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## DESCRIPTION OF A NEW PORED *LEPOSTERNON* (SQUAMATA, AMPHISBAENIDAE) FROM THE BRAZILIAN CERRADO

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**ABSTRACT.** A new species of *Leposternon* is described from the Brazilian Cerrado, Goiás and Minas Gerais states. The known range is restricted to the headwaters of the Paranã and São Francisco drainage systems. The new species has the following diagnostic characters: frontal portion of head strongly depressed, pectoral shield modified, autotomic site absent, 404-448 dorsal and 408-448 ventral postpectoral half-annuli; 14-16 tail annuli; 24-33 and 23-33 dorsal and ventral segments per half-annulus of midbody respectively; 32-53 segments to the fifth tail annulus; two supralabials; three infralabials; two precloacal pores; major infralabials distinct from malar lateral; prefrontals, supraoculars, azygous, frontals and parietals shields distinct; azygous width 29.6-53.2% of posterior head width; frontal length 17.2-24.0% of head length; length of parietals comprising 14.8-25.6% of head length; and diamond-shaped pectoral scales.

**KEY-WORDS.** *Amphisbaenia*, *Leposternon maximus* sp. nov., taxonomy, central Brazil.

### INTRODUCTION

Our knowledge of the diversity and distribution of Neotropical amphisbaenians has grown significantly over the last two decades, with the description of 29 new species, representing an increase in ca. 32% of known diversity (Gans, 2005; see also Castro-Mello, 2003; Thomas and Hedges, 2006; Mott *et al.*, 2008; Ribeiro *et al.*, 2008; Ribeiro *et al.*, 2009; Mott *et al.*, 2009; Strüssmann and Mott, 2009; and Pinna *et al.*, 2010). This increase in knowledge has allowed better accounts of taxonomic composition and distribution of amphisbaenians among major Brazilian ecosystems. Of the 67 Brazilian species of amphisbaenians (Bérnils, 2010), 33 are known to occur within the central Brazilian Cerrado, including five species of *Leposternon* Wagler, 1824 (Nogueira *et al.*, 2011).

The genus *Leposternon* is characterized by the following combination of characters: relatively large and robust body, head dorsoventrally compressed, nostrils opening on the ventral surface of snout, suture connecting each nostril to the edge of mouth, nasal shield absent, rostronasal shield followed by a sequence of one to five enlarged shields along the dorsal surface of head, gular portion without segmental cover, more than two dermal annuli per vertebrae, tail very short

with rounded tip, autotomic site absent on tail, and none to four precloacal pores (Ribeiro *et al.*, 2008).

Currently, *Leposternon* includes eight species, distributed in Brazil, Bolivia, Paraguay, Argentina, and Uruguay, and representing ca. 12% of Brazilian amphisbaenian richness: *Leposternon cerradensis* Ribeiro, Vaz-Silva and Santos-Jr, 2008; *L. infraorbitale* Berthold, 1859; *L. kisteumacheri* Porto, Soares and Caramaschi, 2000; *L. microcephalum* Wagler, 1824; *L. octostegum* (Duméril, 1851); *L. polystegum* (Duméril, 1851); *L. scutigerum* (Hemprich, 1820); and *L. wuchereri* (Peters, 1879). Among the eight described species, three retain precloacal pores: *L. cerradensis* that occurs only within the Cerrado biome (Ribeiro *et al.*, 2008); *L. polystegum*, a species widely distributed along the Brazilian Amazon, Atlantic Forest, Caatinga, and Cerrado (Gans, 1971); and *L. kisteumacheri*, which occurs in the northwestern portion of the state of Minas Gerais, Brazil, in the contact zone between Caatinga and Cerrado (Porto *et al.*, 2000).

Recently, based on a molecular analysis, five of the seven South American amphisbaenians genera were synonymized to *Amphisbaena* Linné, 1758 (*Anops* Bell, 1833, *Aulura* Barbour, 1914, *Bronia* Gray, 1865, *Cercolophia* Vanzolini, 1992 and *Leposternon*)

(Mott and Vieites, 2009). Although we acknowledge the need for taxonomic changes within the family Amphisbaenidae, we prefer to adopt a more conservative position and recognize in the present study the validity of the genus *Leposternon* (see discussion below).

In recent herpetological surveys conducted at the Parque Nacional de Grande Sertão Veredas, in the State of Minas Gerais (Nogueira and Rodrigues, 2006; Recoder and Nogueira, 2007), and in areas of the hydroelectric power plants Santa Edwiges I and II (Fig. 1), in the State of Goiás, we obtained 12 specimens of a distinct amphisbaenian that are here described as a new species of *Leposternon*.

#### MATERIAL AND METHODS

Throughout this paper we follow the traditional generic taxonomy summarized by Gans (2005).

For the sake of clarity, we follow in this study the nomenclature proposed by Gans (1971) for cephalic shields present in *Leposternon*. Although it represents the only available nomenclature up to date, Gans's scheme shows obvious problems of homology with respect to the nomenclature used for other squamate groups (e.g., the recognition of an azygous shield as the scale posterior to the rostronasal or prefrontal while the frontal shields are displaced posteriorly to the orbital region). Such discrepancies hamper broader and accurate comparisons, and we believe that efforts should be invested in the search for more general hypotheses of homology regarding Amphisbaenian cephalic shields.

Morphological features of the new species are described according to the scheme presented in Ribeiro *et al.* (2008) for *Leposternon cerradensis*. The illustrations were produced using a stereomicroscope with a camera lucida and a digital camera attached. Measurements were taken using a digital caliper

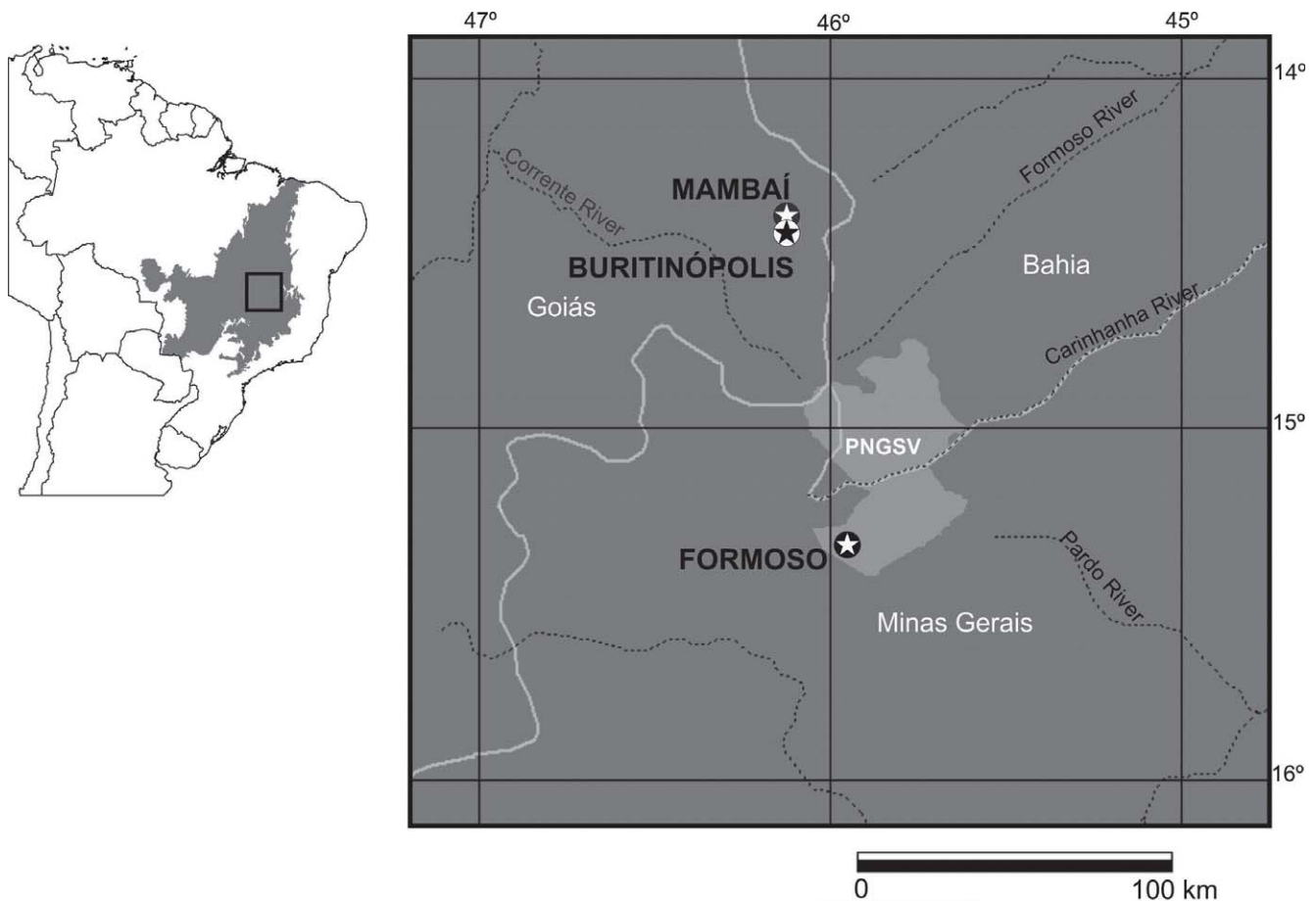


FIGURE 1. Geographic distribution of *Leposternon maximus* sp. nov.. Dark gray area in the map corresponds to the extension of the Cerrado. Light gray area in the enlarged box corresponds to the extension of the Parque Nacional Grande Sertão Veredas (PNGSV). Black star corresponds to the type locality of *Leposternon maximus* sp. nov., and white stars correspond to other localities.

(resolution 0.1 mm), except snout-vent length, which was taken with a flexible ruler to the nearest millimeter. Morphometric data of cephalic shields were measured on the right side of all specimens. Head length was measured from the tip of the rostronasal scale to the posterior margin of the parietal shield. The anterior width and height of the head were measured at the level of the nostril, while the posterior width and height of the head at the level of the second supralabial and postmalar row, respectively. Rostronasal length was measured from the tip of the shield to the anterior margin of the azygous scute. Bilateral variation is reported as “right/left”. Dorsal and ventral postpectoral half-annuli were counted on the right side. Sex was determined through a small incision at the base of the tail to assess the presence or absence of hemipenis. Acronyms of the collections consulted and specimens examined are listed in Appendix.

## RESULTS

*Leposternon maximus* sp. nov.

Figs. 2, 3 and 5

*Leposternon* sp. – Recoder and Nogueira (2007: 270)

*Leposternon polystegum* – Cintra *et al.* (2009: 573)

### *Holotype*

MZUSP 99198 (field number PCH.ST.E.II. 098) (Figs. 2, 3), male, from Santa Edwiges II hydroelectric power plant (14°21'15"S; 46°11'40"W), Buritinópolis municipality, State of Goiás, Brazil, collected on 05 September 2005 by Carlos E. D. Cintra.

### *Paratypes*

MZUSP 93158 (field number CN 459), male, from a pitfall trapping site covered with typical Cerrado savanas (cerrado *sensu stricto*), Parque Nacional Grande Sertão Veredas, (15°20'38"S; 45°57'01"W), Formoso municipality, State of Minas Gerais, Brazil, collected on 18 October 2001 by Cristiano Nogueira. MZUSP 99189 and MZUSP 99195, males; MZUSP 9919094, MZUSP 9919698, females; all from the Santa Edwiges I hydroelectric power plant site (14°18'32"S; 46°10'25"W), Mambai municipality, State of Goiás, Brazil, collected on 31 July and 1, 2 and 25 August 2006 by Carlos E. D. Cintra.

### *Diagnosis*

*Leposternon maximus* sp. nov. differs from all amphisbaenians by presenting 404-448 dorsal postpectoral half-annuli and 408-448 ventral postpectoral half-annuli. The new species also differs from all South American amphisbaenians, (except from species of the genus *Leposternon*) for presenting nostrils opening on the ventral surface of snout; nasal absent; rostral and nasals fused into a single shield; gular portion without segmental cover; and prefrontals bone with nasal process long and ‘T’ shaped. Differs from all South American amphisbaenians, except of *Aulura anomala* and other species of *Leposternon* for presenting frontal portion of head strongly depressed; and pectoral shields with irregular form, not disposed in dermal annuli.

### *Comparison with congeneric species (characters of others species of Leposternon in parenthesis)*

*Leposternon maximus* sp. nov. can be distinguished from all congeners by the presence of 404-448 dorsal postpectoral half-annuli and 408-448 ventral postpectoral half-annuli (Fig. 4). It also differs from all other species, except *L. cerradensis*, *L. kisteumacheri* and *L. polystegum*, by having diamond-shaped pectoral scales (vs. diamond-shaped scales absent) (Fig. 3D) and two precloacal pores (vs. pores absent) (Fig. 3E). The new species further differs from each species of the genus *Leposternon* by the following combinations of characteristics: from *L. infraorbitale* by the presence of two supralabials (vs. three) and 14-16 tail annuli (vs. 9-13); from *L. octostegum* by the presence of two supralabials (vs. one), three infralabials (vs. one), dorsal head shields with five series of large horizontally disposed plates (vs. three), and 14-16 tail annuli (vs. 11); from *L. scutigera* by the presence of distinct prefrontals, azygous, frontals, supraoculars, preoculars, and parietal shields (vs. indistinct shields), and three infralabials (vs. one or two); from *L. wuchereri* by the presence of three infralabials (vs. one or two), four parietals (vs. absent or two), 24-33 dorsal segments per half-annulus of midbody (vs. 16-19), 22-33 ventral segments per half-annulus of midbody (vs. 16-21), and 14-16 tail annuli (vs. 11-13); from *L. cerradensis* by the presence of supraoculars (vs. absent), three infralabials (vs. two), major infralabials distinct from lateral malar (vs. fused major infralabials and lateral malar), posterior margin of mental wider than previous margin (vs. previous margin of mental wider than posterior margin); from *L. kisteumacheri* by the presence of azygous that reaches 29.6-53.2% of head width (vs. 21.9-26.9%); from *L. polystegum* by the



presence of azygous width comprising 29.6-53.2% of head width (vs. 15.2-21.8%), frontals length comprising 17.2-24.0% of head length (vs. 42.4-51.6%), and parietal length comprising 14.8-25.6% of head length (vs. 3.1-10.9%).

#### *Description of holotype*

A specimen with 418 mm snout-vent length, 21 mm tail length (5.0% of total length), 9.3 mm head

length (2.2% of total length), 1.5 mm anterior head height, 6.6 mm posterior head height, 3.4 mm anterior head width, 6.9 mm posterior head width, 8.0 mm midbody diameter, and 7.4 mm tail diameter.

Rostronasal 23.0% longer than high, 42.3% wider than long, with nostril in ventral portion of head, in contact with the first supralabials laterally, and azygous and prefrontals posteriorly. Azygous almost as long (3.8 mm) as wide (3.6 mm), in contact with the prefrontals and supraoculars laterally, and frontals

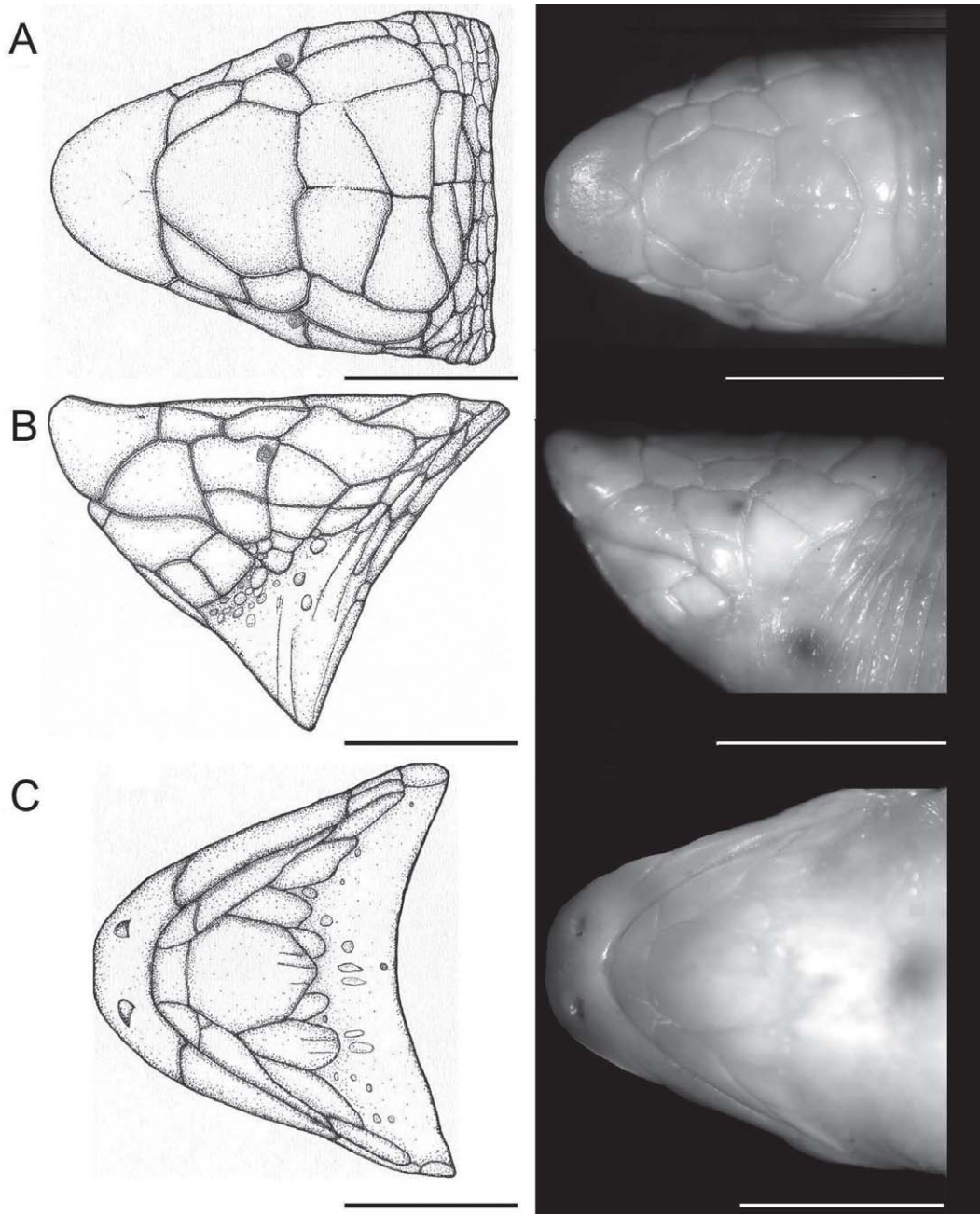


FIGURE 2. *Leposternon maximus* sp. nov. (holotype, MZUSP 99198). (A) Dorsal, (B) lateral, (C) ventral view of the head. (Del. L. Hilbert). Scale bar = 5 mm.

posteriorly (Fig. 2A). Prefrontals almost rectangular, 41.2% longer than wide, in contact with the first supralabials and oculars laterally, and supraoculars posteriorly. Frontals paired (suture length 1.6 mm), with posterior border projected posteriorly, almost as long (1.8) as wide (1.9 mm), in contact with supraoculars anteriorly, temporals laterally, and parietals posteriorly. Parietals paired (suture length 0.9 mm), roughly rectangular, 22.7% wider than long, in contact with temporals laterally, and row of the occipitals posteriorly. The occipitals row with two small shields, in contact with two smaller shields with irregular form and the first dorsal anterior half-annulus (Fig. 2A). Temporals 37.3% longer than wide, in slight contact with oculars, wide contact with supraoculars anteriorly, and postoculars laterally. Supraoculars small, 40.1% longer than wide, in contact with oculars laterally (Fig. 2A, B). Oculars almost rectangular, 36.4% longer than high, in contact with the first supralabial and prefrontals anteriorly, second supralabial laterally, and postocular posteriorly. Postocular 33.5% longer than high, in contact with the first postsupralabials laterally. Two supralabials; the first one largest (39.8% of head length), first one being 1.6 times

longer and 0.7 times higher than the second one, in contact with second supralabials posteriorly. Second supralabials relatively small (15.4% of head length), roughly rectangular, in contact with postsupralabials posteriorly. Three irregular postsupralabials, the superior larger than the posterior ones (Fig. 2B).

Three infralabials; the first one smallest (9.2% of head length), roughly triangular, in contact with mental and point contact with postmental laterally and second infralabial posteriorly. Second infralabial largest (33.8% of head length), relatively narrow (width representing 42% of length), irregularly shaped, anterior margin with the same width than first infralabial, but with a much narrower posterior margin, 2.7 times longer and 1.0 times wider than first infralabial and 1.4 times longer and 0.3 times wider than third one, in contact with postmental and malars laterally and third infralabial posteriorly. Third infralabials relatively small (14.2% of head length), slightly rectangular, in contact with lateral malar laterally (Fig. 2C). Mental with posterior margin 13.4% wider than anterior margin, in contact with postmental posteriorly. Postmental 28.8% longer than wide, in contact with the malar

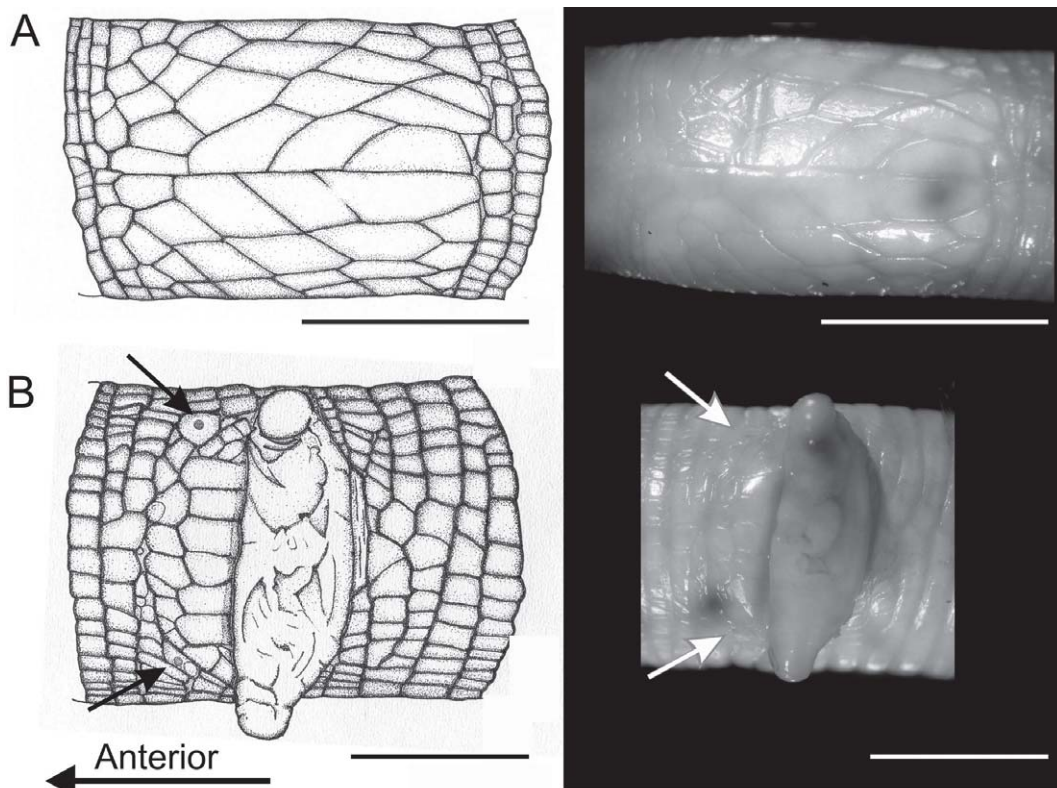


FIGURE 3. *Leposternon maximus* sp. nov. (holotype, MZUSP 99198). (A) pectoral and (B) cloacal regions (Del. L. Hilbert). Black and white arrows indicate precloacal pores. Scale bar = 5 mm.

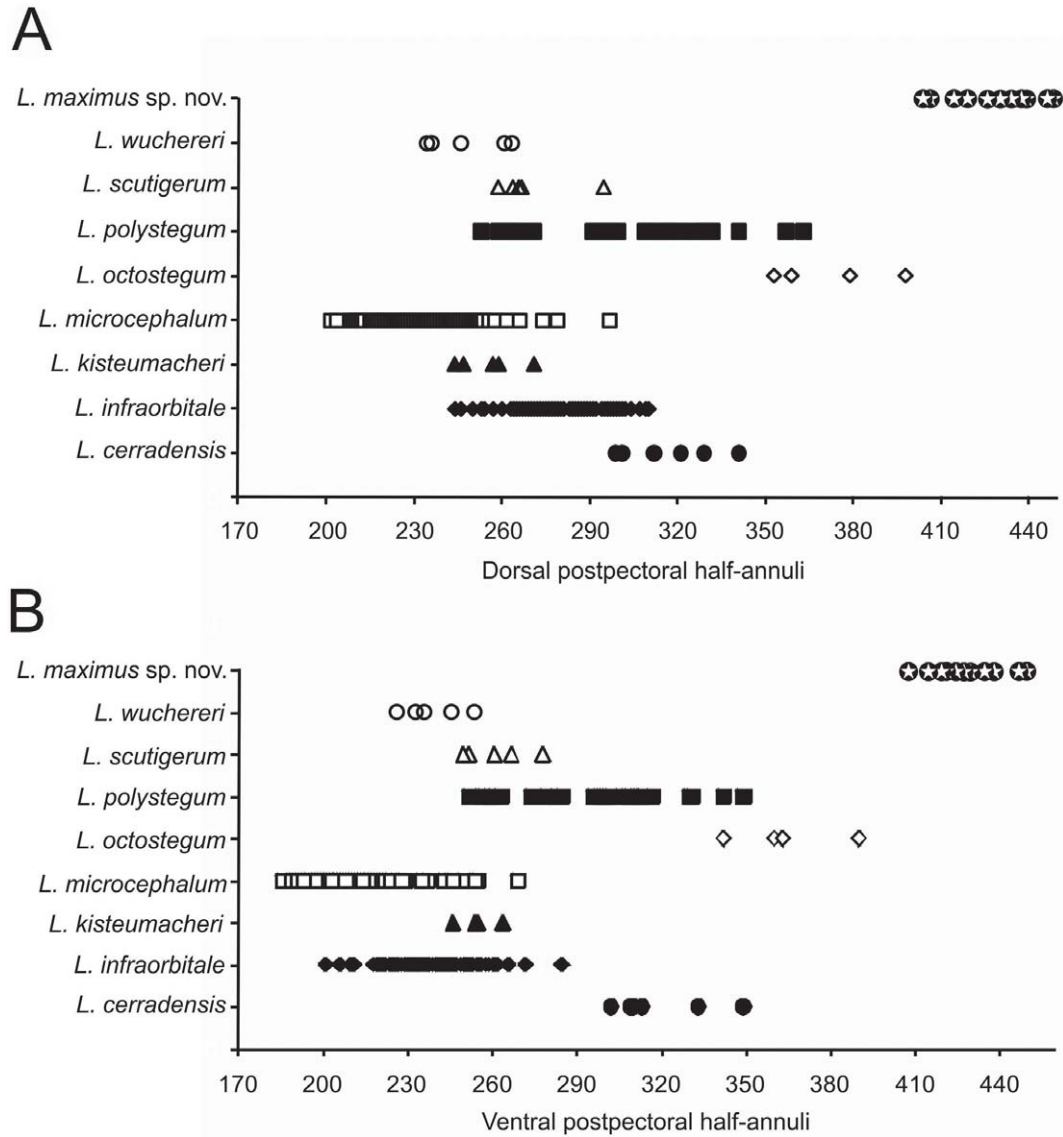


FIGURE 4. Number of (A) dorsal postpectoral half-annuli and (B) ventral postpectoral half-annuli in *Leposternon* species.

laterally and postmalar row posteriorly. Two malars on each side of the postmental, both with irregular shape and size, the more external being the lateral malar (Fig. 2C). A lateral malar with irregular form, 33.8% longer than wide, lateral to third infralabial.

Most pectoral scales are diamond-shaped, the central ones the largest, and lateral scales the smallest (Fig. 3A). Fifteen dorsal anterior half-annuli, 436 dorsal postpectoral half-annuli, 436 ventral postpectoral half-annuli, six lateral half-annuli, and 15 tail annuli. Thirty dorsal segments per half-annulus at midbody, 31 ventral segments per half-annulus at midbody, and 53 segments forming the fifth tail annulus. Anal flap semicircular with ca. 20 segments. One preloacal pore on each side of the cloaca (Fig. 3B).

*Color in life (based on specimens collected alive in the type locality)*

The species has a uniform pinkish color pattern due to the overall lack of pigmentation, except for the tail that is slightly light brown dorsally and light cream ventrally. Infralabial shields and posterior region of the head and neck are whitish due to the visible muscle and tendon insertions (Fig. 5).

*Color in preservative (ethylic alcohol 70%)*

The specimens are uniform light cream in all their extension, except for the tail that is slightly light brown dorsally and light cream ventrally.





FIGURE 5. *Leposternon maximus* sp. nov. in life (MZUSP 99195). Photo by C. E. D. Cintra.

### Variation

Meristic and morphometric variations of the paratypes are presented in Table 1. Some variation in the topology and morphology of cephalic shields were observed in the type series. MZUSP 93158 has smaller preoculars (Fig. 6) and oculars. MZUSP 99195 lacks distinct supraoculars and a left temporal, probably due to fusion. MZUSP 99196 has a very wide azygous in contact with the ocular laterally, and lacks supraocular and temporal scales on both sides. In MZUSP 99197, the temporals are partially fused with the parietals medially.

### Etymology

The specific epithet *maximus*, from the Greek, is used herein in allusion to its higher number of half-annuli when compared to other amphisbaenians.

### Geographic distribution and habitat

The new species is known from three localities in the Cerrado region of central Brazil (Fig. 1). The known range is restricted to plateaus in the headwaters of the Paranã and São Francisco drainage systems. The type locality is situated in the upper Paranã drainage, between Buritis and Piracanjuba Rivers, at Santa Edwiges II hydroelectric power plant, municipality of Buritinópolis, State of Goiás (14°21'15"S; 46°11'40"W, 700 m elevation). Piracanjuba River is a tributary of the Buritis River and the latter is a tributary of the right margin of the Correntes River, which drains to the Paranã, upper Tocantins River system. The specimen from Parque Nacional Grande Sertão Veredas was collected in the Mato Grande drainage, a tributary of the Carinhanha River, São Francisco drainage, Formoso municipality, State of Minas Gerais, in pit fall trap (15°20'38"S; 45°57'01"W, 801 m elevation). According to Recoder and Nogueira (2007), the latter area is covered with typical cerrado interfluvial savannas (cerrado *sensu-stricto*) that consists of semi-open vegetation, with a predominance of trees and shrubs. The herbaceous and grassy stratum is fairly developed, and grows on sandy soils with sparse litter cover.

### DISCUSSION

The genus *Leposternon* corresponds to a monophyletic group of highly specialized South American amphisbaenians (Gans, 1971; Mott and Vieites, 2009). The genus was revised by Gans (1971) and recently sunk into *Amphisbaena* by Mott and Vieites (2009) as a result of a Bayesian analysis of molecular

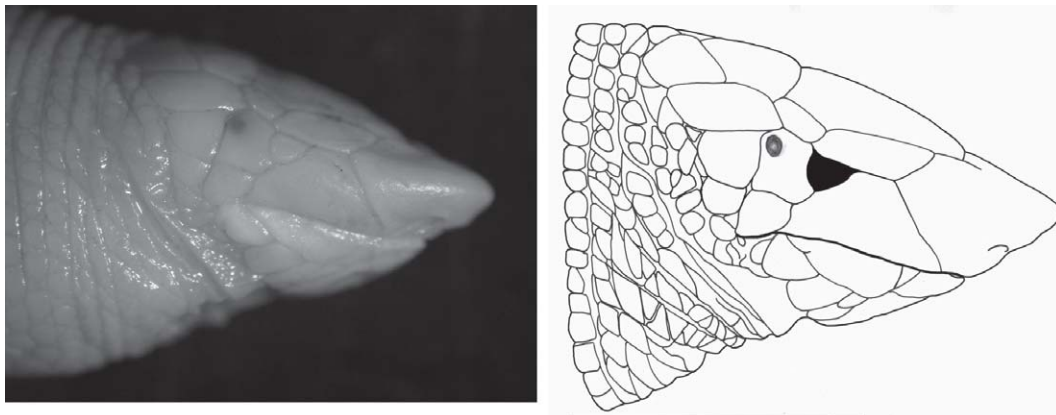


FIGURE 6. *Leposternon maximus* sp. nov. (paratype, MZUSP 93158). Note the presence of a preocular shield (in black). Scale bar = 5 mm



TABLE 1. Meristics and morphometrics (millimeters) of the type series of *Leposternon maximus* sp. nov.\* = holotype; F = female; M = male. Abbreviations of characters: Sex = S; Dorsal anterior half-annuli = DAA; Dorsal postpectoral half-annuli = DPA; Ventral postpectoral half-annuli = VPA; Caudal annuli = CA; Lateral half-annuli = LA; Dorsal segments per half-annulus of midbody = DS; Ventral segments per half-annulus of midbody = VS; Segments caudal (5<sup>th</sup> annulus) = CS; Preloacal vertebrae = PV; Head length (mm) = HL; Snout-vent length (mm) = SVL; Midbody diameter (mm) = MD; and Tail length (mm) = TL.

	Characters												
	S	DAA	DPA	VPA	CA	LA	DS	VS	CS	HL	SVL	MD	TL
MZUSP 93158	M	16	436	425	16	5/5	29	31	44	7.3	143 + 104 <sup>a</sup>	4.8	15.3
MZUSP 99189	M	16	426	428	14	5/5	26	23	32	8.1	375	6.8	15.3
MZUSP 99190	F	16	439	448	15	4/5	29	25	36	7.9	380	7.1	15.1
MZUSP 99191	F	15	414	408	14	5/4	24	27	37	7.7	340	5.8	17.6
MZUSP 99192	F	16	404	415	15	5/5	27	30	42	8.7	435	7.3	20.2
MZUSP 99193	F	15	414	420	14	5/5	29	31	39	8.6	390	7.6	20.8
MZUSP 99194	F	15	432	420	14	5/5	29	28	37	8.4	398	6.6	20.2
MZUSP 99195	M	17	419	421	15	3/5	29	32	41	8.0	378	6.9	14.7
MZUSP 99196	F	15	406	427	15	4/4	25	22	39	7.7	398	7.2	19.4
MZUSP 99197	F	16	448	448	12+n <sup>b</sup>	4/4	33	33	45	8.8	440	8.2	19.2
MZUSP 99198*	M	15	436	436	15	6/6	30	31	53	9.3	418	8.0	21.0
Mean ± SD		15.6 ± 0.8	424.9 ± 14.5	426.9 ± 11.3	14.7 ± 0.5	—	28.2 ± 2.6	28.5 ± 4.0	40.5 ± 5.9	8.2 ± 0.6	395.2 ± 22.1	6.9 ± 0.6	18.1 ± 2.3

<sup>a</sup> Specimen with mutilated body

<sup>b</sup> Specimen with mutilated tail

data. Mott and Vieites (2009) also proposed the transfer of other four South American genera (viz., *Anops*, *Aulura*, *Bronia*, and *Cercolophia*) into the synonymy of *Amphisbaena*. Although we applaud their efforts to elucidate the phylogeny of this complicated group and agree that some of these South American genera might well fall within *Amphisbaena*, we consider their new taxonomic scheme to be premature in respect to *Leposternon*.

Although synonymy provides an expedient solution to the non-monophyly of *Amphisbaena*, within that clade only *Bronia* and *Cercolophia* were found to be nonmonophyletic by Mott and Vieites (2009). By simply synonymizing all five genera, the monophyly of the long-recognized genus *Leposternon* is entirely lost, thereby complicating species comparisons and diagnoses. Furthermore, their own data do not support unequivocally the position of *Leposternon* within *Amphisbaena*. Part of the problem derives from the use of a Bayesian probability approach to withdraw their taxonomy, as it has been shown to be severely affected by model choice (Lemmon and Moriarty, 2004), burn-in selection, and prior bias (Sinharay and Stern, 2002), often resulting in overestimated posterior probability values (Simmons *et al.*, 2004; Yang and Rannala, 2005).

Inflated posterior probability values in Mott and Vieites's (2009) figure 1 can be observed in the three nodes that place *Leposternon* deep inside a paraphyletic *Amphisbaena*. According to Mott and

Vieites (2009), the same nodes did not receive significant bootstrap values in their Maximum Likelihood and Maximum Parsimony analyses. A reanalysis of Mott and Vieites's (2009) data matrix with the program RAxML v. 7.0.4 (Stamatakis, 2006), using GTRGAMMA model in 64 independent searches, recovered a Maximum Likelihood tree with a significantly distinct topology than the one shown in their figure 1 and confirmed very low Bootstrap support values for the same three nodes that place *Leposternon* inside *Amphisbaena*. Additionally, although the tree derived from a Maximum Parsimony analysis of the same dataset recovers a topology that is similar to the Bayesian tree of Mott and Vieites (2009), the same deeper nodes also present very low Bootstrap support values.

Such a poorly supported hypothesis would have benefitted from additional evidence, either molecular and/or morphological. As Mott and Vieites (2009) observed, "The foundations of the current taxonomy in this clade are morphological characters used to diagnose genera and species." Nevertheless, the authors made no effort to either incorporate or refute the considerable morphological evidence that exists. This is especially relevant because their results are strikingly at odds with those of Kearney's (2003) analysis of a large morphological matrix that included both Recent and fossil taxa. As Mott and Vieites (2009:199) summarized, "Our analyses suggest a major disagreement between morphological and molecular data in this

group”, yet they arbitrarily chose to reject the morphological data in favor of their own molecular data. Such wholesale dismissal of available evidence and prior results is highly problematic.

As such, we believe that synonymization of *Leposternon* with *Amphisbaena*, although plausible, needs to be better supported by the evidence at hand.

In contrast to most known *Leposternon* species, which present dark, tan or light brown pigmented colorations, the new species shows a faint whitish color (Fig. 5). No published studies are available on the ecological or evolutionary significance of color patterns in amphisbaenians. For fossorial amphibians of the order Gymnophiona, the evolution of color pattern is interpreted as a result of mimetism and aposematism or as a result of selective pressure related to thermoregulation in different layers of the soil surface (Wollenberg and Measey, 2009). As records of toxicity in amphisbaenians are nonexistent, a plausible explanation for different color patterns would be thermal ecology and different occupation of superficial or deeper soil layers. Vertical migration between deeper and superficial layers has been suggested for *Blanus cinereus* and *Anops kingii*, from highly seasonal subtropical regions of South America. These two species are much more common during the winter, and may use deeper layers in warmer months (Martín *et al.*, 1990; Vega, 2001). Thus, the ability to use different soil layers, including deeper soils, may compensate the lack of pigmentation. Darker colors and body pigments may thus be unnecessary for highly specialized fossorial species which can adjust their depth in deep soils, such as those typical of the Cerrado of central Brazil. Although highly speculative, these interpretations point to a possible effect of temperature regulation and degree of fossoriality on body color of amphisbaenians, a good subject for future studies.

The Cerrado is under intense human pressure, due to an ongoing process of fragmentation as a result of agricultural practices (Klink and Machado, 2005). The type series of *Leposternon maximus* was found in localities dispersed along a restricted area of the Cerrado, near the boundaries of the States of Goiás, Bahia, and Minas Gerais (Fig. 1) that has recently suffered a significant loss of natural habitats due to a drastic increase of interest for the production of hydroelectric power in the region (Cintra *et al.* 2009), and also due to the expansion of mechanized agriculture along most of central Brazil. The area of Parque Nacional Grande Sertão Veredas, from which one of the paratypes was recorded, corresponds to a protected area of Cerrado that stretches between two

states, along the southwestern portion of the State of Bahia and Northern region of the State of Minas Gerais (Fig. 1). *Amphisbaena vermicularis* was the only amphisbaenian species found in sympatry with *L. maximus* in the area of Parque Nacional Grande Sertão Veredas. However, this species was found living in gallery forest environments while the new species was collected in open interfluvial areas.

## RESUMO

Uma nova espécie de *Leposternon* é descrita para os Estados de Goiás e Minas Gerais, no Cerrado brasileiro. A distribuição é restrita para as cabeceiras do divisor de águas entre o Rio Paranã e o sistema de drenagem do São Francisco. A espécie apresenta os seguintes caracteres diagnósticos: porção frontal da cabeça fortemente deprimida; escamas peitorais modificadas; plano de autotomia caudal ausente; 404-448 e 408-448 meios anéis pós-peitorais dorsais e ventrais, respectivamente; 14-16 anéis caudais; 24-33 e 23-33 segmentos no meio anel dorsal e ventral do meio do corpo respectivamente; 32-53 segmentos no quinto anel caudal; 2/2 supralabiais; 3/3 infralabiais; maior infralabial distinto do malar lateral; escudos pré-frontais, supra-oculares, ázigo, frontais e parietais distintos; largura do ázigo representando 29,6-53,2% da largura posterior da cabeça; comprimento dos frontais representando 17,2-24,0% do comprimento da cabeça; comprimento dos parietais representando 14,8-25,6% do comprimento da cabeça; e escamas peitorais com formato de diamante.

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## APPENDIX

## Collections consulted and specimens analyzed

*Institutional acronyms are as follow:* Centro de Estudos e Pesquisas Biológicas of Universidade Católica de Goiás, Goiânia, Brazil (CEPB); Coleção Herpetológica of Universidade de Brasília, Brasília, Brazil (CHUNB); Coleção Zoológica da Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil (ZUF RJ); Museu de Ciências Naturais Pontifícia Universidade Católica de Minas Gerais, Belo Horizonte, Brazil (MCNR); Museu de Ciências e Tecnologia da Pontifícia Universidade Católica do Rio Grande do Sul, Porto Alegre, Brazil (MCP); Museu de História Natural de Capão da Imbuía, Curitiba, Brazil (MHNCI); Museu Nacional, Rio de Janeiro, Brazil (MNRJ); Museu de Zoologia da Universidade Estadual de Santa Cruz, Ilhéus, Brazil (MZUESC); Museu de Zoologia da Universidade de São Paulo, São Paulo (MZUSP), Brazil; Museu Paraense Emílio Goeldi, Belém, Brazil (MPEG); Museum Für Naturkunde, Berlin, Germany (ZMB); Zoologisches Museum, Berlin, Germany (ZSM).

*Leposternon cerradensis* (N = 6).

BRAZIL: GOIÁS: *Aporé*: MZUSP 96347 (holotype); CEPB 5377 (paratype); CEPB 5378 (paratype); MNRJ 16111 (paratype); MZUSP 96348 (paratype); MZUSP 98036 (paratype).

*Leposternon infraorbitale* (N = 20).

BRAZIL: BAHIA: *Barra do Choça*: MZUESC 5852; *Boa Nova*: MZUESC 2285; MZUESC 4546; *Igrapiúna*: MZUESC 4858; MZUESC 4865; MZUESC 5110; MZUESC 5111; MZUESC 5953; *Ilhéus*: MZUESC 4765; MZUESC 4777; *Itabuna*: MZUSP 78803; *Itacaré*: MCP 18180; MZUESC 3939; *Itapebi*: MZUESC 3274; MZUESC 3276; *Santo Antônio de Jesus*: MZUSP 57768; *Ubaitaba*: MCP 18175; MINAS GERAIS: *Conselheiro Lafaiete*: MNRJ 1782; *UHE de Queimados*: MNCR 1026.

*Leposternon kisteumacheri* (N = 5).

BRAZIL: BAHIA: *Jequié*: MZUSP 8929; MINAS GERAIS: *Januária*: MZUSP 6674; *Manga*: MNRJ 4041 (holotype); MNRJ 4042; MNRJ 4044 (paratype).

*Leposternon microcephalum* (N = 118).

BRAZIL: BAHIA: *Boa Nova*: MZUESC 4547; ESPÍRITO SANTO: *Alfredo Chaves*: MZUSP 1943; *Santa Leopoldina*: MZUSP 6514; MZUSP 6515; *Santa Tereza*: MZUSP 8811; MZUSP 17448; MZUSP 17449; MZUSP 17451; *São José do Calçado*: MZUSP 93705; GOIÁS: *Luziânia*: CHUNB 49955; *Minaçu*, *UHE Serra da Mesa*: MZUSP 85220; MZUSP 85221; MZUSP 85222; MZUSP 85223; MZUSP 85224; MINAS GERAIS: *Alto Jequitibá*: MZUSP 95034; *Belo Horizonte*: ZUF RJ 797; *Cataguases*: MCNR 671; MCNR 708; *Juiz de Fora*: MZUSP 77036; *Perdões*: MCNR 471; *Recreio*: MNRJ 11280; *Sereno*: MZUSP 6615; *Viçosa*: MZUSP 6560; PERNAMBUCO: *Fernando de Noronha*: MZUSP 7691. PARANÁ: *Adrianópolis*: MHNCI 3064; *Antonina*: MHNCI 11303; MZUSP 3464; MZUSP 3465; *Guaraqueçaba*: MHNCI 7744; *Matinhos*: MHNCI 957; MHNCI 2832; MHNCI 9685; *Mirador*: MHNCI 8275; *Morretes*: MHNCI 1397; MHNCI 6329; *Paranaguá*: MHNCI 4134; MZUSP 1265; *Pontal do Paraná*: MHNCI 5853; *Santa Isabel do Ivaí*: MHNCI 8263; *São José dos Pinhais*: MHNCI 7654; MHNCI 7736; *Tapira*: MHNCI 8272; RIO DE JANEIRO: ZMB 1395; ZMB 1396; *Campo Grande*: ZUF RJ 1676; *Duque de Caxias*: MZUSP 6394; MZUSP 6397; MZUSP 6398; MZUSP 6399; *Floriano*: MZUSP 6578; *Manguinhos*: MZUSP 7677; MZUSP 8284; *Miguel Pereira*: MZUSP 65390; *Rio de Janeiro*: MZUSP 2426; MZUSP 2676; MZUSP 13762; ZSM 3150 (holotype); *Araquari*: MHNCI 7265; MHNCI 7395. SANTA CATARINA: *Corupá*: MZUSP 1249; MZUSP 6466; MZUSP 6487; MZUSP 6488; MZUSP 6518; *Florianópolis*: MZUSP 67046; UFRJ 1003; *Ilha do Arvoredo*: MZUSP 67047; *Itapoá*: MHNCI 1400. SÃO PAULO: *Alecrim*: MZUSP 6610; *Aparecida do Norte*: MZUSP 77538; *Campo limpo*: MZUSP 89660; *Cotia*: MZUSP 77021; *Diadema*: MZUSP 77524; *Embu*: MZUSP 77020; *Engenheiro Marsillac*:



MZUSP 77534; *Forte do Itaipui*: MZUSP 77030; *Guararema*: MZUSP 77537; *Guarujá*: MZUSP 89391; *Ilha da Queimada*: MZUSP 77031; MZUSP 77032; *Ilha dos Alcatrazes*: MZUSP 6496; *Jundiá*: MZUSP 77533; *Juquitiba*: MZUSP 77539; *Miracatu*: MZUSP 77526; *Paratei do Meio*: MZUSP 77024; *Pedro Toledo*: MZUSP 77029; *Peruíbe*: MZUSP 77026; MZUSP 81402; *Piquete*: MZUSP 1252; *Registro*: MZUSP 77528; *Ribeirão Pires*: MZUSP 77525; *Santo Amaro*: MZUSP 77017; MZUSP 77018; MZUSP 77019; *São Bernardo do Campo*: MZUSP 89803; *São Carlos*: MZUSP 77536; *São Paulo*: MZUSP 11959; MZUSP 77011; MZUSP 77012; MZUSP 77013; MZUSP 77014; MZUSP 77015; MZUSP 77037; MZUSP 77042; MZUSP 77514; MZUSP 77515; MZUSP 77016; MZUSP 77516; MZUSP 77520; MZUSP 77521; MZUSP 89140; *São Sebastião*: MZUSP 6525; *Taubaté*: MZUSP 87545; *Ubatuba, Ilha do mar Virado*: MHNCI 7238; MZUSP 77027; MZUSP 77028; MZUSP 78431.

*Leposternon octostegum* (N = 4).

BRAZIL: BAHIA: *Camaçari*: MCP 18192; MCP 18193; MZUSP 96349; *Salvador*: MZUSP 96350.

*Leposternon polystegum* (N = 15).

BRAZIL: ALAGOAS: *Piranhas*: MZUSP 79410; MZUSP 79411; MZUSP 79414; MZUSP 79416; MZUSP 79417; MARANHÃO: *Nova Vida*: MPEG 11678; *Paruá*: MPEG 11500; MPEG 11504; MPEG 11756; MPEG 11757; *Paraquéu*: MPEG 11502; MPEG 11755; PARÁ: *Belém*: MPEG 198; MPEG 199; TOCANTINS: *Lajeado*: MZUSP 94293.

*Leposternon scutigerum* (N = 5).

BRAZIL: RIO DE JANEIRO: *Rio de Janeiro*: MNRJ 7186; MNRJ 12452; MZUSP 2519; MZUSP 7075; ZUF RJ 289.

*Leposternon wuchereri* (N = 4).

BRAZIL: ESPIRITO SANTO: *Santa Tereza*: MZUSP 8812; *São Mateus*: MNRJ 3892; BAHIA: *Santa Clara*: MCNR 279; MCNR 280.