

A new species of *Cetopsorhamdia* (Siluriformes: Heptapteridae) from the Upper Amazon River basin

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Abstract

A new species of *Cetopsorhamdia* is described from material collected on rapid inventories and ichthyological expeditions in the Amazon region of Peru, Ecuador and Colombia. The new species can be differentiated from all other species of *Cetopsorhamdia* by the colouration pattern on fins, number of vertebrae, number of ribs, level insertion of dorsal fin, number of rays on dorsal and pectoral fin, osteological characters and several other morphometric characters. The new species is distributed along tributaries of the upper Amazon River basin in Peru, Colombia and Ecuador.

KEYWORDS

fresh water, Neotropical, taxonomy, three-barbel catfish

1 | INTRODUCTION

Cetopsorhamdia Eigenmann & Fisher 1916 is a genus of Neotropical three-barbeled catfish distributed along the cis/trans Andean drainages of Magdalena, Amazon, Orinoco, São Francisco, Parana and Uruguay River basins (Bockmann & Guazzelli, 2003; Bockmann & Slobodian, 2017). This genus was previously classified with the larger bodied catfishes Siluridae within subfamily Pimelodinae by Eigenmann & Fisher in Eigenmann (1922). Afterwards, Gosline (1945) and Gomes and Schubart (1958) considered *Cetopsorhamdia* a member of Pimelodidae. Stewart (1986) was the first to place *Cetopsorhamdia* within the *Heptapterus* group, which became part of the large monophyletic clade proposed by Lundberg and McDade (1986). Subsequent morphological analysis placed *Cetopsorhamdia* within the *Nemuroglanis* clade (Ferraris Jr, 1988; Lundberg et al., 1991) and thus formally within Rhamdiinae (Lundberg et al., 1991) but shortly thereafter raised to Rhamdiidae by de Pinna (1993) in his unpublished Ph.D. thesis. Although Bockmann (1994) corroborated *Cetopsorhamdia* as a member of the *Nemuroglanis* clade within Rhamdiinae, Silvergrip (1996) pointed out priority of Heptapterinae Gill (1861) over Rhamdiinae Bleeker (1862). Swarça et al. (2000) was the first to formally use Rhamdiidae based on

de Pinna's thesis 1993, but has thereafter been recognized as the family Heptapteridae by Bockmann & Guazzelli (2003).

Cetopsorhamdia is a member of Heptapterini based on morphological and molecular analysis (Ferraris Jr, 1988; Bockmann, 1998, Silva et al., 2021, Faustino-Fuster et al., 2021). *Cetopsorhamdia* can be diagnosed from all other genera within Heptapterini by four morphological characters: (a) presence of a medial ossification over the median portion of the skull, covering the epiphyseal bar and leaving reduced anterior and posterior fontanels; (b) orbital (= optic) foramen small; (c) mouth ventral and (d) snout conical (Bockmann & Reis, 2021). In addition, the previous authors suggest a strict definition of *Cetopsorhamdia* based on two putative synapomorphies: (a) presence of a medial ossification over the median portion of the skull, covering the epiphyseal bar and leaving reduced anterior and posterior fontanels; (b) orbital (= optic) foramen small. Therefore, *Cetopsorhamdia* sensu stricto (following Bockmann & Reis, 2021) includes *Cetopsorhamdia boquillae* Eigenmann, 1922, *Cetopsorhamdia clathrata* Bockmann & Reis, 2021, *Cetopsorhamdia iheringi* Schubart & Gomes 1959, *Cetopsorhamdia insidiosa* Steindachner 1915, *Cetopsorhamdia nasus* Eigenmann & Fisher 1916, *Cetopsorhamdia picklei* Schultz 1944 and *Cetopsorhamdia spilopleura* Bockmann & Reis, 2021. Recent morphological work suggests that *Cetopsorhamdia molinae* Miles 1943, *Cetopsorhamdia orinoco*

Schultz 1944, *Cetopsorhamdia phantasia* Stewart 1985 and *Cetopsorhamdia shermani* Schultz 1944 belong to three currently unrecognized genera (Bockmann, 1998; Bockmann & Slobodian, 2017), with molecular evidence that further supports this finding for *C. molinae* (Faustino-Fuster et al., 2021). *Cetopsorhamdia filamentosa* Fowler 1945 appears to be related to *Rhamdia* (Bockmann, 1998, DRFF pers. obs.). These hypotheses are not yet formally published; therefore, in this study the authors considered the following 12 valid species as *Cetopsorhamdia* (Fricke et al., 2020): *C. boquillae*, *C. clathrata*, *C. spilopleura*, *C. filamentosa*, *C. iheringi*, *C. insidiosa*, *C. molinae*, *C. nasus*, *C. orinoco*, *C. phantasia*, *C. picklei* and *C. shermani*.

Recent expeditions carried out by natural history museums, governmental institutions and non-governmental organizations along the Amazon basin in Peru and Ecuador revealed one new species of *Cetopsorhamdia* herein described.

2 | MATERIALS AND METHODS

Measurements were taken with digital calipers and are expressed to the nearest 0.1 mm. All measurements were taken point to point and followed Lundberg and McDade (1986), Bockmann (1994) and Faustino-Fuster et al. (2019). Standard length (L_S) is given in millimetres, and the other measurements are expressed in percentage of L_S or head length (HL) (Table 1a–c). Counts of fins rays, ribs and vertebrae (including the first five vertebrae in the Weberian apparatus and one from the hypural plate) were taken from cleared and stained (c&s) specimens prepared according to Taylor and Van Dyke (1985), and digital radiographs (xr) were taken with the AXR 110 Hotshot X-Ray System in the fish division, Field Museum of Natural History, Chicago, United States. Asterisks within parenthesis (*) represent holotype count. Numbers between parenthesis () are number of specimens. Osteology analyses were done following Bockmann and Miquelarena (2008) and Ortega-Lara (2012), and Carvalho et al. (2013). Nomenclature of the laterosensory cephalic system followed Arratia and Huaquin (1995), Schaefer and Aquino (2000) and Bockmann and Miquelarena (2008). Geographic distribution map was prepared in the Quantum GIS version 2.18.10 software (Sherman et al., 2012). Institutional abbreviations follow Sabaj (2019).

Comparisons were performed through the examination of specimens, including types, original descriptions and revisionary works on valid species of *Cetopsorhamdia*: *C. boquillae*, *C. filamentosa*, *C. iheringi*, *C. insidiosa*, *C. molinae*, *C. nasus* (Ortega-Lara, 2012), *C. orinoco*, *C. phantasia*, *C. picklei* and *C. shermani*.

2.1 | Ethical statement

This study used only ethanol-preserved specimens deposited in museums and did not involve animal experimentation.

3 | RESULTS

3.1 | *Cetopsorhamdia hidalgoi* new species

urn:lsid:zoobank.org:pub:CF107813-B3A7-467E-82D0-6CD2367B633F
urn:lsid:zoobank.org:act:18608754-E7B8-400A-BD3E-2502EE5A1719

(Figures 1a–c, 2, 3, 4 and 5; Table 1a)

Cetopsorhamdia sp.: Hidalgo & Pezzi, 2006: 42, 73, 77, 79–80, 144, 173, 177–179, 254, Figure 5c (rapid biological and social inventory).

Cetopsorhamdia sp.: Hidalgo & Willink, 2007: 34, 56, 59–60, 105, 125, 127–128, 198, Figure 6c (rapid biological and social inventory).

Cetopsorhamdia sp. n. 1: Bockmann & Slobodian, 2013: 22–23 (fish inventory)

C. phantasia: Carvalho et al., 2016: 417, 437 (species list).

Holotype. MUSM 69550, 30.7 mm L_S , Peru, Loreto Department, Requena Province, Tapiche River, National Park Sierra del Divisor, 7° 12' 29.70" S; 73° 55' 25.57" W, 14 August 2005, M. Hidalgo & J. Pezzi.

35 Paratypes: All from Peru, Nanay drainage. FMNH 139553, 1, 29.6 mm L_S , Loreto Department, Maynas Province, Alto Nanay, 2° 47' 29.00" S; 74° 49' 36.84" W, 22 August 2006, M. Hidalgo & P. Willink. MUSM 65034, 1, 26.22 mm L_S , collected with FMNH 139553. **Marañón drainage,** Amazonas Department, Condorcanqui Province: AUM 46744, 4, 26.3–27.2 mm L_S , Marañón River, 4° 35' 22.45" S; 77° 51' 10.19" W, 08 August 2006, N.K. Lujan, S. Flecker, A. Capps, P. German, D. Osorio. AUM 71300, 3, 24.1–26.4 mm L_S , Cenepa River, 4° 33' 37.76" S; 78° 11' 7.08" W, 02 August 2006, N.K. Lujan, D.C. Taphorn, S. Flecker, B. Rengifo, D. Osorio. **Ucayali drainage.** Loreto Department, Requena Province: FMNH 143004, 1, 28.9 mm L_S , Unnamed creek tributary to Tapiche River, National Park Sierra del Divisor, 7° 49' 39.79" S; 73° 56' 34.10" W, 14 August 2005, M. Hidalgo & J. Pezzi. FMNH 143018, 1, 28.3 mm L_S , collected with holotype. FMNH 143069, 2, 23.4–30.0 mm L_S , Unnamed creek tributary to Tapiche River, National Park Sierra del Divisor, 7° 12' 21.10" S; 73° 56' 7.19" W, 16 August 2005, M. Hidalgo & J. Pezzi. FMNH 143086, 2, 27.8–31.4 mm L_S , Unnamed creek tributary to Tapiche River, National Park Sierra del Divisor, 7° 11' 38.48" S; 73° 52' 1.90" W, 19 August 2005, M. Hidalgo & J. Pezzi. MUSM 62615, 2, 23.5–23.7 mm L_S , collected with FMNH 143004. MUSM 62715, 2 (1 c&s), 26.0–27.5 mm L_S , collected with FMNH 143069. MUSM 63924, 1, 28.1 mm L_S , collected with holotype. MUSM 63924, 1, 28.0 mm L_S , collected with holotype. Cusco Department, La Convención Province: MUSM 35639, 1, 23.2 mm L_S , El Dorado creek, tributary to Mishahua River, Urubamba River, 11° 22' 35.70" S; 72° 50' 0.39" W, 25 July 2009, H. Ortega et al. MUSM 54758, 1, 29.7 mm L_S , Serjali River tributary to Mishahua River, 11° 45' 9.67" S; 72° 30' 24.86" W, 10 December 2015, I. Sipión, J. Espino & P. Andia. MUSM 60687, 3 (1 c&s), 24.4–32.9 mm L_S , Megantoni District, Serjali River tributary to Mishahua River, 11° 45' 19.34" S; 72° 29' 44.86" W, 01 September 2017, I. Sipión, A. Mendoza & P. Andia. UFRGS 28665,

TABLE 1 (a)–(c), Morphometric data of *Cetopsorhamdia* species

(a)

LM	Measurement	<i>Cetopsorhamdia hidalgoi</i> new species					<i>Cetopsorhamdia boquillae</i> Eigenmann, 1922		<i>Cetopsorhamdia filamentosa</i> Fowler 1945		
		H	N	Min	Max	SD	H	N	Min	Max	
	Standard length (mm)	30.7	21	23.2	32.9	-	72.1	5	41.5	72.4	
	Percentage of standard length										
1-3	Predorsal distance	39.4	22	36.7	42.7	1.4	36.9	5	35.2	36.7	
1-4	Preadipose distance	71.6	22	67.4	72.8	1.4	62.1	5	60.1	63.5	
1-5	Prepectoral distance	25.3	22	23.9	27.7	0.8	20.1	5	22.6	24.6	
1-6	Prepelvic distance	44.7	22	42.9	48.3	1.5	43.9	5	46.6	48.7	
1-7	Preanal distance	68.5	22	65.4	70.8	1.6	64.0	5	67.0	68.2	
3-8	Body depth	16.8	22	13.0	18.1	1.5	13.7	5	14.9	17.2	
9-10	Caudal peduncle depth	8.5	22	7.8	9.3	0.4	10.2	5	9.4	11.0	
2-11	Caudal peduncle length	20.4	22	17.4	21.5	1.1	19.2	5	18.3	20.9	
37-38	Body width	18.6	22	16.0	20.8	1.2	16.8	5	18.1	19.6	
3-12	Dorsal-fin base length	14.8	22	11.7	15.2	0.8	11.4	5	14.5	16.3	
7-11	Anal-fin base length	12.8	22	11.7	15.4	0.7	15.9	5	13.0	14.1	
3-15	Unbranched dorsal-fin ray length	21.6	22	20.0	23.0	0.9	16.1	5	13.9	17.7	
16-17	Dorsal-fin length	19.4	22	16.0	19.7	0.9	17.9	5	17.2	19.2	
19-20	Adipose-fin depth	5.4	22	3.1	5.4	0.5	3.3	5	3.8	4.8	
4-9	Adipose-fin base length	16.4	22	14.9	18.7	1.0	29.9	5	26.7	29.6	
4-12	Interdorsal distance	20.3	22	14.7	20.3	1.2	15.2	5	11.7	14.6	
5-18	Unbranched pectoral-fin ray length	20.9	22	18.5	21.4	0.9	10.6	5	13.3	17.1	
5-13	Pectoral-fin length	20.6	22	15.9	20.6	1.1	16.1	5	15.4	18.3	
6-14	Pelvic-fin length	15.4	22	14.5	16.8	0.6	14.6	5	14.1	17.1	
5-6	Pectoral-pelvic fins distance	21.4	22	20.2	24.8	1.3	28.4	5	25.1	27.5	
6-7	Pelvic-anal fins distance	22.4	22	20.4	23.7	0.8	18.8	5	20.0	21.3	
3-2	Dorsal-fin insertion-hypural plate	62.9	22	59.4	64.3	1.2	64.6	5	66.2	68.4	
6-2	Pelvic-fin insertion-hypural plate	55.4	22	52.5	56.9	1.1	55.1	5	51.3	53.6	
7-2	Anal-fin insertion-hypural plate	33.1	22	30.6	35.7	1.2	35.0	5	31.3	33.7	
1-21	Head length	26.8	22	26.5	29.9	0.9	22.4	5	25.6	27.6	
	Percentage of head length										
1-27	Snout length	39.3	22	34.2	42.0	1.9	35.0	5	34.2	37.3	
26-27	Orbital diameter	14.1	22	9.4	14.2	1.4	12.3	5	14.6	19.6	

(Continues)

TABLE 1 (Continued)

(a)

LM	Measurement	<i>Cetopsorhamdia hidalgoi</i> new species				<i>Cetopsorhamdia boquillae</i> Eigenmann, 1922				<i>Cetopsorhamdia filamentosa</i> Fowler 1945				
		H	N	Min	Max	Mean	SD	H	N	Min	Max	N	Min	Max
39-40	Head width	71.1	22	55.2	71.1	64.3	4.9	74.2	5	64.4	76.8	5	64.4	76.8
41-42	Mouth width	45.0	22	35.8	53.1	42.7	3.9	40.2	5	37.2	46.0	5	37.2	46.0
47-48	Mandibular isthmus-lower lip distance	20.4	22	15.6	24.9	19.7	2.1	21.5	5	25.6	28.1	5	25.6	28.1
47-1	Mandibular isthmus-upper lip distance	26.3	22	19.0	31.3	25.0	3.5	24.9	5	25.8	31.8	5	25.8	31.8
28-29	Maxillary barbel length	126.1	22	101.7	126.1	116.3	7.2	152.8	5	222.5	276.5	5	222.5	276.5
43-44	External mandibular barbel length	84.2	22	63.5	84.8	76.0	5.0	63.5	5	89.3	111.2	5	89.3	111.2
45-46	Internal mandibular barbel length	55.6	22	43.7	58.4	51.9	3.6	48.2	5	58.9	70.4	5	58.9	70.4
21-26	Postorbital distance	52.4	22	47.5	53.4	50.5	1.5	52.1	5	47.3	49.3	5	47.3	49.3
30-31	Interorbital width	28.6	22	25.8	31.9	28.6	1.9	28.9	5	31.9	37.7	5	31.9	37.7
1-32	Snout-anterior nostril distance	11.7	22	8.7	13.5	11.0	1.2	11.3	5	8.8	10.1	5	8.8	10.1
32-33	Internostril distance	14.9	22	9.3	15.1	12.8	1.5	12.9	5	10.6	12.9	5	10.6	12.9
27-33	Posterior nostril-orbit distance	7.2	22	4.2	7.2	5.5	0.8	8.0	5	11.3	13.4	5	11.3	13.4
22-23	Head depth at supra occipital	52.4	22	39.6	56.3	51.6	4.0	53.4	5	48.2	54.1	5	48.2	54.1
24-25	Head depth at interorbital	41.5	22	33.1	43.0	37.4	2.7	39.6	5	35.2	38.9	5	35.2	38.9
35-36	Head width at posterior nostril	52.9	22	45.1	60.9	52.1	4.5	52.8	5	47.8	56.7	5	47.8	56.7
1-34	Dorsal head length	91.7	22	86.7	96.0	92.1	2.0	89.3	5	96.5	98.0	5	96.5	98.0

(b)

LM	Measurement	<i>Cetopsorhamdia iheringi</i> Schubart & Gomes 1959				<i>Cetopsorhamdia insidiosa</i> (Steindachner 1915)				<i>Cetopsorhamdia molinae</i> Miles 1943				<i>Cetopsorhamdia nasus</i> Eigenmann & Fisher 1916			
		N	Min	Max		N	Min	Max		N	Min	Max		N	Min	Max	
	Standard length (mm)	5	56.6	75.8	2	32.7	36.8	1	36.7	36.7	54.3						
	Percentage of standard length																
1-3	Predorsal distance	5	38.0	40.3	2	40.0	40.3	1	38.4	38.4	38.8						
1-4	Preadipose distance	5	69.8	71.7	2	67.9	69.9	1	66.7	66.7	71.1						
1-5	Prepectoral distance	5	22.6	24.2	2	24.9	25.9	1	24.9	24.9	24.1						
1-6	Prepelvic distance	5	44.4	46.1	2	43.1	44.0	1	45.2	45.2	46.8						
1-7	Preanal distance	5	67.9	72.0	2	67.7	68.2	1	64.8	64.8	68.9						
3-8	Body depth	5	15.5	17.7	2	16.2	16.3	1	17.4	17.4	13.5						

TABLE 1 (Continued)

(b)

LM	Measurement	Cetopsohamdia iheringi Schubart & Gomes 1959			Cetopsohamdia insidiosa (Steindachner 1915)			Cetopsohamdia molinae Miles 1943			Cetopsohamdia nasus Eigenmann & Fisher 1916			
		N	Min	Max	N	Min	Max	N	Min	Max	N	Min	Max	H
9-10	Caudal peduncle depth	5	10.4	10.7	2	8.6	9.1	1	10.6	10.6	1	10.6	10.6	9.3
2-11	Caudal peduncle length	5	15.0	19.3	2	19.1	20.6	1	23.5	23.5	1	23.5	23.5	19.3
37-38	Body width	5	17.8	20.0	2	16.5	17.5	1	22.0	22.0	1	22.0	22.0	16.7
3-12	Dorsal-fin base length	5	11.3	12.0	2	11.6	12.8	1	16.2	16.2	1	16.2	16.2	12.9
7-11	Anal-fin base length	5	13.3	14.6	2	13.5	13.7	1	12.6	12.6	1	12.6	12.6	14.1
3-15	Unbranched dorsal-fin ray length	5	12.8	19.4	2	17.4	19.5	1	30.6	30.6	1	30.6	30.6	19.9
16-17	Dorsal-fin length	5	12.5	20.3	2	16.2	18.4	1	26.0	26.0	1	26.0	26.0	16.6
19-20	Adipose-fin depth	5	3.8	4.7	2	2.3	4.1	1	5.6	5.6	1	5.6	5.6	4.6
4-9	Adipose-fin base length	5	14.3	16.4	2	15.2	15.5	1	20.5	20.5	1	20.5	20.5	16.9
4-12	Interdorsal distance	5	20.3	21.6	2	18.0	19.5	1	13.4	13.4	1	13.4	13.4	19.6
5-18	Unbranched pectoral-fin ray length	5	12.4	16.4	2	16.3	17.2	1	23.0	23.0	1	23.0	23.0	18.4
5-13	Pectoral-fin length	5	14.7	19.4	2	19.1	19.1	1	21.6	21.6	1	21.6	21.6	20.0
6-14	Pelvic-fin length	5	13.1	18.3	2	17.0	17.3	1	19.2	19.2	1	19.2	19.2	17.1
5-6	Pectoral-pelvic fins distance	5	22.8	24.9	2	20.2	20.6	1	21.9	21.9	1	21.9	21.9	23.9
6-7	Pelvic-anal fins distance	5	24.3	26.9	2	22.1	23.0	1	20.9	20.9	1	20.9	20.9	22.9
3-2	Dorsal-fin insertion-hypural plate	5	61.3	63.6	2	62.6	64.0	1	63.4	63.4	1	63.4	63.4	63.4
6-2	Pelvic-fin insertion-hypural plate	5	55.6	56.6	2	55.2	57.4	1	56.6	56.6	1	56.6	56.6	53.6
7-2	Anal-fin insertion-hypural plate	5	29.8	32.8	2	32.3	33.7	1	35.2	35.2	1	35.2	35.2	31.8
1-21	Head length	5	24.5	26.8	2	27.2	28.4	1	27.7	27.7	1	27.7	27.7	25.7
Percentage of head length														
1-27	Snout length	5	36.4	41.1	2	35.4	36.2	1	38.2	38.2	1	38.2	38.2	-
26-27	Orbital diameter	5	10.0	13.9	2	10.7	11.1	1	11.0	11.0	1	11.0	11.0	13.2
39-40	Head width	5	66.5	81.7	2	61.9	63.3	1	73.9	73.9	1	73.9	73.9	62.6
41-42	Mouth width	5	35.0	40.2	2	30.5	32.6	1	45.0	45.0	1	45.0	45.0	32.0
47-48	Mandibular isthmus-lower lip distance	5	21.5	24.0	2	22.4	23.5	1	20.9	20.9	1	20.9	20.9	24.4
47-1	Mandibular isthmus-upper lip distance	5	28.0	32.7	2	32.5	32.6	1	25.8	25.8	1	25.8	25.8	35.5
28-29	Maxillary barbel length	5	62.4	134.6	2	79.6	85.5	1	121.5	121.5	1	121.5	121.5	94.1
43-44	External mandibular barbel length	5	35.9	59.8	2	47.4	52.0	1	63.5	63.5	1	63.5	63.5	49.5
45-46	Internal mandibular barbel length	5	29.8	38.9	2	35.4	39.4	1	43.6	43.6	1	43.6	43.6	52.5

(Continues)

TABLE 1 (Continued)

(b)

LM	Measurement	Cetopsohamdia iheringi Schubart & Gomes 1959			Cetopsohamdia insidiosa (Steindachner 1915)			Cetopsohamdia molinae Miles 1943			Cetopsohamdia nasus Eigenmann & Fisher 1916			
		N	Min	Max	N	Min	Max	N	Min	Max	N	Min	Max	
21-26	Postorbital distance	5	47.8	52.6	2	52.0	54.2	1	48.1	48.1	1	48.1	48.1	31.5
30-31	Interorbital width	5	25.1	28.4	2	25.7	26.8	1	26.6	26.6	1	26.6	26.6	47.8
1-32	Snout-anterior nostril distance	5	10.8	12.5	2	8.9	11.6	1	15.3	15.3	1	15.3	15.3	11.5
32-33	Internostril distance	5	12.1	13.4	2	8.3	11.1	1	12.0	12.0	1	12.0	12.0	13.6
27-33	Posterior nostril-orbit distance	5	6.1	7.6	2	7.8	8.6	1	7.1	7.1	1	7.1	7.1	5.0
22-23	Head depth at supra occipital	5	47.7	52.8	2	52.9	59.1	1	53.5	53.5	1	53.5	53.5	54.1
24-25	Head depth at interorbital	5	32.9	39.6	2	36.5	36.7	1	42.6	42.6	1	42.6	42.6	41.8
35-36	Head width at posterior nostril	5	52.8	58.3	2	46.7	47.2	1	61.9	61.9	1	61.9	61.9	47.6
1-34	Dorsal head length	5	88.8	93.3	2	94.7	94.9	1	87.5	87.5	1	87.5	87.5	91.6

(c)

LM	Measurement	Cetopsohamdia orinoco Schultz 1944			Cetopsohamdia phantasia Stewart 1985			Cetopsohamdia picklei Schultz 1944			Cetopsohamdia shermani Schultz 1944			
		H	N	Min	Max	H	N	Min	Max	H	N	Min	Max	
	Standard length (mm)	54.3	6	32.3	71.0	38.8	2	38.8	39.0	88.4	17	42.2	89.3	30.5
	Percentage of standard length													
1-3	Predorsal distance	36.2	6	32.4	38.8	42.5	2	41.4	42.5	35.4	17	34.8	40.4	38.7
1-4	Preadipose distance	68.2	6	64.6	69.7	67.2	2	67.2	67.8	69.5	17	65.7	71.9	67.8
1-5	Prepectoral distance	23.2	6	18.9	24.5	24.9	2	22.8	24.9	23.1	17	21.2	26.7	24.4
1-6	Prepelvic distance	44.5	6	38.0	44.7	45.1	2	45.1	46.3	45.5	17	44.4	47.3	45.6
1-7	Preal distance	64.8	6	62.0	66.3	67.1	2	67.1	67.2	69.5	17	67.0	70.8	65.0
3-8	Body depth	11.6	6	8.7	13.5	19.8	2	19.0	19.8	20.5	17	15.3	23.3	17.4
9-10	Caudal peduncle depth	8.7	6	5.9	9.9	9.3	2	9.2	9.3	12.5	17	11.1	14.1	10.4
2-11	Caudal peduncle length	22.8	6	20.7	25.1	21.2	2	21.0	21.2	19.0	17	18.2	22.6	19.4
37-38	Body width	19.8	6	16.1	19.8	17.2	2	17.1	17.2	18.9	17	17.4	20.4	20.7
3-12	Dorsal-fin base length	13.7	6	12.2	14.2	22.8	2	22.6	22.8	12.4	17	11.1	13.2	16.6
7-11	Anal-fin base length	13.7	6	12.1	14.4	12.7	2	12.7	15.2	13.8	17	11.9	13.8	14.2
3-15	Unbranched dorsal-fin ray length	16.7	6	16.7	21.7	26.1	2	25.6	26.1	21.1	17	19.5	22.8	24.7

TABLE 1 (Continued)

(c)

LM	Measurement	Cetopsorhamdia orinoco Schultz 1944			Cetopsorhamdia phantasia Stewart 1985			Cetopsorhamdia picklei Schultz 1944			Cetopsorhamdia shermani Schultz 1944				
		H	N	Max	H	N	Max	H	N	Max	H	N	Max		
16-17	Dorsal-fin length	16.2	6	14.2	18.8	2	18.8	20.6	17	18.3	20.6	17	18.3	22.3	21.3
19-20	Adipose-fin depth	4.0	6	3.1	4.8	2	4.8	5.5	17	3.6	5.5	17	3.6	6.4	6.3
4-9	Adipose-fin base length	22.8	6	21.6	21.4	2	20.4	17.4	17	14.8	17.4	17	14.8	18.5	19.6
4-12	Interdorsal distance	18.5	6	16.5	5.9	2	5.5	22.0	17	17.7	22.0	17	17.7	23.1	13.9
5-18	Unbranched pectoral-fin ray length	17.7	6	17.4	31.4	2	28.3	17.6	17	14.2	17.6	17	14.2	19.8	22.1
5-13	Pectoral-fin length	17.6	6	14.8	22.2	2	22.2	20.1	17	17.7	20.1	17	17.7	21.7	20.9
6-14	Pelvic-fin length	16.2	6	13.9	25.0	2	21.1	19.1	17	17.3	19.1	17	17.3	20.3	18.3
5-6	Pectoral-pelvic fins distance	24.7	6	19.7	24.3	2	24.3	24.0	17	21.7	24.0	17	21.7	27.5	22.6
6-7	Pelvic-anal fins distance	22.4	6	21.6	24.0	2	20.9	24.1	17	22.5	24.1	17	22.5	26.7	19.6
3-2	Dorsal-fin insertion-hypural plate	64.7	6	64.3	61.8	2	61.6	65.2	17	61.9	65.2	17	61.9	66.7	64.4
6-2	Pelvic-fin insertion-hypural plate	57.8	6	55.1	55.7	2	55.7	55.3	17	54.5	55.3	17	54.5	58.2	54.7
7-2	Anal-fin insertion-hypural plate	35.9	6	34.3	34.3	2	34.3	31.7	17	30.0	31.7	17	30.0	34.6	35.4
1-21	Head length	23.5	6	21.7	25.4	2	24.9	25.6	17	24.4	25.6	17	24.4	27.4	27.3
1-27	Snout length	36.2	6	32.4	34.9	2	34.3	38.0	17	34.5	38.0	17	34.5	40.3	41.9
26-27	Orbital diameter	68.2	6	64.6	22.1	2	20.4	10.6	17	7.7	10.6	17	7.7	13.8	10.1
39-40	Head width	23.2	6	18.9	58.4	2	58.4	76.5	17	62.4	76.5	17	62.4	76.5	70.4
Percentage of head length															
41-42	Mouth width	40.5	6	35.2	45.4	2	45.4	34.8	17	27.6	34.8	17	27.6	41.0	41.4
47-48	Mandibular isthmus-lower lip distance	9.0	6	8.4	19.0	2	19.0	18.5	17	17.8	18.5	17	17.8	23.3	16.6
47-1	Mandibular isthmus-upper lip distance	86.3	6	73.4	24.7	2	24.7	31.6	17	27.1	31.6	17	27.1	35.8	21.1
28-29	Maxillary barbel length	40.5	6	40.0	430.3	2	403.1	119.9	17	104.2	119.9	17	104.2	135.2	172.4
43-44	External mandibular barbel length	21.5	6	20.9	137.8	2	137.8	56.4	17	51.8	56.4	17	51.8	68.5	85.8
45-46	Internal mandibular barbel length	33.3	6	25.2	57.8	2	57.8	34.3	17	33.5	34.3	17	33.5	42.2	51.4
21-26	Postorbital distance	128.5	6	128.5	46.6	2	46.6	49.1	17	47.8	49.1	17	47.8	52.9	47.4
30-31	Interorbital width	74.8	6	66.5	22.7	2	22.7	20.2	17	20.2	20.2	17	20.2	25.9	31.0
1-32	Snout-anterior nostril distance	49.0	6	43.1	10.5	2	10.5	11.8	17	9.9	11.8	17	9.9	12.8	13.1
32-33	Internostril distance	51.2	6	49.1	19.1	2	19.1	14.0	17	9.2	14.0	17	9.2	15.2	14.9
27-33	Posterior nostril-orbit distance	26.9	6	23.7	1.9	2	1.9	7.1	17	4.5	7.1	17	4.5	7.9	5.4
22-23	Head depth at supra occipital	13.9	6	11.8	57.7	2	54.4	57.7	17	47.9	57.7	17	47.9	60.1	52.9

(Continues)

TABLE 1 (Continued)

(c)

LM	Measurement	<i>Cetopsorhamdia orinoco</i> Schultz 1944			<i>Cetopsorhamdia phantasia</i> Stewart 1985			<i>Cetopsorhamdia picklei</i> Schultz 1944			<i>Cetopsorhamdia shermani</i> Schultz 1944		
		H	N	Max	H	Min	Max	H	N	Min	Max	H	
24–25	Head depth at interorbital	11.9	6	8.0	43.2	2	43.2	38.5	17	34.5	43.7	41.4	
35–36	Head width at posterior nostril	7.4	6	4.6	47.4	2	47.4	50.2	17	46.8	52.0	52.6	
1–34	Dorsal head length	52.2	6	43.0	100.0	2	97.1	90.8	17	88.6	97.0	93.3	

Note: Highlighted areas indicate measurements that differ from those of new species.

Abbreviations: H: holotype; LM: landmark; Max: maximum; Min: minimum; N: number of specimens; SD: standard deviation.

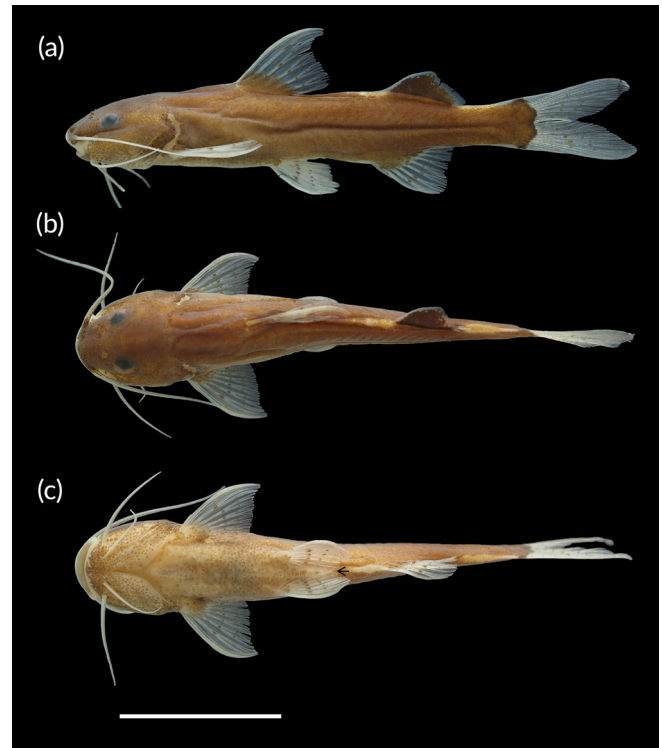


FIGURE 1 *Cetopsorhamdia hidalgoi*. MUSM 69550, holotype, 30.7 mm L_S , Peru, Loreto, Requena, Tapiche River tributary to Ucayali River basin. (a) Lateral view, (b) dorsal view and (c) ventral view. Black arrow indicates the urogenital papillae. Scale bar = 1 cm

2, 28.9–30.7, collected with MUSM 60687. **Madre de Dios drainage.** Madre de Dios Department, Manu Province: MUSM 23696, 1, 28.3 mm L_S , Amiguillos Boca creek, tributary to Amiguillos River, Amigos River, 12° 22' 15.91" S; 70° 22' 13.83" W, 21 June 2004, M. Hidalgo et al. **All from Ecuador, Napo drainage.** All from Sucumbios Province, Shushufundi Canton: FMNH 103260, 1, 27.0 mm L_S , Napo River, 0° 10' 59.88" S; 76° 30' 0.00" W, 25 November 1985, D. J. Stewart, M. C. Ibarra, R. Barriga-Salazar. FMNH 103261, 1, 28.8 mm L_S , Napo River, 0° 10' 54.12" S; 76° 50' 35.88" W, 27 September 1981, D. J. Stewart, M. C. Ibarra, R. Barriga-Salazar. All from Orellana Province, Francisco de Orellana Canton: FMNH 103262, 2, 28.9–28.9 mm L_S , Napo River, 0° 40' 0.12" S; 76° 53' 42.00" W, 04 November 1981, D. J. Stewart, M. C. Ibarra, R. Barriga-Salazar. **Colombia:** ROM 107277, 2, 29.6–31.5 mm L_S , Caqueta Department, Florencia, Orteguzza River, 1° 39' 29.70" N; 75° 32' 31.06" W, 08 July 2017, N. K. Lujan, A. Ortega-Lara, G. C. Sanchez, C. Conde, V. Meza-Vargas.

Diagnosis

C. hidalgoi new species is distinguished from all congeners by having one or two dark brown stripes on dorsal, pelvic and anal fins (vs. stripes on previous fins absent). In addition, *C. hidalgoi* can be distinguished from all congeners except from *C. molinae* by having fewer vertebrae (34–35 vertebrae vs. 36 in *C. shermani*; 36–37 in *C. phantasia*; 36–38 in *C. picklei*; 36–39 in *C. nasus*; 37 in *C. boquillae* and *C. insidiosa*; 37–39 in *C. iheringi*; 38–40 in *C. orinoco*; 39–40 in

FIGURE 2 Left lateral view of the caudal skeleton of *Cetopsorhamdia hidalgoi*, MUSM 60687, paratype, 28.7 mm L_S . Abbreviations of the anatomical parts: ep: epural; hu1 + hu2: complex plate formed by hypurals 1 and 2; hu3 + hu4 + hu5: complex plate formed by hypurals 3, 4 and 5; ph: parhypural; pu1 + u1: complex centrum formed by preural centrum 1 and ural centrum 1; pu2: preural centrum 2; ur: uroneural. Scale bar = 1 mm

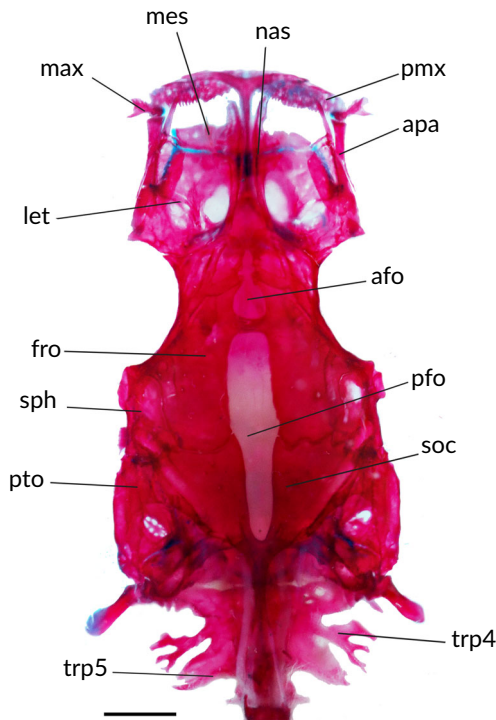
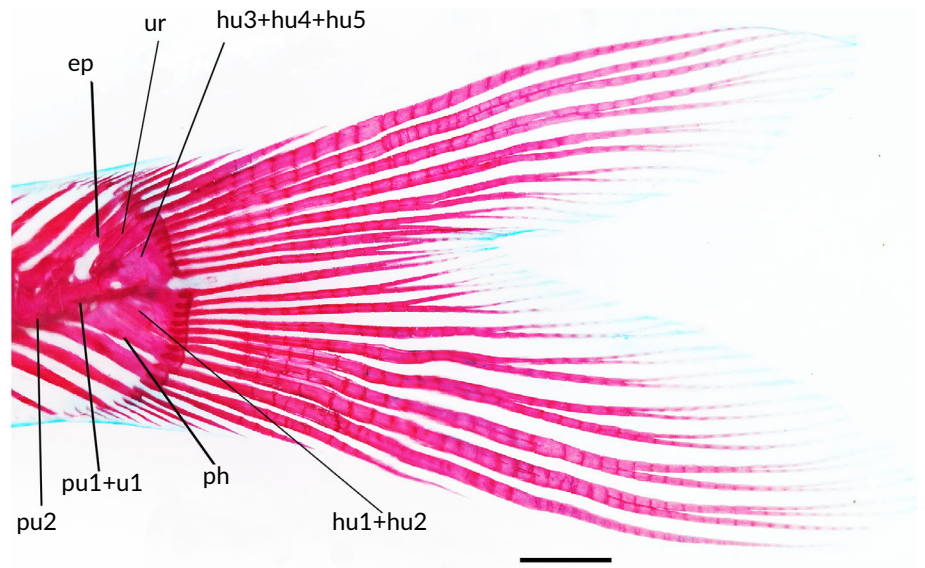


FIGURE 3 Dorsal view of cranium of *Cetopsorhamdia hidalgoi*, MUSM 60687, paratype, 28.7 mm L_S . Abbreviations of the anatomical parts: afo: anterior fontanel; apa: autopalatine; fro: frontal; let: lateral ethmoid; max: maxilla; mes: mesethmoid; nas: nasal; pfo: posterior fontanel; pmx: premaxilla; pto: pterotic; soc: supraoccipital; sph: sphenotic; trp4: transverse process 4; trp5: transverse process 5. Scale bar = 1 mm

C. spilopleura; 40–42 in *C. clathrata* and 45 in *C. filamentosa*. *C. hidalgoi* can be distinguished from all *Cetopsorhamdia* except from *C. boquillae* and *C. spilopleura* by having fewer number of paired ribs (7 ribs vs. 8 ribs in *C. molinae*, *C. phantasia* and *C. filamentosa*; 8–9 ribs

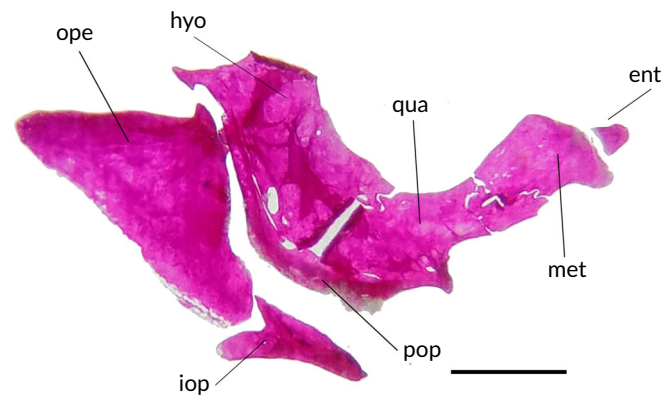


FIGURE 4 Right lateral view of suspensorium of *Cetopsorhamdia hidalgoi*, MUSM 62715, paratype, 27.8 mm L_S . Abbreviations of the anatomical parts: ent: entopterygoid; hyo: hyomandibula; iop: interopercle; met: metapterygoid; ope: opercle; pop: preopercle; qua: quadrate. Scale bar = 1 mm

in *C. orinoco* and *C. clathrata*; 9 ribs in *C. insidiosa*, *C. picklei* and *C. shermani*; 10 ribs in *C. nasus*; and 9–12 ribs in *C. iheringi*). Moreover, *C. hidalgoi* can be distinguished from all congeners except from *C. molinae* and *C. shermani* by having the first anal fin pterygiophore inserted on vertebrae 18–19 and 19–20 (vs. inserted on vertebrae 21 in *C. boquillae*, *C. insidiosa*, *C. orinoco*, *C. phantasia* and *C. picklei*; 21–22 in *C. iheringi*; 22–24 in *C. spilopleura*; 22–25 in *C. clathrata*; 23 in *C. nasus* and *C. filamentosa*). It is further distinguished from all *Cetopsorhamdia* species except from *C. molinae*, *C. picklei* and *C. shermani* by having the first dorsal fin pterygiophore inserted on vertebra 7 (vs. inserted on vertebrae 4 in *C. filamentosa*; 8 in *C. boquillae*, *C. iheringi*, *C. insidiosa*, *C. orinoco*; 9 in *C. nasus*; 10 in *C. phantasia*; 11–12 in *C. clathrata* and *C. spilopleura*). It is further distinguished from *C. clathrata*, *C. spilopleura*, *C. molinae* and *C. shermani* by having homogeneous dark brown colouration on body sides with

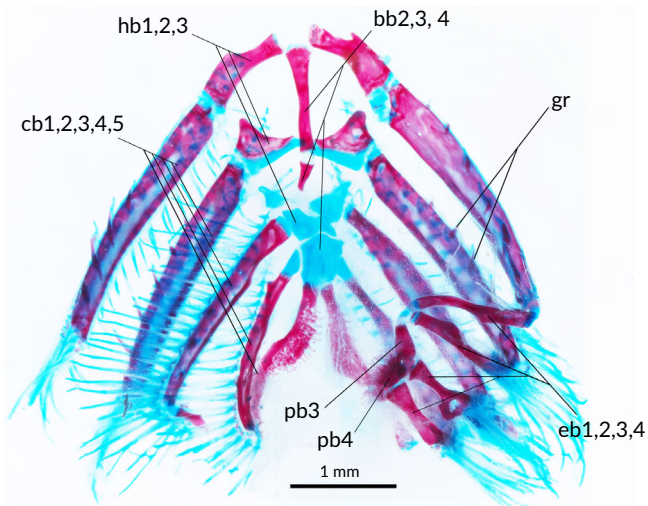


FIGURE 5 Dorsal view of the branchial arch of *Cetopsorhamdia hidalgoi*, MUSM 60687, paratype, 28.7 mm L_S . Abbreviations of the anatomical parts: bb₂₋₄: basibranchial 2 to 4; cb₁₋₅: ceratobranchial 1–5; eb₁₋₄: epibranchial 1–4; gr: gill rakers; hb₁₋₃: hypobranchial 1–3; pb₃₋₄: pharyngo-branchial 3–4. Scale bar = 1 mm

two more intense dark brown bars, first one ventral to adipose fin and second one at the caudal-fin base (vs. two longitudinal rows of 10–12 quadrangular dark brown marks in *C. clathrata*; 18–22 irregular, vertical brown bars in *C. spilopleura*; four well-defined vertical dark brown bars, first anterior to dorsal-fin, second posterior to dorsal-fin, third below adipose fin and a last one at the caudal-fin base in *C. molinae* and *C. shermani*). Furthermore, *C. hidalgoi* can be distinguished from *C. phantasia* by having six branched rays on dorsal-fin (vs. 10 branched rays on dorsal-fin). In addition, other proportional measurements distinguish *C. hidalgoi* from all congeners (except *C. clathrata* and *C. spilopleura*) as highlighted in Table 1a–c.

Description. Morphometric data presented in Table 1a.

Body elongate, cylindrical in cross section until adipose-fin and becoming progressively compressed posteriorly. Body depth at dorsal-fin origin c. 0.12–0.18 of L_S , and less than HL. Lateral line on body complete until anterior edge of the hypural plate. Dorsal profile of body slightly convex, mildly straight from nape to adipose fin insertion, slightly convex from insertion to end of adipose-fin and slightly straight from end of adipose-fin to caudal-fin base. Ventral profile of body slightly convex from opercle opening to pelvic girdle, mildly straight from that point to anal-fin origin, slightly convex from anal-fin insertion to caudal-fin origin. Caudal-peduncle depth approximately twice of caudal-peduncle length.

Head small, slightly depressed with conical snout in dorsal view. Dorsal profile of head forming convex arch from snout tip to supra-occipital, and ventral profile of head slightly convex from tip of lower lip to opercle opening. Anterior nostril tubular and closer to upper lip. Posterior nostril opening nearly round and with flap of skin extending along aperture, closer to anterior margin of eye than to anterior nostril. Four nostrils arranged as in vertices of a trapezoid; anterior nostril

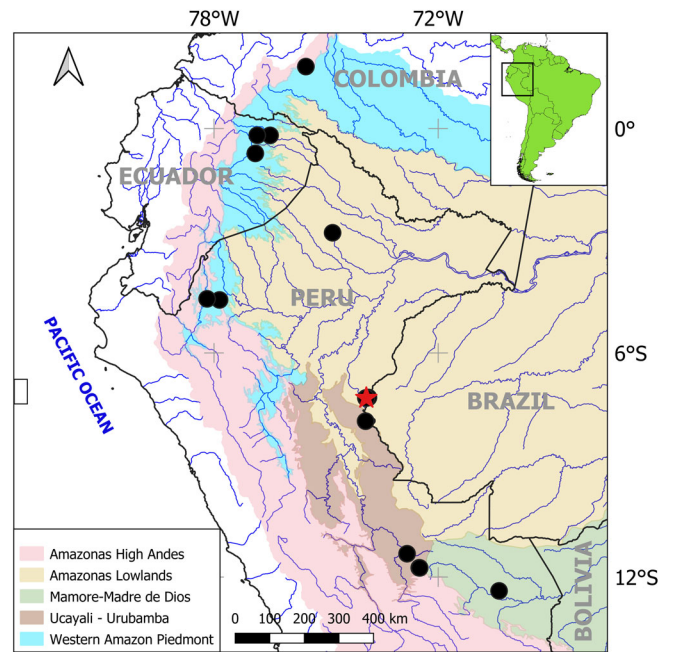


FIGURE 6 Geographical distribution of *Cetopsorhamdia hidalgoi*. Red star symbol represents the type locality. Each symbol may represent more than one collection lot

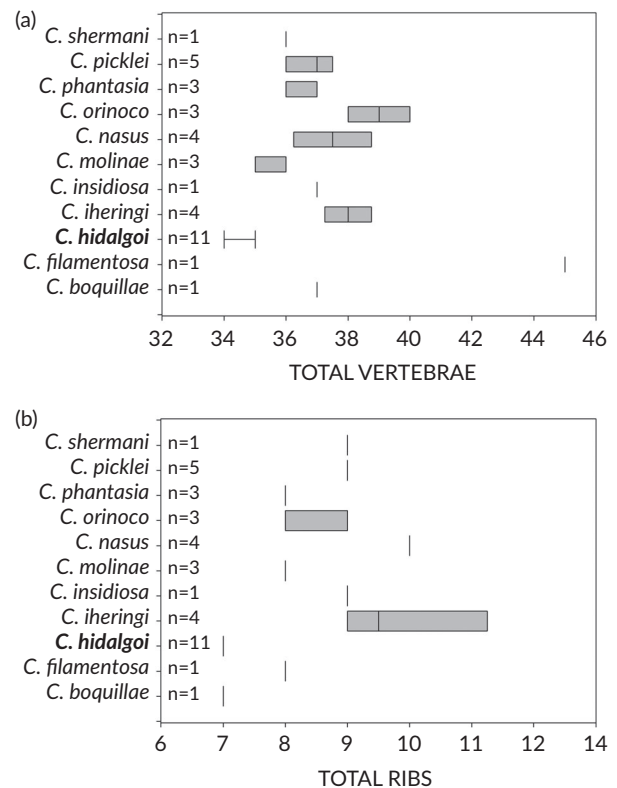


FIGURE 7 Boxplot showing meristic variation among *Cetopsorhamdia*. (a) Number of total vertebrae. (b) Number of ribs. |, median; □, 25th to 75th percentiles; T, 95% range; n, sample size

distance narrower than posterior nostril distance; all nostrils lacking barbels. Eye diameter similar to internostril distance.

Mouth wide, subterminal (approximately half of HL); margin of lower jaw slightly convex, lateral commissure reaching to vertical through middle of internostril region. Premaxillary rectangular, length approximately four times its width; teeth on premaxilla small, conical and sharply pointed and arranged in five or six nearly regular rows. Maxillary, inner and outer mental barbels short, slender and tapering distally. Maxillary barbel reaching pectoral-fin origin when adpressed (more than one time its HL), inserted posterior to upper lip. Outer mental barbel inserted at middle of vertical through region between maxillary barbel insertion and anterior eye margin, its tip reaching pectoral-fin insertion when adpressed (one-sixth to one-eighth of HL). Inner mental barbel inserted anterior to vertical through insertion of mental barbel, its tip reaching inner border of branchiostegal membrane when adpressed.

Dorsal fin moderately large, with length of dorsal-fin base 0.4–0.5 of HL, distally triangular in lateral profile. Dorsal-fin spinelet absent, first dorsal fin ray unbranched with proximal one-fifth rigid and remainder flexible, lacking distal filament in all examined specimens, six branched rays (18), first pterygiophore inserted on bifid neural spine of vertebrae 7 (12).

Pectoral fin length approximately four-fifths of HL, with $i + 8$ (16*) or $i + 9$ (2) rays, and distal margin triangular; first pectoral fin ray slightly longer than other fin rays, proximal portion of first pectoral-fin ray slightly rigid and distal portion soft, and not prolonged as filament in any examined specimens, tip of pectoral-fin close to pelvic-fin insertion.

Pelvic fin small, approximately half of HL, with $i + 6$ (21), all rays completely soft, distal margin slightly convex. Pelvic fin insertion located halfway between pectoral and anal fin insertions, tip of pelvic fin surpassing anus and urogenital papillae.

Anal fin $iii + 7$ (1), $iii + 8$ (2), $iv + 7$ (13) and $iv + 8$ (2*); triangular margin on lateral profile, small fin base (0.11–0.15 of L_S). Anal-fin base insertion anterior to vertical through the adipose fin insertion. First anterior pterygiophore of anal fin inserted between 18 and 19 (8) or 19 and 20 (3) vertebrae.

Adipose fin short (0.15–0.19 of L_S), distal margin triangular in lateral profile. Adipose fin insertion slightly posterior to body midpoint and posterior to vertical through anal fin insertion. Adipose fin insertion between vertebrae 20 and 21 (9) and 21 and 22 (2).

Caudal fin deeply forked, with ventral lobe slightly longer than dorsal lobe and tips of lobes rounded. Total caudal fin rays 40 (2), 41 (5), 42 (2), 43 (1) and 44 (2); 19 (1), 20 (4), 21 (5) and 22 (2) on dorsal caudal lobe and 20 (4), 21 (5), 22 (2) and 23 (1) on ventral caudal lobe. Dorsal caudal lobe with 7 (19*) branched rays and ventral caudal lobe with 8 (19*) branched rays. Caudal fin (Figure 2) with five hypurals series: hu1, hu2, hu3, hu4 and hu5. Ventral caudal plate (hu1 and hu2) and dorsal caudal plate (hu3, hu4 and hu5) separated distally. Hypurals 1 and 2 completely fused into single ventral caudal plate, without any vestige of suture line. Parhypural very close to ventral margin of hu1 with some proximal suture region. Third and fourth hypurals completely fused into single dorsal caudal plate. Fifth hypural and hu3 + hu4 with proximal region suture, medial

and distal region free. Uroneural present and fused to hypural five, with vestige of suture. Epural rod-like and connected to dorsal region of preural centrum 1 and ural centrum 1 (pu1 + u1). Hypurapophysis complex with foramen (passage of dorsal branch of caudal artery) posterior to pu1 + u1 centrum. Posteriormost neural spines without any process. Dorsal caudal plate (hypural 3, 4 and 5) with 8 (12) rays. Ventral caudal plate (hypural 1 and 2) with 9 (12) rays. Total vertebrae 34 (2) or 35 (9). 12 (1) or 13 (10) precaudal vertebrae and 21 (2), 22 (8) or 24 (1) caudal vertebrae (complete haemal spine). Ribs 8 (11) pairs.

Cranial skeleton (Figure 3). Cranial roof bones lacking ornamentation; dorsal surface slightly convex and without crests; orbital region well defined dorsally; concave and limited anteriorly by lateral ethmoid, laterally by frontal and posteriorly by sphenotic; interorbital wider than its length; two cranial fontanels separated by epiphyseal bar; posterior fontanel longer than anterior fontanel (more than thrice of anterior fontanel length), anterior region of posterior fontanel twice the width of its posterior region, anterior region of anterior fontanel elongated, posterior region of anterior fontanel rounded; epiphyseal bar located anterior to midpoint of frontals length. Mesethmoid in dorsal and ventral plane; anterolateral mesethmoid in dorsal horizontal plane, anterolateral mesethmoid *cornu* short, thick, blunt-tipped and anterolaterally directed; posterolateral mesethmoid in ventral horizontal plane, laterally projected; region between posterior border of posterolateral mesethmoid and anterior border of lateral ethmoid separated (connected only by ethmoidean cartilage). Lateral ethmoid slightly rectangular; anterior and lateral margins slightly concave; posterior portion longer than anterior portion; lateral region of posterior portion pointed. Vomer arrow-shaped, small (half size of posterolateral mesethmoid). Premaxilla rectangular, width more than thrice its length; anterior margin continuous, posterolateral edge similar to posteromedial angle; five or six irregular rows of villiform teeth. Maxilla small and trapezoidal (distal longer than mesial region), distal region forming bony tubule around maxillary barbel base. Autopalatine rod-like; size longer than orbital region; small cartilages at anterior and posterior margins, anterior slightly longer than posterior cartilage. Nasal shorter than autopalatine, slightly wider than autopalatine, and poorly ossified. Frontal smooth and lacking processes; anteriorly limited by lateral ethmoid, posterolaterally limited by sphenotic and posteriorly limited by supraoccipital; posterior and anterior portion with similar width. Sphenotic smaller than pterotic; sphenotic slightly narrower than pterotic, anterior and posterior portions with similar width. Pterotic longer than sphenotic; anterior portion narrower than posterior portion. Supraoccipital limited laterally by sphenoid, and anteriorly by posterior margin of sphenotic and frontals; supraoccipital process narrow, bifid and medium-sized (similar size of anterior fontanel length), reaching midpoint of complex *centra* (in dorsal view).

Complex anterior vertebra (Figure 3). Composed of vertebrae 1, 2, 3, 4 and 5; vertebrae 1 disc-like element and attached to complex vertebra; complex vertebra (vertebrae 2–4) attached to vertebra 5 with suture ventrally; neural spine of vertebra 4 not covering neural spine of vertebra 5. Transverse process of vertebra 4 divided into anterior and posterior branches. Anterior branch of transverse process of vertebra 4 wide, laminar and expanded laterally; proximal portion

wider than distal portion. Posterior branch divided in anterior and posterior portion; anterior portion arborescent, divided into two main arms (anterior and posterior arms), posterior arms with conspicuous notch; posterior portion triangular and expanded laterally one-third length of anterior portions. Transverse process of vertebra 5 is expanded and not branched.

Suspensory (Figure 4). Entopterygoid small and slightly quadrangular; anterodorsal and posteroventral margins pointed and anterior margin attached to lateral process of vomer; posterior margin slightly concave and attached to anterodorsal margin of metapterygoid. Metapterygoid quadrangular, smooth and approximately four times entopterygoid size; dorsal, anterior and ventral margins slightly concave; posterodorsal and posteroventral margin of metapterygoid attached with dentate suture and small cartilaginous bar to anterodorsal margin of quadrate; and ventral margin joint with anterodorsal process of quadrate. Quadrate approximately rectangular, smaller than hyomandibula; anterior and posterior portions separate each other; anterior margin of quadrate with long anterodorsal process covering ventrolateral margin of metapterygoid; dorsal margin slightly concave; posterodorsal and posteroventral margins connected to hyomandibula with dentate sutures and large cartilaginous bar; anterior portion of quadrate with robust triangular process to articulate with angulo-articulo-retroarticular. Hyomandibula rectangular and slightly smooth (with crest for the insertion of the *levator arcus palatini* muscle); anterodorsal margin concave; dorsal margin with wide processes to connect to neurocranium; posterodorsal hyomandibular process slender and triangular (insertion of *levator operculi* muscle) with posterior margin pointed; medial face of hyomandibula with slender elliptical foramen for hyoideomandibular nerve trunk passage. Opercle triangular and longer than hyomandibula; anterior and posteroventral margins slightly convex; dorsal margin mostly straight; posterior and ventral margins rounded, with posterior margin oriented ventrally; lateral surface flat with conspicuous crest and fossae for accommodation of *levator operculi* muscle. Interopercle triangular; anterior, posterior and dorsal margin pointed; ventral margin and posterodorsal region concave; anterodorsal region slightly concave. Preopercle rod-shape; anterior margin wider than posterior margin; anterodorsal border articulating with ventral margin of quadrate and posterodorsal border articulating with anteroventral border of hyomandibula.

Branchial arches (Figure 5). Three basibranchial series: bb2, bb3 and bb4 (basibranchial 1 absent). Basibranchial 2 and 3 antero-posteriorly elongate, largely ossified, anterior portion wider than posterior portion, bb2 four times longer than bb3. Basibranchial 4 completely cartilaginous, hexagonal shape, anterior and posterior portions pointed and lateral portions slightly concave; bordered by cartilaginous heads, hypobranchial 3 anteriorly, ceratobranchial 5 posteriorly and ceratobranchial 4 laterally. Three hypobranchial series: hb1, hb2 and hb3. Hypobranchial 1 laterally elongate, largely ossified, size more than twice its greatest width, largely ossified, cartilage just in proximal and distal extremities, anterior portion with uncinat process. Hypobranchial 2 slightly elongate, triangular with medial portion more pointed than lateral portion, anterior portion ossified and

posterior portion cartilaginous, ossified portion twice longer than cartilaginous portion. Hypobranchial 3 completely cartilaginous, rectangular and elongate anterolaterally; hypobranchial 4 absent. Five ceratobranchial series: cb1, cb2, cb3, cb4 and cb5; fully ossified with cartilage only at their distal and proximal extremities; ceratobranchial 1 and 2 similar size, longer and wider than ceratobranchial 3, 4 and 5. Ceratobranchial 3 longer and wider than ceratobranchial 4. Ceratobranchial 4 and 5 with similar length but cb5 expanded anteromedially to support one patch of conical teeth, teeth with similar size and covering more than half of cb5 length. Four epibranchial series plus accessory element of ceratobranchial 4: eb1, eb2, eb3, eb4 and aeb4; first four rod-shaped, anteromedially narrower than posterolaterally portion; mostly ossified; eb1, eb2, eb3 and eb4 extremities and aeb4 cartilaginous; epibranchial 1 and 2 with similar size, eb1 and eb2 longer than eb3 and eb4. Epibranchial 3 with triangular posterior uncinat process united to medial portion to itself (looks like foramen on posterior portion of cb3). Epibranchial 4 expanded at anterior and posterior portion. Two pharyngobranchial series: pb3 and pb4; pharyngobranchial 1 and 2 absent. Pharyngobranchial 3 rectangular, ossified and anterior portion narrower than posterior portion. Pharyngobranchial 4 ossified, semicircular with patch of conical teeth.

3.2 | Colour in alcohol

Dorsal and lateral body surfaces mostly dark brown with cream details and ventral surface cream (Figure 1). Dorsal region of head and cheeks covered by dark brown pigment, ventral region cream with scattered dark brown chromatophores fading ventrally and cream blotches anterior to adipose fin insertion and on dorsal region of caudal peduncle. Distal portion of maxillary barbel with dark brown pigment dorsally and proximal portion unpigmented. Outer mental barbel dark brown dorsally only on distal portion and proximal portion unpigmented. Inner mental barbel dark brown pigment only on insertion, and proximal portion unpigmented.

Base of caudal fin with “W” shape dark brown blotch. Caudal-fin rays grey and inter-radial caudal-fin membrane translucent with one well-defined dark brown vertical “V” shape stripe and one diffuses dark brown vertical “V” shape stripe. Dorsal, anal, pectoral and pelvic fins with two dark brown stripes, with concentration of grey chromatophores along rays and interradian membranes translucent; fin bases with concentration of dark brown chromatophores. Adipose fin with distal grey pigmentation, base with concentration of dark brown chromatophores reaching more than half its depth. Black and narrow stripe along lateral line, slightly convex above pectoral fin and straight along midbody line from that point to caudal-fin base.

3.3 | Sexual dimorphism

Urogenital region triangular and slightly elongate in males (Figure 1c, black arrow), trapezoidal and short in females.

3.4 | Etymology

Named in honour of the authors' colleague and friend Max Hidalgo, professor, and curator of the Ichthyology Department at the Museo de Historia Natural in the Universidad Nacional Mayor de San Marcos (MUSM) for his devotion and dedication to Peru Ichthyology. Hidalgo collected the holotype, in addition to many specimens of the type series on expeditions including several rapid inventories in Peru that have led to the creation of multiple conservation areas.

3.5 | Geographic distribution

C. hidalgoi is known from the Ucayali, Marañón, Napo and Orteguaza rivers tributaries of the Upper Amazon River in Peru, Ecuador and Colombia and from the Madre de Dios River tributary of the Madeira River basin in Peru (Figure 6).

3.6 | Ecology

Found in clearwater streams with modest flow, substrate often with submerged leaves and sand.

4 | DISCUSSION

Cetopsorhamdia belongs to Heptapterini which is based on 12 synapomorphies (Bockmann, 1998; Ferraris Jr, 1988; Silva *et al.*, 2021). All these synapomorphies were found in the new species *C. hidalgoi*, most of them shown in Figures 1–5.

Based on morphological (Bockmann, 1998) and molecular (Faustino-Fuster *et al.*, 2021) phylogenies, *Cetopsorhamdia* do not form a monophyletic genus, and some species are to be moved to different genera not yet formally described (Bockmann & Slobodian, 2017).

Bockmann and Reis (2021) (based on Bockmann, 1998) diagnosed the genus *Cetopsorhamdia* by having four synapomorphies: (a) presence of a medial ossification over the median portion of the skull, covering the epiphyseal bar and leaving reduced anterior and posterior fontanels; (b) orbital (= optic) foramen small; (c) mouth ventral and (d) snout conical. According to morphological data (Figures 1 and 2) *C. hidalgoi* does not contain the first previous synapomorphy of the four morphological characters to diagnosis *Cetopsorhamdia*. It is more similar to *C. molinae*, *C. orinoco*, *C. phantasia* and *C. shermani* by the absence of a medial ossification over the medial portion of the skull, covering the epiphyseal bar and leaving reduced anterior and posterior fontanels. This character is present in *C. boquillae*, *C. clathrata*, *C. spilopleura*, *C. nasus*, *C. iheringi* and *C. insidiosa* (Bockmann, 1998; Ortega-Lara, 2012; Bockmann & Reis, 2021; DRFF pers. obs.).

The morphometric data of this study (Table 1a) indicate that *C. hidalgoi* is most similar to *C. nasus*, *C. insidiosa*, *C. orinoco* and *C. picklei*, whereas the vertebrae and ribs count data suggest that

C. hidalgoi is more similar to *C. molinae* (Figure 7a) or *C. boquillae*. Despite this difference all previous *C. hidalgoi* morphological data are most congruent with the phylogenetic hypothesis of *Cetopsorhamdia* proposed by Bockmann (1998) and Faustino-Fuster *et al.*, (2021).

Distributional patterns of *C. hidalgoi* suggest that the new species is found in the piedmont region of the Amazon basin in Ecuador, Colombia and Peru and the lowlands in tributaries of the Upper Madeira River. Bockmann and Slobodian (2013) recorded a similar morphotype distributed in the Beni River (Bolivia), Guapore River (Brazil) and Madeira River (Brazil) but the authors of this study could not access this material to include them in the analyses of this study. Based on photographic and morphological information provided by these authors, the authors of this study found colouration patterns and some meristic data similar to *C. hidalgoi*, thus possibly expanding the distribution of *C. hidalgoi* to Bolivia and Brazil.

4.1 | Comparative material examined

In addition to the comparative material listed by Faustino-Fuster *et al.* (2019), the following lots were examined:

C. boquillae. All from Colombia: **Holotype**: FMNH 55212, xr, 72.1 mm L_S , Boquilla, Cauca River. **Paratype**: FMNH 55213, 6, 44.9–60.2 mm L_S , Boquilla, Cauca River.

C. filamentosa. All from Peru, Junín Department: **Non-type**: Perene River basin: MUSM 15606, 3, 62.1–72.4 mm L_S , Tulumayo River, San Ramon. MUSM 12667, 6, 25.4–42.2 mm L_S , creek tributary to Chanchamayo River, Chanchamayo.

C. iheringi. All from Brazil. **Non-type**: MCP 47191, 4 (1c&s), 43.7–64.8 mm L_S , Paraná River, Pratinha, Minas Gerais. MCP 49058, 5 (1c&s), 36.8–56.0 mm L_S , São Francisco River, Jaboticatubas, Minas Gerais. UFRGS 11277, 3 (c&s), 56.0–72.9 mm L_S , Paraná River, Planaltina, Distrito Federal. UFRGS 25409, 10 (1c&s), 35.3–78.1 mm L_S , Uruguai River, Ijuí, Rio Grande do Sul. USNM 313192, 4, 56.6–75.8 mm L_S , Cubatao River, Upper Parana River, Near Cajuru, São Paulo State. USNM 345663, 1, 63.2 mm L_S , Pedro Leopoldo creek, tributary to Das Velhas River, Jaguara, Minas Gerais State.

C. insidiosa. All from Venezuela, Amazonas State. **Non-type**: ANSP 160596, 1, 32.7 mm L_S , Orinoco River, Puerto Ayacucho. ANSP 165534, 1, 36.8 mm L_S , Cataniapo River, Puerto Ayacucho.

C. molinae. All from Colombia, Magdalena Basin. **Non-type**: Huilla Department. ICN-MNH 5719, 1, 35.7 mm L_S , Magdalena River. ICN-MNH 20207, 5, 33.7–40.1 mm L_S , Suaza River, Garzon Municipality. ICN-MNH 23039, 1, 31.2 mm L_S , Suaza River, Garzon Municipality. ICN-MNH 23049, 5, 23.2–23.9 mm L_S , Magdalena River confluence with Páez River, Gigante Municipality. ICN-MNH 23131, 1, 34.8 mm L_S , Suaza River, Garzón Municipality. ICN-MNH 23154, 10, 22.6–24.6 mm L_S , Magdalena River near to Betania, Gigante Municipality. ICN-MNH 23317, 2, 26.2–26.8 mm L_S , Paéz River, Tesalia Municipality. Caldas Department. ICN-MNH 13829, 1, 33.0 mm L_S , Magdalena River.

C. nasus. **Holotype:** FMNH 58126, xr, 54.3 mm L_S , Honda, Colombia.

C. orinoco. **Holotype:** USNM 121214, xr, 54.3 mm L_S , Torbes River, Orinoco River basin, Tariba, Venezuela. **Paratype:** USNM 121215, 3, 32.3–52.3 mm L_S , same data of holotype. **Non-type:** ICN-13391, 1, 69.9 mm L_S , Colombia. ICN-16983, 1, 71.4 mm L_S , Colombia.

C. phantasia. All from Ecuador, Orellana Province. **Holotype:** FMNH 94601, xr, 38.8 mm L_S , Jivino River. **Paratype:** FMNH 94602, 1, 39.0 mm L_S , Jivino River.

C. picklei. All from Venezuela. **Holotype:** USNM 121217, xr, 88.4 mm L_S , Motatan River, Motatan, Maracaibo Basin. **Paratype:** USNM 121218, 28, 45.3–116.9 mm L_S , same data of holotype. USNM 121219, 22, 37.0–79.8 mm L_S , San Juan River, tributary to Motatan River, Mene Grande, Maracaibo Basin. USNM 121220, 7, 51.6–94.4 mm L_S , Motatan River, Motatan, Maracaibo Basin. USNM 121221, 17, 36.9–70.2 mm L_S , Palmar River, Totuma, southwest of Maracaibo, Zulia Province. USNM 121222, 24, 46.0–95.7 mm L_S , Jimellas River, Motatan, tributary of Motatan River, Maracaibo Basin. UMMZ 141935, 5, 50.4–77.5 mm L_S , Jimelles River, tributary to Motatan River, Motatan.

C. shermani. **Holotype:** USNM 121216, xr, 30.5 mm L_S , Guarico River, Aragua State, Venezuela.

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AUTHOR CONTRIBUTIONS

Dario R. Faustino-Fuster examined the specimens and performed the morphometric, meristic and osteological examinations. Dario R. Faustino-Fuster and Lesley S. de Souza analysed, discussed and prepared the manuscript. Lesley S. de Souza provided project funding and laboratory resources.

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