

SHORT COMMUNICATION

New record and updated distribution map of the rare *Amphisbaena spurrelli* (Amphisbaenia: Amphisbaenidae)

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Amphisbaenia is a group of squamate reptiles, popularly known as worm lizards, adapted to a subterranean lifestyle. About 200 extant species are recognized, most from Latin America, especially Brazil (Costa and Garcia 2019, Uetz *et al.* 2019). In Central America, amphisbaenians are known only from Panama, where two taxa occur—viz., *Amphisbaena fuliginosa varia* Laurenti, 1768, also known from northern South America, and *A. spurrelli* Boulenger, 1915, also known from Colombia (Gans 1962a, Vanzolini 2002, Ray *et al.* 2015). The occurrence of a third species, *A. alba* Linnaeus, 1758 in Panama is questionable (Gans 1962b, Köhler 2008, Jaramillo *et al.* 2010).

The description of *Amphisbaena spurrelli* is based on two specimens from Andagoya, Colombia, collected by Herbert George Flaxman

Spurrell (1877–1918), a British zoologist and physician (Boulenger 1915, Beolens *et al.* 2011). Subsequently, three additional individuals were collected, and the species was redescribed by Gans (1962a). The first was recorded from Boca de la Raspadura by Burt and Burt (1931). The second was found at the type locality, and the third was found in Panama (Tucuti Branch, Tuira River) (Gans 1962a). More recently, Ibáñez *et al.* (2017) reported the species in Chagres National Park, Panama, but provided no information on voucher specimens.

Amphisbaena spurrelli is distinguished from its congeners by a combination of morphological features, as follow: possession of 218–222 dorsal annuli; 18–20 caudal annuli with the tail tip covered by tuberculate segments; 16–18 dorsal and 16–19 ventral midbody segments; three supra- and three infralabials; one or two postgenial rows; and a postmalar row (Gans 1962a). Morphologically, the species resembles *A. rozei* Lancini, 1963 from Venezuela, which was placed in the synonymy of *A. spurrelli*

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(Donoso-Barros 1968, González-Sponga and Gans 1971). However, *A. spurrelli* and *A. rozei* differ slightly in the range of body annuli and ventral midbody segments, and in the shape of the second infralabial; in *A. spurrelli* the second infralabial is the largest, whereas in *A. rozei* the first infralabial is longer than the second in the mouth-line (Costa *et al.* 2018).

While visiting the reptile collection of the American Museum of Natural History (AMNH), I encountered a specimen of *A. spurrelli* from Panama that was not recorded in the literature. This specimen (AMNH 115649; Figure 1) was collected on 14 August 1976 by Pedro Galindo and Rodolfo Hinds in a flooded forest in the Majecito River of the Bayano River Drainage (ca. 9.123° N, 78.875° W; coordinates found with Google Earth Pro). At the time the worm lizard was collected, the Bayano River was doubtless affected by the filling of a large hydroelectric dam (Finley-Brook and Thomas 2010, AES Panamá 2017).

Unfortunately, the collection data do not specify whether the specimen was collected in a forest that naturally was seasonally flooded or flooded by the Bayano Dam. Despite their fossorial habits, amphisbaenians can swim (Maschio *et al.* 2009, van der Hoek 2018). A small Venezuelan species from the Orinoco Plains (*A. gracilis* Strauch, 1881) is somewhat unusual because it lives in wetlands covered by palms (*Mauritia flexuosa* L.f.), known as ‘morichales’; the worm lizards launch themselves in the water to flee from predators (Señaris 2001). A Colombian species (*A. medemi* Gans and Mathers, 1977) inhabits seasonally flooded pastures and scrublands (Gans and Mathers 1977). Thus, the occurrence of *A. spurrelli* in a flooded forest may not be as unlikely as it might seem.

The identity of AMNH 115649 as *A. spurrelli* was confirmed by comparison with three other specimens of this taxon [AMNH 18261, FMNH 130988 (Field Museum), and MCZ 39784 (Museum of Comparative Zoology)], and with photographs of the lectotype [NHMUK (former



Figure 1. *Amphisbaena spurrelli* (AMNH 115649) from the Majecito River (9.123° N, 78.875° W), Panama.

BMNH) 1915.10.21.9 and the paralectotype (NHMUK 1915.10.21.8) housed at the Natural History Museum, UK, as well as with the data from the species redescription (Gans 1962a). As shown in Table 1, AMNH 115649 clearly is *A. spurrelli*, and the inclusion of this specimen increases the upper range of dorsal body annuli known for this species to 223. The color pattern of AMNH 115649 fits the description by Gans (1962a). Dorsal segments are dark brown with cream margins, giving a reticulate appearance. This pattern is observed in the third to fifth segment below the lateral sulcus; ventrad from this, all segments are cream colored.

The Majecito River site is located between the existing Panamanian records for *A. spurrelli*. The Majecito site is 55 km southeast of Chagres National Park and 160 km northwest of the Tucuti Branch of the Tuirá River and lies in a straight line between these localities that are separated by 210 km (Figure 2, Table 2). The species seems to be a forest dweller, occurring in the moist forests of the Chocó-Darién Ecoregion and the Isthmian Atlantic Ecoregion in the Tropical & Subtropical Moist Broadleaf Forest Biome (Dinerstein *et al.* 2017). The localities where *A. spurrelli* occurs have three different

Table 1. Morphological data for *Amphisbaena spurrelli*. Data from the lectotype (NHMUK 1915.10.21.9) and the paralectotype (NHMUK 1915.10.21.8) are based on photographs and the species redescription (Gans 1962a). All specimens have a tail tip slightly laterally compressed and covered by tuberculate segments. A solidus (/) separates left/right sides. * I consider the scale posterior to the third supralabial (and posterior to the mouth commissure) to be a post-supralabial (Gans 1963a, b), which some authors (Pinna *et al.* 2010) would consider a fourth supralabial. **One could argue that MCZ 39784 does not have a post-malar row, because it is behind the mouth commissure (Gans 1962c, 1964). Discussions regarding the problem of the definition of ‘post-malar row’ are outside the scope of this work, but the specimen has a row of seven scales posterior to the second row of genials.

Character	AMNH 115649	AMNH 18261	FMNH 130988	MCZ 39784	NHMUK 1915.10.21.8	NHMUK 1915.10.21.9
Body annuli	223	221	222	221	219	218
Lateral annuli	4	4	4	4	4	5
Caudal annuli	19	19	19	20	19	18
Autotomic annulus	7	7	6	Not visible	7?	6?
Lateral sulcus	Yes	Yes	Yes	Yes	Yes	Yes
Dorsal sulcus	No	No	No	No	No	No
Midbody dorsal segments (MDS)	16	16	16	16	18	16–18
Midbody ventral segments (MVS)	18	16–18	16	18	19	18
MDS+MVS	34	32–34	32	34	37	34–36
Precloacal pores	4	4	4	4	4	4
Precloacal segments	6	6	6	6	6	6
Post-cloacal segments	12	12	12	12	12	12
Supralabials	3	3	3	3	3	3
Infralabials	3	3	3	3	3	3
Temporals	1	1	1	1/2	1	1
Post-ocular	1	1	1	1	1	1
Post-supralabial*	1/0	1	1	1	1	0/1
Genials on 1 st row	3	2	1	2	3	2
Genials on 2 nd row	0	0	4	3	3	0
Post-malars	7	7	9	7**	7	7
Snout–vent length (mm)	260	225	230	207	297	228
Tail length (mm)	21.9	21.0	22.0	19.0	27	22
Head width (mm)	7.0	5.8	6.7	5.2	?	?
SVL/HW	36.9	38.9	34.3	40.1	?	?

types of dominant soil (Figure 2, Table 2)— cambisol (“brown forest soil” formed by the weathering of adjacent mountains), gleysol (typical of some seasonally flooded lowlands), and nitisol (deep well-drained soils in some tropical rainforests) (FAO *et al.* 2012, IUSS Working Group WRB 2015). These soils present medium to fine textures, varying from loam to clay loam and light clay (FAO *et al.* 2012). *Amphisbaena spurrelli* would be expected to occur in medium-textured soils because the species has a small, round head that is not specialized to dig in finer, textured clayic soils (Gans 1968, Navas *et al.* 2004). However, Kazi and Hipsley (2018) found no relationship between soil texture and cranial shape among Caribbean worm lizards, and the occurrence of *A. spurrelli* in clayic soils in Chagres National Park is consistent with this observation. Individuals of this species probably excavate only at shallow depths, as its countershaded color pattern suggests (Gans 1968); this may explain its presence in fine-textured soils. In this type of habitat, the worm lizards may prefer to inhabit rotten logs, as observed for *A. bakeri* Stejneger, 1904 in Puerto Rico (Schwartz and Henderson 1991). More refined studies

investigating the relationships between cranial shape and soil type, and between color pattern and the microhabitat occupied are needed to test this hypothesis.

Available evidence indicates that *A. spurrelli* is a lowland species (Table 2), probably adapted to seasonally flooded forests or at least associated with riparian forests. The widely separated locality records probably reflect inadequate sampling owing to the difficulty of finding these fossorial lizards (Pramuk and Alamillo 2003), because the vegetation and soil types are similar between the northernmost and the southernmost records (Figure 2). Thus, the range of *A. spurrelli* could be much greater than currently suggested (Ibáñez *et al.* 2017).

Amphisbaena spurrelli is a species of medium vulnerability in Panama (Jaramillo *et al.* 2010) and globally categorized as Data Deficient (DD) by the IUCN “because the distribution is relatively small but not well-known, and nothing is known of its exposure or sensitivity to any threats or its population trend” (Ibáñez *et al.* 2017). Additionally, Ibáñez *et al.* (2017) stated that the distribution of *A. spurrelli* in Panama “is in need of clarification”. The meager knowledge of the distributions of species is one of the main

Table 2. Summary of the locality records for *Amphisbaena spurrelli*. All coordinates and elevations are approximate.

Voucher	Country	Department / Province	Locality	Latitude N (°)	Longitude W (°)	Elevation (m a.s.l.)	Soil type (FAO <i>et al.</i> 2012)
NHMUK 1915.10.21.8, 1915.10.21.9; FMNH 130988	Colombia	Chocó	Andagoya, at the junction of the Condoto and San Juan rivers	5.090	76.695	55	Cambisol
AMNH 18261	Colombia	Chocó	Boca de la Raspadura	5.266	76.700	90	Gleysol
MCZ 39784	Panama	Darién	Tucuti branch (= Río Balsas), Tuirá River	7.983	77.925	15	Cambisol
AMNH 115649	Panama	Panama	Majecito River, Bayano Drainage	9.123	78.875	70	Nitisol
Unknown	Panama	Panama	Chagres National Park	9.300	79.400	~ 200	Cambisol

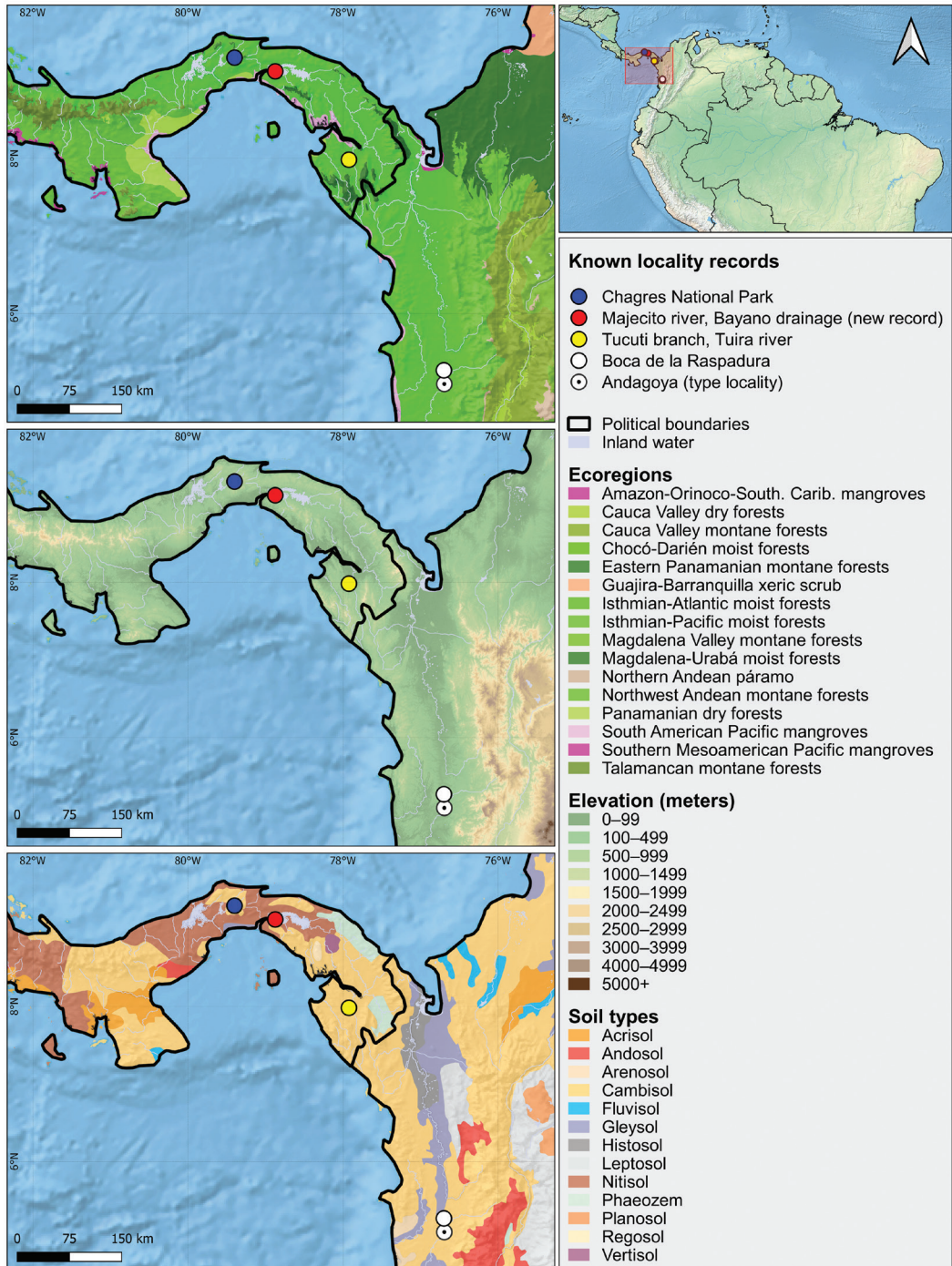


Figure 2. Distribution records of *Amphisbaena spurrelli*, over ecoregions (Dinerstein *et al.* 2017) (top map), elevation (middle map) and soil types (FAO *et al.* 2012) (bottom map).

biodiversity data shortfalls of the 21st century (Hortal *et al.* 2015) and has been responsible for the neglect of reptiles in initiatives of global conservation priorities (Tingley *et al.* 2016). Today, about 21% of reptile species worldwide are considered DD by the IUCN criteria; most of these taxa are fossorial and semi-fossorial groups such as *Amphisbaenia* that require the attention of researchers (Böhm *et al.* 2013). Because *A. spurrelli* is one such DD species, any new locality record merits publication to ensure better future assessments of its conservation status.

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