

Description of a new species of *Moenkhausia* (Characiformes: Acestrorhamphidae) from tributaries of rio Tapajós basin at Serra do Cachimbo, Pará State, Brazil

Correspondence:
Priscila Camelier
pricamelier@gmail.com

 Priscila Camelier¹ and  Manoela Maria Ferreira Marinho²

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A new species of *Moenkhausia* is described from a tributary of the rio Teles Pires, upper rio Tapajós basin, Serra do Cachimbo, Pará State, Brazil. The new species is diagnosed by a distinctive body coloration pattern consisting of dark blotches on the anterior portion of scales of the second to seventh longitudinal series, a conspicuous horizontally elongate, drop-shaped blotch on the caudal peduncle, and a unique eye coloration in life, with the dorsal portion of the iris reddish and the ventral portion bright golden, as well as five or six branched pelvic-fin rays. The new species is morphologically similar to a group of Amazonian congeners that share unusual body coloration and colored eyes in life, all of which exhibit restricted distributions associated with upland areas of the Brazilian crystalline shield. This new taxon represents the fifth species of this putative group described from the Serra do Cachimbo, whose members are likely endemic to the region, indicating that the Serra do Cachimbo may represent an important region of endemism for small-bodied freshwater fishes and underscoring the need for continued taxonomic and biogeographic studies in Amazonian shield headwaters.

Keywords: Amazon, Color pattern, Endemism, Teles Pires River, Taxonomy.

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¹ Programa de Pós-Graduação em Biodiversidade e Evolução, Instituto de Biologia, Universidade Federal da Bahia, Rua Barão de Jeremoabo, 147, Ondina, 40170-115, Salvador, BA, Brazil. pricamelier@gmail.com (corresponding author).

² Laboratório de Zoologia, Instituto de Biociências, Universidade Federal de Mato Grosso do Sul, Bairro Universitário, 79070-900, Campo Grande, MS, Brazil. manoela.marinho@ufms.br.

Uma nova espécie de *Moenkhausia* é descrita de um tributário do rio Teles Pires, bacia do alto rio Tapajós, Serra do Cachimbo, Estado do Pará, Brasil. A nova espécie é diagnosticada por um padrão de colorido distinto do corpo, que consiste em manchas escuras na porção anterior das escamas da segunda à sétima série longitudinal, uma mancha conspícua, alongada horizontalmente e em forma de gota no pedúnculo caudal, coloração única dos olhos em vida, com a porção dorsal da íris avermelhada e a porção ventral dourada brilhante, além de cinco ou seis raios ramificados na nadadeira pélvica. A nova espécie é morfológicamente semelhante a um grupo de congêneres amazônicos que compartilham o padrão de colorido incomum do corpo e olhos coloridos em vida, todas com distribuição restrita a áreas de planalto do escudo cristalino brasileiro. Este novo táxon representa a quinta espécie deste suposto grupo descrita da Serra do Cachimbo, cujos membros são provavelmente endêmicos da região, indicando que a Serra do Cachimbo pode representar uma importante região de endemismo para peixes de água doce de pequeno porte e ressaltando a necessidade de estudos taxonômicos e biogeográficos contínuos nas cabeceiras do escudo amazônico.

Palavras-chave: Amazônia, Endemismo, Padrão de colorido, Rio Teles Pires, Taxonomia.

INTRODUCTION

Moenkhausia Eigenmann, 1903 is among the three most species-rich genera within the Characiformes order (Dagosta, de Pinna, 2019; Marinho *et al.*, 2021), with slightly more than 80 valid species that are widely distributed in the Neotropical Region, predominantly inhabiting the Amazon basin (Fricke *et al.*, 2026). Molecular and morphological phylogenetic hypotheses of Acestrorhamphidae (whose members were until recently included in the former Characidae) have consistently indicated *Moenkhausia* as polyphyletic (*e.g.*, Mirande, 2010, 2019; Oliveira *et al.*, 2011; Mariguela *et al.*, 2013; Ferreira *et al.*, 2024), with less inclusive groups of species recovered as monophyletic. Although widely regarded as an artificial group, new species continue to be described under Eigenmann's concept of *Moenkhausia* (*e.g.*, Marinho *et al.*, 2021; Marinho, Dagosta, 2023; Reia *et al.*, 2024; Silva *et al.*, 2025), which is the presence of the combination of two premaxillary teeth rows, the inner teeth row with five multicuspid teeth, complete lateral line, and caudal fin partially covered by small scales (Eigenmann, 1917).

Notably, *Moenkhausia* has a significant number of species recently described, with 24 (about 30% of its diversity) species described in the last decade, of which half were described with specimens collected in the "South American Characiformes Inventory" project (SACI). SACI (2011–2017) was a large-scale collaborative project focused on advancing the taxonomic and systematic knowledge of South American characiform fishes, integrating extensive field sampling in poorly collected regions with the sampled material deposited in major ichthyological collections, and combining morphological

and molecular data to support taxonomic, phylogenetic, and biogeographic research. According to Marinho *et al.* (2019), the project brought together 34 participants from 17 institutions and conducted eight expeditions across Amazonian drainages (Brazil and Peru) and small coastal drainages of the Atlantic Forest, resulting in the processing of more than 31,000 specimens (3,500 lots) representing 972 species, with tissue samples obtained for many taxa. More than 60 new taxa have been described based on material collected by SACI, and several of these taxonomic outputs were compiled in a dedicated issue of Neotropical Ichthyology (see <https://www.ni.bio.br/v12n2/>).

During the latest expedition of this project, individuals of an undescribed species of *Moenkhausia* were collected in a tributary stream of the rio Teles Pires drainage that drains the Serra do Cachimbo, upper rio Tapajós basin, Amazon basin, Brazil. The new species described here represents one of the taxonomic outcomes resulting from this collaborative effort.

MATERIAL AND METHODS

Morphometrics and meristics follow Fink, Weitzman (1974), except by the horizontal scale rows below the lateral line, counted to the pelvic-fin origin, and by posterior unbranched fin rays, which, besides the typical anteriormost unbranched rays, smaller unbranched rays that is eventually present posteriorly to the branched rays were counted separated from the later and are indicated as roman numerals (in the new species, they are present at the dorsal and pelvic fins), and with addition of distance from pelvic-fin origin to anal-fin origin. In the description, counts are followed by their absolute occurrence in parentheses. An asterisk indicates the count of the holotype. Standard length (SL) is expressed in millimeters (mm); other measurements are expressed as percentages of SL, except for subunits of the head, which are expressed as percentages of head length. Counts of supraneurals, branchiostegal rays, gill-rakers of first branchial arch, tooth cusps, small dentary teeth, unbranched anal-fin rays, procurent caudal-fin rays, and position of pterygiophores were taken from cleared and stained (c&s) specimens prepared according to Taylor, Van Dyke (1985). Vertebrae of the Weberian apparatus were counted as four elements and the compound caudal centra (PU1+U1) as a single element. The pattern of *circuli* and *radii* was examined on scales sampled from the region between the lateral line and the origin of the dorsal fin. Color in life was taken on freshly collected material. Catalog numbers are followed by the number of specimens in alcohol and the SL range, and if any, the number of c&s specimens and their SL range or the presence of a tissue sample from specimens directly preserved in alcohol without fixation in formalin (mol). Institutional abbreviations follow Fricke, Eschmeyer (2026), with inclusion of the tissue collection of the Museu de Zoologia da Universidade de São Paulo (MZict).

RESULTS

Moenkhausia nanah, new species

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(Figs. 1–4; Tab. 1)

Holotype. MZUSP 127625, 37.3 mm SL, Brazil, Pará State, Municipality of Novo Progresso, stream tributary of rio Inhandu, near to the locality “Olho da Xuxa”, rio Teles Pires basin, upper rio Tapajós basin, 09°29'12.5"S 55°08'12.9"W, 384 m above sea level, 17 Oct 2017, M. M. F. Marinho, O. T. Oyakawa, P. Camelier & R. Burger.



FIGURE 1 | Holotype of *Moenkhausia nanah*, MZUSP 127625, 37.3 mm SL, Brazil, Pará State, Novo Progresso, stream tributary of rio Inhandu, near to the locality “Olho da Xuxa”, rio Teles Pires basin, upper rio Tapajós basin.



FIGURE 2 | Paratype of *Moenkhausia nanah*, freshly preserved, MZUSP 124117, 33.6 mm SL, collected with the holotype.

Paratypes. INPA-ICT 62733, 5, 31.0–40.6 mm SL; MCP 56128, 5, 30.7–45.4 mm SL; MZUSP 124117, 106, 14.2–48.6 mm SL, 2 c&s, 34.1–36.2 mm SL, 2 mol (MZict 8885 and MZict 8886); ZUFMS 10126, 10, 26.5–40.3 mm SL, collected with the holotype.

Diagnosis. *Moenkhausia nanah* is distinguished from all congeners, except *Moenkhausia cambacica* Marinho, Ohara & Dagosta, 2021, *M. chlorophthalma* Sousa, Netto-Ferreira & Birindelli, 2010, *M. parecis* Ohara & Marinho, 2016, *M. petymbuaba* Lima & Birindelli, 2006, *M. plumbea* Sousa, Netto-Ferreira & Birindelli, 2010, and *M. solaris* Silva, Santana & Marinho, 2025 by the presence of a dark blotch on scales of the second to seventh longitudinal series of body, which are formed by a higher concentration of chromatophores on the anterior portion of scales (*vs.* pigmentation absent or, when present, concentrated at the middle or posterior margin of scales, forming stripes or a reticulate pattern, as in *M. sanctaefilomenae* species group). The new species can be distinguished from all aforementioned species, except *M. plumbea*, by having five or six branched pelvic-fin rays (*vs.* seven). It can be distinguished from *M. plumbea* and, additionally, from *M. chlorophthalma* and *M. petymbuaba*, by the absence of a conspicuous longitudinal dark stripe on body (*vs.* dark stripe present). Additionally, *Moenkhausia nanah* is distinguished from all aforementioned species by having the upper portion of iris markedly red in life (*vs.* eyes crossed by a longitudinal dark stripe without red pigmentation in *M. cambacica* and *M. plumbea*, green in *M. chlorophthalma*, blue in *M. parecis*, mostly green with some red in *M. petymbuaba*, and dark in *M. solaris*).

Description. Morphometric data of the holotype and paratypes presented in Tab. 1. Largest examined specimen 48.6 mm SL. Body laterally compressed, moderately deep. Greatest body depth at vertical through tip of adpressed pectoral fin. Dorsal profile of head convex from upper lip to vertical through anterior nostrils, slightly convex from that point to the vertical through middle of eye, straight to slightly concave from latter point to tip of supraoccipital spine. Dorsal profile of body slightly convex from tip of supraoccipital spine to dorsal-fin origin, straight along dorsal-fin base, straight from that point to adipose-fin origin, and somewhat straight to slightly concave from adipose fin to origin of anteriormost dorsal procurent caudal-fin ray. Ventral profile of head and body slightly convex from tip of lower jaw to anal-fin origin, straight along anal-fin base, and slightly concave from the terminus of anal fin to origin of anteriormost ventral procurent caudal-fin ray.

Jaws vertically aligned, mouth terminal. Premaxillary teeth in two distinct rows (Fig. 3). Outer row with 3(6), 4*(20), or 5(3) tricuspid teeth. Inner row with 4(2) or 5*(27) teeth bearing three to five cusps. Posterior terminus of maxilla at the vertical through middle of pupil. Maxilla approximately at 45 degrees angle relative to longitudinal axis of body. Maxilla with 2*(20) or 3(9) teeth, with four or five cusps. Dentary with 4*(24) or 5(1) larger teeth decreasing in size posteriorly, with four or five cusps, followed by 6(2) diminute conical to tricuspid teeth. Central median cusp in all multicuspid teeth more developed than remaining lateral cusps. Branchiostegal rays 4(2). First gill arch with 2(2) gill rakers on hypobranchial, 8(2) rakers on ceratobranchial, 1(2) raker on intermediate cartilage, and 5(2) rakers on epibranchial. Infraorbitals 5(2), except in one specimen, which has 6 on the left side and 5 on the right, the latter side showing partial

TABLE 1 | Morphometric data of *Moenkhausia nanah*. Range includes the holotype. N = number of specimens; SD = Standard deviation.

	Holotype	N	Range	Mean	SD
Standard length (mm)	37.3	30	26.5–48.6	34.7	–
Percentage of standard length					
Depth at dorsal-fin origin	30.6	30	27.3–34.1	31.4	1.6
Snout to dorsal-fin origin	56.6	30	54.4–58.7	56.3	1.1
Snout to pectoral-fin origin	27.9	30	25.8–31.1	28.1	1.0
Snout to pelvic-fin origin	48.8	30	47.7–52.9	50.0	1.2
Snout to anal-fin origin	65.1	30	63.4–68.0	65.8	1.2
Caudal-peduncle depth	11.5	30	10.3–12.9	11.5	0.6
Caudal-peduncle length	11.0	30	8.5–13.2	11.3	1.0
Pectoral-fin length	19.3	30	18.9–23.5	21.3	1.0
Pelvic-fin length	13.7	30	13.3–16.9	14.9	1.0
Pelvic-fin origin to anal-fin origin	17.4	30	15.7–18.8	17.3	0.7
Dorsal-fin base length	12.9	30	11.6–14.7	13.1	0.8
Dorsal-fin length	23.9	30	23.9–28.8	26.0	1.2
Anal-fin base length	25.7	30	24.3–26.9	25.6	0.7
Anal-fin length	17.7	30	15.4–21.5	18.2	1.3
Eye to dorsal-fin origin	41.3	30	39.1–42.4	40.8	0.9
Dorsal-fin origin to caudal-fin base	46.6	30	45.1–51.7	48.8	1.8
Head length	32.4	30	27.4–32.4	30.0	1.1
Percentage of head length					
Horizontal eye diameter	29.8	30	27.8–35.2	31.4	2.2
Snout length	25.6	30	24.1–29.6	25.9	1.4
Interorbital width	30.6	30	26.9–34.4	30.6	1.8
Upper jaw length	44.6	30	42.3–50.0	46.3	2.2

fusion of infraorbitals 4 and 5. Nostrils close to each other, anterior opening circular and small, crescent-shaped posterior one, twice in size. Nostrils separated by narrow skin flap.

Scales cycloid, moderately large, with 10 to 17 parallel *radii* from focus to posterior border and several conspicuous *circuli* anteriorly. Lateral line slightly curved downward anteriorly, with 33(3), 34*(13), 35(10), or 36(4) perforated scales continuously from supracleithrum to caudal-fin base. Longitudinal scale rows between dorsal-fin origin and lateral line 5*(26) or 6(4). Longitudinal scale rows between lateral line and pelvic-fin origin 4(2) or 5*(28). Predorsal scales variably arranged. Some specimens with 11(1), 12(4), or 13(2) scales arranged in a median series. Others with anterior portion of predorsal region covered by scales from 1st(14) or 2nd(8) longitudinal scale row, irregularly arranged, followed by single series of 10(8), 11*(11), or 12(3) median scales. Single row of 8(1), 9(3), 10(11), 11(4), or 12*(3) scales covering base of anteriormost anal-fin rays. Axillary scale absent. Horizontal scale rows around caudal peduncle 14(9), 15*(17), or 16(4). Caudal fin with small scales on the basal fourth of caudal-fin lobes.

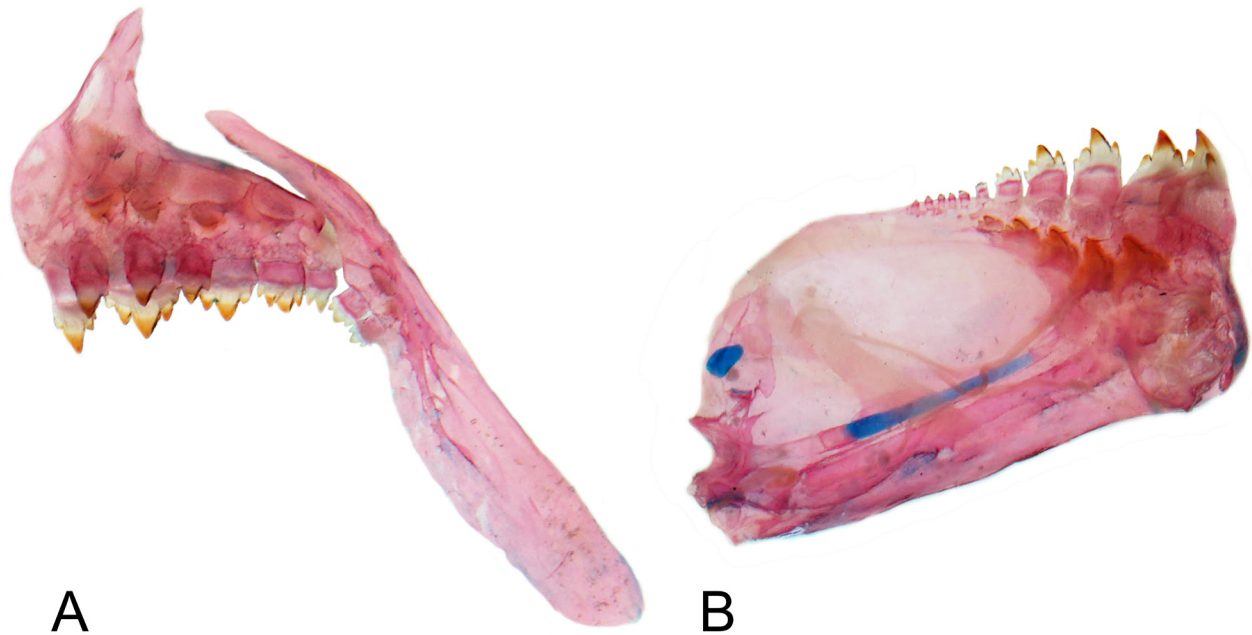


FIGURE 3 | Jaws of *Moenkhausia nanah*, MZUSP 124117, 36.9 mm SL, paratype. Lateral view of upper jaw (A) and medial view of lower jaw (B).

Supraneurals 5(1) or 6(1), without bony lamella. Dorsal-fin rays ii*(30), 9*(27) or 8,i(3). Dorsal-fin origin posterior to vertical through pelvic-fin origin. First dorsal-fin pterygiophore located behind neural spine of 11th(2) vertebra. Base of last dorsal-fin ray slightly anterior to vertical through anal-fin origin or aligned with anal-fin origin. Adipose fin present. Anal-fin rays iv(2), 17(2), 18(13), 19*(14), or 20(1); anteriormost rays longer, subsequent rays gradually decreasing in size. Pectoral-fin rays i*(30), 10*(20) or 11(10). Pelvic-fin rays i*(30), 6*(23) or 5,i(7). Anteriormost anal-fin pterygiophore inserted posterior to haemal spine of 18th(2) vertebra. Principal caudal-fin rays i,8/9,i(1), i,9/7,i(1), i,9/8,i*(25), or i,9/10,i(1); caudal fin forked, lobes somewhat pointed, of similar size. Dorsal procurrent caudal-fin rays 10(2); ventral procurrent caudal-fin rays 9(2). Total vertebrae 35(2); precaudal vertebrae 17(2) and caudal vertebrae 18(2).

Coloration in alcohol. Overall ground coloration pale or yellowish, with small dark chromatophores spread at the entire head and body, densely concentrated in the dorsal portion (Fig. 2). Jaws, opercular, and infraorbital areas pigmented with dark chromatophores. A dark blotch on each scale of the second to seventh longitudinal body series formed by a higher concentration of chromatophores on the anterior portion of scales. Single, dark humeral blotch, vertically oriented, extending two or three scale rows above and one scale row below the lateral line. Middle portion of humeral blotch wider, over three scales horizontally. Ventral portion narrower, spanning over one scale. Some specimens with a vertical pigmented area posterior to the humeral spot. Thin longitudinal dark stripe at horizontal septum, formed by underlying chromatophores extending from vertical through dorsal-fin origin to caudal peduncle.

A conspicuous dark horizontal drop-shaped blotch on the caudal peduncle, usually tapering anteriorly, extending to middle caudal-fin rays, never reaching the upper and lower edges of caudal peduncle. All fins with dark chromatophores scattered along edge of lepidotrichia. Some specimens with concentration of dark chromatophores on distal portions of dorsal and anal fin-rays.

Coloration in life. Dorsal portion of head and body darker than ventral portion. Ventral half of head and body golden yellow (Fig. 4). Middle portion of body greenish anteriorly and light pink posteriorly. Infraorbital and opercular areas reddish, more intense on opercular area. Some specimens retaining guanine on infraorbital, opercular, and gular areas. Edge of lips dark. Dorsal portion of eye red with a bluish-purple line between this part and the iris, ventral portion bright golden with light greenish hue. Humeral blotch inconspicuous in life. Black caudal-peduncle spot conspicuous. All fins with intense orange to yellow coloration. Anal fin and caudal-fin lobes orangish. Posterior tip of caudal, anal, and dorsal fins with concentration of dark chromatophores, more evident at caudal and anal fins. Distal portions of dorsal, anal, pelvic, and caudal fins hyaline.

Sexual dimorphism. No secondary sexually dimorphic characters were found among analyzed specimens.

Geographical distribution. *Moenkhausia nanah* is known only from its type locality, a stream tributary of rio Inhandu, near to the locality “Olho da Xuxa”, rio Teles Pires basin, upper rio Tapajós basin at Serra do Cachimbo, Novo Progresso, Pará State, Brazil (Fig. 5A).

Ecological notes. *Moenkhausia nanah* was collected in a dark water stream (Fig. 5B), running over rocks, organic debris, and sand bottoms, at an altitude of approximately 380 m above sea level, in a habitat characterized by moderate water current. Aquatic macrophytes were present in abundance and the riparian vegetation is mainly composed of herbs, shrubs, and trees. The analysis of stomach contents of two c&s



FIGURE 4 | *Moenkhausia nanah*, live specimen, paratype, MZUSP 124117, 48.6 mm SL, Brazil, Pará State, Novo Progresso, rio Teles Pires basin, upper rio Tapajós basin.

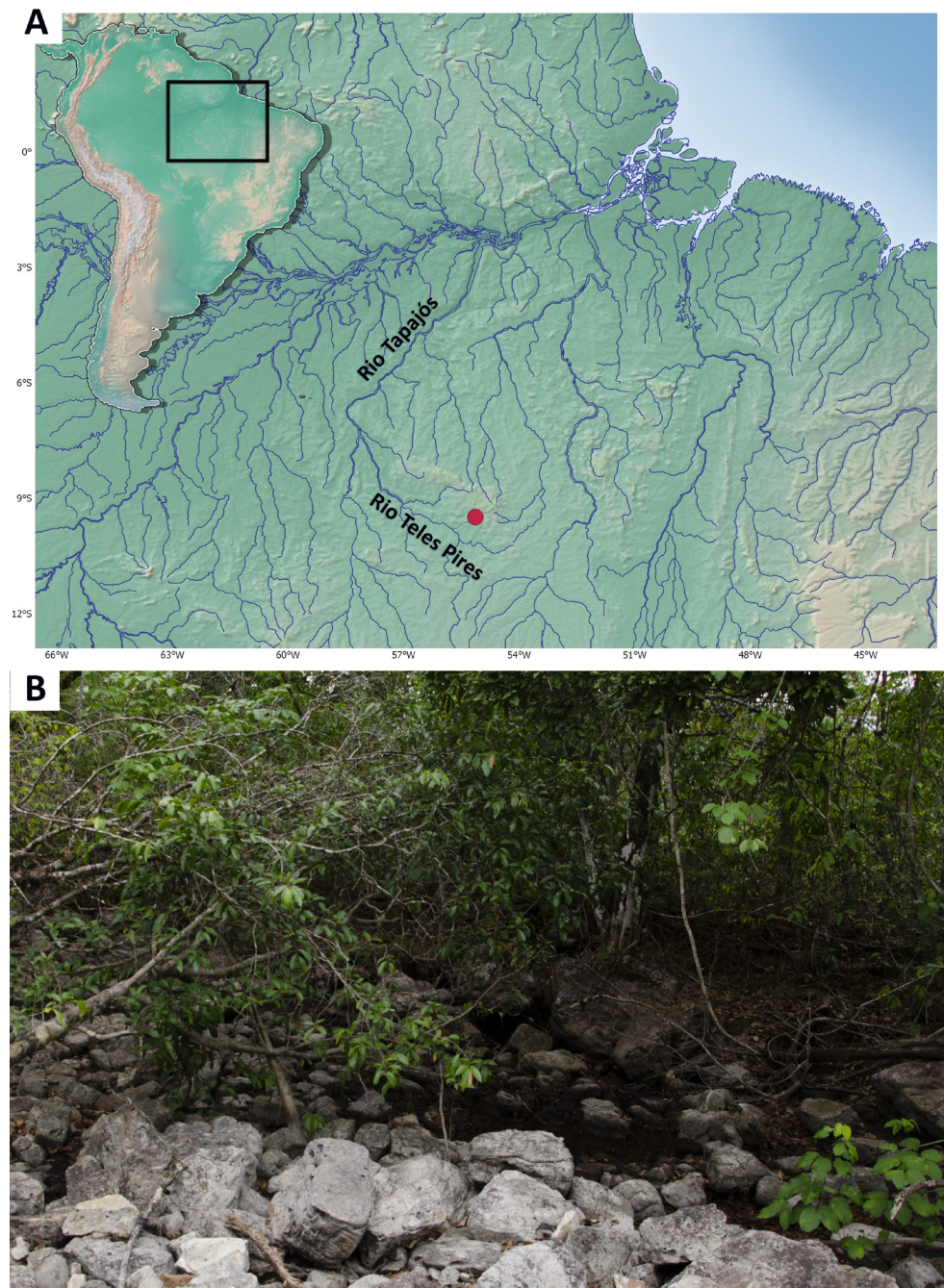


FIGURE 5 | Geographical distribution of *Moenkhausia nanah* (A) and its type-locality, a small stream tributary of the rio Inhandu, rio Teles Pires basin, upper rio Tapajós basin, Pará State, Brazil (B).

specimens (MZUSP 124117, 34.1–36.2 mm SL) revealed the presence of allochthonous and autochthonous items, composed of filamentous algae, fragments of vascular plants, organic debris, nymph of Ephemeroptera, Simuliidae larva (Diptera) and fragments of other insects (Coleoptera and other unidentified orders).

Conservation status. *Moenkhausia nanah* is currently only known from its type locality, a tributary of the rio Inhandu, upper rio Teles Pires basin, rio Tapajós basin, restricted to the Serra do Cachimbo region. Despite its restricted distribution, the area is well preserved, and no identifiable threats have been recorded. Therefore, *Moenkhausia nanah* should be classified as Least Concern (LC) following the International Union for Conservation of Nature (IUCN) categories and criteria (IUCN, 2024).

Etymology. The specific name, *nanah*, is in honour of the esteemed ichthyologist Dr. Naércio Aquino Menezes in recognition of his significant contributions to the knowledge of ichthyofauna. Naércio, who we affectionately call “Naná”, trained many new ichthyologists with respect and kindness and was our PhD advisor. Dr. Menezes also coordinated the “South American Characiformes Inventory” project, which supported the expedition in which the new species was collected. A noun in apposition.

DISCUSSION

The phylogenetic relationships among species currently assigned to *Moenkhausia* remain poorly resolved. Phylogenetic studies have consistently recovered *Moenkhausia* as a polyphyletic group (e.g., Mirande, 2010, 2019; Mariguela *et al.*, 2013), with important consequences for the delimitation and recent reclassification of the genus (see Melo *et al.*, 2024; Silva *et al.*, 2025). Those phylogenetic studies also have recovered less inclusive groups of species as monophyletic. Several of these clades had long been hypothesized as monophyletic based on the shared presence of distinctive color patterns. One example involves a group of species that, until recently, was allocated to *Moenkhausia* but has since been transferred to the genus *Bario* Myers, 1940 by Melo *et al.* (2024). This group, comprising *Bario australis* (Eigenmann, 1908), *B. cosmops* (Lima, Britski & Machado, 2007), *B. forestii* (Benine, Mariguela & Oliveira, 2009), *B. oligolepis* (Günther, 1864), and *B. steindachneri* (Eigenmann, 1893), was also recovered as monophyletic in previous phylogenetic studies (see Mariguela *et al.*, 2013; Mirande, 2019; Ferreira *et al.*, 2024) and recognized by several authors as closely related taxa (e.g., Costa, 1994; Lima, Toledo-Piza, 2001; Lima *et al.*, 2007). These species share a reticulated color pattern of the body, a large dark blotch at the caudal peduncle and caudal-fin basis with a clear area preceding it, and a red pigmentation on the dorsal portion of the eye.

An additional putative monophyletic group, never tested within a phylogenetic framework, includes *Moenkhausia cambacica*, *M. chlorophthalma*, *M. parecis*, *M. petymbuaba*, *M. plumbea*, *M. solaris*, and the new species herein described. All of them exhibit a unique color pattern consisting of a series of dark blotches on body, located at the anterior portion of scales, not observed in any other species of the family (see Sousa *et al.*, 2010; Marinho *et al.*, 2021; Silva *et al.*, 2025). Additionally, these species possess distinctive eye coloration, such as entirely green in *M. chlorophthalma*, partially green in *M. petymbuaba*, totally blue in *M. parecis*, yellowish with a longitudinal dark stripe in *M. plumbea* and *M. cambacica* (Marinho *et al.*, 2021; Silva *et al.*, 2025), and red in *M. nanah*. These authors suggest that these species are likely closely related, although further phylogenetic analyses are required to confirm this hypothesis.

The currently known geographic distribution of *Moenkhausia nanah* is highly restricted, encompassing an upper tributary of the rio Teles Pires within the Serra do Cachimbo. The other putative closely related species, *M. cambacica*, *M. chlorophthalma*, *M. petymbuaba*, *M. plumbea*, *M. parecis*, and *M. solaris*, also exhibit narrow distributions, being endemic to elevated areas of the Brazilian Shield. *Moenkhausia chlorophthalma*, *M. nanah*, *M. petymbuaba*, *M. plumbea*, and *M. solaris* are confined to headwaters of the Xingu and/or Tapajós basins draining the Serra do Cachimbo whereas *M. cambacica* and *M. parecis* are restricted to the upper rio Madeira basin at the Chapada dos Parecis. This pattern indicates a recurrent endemism within the putative group, associated with upland regions of the Brazilian Shield, particularly the Serra do Cachimbo, and the Chapada dos Parecis, likely driven by the pronounced topographic heterogeneity of the region, promoting both long-term isolation and faunal interchange among headwaters. The biogeographic analysis conducted by Dagosta, de Pinna (2017) provides further support for this interpretation, recovering the rio Iriri (rio Xingu basin) as closely related to the rivers Jamanxim, Juruena, and Teles Pires (rio Tapajós basin), thus defining a biogeographic unit corresponding to the Serra do Cachimbo and adjacent uplands in northern Mato Grosso and southern Pará.

Within this unit, the high density of rapids, waterfalls, and deeply incised valleys typifies an Extreme Shield setting (Dagosta, de Pinna, 2019), in which geomorphological barriers simultaneously promote allopatric divergence and restrict the establishment of lineages widespread in other Brazilian Shield basins. Therefore, these regions exhibit pronounced faunal regionalization, reduced sympatry, and comparatively low species richness (Dagosta, de Pinna, 2019; Marinho, Dagosta, 2024; Silva *et al.*, 2025). The restricted distribution of *M. nanah* likely reflects long-term geographic isolation associated with rapids and waterfalls, combined with limited dispersal across drainage divides. Moreover, *M. nanah* represents the fifth species of this putative group described from the Serra do Cachimbo, all of which are likely endemic to the region. Together with congeners restricted to the Chapada dos Parecis, these species reinforce the recognition of these Amazonian Shield uplands as important regions of endemism for small-bodied freshwater fishes and reinforce the need for continued taxonomic and biogeographic studies in Amazonian Shield headwaters, as previously emphasized by several authors (*e.g.*, Sousa *et al.*, 2010; Lima *et al.*, 2023; Marinho, Dagosta, 2024; Silva *et al.*, 2025).

Comparative material examined. Material examined here is the same listed at Ohara, Marinho (2016), Marinho *et al.* (2021), and Silva *et al.* (2025).

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AUTHORS' CONTRIBUTION

Priscila Camelier: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Visualization, Writing–original draft, Writing–review and editing.

Manoela Maria Ferreira Marinho: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Visualization, Writing–original draft, Writing–review and editing.

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