

Rediscovery of the rare Andean blindsnake *Anomalepis colombia* Marx 1953 (Serpentes: Anomalepididae) in the wild

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The fossorial snake genus *Anomalepis* Jan 1860 currently comprises four species with distribution restricted to the Neotropics, occurring from Nicaragua to trans-Andean Peru. Species of *Anomalepis* occur on the mainland from sea level to about 2,700 m elevation in habitats that range from xerophyte vegetation to tropical wet forests (Kofron 1988; McDiarmid *et al.* 1999; Uetz *et al.* 2019; Wallach *et al.* 2014). Kofron (1988) performed a taxonomic review of the genus *Anomalepis*, recognizing two phenotypic clusters of species: the *A. mexicanus* Jan 1860 composed exclusively by its nominal form, and the *A. aspinosus* Taylor 1939 group consisting of the former species, *A. colombia* Marx 1953 (Fig. 1) and *A. flavapices* Peters 1957. While *Anomalepis aspinosus* occurs in xerophytic formation from 500–2700 above sea level (asl hereafter) along the Peruvian Andes (Kofron 1988; McDiarmid *et al.* 1999; Wallach *et al.* 2014), and *Anomalepis flavapices* is found in the coastal rainforest plains of northwestern Ecuador (Kofron 1988; Wallach *et al.* 2014), *Anomalepis mexicanus* presents the most widespread distribution amongst its congeners, occurring in northeastern Honduras, Nicaragua, Costa Rica and Panama from sea level to 725 m altitude. Even though this species has previously been recorded for Peru (Kofron, 1988), it seems unlikely that this specimen belongs to *A. mexicanus* due to its distinct meristic features (see Kofron 1988) and its outlandish record (see Fig. 2). Marx (1953) described *Anomalepis colombia* based on a single specimen collected in 1946 by Kjell von Sneidern at La Selva (05°25'23N, 74°57'44W; 1700 m asl), municipality of Pueblo Rico, department of Caldas, Colombia. As far as we know, since its original description, no additional specimen of *A. colombia* has been reported in literature (cf. Kofron 1988; McDiarmid *et al.* 1999; Wallach *et al.* 2014).

Kofron (1988) re-examined the holotype of *Anomalepis colombia* and reported 30/30/27 dorsal scale rows and 363 middorsal scales, in a distinct pattern reported by Marx in its original description (365 middorsal scales and 32/28/26 dorsal scale rows). Although we did not examine the holotype, we accept Kofron's corrections and consider such discrepancies on meristic data mostly due to a different method of scale counting. Herein we report two additional specimens of *Anomalepis colombia* collected during fieldwork in the years of 2005 and 2015 (Figs. 3–4) at the municipalities of Armenia (Herpetos-UQ 106; 04°33'16.6"N, 075°39'35.4"W; 1480 m asl) department of Quindío and municipality of Toledo (ICN 13047; 07°03'45.22"N, 75°41'35.81"W; 599 m asl), department Antioquia; both on the Central Cordillera of Colombia (Fig. 2). The new records extend the species range of distribution 210.4 km north and 92.7 km south from its type locality and provide additional data on the meristic and morphometric features for the species (Table 1). We examined additional comparative material in order to update the diagnosis and comparisons of *A. colombia* with respect to other congeners (listed in Appendix). The institutional abbreviations follow Sabaj (2016). We obtained geographic coordinates for other congeners from museum databases or refined them using the software Google Earth 6.2. We follow Kofron (1988) for terminology on the cephalic shields, middorsal scales, and scale rows around body.

Kofron (1988) reports a supposedly aberrant condition in the holotype of *Anomalepis colombia* in having the two scales adjacent to the prefrontal fused on the left side but not on the right side. In fact, such condition is also present on both sides of the head of the two additional specimens of *A. colombia* reported herein and therefore it may represent a

more prevalent condition in the species. *Anomalepis colombia* is distinguished from all congeners by a unique combination of the characters, as follows: 28–30/28–30/25–27 scale rows around body, snout rounded in dorsal view and moderately acuminate in lateral view, total length 170–193 mm, subcaudal scales 10, supralabial and infralabial scales four, middorsal scales 363–410, midventral scales 357–402, dorsal color uniform light brown, and ventral coloration creamish white (Fig. 4). *Anomalepis colombia* differs from other species by having 28 or more midbody scale rows (vs. < 27 in other congeners), 363–410 middorsal scales (vs. ≤ 330 in other congeners), midventral scales 357–402 (vs. ≤ 320 in other congeners), and 2.0–2.2 head length/snout-vent length (vs. ratio ≥ 3.8 in other congeners). We refer to Table 1 for additional quantitative comparisons for the currently recognized species of *Anomalepis*.

TABLE 1. Meristic and morphometric variation for species of the genus *Anomalepis*. Abbreviation are as follow: SVL=snout-vent length; HL=head length; HW=head width; BD=body diameter, measured on the midbody; D=eye distinct; and I=eye indistinct. Data on the holotype of *Anomalepis colombia* is based in Marx (1953) as detailed by and Kofron (1988).

Species	<i>Anomalepis aspinosus</i>	<i>Anomalepis colombia</i>	<i>Anomalepis flavapices</i>	<i>Anomalepis mexicanus</i>
Sample size	1	3	2	4
SVL (mm)	130	171–193	143–148	77–176
CL (mm)	2.2	2.5–3.7	3.5–5	2.7–5
HL/SVL (%)	4.5	2.0–2.2	4.6–5	3.8–6.8
HW/HL (%)	46.5	66–74	40–48.3	44–55.3
SVL/BD	40	49–58	38–42	30–48
Scales around body	28/24/24	28/28/26 28/28/25 32/28/26	26/26/24	24/25/26/28-21/22/23/24- 20/21/22
Middorsal scales	330	363–410	308–317	242–267
Midventral scales	320	357–402	300–301	240–250
Subcaudal scales	10	8–10	09–10	08–10
Eye contrast	I	D	I	D

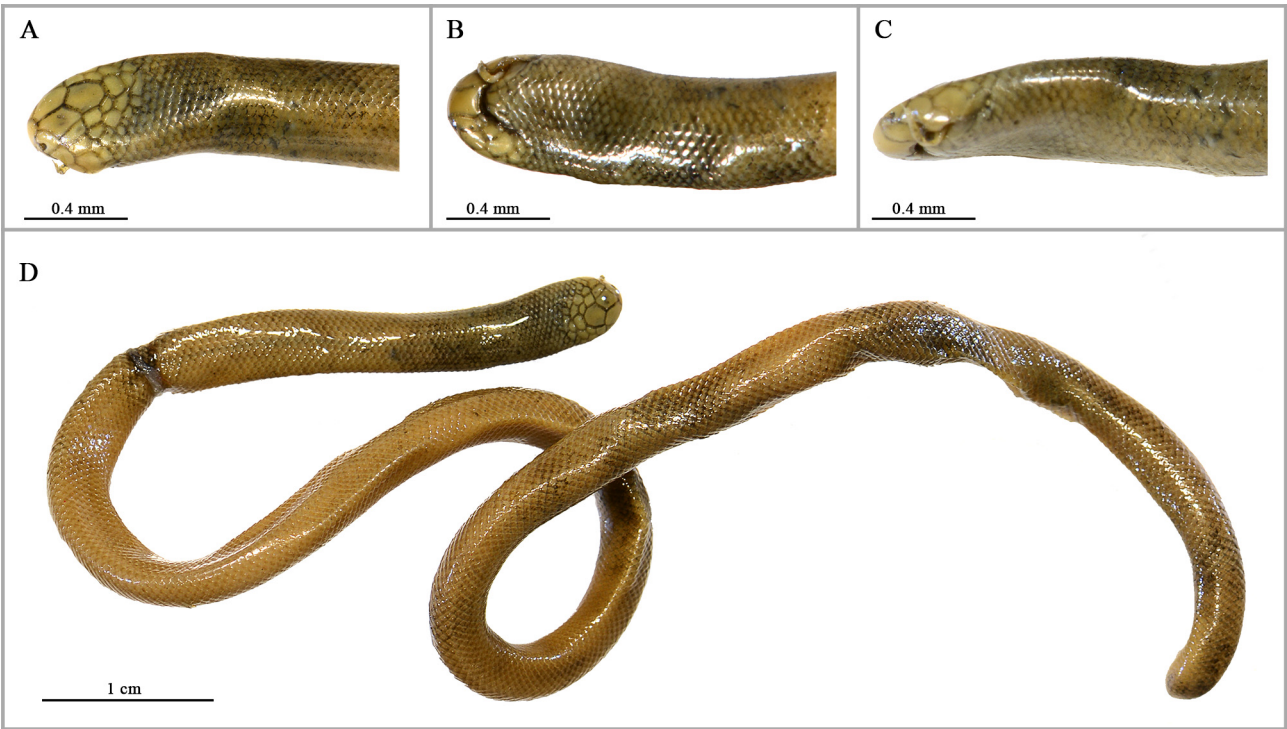


FIGURE 1. Dorsolateral (A), ventral (B) and lateral (C) views of head, and general view of body (D) of the holotype of *Anomalepis colombia* (FMNH 54986) from municipality of Pueblo Rico, department of Caldas, Colombia. Photos by S.O. Borber.

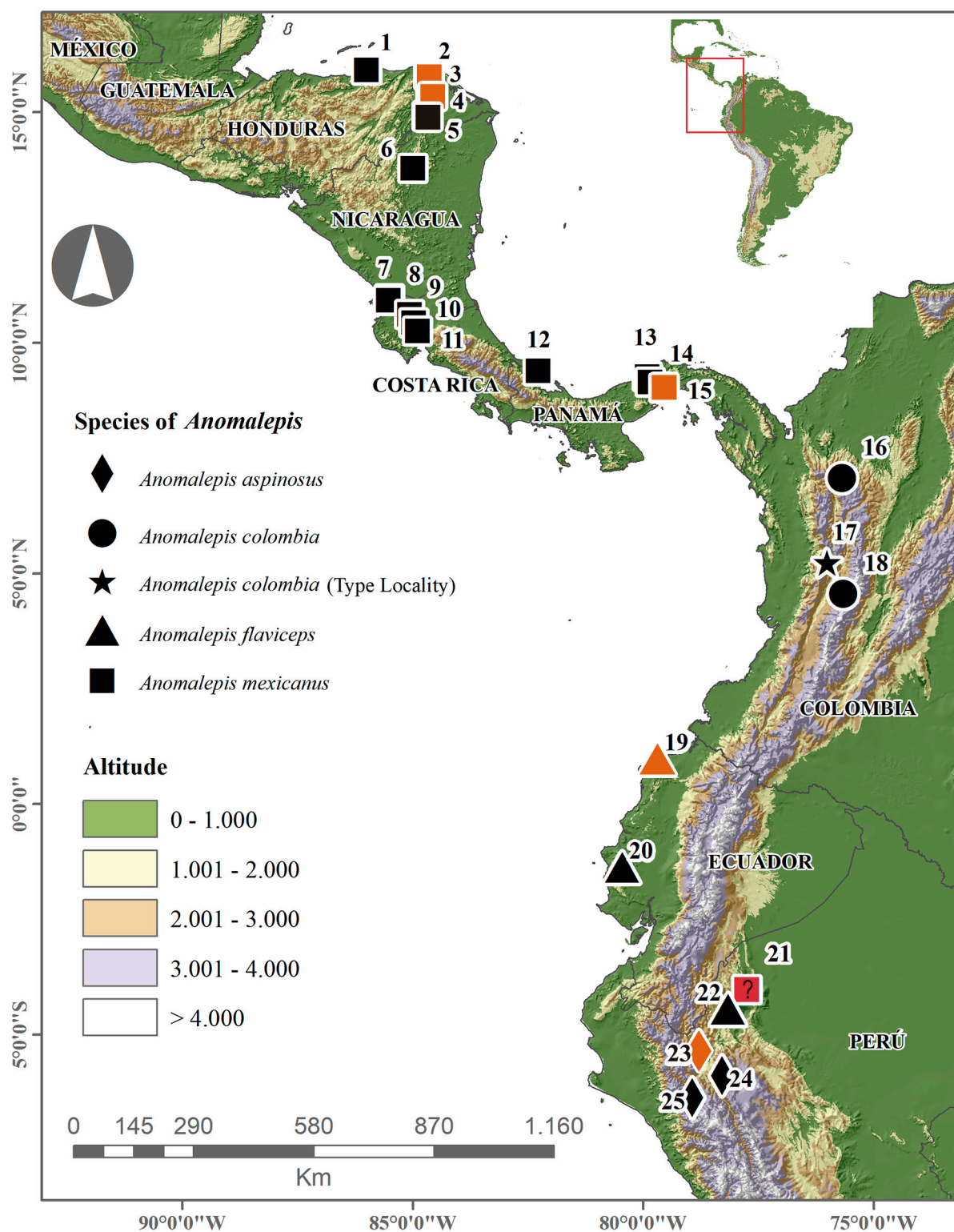


FIGURE 2. Distribution based on literature data (black; Appendix II) and examined specimens (orange; Appendix I) for species of the genus *Anomalepis*. The red point indicates the unlikely record of *A. mexicanus*.

In addition, we provide a detailed description of qualitative features on the basis of these two new specimens of *A. colombia*: head slightly depressed; body subcylindrical and slightly tapered caudally near the tail; tail slightly pointed with reduced tail spine; snout rounded in dorsal view and moderately acuminate in lateral view; rostral visible and rounded in dorsal view, not extending posterior to nostrils; prefrontals and frontal with similar length; prefrontals asymmetrical, narrowing anteriorly and posteriorly, longer than broad; frontal as long as wide; frontal in contact posteriorly to three en-

larged nuchals; supraocular single, slightly wider than long, placed between the ocular and the frontal, in contact with prefrontals; preoculars two; superior preocular not divided and in contact with nasal; inferior preocular separated from nasal by loreal; ocular single and reduced; eye distinct, situated almost centrally on anterior part of ocular; suboculars two, with small size; postoculars two; nasal about as large as first supralabial, undivided, with nostril close to anterior labial border; loreal single, relatively large, contacting nasal, both preoculars, and first, second and third supralabials; infralabials four; supralabial lip composed by rostral and four labials; first upper labial as high as long, contacting rostral, nasal and loreal; first supralabial widely separating nasal from the mouth open; second supralabial small, contacting loreal; third labial large, contacting loreal, inferior preocular, and anterior subocular; symphyseal slightly wider than long; three teeth on each side of upper jaw and one teeth on each side of lower jaw; a pair of enlarged pre-cloacal plates in contact posteriorly and separated anteriorly by an enlarged scale. Dorsum of body uniformly medium brown (ICN 13047; Fig. 4) or light brown (Herpetos-UQ 0106; Fig. 3), with cream border among scales; ventral surface of body creamish white, with center of scales light brown; head creamish white dorsally and ventrally, with a few brown spots on the center of the scales.

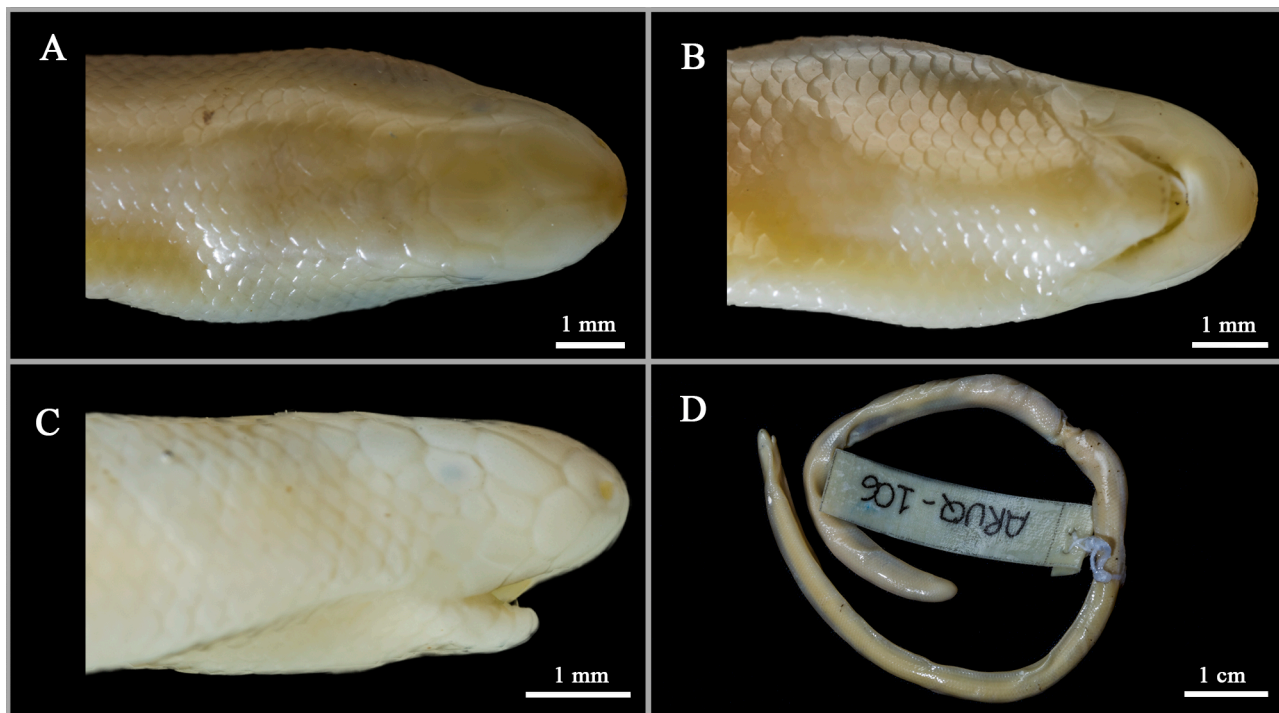


FIGURE 3. Dorsal (A), ventral (B) and lateral (C) views of head, and general view of body (D) of the specimen of *Anomalepis colombia* (Herpetos-UQ 106) from municipality of Armenia, department of Quindío, Colombia.

As most of the currently understood ‘Scolecophidia’ (sensu lato, i.e. Anomalepididae + Leptotyphlopidae + Typhlopoidea), *Anomalepis colombia* has a predominantly secretive lifestyle. The specimen collected in the Antioquia Department (ICN 13047) was found under a highly decomposed log, few meters from a stream in a riparian forest. This area presents an average annual temperature of 24°C, a relative humidity of 72% an average of annual rainfall of 3,000 mm, corresponding to a zone of mountain wet forest and tropical dry forest. The specimen of Quindío Department (Herpetos-UQ 0106) was found underground about 15 cm deep, after an excavation under a leaf litter microhabitat in urban forest remnants associated to water bodies in the campus of Universidad del Quindío. This urban forest presents an average annual rainfall of 2,436 mm, an average temperature of 19°C and a relative humidity ranging from 65–75%, corresponding to a mountain wet forest life zone (Marín-Gómez 2005). ‘Scolecophidians’ as a rule occupy strictly fossorial environments, hampering their encounter in fieldtrips. Thus, many scolecophidian species are poorly represented in scientific collections and, as so far for *Anomalepis colombia*, several taxa are still known only from their type-series (Wallach *et al.* 2014). Thus, regular fieldworks in unexplored or even poorly known areas such as the Colombian Andes might provide valuable data on the natural history of species occurring therein. In view of the incipient knowledge on the natural history of *A. colombia*, additional efforts are still needed in order to assess a precise conservation status of the species.

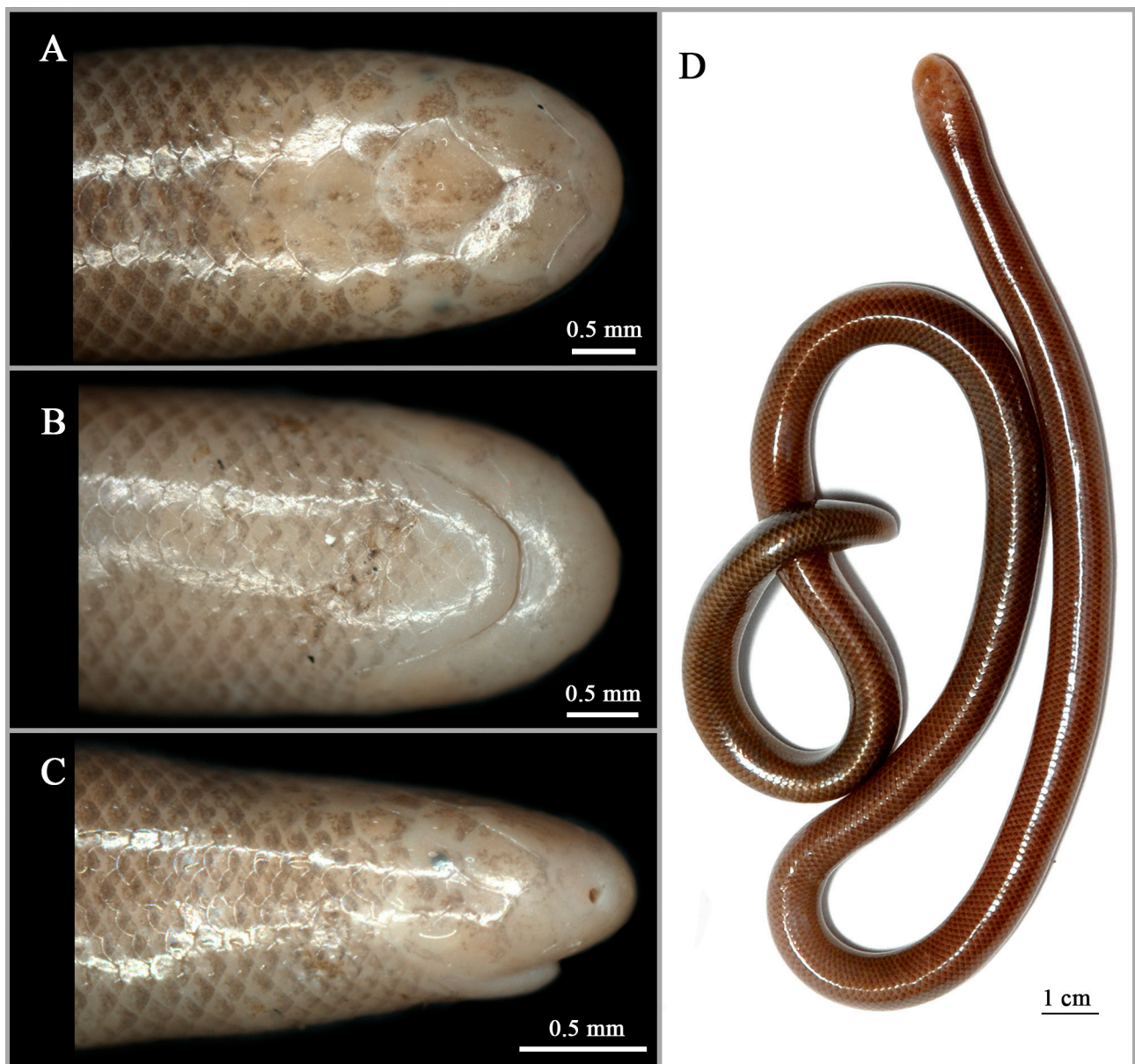


FIGURE 4. Dorsal (A), ventral (B) and lateral (C) views of head, and general view of body (D) of the specimen of *Anomalepis colombia* (IUCN 13047) from municipality of Toledo, departament of Antioquia, Colombia. Photos by J. Sánchez.

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APPENDIX I

Material examined

Anomalepis aspinosus (n=1). PERU: CAJAMARCA: Perico: (USNM 76295, paratype).

Anomalepis flavapices (n=2). ECUADOR: ESMERALDAS: Manabi (USNM 196349, holotype), (AMNH 6966, paratype).

Anomalepis mexicanus (n=5). HONDURAS: GRACIAS A DIOS: Cayo Cañones: (USNM 565512); Hiltara Kiamp (USNM 562870); San San Hil (USNM 563482–83). PANAMA: without specific locality (AMNH 103750).

APPENDIX II

Records based on the museum databases and literature not checked personally for accuracy of identifications, except in the case of the specimen indicates by asterisk.

Anomalepis aspinosus (n=16). PERU: 23. CAJAMARCA, Perico: USNM 76295 (paratype)*; MCZ R-17402; MCZ R-17403; MCZ R-14781; MCZ R-14782; MCZ R-14783; R-14784; MCZ R-14785; R-17401; NHMUK ZOO 1929.6.1.41. 24. AMAZONAS, Bagua Grande: LSU 32591. 25. CAJAMARCA: Santa Cruz: LSU 19450; LSU 19451; LSU19452, LSU 19453; LSU 19454.

Anomalepis flavapices (n=3). ECUADOR: 19. ESMERALDAS, Guadalupe: USNM 196349 (holotype)*. 20. Manabi: AMNH 6966 (paratype)*. PERU: 22. AMAZONAS, Huampami: MVZ 163245.

Anomalepis mexicanus (n=16). HONDURAS: 1. COLÓN, Trujillo: CM 90254. 2. GRACIAS A DIOS, San San Hil USNM 563482–83*. 3. GRACIAS A DIOS, Cayo Cañones: USNM 565512*. 4. GRACIAS A DIOS, Hiltara Kiamp: USNM 562870*. 5. GRACIAS A DIOS, Warunta Tingni Kiamp: USNM 564062. NICARAGUA: 6. REGIÓN AUTÓNOMA DEL ATLÁNTICO NORTE, El Consuelo: SMF82845. COSTA RICA: 7. GUANACASTE, La Cruz: ZFMK 57773. 8. GUANACASTE, La Cruz: from Savage (2002). 9. GUANACASTE, Cañas: from Savage (2002). 10. GUANACASTE, Tilarán: UMMZ132190. 11. GUANACASTE, Tilarán: KU 35512. PANAMA: 12. BOCAS DEL TORO: AMNH R-119069. 13. COLÓN, Canal zone: NUV-944. 14. COLÓN, Colón: MCZ 29220. 15. PANAMA, Panama: AMNH103749*. PERU: 21. AMAZONAS, Vicinity of La Poza: MVZ 174999.