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SHORT COMMUNICATION

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First confirmed record of the snake genus *Xenodon* from Sierra Nevada de Santa Marta, Colombia, supports the morphological distinctiveness of *Xenodon angustirostris* and *Xenodon rabdocephalus*

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The Sierra Nevada de Santa Marta (SNSM) in northern Colombia harbours a high proportion of the endemic biota of northern South America. It is an isolated mountain massif with a broad altitudinal gradient (0–5,800 m a.s.l) giving it wide variations in climatic and ecological conditions encompassing páramo, montane forest, xerophytic forest, and rainforest. Lower elevation dry forests, xeric shrublands and wide alluvial plains isolate the SNSM from other Andean wet forests (Rangel-Ch et al., 1997; Sánchez-Pacheco et al., 2018). Most previous herpetological studies of the SNSM have focused on the ecosystems/species of the western versant of this mountain massif so leaving the eastern versant poorly explored. However, the signing of the peace agreement in Colombia has allowed the return of field scientists to vast rural areas, including the SNSM, that were inaccessible due to the internal armed conflict. Since the peace agreement, biological recording at the National Biodiversity System of Colombia has spiked (Salazar et al., 2021; 2022).

Thirty four snake species are known to occur in the SNSM (Rivas et al., 2021), of which 17 taxa have known distributions on the eastern versant (Rodríguez-Mahecha et al., 2008; Meza-Joya, 2015). Although there are records for dipsadid snakes of the genus *Xenodon* in the SNSM, *Xenodon rabdocephalus* (Carvajal-Cogollo et al., 2020) and *Xenodon severus* (Rivas et al., 2021), and two further claims about the occurrence of *Xenodon* spp near the SNSM (Blanco-Torres et al., 2013; Blanco-Torres & Renjifo, 2014), these are all unsubstantiated as no voucher specimens or data on specific localities were registered in biological collections.

The available geographical records of *Xenodon* nearest to the SNSM with specific localities and voucher specimens are from Municipio Sabanas de San Ángel, Departamento de Magdalena (*X. rabdocephalus*; Angarita-M et al., 2015) and Serranía del Perijá (*Xenodon angustirostris*; Angarita-Sierra & Manco-Jaraba, 2023) (Fig. 1). We document the first confirmed record of *Xenodon* from the SNSM based on two specimens collected from the eastern versant of this isolated mountain massif. On 16 January 2024 at 09:00 h PAL found a freshly killed male *Xenodon* during his routine farm

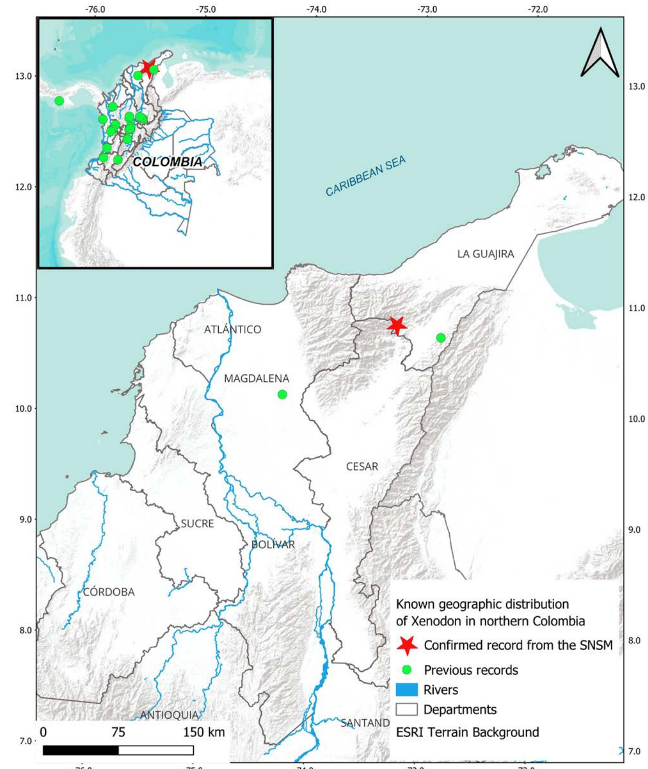

Figure 1. Geographical distribution of the snake genus *Xenodon* in northern Colombia. Green dots depict previous substantiated records (Angarita-M et al., 2015; Angarita-Sierra & Manco-Jaraba, 2023). Red star indicates the first confirmed record of *Xenodon* (*X. rabdocephalus* sensu Myers & McDowell [2014]) from the Sierra Nevada de Santa Marta.

duties at the settlement of Potrerito, Corregimiento La Junta, Municipio San Juan del Cesar, Departamento de La Guajira, Colombia (10,80638889 °N, -73,22361111 °W, WGS84; 685 m a.s.l; Fig. 1), and on 15 March 2024 at 08:40 h found a conspecific female. Both specimens were collected and fixed following the procedures described by Pisani (1973), and exhibit similar colour pattern, scutellation, and head-scales

Figure 2. *Xenodon rabdocephalus* from Potrerito, San Juan del Cesar, La Guajira, Sierra Nevada de Santa Marta, Colombia and *Xenodon angustirostris* from Corraleja, San Juan del Cesar, La Guajira, Serranía del Perijá, Colombia. Colour pattern in life of **A.** *X. angustirostris* (male, INSZ 281) and **B.** *X. rabdocephalus* (female, INSZ 247). **C.** Dorsal and **D.** Ventral views of *X. rabdocephalus* (male, INSZ 246). **E.** Dorsal and **F.** Ventral views of *Xenodon angustirostris* (male, INSZ 281). Black bars represent 10 mm.

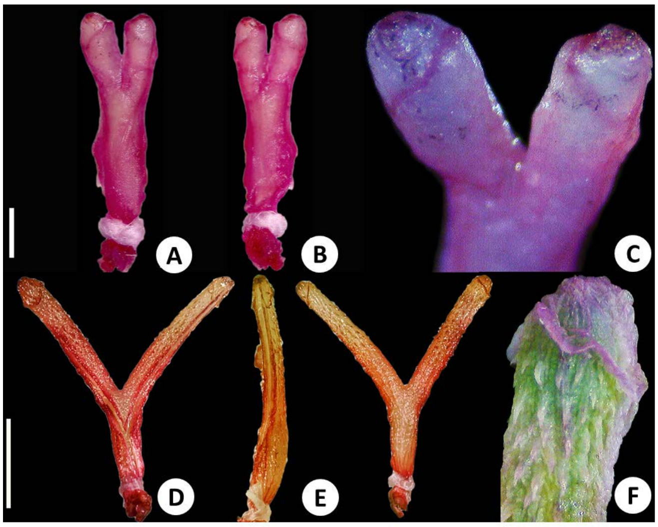

Figure 3. Hemipenial morphology of *Xenodon* spp: *Xenodon angustirostris* (INSZ 281)- **A.** Sulcate and **B.** Asulcate views, **C.** Apices of lobes showing the absence of apical discs with free edges. *Xenodon rabdocephalus* (INSZ 246)- **D.** Sulcate and **E.** Asulcate views, **F.** Apices of lobes showing the presence of apical discs with free edges. White bars represent 10 mm.

Table 1. Meristic and morphometric (mm) data of the specimens of *Xenodon rabdocephalus* (INSZ 246 and 247) from the Sierra Nevada de Santa Marta, Colombia. Abbreviations: snout-vent length (SVL), tail length (TL) and total length (TTL).

Character	INSZ 246 (male)	INSZ 247 (female)
SVL	440	727
TL	86	100
TTL	526	827
TL/SVL	19.5%	13.8%
Ventral scales	133	145
Subcaudal scales	44+spine	40+spine
Dorsal scale rows	19/19/17	19/19/17
Supralabial scales	7/7	7/8
Infralabial scale	9/9	9/8
Preocular	2/2	1/1
Loreal	1/1	1/2
Temporal formula	1+2/1+2	1+2/1+2
Head length	20.85	30.16
Head width	17.17	22.77
Parietal scale length	7.80	10.81
Parietal scale width	4.87	7.11
Frontal scale length	5.80	7.84
Frontal scale width	4.65	6.65
Prefrontal scale length	2.44	2.98
Prefrontal scale width	3.27	3.66
Internasal scale length	2.47	2.82
Internasal scale width	2.66	3.38
Eye diameter	4.05	7.18
First temporal scale length	5.14	8.50
First temporal scale high	1.49	3.02
Interorbital length	8.41	12.36
Rostro-orbital length	5.01	11.23
Naso-orbital length	5.68	8.59
Hemipenis length	12^{th} subcaudal scales	N/A

measurements (Table 1, Fig. 2). Hemipenial eversion followed Pesantes (1994). Based on hemipenial morphology, we identified the male as *X. rabdocephalus* since it possesses the distinctive characteristics described by Myers & McDowell (2014), such as hemipenial lobes deeply divided (>50% of the hemipenial body), sulcus spermaticus centrifugal and strongly grooved, each branch extending onto the tip of lobe, intersulcar area nude, apices of lobes ornamented with smooth calices and presence of apical discs with free edges, and hemipenial body with medium-sized spines arranged in longitudinal rows (Fig. 3). The specimens were deposited in the Colección Zoológica del Instituto Nacional de Salud (INSZ, Bogotá) under the numbers INSZ 246 (male) and 247 (female). The new locality of *X. rabdocephalus* is located 139 km north-east from the record of this taxon nearest to the SNSM (Angarita-M et al., 2015) and 47 km west from the report of *Xenodon* nearest to the SNSM (Angarita-Sierra &

Manco-Jaraba, 2023), and represents the highest altitude at which *X. rabdocephalus* has been recorded.

Based on hemipenial morphology, Myers & McDowell (2014) tentatively resurrected *X. angustirostris* from synonymy with *X. rabdocephalus* for Central American and western Colombian populations but cautioned "...in applying the name *angustirostris* until comparative hemipenial and other data can be accrued from populations throughout western Colombia and especially Middle America". Recently, Angarita-Sierra & Manco-Jaraba (2023) reported the occurrence of *X. angustirostris* in the Serranía del Perijá, northern Colombia. Although the specimen described by them (INSZ 281; Fig. 3A–C) is not from western Colombia, it is in general agreement with the hemipenial characteristics attributable to *X. angustirostris* sensu Myers & McDowell (2014). Similarly, our newly collected male (INSZ 246; Fig. 3 D–F) possesses the distinctive hemipenial characteristics of *X. rabdocephalus* as described by Myers & McDowell (2014). Specifically, it differs from Angarita-Sierra & Manco-Jaraba's (2023) male *X. angustirostris* (INSZ 281) by having hemipenial lobes deeply divided (vs. moderately divided), sulcus spermaticus strongly grooved (vs. moderately grooved), apices of lobes ornamented with smooth calices and the presence of apical discs with free edges (vs. nude, lacking apical discs), and hemipenial body with medium-sized spines arranged in longitudinal rows (vs. with several medium-sized spines positioned laterally on each side, lacking spines arrangement in longitudinal rows) (Fig. 3). In addition to differences in hemipenial morphology, both specimens of *X. rabdocephalus* also differ from that of *X. angustirostris* in having dorsal scale formula 19/19/17 (vs. 21/21/17), 9/9 (male) and 9/8 (female) supralabial scales (vs. 10/11), 3rd supralabial scale entering into the eye orbit (vs. 4th and 5th supralabial scales entering into the eye orbit), temporal scale formula 1+2 (vs. 1+3), and ventral surface of the body cream (vs. dark, Fig. 2). Therefore, comparison between these Colombian specimens supports Myers & McDowell's (2014) hypothesis that the morphological distinctiveness of *X. angustirostris* and *X. rabdocephalus* warrants the resurrection of the former from synonymy with the latter. This work expands our knowledge of the distribution and morphology of *Xenodon* spp, which are rare dipsadid snakes poorly represented in biological collections.

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