

A New Species of Amphisbaena from Northeastern Brazil (Squamata: Amphisbaenidae)

Authors: Ribeiro, Leonardo B., Gomides, Samuel C., and Costa, Henrique C.

Source: Journal of Herpetology, 52(2) : 234-241

Published By: Society for the Study of Amphibians and Reptiles

URL: <https://doi.org/10.1670/17-028>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

A New Species of *Amphisbaena* from Northeastern Brazil (Squamata: Amphisbaenidae)

LEONARDO B. RIBEIRO,^{1,2} SAMUEL C. GOMIDES,³ AND HENRIQUE C. COSTA⁴

¹Universidade Federal do Vale do São Francisco (UNIVASF), Centro de Conservação e Manejo de Fauna da Caatinga (CEMAFAUNA-CAATINGA), 56304-917, Petrolina, Pernambuco, Brazil

³Universidade Federal do Oeste do Pará, Campus Oriximiná. Rodovia PA-254, no. 257 - Bairro Santíssimo. CEP 68.270-000, Oriximiná, Pará, Brazil

⁴Programa de Pós-Graduação em Zoologia, Universidade Federal de Minas Gerais, 31270-901, Belo Horizonte, Minas Gerais, Brazil

ABSTRACT.—We describe a new species of *Amphisbaena* from the Caatinga in the northern region of Bahia, northeastern Brazil. The new taxon is identified mainly by having two precloacal pores, 158–165 body annuli, 12–14 caudal annuli with autotomy on the third and fourth annuli, 14–16 dorsal and 15–16 ventral segments on a midbody annulus, four supralabials, three infralabials, and a postmalar row. Its description increases to 23 the number of species of *Amphisbaena* for the Caatinga. Knowledge of worm lizard richness has largely increased in Brazil since the 1990s, especially in the Caatinga and the Cerrado, due mainly to collections in previously unsurveyed areas for environmental impact assessments.

RESUMO.—Nós descrevemos uma nova espécie de *Amphisbaena* da Caatinga na região norte da Bahia, nordeste do Brasil. O novo taxon é identificado principalmente por possuir dois poros pré-cloacais, 158–165 anéis corporais, 12–14 anéis caudais com autotomia no terceiro e quarto anéis, 14–16 segmentos dorsais e 15–16 segmentos ventrais em um anel no meio do corpo, quatro supralabiais, três infralabiais, e uma fileira pós-malar. Sua descrição eleva para 23 o número de espécies de *Amphisbaena* para a Caatinga. O conhecimento sobre a riqueza de espécies de cobras-de-duas-cabeças tem aumentado intensamente no Brasil desde a década de 1990, especialmente na Caatinga e no Cerrado, em maior parte devido a coletas em áreas previamente não amostradas para fins de estudos de impacto ambiental.

The Caatinga is one of the six Brazilian biomes (sensu IBGE, 2004), located in the northeast of the country. With 844,000 km², it presents mostly a semiarid and very seasonal climate, but is far from being a homogeneous region, harboring several kinds of vegetation from open to forested areas (Velloso et al., 2001).

In past years, biologists thought the Caatinga, together with the Cerrado and the Chaco, did not have particular fauna, but shared species found through the South American diagonal of open formations (Vanzolini, 1963, 1974). This proposition was biased by the lack of adequate information on the region's endemic biodiversity, and the situation has changed. As a result of accumulation of data from different localities and, more recently, through phylogeographic studies (e.g., Oliveira et al., 2015; Werneck et al., 2016), the Caatinga, Cerrado, and Chaco each are now known to have a high species richness and their own endemic taxa (e.g., Rodrigues, 2003a; Azevedo et al., 2016; Cacciali and Ubilla, 2016).

A good example of the impact of increasing collection effort in the Caatinga comes from worm lizards (*Amphisbaena*). These reptiles are usually difficult to find because of their fossorial habits, underestimating their richness patterns (Colli et al., 2016). Before the 1990s, nine species were known from the region (Vanzolini, 1951, 1964, 1968; Gans, 1965a,b, 1971; Gans and Amdur, 1966; Williams and Vanzolini, 1980). Since 1991 this number has increased to 22 species, after the description of new taxa (Vanzolini, 1991a,b, 1996; Porto et al., 2000; Rodrigues, 2003b; Mott et al., 2008, 2009; Roberto et al., 2014) and geographic distribution extensions (Borges-Nojosa and Caramaschi, 2000; Perez and Ribeiro, 2008; Colli et al., 2016).

During the examination of specimens housed at the herpetological collection of the Museu de Fauna da Caatinga in Brazil,

we found eight specimens of *Amphisbaena* that could not be assigned to any known species. After a careful examination, we recommend they be treated as a new species that we describe below.

MATERIALS AND METHODS

Specimens were obtained at a faunal rescue for the installation of a wind farm in the semiarid region of the state of Bahia, Brazil; none of the authors participated in the collections. They were fixed in formalin and are preserved in 70% alcohol at the herpetological collection of the Museu de Fauna da Caatinga (MFCH), located at the Centro de Conservação e Manejo de Fauna da Caatinga, Universidade Federal do Vale do São Francisco, municipality of Petrolina, state of Pernambuco, and in the herpetological collection of the Centro de Coleções Taxonômicas, Universidade Federal de Minas Gerais, municipality of Belo Horizonte, state of Minas Gerais, Brazil.

Scale nomenclature follows Gans and Alexander (1962). Measurements were taken to the nearest 0.1 mm with a digital caliper, except for the snout–vent length (SVL), measured with a flexible ruler to the nearest 1.0 mm. Body slenderness proportion (BSP) (SVL/head width) follows Vanzolini (1997) and Pinna et al. (2014). Color descriptions are based on preserved specimens. Sex was determined by the direct examination of hemipenes after a small incision at the base of tail, or by direct examination of the gonads after a small incision at the abdomen. Comparisons with other taxa were facilitated by both literature (e.g., Vanzolini, 1997; Costa et al., 2015; Ribeiro et al., 2016) and specimens from the herpetological collections of Fundação Ezequiel Dias (FUNED), Museu de Zoologia da Universidade de São Paulo (MZUSP), Universidade Federal de Goiás (UFG), and Universidade Federal de Minas Gerais (UFMG) (Appendix 1). All geographic coordinates were recorded in datum WGS84.

²Corresponding Author. E-mail: leonardo.ribeiro@univasf.edu.br
DOI: 10.1670/17-028

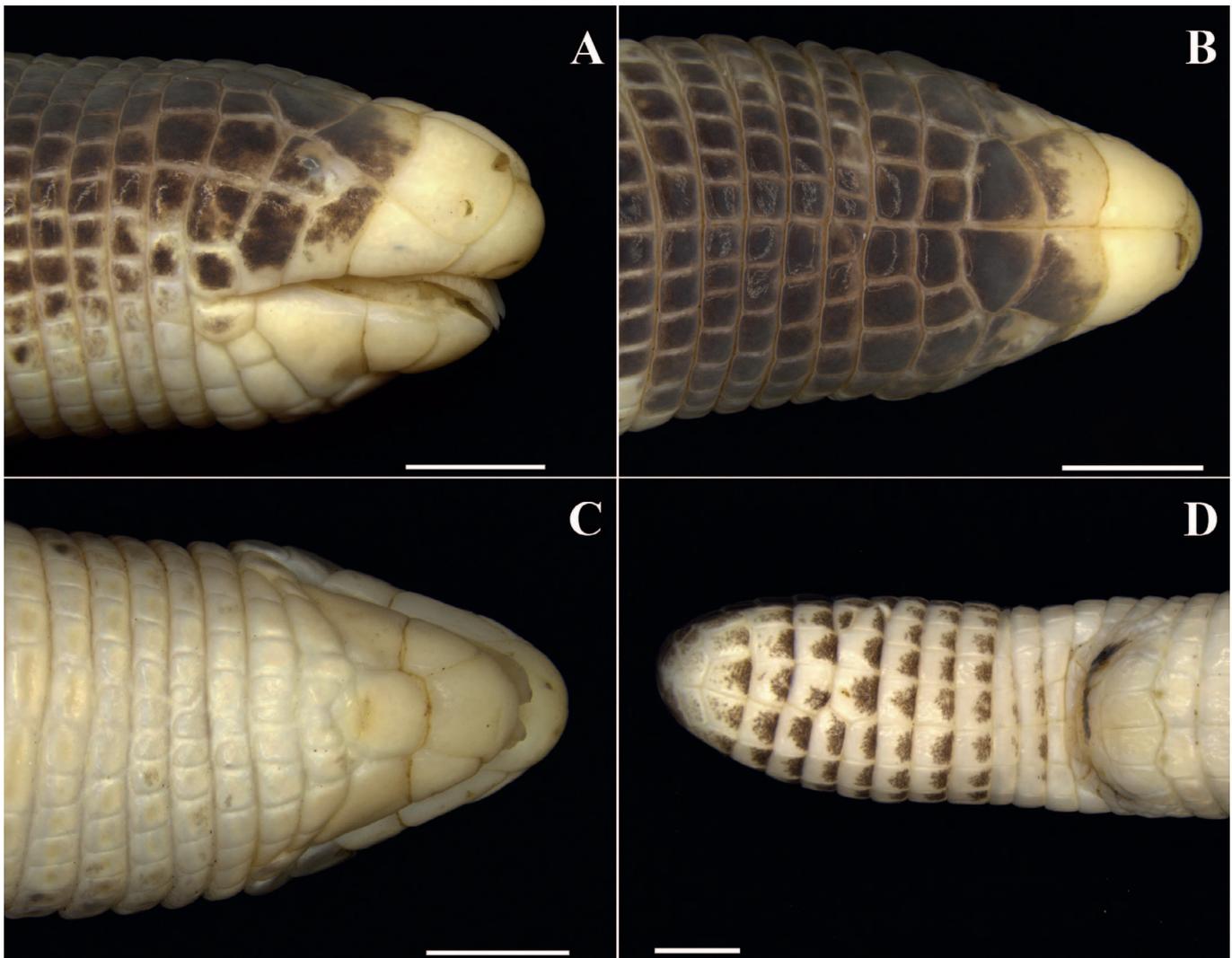


FIG. 1. Lateral (A), dorsal (B), and ventral view (C) of the head, and ventral view of the tail (D) of the holotype (MFCH 3939) of *Amphisbaena kiriri* sp. nov. Scale bar: 2 mm.

RESULTS

Amphisbaena kiriri sp. nov.

Figures 1–2; Table 1

Holotype.—Female, MFCH 3939 (field number 3971), municipality of Campo Formoso, state of Bahia, Brazil, (10.558345°S 40.569221°W; 877 m above sea level [m a.s.l.]), collected on 6 September 2014 by Robson Lúcio Moraes Dias Santos.

Paratypes.—All from Campo Formoso, Bahia, Brazil, but collected at different sites. Female, MFCH 4165 (field number RE67) (10.024767°S 40.845489°W; 556 m a.s.l.), 5 March 2016. Male, UFMG 3080 (former MFCH 4166, field number RBF302) (9.999412°S 40.910579°W; 944 m a.s.l.), 28 March 2016. Male, MFCH 4167 (field number REC2C02) (9.994342°S 40.919906°W; 969 m a.s.l.), 28 April 2016. Female, MFCH 4168 (field number RE2-11) (10.042046°S 40.961339°W; 987 m a.s.l.), 30 April 2016. Male, MFCH 4169 (field number RE2C16) (10.001281°S 40.929805°W; 1,001 m a.s.l.), 11 May 2016. Female, MFCH 4170 (field number RE2B42) (10.016805°S 40.940276°W; 1,002 m a.s.l.), 25 May 2016. Female, UFMG 3081 (former MFCH 4171, field number RE2B43) (10.01712°S 40.940369°W; 1,002 m a.s.l.), 25 May 2016.

Definition.—*Amphisbaena kiriri* sp. nov. is identified by the following combination of characters: 1) head round-shaped; 2) nasal suture \gg frontal suture $>$ prefrontal suture; 3) two preloacal pores without a median hiatus; 4) 158–165 body annuli; 5) three to four lateral annuli; 6) 12–14 caudal annuli; 7) autotomy on third or fourth caudal annulus; 8) tail tip rounded; 9) 14–16 dorsal segments on midbody annulus; 10) 15–16 ventral segments on midbody annulus; 11) four supralabials; 12) three infralabials; 13) one row of postgenials; 14) postmalar row present; 15) dorsal and ventral sulci absent, lateral sulcus present; 16) rostral, nasals, first supralabial, and (sometimes) anterior part of prefrontals cream colored; 17) dorsum dark gray; 18) first two to three ventral segments dark gray, the rest cream colored or (at least after first third of body) cream with a dark gray half-circle at anterior border.

Diagnosis.—*Amphisbaena kiriri* sp. nov. is diagnosed from all South American amphisbaenids by the combination of two preloacal pores, 158–165 body annuli, four supralabials, and a postmalar row. The closest species in number of body annuli are *A. anaemariae* (156–170) and *A. neglecta* (151–155), which also have two preloacal pores, but three supralabials and no postmalars. The new species can be further distinguished from *A. anaemariae*

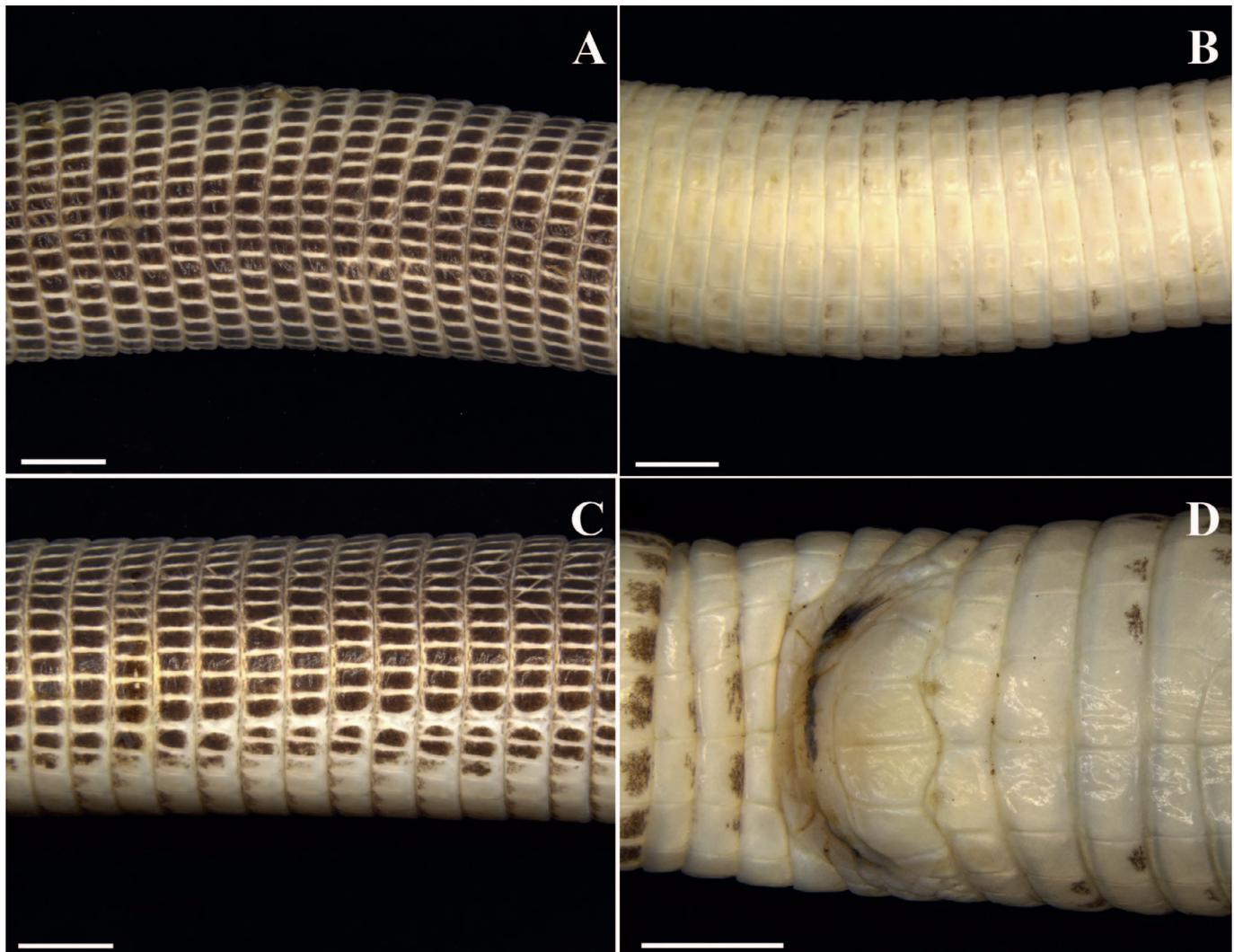


FIG. 2. Midbody in dorsal (A), ventral (B), and lateral view (C), and cloacal region (D) of the holotype (MFCH 3939) of *Amphisbaena kiriri* sp. nov. Scale bar: 2 mm.

and *A. neglecta* by the nasal suture longer than prefrontal suture (vs. shorter in both species) (Fig. 3).

Description of the Holotype.—An adult specimen, SVL 146.9 mm; caudal length 10.5 mm; head short (4.7 mm, 3.2% of SVL), rounded, not depressed or compressed, and not distinct from the neck; BSP 36.5; rostrum rounded, projecting beyond the jaw. Rostral triangular, visible in dorsal view, in contact with nasals and first supralabial. A pair of quadrangular nasals (middorsal suture 1.5 mm [0.98 % head length]), in broad contact with rostral anteriorly and first supralabials, and prefrontals posteriorly. Point contact between nasals and second supralabials. Nostrils in the anteroinferior portion of nasal shields. A pair of parallelogram-shaped prefrontals (middorsal suture 0.8 mm [0.53% head length]), in contact with nasals anteriorly, second supralabials inferiorly, ocular and frontals posteriorly. A pair of triangular frontals (middorsal 1.21 mm [0.82% head length]), in point contact with oculars and postoculars inferiorly, prefrontals anteriorly, parietals and an unnamed scale posteriorly. No enlarged parietals (middorsal suture 0.6 mm [0.43% head length]), in contact with frontals anteriorly, and unnamed scale inferiorly, and first body annulus posteriorly. A diamond-shaped ocular shield, in contact with second and third supralabials

below, prefrontal anteriorly, frontal above, and postocular posteriorly. Eye visible. Temporal squarish, contacting third supralabial anteriorly, postocular dorsally, fourth supralabial inferiorly, and first body annulus posteriorly.

Four supralabials, first triangular, as long as high, and longer than other supralabials, contacting rostral anteriorly, nasal dorsoanteriorly, and second supralabial posteriorly. Second supralabial pentagonal, the highest and higher than long, in point contact with nasal anteriorly, contacting prefrontal dorsally, ocular posterodorsally, and third supralabial posteriorly. Third supralabial pentagonal, higher than long, as high as first supralabial, contacting second supralabial anteriorly, fourth supralabial and temporal posteriorly, ocular dorsally, and in point contact with postocular; fourth supralabial smallest, squarish, contacting third supralabial anteriorly, temporal dorsally, the first body annulus posteriorly, and third infralabial inferiorly.

Mental shield trapezoidal, contacting postmental posteriorly and first infralabials laterally. Postmental pentagonal, contacting mental anteriorly, first and second infralabials laterally, and postgenials posteriorly. One row with four postgenials, in contact with postmental anteriorly, malars laterally, and post-

TABLE 1. Summary of morphometric and meristic data of specimens of *Amphisbaena kiriri* sp. nov. All measurements in millimeters. SVL = snout-vent length; TL = tail length; HW = head width; HL = head length; BSP = body slenderness proportion; BA = body annuli; LA = lateral annuli; CA = caudal annuli; AA = autotomic caudal annuli; DS = dorsal segments on midbody; VS = ventral segments on midbody; SL = supralabials; IL = infralabials; PG = postgenials; PM = postmalars; PP = precloacal pores; PRC = precloacal segments; POC = postcloacal segments; LS = first annulus with lateral sulcus; NS = length of nasal suture; PFS = length of prefrontal suture; FS = length of frontal suture; PS = parietal suture.

| | MFCH 3939 (holotype) | MFCH 4165 | UFMG 3080 (former MFCH 4166) | MFCH 4167 | MFCH 4168 | MFCH 4169 | MFCH 4170 | UFMG 3081 (former MFCH 4171) |
|-----|-------------------------|-----------|---------------------------------|-----------|-----------|-----------|-----------|---------------------------------|
| Sex | Female | Female | Male | Male | Female | Male | Female | Female |
| SVL | 146.9 | 164.8 | 130.8 | 155.3 | 130.4 | 154.6 | 145.5 | 155.6 |
| TL | 10.48 | — | — | — | 11.08 | 13.45 | — | 15.25 |
| HW | 4.03 | 4.42 | 3.94 | 4.25 | 4.15 | 4.29 | 4.61 | 4.65 |
| HL | 4.7 | 5.3 | 5 | 5.6 | 5.2 | 5.7 | 5.6 | 5.5 |
| NS | 1.45 | 1.5 | 1.4 | 1.6 | 1.3 | 1.6 | 1.4 | 1.3 |
| PFS | 0.8 | 0.9 | 0.5 | 0.7 | 0.6 | 1.2 | 1.0 | 0.6 |
| FS | 1.2 | 1.6 | 1.3 | 1.7 | 1.6 | 1.3 | 1.7 | 1.5 |
| PS | 0.64 | 0.6 | 0.5 | 1.0 | 1.0 | 0.8 | 0.9 | 0.6 |
| BSP | 36.45 | 37.29 | 33.19 | 36.53 | 31.42 | 36.03 | 31.56 | 33.47 |
| BA | 160 | 161 | 163 | 164 | 165 | 163 | 158 | 160 |
| LA | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 |
| CA | 12 | 3+ | 3+ | 3+ | 13 | 13 | 3+ | 14 |
| AA | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 |
| DS | 14 | 16 | 15 | 14 | 14 | 14 | 14 | 14 |
| VS | 16 | 16 | 16 | 16 | 16 | 15 | 16 | 16 |
| SL | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| IL | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| PG | 4 | 2 | 3 | 2 | 2 | 2 | 2 | 2 |
| PM | 9 | 10 | 10 | 9 | 10 | 9 | 9 | 9 |
| PP | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| PRC | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| POC | 12 | 14 | 12 | 11 | 12 | Damaged | 14 | 12 |
| LS | 38 | 35 | 49 | 45 | 42 | 42 | 35 | 47 |

malars posteriorly. A small, squarish “secondary malar” between the third infralabial and the “primary” malar on each side (possibly originating from a division of the malars during development). Postmalar row with nine scales.

Three infralabials, first triangular and smaller than second. Second infralabial trapezoidal, largest; third infralabial rectangular, smallest. First infralabial contacting mental and postmental laterally, and second infralabial posteriorly; second infralabial contacting postmental laterally, third infralabial, secondary malar, primary malar, and one postgenial posteriorly; third infralabial in contact with second infralabial anteriorly, secondary malar and first scale of postmalar row laterally, and the first body annulus posteriorly.

The first body annulus dorsally includes the segments posterior to the fourth supralabial, temporal, ocular, and parietals; ventrally it includes the segments posterior to postmalars. There are 160 body annuli; 14 dorsal and 16 ventral quadrangular segments (midventral segments about 1.5× wider than long). There are no dorsal or ventral sulci, but a lateral sulcus is visible from the 38th body annulus to the cloacal region. There are two small round precloacal pores; the pore-bearing segments are adjacent to each other, pentagonal, with the pores located in the posterior vertex; there are 6 precloacal segments and 12 postcloacal segments; 4 lateral annuli, 11 caudal annuli, the seventh and eighth fused in the midline; autotomy constriction in the third caudal annulus; tail round in cross-section, its diameter slightly increasing posterior to the autotomic annulus; tail tip round.

Coloration.—The head is cream anteriorly (rostral, nasals, first supralabials, and anterior half of prefrontals), becoming dark gray posteriorly. The dorsum is dark gray, with cream intersegmental sutures. The first two to three ventral segments are dark gray, but the rest of the belly is cream colored, as well as the ventral part of the head. A few ventral segments with the

anterior edge with a gray blotch, more conspicuous at the tail posterior to the autotomy annulus. Color in life unrecorded.

Geographic Distribution.—*Amphisbaena kiriri* sp. nov. is known only from the municipality of Campo Formoso, state of Bahia, northeastern Brazil (Fig. 4). All material of the type series was collected from an area that had the vegetation suppressed for installation of a wind farm. The region has a hot semiarid climate (BSh in Köppen’s climate classification) (Alvares et al., 2013) with vegetation varying from shrubby open Caatinga to arboreal Caatinga; soil is mostly sandy, but rocky with a gravel ground cover at some places. The region of Campo Formoso is in the so-called “Depressão Sertaneja Meridional,” a region composed mostly of low plains with rugged relief, but also having dissected relief and deep valleys at some areas (Velloso et al., 2001). Specimens of *A. kiriri* sp. nov. were collected at elevations ranging from 556 to 1,002 m.

Etymology.—The name *kiriri*, used as a noun in apposition, makes reference to the indigenous tribes (also known as *kariri* or *cariri*) that once inhabited Brazilian backlands, particularly the Caatinga. Four dialects were spoken by them, all currently extinct (Campbell and Grondona, 2012). The word *kiriri* is said to have its origin in the Tupi language spoken by the natives of coastal areas, meaning “silent,” “taciturn” (Sampaio, 1901).

Variation.—In UFMG 3080, the precloacal pores are separated by a median hiatus caused by the longitudinal division of the pore-bearing segments, which we consider an anomaly. The frontal suture is longer than the nasal suture in MFCH 4165, 4167, 4168, 4170, and UFMG 3081. The secondary malar is absent on the left side of the head of UFMG 3081. The parietal region is variable, with fusions between adjacent scales in UFMG 3080 and 3081. A summary of variation in morphometry, annuli, and segment counts of the type series is shown in Table 1; we also noted some color variation. MFCH 4165 has supralabial II and preocular cream colored. UFMG 3080 has supralabial II cream on

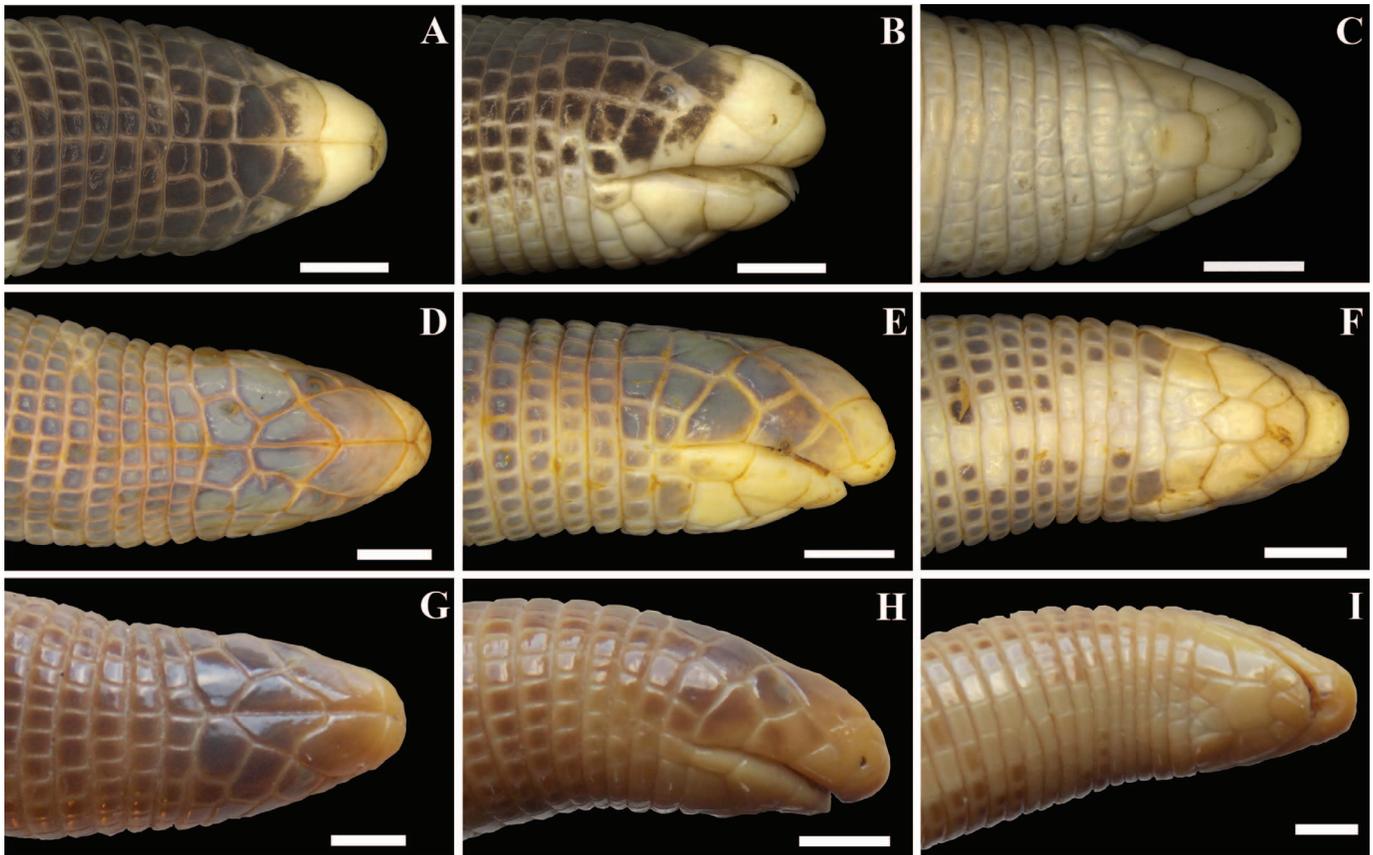


FIG. 3. Comparison of the dorsal, lateral, and ventral views of the head of *Amphisbaena kiriri* sp. nov. (MFCH 3939, holotype) (A, B, and C, respectively), *A. anamariae* (UFG 373) (D, E, and F, respectively), and *A. neglecta* (ANSP 13019, holotype) (G, H, and I, respectively). Scale bar: 2 mm.

the left side, and with a dark spot on the bottom left corner on the right side. MFCH 4167 has supralabial I with dark spots. Prefrontals are completely dark gray in UFMG 3080 and 3081. All paratypes with most ventral segments after the first third of the body with a gray blotch on the anterior border.

DISCUSSION

Among South American worm lizards, *Amphisbaena kiriri* sp. nov. is morphologically most similar to *A. anaemariae* and *A. neglecta*, two Cerrado endemic species. *Amphisbaena anaemariae* is known from the core region of the Cerrado (Colli et al., 2016), whereas *A. neglecta* is known only from the type series from the southwestern state of Mato Grosso (Vanzolini, 1997); a specimen reportedly belonging to this species from Anápolis, in the state of Goiás (Gans, 1962a; Colli et al., 2016), was determined to be misidentified (Vanzolini, 1997). Localities where *A. kiriri* sp. nov. was found are 740 km east and 1,700 km northeast from the closest records of *A. anaemariae* and *A. neglecta*, respectively.

Two other species, *A. alba* and *A. vermicularis*, are known from Campo Formoso (Dal Vechio et al., 2016), though with no information if in syntopy with *A. kiriri* sp. nov. From *A. alba* and *A. vermicularis* the new species can be easily distinguished by many characters such as the number of preloacal pores, body annuli, and segments in a midbody annulus (Gans, 1962b; Gans and Amdur, 1966). Two other species have been recorded in localities at the state of Bahia close to Campo Formoso, and may be found in sympatry with *A. kiriri* sp. nov. in the future: *A. bahiana*, from Senhor do Bonfim (previously known as Vila

Nova, 40 km east of the type locality of *A. kiriri* sp. nov.) (Vanzolini, 1992), and *A. frontalis*, from Alagoado, municipality of Casa Nova (70 km northwest from paratype localities and 145 km from the type locality of *A. kiriri* sp. nov.) (Vanzolini, 1991a) (Fig. 4). Both species differ from *A. kiriri* sp. nov. by having four preloacal pores and higher body annulus counts (Vanzolini, 1991a, 1992). Colli et al. (2016) apparently mistakenly cited *A. hastata* and *A. ignatiana* from Casa Nova on the basis of Rodrigues (1996), who recorded *A. hastata* for only Ibiraba and Queimadas (municipality of Barra), and *A. ignatiana* for only Santo Inácio (municipality of Gentio do Ouro), both localities about 200 km southwest of Campo Formoso (Rodrigues, 1996), state of Bahia. Finally, *A. pretrei*, widespread in northeastern Brazil (Colli et al., 2016), may also be found in sympatry with the new species. From it, *A. kiriri* sp. nov. is easily separated by the number of pores and annulus counts (Gans, 1965b). Table 2 reports a summary of morphological characters useful to distinguish *A. kiriri* sp. nov. from congeners occurring or potentially occurring in sympatry with it.

The municipality of Campo Formoso, where the new species was discovered, has an area of about 7,000 km² and 73,000 inhabitants (IBGE, 2016), including “quilombolas” (rural communities of slaves descendants) (Dantas-Aguiar et al., 2011). Although part of the native vegetation was removed for farming and cattle raising, the region still harbors important areas of Caatinga (Dantas-Aguiar et al., 2011).

The extent of occurrence (IUCN, 2001) of *A. kiriri* sp. nov. is 505 km² (on the basis of the minimum convex polygon). At present, we recommend it be assigned to the Data Deficient

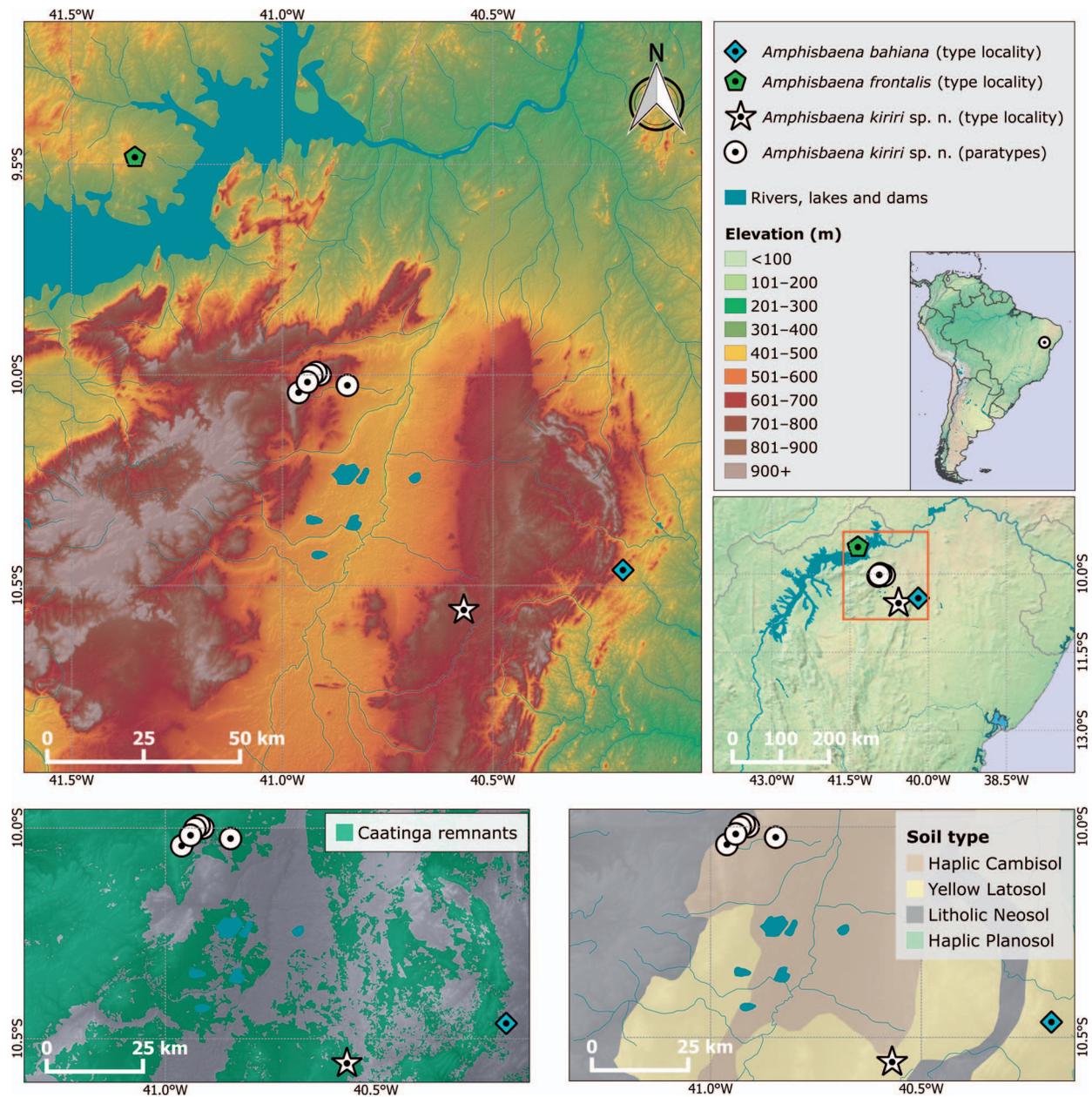


FIG. 4. Geographic distribution map of *Amphisbaena kiriri* sp. nov. Top right map: location of specimen records in South America; middle right map: magnification showing locality records of *A. kiriri* and the type localities of *A. bahiana* and *A. frontalis* in northeastern Brazil; top left map: magnification detailing the elevation gradient of the region where *A. kiriri* specimens were found, together with the type localities of *A. bahiana* and *A. frontalis*; bottom left and right maps: remnants of Caatinga vegetation (MMA and IBAMA, 2011) and the soil types (IBGE and EMBRAPA, 2001) in the study region (type locality of *A. frontalis* not shown).

category, because the available information is inadequate to make any assessment of its risk of extinction (IUCN, 2001); we stress, however, that the type locality was affected by the construction of a wind farm, and no protected area exists in the region, although the creation of a national park has been considered (MMA, 2006).

The discovery of *A. kiriri* sp. nov. contributes to our knowledge of Brazilian biodiversity. Because of sampling biases, many species of these fossorial reptiles remain to be discovered (Colli et al., 2016). An effort is needed to focus sampling efforts on novel and previously unstudied localities, and to review museum specimens, particularly from small regional collections. Our understanding of amphisbaenian species diversity is still

far from complete and inevitably will increase with additional fieldwork.

Acknowledgments.—We thank two anonymous reviewers and the editor for comments and suggestions; B. M. Sousa and Universidade Federal de Juiz de Fora for kindly allowing the use of space and equipment to examine specimens of this study; and G. Cotta (FUNED), N. Maciel (UFG), P. C. A. Garcia (UFMG), and H. Zaher (MZUSP) for access to specimens under their care. HCC received a doctoral scholarship from Coordenação de Aperfeiçoamento de Pessoal de Nível Superior.

TABLE 2. Morphological comparison between *Amphisbaena kiriri* sp. nov. and other species of *Amphisbaena* known to occur or probably occurring in sympatry with it. BA = body annuli; CA = caudal annuli; DS = dorsal segments on midbody; VS = ventral segments on midbody; PP = prelocaal pores; SL = supralabials; IL = infralabials.

| | <i>A. kiriri</i> sp. nov. | <i>A. alba</i> | <i>A. bahiana</i> | <i>A. frontalis</i> | <i>A. pretrei</i> | <i>A. vermicularis</i> |
|----|---------------------------|----------------|-------------------|---------------------|-------------------|------------------------|
| BA | 158–165 | 198–248 | 204–233 | 252–272 | 231–255 | 211–254 |
| CA | 12–14 | 13–21 | 14–17 | 23–29 | 22–26 | 24–30 |
| DS | 14–16 | 30–42 | 12–16 | 14–16 | 20–27 | 18–26 |
| VS | 15–16 | 35–46 | 14–16 | 14–16 | 22–28 | 18–25 |
| PP | 2 | 4–12 | 4 | 4 | 5–9 | 4 |
| SL | 4 | 3–4 | 3 | 3 | 3 | 4 |
| IL | 3 | 3 | 3 | 3 | 3 | 3 |

LITERATURE CITED

- ALVARES, C. A., J. L. STAPE, P. C. SENTELHAS, J. L. M. GONÇALVES, AND G. SPAROVEK. 2013. Köppen's climate classification map for Brazil. *Meteorologische Zeitschrift* 22:711–728.
- AZEVEDO, J. A. R., P. H. VALDUJO, AND C. C. NOGUEIRA. 2016. Biogeography of anurans and squamates in the Cerrado hotspot: coincident endemism patterns in the richest and most impacted savanna on the globe. *Journal of Biogeography* 43:2454–2464.
- BORGES-NOJOSA, D. M., AND U. CARAMASCHI. 2000. Geographic distribution of *Aulura anomala*. *Herpetological Review* 31:108.
- CACCIALI, P., AND M. UBILLA. 2016. Distribución de reptiles en Paraguay: un aporte al conocimiento de su biogeografía. *Boletín del Museo Nacional de Historia Natural del Paraguay* 20:5–30.
- CAMPBELL, L., AND V. GRONDONA. 2012. The indigenous languages of South America: A comprehensive guide. Volume 2: The World of Linguistics. Walter de Gruyter, Germany.
- COLLI, G. R., J. FENKER, L. G. TEDESCHI, A. F. BARRETO-LIMA, T. MOTT, AND S. L. B. RIBEIRO. 2016. In the depths of obscurity: knowledge gaps and extinction risk of Brazilian worm lizards (Squamata, Amphisbaenidae). *Biological Conservation* 24:51–62.
- COSTA, H. C., F. C. RESENDE, M. TEIXEIRA JR., F. DAL VECHIO, AND C. A. CLEMENTE. 2015. A new *Amphisbaena* (Squamata: Amphisbaenidae) from southern Espinhaço Range, southeastern Brazil. *Anais da Academia Brasileira de Ciências* 87:891–901.
- DAL VECHIO, F., M. TEIXEIRA JR., M. SENA, A. ARGÓLO, C. GARCIA, AND M. T. RODRIGUES. 2016. Taxonomic status and the phylogenetic placement of *Amphisbaena leucocephala* Peters, 1878 (Squamata, Amphisbaenidae). *South American Journal of Herpetology* 11:157–175.
- DANTAS-AGUIAR, P. R., R. M. BARRETO, D. SANTOS-FITA, AND E. B. SANTOS. 2011. Hunting activities and wild fauna use: a profile of Queixo D'antas community, Campo Formoso, Bahia, Brazil. *Biodiversity and Bioavailability* 5:34–43.
- GANS, C. 1962a. Redefinition and description of the Brazilian reptiles *Amphisbaena silvestrii* Boulenger and *A. neglecta* Dunn and Piatt. *Copeia* 1962:164–170.
- GANS, C. 1962b. Notes on amphisbaenids (Amphisbaenia, Reptilia). 5: A redefinition and a bibliography of *Amphisbaena alba* Linné. *American Museum Novitates* 2105:1–32.
- GANS, C. 1965a. On *Amphisbaena heathi* Schmidt and *A. carvalhoi*, new species, small forms from the northeast of Brazil (Amphisbaenia: Reptilia). *Proceedings of the California Academy of Sciences* 31:613–630.
- GANS, C. 1965b. Redescription of *Amphisbaena pretrei* Dumeril and Bibron and *A. leucocephala* Peters, with a discussion of their relation and synonymy (Amphisbaenia: Reptilia). *American Midland Naturalist* 74:387–407.
- GANS, C. 1971. Studies on amphisbaenians (Amphisbaenia, Reptilia). 4. A review of the amphisbaenid genus *Leposternon*. *Bulletin of the American Museum of Natural History* 144:379–464.
- GANS, C., AND A. A. ALEXANDER. 1962. Studies on the amphisbaenids (Amphisbaenia; Reptilia). 2. On the amphisbaenids of the Antilles. *Bulletin of the Museum of Comparative Zoology* 128:65–158.
- GANS, C., AND M. A. AMDUR. 1966. Redescription of *Amphisbaena vermicularis* Wagler, with comments on its range and synonymy (Amphisbaenia: Reptilia). *Proceedings of the California Academy of Sciences* 66:69–90.
- IBGE (INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA). 2004. Mapa de biomas do Brasil. Primeira aproximação. Ministério do Meio Ambiente e IBGE, Brazil.
- IBGE. 2016. IBGE Cidades@: Campo Formoso. Available at <http://cidades.ibge.gov.br/xtras/perfil.php?codmun=290600>. Archived by WebCite at <http://cidades.ibge.gov.br/xtras/perfil.php?codmun=290600> on 7 February 2017.
- IBGE AND EMBRAPA (EMPRESA BRASILEIRA DE PESQUISA AGROPECUÁRIA). 2001. Mapa de solos do Brasil. IBGE / EMBRAPA, Brazil.
- IUCN. 2001. IUCN Red List categories and criteria. IUCN Species Survival Commission, Gland and Cambridge, Switzerland and UK.
- MMA (MINISTÉRIO DO MEIO AMBIENTE). 2006. Deliberação CONABIO no. 44, de 28 de junho de 2006. Dispõe sobre a criação, implantação e implementação de Áreas Protegidas por meio de planejamento sistemático para a conservação e uso sustentável da biodiversidade do bioma Caatinga. Available at http://www.mma.gov.br/estruturas/conabio/_arquivos/Delib_044. Archived by WebCite at <http://www.webcitation.org/6szbw7e40> on 25 August 2017.
- MMA AND IBAMA (INSTITUTO BRASILEIRO DO MEIO AMBIENTE E DOS RECURSOS NATURAIS RENOVÁVEIS). 2011. Monitoramento do desmatamento nos biomas brasileiros por satélite: monitoramento do bioma Caatinga 2008–2009. Ministério do Meio Ambiente / Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis, Brazil.
- MOTT, T., M. T. RODRIGUES, M. A. FREITAS, AND T. F. S. SILVA. 2008. New species of *Amphisbaena* with a nonautotomic and dorsally tuberculate blunt tail from state of Bahia, Brazil (Squamata, Amphisbaenidae). *Journal of Herpetology* 42:172–175.
- MOTT, T., M. T. RODRIGUES, AND E. M. SANTOS. 2009. A new *Amphisbaena* with chevron-shaped anterior body annuli from state of Pernambuco: Brazil (Squamata: Amphisbaenidae). *Zootaxa* 2165:52–58.
- OLIVEIRA, E. F., M. GEHARA, V. A. SÃO-PEDRO, X. CHEN, E. A. MYERS, F. T. BURBRINK, D. O. MESQUITA, A. A. GARDA, G. R. COLLI, M. T. RODRIGUES, F. J. ARIAS, H. ZAHER, R. M. L. SANTOS, AND G. C. COSTA. 2015. Speciation with gene flow in whiptail lizards from a Neotropical xeric biome. *Molecular Ecology* 24:5957–5975.
- PEREZ, R., AND S. L. B. RIBEIRO. 2008. Reptilia, Squamata, Amphisbaenidae, *Leposternon* spp.: distribution extension, new state record, and geographic distribution map. *Check List* 4:291–294.
- PINNA, P. H., A. F. MENDONÇA, A. BOCCIGLIERI, AND D. S. FERNANDES. 2014. A new species of *Amphisbaena* Linnaeus, 1758 from a Cerrado region in Bahia, northeastern Brazil (Squamata: Amphisbaenidae). *Herpetologica* 70:339–349.
- PORTO, M., M. SOARES, AND U. CARAMASCHI. 2000. A new species of *Leposternon* Wagler, 1824 from Minas Gerais, Brazil, with a key to the species of the genus (Amphisbaenia, Amphisbaenidae). *Boletim do Museu Nacional, Nova Série, Zoologia* 412:1–10.
- RIBEIRO, S., J. O. GOMES, H. L. R. SILVA, C. E. D. CINTRA, AND N. J. S. JR. 2016. A new two-pored species of *Amphisbaena* (Squamata, Amphisbaenidae) from the Brazilian Cerrado, with a key to the two-pored species of *Amphisbaena*. *Zootaxa* 4147:124–142.
- ROBERTO, I. J., L. B. M. BRITO, AND R. W. ÁVILA. 2014. A new six-pored *Amphisbaena* (Squamata: Amphisbaenidae) from the coastal zone of northeast Brazil. *Zootaxa* 3753:167–176.
- RODRIGUES, M. T. 1996. Lizards, snakes, and amphisbaenians from the Quaternary sand dunes of the middle Rio São Francisco, Bahia, Brazil. *Journal of Herpetology* 30:513–523.
- RODRIGUES, M. T. 2003a. Herpetofauna da Caatinga. Pp. 181–236 in Leal, I. R., M. Tabarelli, and J. M. C. Silva (eds.), *Ecologia e Conservação da Caatinga*. Editora Universitária da UFPE, Brazil.
- RODRIGUES, M. T. 2003b. Herpetofauna of Quaternary sand dunes of the middle Rio São Francisco, Bahia, Brazil. VIII. *Amphisbaena arda* sp. nov., a fuliginosa-like checkered patterned *Amphisbaena* (Squamata, Amphisbaenidae). *Phyllomedusa* 1:51–56.
- SAMPAIO, T. 1901. O Tupi na geographia nacional. Instituto Histórico e Geográfico de São Paulo, Brazil.

- VANZOLINI, P. E. 1951. Contributions to the knowledge of the Brazilian lizards of the family Amphisbaenidae Gray, 1825. 6. On the geographical distribution and differentiation of *Amphisbaena fuliginosa* Linné. Bulletin of the Museum of Comparative Zoology 106:1–67.
- VANZOLINI, P. E. 1963. Problemas faunísticos do Cerrado. Pp. 307–320 in Ferri, M. G. (ed.), Simpósio Sobre o Cerrado. Editora da Universidade de São Paulo, Brazil.
- VANZOLINI, P. E. 1964. *Amphisbaena bahiana* species nov. Reptilia: Sauria: Amphisbaenidae. Pilot Register of Zoology Card 8:1.
- VANZOLINI, P. E. 1968. Environmental temperature and number of body annuli in *Amphisbaena alba*: notes on a cline (Sauria, Amphisbaenidae). Papéis Avulsos de Zoologia 21:231–241.
- VANZOLINI, P. E. 1974. Ecological and geographical distribution of lizards in Pernambuco, Northeastern Brasil (Sauria). Papéis Avulsos de Zoologia 28:61–90.
- VANZOLINI, P. E. 1991a. Two further new species of *Amphisbaena* from the semi-arid Northeast of Brasil (Reptilia, Amphisbaenia). Papéis Avulsos de Zoologia 37:347–361.
- VANZOLINI, P. E. 1991b. Two new small species of *Amphisbaena* from the fossil dune field of the middle Rio São Francisco, State of Bahia, Brasil (Reptilia, Amphisbaenia). Papéis Avulsos de Zoologia 37:259–276.
- VANZOLINI, P. E. 1992. *Cercolophia*, a new genus for the species of *Amphisbaena* with a terminal vertical keel on the tail (Reptilia, Amphisbaenia). Papéis Avulsos de Zoologia 37:401–412.
- VANZOLINI, P. E. 1996. On slender species of *Amphisbaena*, with the description of a new one from northeastern Brasil (Reptilia, Amphisbaenia). Papéis Avulsos de Zoologia 39:293–305.
- VANZOLINI, P. E. 1997. The *silvestrii* species group of *Amphisbaena*, with the description of two new Brazilian species (Reptilia: Amphisbaenia). Papéis Avulsos de Zoologia 40:65–85.
- VELLOSO, A. L., E. V. S. B. SAMPAIO, AND F. G. C. PAREYN. 2001. Ecorregiões propostas para o Bioma Caatinga. Associação Plantas do Nordeste: The Nature Conservancy do Brasil, Brazil.
- WERNECK, F. P., T. GAMBLE, G. R. COLLI, M. T. RODRIGUES, AND J. W. SITES. 2016. Deep diversification and long-term persistence in the South American 'Dry Diagonal': integrating continent-wide phylogeography and distribution modeling of geckos. Evolution 66:3014–3034.
- WILLIAMS, E. E., AND P. E. VANZOLINI. 1980. Notes and biogeographic comments on anoles from Brasil. Papéis Avulsos de Zoologia 34:99–108.

Accepted: 15 March 2018.

Published online: 10 May 2018.

LSID for new taxonomic name is: urn:lsid:zoobank.org:act:28AF33C5-921B-4460-9E8D-F6390E1B60A3, LSID for publication: urn:lsid:zoobank.org:pub:9D5B0F76-085C-430D-A5AE-D836B6420479

APPENDIX 1. SPECIMENS EXAMINED (ALL FROM BRAZIL).

Amphisbaena anaemariae: UFG 341, 343, 356, 373, 374, 376, 376, 379, 381 (Tocantins: Lajeado/Miracema: UHE Luís Eduardo Magalhães); UFG 584 (Minas Gerais: Uberlândia: PCH Malagone); UFMG 2879, 2896 (Goiás: Goiatuba, PCH Mota). *Amphisbaena leeseri*: MZUSP 82539, 82541 (Mato Grosso do Sul: Aquidauana). *Amphisbaena metallurga*: FUNED 2943 [holotype], 2941, 2942, 2944, 2947, UFMG 2080, 2081 [paratypes] (Minas Gerais: Conceição do Mato Dentro). *Amphisbaena neglecta*: ANSP 13019 [holotype examined from photographs] (Mato Grosso: Chapada [= Chapada dos Guimarães]). *Amphisbaena roberti*: UFMG 19 (São Paulo: Itapetininga).