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Two new species of *Hypancistrus* (Siluriformes: Loricariidae) from the rio Xingu, Amazon, Brazil

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Hypancistrus was proposed as a monotypic genus for a highly unique species, *H. zebra*, known only from a short stretch of the Middle rio Xingu on the Brazilian Shield. Subsequent studies added eight species, all described from river systems draining the Guiana Shield. Analysis of *Hypancistrus* specimens from the middle and lower Xingu detected two new species that can be separated from its congeners based on color pattern and body size of adults, and that are well known from the ornamental fish trade. Due to their non-overlapping distributions, the prospects of conserving the two species are quite different. One of the species is relatively safe due to its relatively large distribution throughout the Lower Xingu channel up to the downstream end of Volta Grande do Xingu, while the other is in need of urgent protection because it is restricted to a short stretch of the Middle Xingu channel at depths greater than 15 meters, and its distribution lies entirely within the impact zone of the Belo Monte Hydroelectric Power Plant Complex.

Keywords: Belo Monte dam, Endangered species, Identification key, Ornamental fish, Taxonomy.

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Hypancistrus foi proposto como um gênero monotípico para uma espécie altamente singular, *H. zebra*, conhecida apenas para um curto trecho do Médio rio Xingu no Escudo Brasileiro. Estudos subsequentes adicionaram oito espécies, todas descritas em sistemas fluviais que drenam o Escudo das Guianas. A análise de espécimes de *Hypancistrus* do médio e baixo Xingu detectou duas novas espécies, já bem conhecidas do comércio de peixes ornamentais, que podem ser diferenciadas de suas congêneres com base na coloração e tamanho do corpo nos adultos. Devido às suas distribuições não sobrepostas, as perspectivas de conservação das duas espécies são bastante diferentes. Uma delas está relativamente segura devido à sua distribuição relativamente grande ao longo do canal do Baixo Xingu até a extremidade a jusante da Volta Grande do Xingu, enquanto a outra precisa de proteção urgente porque está restrita a um curto trecho do canal do Médio Xingu em profundidades superiores a 15 metros, e sua distribuição está inteiramente dentro da zona de impacto do Complexo Hidrelétrico de Belo Monte.

Palavras-chave: Chave de identificação, Espécies ameaçadas, Hidrelétrica de Belo Monte, Peixes ornamentais, Taxonomia.

INTRODUCTION

Hypancistrus Isbrücker & Nijssen, 1991 is a genus of sucker-mouth armored catfishes (Loricariidae) that is very popular in the aquarium trade due to their striking color patterns and relatively small size (Evers *et al*., 2019). Despite being common in the global market for ornamental fishes for decades, the species-level taxonomy of the genus remains poorly known. There are currently nine valid species: *Hypancistrus zebra* Isbrücker & Nijssen, 1991, type-species of the genus, described from the rio Xingu, Brazil, *H. inspector* Armbruster, 2002, described from the upper Orinoco, Venezuela, and also found in the upper rio Negro, Brazil; *H. contradens* Armbruster, Lujan & Taphorn, 2007, *H. furunculus* Armbruster, Lujan & Taphorn, 2007, *H. lunaorum* Armbruster, Lujan & Taphorn, 2007, and *H. debillitera* Armbruster, Lujan & Taphorn, 2007, all described from the upper Orinoco, Venezuela (Armbruster *et al*., 2007); *Hypancistrus vandragti* (Lujan & Armbruster, 2011), also from the upper Orinoco, Venezuela, and originally described in the genus *Micracanthicus* Lujan & Armbruster, 2011, now synonymized with *Hypancistrus* (Lujan *et al*., 2017); and *H. margaritatus* Tan & Armbruster, 2016 (rio Takutu, Branco basin, and rio Demeni, Aracá basin) and *H. phantasma* Tan & Armbruster, 2016 (rio Uaupés), respectively from right and left bank tributaries to the rio Negro (Tan, Armbruster, 2016).

Hypancistrus is distinguished from other Ancistrini by a combination of non-unique characters and the presence of "premaxillary teeth considerably smaller than mandibular teeth" (Isbrücker, Nijssen, 1991:347). Although not clearly stated in the original description, the differential number of teeth in the upper and lower jaws also has been used as a diagnostic feature for the genus (*i.e.*, premaxillary teeth more numerous than mandibular teeth). This combination differs from other generalized conditions found in the remaining loricariids, such as: 1) premaxillary and dentary teeth similar in number and size (typical conditions found in the species of *Ancistrus* Kner, 1854 and *Hypostomus* Lacepède, 1803), 2) premaxillary teeth more developed than dentary ones (some Ancistrini, for example *Scobinancistrus* Isbrücker & Nijssen, 1989), and 3) reduction or absence of the premaxillary bones and teeth (many Loricariinae).

The original description of *Hypancistrus inspector* shows that the difference in number of premaxillary and dentary teeth is not consistent ontogenetically because, in that species, larger specimens tend to show a similar number of teeth in both jaws (Armbruster, 2002). Based on this, the author searched for more features to diagnose the genus. He found that *H. inspector* has a wide separation between the lateral ethmoid and the metapterygoid, a sharply angled adductor palatine crest and loss of the lateral wall of the metapterygoid channel (Armbruster, 2002; Armbruster *et al*., 2007), and listed those features as synapomorphies for *Hypancistrus*.

Armbruster's (2004) cladistic analysis of Loricariidae based on morphology did not support a sister relationship between *H. inspector* and *H. zebra* (*i.e*., *Hypancistrus* would be non-monophyletic). In a phylogenetic reanalysis of hypostomine genera, Armbruster (2008) supported the monophyly of *Hypancistrus* as composed by *H. zebra* and the newly described *H. contradens* and *H. furunculus*). In an extensive multiloci analyses of the subfamily Hypostominae, five species of *Hypancistrus* and *Micracanthicus vandragti* formed a monophyletic group inside of what was called the *Peckoltia* clade (Lujan *et al*., 2015). A separate work focusing on the wood-eating genera of the *Peckoltia* clade (*Panaqolus* and *Panaque*) found the same relationship among *Hypancistrus* and formally transferred *Micracanthicus* to its synonymy (Lujan *et al*., 2017).

To date, all nominal species of *Hypancistrus*, except for the type-species *H. zebra*, are described from river systems that drain the Guiana Shield (Essequibo, Orinoco and upper Negro). In the ornamental fish trade, however, several undescribed species of *Hypancistrus* from the Brazilian Shield are known and commercialized using L code numbers (Glaser, Glaser, 1995). In the present paper, we describe two new species of *Hypancistrus* from the middle and lower stretches of rio Xingu (Amazonas basin) and present an updated key for the species of the genus.

MATERIAL AND METHODS

All measurements were taken with a digital caliper. Measurements and counts were made according to Armbruster (2003), and holotype counts were represented by an asterisk. Anatomical and osteological nomenclature follows Schaefer (1987), Rapp Py-Daniel (1997) and Tan, Armbruster (2016). Institutional abbreviations follow Sabaj (2020).

RESULTS

Hypancistrus yudja, new species

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(Figs. 1–2; Tab. 1)

Hypancistrus L174. —Stawikowski, 1994:536 (aquarium fish atlas; citation and brief description). —Schraml, Schäfer, 2004:134 (aquarium fish atlas). —Seidel, Evers, 2005:588–90 (book; citation and brief description). —Seidel, 2008:112 (book, citation and brief description). —Camargo *et al*., 2013:173–81 (book, ornamental fish).

Hypancistrus sp. 2. —Camargo *et al*., 2013:185 (book, ornamental fish). —Ramos *et al*., 2015:97 (citation).

Hypancistrus sp. nov. —Lees *et al*., 2016:460–61 (citation and pictured).

FIGURE 1 | Holotype of *Hypancistrus yudja*, INPA-ICT 61049, 42.1 mm SL, rio Xingu, main channel along right bank at Pimental Dam site, *ca.* 37 km southeast of Altamira, Pará State, Brazil, 03°43'20.3"S 51°95'65.6"W.

Holotype. INPA-ICT 61049, 42.1 mm SL, rio Xingu, main channel along right bank at Pimental Dam site, *ca*. 37 km southeast of Altamira, Pará State, Brazil, 03°25'55.3"S 51°57'23.6"W, 11 Nov 2014, M. H. Sabaj, L. M. Sousa, A. P. Gonçalves, D. B. Fitzgerald, V. Machado, P. M. Ito, A. Oliveira, H. Gimênes Jr., M. Hardman, J. Tiemann, K. S. Cummings, M. C. Dreher Mansur and ornamental fishermen.

Paratypes. All specimens from Xingu, Brazil, Pará State: ANSP 193084, 5, not measured, rio Xingu, deep rocky ledges in main channel, *ca*. 60 km east-southeast of Altamira, 03°24'58.5"S 51°42'38.6"W, 14 Oct 2012, M. H. Sabaj & L.M. Sousa. ANSP 194887, 10, 31.8–49.4 mm SL, rio Xingu (lower Volta Grande), main straight channel running from south-southwest to north-northeast, 03°11'3.36"S 51°37'2.46"W, 28 Sep 2013, L. M. Sousa, A. Gonçalves, N. K. Lujan, D. B. Fitzgerald, P. Madoka Ito & fishermen. ANSP 197292, 1, 42.3 mm SL, collected with the holotype; ANSP 197623, 3, 29.8–44.1 mm SL, LIA 5070, 2, 47.4–48.0 mm SL, rio Xingu, central channel, 03°24'58.5"S 51°42'38.7"W, 9 Nov 2014, M. H. Sabaj & L. M. Sousa. ANSP 198631, 1, 41.5 mm SL, LIA 5059, 1, 44.9 mm SL, rio Xingu, major channel just upstream of cachoeira do Jericoá, *ca*. 55 km east-southeast of Altamira, 03°22'55.4"S 51°44'13.0"W, 8 Nov 2014, M. H. Sabaj & L. M. Sousa. ANSP 198636, 2, 28.0–32.1 mm SL, rio Xingu, major channel along right bank, *ca*. 60 km southeast of Altamira, 03°31'06.2"S 51°45'08.1"W, 9 Nov 2014, M. H. Sabaj & L. M. Sousa. AUM 74485, 2, 44.5–45.7 mm SL, collected with ANSP 194887. INPA-ICT 30115, 10, 30.8–34.0 mm SL, Belo Monte, 03°06'54"S 51°43'15"W, 5 Nov 2004, L. M. Sousa & E. D. Ribeiro. INPA-ICT 31404, 19, 26.7–42.8 mm SL, Maia Community, rocky outcrop in front of the camp, 03°30'44"S 51°44'43"W, 9 Nov 2008, M. Santos, L. Rapp Py-Daniel, I. M. Soares, R. P. Ota, D. B. Fitzgerald, A. P. Gonçalves, L. M. Sousa & M. Sabaj-Péres. INPA-ICT 40757, 15, 30.8–51.1 mm SL, rio Xingu, below Volta Grande, narrow region of the main channel, 03°11'03"S 51°37'02"W, 28 Sep 2013, A. R. Martins, D. R. G. Ribeiro, R. R. Reyes, D. B. Fitzgerald, J. Zuanon, M. Arce, A. P. Gonçalves & M. Sabaj-Péres. INPA-ICT 43790, 6, 27.0–41.5 mm SL, deep rocky ledges in main channel, *ca*. 60 km east-southeast of Altamira, 03°24'58.5"S 51°42'38.6"W, 14 Oct 2012, L. M. Sousa, D. Fitzgerald, A. S. Oliveira, P. M. Ito, N. Lujan, R. Robles, V. Vargas & M. Sabaj-Péres. INPA-ICT 47294, 3, 29.6–49.0 mm SL, rio Xingu, main channel on the right bank, *ca*. 60 km from Altamira, 03°31'06"S 51°45'08"W, 9 Nov 2014, L. M. Sousa, D. Fitzgerald, A. S. Oliveira, P. M. Ito, N. Lujan, R. Robles, V. Vargas & M. Sabaj-Péres. INPA-ICT 47526, 1, 31.1 mm SL, Rio Xingu, *ca*. 4.5 km above Praia do Caju, 03°24'58"S 51°42'39"W, 9 Nov 2014, L. M. Sousa, D. Fitzgerald, A. S. Oliveira, P. M. Ito, N. Lujan, R. Robles, V. Vargas & M. Sabaj-Péres. INPA-ICT 52316, 6, 31.5–46.7 mm SL, rio Xingu, Praia do Caju, 03°22'58"S 51°44'17"W, 2 Sep 2012, IBAMA. LIA 1680, 9, 31.1–48.0 mm SL, Pedral do Jaú, 03°38'12.1"S 51°73'67.8"W, 10 Nov 2013, A. Gonçalves & L. M. Sousa. LIA 1685, 4, 33.5–50 mm SL, region of Jericoá, 03°41'56.3"S 51°71'10.5"W, 10 Nov 2013, A. Gonçalves & L. M. Sousa. LIA 5076, 1, 28.6 mm SL, collected with ANSP 198636. LIA 6956, 1, 28.1 mm SL, region of Jericoá, 03°24'59"S 51°42'38"W, 3 Oct 2017, L. M. Sousa. LIA 6938, 4, 26.7–39.6 mm SL, Largo do Maia, 03°31'05"S 51°45'07"W, 4 Oct 2017, L. M. Sousa. LIA 6944, 3, 23.0–42.8 mm SL, region of Jericoá, 03°22'53"S 51°44'13"W, 3 Oct 2017, L. M. Sousa. ROM 112318, 3, 40.1–44.9 mm SL, collected with ANSP 194887.

Diagnosis. *Hypancistrus yudja* can be distinguished from all congeners by its unique color pattern consisting of body with a light tan background and relatively large brown blotches and saddles (*vs*. pattern composed of small, dark, isolated spots in *H. phantasma*; background color dark brown to black with pale spots in *H. contradens*, *H. inspector*, *H. lunaorum*, *H. margaritatus*, and *H. vandragti* or with pattern of pale lines and small spots in *H. debilittera* Armbruster, Lujan & Taphorn, 2007; coloration composed of alternating dark and pale wavy lines that are broad in *H. furunculus* and narrow in *H. seideli*; and background white with roughly straight black stripes in *H. zebra*).

Description. Morphometric and meristic data in Tab. 1. Small-sized loricariid, with largest examined specimen measuring 50.0 mm SL. Body short and deep, deepest point at insertion of dorsal fin (19–27% SL), becoming gradually slender after dorsal-fin base. In lateral view, dorsal profile gently convex from snout to dorsal-fin insertion and gently declining from this point to end of caudal peduncle; peduncle concave from end of adipose fin to last lateral plate (11–18% SL). Ventral profile straight from snout tip to pelvic-fin insertion, then ascending gently to insertion of first caudal-fin ray. Greatest width of body at cleithrum (30-37% SL). Head somewhat long (35-41%), without ridges or carinae. Head and snout completely covered by plates supporting odontodes. Cheek odontodes completely exposed and set in depression anterodorsally to cleithrum. Eye laterodorsal with small but conspicuous iris; orbit round and slightly elevated, dorsal rim of orbit barely reaching level of dorsalmost portion of frontal bones.

Interorbital almost flat between orbital ridges. Parieto-supraoccipital process showing conspicuous crest and pointed posteriorly. Parieto-supraoccipital limited posteriorly by set of predorsal plates arranged as one disjunct pair, followed by one or two closely attached pairs plus one single plate immediately anterior to dorsal-fin. Oral disk circular, lips almost completely covered with small round papillae (papillae larger on proximal region of lower lip), margin of lower lip smooth (papillae absent). Lower lip large but not reaching pectoral girdle. Maxillary barbel moderate in size, longer than orbital diameter, almost reaching tip of cheek plates, with large portion free from lower lip. Premaxillary teeth thin, delicate and bifurcated; mesial cusp larger, lateral cusp reaching mid portion of mesial cusp; teeth somewhat numerous (4–14), two to three times smaller than dentary teeth; tooth crown bright red. Dentary with fewer teeth than premaxillary (1–7), similar in shape but considerably larger than premaxillary ones. Dentary tooth rows arranged in approx. 90° angle. Branchial opening small. Interbranchial distance 17–29% HL.

Lateral line plates 20 to 24 (21*), three to five (4*) plates between dorsal and adipose fin, eight to 10* plates between anal and caudal fin. Body plates not carinate or keeled. Caudal peduncle deep and covered by five series of plates. All body plates covered by strong odontodes. Ventral surface entirely naked from snout to anal-fin insertion; single plate between urogenital opening and anal-fin insertion. All fin rays supporting odontodes, more developed on first (undivided) ray. Dorsal fin II+7*, pectoral fin I+5–6 (modally 6*), pelvic fin i+4–5 (modally 5*), anal fin I+3–4 (modally 4*) and caudal fin i+13–14+i (modally 14* branched rays). Dorsal fin spinelet triangular, with functional locking mechanism. Dorsal fin reaching adipose fin when adpressed. Adipose fin slanted posteroventrally, spine strong, straight to gently curved with pointed tip reaching first caudal-fin procurrent ray; base containing five plates; preadipose plate present.

TABLE 1 | Morphometric and meristic data of *Hypancistrus yudja*. N = number of specimens; SD = standard deviation.

	Holotype	N	Range	Mean	SD
Standard length (mm)	42.1	36	23.0–50.0	–	–
Total length (mm)	57.5	32	32.9–63.5	–	–
Percentages of standard length					
Predorsal length	44.4	36	41.5–49.2	44.8	1.7
Head length	37.8	36	34.7–41.4	37.8	1.7
Cleithral width	33.5	36	29.7–36.8	33.8	1.2
Thorax length	24.3	36	19.4–25.8	23.4	1.4
Pectoral-spine length	30.0	36	27.4–33.5	30.1	1.3
Abdominal length	22.2	36	14.9–27.3	22.2	2.0
Pelvic-spine length	28.0	34	23.3–30.7	26.6	1.6
Postanal length	31.4	36	27.9–37.3	31.8	2.2
Anal-fin spine length	16.4	36	11.1–16.4	13.6	1.4
Dorsal spine length	29.3	33	21.4–29.3	26.7	1.9
Dorsal-fin base length	28.2	36	20.9–30.0	26.6	1.5
Dorsal-adipose distance	13.0	36	8.3–16.2	12.6	1.7
Caudal penduncle depth	11.1	36	10.2–12.5	11.4	0.6
Adipose-spine length	8.2	36	4.7–10.7	7.5	1.4
Adipose-caudal length	8.3	36	2.7–11.5	6.1	1.9
Body depth at dorsal-fin origin	24.3	36	19.2–26.9	22.3	1.8
Body width at dorsal-fin origin	27.3	36	23.7–30.5	27.3	1.7
Body width at anal-fin origin	14.3	36	11.1–18.0	14.4	1.4
Post dorsal length	33.1	36	25.5–34.4	30.1	2.2
Percentages of head length					
Orbital diameter	8.2	36	6.8–10.6	8.5	0.9
Snout length	12.8	36	11.8–15.1	13.6	0.8
Internares width	4.4	36	3.5–7.0	4.4	0.5
Interorbital width	10.3	36	9.5–12.6	10.9	0.7
Head depth	22.7	36	19.3–23.8	21.9	1.0
Dentary length	5.6	36	4.7–8.9	6.3	0.9
Premaxillary length	3.9	36	3.3–6.1	4.3	0.6
Head width	32.8	36	28.1–35.4	32.0	1.5
Eye-nare length	2.9	36	2.4–13.4	3.3	1.7
Interbranchial distance	19.6	36	16.5–29.0	19.5	2.3
Meristics	**Holotype**	**N**	**Range**	**Mode**	
Teeth on premaxilla	11	36	4–14	11	
Teeth on dentary	5	36	1–7	5	
Lateral plates in middle series	21	36	20–24	23	
Plates between anal and caudal	10	36	8–10	10	
Plates between dorsal and adipose	4	36	3–5	4	
Plates predorsal	4	36	4–5	4	
Dorsal-fin branched rays	7	36	7–7	7	
Pectoral-fin branched rays	6	36	5–6	6	
Ventral-fin branched rays	5	34	4–5	5	
Anal-fin branched rays	4	36	3–4	4	
Caudal-fin branched rays	14	36	13–15	14	

Tip of adpressed pectoral fin reaching one-third of pelvic-fin length; adpressed pelvic fin slightly surpassing posterior end of anal-fin base; paired fins triangular with slightly curved posterior margin. Caudal fin lunate with the upper lobe slightly smaller than lower lobe.

Color in alcohol. Overall background color pale white or cream; irregular brown to dark-brown rounded or elongated blotches along head, body and fins (Figs. 1–2). Ventral surface uniformly light, beige, with little or no pigmentation. Brown blotches sometimes coalesce to form saddles, dumbbells or other irregular shapes. When present, dorsal saddles usually not bilaterally symmetrical. Area between and just past dorsal posterior margin of orbits often with broad dark transverse bar; longitudinal dark oblique bars often present from orbit and nares, respectively, to ventral lateral margin of snout. All fin rays with two to three dark markings that can be organized as stripes. Some specimens showing wide dark transversal bars on dorsal fin.

FIGURE 2 | Body shape and color pattern variations in live specimens of *Hypancistrus yudja* shown to scale. Specimens not preserved. Scale bar = 1 cm.

Color in life. Similar to preserved specimens but contrast between pale background and dark brown blotches more evident (description based on observations of several specimens in aquarium, on pictures of living specimens and in freshly collected specimens).

Sexual dimorphism. *Hypancistrus yudja* presents the secondary sex characteristics often seen in ancistrin loricariids. Mature males possess hypertrophied odontodes on the cheek, pectoral spine and most of the body plates. Odontodes on body plates become larger on the caudal peduncle. Based on observations of aquarium-kept specimens, the hypertrophied odontodes on mature males appear to be permanent. The head slightly longer and wider in males than in females. Gravid females are usually distinguishable in dorsal view due to their wider abdominal region. Males seem to grow a little larger than females.

Geographical distribution. *Hypancistrus yudja* is only known from a very small stretch of the Volta Grande do Xingu, spanning nearly 75 km of the main river course (Fig. 3).

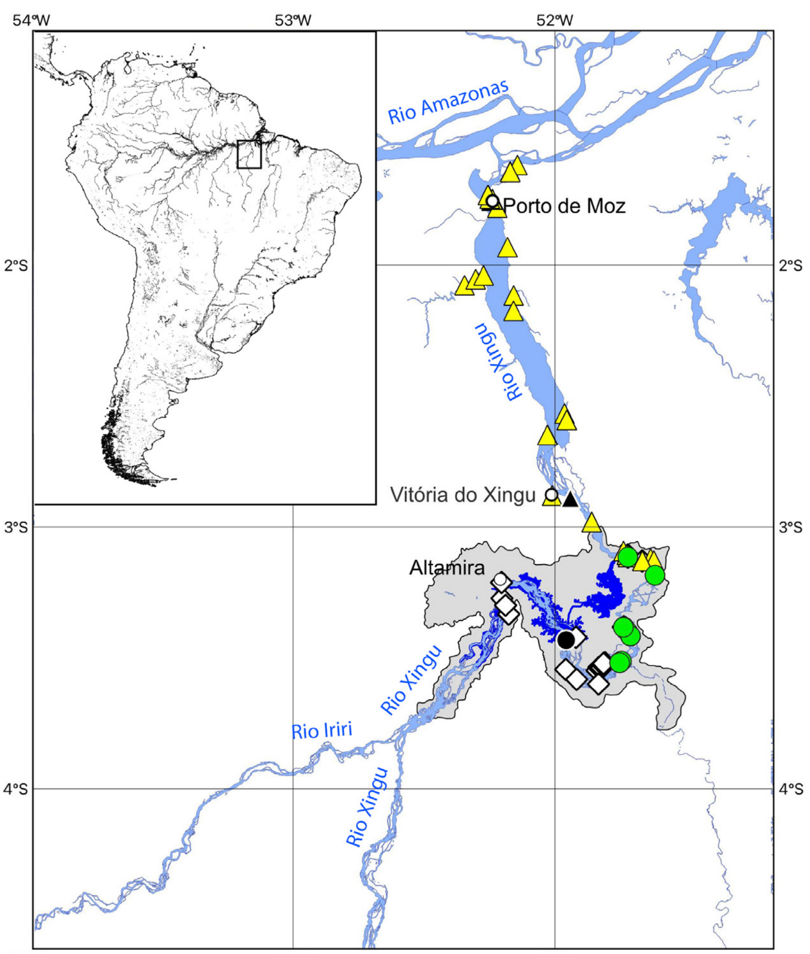

FIGURE 3 | Distribution map of *Hypancistrus* species on the Xingu. *Hypancistrus zebra* (white diamonds); *H. yudja* (green circles) and *H. seideli* (yellow triangles). Type-localities in black.

Ecological notes. *Hypancistrus yudja* inhabits deep portions of the rio Xingu channel. It was only found hidden in lateritic conglomerates below 15 m of depth (Fig. 4). All specimens were collected individually by hand during diving sessions aided by air compressors or scuba equipment. Observations made on specimens kept in captivity suggest that it is a fairly shy species that remains secluded in caves for most of the day. Expert aquarium hobbyists have successfully bred this species. The female lays around 15–20 eggs in a cave that is protected by the male. The fry grows slowly in captivity, often taking two years or more to reach maturity. Under prime conditions they will reach 4–5 cm TL in about a year.

Popular name. Acari-zebra-marrom, zebra-marrom, acari-marrom (in Portuguese); Ozelot-Harnischwels (in German); Ozelot pleco, false zebra pleco, Peruvian (sic) Panther pleco (in English); L174 (L code number).

Etymology. Named after the Yudjá (also known as Juruna), a group of indigenous people from Volta Grande do Xingu. In the Tupi language, Yudjá means "the river owners". This ethnic group has an intimate relationship with the Xingu, being pioneers in navigation on the turbulent, rocky-bottomed waters of this river. *Hypancistrus yudja* is restricted to the Yudjá territory and was a source of income for the indigenous ornamental fishermen who dove below 15 m to catch specimens for the aquarium trade. Both the Yudjá people and *H. yudja* are struggling to survive the environmental impacts of the Belo Monte Hydroelectric Complex on Volta Grande do Xingu, and their fate is connected and deeply threatened.

FIGURE 4 | *Hypancistrus yudja* hidden in a small cave formed by lateritic conglomerate at depth of 16 m near the Jericoá waterfalls.

Conservation status. *Hypancistrus yudja* is restricted to a 75 km stretch of the Volta Grande region of the rio Xingu, in the state of Pará, Brazil. The species' entire area of occurrence falls within the direct impact zone of the Belo Monte Hydroelectric Complex, placing it at high risk of extinction due to severe environmental degradation. This species can be classified as Critically Endangered (CR) under IUCN criteria A4a,c,d, (IUCN, 2022) due to an estimated population decline exceeding 80%, driven by severe habitat degradation from the diversion of over 70% of the rio Xingu's water for hydroelectric operations, disruptions to natural flood and drought cycles, and exploitation for the ornamental fish trade. Recent scuba surveys failed to locate the species in its known habitat, further suggesting a drastic population decline.

Hypancistrus seideli, new species

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(Figs. 5–6; Tab. 2)

Hypancistrus L66. —Stawikowski, 1990:520 (aquarium fish atlas; citation and brief description). —Seidel, Evers, 2005:588–90 (book; citation and brief description). —Seidel, Evers, 2005:576–79 (Book; citation and brief description). —Seidel, 2008:111 (book, citation and brief description). —Cardoso *et al*., 2016:209 (article on cytogenetics). —Araújo *et al*., 2017:300 (article on Xingu ornamental fishery).

Hypancistrus L236. —Glaser, Glaser, 1995:94 (aquarium fish catalog, citation and brief description). —Schraml, Schäfer, 2004:172 (aquarium fish magazine report). —Seidel, Evers, 2005:592–94 (book; citation and brief description). —Seidel, 2008:113 (book, citation and pictured). —Evers, 2021:06 (book about the history of this morphotype on the trade).

Hypancistrus L287. —Seidel, 2000:14 (aquarium fish catalog, citation and brief description). —Schraml, Schäfer, 2004:200 (atlas of aquarium fish). —Seidel, Evers, 2005:602 (Book). —Seidel, 2008:114 (book, citation and pictured).

Hypancistrus L333. —Werner, 2003:35 (aquarium fish magazine, citation and brief description). —Schraml, Schäfer, 2004:215 (aquarium fish catalog). —Seidel, 2008:115 (book, citation and brief description). —Cardoso *et al*., 2016:209 (article on cytogenetics). — Reis *et al*., 2021 (article on feed management). —Borges *et al*., 2021:5 (citation). —Reis *et al*., 2022:3718 (article on sexual dimorphism). —Krings *et al*., 2023:3 (figure of mouth structures).

Hypancistrus L399. —Werner, 2005:56–57 (aquarium fish magazine, citation and brief description). —Seidel, 2008:115 (book, citation and pictured).

Hypancistrus L400. —Werner, 2005:56–57 (aquarium fish magazine, citation and brief description). —Seidel, 2008:115 (book, citation and pictured).

Hypancistrus sp.1. —Camargo *et al*., 2013:173–81 (book, ornamental fish). —Ramos *et al*., 2015:97 (citation).

Hypancistrus "complexo pão". —Ramos *et al*., 2015:97 (citation).

Hypancistrus sp. —Araújo *et al*., 2017:300 (citation). — Fitzgerald *et al*., 2018:105, fig. 1 (list of species). — Reis *et al*., 2021:2 (article on feed management). —Reis

et al., 2022:3718 (article on sexual dimorphism). —Almeida *et al*., 2023 (article on cytogenetics). —Reis *et al*., 2023:02 (biotechnology and nutrition).
Hypancistrus sp. "pão". —Santos *et al*., 2023:29 (article on cytogenetics).

Holotype. INPA-ICT 61050, 98.1 mm SL, Vitória do Xingu, Itaubinha, pedral, Pará State, Brazil, 02°53'21"S 51°56'26"W, 4 Nov 2008, L. Rapp Py-Daniel, H. Anatole & J. Bessa.

FIGURE 5 | Holotype of *Hypancistrus seideli*, INPA-ICT 61050, 98.1 mm SL, Vitória do Xingu, Itaubinha, pedral, Pará State, Brazil, 02°53'21"S 51°56'26"W.

Paratypes. All from Brazil, Pará State: ANSP 185238, 9, 72.2–95.3 mm SL, rio Acarai, upstream from confluence with rio Xingu at Porto de Moz, 02°04'34"S 52°20'42"W, 10 Nov 1994, A. M. Zanata, J. G. Lundberg & L. Rapp Py-Daniel. ANSP 194643, 13, 46.3–103.4 mm SL, rio Xingu, deep channel along right bank of river *ca*. 38 km southeast of Vitória do Xingu, 03°05'32.39"S 51°44'14.1"W, 21 Sep 2013, M. H. Sabaj, L. M. Sousa, A. Gonçalves, N. K. Lujan, D. B. Fitzgerald, P. Madoka Ito, A. Oliveira, R. Robles & ornamental fishermen. ANSP 194954, 15, 33.4–83.1 mm SL, rio Xingu (lower Volta Grande), rocky outcrop in main channel, 03°7'45"S 51°39'55.1"W, 20 Sep 2013, M. H. Sabaj, L. M. Sousa, A. Gonçalves, N. K. Lujan, D. B. Fitzgerald, P. Madoka Ito, A. Oliveira, R. Robles & fishermen. ANSP 194988, 18, 41.1–102.8 mm SL, rio Xingu, *ca*. 50 m off right bank of main channel *ca*. 1 km downstream of Porto de Moz, 01°44'42.4"S 52°14'53.9"W, 24 Sep 2013, M. H. Sabaj, A. Gonçalves, N. K. Lujan, D. B. Fitzgerald, P. Madoka Ito, A. Oliveira, R. Robles & fishermen. ANSP 195292, 2, 94.0–116.0 mm SL, rio Xingu, along left bank, *ca*. 10.4 km southwest of Senador José Porfírio, 02°38'54.3"S 52°01'41.9"W, 7 Mar 2014, M. Arce, A. P. Gonçalves, J. A. S. Zuanon, D. B. Fitzgerald, R. Robles, D. R. G. Ribeiro, L. M. Sousa & fishermen D. R. Costa (Dani), D. R. Costa (Ronca), N. S. Balão (Nelson) & A. S. Oliveira (Tonho). ANSP 195384, 9, 44.6–116.0 mm SL, rio Xingu, along right bank of major right braid, directly in front of Tapará village, *ca*. 14.5 km northeast (downstream) of Porto de Moz, 01°38'36.6"S 52°10'13.0"W, 5 Mar 2014, M. Arce, A. P. Gonçalves, J. A. S. Zuanon, D. B. Fitzgerald, R. Robles, D. R. G. Ribeiro, L. M. Sousa & fishermen D. R. Costa (Dani), D. R. Costa (Ronca), N. S. Balão (Nelson) & A. S. Oliveira (Tonho). AUM 74486, 4, 51.6–83.5 mm SL, same data as ANSP 194643. INPA-ICT 31472, 63, 38.26–107.33 mm SL, collected with holotype. INPA-ICT 40457, 16, 38.8–80.6 mm SL, Anapu, 03°28'20"S 51°11'52"W, 20 Sep 2013, M. Hardman, A. S. Oliveira, P. M. Ito, V. Machado, D. B. Fitzgerald, A. P. Gonçalves, L. M. Sousa & M. Sabaj-Péres. INPA-ICT 40502, 17, 42.6–85.3 mm SL, Senador José Porfírio, 02°35'27"S 51°57'15"W, 21 Sep 2013, D. R. G. Ribeiro, D. B. Fitzgerald, A. P. Gonçalves, M. Arce, D. Bastos, L. Rapp Py-Daniel, Dani & M. Sabaj-Péres. INPA-ICT 40494, 8, 34.3–54.8 mm SL, Anapu, 03°28'20"S 51°11'52"W, 21 Sep 2013, R. R. Reyes, D. B. Fitzgerald, A. P. Gonçalves, M. Arce, D. Bastos, L. Rapp Py-Daniel, L. M. Sousa, Dani & M. Sabaj-Péres. INPA-ICT 40520, 10, 35.8–101.0 mm SL, Vitória do Xingu, 02°52'48"S 52°00'36"W, 22 Sep 2013, A. R. Martins, D. R. G. Ribeiro, R. R. Reyes, D. B. Fitzgerald, J. Zuanon, M. Arce, A. P. Gonçalves, M. Sabaj-Péres. INPA-ICT 40533, 6, 31.6–55.4 mm SL, Vitória do Xingu, 02°52'48"S 52°00'36"W, 22 Sep 2013, A. R. Martins, D. R. G. Ribeiro, R. R. Reyes, D. B. Fitzgerald, J. Zuanon, M. Arce, A. P. Gonçalves & M. Sabaj-Péres. INPA-ICT 40614, 1, 68.5 mm SL, Porto de Moz, 01°44'54"S 52°14'18"W, 23 Sep 2013, A. R. Martins, D. R. G. Ribeiro, R. R. Reyes, D. B. Fitzgerald, J. Zuanon, M. Arce, A. P. Gonçalves, M. Sabaj-Péres. INPA-ICT 40739, 10, 34.1–70.5 mm SL, Porto de Moz, 01°44'54"S 52°14'18"W, 25 Sep 2013, A. R. Martins, D. R. G. Ribeiro, R. R. Reyes, D. B. Fitzgerald, J. Zuanon, M. Arce, A. P. Gonçalves & M. Sabaj-Péres. INPA-ICT 40747, 18, 54.0–90.3 mm SL, Porto de Moz, 01°44'54"S 52°14'18"W, 24 Sep 2013, A. R. Martins, D. R. G. Ribeiro, R. R. Reyes, D. B. Fitzgerald, J. Zuanon, M. Arce, A. P. Gonçalves & M. Sabaj-Péres. INPA-ICT 40843, 15, 31.8–66.0 mm SL, Anapu, 03°28'20"S 51°11'52"W, 1 Oct 2013, A. R. Martins, D. R. G. Ribeiro, R. R. Reyes, D. B. Fitzgerald, J. Zuanon, M. Arce, A. P. Gonçalves & M. Sabaj-Péres. INPA-ICT 43082, 4, 47.6–89.5 mm SL, Senador José Porfírio, 02°35'27"S 51°57'15"W, 27 Oct

2140, A. R. Martins, D. R. G. Ribeiro, R. R. Reyes, D. B. Fitzgerald, J. Zuanon, M. Arce, A. P. Gonçalves & M. Sabaj-Péres. INPA-ICT 43152, 1, 96.0 mm SL, Senador José Porfírio, 02°35'27"S 51°57'15"W, 3 Mar 2014, L. M. Sousa, M. Sabaj-Péres, A. S. Oliveira & P. M. Ito. INPA-ICT 43213, 7, 62.5–113.3 mm SL, Porto de Moz, 01°44'54"S 52°14'18"W, 4 Mar 2014, L. M. Sousa, D. Fitzgerald, A. S. Oliveira, P. M. Ito, N. Lujan, R. Robles, V. Vargas & M. Sabaj-Péres. INPA-ICT 43249, 7, 61.6–77.0 mm SL, Porto de Moz, 01°44'54"S 52°14'18"W, 5 Mar 2014, L. M. Sousa, D. Fitzgerald, A. S. Oliveira, P. M. Ito, N. Lujan, R. Robles, V. Vargas & M. Sabaj-Péres. INPA-ICT 43260, 8, 2.1–84.5 mm SL, Porto de Moz, 01°44'54"S 52°14'18"W, 5 Mar 2014, L. M. Sousa, D. Fitzgerald, A. S. Oliveira, P. M. Ito, N. Lujan, R. Robles, V. Vargas & M. Sabaj-Péres. INPA-ICT 43295, 3, 46.5-65.0 mm SL, Porto de Moz, 01°44'54"S 52°14'18"W, 6 Mar 2013, L. M. Sousa, D. Fitzgerald, A. S. Oliveira, P. M. Ito, N. Lujan, R. Robles, V. Vargas, M. Sabaj-Péres. INPA-ICT 43334, 2, 80.1–102.6 mm SL, Porto de Moz, 01°44'54"S 52°14'18"W, 7 Mar 2014, L. M. Sousa, D. Fitzgerald, A. S. Oliveira, P. M. Ito, N. Lujan, R. Robles, V. Vargas & M. Sabaj-Péres. INPA-ICT 43546, 2, 48.8–50.9 mm SL, Altamira, 03°12'12"S 52°12'23"W, 13 Mar 2014, L. M. Sousa, D. Fitzgerald, A. S. Oliveira, P. M. Ito, N. Lujan, R. Robles, V. Vargas & M. Sabaj-Péres. INPA-ICT 43229 (same data as INPA-ICT 43213), 6, 70.8–107.0 mm SL, Porto de Moz, 01°44'54"S 52°14'18"W, 4 Mar 2014, L. M. Sousa, D. Fitzgerald, A. S. Oliveira, P. M. Ito, N. Lujan, R. Robles, V. Vargas & M. Sabaj-Péres. LIA 0021, 1, 61.4 mm SL, Belo Monte, 03°07'45"S 51°39'56"W, 28 Sep 2012, D. Bastos. LIA 5098, 5, 75.3–88.1 mm SL, rio Xingu, off right bank, *ca*. 1 km northwest of Porto do Moz, 01°44'42"S 52°14'54"W, 14 Nov 2014, M. H. Sabaj, L. M. Sousa & fishermen D. R. Costa (Dani), D. R. Costa (Ronca), N. S. Balão (Nelson) & A. S. Oliveira (Tonho). LIA 5105, 7, 75–113.9 mm SL, rio Xingu, off right bank, *ca*. 1 km northwest of Porto do Moz, 01°44'42"S 52°14'54"W, 14 Nov 2014, M. H. Sabaj, L. M. Sousa & fishermen D. R. Costa (Dani), D. R. Costa (Ronca), N. S. Balão (Nelson) & A. S. Oliveira (Tonho). LIA 5118, 2, 72.8–106.49 mm SL, rio Xingu, off right bank *ca*. 3 km north-northwest of Porto do Moz, 01°43'53"S 52°15'20"W, 14 Nov 2014, M. H. Sabaj, L. M. Sousa & fishermen D. R. Costa (Dani), D. R. Costa (Ronca), N. S. Balão (Nelson) & A. S. Oliveira (Tonho). LIA 5122, 2, 99.9 mm SL, rio Xingu, off right bank *ca*. 3 km north-northwest of Porto do Moz, 01°43'53"S 52°15'20"W, 14 Nov 2014, M. H. Sabaj, L. M. Sousa & fishermen D. R. Costa (Dani), D. R. Costa (Ronca), N. S. Balão (Nelson) & A. S. Oliveira (Tonho). LIA 5146, 19, 62.9–103.43 mm SL, rio Xingu, off upstream end of island, downstream of campsite 7, *ca*. 3.5 km northwest (downstream) of BR-230 ferry crossing on left bank (Belo Monte II), 03°06'19"S 51°43'28"W, 19 Nov 2014, M. H. Sabaj, L. M. Sousa & fishermen D. R. Costa (Dani), D. R. Costa (Ronca), N. S. Balão (Nelson) & A. S. Oliveira (Tonho). LIA 5153, 3, 34.2–67.37 mm SL, rio Xingu, off right bank at confluence of three major braids, just upstream of campsite 7, 03°07'45"S 51°39'55"W, 19 Nov 2014, M. H. Sabaj, L. M. Sousa & fishermen D. R. Costa (Dani), D. R. Costa (Ronca), N. S. Balão (Nelson) & A. S. Oliveira (Tonho). LIA 5161, 5, 62.3–80.2 mm SL, rio Xingu, off right bank *ca*. 20 km southeast of Vitória do Xingu, 02°58'51"S 51°51'32"W, 20 Nov 2014, M. H. Sabaj, L. M. Sousa & fishermen D. R. Costa (Dani), D. R. Costa (Ronca), N. S. Balão (Nelson) & A. S. Oliveira (Tonho). LIA 6305, 2, 46.7–51.1 mm SL, rio Xingu, rock pile in channel, 03°07'45"S 51°39'55"W, 29 Aug 2016, L. M. Sousa. LIA 6863, 5, 62.6–116.54 mm SL, Senador José Porfírio, Pedral in front of Itaubinha, 02°53'19"S 51°56'20"W, 8 Oct 2017, L. M. Sousa.

Diagnosis. *Hypancistrus seideli* is distinguished from all congeners by its color pattern, having head, body and fins with alternating dark and pale vermiculations (*vs*. tan background color with irregular brown blotches in *H. yudja* and small dark spots in *H. phantasma*; dark background color with pale spots in *H. contradens*, *H. inspector*, *H. lunaorum*, *H. margaritatus*, and *H. vandragti* or with pale lines and spots in *H. debilittera*; body with pattern of alternating light and dark broad wavy bars in *H. furunculus*; and white background color with black straight stripes in *H. zebra*). It can be further distinguished from *H. debilittera* by the number of bars on fins (6 to 10 in *H. seideli* and 3 to 4 in *H. debilittera*).

Description. Morphometric and meristic data presented in Tab. 2. Medium-sized loricariid, largest specimen measuring 117 mm SL. Body short and deep with deepest point at supra-occipital (17–36% SL), becoming gradually slender after dorsal fin base. Head deep, snout short. In lateral view, dorsal profile convex, rising as straight line from snout to nares, becoming gently curved from that point of the end of head, then gradually declining to the end of caudal peduncle. Ventral profile straight from snout tip to pelvic-fin insertion, then ascending gradually to insertion of first caudal-fin ray. Greatest width of body at cleithrum (29–36% SL). Head somewhat short (32–42% SL), without ridges or carinae.

Head and snout completely covered by plates with odontodes. Hypertrophied odontodes on cheek plates relatively few, completely exposed and partly set in depression anterodorsally to cleithrum. Eye large, laterodorsal; orbit round and distinctly elevated; dorsal rim of orbit surpassing level of dorsal most portion of frontal bones.

Parieto-supraoccipital process short, bearing a small dorsal crest and limited posteriorly by set of predorsal plates arranged as one disjunct pair, followed by one or two closely attached pairs plus one single plate immediately anterior to dorsal-fin spinelet.

Oral disk circular, lips almost completely covered with small round papillae (papillae larger on proximal region of lower lip); lips smooth near maxillae. Lower lip large but not reaching pectoral girdle. Maxillary barbel moderate, larger than orbital diameter, mostly free from lower lip. Premaxillary teeth thin, delicate and bifurcated; mesial cusp larger, lateral cusp reaching mid portion of mesial cusp. Premaxillary teeth 5–18, two to three times smaller than dentary teeth; tooth crown bright red. Dentary with fewer teeth than premaxillary (1–9), similar in shape but considerably more robust. Dentary tooth rows arranged in approx. 90°angle. Branchial opening small. Interbranchial distance 15–25% HL.

Lateral line with 19–25* plates, four* to five plates between dorsal and adipose fins, 8–11 plates (10*) between anal and caudal fins. Body not carinate or keeled. Caudal peduncle deep and covered by five series of plates. All body plates covered by strong odontodes. Ventral surface largely naked from snout to anal-fin insertion; pectoral, thoracic and pre-anal areas with few small, scattered plates bearing odontodes, especially on larger specimens. Single plate between urogenital opening and anal-fin insertion.

All fin rays supporting odontodes; odontodes more developed on first (undivided) ray. Origin of dorsal fin in anterior third of body, between pectoral and pelvic-fin insertions. Dorsal fin II+7*, short, composed of spinelet, spine, and seven soft, segmented, branched rays. Dorsal-fin spinelet triangular with functional locking mechanism. Dorsal-fin spine with small odontodes along its entire margin. Tip of adpressed dorsal-fin spine

TABLE 2 | Morphometric and meristic data of *Hypancistrus seideli*. N = number of specimens; SD = standard deviation.

	Holotype	N	Range	Mean	SD
Standard length (mm)	98.1	111	29.3–116.5	–	–
Total length (mm)	131.5	108	40.9–150.2	–	–
Percentages of standard length					
Predorsal length	42.7	111	37.8–48.2	41.7	2.1
Head length	36.9	111	32.1–41.7	35.9	1.8
Cleithral width	32.0	111	29.2–36.0	31.9	1.2
Thorax length	23.9	111	20.3–33.3	23.8	1.4
Pectoral-spine length	31.1	111	27.4–39.1	33.0	1.9
Abdominal length	24.2	111	18.8–28.1	23.7	1.4
Pelvic-spine length	26.2	111	23.2–33.8	27.5	2.1
Postanal length	32.1	111	15.7–38.6	32.8	2.7
Anal-fin spine length	14.2	111	10.8–29.8	15.5	2.0
Dorsal spine length	30.1	106	24.0–36.3	30.4	2.5
Dorsal-fin base length	30.5	111	25.2–33.1	28.9	1.4
Dorsal-adipose distance	16.1	111	8.4–34.0	14.1	2.4
Caudal penduncle depth	11.6	111	10.0–15.6	11.6	0.8
Adipose-spine length	9.0	111	5.7–14.3	9.1	1.1
Adipose-caudal length	6.4	111	2.0–12.6	6.9	2.3
Body depth at dorsal-fin origin	26.4	111	3.6–28.9	23.4	3.0
Body width at dorsal-fin origin	29.4	111	23.0–31.6	27.7	1.7
Body width at anal-fin origin	18.2	111	10.1–29.6	15.5	2.1
Post dorsal length	35.2	111	24.8–39.7	32.1	3.1
Percentages of head length					
Orbital diameter	7.6	111	6.9–10.8	8.7	0.9
Snout length	13.8	111	4.3–15.3	13.2	1.1
Internares width	4.5	111	3.2–5.8	4.1	0.4
Interorbital width	11.5	111	8.8–12.7	10.5	0.9
Head depth	23.4	111	17.3–36.0	21.8	2.1
Dentary length	4.8	111	2.6–7.4	4.5	0.9
Premaxillary length	3.2	111	2.2–5.9	3.2	0.5
Head width	31.0	111	27.0–33.8	30.8	1.3
Eye-nare length	4.1	111	2.3–5.3	3.4	0.5
Interbranchial distance	20.2	111	14.9–24.9	18.9	2.1
Meristics	**Holotype**	**N**	**Range**	**Mode**	
Teeth on premaxilla	10	111	5–18	11	
Teeth on dentary	6	111	1–9	6	
Lateral plates in middle series	25	111	19–25	23	
Plates between anal and caudal	10	111	8–11	10	
Plates between dorsal and adipose	4	111	4–5	4	
Plates predorsal	4	111	3–5	4	
Dorsal-fin branched rays	7	111	6–7	7	
Pectoral-fin branched rays	6	111	5–6	6	
Ventral-fin branched rays	5	111	5–6	5	
Anal-fin branched rays	4	111	3–5	4	
Caudal-fin branched rays	14	111	13–14	14	

reaching preadipose plate; membrane between last dorsal-fin ray and body absent. Four* to five plates separating dorsal and adipose fins. Adipose fin well developed, its base containing 5–6 plates; preadipose plate present. Adipose fin with strong spine bearing small odontodes on its entire surface, its distal tip reaching first caudal-fin procurrent ray. Pectoral fin with spine and 6–7 soft, segmented, branched rays (I+6*–7). Tip of adpressed pectoral fin reaching proximal half of pelvic fin. Pelvic fin with first ray thickened and unbranched and 5–6 branched rays (i+5*–6). Pelvic-fin tip slightly surpassing posterior end of anal-fin base. Anal fin with i+3–5 rays (4*). Caudal fin lunate with i+13–14+i rays, the dorsal and ventralmost thickened, unbranched and bearing small odontodes; lower lobe slightly longer than upper lobe.

Color in alcohol. Body, head and fins with alternated dark and pale wavy lines. Number and shape of pale lines vary ontogenetically and geographically. In juveniles, the light lines are relatively thick, less wavy and sometimes interrupted, leaving a sequence of light blotches on the body. In large specimens the lines are thinner, more numerous and frequently collapsed, forming a reticulate or alveolar pattern. Individuals of a same population may exhibit highly variable patterns of vermiculation (Fig. 6). The frequency of these color types may vary along the longitudinal distribution of the species.

FIGURE 6 | Variation in color patterns of *Hypancistrus seideli* collected along the distributional range of the species in rio Xingu. Specimens not preserved. Scale bars = 1 cm.

Color in life. Similar to color in alcohol but more contrasting, with pale lines varying from white to yellowish, sometimes even pinkish.

Sexual dimorphism. *Hypancistrus seideli* presents the same secondary sex characteristics described for *H. yudja*, with males presenting hypertrophied odontodes on cheeks, pectoral spine and all body plates. The males also have a slimmer body but grow larger than females, with head proportionally larger. Females present a rounder body in dorsal view (more noticeable in gravid individuals). Sex dimorphism in *H. seideli* was extensively discussed in Reis *et al*. (2022).

Geographical distribution. *Hypancistrus seideli* occurs throughout the lower Xingu channel from the extreme downstream portion of Volta Grande do Xingu to the river's confluence with the rio Amazonas (Fig. 3). Populations of *Hypancistrus* resembling *H. seideli* are found in the downstream portion of other clearwater tributaries of rio Amazonas, and their taxonomic status remains under study.

Ecological notes. *Hypancistrus seideli* occupies the broadest range of habitats known for the genus. The known depth range varies from <1 to 40 m, and the rocks they inhabit vary from granitoid boulders to sedimentary rocks (*e.g*., sandstones) of all shapes and sizes (Fig. 7). They can occur in strong currents at the downstream end of Volta Grande do Xingu (Middle Xingu), as well as in slow-flowing conditions in the Lower Xingu mouth bay (*i.e*., ria).

FIGURE 7 | *Hypancistrus seideli* in natural habitat near Vitória do Xingu (Xingu Ria), resting between granitoid rocks at a depth of about 8 m.

Remarks. *Hypancistrus seideli* is a difficult species to diagnose using traditional taxonomic criteria, including its (conspicuous) color pattern. Its phenotypic plasticity spans an astonishing array of color patterns, many of which are recognized and named as varieties in the aquarium trade. Some morphotypes are slender with elongated caudal-fin lobes (*e.g.*, L66) while other forms are stouter-bodied and with a somewhat truncated caudal fin (*e.g.*, L333). Several intermediate forms exist, each one with an individual L code number (Haagensen, 2014).

Popular name. Acari-pão (Portuguese); King Tiger Pleco, Golden King Tiger, (English); L66, L236, L287, L333, L399, L400 (and perhaps some other L code numbers).

Etymology. A patronym honoring Ingo Seidel, a renowned German aquarist whose decades of dedication to the care, understanding, and breeding of *Hypancistrus* species in captivity have made him a global authority. Ingo's vast contributions to the knowledge of *Hypancistrus* (and other loricariid genera) through numerous books and lectures have significantly advanced the aquarium hobby, particularly in the realm of pleco breeding. This species is named in recognition of his unwavering passion and invaluable contributions to the field.

Conservation status. *Hypancistrus seideli* is widespread throughout the entire Lower Xingu channel from the extreme downstream portion of Volta Grande do Xingu to the river's confluence with the rio Amazonas. The species occupies slow moving stretches of the river and probably will not be negatively affected by the Belo Monte dam. Their adaptability is shown by the presence of an introduced population near the town of Altamira that became established after the release of captive specimens by aquarium fish traders some years ago. Populations of this species currently face no identified imminent threats, which would align with the Least Concern (LC) categorization, as per the criteria established by the International Union for Conservation of Nature (IUCN, 2022).

DISCUSSION

The genus *Hypancistrus* is famous for its diversity of color morphs which hobbyists worldwide have appreciated for a long time (Seidel, Evers, 2005; Seidel, 2008; Camargo *et al*., 2013; Haagensen, 2014; Evers, 2021). Based on the overall body color, most species can be divided into two general patterns: light spots on a dark background (*H. contradens*, *H. inspector*, *H. lunaorum*, *H. margaritatus*, and *H. vandragti*), and alternating dark and light straight or wavy lines (*H. zebra*, *H. furunculus*, and *H. debilittera*). One species, *H. phantasma*, differs from the above patterns by presenting dark spots on a lighter background. Hobbyists have access to large numbers of individuals and distinguish subtle variations in these patterns as separate L-numbers, but a strong correlation between these morphotypes and nominal or undescribed species needs testing (Silva *et al*., 2014). Species-level variation in color patterns of *Hypancistrus* has been difficult to assess and helps motivate the search for new tools to understand purported cases of highly variable species (Mendelson, Shaw, 2012; Endo, Watanabe, 2020).

The three species of *Hypancistrus* from the rio Xingu occupy different habitats within the river's main course. *Hypancistrus zebra* lives in narrow crevices among granitoid boulders, especially straight and flat cracks of rocks situated in relatively shallow places (< 1 to 10 m deep) along nearly 160 km of the channel centered on Volta Grande do Xingu (LMS, pers. obs.). *Hypancistrus yudja* inhabits lateritic encrustations in deeper places (15 to 40 m) of an even shorter (75 km) stretch of the Volta Grande. Small cave-like shelters are formed in these encrustations when encrusted pebbles wash out, providing tight spaces that are occupied by this small-sized species. The color pattern of *H. yudja* composed of roundish and irregular blotches may match the alternating dark and light colors of pebbles and gravels bound to the laterite matrix. *Hypancistrus yudja* and *H. zebra* are sympatric at some localities but not entirely syntopic, occupying different rock formations at separate depths. In contrast, *H. seideli* inhabits a great range of depths from <1 to 40 m and ornamental fishermen report their occurrence below 40 m. *Hypancistrus seideli* also occupies variable formations of granitoid or sedimentary rocks in a range of currents, which may contribute to the morphological variation observed along its geographical range. Generalist species that occupy a wide range of habitats often exhibit higher phenotypic variation (Dickman, 1996; Dewitt, Langerhans, 2004). On the other hand, *H. zebra* exhibits little variation and has perhaps the most striking and consistent color pattern within Loricariidae: bold black stripes on a milky white background. Variation in chromosome morphology and the organization and distribution of repetitive sequences is well studied in loricariids (Ayres-Alves *et al*., 2017; Favarato *et al*., 2017). It has been suggested that genetic mechanisms, environmental factors and behavioral characteristics of the organisms may act as triggers for the origin and fixation of polymorphisms in the heterochromatic regions of chromosomes (Gross *et al*., 2010; Silva *et al*., 2014). For instance, the astounding variation in body pigmentation pattern of *H. seideli* may have a high adaptive value by impairing the formation of an accurate search image by visually oriented predators, a hypothesis that needs to be tested.

The conservation of all three species must consider their distinctive genetics, ecology and geographic distribution. *Hypancistrus zebra* and *H. yudja* have limited distributions that occur entirely within the area impacted by the Belo Monte Hydroelectric Dam Complex (Winemiller *et al*., 2016; Fitzgerald *et al*., 2017, 2018; Tófoli *et al*., 2017). For *H. seideli* the scenario is different as this fish has a relatively large distribution, occurring naturally from the lowermost Volta Grande do Xingu to Porto de Moz, and is well adapted to a variety of currents, substrates and depths.

Identification key to *Hypancistrus* species

1a. Body with pale blotches or spots on a dark background.. 2
1b. Body color pattern different from above.. 5
2a. Pale marks on head much smaller than on body .... *H. inspector*
2b. Pale marks on head and body of similar size 3
3a. Pale marks equal to or larger than diameter of orbit ....*H. contradens*
3b. Pale marks smaller than diameter of orbit 4
4a. Pale marks similar in size to that of nasal aperture.............................. *H. margaritatus*
4b. Pale marks less than half the size of nasal aperture.................................. *H. lunaorum*
5a. Color pattern with dark spots, blotches or stripes on pale background 6
5b. Color pattern with pale lines or bars on dark background..................................... 8
6a. Body milky white with wide oblique black bars on head and longitudinal stripes on body...*H. zebra*
6b. Body tan with dark spots or blotches 7
7a. Body with small dark isolated spots... *H. phantasma*
7b. Body with irregular dark-brown blotches, some coalescing to form large sinuous bars or saddles ....*H. yudja*
8a. Body covered with relatively few broad and wavy bars that alternate between dark and pale and are of similar widths ....*H. furunculus*
8b. Body covered with pale wavy lines that are distinctly thinner than the dark adjacent areas 9
9a. Body with many alternating dark and pale sinuous lines that are frequently anostomosed or interrupted into irregularly shaped bars; dorsal, pelvic and caudal fins with 6 to 10 dark bands similar in width to intervening pale bands ....*H. seideli*
9b. Body dark with few thin pale lines that are sometimes interrupted and reduced to small isolated spots; dorsal, pelvic and caudal fins with 3 to 4 dark bands that are distinctly wider than intervening pale bands .... *H. debilittera*

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