

# First record of *Amphisbaena lumbricalis* (Squamata, Amphisbaenidae) in the state of Pernambuco, Brazil: including a distribution map and soil classification of its occurrence

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*Amphisbaena* is currently represented by 196 species (Uetz and Hošek, 2016) belonging to six families (Vidal and Hedges, 2009). Amphisbaenidae, the most diverse family (178 species), is distributed throughout South America and Africa (Gans, 2005; Vidal et al., 2008; Uetz and Hošek, 2016). Of these, 73 species occur in Brazil (Costa and Bérnills, 2015), and 20 in the semiarid region. Three distribution patterns can be recognised in these species (Rodrigues, 2003): i) species with wide distribution in the Caatinga Morphoclimatic Domain: *Amphisbaena alba*, *A. pretrei*, *A. vermicularis*, *Leposternon infraorbitale*, *L. microcephalum* and *L. polystegum*; ii) species associated with the sand dunes of the middle São Francisco River and adjacent sands: *A. arda*, *A. frontalis*, *A. hastata* and *A. ignatiana*; and iii) relictual species: *A. anomala*, *A. arenaria*, *A. bahiana*, *A. carvalhoi*, *A. heathi*, *A. littoralis*, *A. lumbricalis*, *A. supernumeraria*, *A. uroxena* and *L. kisteumacheri*.

*Amphisbaena lumbricalis* was described by Vanzolini, 1996 based on 72 specimens from its type locality (the Xingó Hydroelectric Power Plant: -9.4°S, -37.9666°W), on the lower São Francisco River, which divides the states of Alagoas and Sergipe, Brazil. To date, its distribution area was recognised only for the states of Alagoas and Sergipe with a total of four known occurrence sites

(Vanzolini, 1996; Galdino et al., 2015). In Alagoas, *A. lumbricalis* has been recorded in the municipalities of Delmiro Gouveia, Piranhas and Traipu, and in the municipality of Canindé de São Francisco in Sergipe state. In the present study, we report a new occurrence of this worm lizard for the semiarid region of Pernambuco state and classify the soil where it occurs.

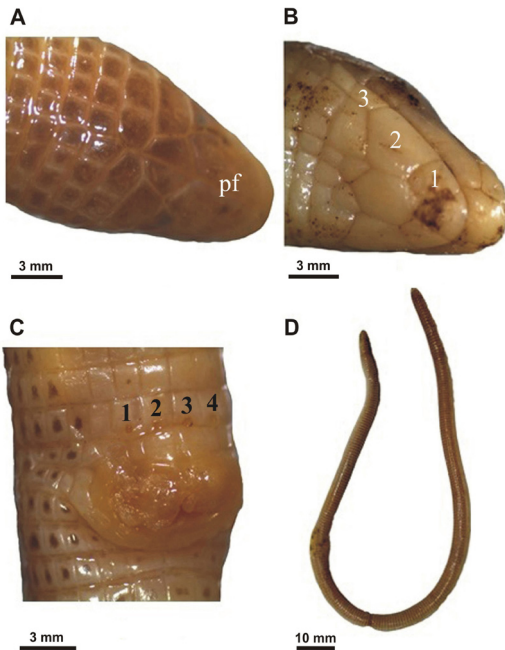
Between July 2009 and March 2014, specimens of *A. lumbricalis* were gathered during wild fauna rescue missions conducted by the Project to Integrate the San Francisco River with the Northern Northeast Hydrographic Basins (PISF). A total of 477 km of the area (eastern and northern axes of the PISF) were sampled during vegetation suppression and worm lizards were collected manually when sighted. The work was conducted in the state of Pernambuco (PE) in the following municipalities: Floresta, Custódia and Sertânia. These three collection sites are located in the Depressão Sertaneja Meridional, lie in the Caatinga Biome and are characterised by bushy vegetation on a sandy soil. We identified the specimens based on the diagnostic and meristic characters as compared to other South American *Amphisbaena* species (Vanzolini, 1996, 2002). Voucher specimens are deposited in the Herpetological Collection of the Caatinga Fauna Museum (MFCH, Appendix) at the Center for the Conservation and Management of Caatinga Fauna (CEMAFAUNA-CAATINGA/UNIVASF), municipality of Petrolina, PE, Brazil. The morphological description of soil profiles was conducted according to the Technical Pedology Manual (IBGE, 2015). A granulometric analysis and textural classification of soil samples were performed in the Physics and Chemistry of Soil Laboratory of the Universidade Federal do Vale do São Francisco (UNIVASF).

A total of 30 specimens of *A. lumbricalis* (snout-vent length:  $172.2 \pm 14.8$  mm; range: 139-201 mm) were collected. All specimens exhibited the following

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**Figure 1.** Photographs of MFCH 2267, showing some diagnostic characters of *Amphisbaena lumbricalis*: (A) prefrontals (pf) being the largest scales on top of the head; (B) three lower labials (1-3), the second by far the largest; (C) four preloacal pores (1-4); (D) dorsal view of the animal.

diagnostic characters (Vanzolini, 1996): (i) no major fusions of head scales; (ii) prefrontals being the largest scales on top of the head and parietals very variable, irregular; and (iii) three upper and three lower labials, in both cases the second by far the largest (Fig. 1). A

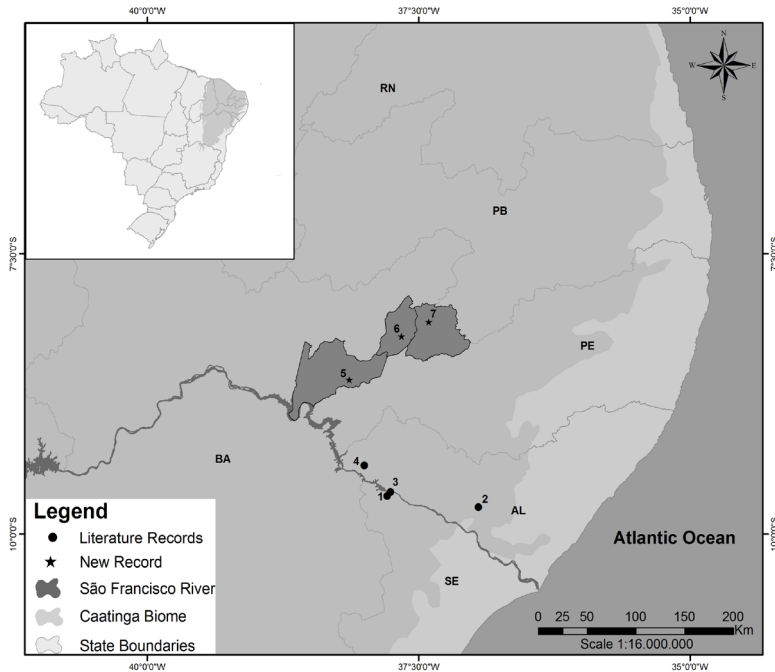
comparison of the morphology of *A. lumbricalis* with four other slender *Amphisbaena* species is presented in Table 1. All *A. lumbricalis* displayed similar characteristics to those reported by Vanzolini (1996) and Galdino *et al.* (2015). Besides the *A. lumbricalis* specimens, other amphisbaenids (*A. alba*, *A. vermicularis* and *Leposternon polystegum*) were also recorded in the study area (Tavares and Ribeiro, 2014).

Our new findings of *A. lumbricalis* in the municipalities of Floresta (four specimens), Custódia (two specimens) and Sertânia (24 specimens), extend the distribution of this species by 86 km, 133 km and 160 km, respectively southward, from Delmiro Gouveia, Alagoas, the closest known locality (Fig. 2). *Amphisbaena lumbricalis*, until recently considered endemic to the Caatinga, with disjunct distribution and predominantly inhabiting sandy soils (Vanzolini, 1996), was recently found in an ecotone between the Atlantic Forest and Caatinga (Traipu, Alagoas), including a non-sandy area (Galdino *et al.*, 2015). Analysis of soil from the new sites reported here made it possible to identify the occurrence of *A. lumbricalis* associated with three classes as follows: eutrophic chromic cambisol moderate A medium/clayey texture (Floresta and Sertânia), quartzarenic neosol weak A sandy texture (Floresta), and red-yellow argisol moderate A sandy/clayey texture (Custódia). These types of soil textures can facilitate animal burrowing. Other amphisbaenids, such as *A. alba* and *A. vermicularis*, have been recorded in sandy soils on the right bank of the San Francisco River (Porto *et al.*, 2000), although these species also occur in non-sandy soils (Barros-Filho and Valverde, 1996).

Several aspects of the biology of amphisbaenians remain poorly understood, due to their fossorial habits,

**Table 1.** Meristic characters of *Amphisbaena lumbricalis*, based on examined specimens, literature records (Vanzolini, 1996; Galdino *et al.*, 2015), and compared with four other slender *Amphisbaena* species. Pp: number of preloacal pores; Ba: number of body annuli; Ca: number of caudal annuli; Au: autotomy sites on caudal annuli; Ds: number of dorsal segments per annulus at midbody; Vs: number of ventral segments per annulus at midbody.

Species	Pp	Ba	Ca	Au	Ds	Vs	Study
<i>Amphisbaena lumbricalis</i> (N = 30)	4	225-252 (236 ± 6.3)	20-23 (16.9 ± 6.8)	6-10	12-17 (14 ± 1.1)	15-20 (18 ± 1.0)	This study
<i>Amphisbaena lumbricalis</i> (N = 72)	4 (2, 5, 6)	225-247	20-26	6-10	12-16	16-20	Vanzolini, 1996
<i>Amphisbaena lumbricalis</i> (N = 37)	4	228-252 (240.1 ± 5.6)	20-25 (22.8 ± 1.0)	6-9	12-15 (13.3 ± 1.0)	15-20 (18 ± 1.2)	Galdino <i>et al.</i> , 2015
<i>Amphisbaena hastata</i> (N = 15)	4	264-277 (269.1 ± 0.9)	39-44 (41.3 ± 0.5)	12-16	18	16	Vanzolini, 1996
<i>Amphisbaena heathi</i> (N = 4)	0, 4	186-194 (191.5)	21-32 (26.5)	7-8	12	18-20	Vanzolini, 1996
<i>Amphisbaena ignatiana</i> (N = 5)	6	251-260 (255.6)	32-36 (33.8)	6	16	20-22	Vanzolini, 1996
<i>Amphisbaena minuta</i> (N = 2)	4	265-271 (268.0)	22	8	17-19	20	Vanzolini, 1996



**Figure 2.** Geographic distribution of *Amphisbaena lumbricalis*. Sergipe (SE): 1. Caninéd de São Francisco; Alagoas (AL): 2. Traipu 3. Piranhas 4. Delmiro Gouveia; Pernambuco (PE): 5. Floresta (New Record), 6. Custódia (New Record) and 7. Sertânia (New Record). Localities 1, 2, 3, and 4 are based on literature (Vanzolini, 1996; Galdino et al., 2015).

which limits their observation and capture in nature for more complex studies (Navega-Gonçalves, 2009). Our records of *A. lumbricalis* for the semiarid of Pernambuco increase the evidence that distribution of this species may be especially dependent of sandy soil microhabitats. New records of other squamate reptiles have recently been made in the same municipalities as reported here for *A. lumbricalis*, such as the lizards *Acratosaura mentalis* (Brito et al., 2012) and *Tropidurus cocorobensis* (Ribeiro et al., 2012), and snakes of the genus *Thamnodynastes* (Coelho et al., 2013). This set of records demonstrates the importance of these semiarid sandy soils. In this respect, monitoring in areas directly and indirectly influenced by the PISF and further studies in semiarid regions of Brazil could reveal new occurrence sites of animal species, specifically *A. lumbricalis*. Although the geographical distribution of *A. lumbricalis* is wider than was previously known, its relictual distribution pattern remains unchanged, because its occurrence is especially related to the presence of sandy soils. Finally, *A. lumbricalis* is categorised as “Data deficient” on the IUCN Red List (IUCN, 2016),

but given the current larger distribution of the species, the IUCN status should be reassessed.

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#### Appendix: Specimens examined

*Amphisbaena lumbricalis*: Brazil: Pernambuco: Floresta: MFCH 2166, 2253, 2327, 2331. Custódia: MFCH 2186-87. Sertânia: MFCH 2163-64, 2240, 2245-46, 2254, 2256-58, 2264, 2267, 2272-74, 2276, 2281, 2291, 2295-96, 2299, 2301, 2306, 2322, 3434.