrophied odontodes of males shorter than one eye diameter (*vs*. cheek hyperthrophied odontodes of males equal to or longer than one eye diameter). Furthermore, the new species can be distinguished from all remaining congeners except *P. splendens* (Bizerril, 1995), *P. eurycephalus* (Pereira & Reis, 2002), *P. hypselurus*, and *P.*

stomias by having a wider cleithral width (37.1–41.1 *vs*. 24.2–36.4% SL). From those species but *P. stomias*, the new species can be distinguished by having fewer median lateral plates 21–24 *vs*. 24–29, and larger orbital diameter (14.9–17.7 *vs*. 10.0–14.8% HL). From *P. stomias* the new species is further distinguished by having fewer teeth in each dentary (42–57 *vs*. 94–120) and a shorter pelvic fin, whose posterior margin falls short of the anal-fin origin when adpressed (*vs*. posterior margin surpassing the origin or even reaching half-length of the anal-fin when adpressed in adult males).

Description. Counts and proportional measurements in Tab. 1. Overall view of body in Fig. 1. Small-sized loricariid with standard length of measured specimens 35.8–48.2 mm SL. Body short, moderately depressed. Greatest body width at posterior portion of cheek, progressively tapering to end of caudal peduncle. Dorsal profile of body convex from snout tip to dorsal-fin origin, straight to slightly concave from that point to origin of adipose fin, and slightly concave from adipose-fin spine to caudal fin. Greatest body depth at posterior limit of parieto-supraoccipital bone or predorsal plates. Least body depth at shallowest portion of caudal peduncle. Trunk and caudal peduncle mostly oval in cross-section, flattened ventrally and more compressed caudally. Lateral-line canal in median series uninterrupted, with pored tubes visible from compound pterotic to one plate before caudal-fin base. Ventral profile of body almost straight from snout tip to pelvic girdle, slightly elevating posteriorly along anal-fin base, and almost straight along caudal peduncle. Dorsolateral surface of body covered by dermal plates except for small naked area overlaying opening of swim bladder capsule, posteroventrally to compound pterotic. Predorsal plates arranged in two or three irregular transverse rows. Five rows of lateral dermal plates covering body, not forming keels. Mid-dorsal and mid-ventral series of lateral plates incomplete, ending 4–5 plates before caudal fin base. Lower surface of head and abdomen entirely devoid of plates. Anterior portion of first anal-fin pterygiophore covered by skin, not exposed. Anus positioned between pelvic fins and anal-fin origin, closer to insertion of anal fin than pelvic-fin insertion. Arrector fossae of pectoral girdle completely opened, extending almost from midline symphysis of cleithra and coracoids laterally to arrector bridge.

Head broad and moderately depressed. Outline of head round in dorsal view; widened in adult males. Interorbital space flat to slightly concave. Three weakly elevated ridges between orbits and snout tip formed by underlying bones, without emerging hyperthrophied odontodes. Central ridge on snout more prominent. Snout gently convex in lateral profile; snout tip with small ovoid area of naked skin, devoid of odontodes. Rostral plate absent, anterior postrostral plates granular and irregular; two or three large postrostral plates anterior to preoperculum. Canal cheek plate articulated to preopercle dorsally with unbranched sensory canal. Adult males with very low soft fleshy lobe on cheeks. Soft fleshy area with minute, delicate hypertrophied odontodes, approximately perpendicular to body axis. Margins of head covered by minute odontodes in females and immature males. Preoperculum exposed; ornamented with delicate hypertrophied odontodes in adult males. Canal-bearing cheek plate with unbranched canal. Opercle and lateral process of cleithrum with few small or without hypertrophied odontodes. Eye small, dorsolaterally placed; orbital diameter 14.9–17.7% of HL. Iris operculum small or unnoticeable in some specimens, pupil circular. Nares ovoid, slightly longer than wide, positioned much closer to anterior margin of orbit than to snout tip.

Oral disk roughly circular and comparatively small. Lips occupying approximately two-thirds of ventral surface of head. Upper lip narrow, covered with small rounded papillae. Lower lip short, not reaching pectoral girdle. Ventral surface of lower lip densely covered with small rounded papillae, with smooth band devoid of papillae preceding lip margin. Posterior edge of lower lip very finely fringed. Maxillary barbel short, mostly adnate to lower lip, with vestigial small free portion present in some specimens. Tooth series in both premaxilla and dentary with mesial ends slightly curved inwards. Teeth slender, asymmetrically bifid. Medial cusp long and pointed, slightly curved inwards. Lateral cusp small and pointed, almost reaching, or reaching to middle of medial cusp in unworn teeth.

Dorsal-fin origin along vertical passing through origin of pelvic-fin ray. Dorsal fin short, falling short or contacting preadipose azygous plates when adpressed. Posterior margin straight or slightly convex. Nuchal plate and dorsal-fin spinelet exposed, not covered by skin. Dorsal-fin spinelet oval shaped, slightly wider than base of dorsal-fin spine. Dorsal-fin locking mechanism non-functional. Moderately flexible dorsal-fin spine, followed by seven branched rays. Adipose fin with large and well-ossified, straight spine, laterally compressed and covered with short hypertrophied odontodes. Adipose-fin spine connected to caudal peduncle via fleshy membrane; membrane well developed, extended beyond adipose-fin spine. One or two median unpaired preadipose azygous plates preceding adipose fin spine. Pectoral-fin origin situated slightly dorsal to pelvic-fin origin. Pectoral fin small, with spine slightly curved and dorsoventrally flattened, covered by minute odontodes in females, immature males, and juveniles. Adult male with pectoral-fin spine slightly broadened and bearing straight to slightly curved, small hypertrophied odontodes on entire outer face. Pectoral fin with six branched rays, first and second slightly longer than spine. Subsequent branched rays decrease gradually in size, last ray length two thirds of first ray. Distal margin of pectoral fin somewhat rounded. Tip of adpressed pectoral-fin reaching to mid-length of pelvic-fin unbranched ray. Pelvic fin with one unbranched and five branched rays, not reaching or just reaching to origin of anal fin when adpressed. Pelvic-fin unbranched ray depressed, covered by minute odontodes ventrally and laterally. Well-developed dermal flap on dorsal surface of unbranched pelvic-fin ray of adult males; flap distinctly higher near fin base and extending to ray tip; flap absent or poorly developed in females. Anal fin very small with one unbranched and one (4), two (25), three (182) or four (10) branched rays; three anal-fin pterygiophores. Anal-fin origin at vertical passing between end of dorsal-fin base and tip of last dorsal-fin ray. Caudal fin truncate to slightly concave; lower lobe slightly longer than upper; 14 branched rays. Upper and lower caudal-fin lobe with three plate-like procurrent rays, posteriormost elongate. Odontodes on principal and procurrent rays small and irregularly arranged. Total vertebral centra 26 (3); hypural plate asymmetrical with upper lobe slightly shorter than lower and with large open notch between hypurals 1–2 and hypurals 3–5 reaching to or almost to middle of hypural plate.

TABLE 1 | Morphometric and meristic data of *Pareiorhaphis pumila*. Values are given as percent of standard length or head length. H = holotype, n = number of specimens, and SD = Standard deviation.

	H	n	Low–High	Mean	SD
Standard length (mm)	48.2	31	35.8–48.2	42.5	–
Percent of standard length					
Head length	35.9	31	34.9–38.8	37.4	0.97
Predorsal length	46.8	31	46.2–51.0	48.7	1.13
Postdorsal length	38.4	31	31.9–38.4	34.6	1.41
Preanal length	65.0	31	65.0–69.7	67.6	1.28
Preadipose length	79.8	31	76.6–82.7	80.4	1.23
Dorsal-fin spine length	20.9	31	20.9–25.3	22.6	1.02
Anal-fin unbranched ray length	11.5	27	6.6–12.5	10.1	1.35
Pectoral-fin spine length	22.9	31	22.4–28.4	24.8	1.26
Pelvic-fin unbranched ray length	23.9	31	22.3–30.6	25.7	2.57
Upper caudal-fin ray	18.9	25	18.3–22.8	20.6	1.36
Lower caudal-fin ray	23.2	25	23.1–29.0	26.0	1.61
Adipose-fin spine length	8.4	29	7.8–11.9	9.9	1.05
Adipose to caudal fin distance	18.9	30	16.6–21.3	19.4	1.28
Trunk length	19.4	31	18.6–23.3	20.8	0.94
Abdominal length	23.3	31	20.2–25.5	23.2	1.13
Cleithral width	37.1	31	37.1–41.1	39.2	1.15
Body depth at dorsal-fin origin	17.6	31	17.2–22.8	20.0	1.70
Body width at dorsal-fin origin	23.3	31	22.9–29.5	25.5	1.72
Body width at anal-fin origin	12.0	31	11.5–17.0	12.8	1.07
Caudal peduncle length	34.8	31	30.7–34.9	32.6	1.19
Caudal peduncle depth	8.8	31	8.5–10.0	9.2	0.37
Caudal peduncle width	4.3	31	3.3–4.5	4.0	0.27
Percent of head length					
Snout length	58.7	31	58.0–62.9	60.4	1.43
Orbital diameter	16.6	31	14.9–17.7	16.3	0.74
Interorbital width	32.9	31	29.6–35.7	32.9	1.29
Head depth	51.0	31	48.4–57.1	52.3	2.54
Mandibular ramus	23.8	31	22.5–25.7	24.2	0.84
Meristics					
Premaxillary teeth	47/48	31	41–60	50.8	4.01
Dentary teeth	44/47	31	42–57	48.2	3.87
Plates in median lateral series left/right	22/22	31	21–24	22.2	0.78
Plates at dorsal-fin base	5	31	5–7	6.1	0.54

TABLE 1 | (Continued)

	H	n	Low–High	Mean	SD
Plates between dorsal and adipose	6	31	4–6	4.7	0.69
Plates between adipose and caudal	3	31	2–3	2.6	0.49
Plates at anal-fin base	2	31	1–2	1.6	0.49
Plates between anal and caudal	11	31	10–12	10.6	0.56
Pre-adipose azygous plates	2	31	1–3	1.5	0.57

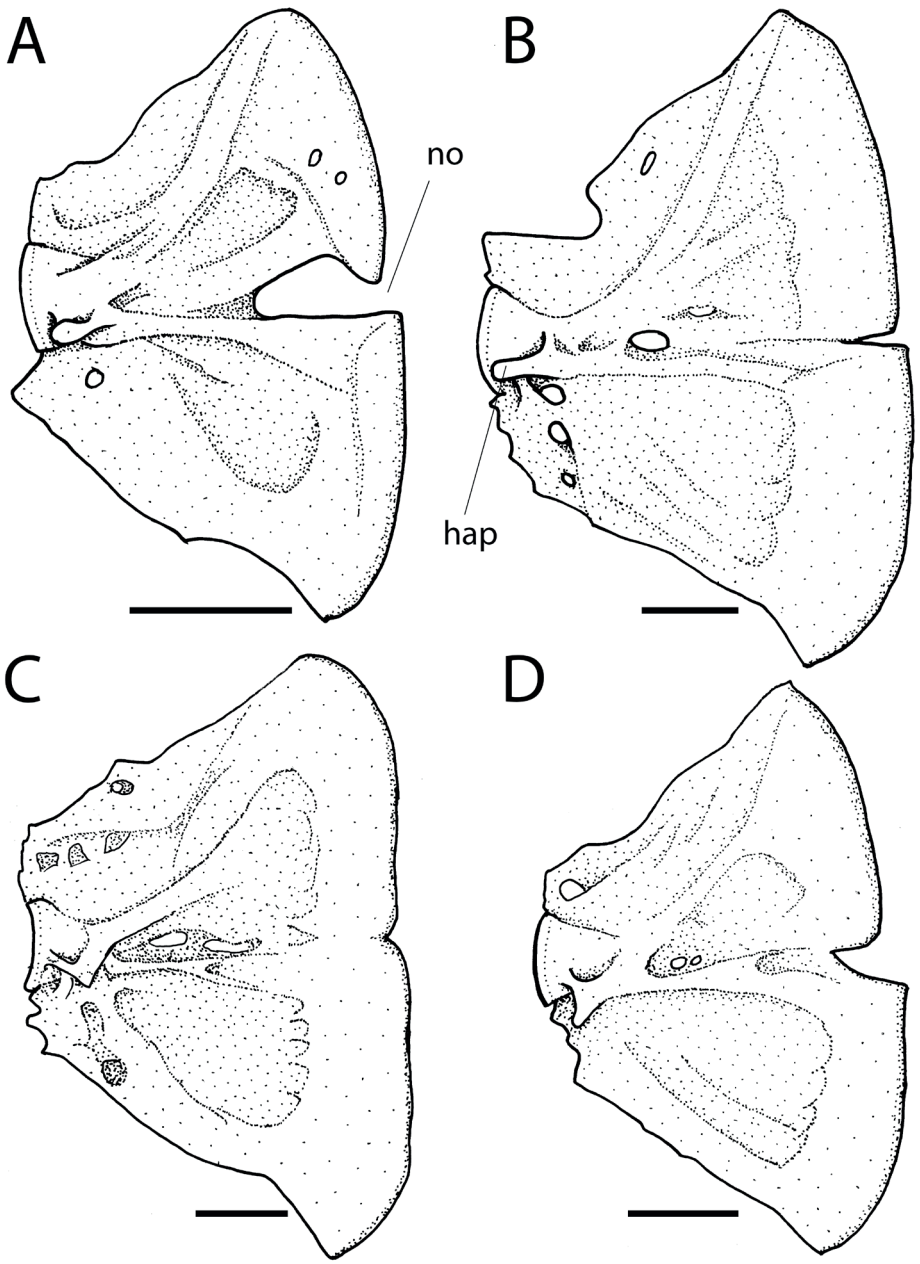

FIGURE 2 | *Pareiorhaphis* species from the upper rio Uruguai basin, hypural plate, lateral view, left side. **A.** *P. pumila*, MCP 45899, paratype. **B.** *P. hystrix*, MCP 14348, paratype. **C.** *P. vestigipinnis*, MCP 14345, paratype. **D.** *P. eurycephalus*, MCP 22341. no = caudal-fin notch; hap = hypurapophysis. Scale bars = 1 mm.

Color in alcohol. Overall background color of dorsal and lateral surface of head and trunk light brown to grayish brown. Head usually darker than remaining of body. Predorsal area and area around dorsal fin sometimes lighter. Caudal peduncle yellowish brown with three to four irregular, very distinctive transverse dark brown bars; first at end of dorsal-fin base, second at preadipose plates, third and fourth variably below adipose fin and between adipose and caudal fins. Those bars sometimes broken and forming irregular blotches on much lighter background. Ventral surface of head and abdomen yellowish or whitish pale, mostly unpigmented; dark lateral bars of caudal peduncle appearing on lateral portions of ventral surface, sometimes meeting at ventral midline. Dorsal fin with 2–3 irregular dark brown bands on spine and branched rays. Pectoral fin with 3–4 and pelvic fin with 2–3 irregular dark brown bands on spine and branched rays; anal fin with 1–2 inconspicuous dark bands. Caudal fin with one wide band at base and 2–3 additional, slightly slanted dark bands. Posterior bands sometimes coalesced to form one wide band. Interradial membrane mostly hyaline in all fins.

Color in life. Same color pattern as in alcohol but contrast between caudal peduncle dark bars very conspicuous.

Sexual dimorphism. Males of *Pareiorhaphis pumila* share secondary sexually dimorphic attributes with other members of the genus. The low cheek fleshy lobe that is ornamented with minute, delicate hypertrophied odontodes are present in males, both of which are absent in females. Males also have a thickened pectoral-fin spine, slightly intumescent along its entire length with dorsal, lateral, and ventral surfaces ornamented with short hypertrophied odontodes, and a well-developed skin fold on the dorsal surface of the unbranched pelvic-fin ray that extends to the ray tip, which are absent in females. Finally, females possess an enlarged, swollen urogenital opening, while males have small and pointed urogenital papillae.

Geographical distribution. Rio Ijuí and its tributaries in northwestern Rio Grande do Sul State, Brazil (Fig. 3). The rio Ijuí is itself a tributary to the middle portion of the rio Uruguai.

Ecological notes. *Pareiorhaphis pumila* occurs in small to medium headwater creeks with fast-flowing, well oxygenated water, and bottom formed by boulders, pebbles, and coarse gravel. It was also found in the middle course of larger tributaries and in the rio Ijuí itself, where it was collected in the main river bed during a low water condition caused by the filling of a hydroelectric reservoir (Fig. 4). *Pareiorhaphis hystrix* is found in syntopy with the new species, along with several other loricariids across its distribution: *Ancistrus taunayi* Miranda Ribeiro, 1918, *Eurycheilichthys pantherinus* (Reis & Schaefer, 1992), *Hemiancistrus fuliginosus* Cardoso & Malabarba, 1999, *H. punctulatus* Cardoso & Malabarba, 1999, *Hisonotus charrua* Almirón, Azpelicueta, Casciotta & Litz, 2006, *Hypostomus roseopunctatus* Reis, Weber & Malabarba, 1990, *H. spiniger* (Hensel, 1870), *Loricariichthys melanocheilus* Reis & Pereira, 2000, *Rineloricaria capitonia* Ghazzi, 2008, and *R. stellata* Ghazzi, 2008.

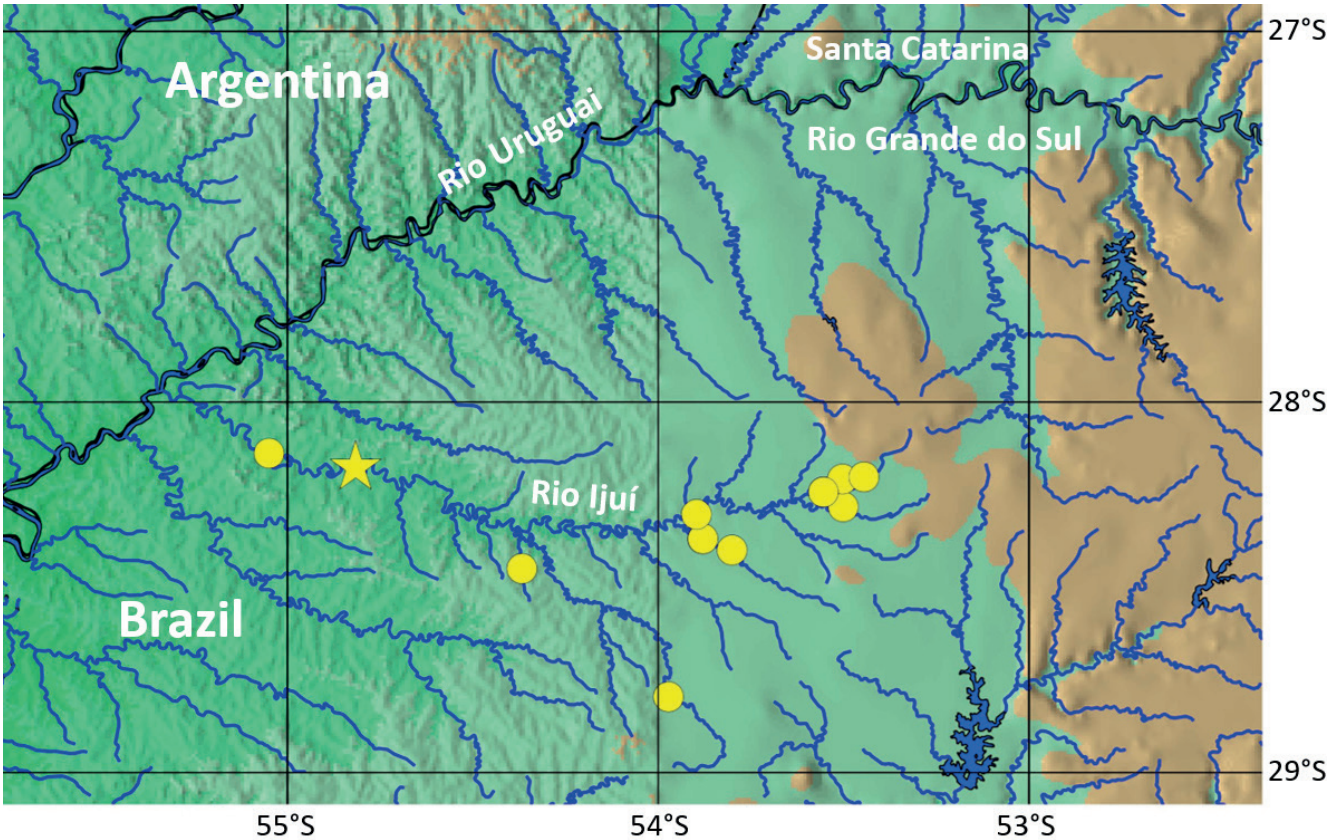

FIGURE 3 | Distribution of *Pareiorhaphis pumila* in south Brazil. Star = holotype; dots = other specimens. Each symbol may represent more than one lot or locality.

FIGURE 4 | Type-locality of *Pareiorhaphis pumila*, rio Ijuí below dam of Passo de São José hydropower reservoir, Cerro Largo, Rio Grande do Sul, Brazil.

Etymology. The species name *Pareiorhaphis pumila* is from the Latin *pumilus*, meaning dwarfish, little, in reference to the small size which is distinctive of this species. An adjective.

Conservation status. *Pareiorhaphis pumila* is distributed in the rio Ijuí basin, a tributary to the rio Uruguai, in Rio Grande do Sul State, Brazil (Fig. 3). Its Extent of Occurrence (EOO) was estimated at approximately 14,529 km^2 by the Minimum Convex Polygon drawn around the micro-basins with species records, using Hydrosheds 8 level. A series of small dams exist or are planned for the rio Ijuí basin and the region is severely impacted by agriculture and deforestation of river banks, with subsequent river siltation. *Pareiorhaphis pumila* was tentatively assessed as Near Threatened (NT) by approaching the criteria B1b(iii), according to IUCN criteria (IUCN Standards and Petitions Subcommittee, 2022).

DISCUSSION

Pareiorhaphis pumila barely reaches 50 mm of standard length (maximum SL measured 48.2 mm) and has one unbranched and three, rarely two or four, branched rays in the anal fin. Most species of *Pareiorhaphis*, on the other hand, typically vary between 70 and 120 mm of maximum SL and have one unbranched and five branched rays in the anal fin. The three other species previously known from the upper rio Uruguai are *P. vestigipinnis*, *P. hystrix*, and *P. eurycephalus* (maximum SL 97.5, 114.5, and 67.8 mm, respectively) and have i,5 rays in the anal fin. In the contiguous coastal rivers of Santa Catarina and Rio Grande do Sul states, *P. cameroni* (Steindachner, 1907) and *P. steidachneri* (Miranda Ribeiro, 1918) also possess a large size (maximum SL 92.5 and 124.2 mm, respectively) and five branched anal-fin rays. However, a clade formed by *P. nudula*, *P. stomias*, and *P. hypselurus*) (clade 58 in Pereira, Reis, 2017) that inhabits the Maquiné, Três Forquilhas, Mampituba and Araranguá rivers along the southern portion of the coastal drainages, are small sized (maximum SL 32.4, 51.4, and 69.1 mm, respectively) and have four branched anal-fin rays. *Pareiorhaphis pumila* was not included in the phylogenetic analysis of Pereira, Reis (2017) and its relationships to the above species remains unknown. Whether the reduction in anal-fin rays is a shared derived feature or a convergence related to reduced size has still to be studied.

Pareiorhaphis pumila is also distinguished from most congeners by having a deep notch between the hypurals 1–2 and hypurals 3–5 in the caudal-fin skeleton, reaching or almost reaching to the middle of the hypural plate (Fig. 2). This state is shared by three other species of *Pareiorhaphis*, *P. bahiana* from the coastal rivers of Bahia, *P. togoroi* from the upper rio Grande in the rio Paraná basin, and *P. vetula* from the upper rio Doce. However, this feature further distinguishes the new species from all congeners in the upper rio Uruguai basin and all coastal rivers of south and southeastern Brazil. Having a deep caudal-fin notch is not common in members of the Hypoptopomatinae, but this character state is shared with *Kronichthys* Miranda Ribeiro, 1908 (see fig. 39 in Pereira, Reis, 2017) and some *Neoplecostomus* Eigenmann & Eigenmann, 1888, species.

With the present new species description, the richness of *Pareiorhaphis* rises to 28 species and the known diversity in the rio Uruguai basin increases to four species. Only

the rio Doce in eastern Brazil so far exceeds the rio Uruguai in number of species, but additional undescribed diversity will soon be revealed from the later basin.

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AUTHORS' CONTRIBUTION

Edson H. L. Pereira: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing-original draft, Writing-review and editing.

Roberto E. Reis: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing-original draft, Writing-review and editing.

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Not applicable.

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The authors declare no competing interests.

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