

## New Species of *Amphisbaena* with a Nonautotomic and Dorsally Tuberculate Blunt Tail from State of Bahia, Brazil (Squamata, Amphisbaenidae)

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**ABSTRACT.**—A new species of *Amphisbaena* is described from Fazenda Caraibas, municipality of Mucugê, state of Bahia, Brazil, in the northern portion of the Serra do Espinhaço. The new species is a small amphisbaenian without precloacal pores, 210–213 body annuli, 12–13 tail annuli without evident autotomic site, and 14 dorsal and 14–15 ventral segments per annuli at midbody. The striking difference of this form is the presence of small tubercles on the dorsal region of its tail. This feature is unique among its congeners, although *Rhineura floridana*, a North American amphisbaenian, has tubercles on its tail. We suggest that the presence of tubercles on the tail of *Amphisbaena* sp. nov. and *Rhineura floridana* has arisen independently.

Several new species of amphisbaenians have been described from South America in the last decade (Vanzolini, 1997; Porto et al., 2000; Strüssmann and Carvalho, 2001; Rodrigues et al., 2003), several of them from previously unexplored regions. In a survey conducted in the highlands of Serra do Espinhaço, state of Bahia, Brazil, we obtained three small specimens of amphisbaenians, which at first sight seem to have had the tail autotomized. At closer examination, it became evident that their tail, short, blunt, nonautotomic, and covered with conic tubercles at their diagonal and dorsally oriented tip, was strikingly different from that of all other South American amphisbaenians. Despite its unique tail morphology, we describe the new taxon in *Amphisbaena* based on an overall similarity in head and body shape and scalation.

### MATERIALS AND METHODS

Specimens were obtained by hand when one of us (MAF) followed a tractor during the clearing of an area in Mucugê, state of Bahia, Brazil. Snout-vent length was measured to the nearest 1 mm with a ruler; scale counts were taken with the aid of a stereomicroscope; and sex was determined by dissection and direct inspection of the gonads. We follow the scale nomenclature and the standardized diagnosis of Gans and Alexander (1962). All comparative data were taken from preserved specimens housed at MZUSP (Museu de Zoologia, Universidade de São Paulo) and from literature (Vanzolini, 2002).

### SYSTEMATICS

#### *Amphisbaena uroxena* sp. nov.

**Holotype.**—MZUSP 95987, an immature female from Fazenda Caraibas (13°09'49"S, 41°24'19"W), district of Cascavel, municipality of Mucugê, Serra do Espinhaço (Chapada Diamantina), state of Bahia, Brazil, collected by Marco Antonio de Freitas and Thais Figueiredo Santos Silva on 8 December 2005.

**Paratypes.**—MZUSP 95988 (immature female) and MZUSP 95989 (undetermined sex because the animal was mutilated by the tractor), collected between 8 and 30 December 2005; all other data as for the holotype.

**Etymology.**—The *uroxena* from the Greek *uros* meaning tail and *xenos* meaning strange, different, is a reference to the strikingly different tail of this species.

**Diagnosis.**—A small *Amphisbaena* with a short, blunt, nonautotomic tail covered with small conic tubercles at their diagonal and dorsally oriented tip. This morphological feature is unique among South American amphisbaenians. No visible precloacal pores, paired nasals, prefrontals, frontals and parietals, 210–213 body and 12–13 caudal annuli, 14 dorsal and 14–15 ventral segments per annuli at midbody, 3 supralabials, 3 infralabials. Head not distinct from the trunk, mouth ventral. Prefrontals are the largest head scales.

**Description of the Holotype.**—A small amphisbaenid with head not distinct from trunk, an elongated snout, mouth ventral, 108 mm total length (9 mm corresponding to tail), 4.2 mm diameter at midbody (Figs. 1, 2). Rostral hardly visible from above, subtriangular, contacting first supralabials and broadly the nasals. Paired nasals, prefrontals, frontals, and parietals, all in

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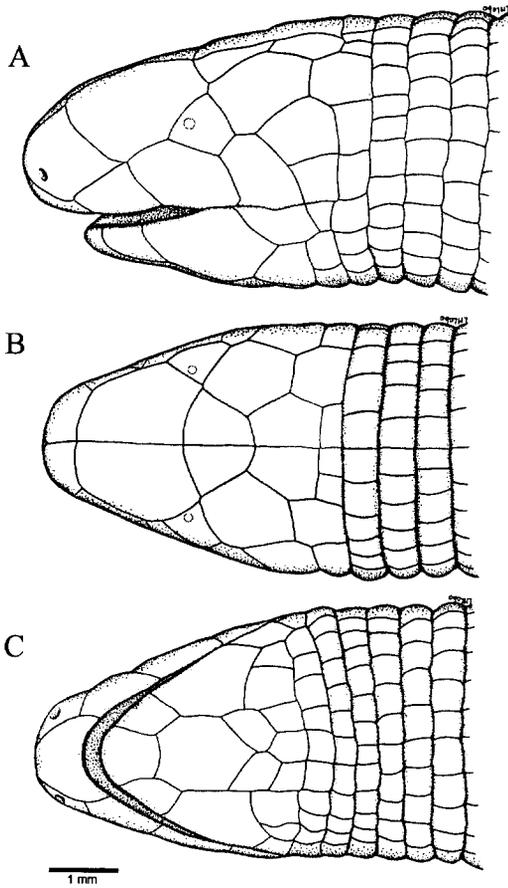


FIG. 1. *Amphisbaena uroxena*: (A) lateral, (B) dorsal, and (C) ventral views of head (MZUSP 95987, holotype).

broad contact at midline. Nasals large, forming most of tip of the snout, quadrangular, contacting rostral, first supralabial, and prefrontal; external nares anterolaterally placed. Prefrontals the largest scales on top of head, pentagonal, longer than wide, contacting slightly first supralabial and postocular at anterior and posterior margins, respectively, anterolaterally contacting second supralabial and ocular. Frontals small, one-fourth of size of the prefrontals, subtriangular, contacting postocular broadly. Parietals as wide as frontals, pentagonal, contacting postocular anterolaterally, posterior border straight, parallel to second body annulus. Oculars trapezoid, contacting anterodorsally and posterodorsally prefrontal and postocular, respectively, and ventrally second and third supralabials. Eyes barely visible, sitting on anterodorsal region of oculars. Three supralabials, first smallest, slight contact with prefrontal. Second supralabial slightly larger than third, former contacts prefrontal, latter contacts

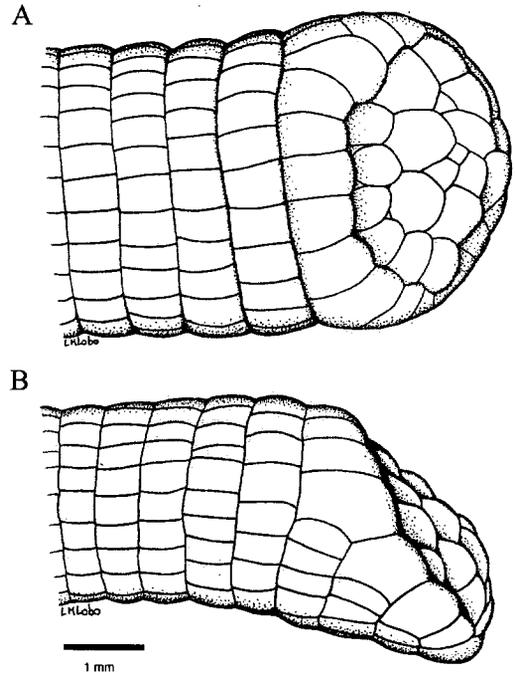


FIG. 2. *Amphisbaena uroxena*: (A) dorsal and (B) lateral views of the tail (MZUSP 95987, holotype).

temporal and postocular; both supralabials in contact with ocular. Postocular twice as large as parietal, hexagonal, its anterior margin contacts ocular ventrally, third supralabial, and temporal, dorsally it contacts prefrontal slightly, and frontal broadly, and parietal posteriorly. Three infralabials, second largest, trapezoidal, the largest scale on ventral aspect of head. First infralabial quadrangular, slightly smaller than mental. Second infralabial in broad contact with postmental and in partial contact with the first row of postgenials; third infralabial smallest, contacting malars. Mental (symphyisial of Vanzolini, 1991) quadrangular. Postmental heptagonal, second largest scale ventrally, contacting anteriorly mental and first infralabials, second infralabial laterally, and with posterior tip inserting between two postgenials. Two rows of postgenials, first with two segments, second with three. Malars divided by medial long grooves, trapezoidal, half the size of second infralabial, contacting second and third infralabials and both rows of postgenials. Postmalar row present, with 11 segments, the lateral-most contacts anterior half of third infralabials. Body annuli well marked, with regular and conspicuous segments separated by lateral grooves. First body annulus well defined only ventrally; 210 body annuli between posterior level of third infralabial and the cloacal opening. An interca-

lated annulus present between the 207 and 208 body annuli. No visible precloacal pores. Fourteen rectangular dorsal, and 15 ventral segments per midbody annulus; ventral segments squared, medial ventrals larger. Ventral sulcus beginning at level of 30th annulus, dorsal sulcus absent. Tail short, blunt, enlarged at tip, lacking autotomy, with six and 13 precloacal and postcloacal segments. Ten tail annuli dorsally, last enlarged, probably resulting from the fusion of two correspondent ventral annuli. Dorsally and posterior to the 10th tail annulus lies a circular and diagonally disposed area covered by conic tubercles. This area corresponds to three of the ventral tail annuli which have 13, seven and three segments, respectively, from anterior to posterior part of tail. Tubercles are concentrated at the posterior tip of the tail, and the tuberculate part of tail corresponds to one-fifth of its dorsal surface. Tail region where tubercles sit is depressed (compressed dorso-ventrally, Fig. 2).

*Coloration in Preservative.*—Dorsal ground color pale brown with pigments concentrated on central parts of scales. Ventral region immaculate except by one or two segments below the lateral line that are pigmented. Tail color dorsally identical to dorsal part of body, ventrally immaculate. Tip of head creamy, lighter on nasals, first supralabials, and part of the second and third supralabials.

*Variation.*—The holotype is unique in having an intercalated body annulus and a ventrally immaculate tail; the extranumerary body annulus is absent on the other specimens and their tails, contrary to that of the holotype, are pigmented ventrally.

*Distribution and Natural History.*—The three specimens of *A. uroxena* were collected at Fazenda Caraibas, a 5,200-ha farm situated on a relatively flat upland plateau situated around 1,100 m altitude on the west side of the escarpments of Serra do Sincorá, a section of Chapada Diamantina, the local name of the northern segment of the mountain ridge referred to as Serra do Espinhaço. Specimens were obtained by hand, walking behind a tractor during a deforestation process aiming to introduce agriculture in the area. When exposed they laid on the upper 20 cm of soil in an extensive plateau covered by a semideciduous dry forest, locally referred to as "carrasco" and characterized by the abundance of Myrtaceae. The carrasco was very dense and formed by relatively low and thin trees of about 4–5 m high and with 5–10 cm diameter, exceptionally with some scattered emergent trees reaching 15 m. For more information and an illustration of the habitat of this area, from which *Enyalius*

*erythroceus* was also recently described, see Rodrigues et al. (2006).

#### DISCUSSION

*Amphisbaena uroxena* differs from all South American amphisbaenians by the presence of conic tubercles on the dorsal surface of the tail. Similar tubercles are only known on the dorsal surface of the tail of the genus *Rhineura*. Nevertheless, their arrangement differs substantially from those of the new species. The tail tubercles of *Rhineura floridana* (as seen on MZUSP 3062, 3305–3307) extend along approximately 50% of the dorsal surface of the tail and are not restricted to a circular area as in *A. uroxena*. Considering the overall similarity in head and body shape, and scalation, the new species is closer to *Amphisbaena*. From other species of *Amphisbaena*, with or without occasional precloacal pores (*Amphisbaena dubia*, *Amphisbaena anaemariae*, *Amphisbaena heathi*, *Amphisbaena hiata*), the new species differs by having smaller numbers of dorsal and ventral segments per midbody annulus (14 / 14–15 on *A. uroxena* and higher numbers on the other species). There are five South American species lacking tail autotomy: *Amphisbaena alba*, *Amphisbaena angustifrons*, *A. dubia*, *Amphisbaena miringoera*, and *Amphisbaena ridleyi*. *Amphisbaena uroxena* differs from *A. alba* and *A. angustifrons* by presenting a much lower segment numbers per midbody annulus (14 / 14–15 on *A. uroxena* and 30–42 / 35–46 on *A. alba*, 20–30 / 20–30 on *A. angustifrons*) and by its much smaller size, considering that the last two species are the largest amphisbaenid species of South America. *Amphisbaena uroxena* differs from *A. ridleyi*, an endemic species to Fernando de Noronha island, by presenting a lower number of tail annuli (12–13 on *A. uroxena* and 14–17 on *A. ridleyi*), lower number of segments at midbody annulus (14 / 14–15 on *A. uroxena* and 16–18 / 20–28 on *A. ridleyi*), and higher number of body annuli (210–213 on *A. uroxena* and 170–192 on *A. ridleyi*). *Amphisbaena uroxena* additionally differs from *A. miringoera* by having a much lower numbers of body and tail annuli (210–213, 12–13 on *A. uroxena* and 250–262, 22–24 on *A. miringoera*, respectively). The new species is similar to *A. dubia* regarding some morphological and meristic characteristics such as their small size, the occasional or fixed absence of precloacal pores, and the number of body and tail annuli (210–213, 12–13 on *A. uroxena* and 213–231, 13–17 on *A. dubia*). The new form differs from *A. dubia* by having a smaller number of ventral segments at midbody annulus (14–15 on *A. uroxena* and 16–19 on *A. dubia*). However, the unique presence of tubercles on

the dorsal surface of the tail of the new species indisputably certifies its status as a new species.

The higher-level amphisbaenian phylogenetic relationships have been established using independent data sets (Kearney, 2003; Kearney and Stuart, 2004; Macey et al., 2004), and all five currently recognized families have been recovered as monophyletic entities. *Rhineura floridana* is presently allocated in Rhineuridae and is endemic to North America. *Amphisbaena uroxena*, as all South American amphisbaenians, belongs to Amphisbaenidae. Considering this, we suggest that the presence of conic tubercles on the tail of *A. uroxena* and *R. floridana* have arisen independently in these families.

A phylogenetic hypothesis for intergeneric relationships among Amphisbaenidae is lacking, and there is a consensus among researchers that the genus *Amphisbaena* is probably paraphyletic (Kearney, 2003; Kearney and Stuart, 2004) because of the lack of morphological and molecular synapomorphies grouping all species. We are aware of the possibility that the genus *Amphisbaena* could be split when a phylogenetic study becomes available. Only after this can the proper generic allocation of the new species be known, and we will have a better understanding of the intrafamilial evolution of its intriguing tail morphology.

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