A New Species of *Pareiorhaphis* (Loricariidae: Neoplecostominae) from the Mucuri River Basin, Minas Gerais, Eastern Brazil

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Pareiorhaphis mucurina, **new species, is described from the Preto River, a headwater tributary of the Mucuri River basin, Minas Gerais State, eastern Brazil. This description represents the first record of *Pareiorhaphis* in the Mucuri River basin, the intervening drainage between the Doce and the Jequitinhonha rivers, two large coastal drainages in eastern Brazil that are inhabited by six species of *Pareiorhaphis*. *Pareiorhaphis mucurina,* new species, is promptly diagnosed from all congeners by having a distinct, narrow area in the lower lip along and just posterior to each emergent tooth series of the dentary completely devoid of papillae and the lateral margin of the lower lip with a distinctly enlarged flap of skin, forming a continuous connection with most of the maxillary barbel. In addition, the new species can be further distinguished from all congeners by having the upper lip with distinctly shaped papillae, which are coalesced to form three or four transverse series of elongate skin folds. The well-developed dorsal-fin spinelet, the smaller orbital diameter, and features related to morphology of the fleshy lobes on the lateral portion of head of adult males, also distinguish the new species from most congeners.**

Pareiorhaphis mucurina**, espécie nova, é descrita do rio Preto, tributário da cabeceira da bacia do rio Mucuri no Estado de Minas Gerais, leste do Brasil. Essa descrição representa o primeiro registro de uma espécie de *Pareiorhaphis* do rio Mucuri, uma bacia intermediária entre os rios Doce e Jequitinhonha, duas grandes bacias costeiras no leste do Brasil, habitadas por seis espécies de *Pareiorhaphis*. *Pareiorhaphis mucurina*, espécie nova, é prontamente diagnosticada dos demais congêneres por apresentar no lábio inferior uma distinta área estreita ao longo e logo posterior à série emergente de dentes do dentário completamente desprovida de papilas e por apresentar na margem lateral do lábio inferior uma larga e distinta prega de pele que forma uma conexão contínua com a maior parte do barbilhão maxilar. Além disso, a nova espécie poder ser ainda diagnosticada dos demais congêneres por apresentar no lábio superior papilas diferentes, que coalescem para formar três ou quatro séries transversas de pregas de pele. O primeiro elemento da nadadeira dorsal bem desenvolvido, o menor diâmetro orbital e caracteres relacionados à morfologia dos lobos carnosos na margem lateral da cabeça de machos adultos, também distingue a nova espécie da maioria dos congêneres.**

PAREIORHAPHIS is composed of 25 species that occur only in Brazil and are distributed in some of the major river drainages in southern, southeastern, and northeastern Brazil (Pereira et al., 2017). In Atlantic coastal rivers of eastern Brazil, nine species of *Pareiorhaphis* are distributed from north to south: *Pareiorhaphis lophia* in the upper and middle portions of the Paraguaçu River basin, representing the northernmost distribution record of the genus; *P. bahianus* in the Almada River, along with *P. lophia,* the only two congeners reported from Bahia State; *P. stephanus* and *P. lineata*, sympatric and syntopic species in the Jequitinhonha River basin; *P. nasuta*, *P. scutula*, *P. proskynita*, and *P. vetula* from the headwater streams of the Doce River basin, indicating the high diversity of species of *Pareiorhaphis* in that portion of the Northeastern Mata Atlântica freshwater ecoregion (NMA, Ecoregion 328 of Abell et al., 2008); and *P. ruschii* from two small coastal rivers of the Espírito Santo State, the Piraquê-Açu and the Reis Magos rivers. This distribution range encompasses some of the main drainages included in the NMA and represents a still incompletely known diversity.

Along this area, there is a significant distributional gap in the coastal drainage between the Jequitinhonha River, situated in the central portion of the NMA freshwater ecoregion, and the Doce River basin, located in the southernmost portion in Minas Gerais State, in which no species of *Pareiorhaphis* are currently known. The discovery of this new species represents the first record of *Pareiorhaphis* for the Mucuri River, the intervening basin between Jequitinhonha and Doce river basins, both of which harbor high species diversity within Atlantic coastal drainages. The similar morphological features of the new species with remaining congeners, in combination with distinctive features, clearly assigns this undescribed member of Neoplecostominae to *Pareiorhaphis* as currently recognized by Pereira and Reis (2017).

MATERIALS AND METHODS

The subfamily Neoplecostominae is used herein in the sense of Pereira and Reis (2017). Taxonomic methods were conducted according to Pereira et al. (2007). Counts of procurrent caudal-fin rays, pleural ribs, and vertebrae were made in two cleared and counterstained specimens (CS) prepared according to Taylor and Van Dyke (1985). Vertebral counts include the first five centra in the Weberian Apparatus and the fused ural + preural centra which was counted as one element. Nomenclature of plate rows follows Schaefer (1997). All morphometric features were taken with digital calipers to the nearest 0.1 mm and were measured from point to point under a stereomicroscope. Standard length (SL) is expressed in millimeters, while other measurements are given as percent of SL or head length (HL). Descriptions of coloration were based on specimens preserved in ethanol and photographed immediately after collected. In the list of examined material, museum abbreviation and catalog number come

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Fig. 1. *Pareiorhaphis mucurina*, MCP 53888, holotype, 89.5 mm SL, male, Brazil, Minas Gerais State, Catuji, Preto River, Mucuri River basin.

first, followed by the number and SL range of specimens in that lot, the number and SL range of specimens measured for the morphometric comparisons, in parentheses, and locality data. Adult males are herein defined as described by Pereira et al. (2007, 2010). The other specimens included in the list of material examined are a combination of females, young males, and immature specimens of both sexes. Extinction risk of the new species was evaluated according the categories and criteria of the International Union for Conservation of Nature (IUCN Standards and Petitions Subcommittee, 2017). Specimens examined belong to institutions whose abbreviations are listed in Sabaj (2016).

***Pareiorhaphis mucurina*, new species**
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Figures 1, 2; Table 1

Holotype.—MCP 53888, 89.5 mm SL, male, Brazil, Minas Gerais, Catuji, Preto River, Mucuri River basin, 17°23′50.47″S, 41°31′18.56″W, T. C. Pessali, T. A. Barroso, and S. G. Máximo, 10 September 2015.

Paratypes.—All from Brazil, Minas Gerais: Mucuri River drainage: MCNIP 1705, 19, 36.2–74.0 mm SL, MCP 53924, 14 (14, 72.2–97.2 mm SL), collected with the holotype;

Table 1. Morphometric and meristic data of *Pareiorhaphis mucurina*. Values are given as percent of standard length or head length. Ranges include the holotype. H = holotype, *n* = number of specimens, and SD = standard deviation.

	H	*n*	Low	High	Mean	SD
Standard length (mm)	89.5	31	72.2	97.2	82.5	
Percent of standard length						
Head length	37.4	31	32.5	37.4	34.8	1.07
Predorsal length	43.9	31	42.0	45.9	44.2	1.01
Postdorsal length	40.9	30	38.3	43.8	41.0	1.32
Preanal length	65.9	31	63.3	67.8	65.8	1.16
Preadipose length	81.1	31	77.8	82.5	80.2	1.28
Dorsal-fin spine length	17.4	31	17.2	20.3	18.2	0.74
Anal-fin spine length	11.8	30	11.1	14.3	12.5	0.77
Pectoral-fin spine length	15.3	31	15.3	19.4	17.0	0.91
Pelvic-fin spine length	20.7	31	18.6	22.3	20.1	1.05
Upper caudal-fin ray	18.5	30	18.3	23.8	20.8	1.39
Lower caudal-fin ray	22.4	30	20.9	26.4	23.5	1.28
Adipose-fin spine length	7.7	29	7.2	9.4	8.1	0.59
Adipose to caudal fin distance	19.4	31	17.3	23.0	20.4	1.19
Trunk length	15.7	31	15.6	17.8	16.5	0.61
Abdominal length	23.2	31	20.7	24.1	22.6	0.92
Cleithral width	27.5	31	26.5	30.0	28.3	0.87
Body depth at dorsal-fin origin	17.3	31	14.1	19.0	16.4	1.30
Body width at dorsal-fin origin	21.4	31	18.4	23.5	21.0	1.26
Body width at anal-fin origin	13.8	31	10.6	14.8	12.7	1.12
Caudal peduncle length	35.0	31	32.4	36.9	34.7	1.32
Caudal peduncle depth	7.5	31	6.7	9.0	7.4	0.45
Caudal peduncle width	4.6	31	3.8	5.0	4.2	0.31
Percent of head length						
Snout length	67.1	31	66.2	71.7	68.7	1.31
Orbital diameter	8.5	31	8.5	11.3	10.0	0.58
Interorbital width	24.3	31	22.8	27.8	25.6	1.15
Head depth	44.3	31	41.1	50.6	45.7	2.49
Mandibular ramus	20.2	31	19.0	23.8	20.9	1.12
Meristics						
Premaxillary teeth left/right	48/48	31	36/38	69/70	51.7	9.25
Dentary teeth left/right	44/41	29	33/33	63/65	49.7	8.67
Plates in median lateral series left/right	26/27	31	25/25	28/28	26.5	0.96
Plates at dorsal-fin base	6	31	5	6	5.8	0.43
Plates between dorsal and adipose	7	31	6	8	7.2	0.58
Plates between adipose and caudal	4	31	2	4	3.4	0.67
Plates at anal-fin base	4	31	3	4	3.2	0.37
Plates between anal and caudal	12	30	10	13	11.2	0.85
Pre-adipose azygous plates	3	30	1	5	2.3	0.95

MCNIP 1706, 39, 28.5–86.3 mm SL, MCP 53925, 11 (11, 72.5–88.1 mm SL) + 1 CS, 85.1 mm SL, MZUEL 19196, 4, 63.6–73.9 mm SL, NUP 20376, 4, 64.6–77.9 mm SL, UNT 19451, 4, 62.9–73.4 mm SL, ZUEC 16841, 4, 66.0–81.4 mm SL, Catuji, Preto River near Jangadeiro Waterfall, 17°22′46.72″S, 41°31′42.33″W, T. C. Pessali, T. A. Barroso, and S. G. Máximo, 10 September 2015; MCNIP 1720, 1, 88.3 mm SL, MCNIP 1731, 58, 38.6–93.9 mm SL, MCP 53926, 5 (5, 78.0–87.1 mm SL) + 1 CS, 76.5 mm SL, Catuji, Preto River near Jangadeiro Waterfall, 17°22′46.72″S, 41°31′42.33″W, T. C. Pessali, G. M. Santos, and I. S. Penido, 19 April 2015.

Diagnosis.—*Pareiorhaphis mucurina* is diagnosed from all congeners by the following unique autapomorphic features: lower lip with a distinct narrow area completely devoid of papillae along and just posterior to each emergent tooth series of the dentary (vs. area posterior to tooth series of the dentary covered by papillae), and by having a maxillary barbel short, mostly adnate to lower lip by distinctly enlarged skin flap forming a continuous connection from the base to almost the end of the maxillary barbel (vs. flap of skin connecting the maxillary barbel small). In addition, the papillae in upper lip are coalesced to form three or four transverse series of elongate skin folds anterior to the premaxillary tooth series (vs. papillae in upper lip rounded, not fused to form skin folds) also distinguishes *P. mucurina* from all other species of *Pareiorhaphis*. The new species is further distinguished from all congeners, except *P. garapia*, *P. garbei*, *P. nasuta*, *P. proskynita*, *P. splendens*, *P. vestigipinnis*, and *P. vetula* by the smaller eye diameter (8.5–11.3% vs. 11.7–18.8% HL). From the above seven species it is distinguished by having the soft fleshy lobe on the lateral margin of head progressively wider posteriorly in adult males (vs. soft fleshy lobe not widening posteriorly along the lateral margin of the head). In addition, the dorsal-fin spinelet present, well-developed (vs. dorsal-fin spinelet absent) distinguishes the new species from *P. garapia*, *P. vestigipinnis,* and *P. vetula*; the bifid teeth, with a small lateral cusp in both the dentary and the premaxilla (vs. teeth simple, without lateral cusp in both

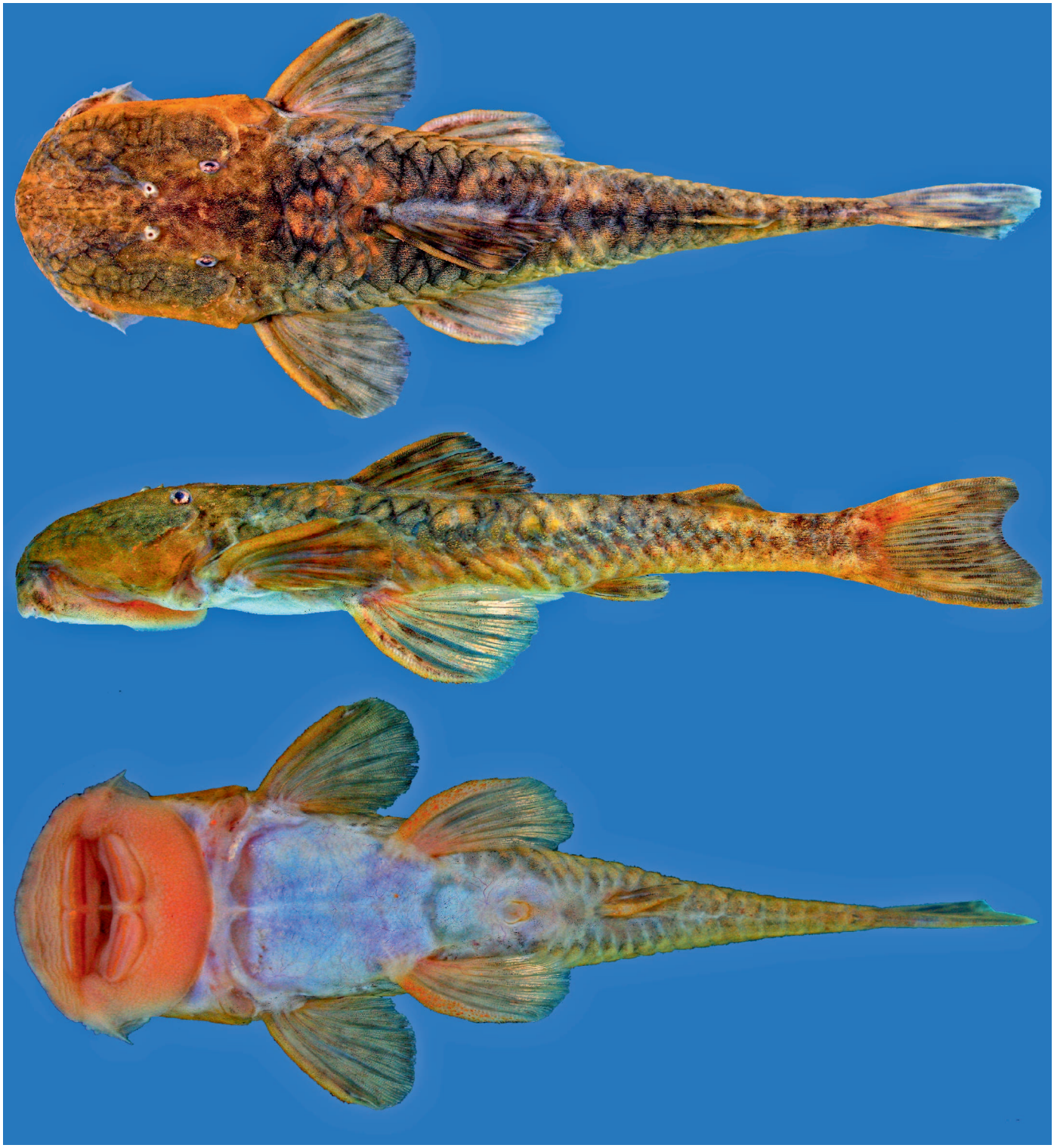

Fig. 2. *Pareiorhaphis mucurina*, MCNIP 1720, 88.3 mm SL, female, paratype, photographed immediately after collection. Brazil, Minas Gerais State, Catuji, Preto River near Jangadeiro Waterfall, Mucuri River basin.

dentary and premaxilla) distinguishes *P. mucurina* from *P. garbei*; from *P. proskynita* and *P. vestigipinnis,* it is distinguished by having an adipose fin (vs. adipose fin absent); from *P. splendens,* it is distinguished by the long first unbranched pelvic-fin ray, approximately equal in size or longer than the pectoral-fin spine (vs. first unbranched pelvic-fin ray short, always shorter than the pectoral-fin spine); and from *P. nasuta,* it is distinguished by having the lateral tooth cusp longer, almost reaching or reaching to middle of medial cusp (vs. lateral cusp minute, never reaching to middle of medial cusp).

Description.—Standard length of measured specimens 72.2–97.2 mm SL. Morphometric and meristic data in Table 1. Overall view of body in Figures 1 and 2. Small to medium-sized loricariid; body elongate, wide anteriorly and dorsoventrally flattened. Greatest body width at posterior portion of cheek, progressively tapering to end of caudal peduncle.

Dorsal profile of body gently convex from snout to parieto-supraoccipital tip, almost straight from that point to dorsal-fin origin and then descending to end of caudal peduncle except for shallow depression at adipose-fin spine. Greatest body depth at dorsal-fin origin. Least body depth at shallowest part of caudal peduncle. Trunk and caudal peduncle mostly oval in cross-section, slightly flattened ventrally and more compressed caudally. Lateral line in median plate series uninterrupted, with pored tubes from compound pterotic to caudal-fin base. Ventral profile almost straight between snout tip and pelvic girdle, then slightly ascending to caudal-fin origin. Dorsolateral surface of body covered by dermal plates except for small naked area overlying opening of swim bladder capsule, posteroventrally to compound pterotic. Predorsal plates arranged in three or four pairs of plates, sometimes randomly distributed. Five rows of lateral dermal plates covering body, not forming keels. Mid-dorsal and mid-ventral series of lateral plates incomplete, ending 3–4 plates before caudal-fin base. Lower surface of head, portion from pelvic-fin insertion to anal-fin origin, and region around urogenital opening naked. Abdomen almost completely naked or with few scattered odontodes directly embedded in skin and irregularly arranged from pectoral girdle to near pelvic-fin insertion. Some specimens with only few odontodes on each side of abdominal region just posterior to gill opening.

Head broad and moderately depressed, rounded in dorsal view; slightly triangular in adult males. Interorbital space flat to slightly concave. Three conspicuous elevated ridges between orbits and snout tip. One median, more prominent and without emerging odontodes, from snout tip to area before nostrils; and two large and elevated in front of each orbit. Snout tip with small ovoid area of naked skin, covered by short hypertrophied odontodes in fully developed adult males. Adult males with well-developed soft fleshy lobes on lateral margin of head, progressively wider posteriorly. Soft fleshy area of cheek with many large, needle-like hypertrophied odontodes projected laterally; irregular row of small hypertrophied odontodes ventrally projected from inner portion of soft fleshy cheek. Opercle and lateral process of cleithrum ornamented with short hypertrophied odontodes. Eye small, dorsolaterally placed; orbital diameter 8.5–11.3% HL. Iris operculum small or unnoticeable. Nares ovoid, slightly longer than wide, positioned much closer to anterior margin of orbit than to snout tip. Oral disk oval; lips well developed, occupying most of ventral surface of head; lips wider than snout in females, visible in dorsal view in some specimens. Upper lip narrow, with three or four series of distinctly shaped papillae, coalesced to form transverse series of elongate skin folds anterior to premaxillary tooth series. Lower lip wide and long, almost reaching to anterior margin of pectoral girdle. Lower lip densely covered by minute papillae; distinct narrow area devoid of papillae along and just posterior to each tooth series of dentary. Posterior edge of lower lip very finely fringed. Maxillary barbel short, mostly adnate to lower lip and with small free portion distally. Distinct enlarged flap of skin on lateral portion of lower lip, forming continuous connection with maxillary barbel. Tooth series in both premaxilla and dentary forming shallow arch, with mesial ends slightly curved inwards. Teeth slender, asymmetrically bifid, medial cusp slightly curved inwards and rounded. Lateral cusp small and pointed, almost reaching or reaching to middle of medial cusp in unworn teeth.

Dorsal-fin origin along vertical passing through or slightly posterior to origin of pelvic fin. Dorsal fin short, not contacting preadipose azygous plates when adpressed; posterior margin straight. Nuchal plate and dorsal-fin spinelet exposed, not covered by skin. Dorsal-fin spinelet transversely oval; wider than base of dorsal-fin spine. Dorsal-fin locking mechanism non-functional. Dorsal-fin spine moderately flexible, followed by seven branched rays. Adipose fin with well-ossified leading spine bearing odontodes. Adipose-fin membrane short or extended slightly beyond adipose-fin spine. Adipose fin preceded by 1–5 (usually 2–3) median preadipose azygous plates. Pectoral-fin origin situated slightly dorsal to pelvic-fin origin. Pectoral fin moderate in size, with spine slightly curved and flattened, covered by minute odontodes in females, immature males, and juveniles. Adult males with pectoral-fin spine very broad, bearing straight, short hypertrophied odontodes on entire outer surface. Pectoral fin with six branched rays, first and second slightly longer than spine. Subsequent branched rays decrease gradually in size. Distal margin of pectoral fin straight to slightly rounded, almost reaching or reaching to middle of unbranched pelvic-fin ray. Pelvic fin with one unbranched and five branched rays, not reaching or just reaching to origin of anal fin when adpressed. First unbranched pelvic-fin ray depressed, covered with 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 tip of ray; flap absent in females. Anal fin short with one unbranched and five branched rays; tip reaching vertical passing through adipose-fin origin when adpressed. Caudal fin with 14 branched rays, posterior margin concave; ventral lobe slightly longer than dorsal. Dorsal caudal-fin lobe with 4–5 and ventral lobe with 4 plate-like procurrent rays, posteriormost elongate. Odontodes on principal and procurrent rays small and irregularly arranged. Hypural plate asymmetrical with ventral lobe slightly longer than dorsal. Total vertebral centra 29 (2); pleural ribs 8 or 9 (2).

Color in alcohol.—Overall coloration of head and dorsum dark brown with pale yellow blotches (Fig. 1). Soft fleshy skin on lateral margin of head of males yellowish pale. Hypertrophied odontodes on lateral portion of head in adult males pale orange. Parieto-supraoccipital and predorsal plates dark brown. Dorsum with four dark bars, at dorsal-fin base, immediately posterior to dorsal-fin base, connected by long and diffuse dark mark at mid-dorsal line to third bar in front of adipose fin, and fourth bar between adipose and caudal fins; bars extending ventrally to lateral diffuse dark stripe along middle series of lateral plates. Leading ray of pectoral and pelvic fins light brown to pale yellow. All fins with inconspicuous dark dots on rays; interradial membrane mostly hyaline or dusky. Ventral surface of body pale yellow to light brown between posterior margin of lower lip and origin of anal fin; ventral portion of caudal peduncle light to dark brown.

Color in life.—Overall coloration yellowish brown (Fig. 2). Soft fleshy skin on lateral margin of head of males bright orange. Hypertrophied odontodes on lateral portion of head in adult males dark brown with base pale white. Parieto-supraoccipital and predorsal plates dark brown, latter ones with bright orange hue. Dorsal surface with four dark bars, as described above. Dorsal surface of leading ray and base of branched rays of pectoral and pelvic fins bright orange.

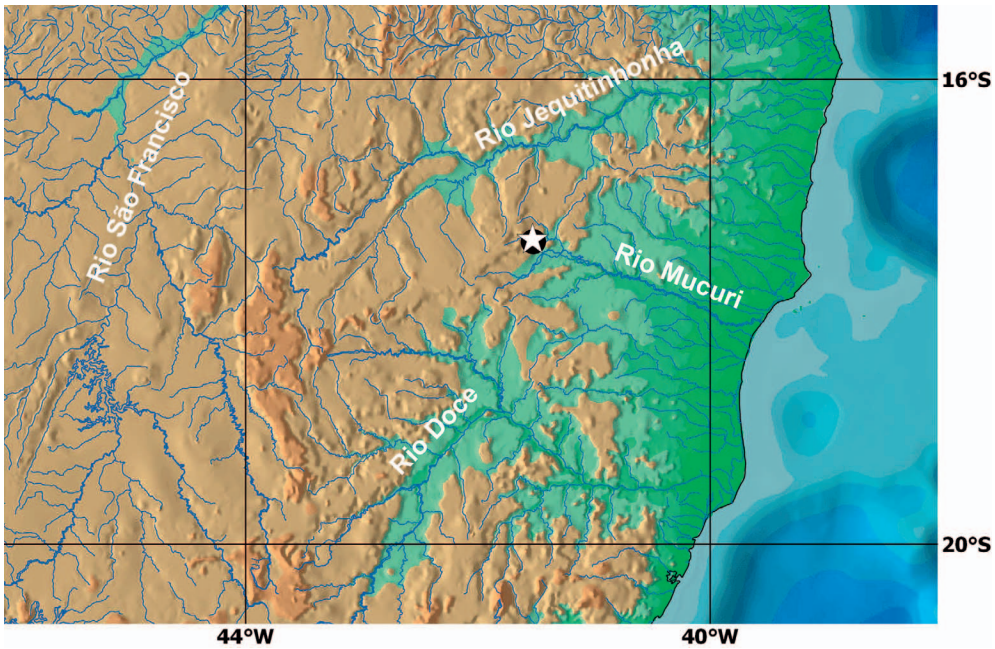

Fig. 3. Distribution of *Pareiorhaphis mucurina* in eastern Brazil. White star = type-locality; black dot = paratype locality.

Ventral surface of body white to light cream between posterior margin of lower lip and origin of anal fin; ventral portion of caudal peduncle light brown.

Sexual dimorphism.—Males of *Pareiorhaphis mucurina* have fleshy lobes that extend along the lateral margin of the head, ornamented with needle-like emerging hypertrophied odontodes, both of which are absent in females. Adult males also have short hypertrophied odontodes on the opercle and lateral process of the cleithrum, pectoral-fin spine very broad, bearing straight, short hypertrophied odontodes on entire outer surface, and a skin fold on the dorsal surface of the unbranched pelvic-fin ray that extends to the ray tip, which are absent in female. Finally, male possesses a small and pointed urogenital papillae behind the anal opening, which is absent in female.

Distribution.—Known from the type locality in the Preto River, a tributary to the upper Mucuri River basin, and a nearby locality in the same river, State of Minas Gerais, Brazil (Fig. 3).

Habitat and ecological notes.—The two localities where the new species was captured have fast flowing, tea-colored water running on a bedrock bottom, and a fair amount of preserved marginal vegetation (Fig. 4). Specimens were captured in places 0.2–1.7 m deep and 3–16 m wide. Individuals of the new species are very abundant, and most were hand-caught among rocks and inside cracks and crevices of the bedrock. Other syntopic species caught are *Euryochus thysanos*, *Astyanax* aff. *fasciatus*, and one unidentified species of *Characidium* and *Trichomycterus*.

Conservation status.—*Pareiorhaphis mucurina* is currently known from two localities separated by 2.5 river km in the Preto River, upper Mucuri River basin. The species is relatively abundant, with numerous specimens collected in each collecting event. Despite the Extent of Occurrence (EOO) based on known localities is very narrow, the fish is estimated to occur widely in the upper portions of the Mucuri River basin with similar habitats. A variety of diffuse threats such as contamination by domestic sewage, *Eucalyptus* plantation, cattle ranching, and deforestation were observed in the area, but no specific threats were detected, and *Pareiorhaphis mucurina* should be categorized as Least Concern (LC) according to IUCN criteria (IUCN Standards and Petitions Subcommittee, 2017).

Fig. 4. Preto River at Jangadeiro Waterfall, near town of Catuji, Minas Gerais, Brazil, collecting locality of paratypes of *Pareiorhaphis mucurina*. Photograph by Sidney dos Reis.

Etymology.—The species name *Pareiorhaphis mucurina* is given in allusion to the Mucuri River basin. An adjective.

DISCUSSION

Because external morphology is conservative in *Pareiorhaphis*, features related to sexual dimorphism in adult males show close similarities among species of *Pareiorhaphis* and provide informative characters for investigating the relationships among neoplecostomine genera, as advanced by Pereira and Reis (2017). Regarding external morphology, this study revealed that *Pareiorhaphis mucurina* shares with remaining species of the genus a series of sexually dimorphic derived features, including hypertrophied odontodes covering the cheek, opercle, and the exposed lateral process of the cleithrum of adult males, as previous described by Pereira et al. (2007, 2010), indicating that current diagnosis of *Pareiorhaphis* leaves no doubt regarding its generic allocation. Other Neoplecostominae inhabiting the area between the Paraguaçu River and the drainages in Espírito Santo State, included in the NMA freshwater ecoregion, however, are *Euryochus thysanos*, *Hirtella carinata*, and *Neoplecostomus doceensis*. *Pareiorhaphis mucurina* is clearly diagnosed from these genera by the attributes related to the sexual dimorphism of adult males, as discussed above. The smaller orbital diameter (8.5–11.3% HL, vs. 13.1–16.5% HL in *H. carinata*, and 16.1–19.7% HL in *E. thysanos*) also distinguishes the new species. From *Neoplecostomus doceensis* it differs by having the abdominal area from the pectoral girdle to the pelvic-fin insertion almost devoid of dermal plates, whereas in *N. doceensis* that region is covered with plates that form a conspicuous shield.

The region situated from the Paraguaçu River to the Reis Magos River, a small coastal drainage south of the Doce River, encompasses most of the NMA freshwater ecoregion and houses high species diversity in the genus *Pareiorhaphis*. Usually, the general body shape is remarkably similar in all species of *Pareiorhaphis* occurring in this particular area. The only exception is *Pareiorhaphis vetula* from the headwaters of the Doce River basin, in Minas Gerais State, which has a much smaller adult size, contrary to remaining congeners described from the costal Atlantic drainage, in which adults are clearly larger than the latter species. This assemblage of species generally shares an elongate body, quite long snout, small eye, broadly rounded head, and short, hypertrophied needle-like odontodes inserted on the lateral margin of head of adult males. Despite the similarities of these features with those found in *Pareiorhaphis mucurina*, the new species is distinguished from all other species by having a distinct, enlarged flap of skin on the lateral portion of the lower lip, forming a continuous connection with most of the maxillary barbel. A similar condition is found in *P. nasuta*, the earliest described species of *Pareiorhaphis* from the Doce River basin, but the connection between the maxillary barbel and the lower lip is short when compared to the new species. In addition to *P. vetula* and *P. nasuta*, two sympatric species inhabiting the headwaters of the Doce River, *Pareiorhaphis scutula* and *Pareiorhaphis proskynita* are also found in the Doce River basin, in the headwaters of the Piracicaba River, Minas Gerais State. *Pareiorhaphis mucurina* differs from all congeners that inhabit the Doce River drainage by adult males having a well-developed fleshy lobe on lateral margin of the head, which is progressively wider posteriorly, while in *P. nasuta*, *P. proskynita*, *P. scutula,* and *P. vetula*, the fleshy lobe extends along the entire lateral margin of head. *Pareiorhaphis ruschii* from the Piraquê-Açu and Reis Magos rivers, two coastal drainages situated south of the Doce River, is an additional congener that occurs in this area. *Pareiorhaphis mucurina*, however, can be further distinguished from the latter species by having the pectoral-fin spine short, maximally reaching to half of the pelvic-fin length when adpressed in adult males, while *P. ruschii* has a long pectoral-fin spine reaching the distal third of the pelvic-fin length in adult males. In addition to those, four other species of *Pareiorhaphis* occur from the Mucuri River north to the Paraguaçu River. *Pareiorhaphis lineata* and *Pareiorhaphis stephanus* are the only neoplecostomine species known to occur sympatrically and syntopically in the headwaters of the Jequitinhonha River, a large basin in the eastern Brazilian coastal drainages. *Pareiorhaphis mucurina* differs from both species by having the hypertrophied odontodes inserted on the lateral margin of head in adult males, while in *P. lineata* and *P. stephanus* the hypertrophied odontodes are distributed around the entire margin of the snout and head. Furthermore, adult males of *P. mucurina* differ from *P. stephanus* by having the largest hypertrophied odontodes on the pectoral-fin spine always shorter than one orbital diameter, while larger hypertrophied odontodes are always longer than one orbital diameter in *P. stephanus*. From *P. lineata* the new species is easily distinguished by the color pattern, with the dorsum having distinct dark saddle-like marks interspaced with pale yellow blotches, in contrast to the lighter dorsum and well-defined dark brown stripe on median series of lateral plates that extends along the flanks in the former species. *Pareiorhaphis bahianus*, from the Almada River basin, the first species of *Pareiorhaphis* described from eastern Brazilian coastal drainages, and the species with northernmost distribution record, *Pareiorhaphis lophia*, from the headwaters of the Paraguaçu River, differ from *Pareiorhaphis mucurina* by their larger eye (see Diagnosis). Furthermore, *P. mucurina* can be distinguished from *P. bahianus* by the shape of the caudal peduncle, which is mostly ovoid in cross-section and only slightly flattened ventrally, while somewhat flat dorsally and very flattened ventrally in *P. bahianus*. In addition, the lower lip is covered with small rounded papillae to the posterior edge in *P. mucurina*, while leaves a smooth band before the lip edge in *P. bahianus*. From *P. lophia* the new species differs in having the papillae in upper lip distinctly shaped, coalescing to form three or four transverse series of elongate skin folds, while the upper lip bears small, rounded papillae in the former. *Pareiorhaphis mucurina* is still distinguished from *P. lophia* by having the dorsal-fin spinelet always present and wider than the base of the dorsal-fin spine, while in *P. lophia* the spinelet is usually absent, but narrower than the dorsal-fin spine base when present.

Internal anatomy provides yet an additional suite of diagnostic characters for the new species. Although a detailed review of the osteology of *Pareiorhaphis mucurina* is beyond the scope of this contribution, a few details concerning a ligamentous connection of the mandible deserve mention. Pereira and Reis (2017), in a phylogeny of the Neoplecostominae, commented regarding a ligamentous connection that extends from the anguloarticular anteriorly to the opercle posteriorly. Further, a small ossification mesial to the preopercle and associated with that ligament variably occurs among species of the subfamily and in other loricariids. Previous authors, Schaefer and Lauder (1986, 1996), Schaefer (1990, 2003), and Armbruster (2004), already discussed the evidence in favor of and against the occurrence of the interoperculo-mandibular ligament in loricariids. In addi-

tion, Armbruster (2004) described a small ossification mesial to the preopercle connected by a ligament to the opercle and the anguloarticular in several loricariids (*Delturus*, *Harttia*, *Hemipsilichthys*, *Lithogenes, Neoplecostomus,* and *Pogonopoma*). A considerable variation in size and shape of such bone was noted among genera by Schaefer (2003), Armbruster (2004), and Pereira and Reis (2017). According to the latter authors, however, the ossification ligamentously connected to the anguloarticular anteriorly and broadly connected via an expanded ligament to the opercle is indeed homologous with the interopercle of other catfishes in *Lithogenes* and the delturines. The homology interpretation of this ossicle in other loricariids is ambiguous, and it may be either a highly reduced interopercle or a novel, sesamoid ossification.

Pareiorhaphis mucurina has a ligament connecting the anguloarticular and the opercle with a small sesamoid ossification associated with the ligament. The ligament is extremely thin and fragile, being attached on the posterior process of the anguloarticular anteriorly and to a broad surface on the anterior opercular margin. At the same time, the sesamoid element associated with the ligament is a small and cylindrical bone nodule, either completely enclosed within the confines of the ligament or slightly wider than the ligament. Among remaining congeners, only *P. bahianus*, *P. lophia*, and *P. lineata* have a condition similar to that of the new species. *Pareiorhaphis bahianus* and *P. lineata* share the presence of the ligament between the anguloarticular and the opercle and the sesamoid ossification, but their ligament is clearly thicker than that found in *P. mucurina*. Furthermore, the sesamoid ossification of *P. bahianus* is very small and always confined to the limit of the ligament, whereas in *P. lineata* the sesamoid is similar to that of the new species. On the other hand, *P. lophia* possesses a ligament that is much thicker than the remaining species but the sesamoid element is absent. A detailed study of this ligament and associated ossification in all species of *Pareiorhaphis* can bring additional light to their phylogenetic interrelationships.

MATERIAL EXAMINED

All from Brazil, in addition to that listed in Pereira and Reis (2002), Pereira and Britto (2012), Pereira et al. (2012), and Pereira and Zanata (2014).

Pareiorhaphis garapia: MCP 48861, holotype, 46.8 mm SL, male, Rio Grande do Sul, Maquiné, Garapiá Creek; MCP 48862, paratype, 4, 27.1–42.1 mm SL + 1 CS 45.9 mm SL, same locality as holotype.

Pareiorhaphis lineata: MCP 50863, holotype, 95.1 mm SL, male, MCP 50971, paratype, 6, 60.9–98.4 mm SL + 2 CS, 78.5–88.0 mm SL, Minas Gerais, Grão Mogol, Jequitinhonha River basin, Itacambiruçu River.

Pareiorhaphis vetula: MCP 49693, holotype, 48.2 mm SL, male, Minas Gerais, Santo Antônio do Itambé, Doce River basin, Mãe D'água River at Ponte de Pedra Waterfall; MCP 49149, 5, 40.5–49.3 mm SL + 1 CS, 44.5 mm SL, Minas Gerais, Santo Antônio do Itambé, Doce River basin, Areia Creek, below Fumaça waterfall.

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