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New records of the Amazon banded snake *Rhinobothryum lentiginosum* (Serpentes: Colubridae) from Mato Grosso State, Brazil, with natural history notes

LUANA APARECIDA GOMES DE ARRUDA¹, MARCOS ANDRÉ DE CARVALHO²
& RICARDO ALEXANDRE KAWASHITA-RIBEIRO³

¹⁾ Universidade Federal de Mato Grosso, Programa de Pós-Graduação em Recursos Hídricos,
Av. Fernando Côrrea da Costa, nº 2365, Cuiabá, MT 78060-900, Brazil

²⁾ Universidade Federal de Mato Grosso, Instituto de Biociências, Av. Fernando Côrrea da Costa, nº 2365,
Cuiabá, MT 78060-900, Brazil

³⁾ Universidade Federal de Mato Grosso, Programa de Pós-Graduação em Ecologia e Conservação da Biodiversidade,
Av. Fernando Côrrea da Costa, nº 2365, Cuiabá, MT 78060-900, Brazil

Corresponding author: LUANA A. GOMES DE ARRUDA, e-mail: luana_laga@hotmail.com

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The distribution of the colubrid snake *Rhinobothryum lentiginosum* (SCOPOLI, 1785) has been predominantly associated with Amazon Hylean in South America with its presence being recorded from Bolivia (CUNHA & NASCIMENTO 1978, 1993), Colombia (DUMÉRIL et al. 1854, CUNHA & NASCIMENTO 1978, PÉREZ-SANTOS & MORENO 1988), Ecuador (ORCÉS & ALMENDÁRIZ 1994), Guyana (CUNHA & NASCIMENTO 1978, REYNOLDS & MACCULLOCH 2012), French Guiana (DUMÉRIL et al. 1854, GASC & RODRIGUES 1980, CHIPPAUX 1986, CUNHA & NASCIMENTO 1993), Paraguay (CUNHA & NASCIMENTO 1978, 1993; see the discussion below), Peru (CUNHA & NASCIMENTO 1978, DIXON & SOINI 1986, CUNHA & NASCIMENTO 1993, SILVA 2006), Venezuela (SILVA 2006, RIVAS et al. 2012), Suriname (HOGE 1960, CUNHA & NASCIMENTO 1993), and Brazil in the states of Amapá (OLIVEIRA & MARTINS 1998, LIMA 2008), Acre (SILVA 2006, MIRANDA et al. 2009, SILVA et al. 2010), Amazonas (CUNHA & NASCIMENTO 1978, 1993, ZIMMERMAN & RODRIGUES 1993, MARTINS & OLIVEIRA 1998, SILVA 2006, PRUDENTE et al. 2010), Rondônia (SILVA-JR. 1993, BERNARDE 2004, BERNARDE & ABE 2006, FRANÇA et al. 2006, SILVA 2006, TURCI & BERNARDE 2008, ÁVILA-PIRES et al. 2009, BERNARDE & ABE 2010, BERNARDE et al. 2012, FERÃO et al. 2012), Pará (CUNHA & NASCIMENTO 1978, CUNHA et al. 1985, CUNHA & NASCIMENTO 1993, OLIVEIRA & MARTINS 1998, FROTA et al. 2005, PRUDENTE & SANTOS-COSTA 2005, SILVA 2006, ÁVILA-PIRES et al. 2009, ÁVILA-PIRES et al. 2010) and Mato Grosso (AMARAL 1948, CUNHA

& NASCIMENTO 1978, CARVALHO 2006, KAWASHITA-RIBEIRO et al. 2011). Herein, we update the distribution map of *R. lentiginosum* in the Brazilian state of Mato Grosso and provide natural history data.

This study used for obtaining morphological data 25 specimens from Mato Grosso, Brazil, housed in the Coleção Zoológica de Vertebrados da Universidade Federal de Mato Grosso, Cuiabá – UFMT. Measurements of snout–vent length (SVL) and tail length (TL) were recorded to the nearest millimetre with nylon line and plastic rulers. Scales counts follow DOWLING (1951), using a slash (/) to separate characters from the right and left sides of the body, while dorsal scale counts represent the anterior/mid-body/posterior regions. Values of morphometric and scale counts include: mean, standard deviation ($\pm$), range, and number of specimens analysed (N). Sexual dimorphism in morphometric data was tested for using t-tests.

Six males and eight females were used for analyses of their reproductive states. The size of testes can provide information on spermiogenesis and seasonal timing of reproduction (JAMES & SHINE 1985), for which reason the lengths and widths of the males' right and left testes were evaluated and used to find the ratio between the sum of the testes lengths divided by SVL (Tab. 2) and the condition of efferent duct (opaque or translucent) (SHINE 1982). The number and dimensions of primary vitellogenic follicles (Lpvf, Wpvf), secondary vitellogenic follicles (Lsvf, Wsvf), and eggs in the oviducts (Le, We) were evaluated in the fe-

Table 1. Morphological data of *Rhinobothrium lentiginosum* from Mato Grosso, Brazil, and bibliographic localities, with numbers of specimens analysed (N), mean, standard-deviation ($\pm$), and range; snout-vent length (SVL) and tail length (TL) in millimetres; number of dorsal scale rows (/ indicates anterior/medial/posterior rows), ventral and subcaudal scales; condition of anal scute; number of supralabials (SL), supralabials in contact with the eye, infralabials (IL), infralabials in contact with the chin shields, preocular (PreOc), postocular (PosOc), and temporal (Temp) (/ indicates right/left sides), X indicates incomplete measurements or characters.

Source	Locality	Sex	SVL mean $\pm$ SD; range (N)	TL mean $\pm$ SD; range (N)	Dorsals (N)	Ventrals mean $\pm$ SD; range (N)	Subcaudals mean $\pm$ SD; range (N)	Anal scute (N)	SL (N)	SL in contact with eye (N)	IL (N)	IL in contact with chin shields (N)	PreOc (N)	PosOc (N)	Temp. (N)	
This study	Mato Grosso, Brazil	M	925.44 $\pm$ 288.64; 371–1252 (16)	227.09 $\pm$ 81.03; 96–324 (11)	21/19/17 (7); 20/19/17 (4); 19/19/17 (3); 21/18/17 (1); 19/19/16 (1)	261.88 $\pm$ 5.11; 254–272 (16)	108.64 $\pm$ 3.04; 102–113 (11)	Divided (15); entire (1)	8/8 (14); 8/9 (1); 9/8 (1)	4 ^a +5 ^a /4 ^a +5 ^a (16)	10/10 (6); 10/9 (3); 10/11 (2); 11/10 (2); 9/9 (1); 9/10 (1); 11/11 (1)	1 ^a –5 ^a /1 ^a –5 ^a (14); 1 ^a –4 ^a /1 ^a –4 ^a (1); 1 ^a –4 ^a /1 ^a –5 ^a (1)	1/1 (16) 2/2 (16)	3+3/3+3 (4); 4+3+3/6+4 (2); 3+2/3+2 (2); 3+3/3+2 (1); 3+2/2+3 (1); 3+2+2/3+2+2 (1); 2+2/2+2+2 (1); 2+3/2+3 (1); 3+3/4+2 (1); 4+3+3/6+4 (1)		
		F	896.89 $\pm$ 299.91; 387–1187 (9)	240.38 $\pm$ 84.95; 106–323 (8)	20/19/17 (4); 21/19/17 (3); 20/19/18 (1); 23/19/16 (1)	262.33 $\pm$ 5.00; 257–269 (9)	112.33 $\pm$ 4.06; 106–118 (9)	Divided (9)	8/8 (7); 8/9 (1); 9/8 (1)	4 ^a +5 ^a /4 ^a +5 ^a (9)	10/10 (3); 9/10 (2); 9/9 (1); 10/11 (1); 11/11 (1); 8/10 (1)	1 ^a –5 ^a /1 ^a –5 ^a (7); 1 ^a –4 ^a /1 ^a –3 ^a (1); 1 ^a +4 ^a /1 ^a +5 ^a (1)	1/1 (9) 2/2 (9)	3+2/3+2 (2); 3+3/3+3 (1); 3+4/3+3 (1); 2+3/2+2 (1); 3+3/3+2+3 (1); 3+2/3+3 (1); 2+3/3+2 (1)		
		CUNHA & NASCIMENTO 1993	Pará, Brazil	X	X $\pm$ X; X–1176 (X)	X $\pm$ X; X–322 (X)	21/19/17 (–); 20/19/17 (–)	X $\pm$ X; 258–264 (X)	X $\pm$ X; 113–117 (X)	Divided (X)	8/8 (X); 8/9 (X)	X	10/10 (X)	X	1/1 (X) 2/2 (X)	2+2 (X); 2+3 (X); 3+3 (X)
		CHIPPAUX 1986	Guyana	X	X	X	21/19/17 (2)	X $\pm$ X; 262–268 (2)	X $\pm$ X; 114 (2)	X	7–8 (2)	3 ^a +4 ^a (1); 4 ^a +5 ^a (1)	9–10 (2)	X	X	2+2 (1); 3+3 (1)
ORCÉS & ALMENDÁRIZ 1994	Ecuador	M	X $\pm$ X; X–1066–1245 (2)	X $\pm$ X; X–322 (X)	X/19/X (2)	X $\pm$ X; 257–261 (2)	X $\pm$ X; 112–120 (2)	Divided (2)	8 (2)	4 ^a +5 ^a (2)	9 (2)		1 (2) 2 (2)	2+2 (1); 3+2+2 (1)		
CUNHA et al. 1985	Carajás, Pará, Brazil	M	X $\pm$ X; X–1176 (1)	X	21/19/17 (1); 21/19/16 (1)	X $\pm$ X; 258–264 (2)	X $\pm$ X; 115–117 (2)	Divided (2)	8/8 (1); 8/9 (1)	4 ^a +5 ^a (2)	10/10 (2)	X	1 (2) 2 (2)	2+2 (1); 2+3 (1)		
AMARAL 1948	Mato Grosso, Brazil	F	X $\pm$ X; X–655–1210 (2)	X $\pm$ X; 123–241 (2)	X/19/X (2)	X $\pm$ X; 269–275 (2)	X $\pm$ X; 111–112 (2)	Divided (2)	8 (1)	4 ^a +5 ^a (1)	X	X	X	X	X	

Correspondence

Table 2. Snout-vent length (SVL), month/year of record, length of right (Lrt) and left (Llt) testes, width of right (Wrt) and left (Wlt) testes, condition of efferent ducts, and ratio between the sum of Lrt and Llt divided by SVL of *Rhinobothryum lentiginosum* from Mato Grosso, Brazil (all measurements in millimetres).

Voucher	SVL	Month/year	Lrt	Wrt	Llt	Wlt	Efferent ducts condition	Ratio (Lrt+Llt)/SVL
UFMT-R 7997	1079	04/2009	24.98	6.45	24.77	6.03	opaque	0.046
UFMT-R 7974	805	04/2009	14.34	4.31	14.24	4.16	opaque	0.036
UFMT-R 8528	699	10/2009	10.95	2.68	9.56	4.64	translucent	0.029
UFMT-R 8572	1235	11/2009	24.27	6.22	21.86	5.36	opaque	0.037
UFMT-R 8571	1088	11/2009	15.14	7.59	22.82	4.77	opaque	0.035
UFMT-R 8548	1160	10/2009	28.43	5.29	28.25	5.11	opaque	0.049

males. Measurements were taken to the nearest 0.01 mm with digital callipers and considered secondary vitellogenic follicles if larger than 10 mm (SHINE 1977, 1978). We used 18 specimens for dietary analyses.

The specimens of *Rhinobothryum lentiginosum* (Fig. 1) used in this study were collected from the municipalities of Alta Floresta (09°52' S, 56°05' W; N = 1), Cláudia (11°30' S, 54°53' W; N = 9), Cotriguaçu (09°51' S, 58°14' W; N = 1), Juína (11°22' S, 58°44' W; N = 2), Juruena (10°19' S, 58°21' W; N = 1), Novo Mundo (09°57' S, 55°11' W; N = 1), Paranaíta (09°39' S, 56°28' W; N = 11), and Sinop (11°50' S, 55°38' W; N = 1). The record made by CARVALHO (2006) from the municipality of Cláudia remains the southeasternmost known locality for the species (Fig. 2).

The state of Mato Grosso has three biomes, the Amazon in the north (480.215 km²), the Cerrado in the centre (354.823 km²), and the Pantanal in the western portion (60.885 km²) (SEMA 2010). The majority of records for the species in Mato Grosso are from Amazonian localities, with the exception of the Cláudia municipality, which is

located in the Amazon-Cerrado transitional zone. Considering the material analysed and the bibliographic records (DUMÉRIL et al. 1854, AMARAL 1948, HOGE 1960, PETERS & OREJAS-MIRANDA 1970, GASC & RODRIGUES 1980, CUNHA et al. 1985, DIXON & SOINI 1986, PÉREZ-SANTOS & MORENO 1988, ZIMMERMAN & RODRIGUES 1993, ORCÉS & ALMENDÁRIZ 1994, MATINS & OLIVEIRA 1998, OLIVEIRA & MARTINS 1998, BERNARDE 2004, FROTA et al. 2005, PRUDENTE & SANTOS-COSTA 2005, BERNARDE & ABE 2006, CARVALHO 2006, FRANÇA et al. 2006, SILVA 2006, LIMA 2008, TURCI & BERNARDE 2008, MIRANDA et al. 2009, ÁVILA-PIRES et al. 2010, BERNARDE & ABE 2010, PRUDENTE et al. 2010, KAWASHITA-RIBEIRO et al. 2011, FERRÃO et al. 2012, REYNOLDS & MACCULLOCH 2012, RIVAS et al. 2012), *R. lentiginosum* exhibits a predominately Amazonian distribution. The only record from outside the Amazonian domain, Paraguay (CUNHA & NASCIMENTO 1978, 1993), could be an erroneous interpretation of the data provided by PETERS & OREJAS-MIRANDA (1970) who gave the distribution of the species as the “Basins of Ríos Amazon and



Figure 1. Juvenile *Rhinobothryum lentiginosum* from Paranaíta, Mato Grosso, Brazil (UFMT-R 7300).

Paraguay in tropical South America”, but not in the country of Paraguay itself.

The mean SVLs and TLs of males (SVL 925.44 ± 288.64 mm; TL 277.09 ± 81.03 mm) were higher than those of females (SVL 896.89 ± 299.91 mm; TL 240.38 ± 84.95 mm); the largest male was 1,252 mm and largest female 1,187 mm, but the differences in SVL and TL between males and females are not statistically significant (SVL $t = 0.234$, $p = 0.816$; TL: $t = -0.345$, $p = 0.733$). There were no substantial differences in ventral (V) and subcaudal (SC) counts averages per sex (♂ V 262, SC 108; ♀ V 262, SC 112), however, the amplitude known to exist in ventral scale counts (257; ORCÉS & ALMENDÁRIZ 1994) was lowered to 254, and that of subcaudals (111; AMARAL 1948) to 102 scales. The number of supralabial (SL) scales was similar to that of specimens from the east of Pará State in Brazil, ranging from 8–9 (CUNHA & NASCIMENTO 1978, 1993). Infralabial (IL) scale counts varied more (9–11/9–11) compared to specimens from eastern Pará (CUNHA & NASCIMENTO 1978, 1993: 10–10 IL) (Tab. 1).

Males with the largest testes ratios were from the months of April and October. One of these males (SVL 699 mm) had translucent efferent ducts and those of another (SVL 805 mm) were opaque (Tab. 2). One female that had been collected in the month of May contained three secondary vitellogenic follicles (Lsvf: 18.72 ± 1.01 ; Wsvf: 5.17 ± 0.62), while other females from May contained three eggs (Le: 36.99 ± 3.54 ; We: 10.98 ± 1.34), and four eggs in August (Le: 40.33 ± 1.28 ; We: 13.00 ± 0.37), and one female from the month of May showed dilated and translucent oviducts. Juveniles with umbilical scars still present (SVL < 388 mm) were found in March and June (Tab. 3). Bibliographic data on the reproduction of the species are scarce. OLIVEIRA & MARTINS (1998) recorded only one specimen in Amazonas State, Brazil, with large follicles in July. The apparent lack of a seasonal pattern in males with enlarged testes, females with eggs and juveniles, may suggest a circumannual reproduction pattern (PIZZATO et al. 2006), however more data are required to confirm this assumption.

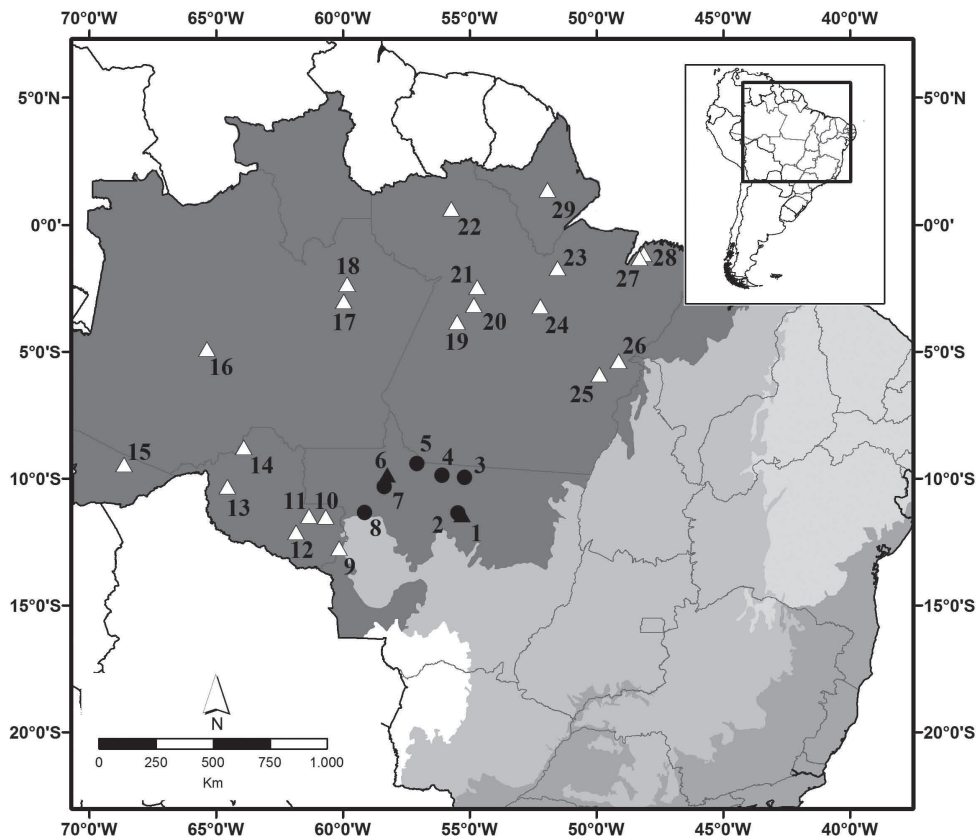


Figure 2. Geographic distribution of *Rhinobothryum lentiginosum* in Brazil, with new records from the state of Mato Grosso. Black circles are new records; black triangles bibliographic records and specimens analysed; white triangles are bibliographic records. Localities in Mato Grosso: 1 – Cláudia; 2 – Sinop; 3 – Novo Mundo; 4 – Alta Floresta; 5 – Paranaíta; 6 – Cotriguaçu; 7 – Juruena; 8 – Juína. Rondônia: 9 – Vilhena; 10 – Espigão do Oeste; 11 – Cacoal; 12 – Alto Alegre dos Parecis; 13 – Guajará-Mirim; 14 – Porto Velho. Acre: 15 – Sena Madureira. Amazonas: 16 – Coari; 17 – Reserva Ducke; 18 – Manaus. Pará: 19 – Vila Nova; 20 – Curucú-Una; 21 – Santarém; 22 – Grão-Pará Center; 23 – Caxiuanã; 24 – Altamira; 25 – Carajás; 26 – Marabá; 27 – Benfica; 28 – Santo Antônio do Tauá. Amapá: 29 – Tumucumaque.

Correspondence

Table 3. Snout-vent length (SVL), month/year of record, mean $\pm$ standard-deviation, and range of length of primary vitellogenic follicles (Lpvf), width of primary vitellogenic follicles (Wpvf), length of secondary vitellogenic follicles (Lsvf), width of secondary vitellogenic follicles (Wsvf), length of eggs (Le), width of eggs (We), number of follicles (N), and some observations (Obs.) of *Rhinobothryum lentiginosum* from Mato Grosso, Brazil (all measurements in millimetres).

Voucher	SVL	Month/year	Lpvf	Wpvf	Lsvf	Wsvf	Le	We	Obs.
UFMT-R 3869	371	03/2004							Presence of umbilical scar
UFMT-R 3915	373	03/2004							Presence of umbilical scar
UFMT-R 6551	991	05/2007	3.92 $\pm$ 1.82; 1.11–7.39 (24)	2.28 $\pm$ 0.88; 0.88–3.67 (24)	18.72 $\pm$ 1.01; 17.74–19.75 (3)	5.17 $\pm$ 0.62; 4.47–5.64 (3)			
UFMT-R 8449	963	05/2008	3.65 $\pm$ 1.43; 1.74–6.41 (9)	2.39 $\pm$ 0.73; 1.24–3.33 (9)					Dilated and translucent oviducts
UFMT-R 8234	1104	05/2009	4.28 $\pm$ 2.12; 1.18–9.92 (25)	2.27 $\pm$ 0.82; 0.94–3.48 (25)			36.99 $\pm$ 3.54; 33.38–40.45 (3)	10.98 $\pm$ 1.34; 9.96–12.5 (3)	
UFMT-R 3783	387	06/2004							Presence of umbilical scar
UFMT-R 3856	860	06/2003	3.14 $\pm$ 0.83; 1.6–4.23 (9)	1.50 $\pm$ 0.44; 0.92–2.09 (9)					
UFMT-R 3854	1187	08/2003	4.58 $\pm$ 1.20; 2.51–6.09 (14)	2.50 $\pm$ 0.74; 1.33–4.19 (14)			40.33 $\pm$ 1.28; 38.63–41.46 (4)	13.00 $\pm$ 0.37; 12.54–13.44 (4)	

Table 4. Diet of *Rhinobothryum lentiginosum* from Mato Grosso, Brazil, and bibliographic sources.

Source	Voucher	Locality	Stomach contents	Intestine contents
This study	UFMT-R 7974	Paranaíta, Mato Grosso	Remains of <i>Gonatodes</i> sp. (ingested head first)	Empty
	UFMT-R 8528	Paranaíta, Mato Grosso	Remains of <i>Ameiva ameiva</i>	Lizard scales
	UFMT-R 9149	Paranaíta, Mato Grosso	Remains of <i>Ameiva ameiva</i> (ingested head first)	Lizard remains
	UFMT-R 6551	Juruena, Mato Grosso	Remains of Mabuyidae (ingested head first)	Lizard remains
	UFMT-R 8234	Paranaíta, Mato Grosso	Remains of <i>Ameiva ameiva</i> (ingested head first)	Amorphous material
	UFMT-R 3854	Cláudia, Mato Grosso	<i>Kentropyx calcarata</i>	Empty
	UFMT-R 3915	Cláudia, Mato Grosso	<i>Kentropyx calcarata</i> juvenile	Empty
	UFMT-R 3856	Cláudia, Mato Grosso	Remains of Mabuyidae	Empty
	UFMT-R 3865	Cláudia, Mato Grosso	Remains of lizard, unidentifiable	Empty
CUNHA & NASCIMENTO 1993		Pará	Lizards	
OLIVEIRA & MARTINS 1998	MPEG 16570	Marabá, Pará	<i>Plica plica</i>	
	MPEG 16672	Amapá	Mabuyidae	
	MPEG 16840	Marabá, Pará	<i>Plica umbra</i> and remains of another lizard, unidentifiable	
	MPEG 17011	Marabá, Pará	<i>Polychrus marmoratus</i> and remains of another lizard, unidentifiable	
	MPEG 18779	Benfica, Pará	<i>Polychrus marmoratus</i> and remains of another lizard, unidentifiable	
		Altamira, Pará	<i>Gonatodes humeralis</i>	
BERNARDE & ABE 2010		Espigão do Oeste, Rondônia	<i>Copeoglossum</i> cf. <i>nigropunctatum</i>	
ÁVILA-PIRES et al. 2010		Óbidos, Pará	Birds, mammals	
ZIMMERMAN & RODRIGUES 1993		WWF reserve, Manaus-AM	Frogs	

This study recorded identifiable food items in nine out of 18 specimens (50%) that were examined to this effect. All food items found were lizards and a little more than half of these (55%) were terrestrial lizards (Tab. 4). This supports the suggestions by OLIVEIRA & MARTINS (1998) that the species is a dietary specialist focussing on lizards and has terrestrial and arboreal habits. Bibliographic records of the species' diet include birds and mammals (ÁVILA-PIRES et al. 2010) and amphibians (ZIMMERMAN & RODRIGUES 1993), but lizards apparently account for the largest portion in its diet (CUNHA & NASCIMENTO 1993, OLIVEIRA & MARTINS 1998, BERNARDE & ABE 2010).

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Appendix

Specimens examined

Alta Floresta: UFMT-R 5491; Cláudia: UFMT-R 3783, 3854, 3856, 3865, 3869, 3915, 3932, 3934, 7980; Cotriguaçu: UFMT-R 8898; Juína: UFMT-R 4867, 5881; Juruena: UFMT-R 6551; Novo Mundo: UFMT-R 5832; Paranaita: UFMT-R 7300, 7974, 7997, 8234, 8252, 8528, 8548, 8549, 8571, 8572, 9149; Sinop: UFMT-R 8449.