

A NEW SPECIES PREVIOUSLY CONFUSED WITH *CAECILIA PACHYNEMA* (GÜNTHER, 1859) (AMPHIBIA: GYMNOPTIONA: CAECILIIDAE) FROM THE CORDILLERA CENTRAL OF COLOMBIA

UNA NUEVA ESPECIE PREVIAMENTE CONFUNDIDA CON *CAECILIA PACHYNEMA* (GÜNTHER, 1859) (AMPHIBIA: GYMNOPTIONA: CAECILIIDAE) DE LA CORDILLERA CENTRAL DE COLOMBIA

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Resumen.— *Caecilia pachynema* es una especie con una coloración llamativa, conocida del occidente de Ecuador y supuestamente de una población remota al norte de la Cordillera Central de Colombia. Previamente se había reconocido que aquellas poblaciones colombianas de "*C. pachynema*" pertenecen a una especie no descrita. El material obtenido durante los últimos veinte años nos permite describir esta especie nueva y restringir la distribución de *C. pachynema* a Ecuador.

Palabras clave.— Cecilias, Dimorfismo sexual, Fosorial, Neotropical, Taxonomía.

Abstract.— *Caecilia pachynema* is a distinctively colored species known from western Ecuador and supposedly from a remote population in the northern Cordillera Central of Colombia. Previously it had been detected that the Colombian populations of "*C. pachynema*" were likely an undescribed species. Material gathered over the past twenty years allows us to describe this new species and restrict the known distribution of *C. pachynema* to Ecuador.

Keywords.— Caecilians, Fossorial, Neotropical, Sexual dimorphism, Taxonomy.

INTRODUCTION

Caecilia pachynema (Günther, 1859) is a large, stout caecilian with large, recurved dentary teeth, known from western Ecuador in the provinces of Azuay, El Oro, Intac, Pallatanga, and Pichincha. This species bears a particular color pattern of white rectangles on the annuli, subdivided by dark grooves, constituting a broad "ventrolateral stripe" along the body. Taylor (1968) remarked that this species inhabited the Pacific drainages of Ecuador, the Caribbean drainages of Colombia, and considered that it might extend into Peru. Our results indicate this species is restricted

to western Ecuador as it has not been found in the neighboring Pacific lowlands of Colombia. Furthermore, the Peruvian record was subsequently designated as the holotype of *C. inca* by Taylor (1973).

The presence of *C. pachynema* in Colombia was first reported by Dunn (1942), who provided a brief taxonomic account but had a mixed series that comprised more than a single species. Later, Taylor (1968, 1973) named *C. attenuata* Taylor, 1968, *C. crassiquama* Taylor, 1968, and *C. tenuissima* Taylor, 1973, which were taken from the type series of Dunn's *C. pachynema*. Lynch (2000)

detected an undescribed species misidentified as '*C. pachynema*' known from around Medellín, Antioquia, Colombia, and attributed the taxonomic confusion to the recurrent presence of similar coloration patterns (like that of *C. pachynema*) in various Colombian species of *Caecilia* (i.e. *C. occidentalis* Taylor, 1968 and *C. sp.*) but deferred from describing it until further material became available. Over the past twenty years, enough material has become available for a robust taxonomic assessment of this new species and its intraspecific variation.

MATERIALS AND METHODS

All groove counts were performed under a stereoscope and repeated at least twice for each individual. Entomological pins were used to demarcate and differentiate primary and secondary grooves in order to avoid misrepresenting their individual counts. Careful incisions to the mouth's commissure were performed using a razor blade in order to fully open the mouth and access dentition, choanae, and tongue when necessary. A sharp pin was used to open the pockets where the primary grooves concealed their dermal scales. Once these were obtained, they were described in shape and size and put back in their respective positions so no material would be lost or damaged. Subdermal scales were searched by partial dissection of the annuli close to mid-body point and removing a section of epidermis to expose the connective tissue and determine their presence or absence.

Sex was determined through direct examination of gonads by performing a ventral longitudinal incision posterior to the mid-body point and anterior to the vent to look for testis in males and ovaries in females; if mature testis or ovaries were found, these were considered to be adults. Juveniles are much smaller than adults, have undefined collars, and bear an incomplete dentition. Diagnosis and description follow Taylor (1968) and Maciel & Hoogmoed (2018) with some modifications. All measurements were performed under a Zeiss stereoscope; these were taken to the nearest 0.1 mm using a Neiko digital caliper with the exception of total length, which was determined using a measuring tape.

Comparisons of groove counts were made using Taylor's (1968) species accounts or their respective original descriptions for those species of *Caecilia* described after 1968. Museum abbreviations are as follows: Colección de Anfibios, Museo de Historia Natural C.J. Marinkelle, Universidad de Los Andes, Bogotá, Colombia (ANDES), British Museum of Natural History (BMNH), now Natural History Museum, London, U.K., Colegio San José, Medellín, Colombia (CSJ), now Instituto Tecnológico de Medellín, Colección de Anfibios, Instituto

Alexander von Humboldt, Villa de Leyva, Boyacá, Colombia (IAvH), Colección de Anfibios, Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá, Colombia (ICN), Museo de Herpetología, Universidad de Antioquia, Medellín, Colombia (MHUA), Museo de Herpetología, Universidad del Cauca, Popayán, Colombia (MHUC), Colección de Anfibios, Museo La Salle, Universidad de La Salle, Bogotá, Colombia (MLS), Colección de Anfibios, Pontificia Universidad Javeriana, Bogotá, Colombia (MUJ), Colección de Anfibios, Universidad Industrial de Santander, Bucaramanga, Colombia (UIS), Museo de Zoología, Pontificia Universidad Católica del Ecuador, Quito (QCAZ), National Museum of Natural History, Smithsonian Institution, Washington, D.C., U.S.A. (USNM), and Colección de Herpetología, Universidad del Valle, Cali, Colombia (UVC).

RESULTS

Caecilia goweri sp. nov.

Caecilia pachynema Dunn, 1942: Taylor (1968: 425), Lynch (2000: 327)

Holotype. MHUA 3241, an adult male from vereda Potreritos, San Antonio del Prado, Medellín, Antioquia, 6°10'55.74" N, 75°39'49.8" W, 1800 meters above sea level (m a.s.l.) by C. Cuartas in 2003 (Fig. 1).

Paratypes (n = 12). MHUA 3915, an adult female collected by Mauricio Rivera-Correa in 1998 in Altos del Castillo, Belén, Medellín, Antioquia, Colombia, 6°14'07.0" N, 75°36'58.0" W, 1600 m a.s.l.; MHUA 6296, a juvenile obtained by O. Ortiz in 2009 in Alto de Mercado, Marinilla, Antioquia, 6°10'46.0" N, 75°18'13.0" W, 2200 m a.s.l.; MHUA 8115, an adult male obtained by Juan Manuel Daza in 9 January 2014 in Finca El Recuerdo, San Juan, San Roque, Antioquia, 6°27'49.3" N, 75°2'56.5" W, 1500 m a.s.l. (Figs. 2–3); MLS 46, an adult male obtained in Carolina del Príncipe, Antioquia, 6°43'21.0" N, 75°17'03.0" W, 1800 m a.s.l. in 28 November 1971; MLS 48–49, small juveniles collected in Caldas, Bellavista, Antioquia, 6°05'15.2" N, 75°38'03.0" W, 1750 m a.s.l. in December 1967 by Hermano José Ignacio Isaza; MLS 50, an adult female obtained in San Pedro, Antioquia, 6°15'53.0" N, 75°37'18.8" W, 1620 m a.s.l. in 10 May 1967; MLS 51, an adult male obtained at San Antonio del Prado, Medellín, Antioquia, 6°10'53.9"N, 75°38'9.6"W, 1700 m a.s.l. in 20 May 1971; MLS 52, an adult female obtained by Hermano Marco Antonio Serna in San Antonio del Prado, Medellín, Antioquia, 6°10'53.9"N, 75°38'9.6"W, 1700 m a.s.l. in 10 May 1967; MLS 53, an adult female from Caldas, La Tablaza, Antioquia, 6°6'53.47"N, 75°38'17.71"W, 1750 m a.s.l. by Hermano Marco Antonio Serna in January 1969; UVC 7376,

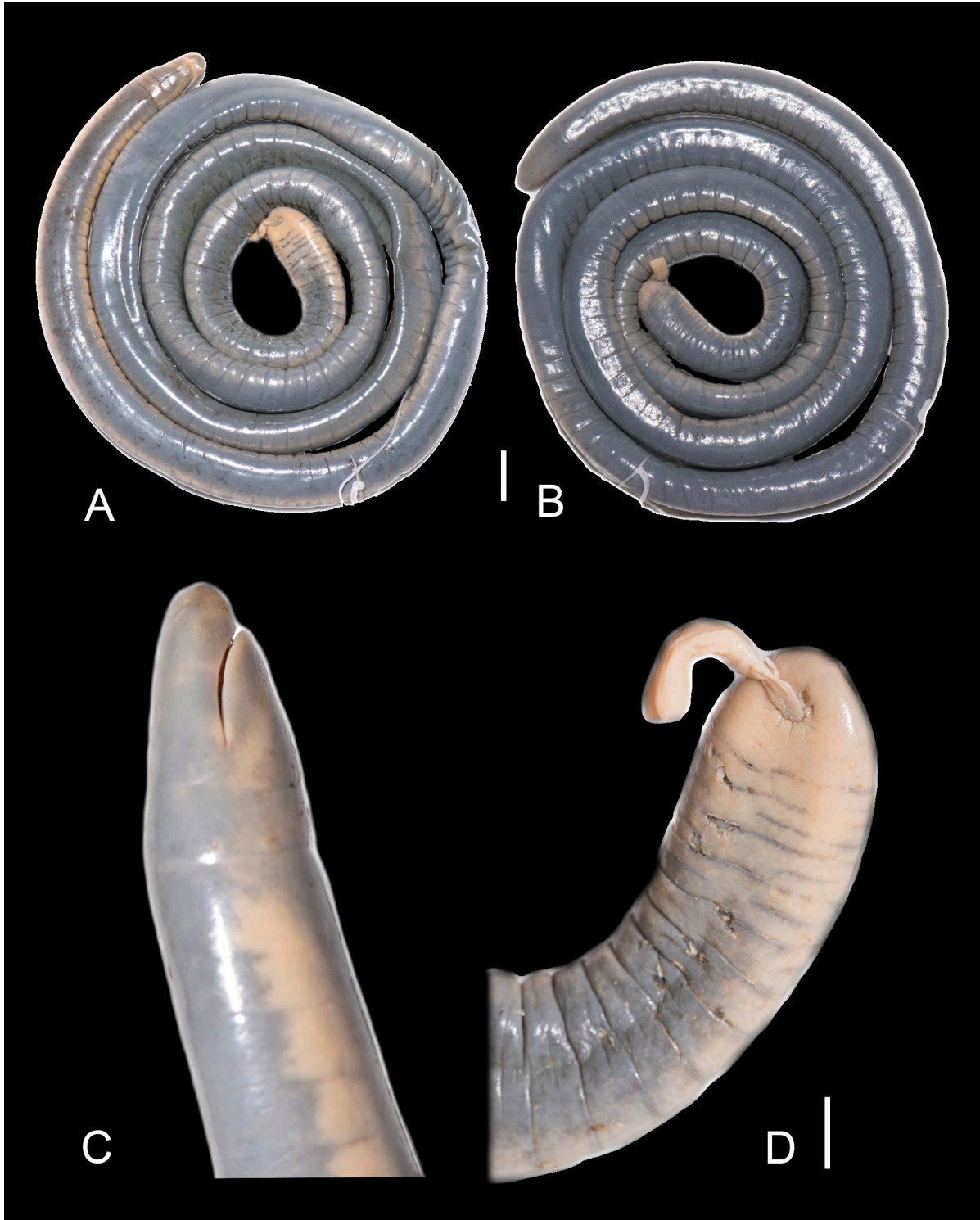


Figura 1. Holotipo de *Caecilia goweri* (MHUA 3241). (A) Vista ventral y (B) dorsal del espécimen; la escala equivale a 8 mm. (C) Vista lateral de la cabeza y (D) vista ventral del término y el phalloseum; la escala equivale a 3mm.

Figure 1. Holotype of *Caecilia goweri* (MHUA 3241) (A) Ventral and (B) dorsal views, respectively, of whole specimen; scale bar equals 8 mm. (C) Lateral view of the head and (D) ventral view of the terminus and phalloseum; scale bar equals 3 mm.



A



B

Figura 2. (A-B) Vista general del cuerpo de *Caecilia goweri* (MHUA 8115) en vida. Fotografías por el Dr. Juan Manuel Daza del MHUA.

Figure 2. (A-B) General body views of *Caecilia goweri* (MHUA 8115) in life. Photographs by Dr. Juan Manuel Daza of MHUA.

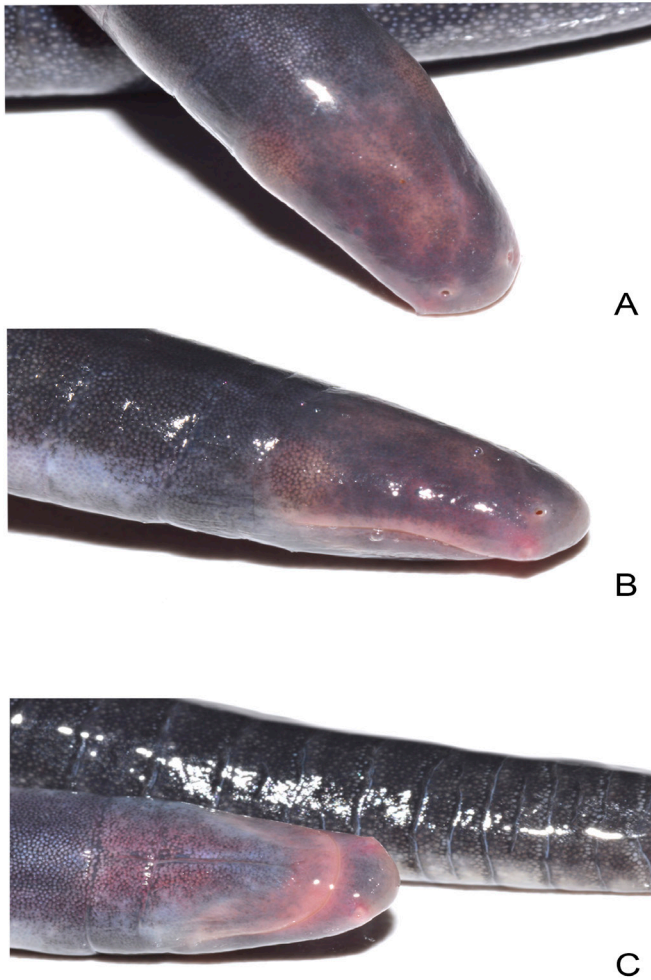


Figura 3. Cabeza de *Caecilia goweri* (MHUA 8115) en vista (A) dorsal, (B) lateral y (C) ventral, en vida. Fotografías por el Dr. Juan Manuel Daza del MHUA.

Figure 3. Head of *Caecilia goweri* (MHUA 8115) in (A) dorsal, (B) lateral, and (C) ventral views, in life. Photographs by Dr. Juan Manuel Daza of MHUA.

an adult female and UVC 77, an adult male obtained in Caldas, Antioquia, 6°06'01.0" N, 75°37'26.0" W, 1750 m a.s.l. by Hermano Marco Antonio Serna in July 1968.

Referred specimens (n = 4). CSJ 710, 711, 1141 and 1507 from Medellín, Antioquia, Colombia. All examined by J.D. Lynch in 1999.

Distribution. Known only from the northern Cordillera Central of Colombia in the Altiplano region of Medellín, Antioquia, in the municipalities of Caldas, Carolina del Principe, Marinilla, San Antonio del Prado, San Pedro, San Roque and San Vicente; as well as in the city of Medellín, ranging from 1500–2200 m a.s.l.

Diagnosis. Differs from *C. attenuata*, *C. caribea* Dunn, 1942, *C. corpulenta* Taylor, 1968, *C. crassisquama*, *C. degenerata* Dunn, 1942, *C. guntheri* Dunn, 1942, *C. inca* Taylor, 1973, *C. occidentalis*, *C. orientalis* Taylor, 1968, *C. pachynema* (Figs. 4–5), *C. pulchraserrana* Acosta-Galvis, Torres & Pulido-Santacruz, 2019, and *C. subdermalis* Taylor, 1968, because unlike these species, it bears secondary grooves.

A

Caecilia disossea Taylor, 1968 (216–262 primary grooves), *C. gracilis* Shaw, 1802 (183–204), *C. occidentalis* (191–221), and *C. thompsoni* Boulenger, 1902 (187–240) are the only member of the genus that have higher counts of primary grooves than *C. goweri* (156–193 primary grooves and 7–20 secondaries), while *C. abitaguae* Dunn, 1942 (137–148 primaries and 0–5 secondaries), *C. albiventris* Daudin, 1803 (144–147 primaries and 45–53 secondaries), *C. dunnii* Hershkovitz, 1938 (124), *C. guntheri* (111–132), *C. isthmica* Cope, 1877 (131–147), *C. leucocephala* Taylor, 1968 (118–142), *C. mertensi* Taylor, 1973 (142), *C. museugoeldi* Maciel & Hoogmoed, 2018 (152), *C. perdita* Taylor, 1968 (139–152), *C. tentaculata* Linnaeus, 1758 (122–137), and *C. volcani* Taylor, 1969 (112–124) all have lower counts of primary grooves than the new species.

B

C

Caecilia antioquiaensis Taylor, 1968 (171 primary grooves and 4 secondary grooves) and *C. armata* Dunn, 1942 (186 primaries and 92 secondaries) have overlapping counts of primary grooves but these differ in their counts of secondary grooves. *Caecilia bokermanni* Taylor, 1968 (180–192 primaries and 15–21 secondaries) has overlapping counts of primary and secondary grooves but these differ in their number of splenial teeth, which is 1-1 in *C. bokermanni* and up to 4-4 in the new species. *Caecilia gracilis* (183–204 primaries and 11–21 secondaries) also has overlapping counts of primary and secondary grooves with the new species but lacks subdermal scales within the connective tissue of the skin and has more denticulations on the anterior (6) and posterior margins (6) of the vent versus 4 anterior and 5 posterior denticulations in the new species.

Caecilia abitaguae (137–148 primaries and 0–5 secondaries), *C. subterminalis* Taylor, 1968 (170 primaries and 16 secondaries), and *C. tenuissima* (186 primaries and 10 secondaries) have overlapping counts of primary grooves but many fewer secondary grooves or none at all. *Caecilia flavopunctata* Roze & Solano, 1963 (155 primaries and 27 secondaries) has overlapping counts of grooves but its characteristic "funnel-shaped", truncated head (Taylor, 1968: 382: Fig. 199 B-D) differs from that of *C. goweri*, which is rounded. *Caecilia nigricans* Boulenger, 1902 also has overlapping counts of primary grooves (157–189) but higher counts of secondary grooves (32–62) furthermore, *C. nigricans* entirely



Figura 4. Vista ventral del holotipo de *Caecilia pachynema* (BMNH 1946.9.6.83.) de Intac, Ecuador. Fotografía por Martín R. Bustamante.
Figure 4. Ventral view of the holotype of *Caecilia pachynema* (BMNH 1946.9.6.83.) from Intac, Ecuador. Photograph by Martín R. Bustamante.

lacks an unsegmented terminal shield (Taylor, 1968; 409), unlike the new species. *Caecilia subnigricans* Dunn, 1942 has overlapping counts of grooves (151–161 primaries and 17–31 secondaries) but it differs from the new species in the shape of its dermal scales, which are thin and mostly rounded in *C. goweri*, but thick and straight at the margin of inception with the scale pocket but with a rounded terminal margin in *C. subnigricans* (Taylor, 1972: 1118: Fig. 73).

The new species most closely resembles *C. pachynema* and *C. occidentalis*, mainly because these *Caecilia* are very elongate, bear subdermal scales within the connective tissue of the skin, have few (or no) secondary grooves, and bear a series of light colored ventrolateral rectangles subdivided by the primary grooves throughout their body lengths. Discerning *C. goweri* from *C. pachynema* could be difficult given that both species have overlapping counts of teeth on all four series, overlapping counts

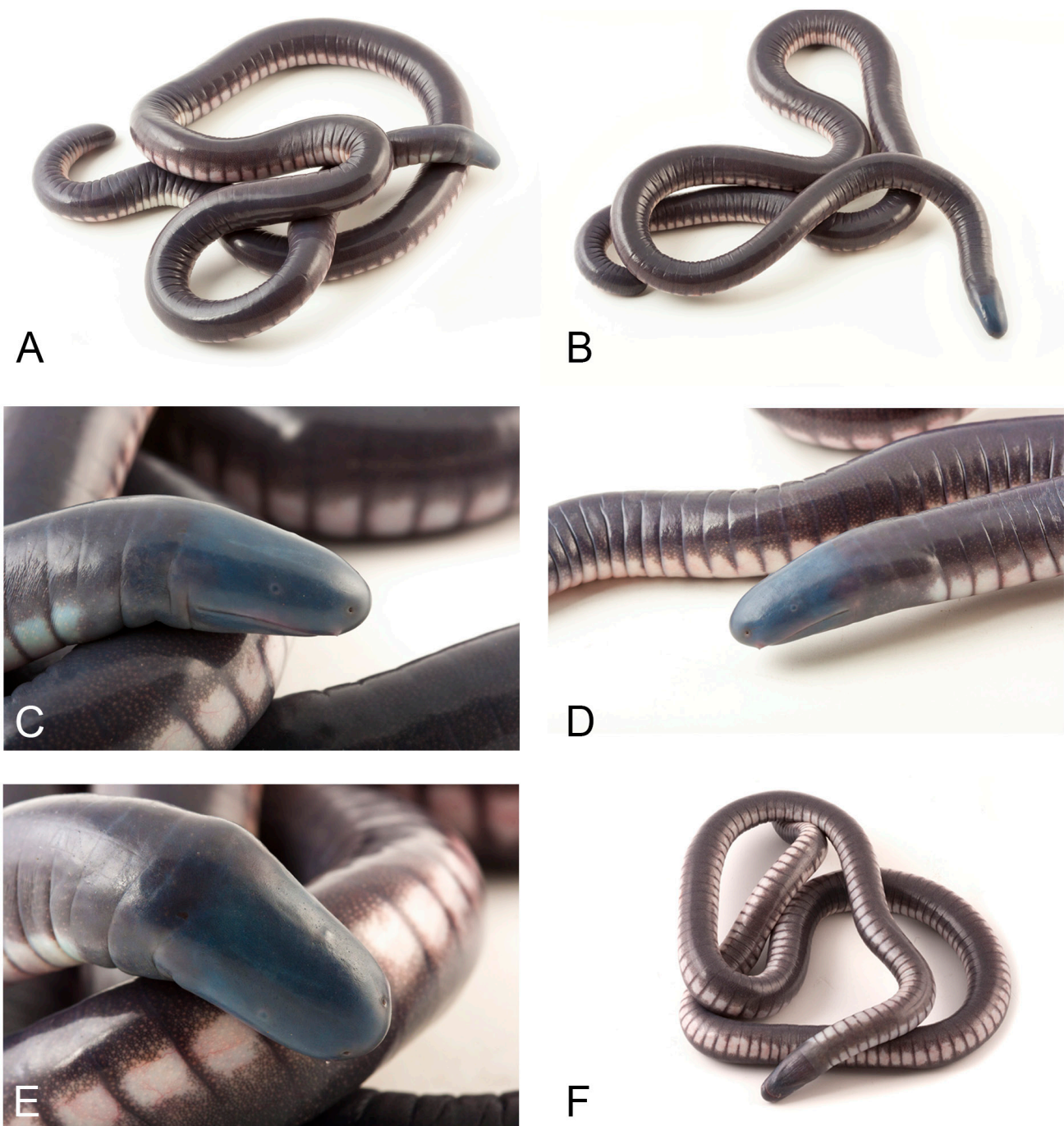


Figura 5. *Caecilia pachynema* (QCAZA 46983) del Río Chipla, provincia Azuay, en la vía entre Molleturo y La Costa Pacífica. A-B) Vista general del cuerpo; C-E) Vistas dorso-laterales de la cabeza; F) Vista ventral de la cabeza y el cuerpo. Todas las fotografías por el Dr. Santiago R. Ron del QCAZ.

Figure 5. *Caecilia pachynema* (QCAZA 46983) from Río Chipla, Azuay Province, on the road between Molleturo and the Pacific coast. A-B) General body views; C-E) Dorsolateral views of the head; F) Ventral view of the head and body. All photographs by Dr. Santiago R. Ron of QCAZ.

of primary grooves and a similar color pattern. Still, *C. pachynema* tends to have a lower count of primary grooves (150–163) and its teeth are much more recurved than those of *C. goweri* (Taylor, 1968: 428: Fig. 228 C). Dermal scales are present in both species (contra Taylor, 1968) and these tend to be subrectangular in *C. pachynema* (Taylor, 1973: 1113: Fig. 68) but clearly rounded in the new species. Some individuals of *C. pachynema* lack secondary grooves entirely but others have up to 11 secondaries; in contrast, all individuals of *C. goweri* bear secondary grooves (7–20). The last primary and secondary grooves dorsally encompass the terminal portion of *C. goweri* but these do not extend onto the ventral surfaces of the terminus, hence it has a small terminal shield, while *C. pachynema* bears a large, notable, completely unsegmented terminal shield (Taylor, 1968: 428: Fig. 228 D-E) (Fig. 4).

To a certain degree, *C. occidentalis* is easier to discern from *C. goweri* because *C. occidentalis* has an even higher count of primary grooves (191–221) (Taylor, 1969) and because the nuchal collars of *C. occidentalis* are not clearly demarked as those of *C. goweri*; in *C. occidentalis* the third nuchal groove is complete (Taylor,

1969: 787: Fig. 1) while it is only complete ventrally in the new species. Dermal scales of *C. occidentalis* seemingly vary in shape from subtriangular, to subrectangular to oval *sensu* Taylor (1972: 1022: Fig. 67) but these are circular in *C. goweri*. The new species has larger premaxillary-maxillary teeth than *C. occidentalis*, their dentary teeth are slightly recurved and of very similar proportions in both species, however these are well spaced from each other in *C. goweri* but set closer together in *C. occidentalis*, where the first 3-3 are set further from each other and the posterior 5-5 are closer together.

Description of the holotype. General condition is poor given that there are a few scratches on the surface of the skin, a constriction caused by an over-tightened tag on the 34th primary groove and an aggressive bend of the spine between primary grooves 37–50; a few dermal pockets were opened towards the terminus to check for dermal scales. Still, all usual measurements and counts can be made. An adult male with a total body length of 680 mm and a body width of 10 mm at mid-body point, length divided by width is 68 times. Head (7.3 mm) narrower than the body. In lateral view top of head sloping (not straight), margins of the

Tabla 1. Variación merística y datos morfométricos de la serie tipo de *Caecilia goweri*.

Table 1. Meristic variation and morphometric data of the type series of *Caecilia goweri*.

	MHUA 3241	MHUA 3915	MHUA 6296	MHUA 8115	MLS 46	MLS 48	MLS 49	MLS 50	MLS 51	MLS 52	MLS 53	UVC 7376	UVC 7377
Total length (mm)	680	560	180	630	480	125	115	580	530	390	410	320	380
Width at mid-body (mm)	10	8.6	4.6	8	8	2.4	2.3	8.3	11	5.9	8.1	5.5	5.4
Length/width	68	65.1	39	78.7	60	52.1	50	69.9	48.2	66.1	50.6	58.2	70.4
Snout projection (mm)	2.5	1.9	0.9	2.2	1.7	1.1	0.9	1.7	2.1	1.6	1.4	1.6	1.6
Eye-mouth commissure distance (mm)	3.8	2.5	1.6	3.1	2.8	1.8	1.6	2.8	3.6	2.1	1.9	2.4	3.0
Eye-nostril distance (mm)	3.8	3.0	1.6	3.1	2.8	1.7	1.5	3.1	3.4	2.6	2.3	2.7	3.0
First scale found at groove no.	1	1	166	1	74	167	156	127	108	119	55	4	17
Primary grooves	168	168	169	193	165	172	159	169	158	171	160	156	157
Secondary grooves	14	13	18	7	14	13	11	13	12	13	13	17	20
Grooves interrupted by vent	7	4	3	7	4	3	3	7	5	4	4	4	5
Premaxillary-maxillary teeth	4-1-4	5-4	5-1-4	4-1-4	5-5	1-1	7-1-7	9-1-9	6-1-6	6-1-6	6-6	6-5	6-5
Prevomeropalatine teeth	5-5	10-1-9	6-1-5	9-1-9	7-1-9	10-8	7-1-6	9-1-9	6-1-6	8-1-8	4-4	7-1-9	11-8
Dentary teeth	5-6	7-7	6-6	5-4	5-6	0	6-6	6-6	6-8	9-8	9-8	10-11	6-6
Splential teeth	3-2	2-2	3-2	2-1	4-3	4-4	4-3	4-3	3-2	3-3	4-3	3-2	3-3

mouth deeply curved and downturned from the commissure of the mouth to the anterior margin of the mouth.

Snout rounded in dorsal and ventral view but blunt in profile; it projects 2.5 mm beyond the mouth. Nostrils clearly visible in dorsal view and in profile but not visible in ventral view; these are circular in shape and much closer to the tentacular opening than to eye. Distance between nostril and tentacular opening 1.9 mm, that between nostril and eye 3.8 mm. Eyes small, 0.6 mm in diameter, partially concealed by very translucent epidermis and resemble white dots. Distance between eye and commissure of mouth 3.8 mm. Interorbital distance 5.3 mm and the distance between snout tip and eye 4.9 mm. Tentacular openings oval in outline, elevated above skin, positioned below and slightly posterior to nostril, equidistant to margin of mouth and nostril;

not visible in dorsal view but prominent in ventral and lateral views. First nuchal collar smaller than second; both nuchal collars bear a very faint nuchal groove dorsally and ventrally; third nuchal groove is complete ventrally but incomplete dorsally. Width of body increasing past the nuchal collars onto the fourth fifth of the total body length, it then tapers slightly only to become stouter onto the final fifth of the total body length, the terminus is stouter than the width of the head. Primary grooves 168, mostly incomplete, only the last 14 completely encircle the body near the terminus; secondary grooves 14, these are short and barely extend onto the ventral surfaces. Vent transverse, of moderate size, of same color as surrounding skin, bearing small denticulations, 4 anteriorly and 5 posteriorly, seemingly no anal glands on the anterior margin of the vent, but phallosome was badly extruded and this could have hidden them.

A small, unsegmented terminal shield, given that it is dorsally interrupted by the last short primary and secondary grooves even though these do not extend onto the ventral surfaces of the terminus. Dermal scales first appear at the first primary groove, where they are small, slightly oval, and folded upon (misshapen) but those found towards the terminus are circular and slightly thicker at the insertion margin; these are present up to the last primary groove. Dermal scales closer to the venter are larger in size. Many subdermal scales are found in the connective tissue of the skin. All teeth are thin, monocuspid, pointed, and slightly recurved; those on the premaxillary-maxillary and prevomeropalatine series are smaller in overall size than those on the dentary series; splenial teeth are of moderate size and not concealed by the tongue or gums. The premaxillary-maxillary bears 4-1-4 teeth that are well spaced and large but decreasing in size posteriorly; the prevomeropalatine series has 5-5 teeth, which also decrease their overall size posteriorly; the dentary has 5-6 teeth on each side and splenials are 3-2, straight and pointed. Teeth in dentary series more recurved than those on premaxillary-maxillary and prevomeropalatine series. Choanae oval transversally in shape, the maximum diameter of one choana is 0.6 mm, and the space separating them is 1.3 mm, tongue with protruding narial plugs, which are darker than the coloration of the tongue. Teeth replacement is evident in the gums.

Coloration in preservative. Coloration in life is unknown. In preservative, coloration is bright gray dorsally, followed by a cream median "lateral stripe", which extends along the total body length, more evident anteriorly than posteriorly, ventrally same color as dorsum but paler. The color of the terminus is bright cream against the dull cream color of the ventrolateral rectangles (Fig. 1A-D).

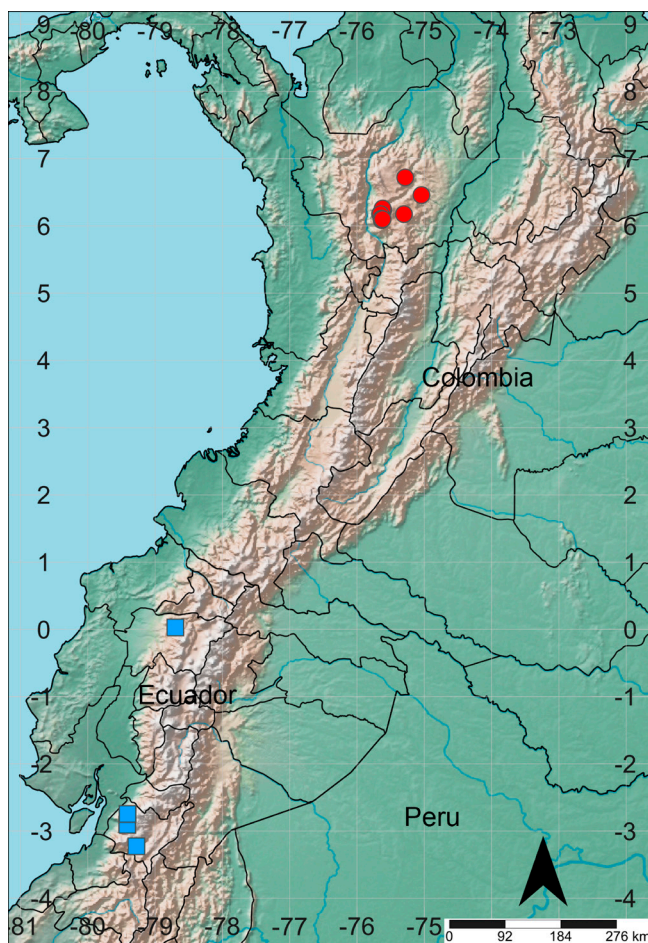


Figura 6. Distribución geográfica de *Caecilia goweri* (círculos rojos) y *C. pachynema* (cuadrados azules).

Figure 6. Geographic distribution of *Caecilia goweri* (red circles) and *C. pachynema* (blue squares).

Variation. There is slight variation in the color pattern because the ventrolateral rectangles are more prominent in some individuals (such as the holotype) than in others such as MHUA 8115 (Fig. 2). In some individuals such as the holotype (MHUA 3241) (Fig. 1C) and paratype MHUA 8115 (Fig. 2) the eyes are concealed by translucent epidermis to a higher degree than in others, such as MHUA 3915 and MHUA 6296. Dermal scales can be rounded (as in MHUA 3241, 3915, 6296 and 8115) or very slightly more oval (UVC 7376–77). Juveniles (MLS 48–49 and MHUA 6296) are very small (115–180 mm total length), have undefined nuchal collars, and bear an incomplete dentition with only 2 premaxillary-maxillary teeth and no dentary teeth although traces of emerging teeth can be seen within the gums. Adult males of *C. goweri* tend to have the eye located equidistant between the commissure of the mouth and the nostril, while adult females tend to have the eye located closer to the commissure of the mouth than to the nostril, suggesting sexual dimorphism (Table 1).

Etymology. We name this species after Dr. David J. Gower, merit researcher at the Natural History Museum in London, U.K., for all his contributions to the anatomy, evolution, systematics, and taxonomy of caecilians and snakes.

Remarks. Coloration in life is unknown for the holotype of *C. goweri*, but paratype MHUA 8115 is mostly dark gray or slate along the dorsal surfaces of the body, paler gray or slate on the flanks with purple hues and pale cream ventrally, which appears even paler (close to white) on the last 30 primary grooves and the terminus; head, tentacles, lips and nostrils are salmon pink surrounded by shades of dark blueish gray (Figs. 2–3).

DISCUSSION

Taylor (1968: 431) paid close attention to the color pattern of *C. pachynema* (Figs. 4–5) and described it as "Ventrolaterally there is a brownish cream stripe ranging from the first collar to very near vent-level but broken by dark lines in the grooves, leaving quadrangular marks on each annulus. A median ventral stripe of grayish-slate, lighter than the dorsum" (Fig. 4). We consider that neither *C. goweri* nor *C. pachynema* bears a true ventrolateral stripe —such as those found in *Epicrionops* Boulenger, 1883, *Ichthyophis* Fitzinger, 1826, and *Rhinatrema* Duméril & Bibron, 1841— but instead these *Caecilia* bear a series of light-colored rectangles interrupted by dark grooves, hence not touching each other. Lynch's assertion that the dermal scales of *C. goweri* are only found within the secondary grooves is wrong (Lynch, 2000: 327), because we have confirmed their presence in both the primary and secondary grooves (as is the case for all Colombian *Caecilia* with secondary grooves).

Taylor (1968: 426) claimed not to have examined any Peruvian specimens of *C. pachynema* (Fig. 6) but still provided an illustration is of a specimen taken from "Fundo Sinchono", Loreto, Peru (Fig. 226). This specimen (USNM 119008) was later designated as the holotype of *C. inca* and, according to Taylor (1973), the differences in coloration, adult size, and presence of scales throughout most of the body separate it from *C. pachynema*. Based on their original descriptions, we find it difficult to discern these two species given that their groove counts overlap and differences in coloration can be attributed to variation. Furthermore, we have found dermal scales in other supposedly scale-less *Caecilia* and the average adult size can only be gauged if a series of specimens is available.

Some individuals of *C. pachynema* may not have secondary grooves fide Taylor (1968), a peculiarity that we corroborated during a recent visit to QCAZ, Ecuador in 2019. Variation in secondary groove number, ranging from zero to 11, could challenge the efforts to diagnose other *Caecilia* with overlapping counts of primary grooves, hence dentition, squamation, cephalic and terminal morphology should be examined in detail to discern other similar species. Nonetheless, *C. pachynema* is not the only *Caecilia* known for variation in the presence and number of secondary grooves, as it is also known to occur in *C. abitaguae*, *C. guntheri*, *C. occidentalis*, *C. orientalis*, and *C. subdermalis* (unpublished data).

Recently, Restrepo et al., (2017) provided a list of the amphibians and reptiles collected from 2006–2016 in two hydroelectric projects on the eastern versant of the Cordillera Central of Colombia in Antioquia, namely Jaguas (1100–1300 m a.s.l.) and San Carlos (600–950 m a.s.l.). Their efforts yielded collections of *C. guntheri* (ICN 58446 and MHUA 3566, 6631), *C. thompsoni* (MHUA 7115 and 7192), *E. parkeri* (Dunn, 1942) (MHUA 7191 and 10720), and *Microcaecilia pricei* (Dunn, 1944) (MHUA 10728, though not examined). *Caecilia goweri* is seemingly restricted to higher elevations (1500–2200 m a.s.l.), as it was not found within these collection sites.

Aside from the collecting efforts of Hermano Nicéforo María in Pensilvania, Caldas, in the 1940s, those of Hermano Marco Antonio Serna in the Altiplano de Medellín during the 1960s, those of Restrepo et al., (2017) during 2006–2016, and more recently those of Dr. Mauricio Rivera-Correa in Valdivia, Antioquia, much of the montane forests of the northern Cordillera Central of Colombia (Fig. 6) have not been adequately sampled for caecilians and as a result it would seem that only seven species (*C. caribea*, *C. guntheri*, *C. occidentalis*, *C. goweri*, *C. subdermalis*, *E. bicolor* Boulenger, 1883 and *M. pricei*) occur near

the 2000 m mark. Still, we are confident that as the rate of collections increases so will the number of caecilian species in these mountains.

The adjacent lowlands of the Magdalena River Valley have not been sufficiently sampled for caecilians either, despite past efforts by Dr. Juan Manual Daza, Mariela Osorno-Muñoz, José Vicente Rueda-Almonacid, Andrés R. Acosta-Galvis, Diego Gómez Sánchez, Esteban Alzate, Dr. Marco Rada, and us. These have yielded collections of *C. guntheri*, *C. subnigricans*, *C. thompsoni*, *E. parkeri*, *M. nicefori* (Barbour, 1924), *M. pricei*, *Osaecilia polyzona* (Fischer, 1880) and *Typhlonectes natans* (Fischer, 1880). Given that the Magdalena River Valley lowlands become considerably drier southward past the Cundinamarca-Tolima boundary (around 4.5° N) in the Upper Magdalena River Valley, we have higher expectations for taxonomic novelties along the northern portion in the Middle and Low Magdalena River Valley.

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C. pachynema and permitted us to use his photographs of this species for this manuscript.

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APPENDIX 1. EXAMINED MATERIAL.

Countries are indicated in bold capitals, departments and provinces in regular capitals, municipalities and localities in plain text.

***Caecilia goweri* (n= 13) COLOMBIA:** ANTIOQUIA: Bellavista: MLS 48-49; Caldas: UVC 7376-77; Carolina del Principe: MLS 46; La Tablaza: MLS 53; Marinilla, Alto de Mercado: MHUA 6296; Medellín, Belén: MHUA 3915; San Antonio del Prado: MHUA 3241, MLS 51-52; San Roque, San Juan, Finca El Recuerdo: MHUA 8115; San Pedro: MLS 50.

***Caecilia guntheri* (n= 21) COLOMBIA:** ANTIOQUIA: Anorí: MHUA 6631; Frontino: IAvH 14557, MHUA 11565; Maceo: MHUA 3566;

Sonsón: ICN 58446; Valdivia, San Fermín, Reserva La Selva: Mauricio Rivera Correa (MRC) 1485 and 1533 (to be catalogued at MHUA). CAUCA: El Tambo, PNN Munchique, sector La Cueva: ICN 58402, 58404. CHOCÓ: Arusí: ANDES-A 4451; vía Cartago-San José del Palmar: UVC 8499. NARIÑO: Barbaçoas: ICN 53580, 53766, 53793; Francisco Pizarro, Salahonda: ICN 57211; Ricaurte, Chucunes, Reserva La Planada: MHUA 4003, UVC 6070. VALLE DEL CAUCA: Bajo Calima: ICN 58411, UVC 8564; Buenaventura, Aguacalara: UVC 9881; Serranía de los Paraguas, vía El Cairo-Las Amarillas: UVC 7113.



***Caecilia occidentalis* (n= 7) COLOMBIA:** ANTIOQUIA: Yarumal: MLS 45; CAUCA: Popayán: ICN 43526, 41225 and MHUC 93–95; VALLE DEL CAUCA: Pance, near Río Pance: UVC 6567.

***Caecilia pachynema* (n= 5) ECUADOR:** AZUAY: Río Chipla, vía Molleturo-La Costa por la carretera pequeña: QCAZA 46983, QCAZA 46938; San Antonio de Chaucha: QCAZA 31720; Santa Isabel, El Unión, Reserva Yunguilla, Fundación Yotoco: QCAZA 33235; PICHINCHA: Reserva Puyucunapi-Mindo Cloudforest Foundation: QCAZA 75976.

***Caecilia thompsoni* (n= 38) COLOMBIA:** ANTIOQUIA: San Carlos, Juanes. Puente Roto: MHUA 7115, Quebrada el Jordán: MHUA 7192; San Roque, Estación Piscícola Universidad de Antioquia:

MHUA 5157; Yondó, Reserva El Silencio: ICN 58437. BOYACÁ: Humbo, Estación de Policía de Quípama: MLS 21–22. CALDAS: La Victoria, El Llano, Quebrada Casanguillas: MHUA 4247, 4432; Corinto, Charco Azul: ICN 43668; Norcasia: ANDES-A 4458, MUJ 7368, La Miel: IAvH 9688; Samaná, Tasajos: ICN 41233. CUNDINAMARCA: Mesitas del Colegio: ANDES-A 1904; Nilo: ICN 11763, 47997; La Esperanza: ICN 21431. SANTANDER: Betulia, vereda Aguamieluda: UIS-A 5753; Floridablanca, barrio Bucarica: UIS-A 5190; Lebrija UIS-A 5189, vereda Portugal: UIS-A 20; Piedecuesta, vereda Monterredondo: UIS-A 6427; Rionegro: UIS-A 4938–40, 4943–44, 4946, 6201; San Vicente de Chucurí: vereda La Colorada, UIS-A 5378, 6865. TOLIMA: Carmen de Apicalá, vereda Cuatro Esquinas: ANDES-A 4448–49, 4462, ICN 58509; Chaparral: MLS 23, MHUA 6611; Ibagué: MLS 34.

