

Original article

## New species of *Pyrrhulina* (Teleostei: Characiformes: Lebiasinidae) from the eastern Amazon, Pará, Brazil

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A new species of *Pyrrhulina* is described based on 60 specimens from tributaries of the rio Amazonas: rio Anapu, rio Capim, rio Guamá and rio Xingu, and coastal drainages in the state of Pará, Brazil. The new species differs from all congeners by having the primary stripe (the horizontal stripe of dark pigmentation extending posteriorly from the snout) terminating at the distal edge of the opercle. In all other species of *Pyrrhulina*, the primary stripe is either restricted to the snout or continues beyond the head (*i.e.* at least the anteriormost four scales of the lateral line series).

**Keywords:** Color pattern, Freshwater fish, Pyrrhulininae, Taxonomy, Teleostei.

Uma nova espécie de *Pyrrhulina* é descrita baseada em 60 espécimes dos afluentes do rio Amazonas: rio Anapu, rio Capim, rio Guamá e rio Xingu, e drenagens costeiras no estado do Pará, Brasil. A nova espécie distingue-se de todas as congêneres por ter a faixa primária (faixa horizontal de pigmentação escura que se estende posteriormente do focinho) terminando na borda distal do opérculo. Em todas as outras espécies de *Pyrrhulina*, a faixa primária é restrita ao focinho ou continua além da cabeça (para incluir pelo menos as quatro escamas anteriores da série da linha lateral).

**Palavras-chave:** Padrão de colorido, Peixes de água doce, Pyrrhulininae, Taxonomia, Teleostei.

### Introduction

The family Lebiasinidae includes 74 small species of fishes (16.0 mm SL up to maximum 250.0 mm SL) endemic to the Neotropical region (Weitzman, Weitzman, 2003; Netto-Ferreira *et al.*, 2011; Fricke *et al.*, 2019). Within Lebiasinidae, the subfamily Pyrrhulininae includes 45 valid species (Fricke *et al.*, 2019) allocated among four genera, which are defined mainly by synapomorphies related to the oral area and cephalic laterosensory canals (Netto-Ferreira, 2010). Of these, the genus *Pyrrhulina* currently comprises 19 nominal species (Fricke *et al.*, 2019) and needs revision (Géry, Zarske, 2002; Weitzman, Weitzman, 2003; Netto-Ferreira, Marinho, 2013). Netto-Ferreira (2010) corroborated the monophyly of the genus on the basis of four non-exclusive synapomorphies, the first two of which were traditionally employed to diagnose the genus (Géry, 1977): the presence of two series of functional premaxillary teeth, the lack of postcleithrum 3, the dorsalmost, paired longitudinal series of scales not reaching posterior to the dorsal-fin origin, and the coronomeckelian bone approximately ten times shorter than Meckelian cartilage. During the early stages of a revisionary study of the genus, specimens of an undescribed species of *Pyrrhulina* were discovered in several collections, where they had been misidentified as *Pyrrhulina brevis*. The species is described herein.

### Material and methods

Counts and measurements follow those proposed by Fink, Weitzman (1974) and Netto-Ferreira *et al.* (2011). All measurements were made point-to-point using calipers with 0.1 mm precision. Standard length (SL) is presented in mm, all other measurements are presented as proportions of SL, except for head subunits, which are presented as proportions of head length (HL). Meristic data are given in the description, followed by the frequency of each count in parentheses and an asterisk indicating values for the holotype. Observations of teeth, vertebrae, supraneurals and procurrent caudal-fin ray counts were obtained from cleared and stained (c&s) paratypes, prepared according to Taylor, Van Dyke (1985). Counts were made from the left side of specimens whenever possible. Vertebrae of the Weberian apparatus were considered four precaudal elements, transitional vertebrae (*sensu* Weitzman, 1962) were included in the count of precaudal vertebrae, and the fused PU1+U1 of the caudal region was counted as a single element (Netto-Ferreira *et al.*, 2011). Patterns of circuli and radii were observed on scales sampled from the region between the lateral line series and the dorsal-fin origin. Color pattern nomenclature follows Weitzman (1966). Basic descriptive statistics and statistical tests for meristic data were performed using SigmaStat for Windows

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3.5 and SigmaPlot for Windows 10.0, Systat Software Inc. Institutional abbreviations are: ANSP (Academy of Natural Sciences, Philadelphia), CAS (California Academy of Sciences, San Francisco), FMNH (Field Museum of Natural History, Chicago), INPA (Instituto Nacional de Pesquisas da Amazônia, Manaus), LIA (Laboratório de Ictiologia de Altamira/Universidade Federal do Pará, Altamira), MBUCV (Museo de Biología de la Universidad Central de Venezuela, Caracas), MCNG (Museo de Ciencias Naturales de Guanare, Venezuela), MCP (Museu de Ciências e Tecnologia da Pontifícia Universidade Católica do Rio Grande do Sul, Porto Alegre), MHNLS (Museo de Historia Natural La Salle, Venezuela), MPEG (Museu Paraense Emilio Goeldi, Belém), MZUSP (Museu de Zoologia da Universidade de São Paulo, São Paulo), UFRGS (Universidade Federal do Rio Grande do Sul, Porto Alegre), and USNM (National Museum of Natural History, Smithsonian Institution, Washington).

## Results

### *Pyrrhulina capim*, new species

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#### Fig. 1, Tab. 1

*Pyrrhulina brevis* (non-Steindachner). — Montag *et al.*, 2008: 18 [checklist]; 28-30 [examined material: MPEG 10442, MPEG 10479, MPEG 11692]. — Silva-Oliveira *et al.*, 2016: 125-142 [species list: inferred from known distribution]. — Ferreira *et al.*, 2018: 553-557 [ecological study: inferred from known distribution].

*Pyrrhulina filamentosa* (non-Cuvier & Valenciennes). — Montag *et al.*, 2009: 245 [checklist]; 251 [examined material: MPEG 7627].

*Pyrrhulina* sp. — Montag *et al.*, 2008: 30 [checklist, examined material: MPEG 10425]. — Raiol *et al.*, 2012: 495 [checklist]; 498 [examined material: MPEG 10570].

**Holotype.** UFRGS 27300, 1, 54.4 mm SL, Brazil, Pará, Bragança, rio São José, 01°07'47"S 46°49'13"W, 05 Feb 2012, J. C. O. Santana *et al.*

**Paratypes.** All from Brazil, from the basins of the rio Guamá, rio Capim: MPEG 4959, 1, 42.9 mm SL, Paragominas, igarapé Paraquequara, rio Guamá basin, 12 Jan 1992, M. Torres, J. Júnior; MPEG 6930, 3, 31.5-43.3 mm SL, Paragominas, igarapé Paraquequara 03°16'05"S 47°46'05"W, 16 Apr 2003, A. B. Sousa, V. S. E. Sena; MPEG 7385, 1, 21.2 mm SL, Paragominas, igarapé Paraquequara, 03°14'50"S 47°45'40"W, 17 Dec 2003, A. B. Sousa, V. S. E. Sena; MPEG 7438, 1, 28.7 mm SL, Paragominas, igarapé Cachoeirinha, 18 Dec 2002, A. B. Sousa, V. S. E. Sena; MPEG 7500, 1, 47.9 mm SL, Paragominas, igarapé Paraquequara, 03°16'40"S 47°43'53"W; MPEG 7502, 1,

28.7 mm SL, Paragominas, igarapé Potiritá, 03°12'13"S 47°39'52"W, 16 Dec 2002, A. B. Sousa, V. S. E. Sena; MPEG 9414, 6, 14.7-29.6 mm SL, Barcarena, rio Arienga, 01°38'0"S 48°43'00"W, 26 Mar 2002, A. B. Sousa, V. S. E. Sena; MPEG 9417, 2, 28.0-33.9 mm SL, Paragominas, igarapé Paraquequara, 03°15'18"S 47° 45'13"W, 14 Dec 2002, A. B. Sousa; MPEG 9424, 36, 12.6-41.9 mm SL, Paragominas, igarapé Paraquequara, 03°16'40"S 47°43'53"W, 14 Dec 2002, V. S. E. Sena; MPEG 9427, 2, 47.2-47.6 mm SL, Paragominas, Guamá-Capim system, rio Cachoeirinha, 03°12'42"S 47°45'36"W, 12 Apr 2003, A. B. Sousa; MPEG 9555, 1, 19.3 mm SL, Tomé-Açu, 02°25'11"S 48°12'13"W, 1 Jul 2005, A. B. Sousa; MPEG 9560, 1, 16.7 mm CP; MPEG 9567, 4, 26.0-42.4 mm SL, Paragominas, igarapé Candiru, 02°51'51"S 47°30'50"W, 28 Jun 2005, L. F. A. Montag; MPEG 9571, 2, 21.9-23.2 mm SL, Concórdia do Pará, igarapé Cajueiro, 02°03'06"S 47°53'09"W, 5 Sep 2005, A. B. Sousa, D. G. Oliveira; MPEG 9574, 4, 15.3-22.8 mm SL, Tomé-Açu, igarapé Timboteua, 02°51'59"S 48°14'38"W, 29 Jun 2005, A. B. Sousa *et al.*; MPEG 9575, 1, 32.5 mm SL, Tomé-Açu, igarapé Marupaúba, 02°13'19"S 48°08'14"W, 1 Jul 2005, A. B. Sousa, D. G. Oliveira; MPEG 9585, 12, 39.6-49.7 mm SL; 2 c&s, 43.3-49.8 mm SL, Tomé-Açu, igarapé Anuerazinho, 02°32'39"S 48°16'10"W, 30 Jun 2005, A. B. Sousa; MPEG 10570, 2, 37.2-41.5 mm SL, Benevides, igarapé do Gelo, 01°21'41"S 48°14'41"W, 6 May 2006, M. B. Mendonça; MPEG 12128, 5, 16.7-26.9 mm SL, Benevides, igarapé Taiassuí, 20 Mar 2006, L. F. A. Montag; MPEG 16188, 23, 12.4-32.8 mm SL, Barcarena, rio Tauá, 01°36'00"S 48°43'00"W, 21 Nov 2001, W. B. Wosiacki; MPEG 18274, 1, 45.0 mm SL, Ourém, igarapé da Loura, 01°32'37"S 47°05'54"W, 16 Nov 2009, B. F. Pamplona; MPEG 21405, 1, 44.6 mm SL, Mãe do Rio, igarapé da Bicheira, 02°03'31"S 47°25'51"W, 24 Oct 2010, P. Gerhard; MPEG 23516, 1, 26.0 mm SL, Paragominas, 03°15'12"S 47°47'02"W, 8 Feb 2012, Alberto Akama; MPEG 29265, 2, 42.9-56.5 mm SL, Barcarena, Arienga I, 01°36'54"S 48°44'03"W, 18 Dec 2015, E. Reis, J. Vilar; MPEG 32950, 2, 24.8-33.5 mm SL, Barcarena, Tauá III, 01°35'44"S 48°43'13"W, 17 Dec 2015, E. Reis, J. Vilar. All from Brazil, Coastal drainages of the Amazon Estuary Pará, Bragança: UFRGS 25559, 13, 39.6-58 mm SL; 5 c&s, 44.2-53.3 mm SL, same data as holotype; UFRGS 25560, 1, 54.2 mm SL, Capitão Poço, fazenda Cachoeira, 01°38'59"S 47°06' 03"W, 02 Feb 2012, J. C. O. Santana *et al.*; UFRGS 25562, 3, 43.8-55.9 mm SL, Bragança, near the Colônia Prati, 01°05'57"S 46°48'45"W, 04 Feb 2012, J. C. O. Santana *et al.*; UFRGS 25563, 9, 21.2-55.7 mm SL, Ourém, igarapé Tororomba, 01°34'14"S 47°02'27"W, 05 Feb 2012, J. C. O. Santana *et al.*; UFRGS 25933, 3, 38.5-50.1 mm SL; 5 c&s, 38.0-41.4 mm SL, Bragança, sítio JW, 01°04'42"S 46°44'21"W, 20 Nov 2015, J. Ready.

**Non-type material.** All from Brazil, Pará: MZUSP 23816, 51, 1 c&s, 37.3 mm SL, Paragominas, rio Capim, igarapé Caranaudina, 06 Ago 1970, Expedição Permanente à

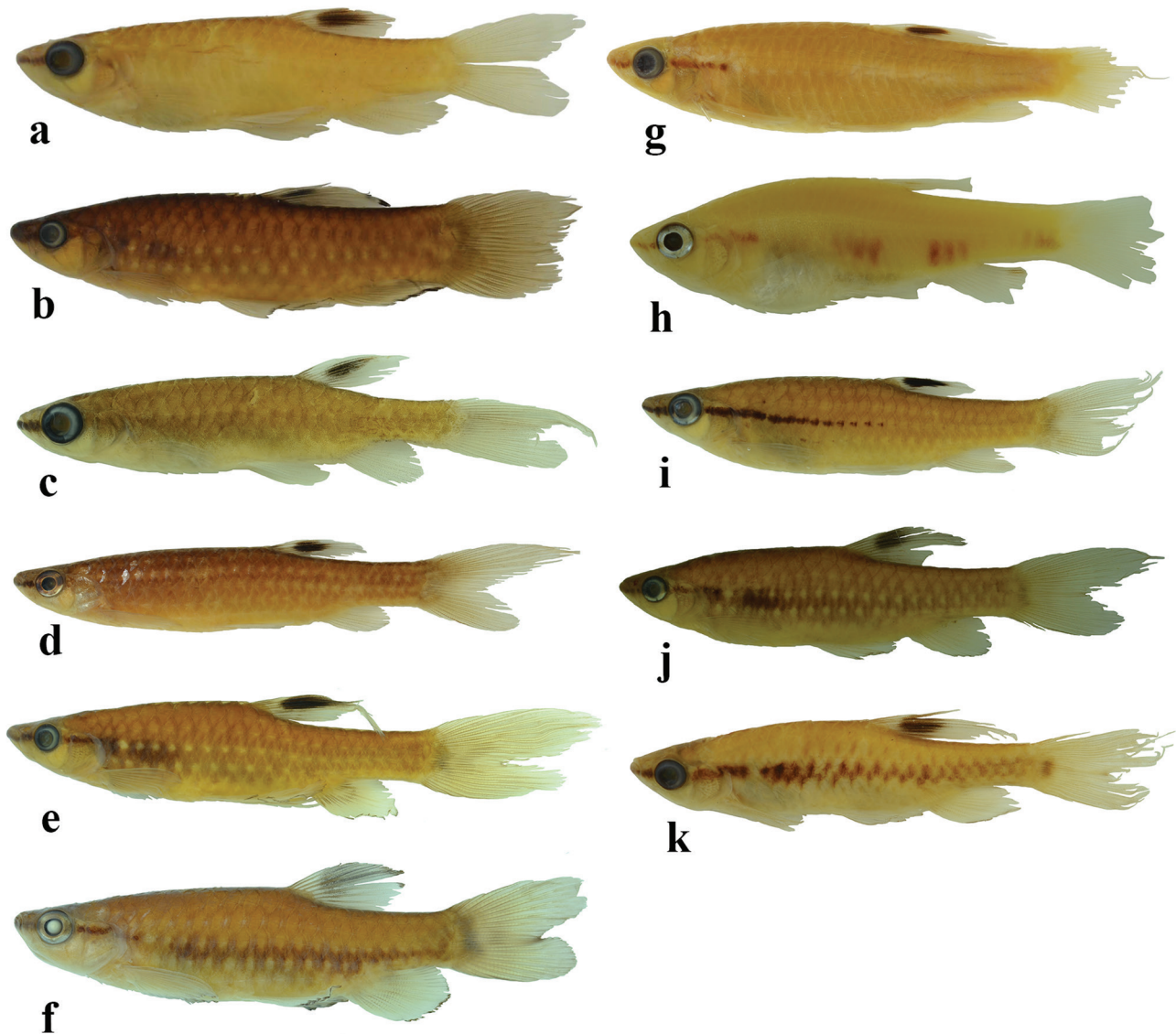
Amazônia. Coastal drainages: MPEG 8224, 9, 12.2-19.2 mm SL, Bragança, 19 Apr 2005, R. Silva; MPEG 8371, 1, 41.8 mm SL, Bragança, Rio Galego, 1 Feb 2005, R. Silva; MPEG 8387, 4, 50.2 mm SL, Bragança, 1 Dec 2005, Kelle; MPEG 18294, 1, 40.1 mm SL, Ourém, igarapé Furo do Novo, 01°34'19"S 47°09'42"W, 17 Nov 2009, B. F. Pamplona; MPEG 21406, 10, 27.8-57.6 mm SL, Marapanim, igarapé Braço Grande de Timboteua, 01°02'24"S 47°37'21"W, 23 Jul 2010, P. Gerhard; UFRGS 25561, 1, 42.7 mm SL, Tracuateua, igarapé do Meio, vila Mirasselas, 01°05'56"S 46°57'41"W, 07 Feb 2012, J. C. O. Santana *et al.* Lower rio Xingu, rio Quiã-paraná and rio Anapu: LIA 2233, 11, 17.9-38.3 mm SL, Vitória do Xingu, 03°19'31"S 51°52'18"W, 26 Jul 2014, D. Bastos, A. Martins; LIA 2304, 2, 39.5-46.4 mm SL, Vitória do Xingu, 03°05'10"S 52°00'36"W, 16 Jul 2014, D. Bastos, A. Martins; LIA 5004, 3, 36.5-47.2 mm SL, rio Xingu, igarapé, 03°05'10"S 52°00'36"W, 15 Jul 2015, R. Oliveira; MPEG 7627, 1, 43.5 mm SL, Ponta de Pedras, rio Quiã-paraná, 01°22'09"S 48°55'24"W, 18 Dec 2003, A. B. Sousa, V. S. E. Sena; MPEG 10425, 3, 32.55 mm SL, Melgaço, Flona de Caxiuanã, 4 Nov 2004, L. F. A. Montag; MPEG 10442, 1, 30.3 mm SL, Melgaço, Flona de Caxiuanã, 01°45'S 51°24'W, 1 Dec 2004, L. F. A. Montag; MPEG 10479, 1, 32.1 mm SL, Melgaço, Flona de Caxiuanã, 01°45'44"S 51°23'55"W, 29 Nov 2004, L. F. A. Montag; MPEG 11692, 1, 30.1 mm SL, Melgaço, Flona de Caxiuanã, 19 Nov 2003, L. F. A. Montag.

**Diagnosis.** *Pyrrhulina capim* differs from all congeners except *P. australis* Eigenmann, Kennedy (Fig. 2a), *P. brevis* Steindachner (Fig. 2b), *P. elongata* Zarske, Géry

(Fig. 2c), and *P. filamentosa* Valenciennes (Fig. 2d) by having the primary stripe restricted to the head (*vs.* primary stripe extending beyond head, reaching the anterior portion of the body but not the vertical through pectoral-fin tip in *P. eleanorae* Fowler (Fig. 2e), *P. laeta* Cope, *P. lugubris* Eigenmann, *P. obermulleri* Myers (Fig. 2f), *P. stoli* Boeseman (Fig. 2g), *P. spilota* Weitzman (Fig. 2h), and *P. vittata* Regan; reaching at least the vertical through the pelvic-fin origin, but not reaching the vertical through the anal-fin terminus in *P. semifasciata* Steindachner (Fig. 2i) and *P. maxima* Eigenmann, Eigenmann (Fig. 2j); or reaching the caudal-fin in *P. beni* Pearson, *P. marilynae* Netto-Ferreira, and *P. zigzag* Zarske, Géry (Fig. 2k)). *Pyrrhulina capim* differs from *P. australis*, *P. brevis*, *P. elongata* and *P. filamentosa* in that the primary stripe reaches the distal edge of the opercle (*vs.* stripe restricted to snout and sometimes across eye, but always lacking a conspicuous dark postorbital portion). The new species is further distinguished from *P. brevis* by the number of premaxillary teeth (outer series: 15-20 *vs.* 25-27; inner series: 24-31 *vs.* 38-41), and dentary teeth (outer series: 13-20 *vs.* 22-26; inner series: 32-45 *vs.* 50-54). *Pyrrhulina capim* further differs from *P. australis* by having 10 principal rays on the upper caudal-fin lobe (*vs.* 9 rays); from *P. filamentosa* by possessing fewer scales along the lateral line series (22-25 *vs.* 25-30); and from *P. elongata* by having 10-12 scales in the first longitudinal paired series, with that series reaching posterior to the pelvic-fin origin (*vs.* no more than 6 scales in that series, with that series falling far short of the vertical through the pelvic-fin origin).



**Fig. 1.** Lateral view of *Pyrrhulina capim*, new species, rio São José, Bragança, Pará, Brazil. **a.** holotype, UFRGS 27300, 54.4 mm SL, male; **b.** paratype, UFRGS 25562, 40.4 mm SL, female.



**Fig. 2.** Lateral view of: **a.** *Pyrrhulina australis*, MCP 39259, 38.8 mm SL, male, Poconé, Mato Grosso, Brazil; **b.** *Pyrrhulina brevis*, INPA 27819, 56.3 mm SL, male, Manaus, Amazonas, Brazil; **c.** *Pyrrhulina elongata*, MPEG 26568, 30.6 mm SL, male, Rio Tapajós, Pará, Brazil; **d.** *Pyrrhulina filamentosa*, MHNLS 14282, 59.5 mm SL, female, Essequibo River, Guiana; **e.** *Pyrrhulina eleanorae*, FMNH 113654, 39.7 mm SL, male, Rio Napo, Ecuador; **f.** *Pyrrhulina obermulleri*, ANSP 152043, 37.2 mm SL, male, Maynas, Peru; **g.** *Pyrrhulina stoli*, USNM 66254, 60.8 mm SL, female, upper Potaro river, Guyana; **h.** *Pyrrhulina spilota*, USNM 197523, 52.7 mm SL, male, Loreto, Peru; **i.** *Pyrrhulina semifasciata*, MCP 37466, 56.7 mm SL, female, Loreto, Peru; **j.** *Pyrrhulina* cf. *maxima*, MPEG 19120, 50.4 mm SL, male, Rio Amazonas, Brazil; **k.** *Pyrrhulina zigzag*, FMNH 94556, 35.6 mm SL, male, Rio Napo, Ecuador.

**Description.** Morphometric data of the holotype and 60 paratypes presented in Tab. 1. Lateral view of male holotype and female paratype in Fig. 1a and Fig. 1b, respectively. Body cylindrical, slightly elongate. Greatest body depth anterior to dorsal-fin origin, between pectoral and pelvic fins. Dorsal profile of head straight, slightly concave from upper lip to anterior scales covering parietal and supraoccipital. Dorsal profile of body slightly convex or nearly straight from that point to dorsal-fin origin; gently concave along dorsal-fin base and caudal peduncle near vertical through

anal-fin terminus, becoming nearly straight from that point to origin of anterodorsal procurent ray of caudal fin. Ventral profile of head and trunk convex from lower lip to pelvic-fin origin, becoming straight from that point to anal-fin origin. In male specimens, anal-fin base slightly convex, caudal peduncle straight or slightly concave from that point to origin of anteroventral procurent ray of caudal fin. In female specimens, ventral profile of anal-fin base and caudal peduncle gently concave to origin of anteroventral procurent ray of caudal fin.

**Tab. 1.** Morphometric data of the holotype and paratypes of *Pyrrhulina capim*, new species. SD = Standard Deviation.

Paratypes	Holotype	n	Males			Females		
			Range	Mean	SD	Range	Mean	SD
SL	54.4	60	39.7 - 57.7	47.1		12.3 - 57.7	34.3	
Depth dorsal fin origin	24.3	53	21.5 - 29.0	24.9	1.4	21.9 - 27.7	24.5	1.4
Snout to anal fin origin	75.5	53	72.4 - 77.7	75.2	1.4	74.0 - 78.5	76.5	1.2
Snout to pelvic fin origin	49.4	53	47.1 - 53.7	50.6	1.7	47.7 - 54.5	52.1	1.4
Snout to dorsal fin origin	57.4	53	56.9 - 62.3	59.1	1.7	59.1 - 62.8	60.7	0.9
Dorsal fin origin to caudal base	44.8	53	39.9 - 45.6	42.6	1.5	39.7 - 44.2	41.7	1.1
Dorsal fin length	33.9	52	26.7 - 34.1	29.9	2.2	21.6 - 30.5	25.7	1.8
Length caudal peduncle	13.3	53	11.9 - 15.4	13.4	0.9	11.7 - 18.9	14.0	1.5
Depth caudal peduncle	13.9	52	12.9 - 16.1	14.3	0.9	11.0 - 13.8	12.8	0.6
Anal fin length	24.1	53	20.1 - 25.1	23.4	1.3	18.0 - 23.2	20.6	1.2
Anal fin base	11.9	53	10.8 - 14.0	12.3	0.7	8.3 - 13.4	10.3	1.2
Pelvic to anal fin origin	28.9	53	23.1 - 28.9	25.9	1.4	22.8 - 29.9	25.2	1.5
Pelvic fin length	25.7	53	19.4 - 27.7	23.6	2.4	17.2 - 22.5	19.9	1.2
Pectoral to pelvic fin origin	27.2	53	25.4 - 29.1	27.0	1.0	23.3 - 31.6	26.9	1.8
Pectoral fin length	22.3	53	20.7 - 24.9	22.5	1.2	17.0 - 25.8	22.6	1.7
Snout to pectoral fin origin	24.1	53	22.2 - 26.3	24.1	0.8	23.8 - 28.4	26.2	1.4
Head length	26.0	53	23.8 - 28.9	25.9	1.1	24.9 - 29.6	27.2	1.4
Horizontal eye diameter	29.4	53	28.2 - 34.0	31.3	1.7	29.1 - 39.4	33.2	2.2
Distance snout to eye	31.4	53	28.1 - 32.2	30.6	1.1	25.0 - 33.2	29.5	2.2
Interorbital distance	38.8	53	36.7 - 42.5	39.4	1.5	35.7 - 43.7	39.5	1.8
Upper jaw length	20.5	53	18.7 - 26.6	21.9	2.4	16.6 - 24.2	20.4	2.0
Lower jaw length	36.5	53	26.4 - 36.5	32.7	2.4	26.6 - 44.0	32.1	3.2

Mouth superior. Premaxillary with two series of conical teeth; outer series with 15(3), 17(1), 18(2), 19(5) or 20(1) teeth; inner series with 24(2), 25(1), 26(3), 28(2), 30(2), or 31(2) teeth. Maxillary with 11(1), 14(1), 15(1), 16(1), 18(1) or 19(1) conical teeth in males, and 7(1), 8(1), 9(3) or 10(1) in females, anterior teeth largest in both sexes. Dentary with two series of conical teeth; outer series with 13(1), 14(2), 15(1), 16(3), 17(1), 18(2), or 20(2); inner series with 32(2), 33(1), 34(1), 35(1), 37(2), 38(1), 42(1), 43(1), 44(1) or 45(1). Inner series of teeth gradually decreasing in size from symphysis to near coronoid process. Lower jaw protruding slightly beyond premaxillary. Branchiostegal rays 3; two articulating with anterior ceratohyal and one with posterior.

Scales cycloid, circuli restricted to anterior border, few radii converging and strongly anastomosed at focus, not forming cells. Lateral line series with 22(3), 23(25), 24\*(19) or 25(1) scales; none perforated. Longitudinal series of scales between dorsal and pelvic fins 5. Predorsal scales 10(1), 11(6), 12\*(22), 13(21) or 14(1). First paired longitudinal series with 9(2), 10(12), 11\*(23), 12(11) or 13(2) scales. Circumpeduncular scales 10\*.

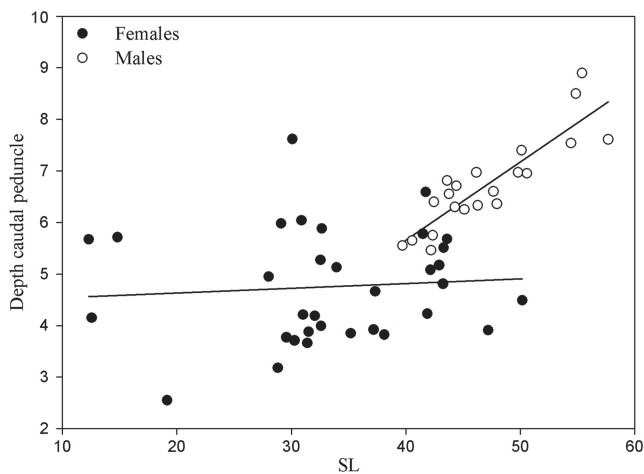
Pectoral-fin rays i,10(5), i,11\*(18) or i,12(30). Tip of longest pectoral-fin ray falling far short of vertical through pelvic-fin origin. Pelvic-fin rays i,7\*(52) or i,8(1); tip of longest pelvic-fin ray reaching anal-fin origin in adult males, but not in juveniles or females. Supraneurals 7(12), positioned anterior to neural spines of centra 7(12) to 13(12). First dorsal-fin pterygiophore inserted posterior to

neural spine of centrum 12(3), 13(8) or 14(1). Dorsal-fin rays ii,6(1), iii,6(6), iii,7(2) or ii,8\*(48). Distal margin of extended dorsal fin somewhat rounded in females, lanceolate in adult males. Dorsal-fin origin located distinctly closer to caudal fin than to snout tip. Base of last dorsal-fin ray located at vertical through anal-fin origin. Anal-fin rays iii,8(37) or ii,8\*(16), with last ray adnate. Profile of extended anal fin rounded in females, somewhat elliptical or lanceolate in males. First anal-fin pterygiophore inserted posterior to haemal arch of centrum 19(8) or 20(4). Adipose fin absent. Caudal fin forked, upper lobe distinctly longer. Caudal-fin principal rays ii,8/7,i(1), ii,8/7,ii(8), ii,8/8,i\*(26), i,9/7,ii(2), i,9/8,i(13) or ii,9/8,i(1). Dorsal caudal-fin procurent rays 4(12). Ventral caudal-fin procurent rays 4(5) or 5(7). Precaudal vertebrae 17(7) or 18(5); caudal vertebrae 14(3), 15(6) or 16(3).

**Color in alcohol.** Background color yellowish. Dorsal portion of head light brown from the upper lip to scales overlying parietal bone. Lateral surfaces of head distinctly lighter than dorsum, with dark pigmentation becoming abruptly scarce ventral to primary stripe. Primary stripe heavily pigmented and restricted to the head, pigmenting both jaws, antorbital, infraorbitals 1 and 5 and eye, and reaching posterior margin of opercle or opercular membrane. Ventral portion of head with few, scattered chromatophores. Mid-dorsal, first and second longitudinal series of scales with light brown pigmentation, becoming

slightly darker at dorsal-fin base and extending to caudal-peduncle tip. Trunk pigmentation lighter ventrally to third longitudinal series of scales. Scale borders of second and third longitudinal series with discrete, dark pigmentation on edges, homogeneously pigmented near foci, not forming distinct reticulate pattern. Scales of fourth to sixth longitudinal series somewhat pale at focus, with discrete guanine deposition, forming longitudinal series of pale blotches (ranging from yellow to red in life). Abdominal region yellowish with sparse dark chromatophores from isthmus to anal-fin origin. Pectoral fin completely hyaline. Pelvic and anal fins mostly hyaline except for pigmented distal margin in males (see sexual dimorphism). Caudal fin hyaline with scarce chromatophores. Dorsal fin with round blotch at mid-distal portion covering all branched and unbranched rays and intervening membranes.

**Sexual dimorphism.** Adult males of *Pyrrhulina capim* possess the typical sexual dimorphism of Lebiasinidae (Netto-Ferreira *et al.*, 2011; Netto-Ferreira, Marinho, 2013), in which the anal-fin rays and all intervening membranes are distinctly thicker and longer than in females, ultimately resulting in broader anal fins in male specimens (Marinho, Menezes, 2017). Male specimens possess more maxillary teeth than females (11-18 vs. 7-10, respectively). Adult males have dark pigmentation at the distal margin of the anal and pelvic fins that forms a discrete dark band. Pelvic fin of males distinctly longer than those of females. Dorsal-fin of adult males with distinctly elongate dark blotch (vs. ovoid or round blotch in females), extending throughout the median and distal portions of first and second branched rays. Caudal peduncle of adult males usually deeper than in females (12.9%-15.1% vs. 11.0%-13.8%; Fig. 3).

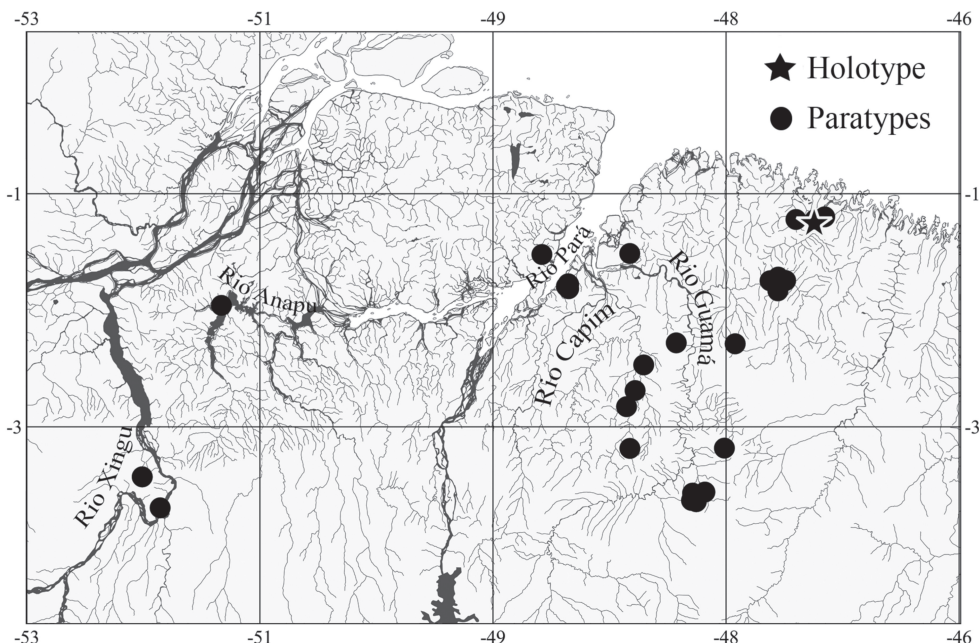


**Fig. 3.** Scatterplot of caudal peduncle depth versus SL in males and females of *Pyrrhulina capim*, new species. Lines represent the 95% confidence intervals.

**Geographical distribution.** *Pyrrhulina capim* is known from the Eastern Amazon, in northern Brazil from the basins of the rio Anapu, rio Capim, rio Guamá, lower rio Xingu, and coastal drainages of the Amazon estuary in the state of Pará (Fig. 4).

**Ecological notes.** *Pyrrhulina capim* inhabits the banks of rivers and streams of clear water with moderate flow, sandy substrate and submerged vegetation.

**Etymology.** The epithet *capim* (from the indigenous language Tupi-Guarani meaning: Caá = leaf; Pii = thin, slender) alludes to the rio Capim, a tributary of the rio Guamá, where the first specimens examined by ALN-F were collected. A noun in apposition.



**Fig. 4.** Map of northern portion of South America, with the distribution of *Pyrrhulina capim*, new species. The polygons represent the localities of the holotype and paratypes.

**Conservation status.** Despite all the human impacts in the known area of occurrence of *Pyrrhulina capim* (i.e., deforestation, mining activities, palm tree plantations, cattle activities, among others), there is no information on whether those activities impact populations of that species. That said, *P. capim*, has a relatively broad distribution in the Floresta Nacional de Caxiuanã, and possibly in other protected areas such as the Reserva Extrativista (=Resex) Gurupá-Melgaço, Resex Terra Grande-Pracuúba, and protected areas in the upper rio Guamá. Because of that broad area of occurrence (see distribution), it is likely that *Pyrrhulina capim* can be classified as a species of Least Concern (LC) according to the International Union for Conservation of Nature (IUCN) categories and criteria (IUCN Standards and Petitions Subcommittee, 2017).

**Remarks.** *Pyrrhulina capim* shares with all congeners the generic synapomorphies indicated by Netto-Ferreira (2010): the presence of two series of premaxillary teeth; the lack of postcleithrum 3; the dorsalmost, paired longitudinal series of scales not reaching posterior to the dorsal-fin origin; and the coronomeckelian bone approximately ten times shorter than Meckelian cartilage. Despite sharing a short primary stripe with *P. australis*, *P. brevis*, *P. elongata* and *P. filamentosa*, it is not currently clear whether *P. capim* is more closely related to those four species than to other species of *Pyrrhulina*, because no phylogenetic hypotheses for the genus exists. That said, the characters discussed by Netto-Ferreira, Marinho (2013) - (i.e., the reduction of the number of precaudal vertebrae; the presence of 9 caudal-fin principal rays on the upper lobe; the absence of postcleithrum 2; and the lack of filamentous rays on dorsal) suggest that *P. australis* may share a closer relationship with other small species of *Pyrrhulina*, such as *P. marilynae*, *P. vittata* and *P. zigzag*.

Specimens of *Pyrrhulina capim* have been commonly identified as *Pyrrhulina brevis* in the literature (Montag *et al.*, 2008; 2009; Raiol *et al.*, 2012; Silva-Oliveira *et al.*, 2016; Ferreira *et al.*, 2018) and in many collections. Such identifications seem to have been induced by the broad definition of the *Pyrrhulina brevis*-group proposed by Géry (1977). According to that definition, the *P. brevis*-group includes deep bodied species with low longitudinal scale counts (20-23), and a short primary stripe restricted to the eye or the opercle. That “diagnosis” fits not only *P. brevis*, but also most stout bodied, short striped species of the genus such as *P. australis*, *P. brevis*, *P. capim*, *P. lugubris*, and *P. obermulleri*. In that contribution Géry suggested the possibility that these forms instead of distinct species would represent variations within a single, widespread species “with slightly divergent characters,” contradicting his own observations in a previous study (Géry, 1972). The subsequent descriptions of *Pyrrhulina zigzag*, originally recognized among the syntypes of *P. brevis* (Zarske, Géry, 1997) and *P. elongata*, a species with short primary stripe but low body depth (Zarske, Géry, 2001) have weakened the case for a single, widespread *Pyrrhulina brevis*. Similarly, the likely erroneous synonymy of *P. rachoviana*

with *P. australis* (Zarske, Géry, 2004), which represents another operational group in the genus indicates substantial imprecision in Géry’s (1977) group definitions, and suggests a substantial lack of evidence for their reality. Hence, the recognition and usage of such “groups” may be misleading, and they should be abandoned until broad phylogenetic and revisionary studies are available for the genus.

**Comparative material examined.** In addition to the specimens listed in Netto-Ferreira *et al.* (2011), Netto-Ferreira (2012), Netto-Ferreira, Marinho (2013) and Netto-Ferreira *et al.* (2013), the following specimens were examined. *Pyrrhulina australis*: MCP 10675, 2, 22.4-39.0 mm SL; MPEG 16997, 4 c&s, 32.1-36.6 mm SL; MCP 37466, 18, 15.1-56.7 mm SL; MCP 38118, 55, 21.0-29.7 mm SL; MCP 39183, 2, 11.5-24.1 mm SL; MCP 39240, 2, 18.3-41.3 mm SL; MCP 39277, 55, 18.7-30.2 mm SL; MCP 40882 2, 13.0-30.7 mm SL. *Pyrrhulina brevis*: INPA 25993, 1, 33.9 mm SL; INPA 25999, 1, 29.0 mm SL; INPA 26019, 5, 14.3-29.2 mm SL; INPA 26024, 24, 15.2-68.8 mm SL; INPA 26033, 2, 16.2-27.0 mm SL; INPA 26040, 1, 54.3 mm SL; INPA 26042, 19, 15.7-61.1 mm SL; INPA 26048, 3, 22.1-42.0 mm SL; INPA 26052, 2, 43.9-60.8 mm SL; INPA 27819, 134, 12.1-67.4 mm SL, 2 c&s; INPA 31528, 18, 30.1-64.4 mm SL. *Pyrrhulina elongata*: MPEG 25182, 2, 20.5-23.6 mm SL; MPEG 26568, 2, 23.8-30.6 mm SL; MPEG 26685, 1, 32.5 mm SL; MPEG 26687, 1, 30.9 mm SL; MPEG 27799, 6, 16.6-22.6 mm SL; MPEG 27844, 1, 31.0 mm SL; MPEG 28403, 4, 13.9-19.1 mm SL; MPEG 28446, 35, 13.2-24.3 mm SL; MPEG 28469, 2, 25.3-29.1 mm SL; MPEG 28482, 2, 20.9-25.8 mm SL; MPEG 28533, 4, 17.9-23.7 mm SL; MPEG 28590, 2, 17.4-26.0 mm SL; MPEG 28657, 1, 17.6 mm SL; MPEG 28685, 3, 15.6-20.5 mm SL; MPEG 28748, 2, 21.2-23.1 mm SL. *Pyrrhulina filamentosa*: FMNH 53439, 5, 39.0-49.9 mm SL; MBUCV 5978, 4, 35.5-52.4 mm SL; MHNLS 14271, 10, 42.2-50.9 mm SL; MHNLS 14282, 10, 52.7-75.6 mm SL, 2 c&s; USNM 66254, 5, 29.9-67.8 mm SL. *Pyrrhulina laeta*: FMNH 94558, 20, 24.5-38.4 mm SL; FMNH 113654, 20, 27.4-61.2 mm SL. *Pyrrhulina lugubris*: CAS 78889, 2, 38.7-40.2 mm SL. *Pyrrhulina marilynae*: ANSP 199222, 2, 26.3-26.7 mm SL. *Pyrrhulina obermulleri*: ANSP 152043, 3, 20.5-32.1 mm SL; ANSP 167231, 3, 29.1-37.1 mm SL. *Pyrrhulina semifasciata*: MCP 37466, 18, 16.3-55.9 mm SL. *Pyrrhulina spilota*: USNM 197523, 17, 14.9-52.7 mm SL. *Pyrrhulina stoli*: ANSP 175475, 9, 19.1-41.6 mm SL; ANSP 176763, 40, 22.8-44.3 mm SL; ANSP 176764, 30, 21.3-42.1 mm SL; ANSP 176765, 20, 24.9-46.8 mm SL; ANSP 201969, 10, 21.6-40.6 mm SL; FMNH 53432, 5, 44.6-64.5 mm SL; FMNH 69736, 15, 27.0-48.3 mm SL. *Pyrrhulina zigzag*: FMNH 94556, 20, 13.7-32.5 mm SL; MPEG 5795, 3, 24.3-32.7 mm SL. *Pyrrhulina* sp.: ANSP 128968, 10, 28.0-37.9 mm SL; ANSP 128969, 5, 14.3-33.9 mm SL; ANSP 128975, 3, 34.4-41.5 mm SL; ANSP 135694, 15, 35.4-46.7 mm SL; ANSP 137624, 4, 44.9-60.1 mm SL; ANSP 141569, 40, 17.9-40.2 mm SL; INPA 26006, 1, 45.4 mm SL; MCP 26213, 2, 22.2-29.9 mm SL; MCP 38699, 25, 20.4-29.2 mm SL; MCP 38748, 13, 22.4-31.3 mm SL; MCP 40684, 25, 22.1-29.4 mm SL; MCP 40714, 24, 15.6-25.9 mm SL; MCP 40745, 17, 21.2-33.5 mm SL; MCP 40803, 25, 27.2-33.1 mm SL; MCP 40876, 24, 17.6-32.4 mm SL; MCP 40884, 25, 15.9-23.4 mm SL; MPEG 8216, 2, 32.0-40.7 mm SL; MPEG 10088, 2 c&s, 41.9-44.8 mm SL; MPEG 12149, 3, 35.2-48.4 mm SL; MPEG 15330, 1, 36.6 mm SL; MPEG 15345, 1, 36.5

mm SL; MPEG 30581, 2, 11.0-60.9 mm SL; MPEG 18214, 2, 16.5-44.8 mm SL; USNM 261426, 10, 23.9-34.7 mm SL; USNM 261434, 5, 23.2-33.3 mm SL. *Pyrrhulina* sp1.: MBUCV 33341, 4, 49.3-57.9 mm SL; MBUCV 33344, 4, 42.2-49.3 mm SL, 2 c&s; MCNG 1521, 15, 35.2-41.9 mm SL; MBUCV 16682, 4, 39.2-47.5 mm SL, 2 c&s; MBUCV 35223, 5, 34.0-39.4 mm SL; MBUCV 34995, 4, 40.2-44.8 mm SL). *Pyrrhulina* sp2.: MBUCV 18648, 4, 44.2-61.7 mm SL, 2 c&s; MBUCV 19759, 6, 45.6-69.5 mm SL). *Pyrrhulina* sp3.: MCNG 25770, 15, 35.0-40.2 mm SL, 1 c&s; MCNG 27823, 5, 34.6-40.2 mm SL; MCNG 25640, 10, 33.5-37.6 mm SL, 1 c&s.

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