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The snake assemblage (Squamata: Serpentes) of a Cerrado-Caatinga transition area in Castelo do Piauí, state of Piauí, Brazil

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ABSTRACT. This study records and analyzes the diversity and structure of a snake assemblage in a transition area between Cerrado and Caatinga, in the municipality of Castelo do Piauí, state of Piauí, comparing the distribution and similarity of the species composition with other open localities already studied in Brazil. We used three complementary sampling methods: time constrained search (TCS), pitfall traps with drift fences (PFT), and incidental encounters (IE). During the TCS and PFT, 912 hours/observer and 6,468 days/trap were used, respectively. We estimated 23 species of snakes for the locality, although only 19 species were recorded. *Philodryas nattereri* Steindachner, 1870 (n = 10), *Liophis poecilogyrus* (Schlegel, 1837) (n = 9), *Liophis viridis* Günther, 1862 (n = 8) and *Thamnodynastes* sp. (n = 8) were the most abundant species. Terrestrial, cryptozoic, and diurnal snakes predominated in the assemblage (Boidae = 2 species, Dipsadidae = 12, Colubridae = 2, Elapidae = 1, Viperidae = 2). The results indicate that the fauna of the locality is similar with that of other open formations, especially the Caatinga, corroborating previous floristic studies. Comparisons between snake assemblages analyzed by different authors suggest structural differences between the assemblages of the Cerrado and the Caatinga, contradicting the hypothesis of mixed composition of fauna in these biomes.

KEY WORDS. Biodiversity; composition; ecotones; richness; similarity.

The high diversity of reptiles in Brazil is associated with the presence of different biomes, resulting in a gradient of regions with open and xeric formations (such as the Caatinga) to regions with extremely humid forest formations (like the Amazon Forest) (Rodrigues 2003, 2005). Despite the great diversity of snakes (371 species) recorded for Brazil (Bérnils 2010), information on distribution and natural history in this group is still unsatisfactory, especially for the Cerrado and Caatinga, biomes with the lowest known diversity (Sazima & Haddad 1992, Rodrigues 2005, Sawaya *et al*. 2008).

The main landscapes in the state of Piauí, northeastern Brazil, are associated with Cerrado sensu lato (30.0% of the total area of the state; CEPRO 1992, Castro *et al*. 1998, Farias & Castro 2004) and Caatinga (28.4%), as well as transitional areas or ecotones between these two biomes (Castro *et al*. 1998, Castro 2003). Few herpetological studies have been conducted in the state in localities of Caatinga (Vanzolini *et al*. 1980, Araujo *et al*. 1998), Cerrado (Coimbra Filho & Maia 1979), or in transitional areas between these two biomes (Vanzolini *et al*. 1980, Rocha & Santos 2004, Rocha & Prudente 2010). Herpetological studies in these and in other localities in northeastern Brazil are mostly restricted to species lists, descriptions of new taxa, and basic information on their biology, with scant information on factors structuring assemblages, as well as on their structure.

Nevertheless, recently Rocha & Prudente (2010) presented data on the composition and aspects of the natural history of the snake assemblage in a transition area between Cerrado and Caatinga in the state of Piauí.

Herein we present the results of an inventory of a snake assemblage from the Municipality of Castelo do Piauí, another transitional area between Cerrado and Caatinga in the state of Piauí. We provide information on composition, estimates of species richness and abundance, and a comparison with snake assemblages from others localities localized on open areas already studied in Brazil.

MATERIAL AND METHODS

The study area of about 3,000 ha belongs to ECB Rochas Ornamentais do Brasil and is located in the Municipality of Castelo do Piauí, northeast of the state of Piauí, Brazil (05°19'20"S, 41°33'09"W, Fig. 1). The vegetation is typical of a transition area between the Caatinga and Cerrado, with a predominance of a low altitude Cerrado Rupestre (rocky grasslands) (Castro & Costa 2007, Farias & Castro 2004). The average an-

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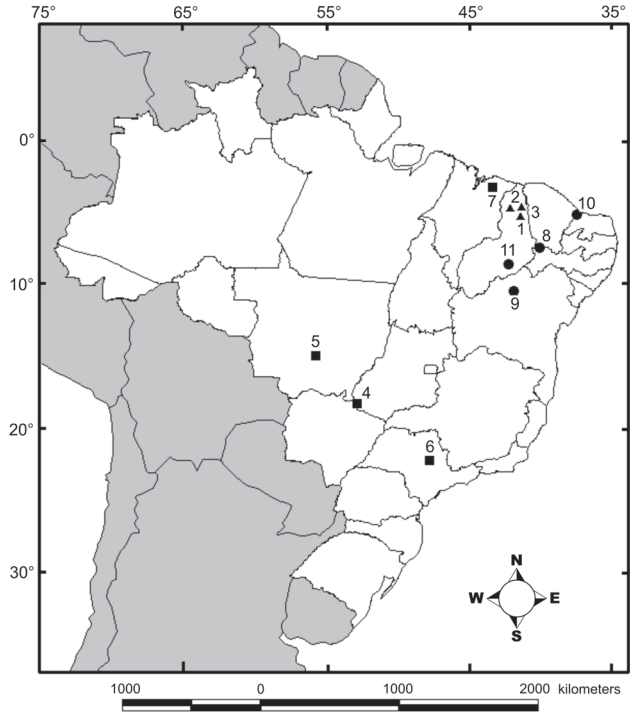


Figure 1. Cerrado, Caatinga and Cerrado-Caatinga transition localities used for comparisons regarding snake assemblages. Subtitle: Cerrado-Caatinga transition: (01) Castelo do Piauí, State of Piauí; (02) José de Freitas, state of Piauí; (03) Parque Nacional de Sete Cidades (PNSC), state of Piauí. Cerrado: (04) Parque Nacional das Emas, state of Goiás; (05) Manso hydroelectric powerplant, state of Mato Grosso; (06) Itirapina, state of São Paulo; (07) Urbano Santos, state of Maranhão; (08) Exu, state of Pernambuco; 09) Dunas de São Francisco, state of Bahia. Caatinga: (10) Chapada do Apodi, state of Ceará and Rio Grande do Norte, and (11) Parque Nacional Serra da Capivara, state of Piauí.

nual temperature is 33.6°C (with a minimum of 21.8°C in February and a maximum of 35.0°C, in October) and the climate is considered dry sub-humid, with annual rainfall of 1,199.3 mm (Thornthwaite & Mather 1955, Castro & Costa 2007).

Fieldwork was conducted in three physiognomically distinct areas, with the following characteristics: Area 1 – low altitude Cerrado Rupestre (rocky grasslands), characterized by superficially rocky soil, with rocky outcrops and with poorly developed plants dispersed between rocky outcrops and between trenches (Castro & Costa 2007) (Figs 2 and 3); Area 2 – Campo Cerrado (open Cerrado), characterized by a predominantly herbaceous-shrub component (rather than a shrub-arboreal) and fields that remain flooded during the rainy season (Figs 4 and 5); and Area 3 – secondary forest of typical Cerrado, composed of mainly shrubs and small trees, with a predominance of secondary vegetation and absence of herbaceous components. In this last area, pioneer species such as *Mimosa* sp. and other Mimosaceae have replaced the native vegetation, resulting in transitional and altered vegetation (Figs 6 and 7).

From October 2005 to July 2006, four expeditions in three physiognomically distinct areas were made, using three complementary data collection methods: a) time constrained search (TCS) (Martins & Oliveira 1999, Martins 2001); 2) pitfall traps with drift fences (PFT) (modified from Fitch 1987, Cechin & Martins 2000, Enge 2001); and 3) incidental encounters (IE) (Sawaya *et al.* 2008).

Seven sets of traps were installed in each of the three areas. Each set contained four 60 L buckets, arranged in a "Y" configuration, 10 m apart from one another and connected by 100 cm high drift-fences, totaling 84 buckets and 630 m of drift-fences. In each of the three areas, the traps remained open during 77 days, spread over four expeditions, two in the dry season and two in the rainy season. This effort resulted in 2,156 days/trap in each area, totalizing 6,468 days/trap performed.

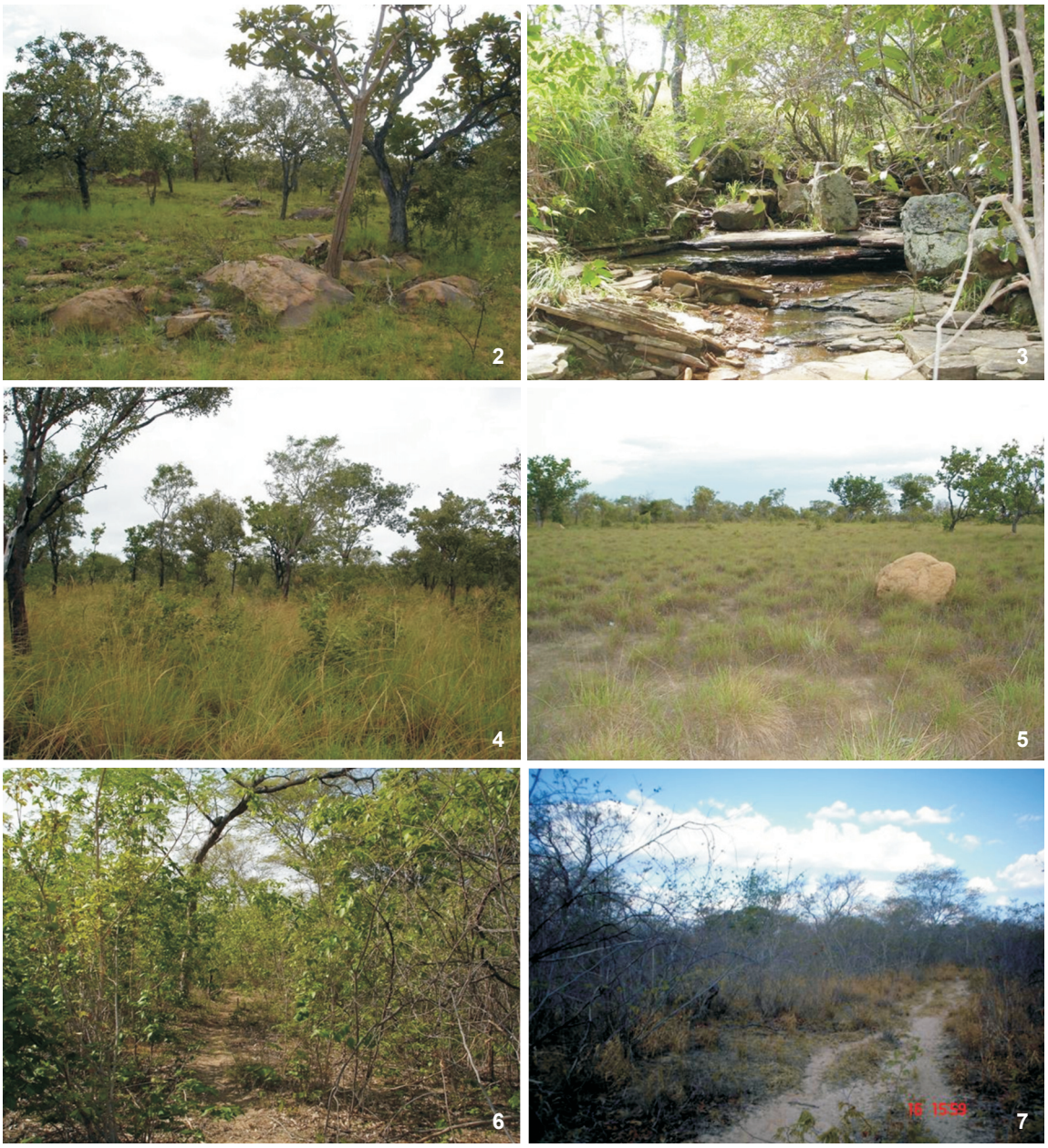
Time constrained search (TCS) consisted of walking slowly along pre-existing tracks within the areas, searching actively (visually) in burrows, termite nests, shrubs, grasses tussocks, etc. This procedure was performed for 38 days in each of the three areas. The search lasted four hours per day (two hours in the morning and two hours at night), and was carried out by two observers. Thus, each area had the same sampling effort of 304 hours/observer, totaling 912 hours/observer for the three areas.

We considered an encounter incidental (IE) when snakes were found alive or dead in the study area and surrounding region during other activities in which the collection time was not being computed, as well as instances when snakes were found and collected by workers and local residents.

The specimens collected were deposited in the Herpetological Collection of the Museu Paraense Emílio Goeldi (MPEG), Municipality of Belém, state of Pará, Brazil (Appendix).

For the species accumulation curves, rarefaction methods and richness estimates, we used the program "EstimateS" version 7.5 (Colwell 2005a) from the samples obtained by the methods TCS and PFT. For TCS, a sample corresponded to 8 man-hours (114 samples) and for PFT it corresponded to a collection day for seven sets of traps per area (231 samples). To estimate richness we used the first order Jackknife estimator (Jack 1) (Colwell & Coddington 1994, Colwell 2005b). For the construction of the accumulation curve and estimation of species richness, the number of species was associated with the number of individuals, using the obtained samples. We performed a hierarchical relationship between relative abundance and dominance ratios between species. For classification of the macrohabitats and daily activity we used the categories proposed by Cadle & Greene (1993), with modifications by Strüssmann (2000).

To evaluate the similarity between the composition of the snake assemblage of Castelo do Piauí and those of other open and transitional areas of Brazil, we used data from 10 localities (Fig. 1), divided into three groups as follows: Cerrado-Caatinga



Figures 2-7. Sampling areas. Area 1: low altitude Cerrado Rupestre, (2) detail of the vegetation and (3) detail of the stony soil typical of the area; Area 2: open Cerrado, (4) detail of the vegetation and (5) detail of the soil; Area 3: secondary forest of typical Cerrado, (6) detail of the vegetation and soil during the rainy season, and (7) detail of the vegetation and soil during the dry season.

transition: 1) Castelo do Piauí (Castelo), state of Piauí; 2) José de Freitas (JFreitas), state of Piauí (Rocha & Santos 2004); 3) Parque Nacional de Sete Cidades (PNSC), state of Piauí (Rocha & Prudente 2010); Cerrado: 4) Parque Nacional das Emas (Emas), state of Goiás (Valdujo *et al*. 2009); 5) Manso hydroelectric powerplant (Manso), state of Mato Grosso (Strüssmann 2000); 6) Estação Ecológica de Itirapina (Itirapina), state of São Paulo (Sawaya *et al*. 2008); 7) Urbano Santos (USantos), state of Maranhão (J. D. Lima, pess. com.); Caatinga: 8) Exu (Exu), state of Pernambuco (Vitt & Vangilder 1983); 9) Dunas de São Francisco (Dunas SF), state of Bahia (Rodrigues 1996); 10) Chapada do Apodi (Apodi), Ceará and Rio Grande do Norte states (Lima-Verde 1976); and 11) Parque

Nacional Serra da Capivara (Capivara), state of Piauí (Araujo *et al*. 1998). Only localities with minimum sampling efforts of at least 80 collection days and/or 200 field hours in total of TCS were used for this comparison.

We performed a Principal Coordinates Analysis (PCoA) for the species recorded in these localities (Pielou 1969, Manly 1994, Kovach 1999), and a cluster analysis using the weighted pair-group method of arithmetic averages (WPGMA, indicated for samples of groups with different richness or differences in sampling, according to Kovach 1999). Both analyses were run by using *Gower's* general *similarity coefficient* (Sneath & Sokal 1983, Kovach 1999). Analyses were performed using the program MVSP 3.1 (Kovach 1999). The distribution map was produced by using ArcView GIS version 3.3.

RESULTS

We recorded 77 specimens of snakes belonging to 19 species, 17 genera and five families (Tab. I). *Philodryas nattereri* Steindachner, 1870 (n = 10; 13.0%), *Liophis poecilogyrus* (Schlegel, 1837) (n = 9; 11.7%), *Liophis viridis* Günther, 1862 (n = 8; 10.4%), and *Thamnodynastes* sp. (= *Thamnodynastes* sp. nov. 2 sensu Franco & Ferreira 2002) (n = 8, 10.4%) were the most abundant species (Fig. 8), considering the three methods used.

Considering only the quantifiable capture methods (TCS and PFT), we recorded 14 species (TCS = 12 species, 912 hours/observer; PFT = 7 species, 6,468 days/trap), the most abundant of which were *Thamnodynastes* sp. (n = 7; 18.0%), *P. nattereri* (n = 5; 15.0%) and *Phimophis iglesiasi* (Gomes, 1915) (n = 5; 15.0%).

Table I. Ecological attributes of the snake community in the locality of Castelo do Piauí, state of Piauí, Brazil. Subtitles: Habitat (phytophysiognomies): (CR) low altitude Cerrado Rupestre, (OC) open Cerrado, (SF) secondary forest of typical Cerrado, (SU) Surroundings of study area. Macrohabitat: (PF) primary or exclusively fossorial, (PA) primary or exclusively arboreal; CT = criptozoic and terrestrial. Microhabitat: (1) on the ground, (2) in the tree canopy, (3) buried in the ground, (4) over rocks, (5) under rocks, (6) under leaf litter, (7) over leaf litter, (8) on trunks in the understory, (9) on fallen logs, (10) in hollow trunks, (11) inside a termite hill, (12) over a termite hill. Activity: (D) diurnal, (N) nocturnal, (DN) diurnal/nocturnal, (TL) mean total length, (SD) standard deviation, (–) no records.

		Habitat					
Species	N	Habitat	Macro	Micro	Activity	TL ± SD (cm)	Distribution
Boidae							
Boa constrictor (Stull, 1932)	1	SU	TE	1	DN	–	Cerrado/Caatinga
Epicrates assisi Machado, 1944	2	SF, SU	TE	1, 7	N	129.55 ± 2.76	Caatinga
Colubridae							
Mastigodryas bifossatus (Raddi, 1820)	1	SU	TE	4	D	100.80	Wide
Spilotes pullatus (Linnaeus, 1758)	1	SU	PA	–	D	192.30	Wide
Dipsadidae							
Leptodeira annulata (Linnaeus, 1758)	3	CR,SU	PA	2, 7	N	61.84 ± 16.22	Wide
Apostolepis cearensis Gomes, 1915	4	SF,CR	PF	6, 7	N	34.09 ± 7.55	Cerrado/Caatinga
Liophis poecilogyrus (Schlegel, 1837)	9	SU	TE	1, 9, 6	D	35.98 ± 8.16	Cerrado/Caatinga
Liophis paucidens (Hoge, 1953)	2	OC,SU	TE	1, 6, 10	D	52.25 ± 4.45	Cerrado
Liophis viridis Günther, 1862	8	CR,SU	TE	5, 1, 6	D	39.28 ± 10.67	Caatinga
Oxyrhopus trigeminus Duméril, Bibron & Duméril, 1854	7	SF,CR	TE	1, 6, 4	DN	47.59 ± 14.12	Wide
Philodryas nattereri Steindachner, 1870	10	OC,CR,SU	TE	5, 6, 11	D	73.83 ± 35.94	Cerrado/Caatinga
Phimophis iglesiasi (Gomes, 1915)	5	OC,SF	PF	1, 3	DN	41.39 ± 6.01	Cerrado/Caatinga
Pseudoboa nigra (Duméril, Bibron & Duméril, 1854)	2	CR	TE	1, 10	N	65.99 ± 3.42	Wide
Psomophis joberti (Sauvage, 1884)	1	OC	TE	1, 8	D	42.60	Wide
Thamnodynastes sp.	8	OC,CR,SF,SU	TE	1, 7, 10	DN	38.74 ± 9.91	Cerrado/Caatinga
Xenodon merremii (Wagler, 1824)	5	SF, SU	TE	1	D	37.22 ± 10.81	Wide
Elapidae							
Micrurus ibiboboca (Merrem, 1820)	4	SF,SU	PF	1, 6	N	60.70 ± 9.30	Cerrado/Caatinga
Viperidae							
Bothropoides lutzi (Miranda-Ribeiro, 1915)	3	OC	TE	1, 12	N	47.36 ± 8.18	Cerrado
Crotalus durissus (Linnaeus, 1758)	1	CR	TE	1, 12	N	–	Wide

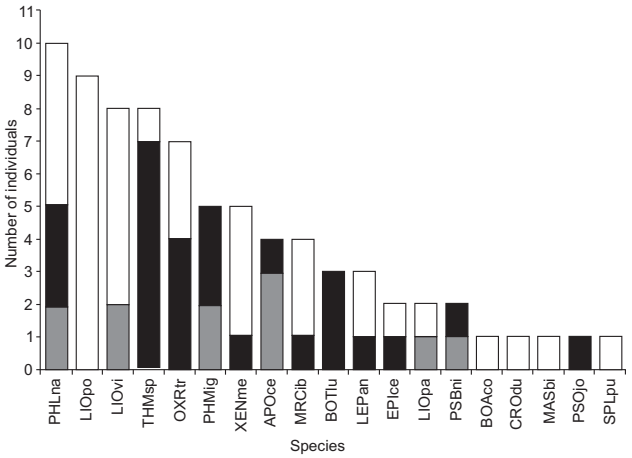


Figure 8. Relative abundance of snake species recorded at Castelo do Piauí (Piauí, Brazil) by using the methods of time constrained search (solid black), pitfall traps (gray), and incidental encounters (blank). (PHLna) *Philodryas nattereri*, (LIOpo) *Liophis poecilogyrus*, (LIOvi) *Liophis viridis*, (THMsp) *Thamnodynastes* sp., (OXRtr) *Oxyrhopus trigeminus*, (PHMig) *Phimophis iglesiasi*, (XENme) *Xenodon merremii*, (APOce) *Apostolepis cearensis*, (MCRib) *Micrurus ibiboboca*, (BOTlu) *Bothropoides lutzi*, (LEPan) *Leptodeira annulata*, (EPIce) *Epicrates assisi*, (LIOpa) *Liophis paucidens*, (PSBni) *Pseudoboa nigra*, (BOAco) *Boa constrictor*, (CROdu) *Crotalus durissus*, (MASbi) *Mastigodryas bifossatus*, (PSOjo) *Psomophis joberti*, (SPLpu) *Spilotes pullatus*.

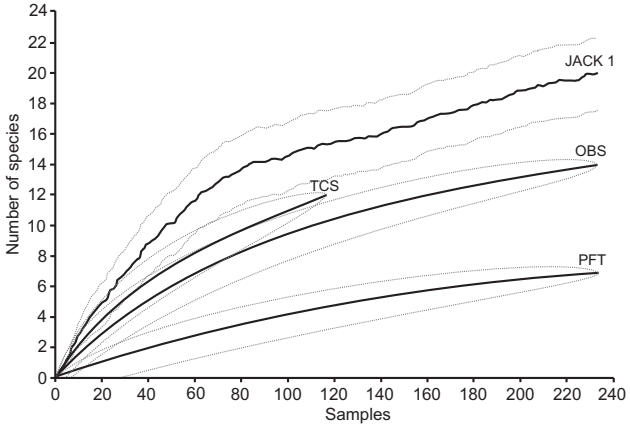


Figure 9. Species accumulation curve, richness estimates and performance of two different methods employed to sample snakes at Castelo do Piauí. Samples were generated after 100 randomizations. (TCS) Time constrained search (1 sample = 8 man-hours); (PFT) pitfall traps (1 sample = 28 days/trap). Jack 1 = 1st order Jackknife richness estimator; OBS = observed richness.

Thirteen species were recorded using IE (five species were uniquely recorded by this method), of which *L. poecilogyrus* (n = 9; 23.0%), *L. viridis* (n = 6; 15.0%) and *P. nattereri* (n = 5; 13.0%) were the most frequent. The species accumulation and rarefaction curves did not reach an asymptote, suggesting that at least 23 species occur in the locality (Jack 1: 19.95 + 2.41) (Fig. 9).

Most species in this assemblage had diurnal habits (8 species; 42.1%). They were followed by nocturnal species (7 species, 36.8%), and by species with both diurnal and nocturnal activities (4 species, 21.1%) (Tab. I). Regarding the use of the substrate, snakes with terrestrial and cryptozoic habits predominated in the assemblage (14 species, 73.7%), followed by fossorial (3 species, 15.8%) and arboreal (2 species, 10.5%) species (Tab. I). Most terrestrial species have diurnal or diurnal/nocturnal habits. Exclusively nocturnal species were recorded in a wide variety of substrates (Tab. I).

The first two axes of the Principal Coordinates Analysis (PCoA) together explained 36.6% of the data variance (Axis 1: eigen value = 1.573 and 21.9% of the variance; axis 2: eigen value = 1.05 and 14.6% of the variance). Axis 1 ordered the assemblages into two main groups: group 1 formed by assemblages from the Caatinga (Exú, Apodi, Capivara and Dunas SF), ecotones (Castelo, JFreitas and PNSC), and northeastern Cerrado (USantos); group 2 was formed by assemblages from Midwestern (Manso) and Midwestern Cerrado (Emas and Itirapina) (Fig. 10). Axis 2 of the PCoA ordered the assemblages into two other groups: group 1 was formed by the assemblages from the Cerrado (Manso and USantos) and from two transition areas (PNSC and J Freitas); group 2 was composed by the assemblages from other open formations of Northeastern Brazil, including Castelo (Fig. 10).

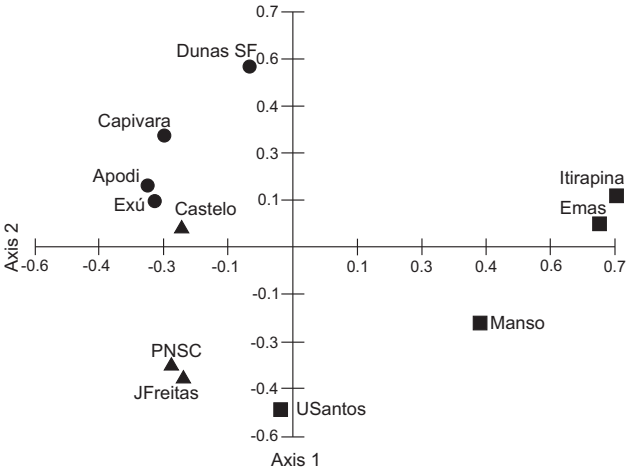


Figure 10. Ordination diagram of the Principal Coordinates Analysis (PCoA) resulting from the species composition of thirteen localities. Axis 1: eigenvalue = 1.57 and 21.9% variance, axis 2: eigenvalue = 1.05 and 14.6% variance. Legends: Cerrado (squares), transition area (triangles) and Caatinga localities (circles).

Similarly to the PCoA results, the cluster analysis showed two groups according to vegetation characteristics. The group 1 was formed by the Cerrado assemblages (Manso, Emas and Itirapina) and the northeastern Cerrado (USantos). The group 2 was formed by the Dunas SF and a subgroup composed by assemblages from the Caatinga (Capivara, Exu and Apodi), and Cerrado-Caatinga transition areas (PNSC, Castelo and JFreitas) (Fig. 11). PNSC (53.6%) and J Freitas (37.0%) are the most similar assemblages to Castelo (Tab. II).

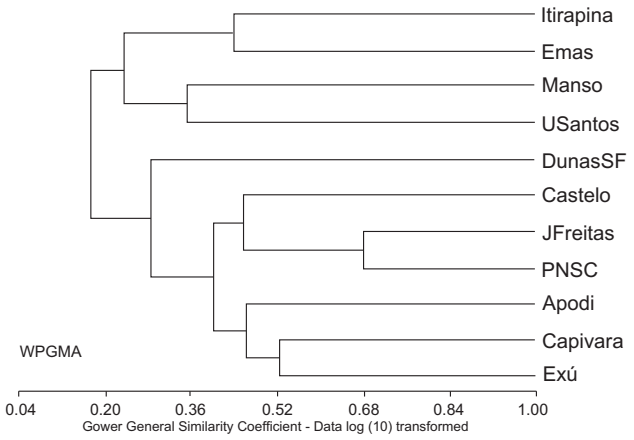


Figure 11. Dendrogram of the cluster analysis between eleven localities resulting from the snake species composition of localities from transition localities (Castelo, JFreitas e PNSC), Cerrado (Emas, Manso, Itirapina e USantos) and Caatinga localities (Exu, Dunas SF, Apodi e Capivara).

DISCUSSION

The low diversity of snakes observed in the assemblages studied in Castelo and in other two Cerrado-Caatinga transition localities (PNSC, JFreitas) is probably a pattern of the transitional formations, since localities with a predominance of open vegetation types tend to have relatively lower diversity when compared to forested formations (Vanzolini 1974, 1976, Vitt & Vangilder 1983, Silva & Sites 1995, Strüssmann 2000, Bernarde & Abe 2006, Sawaya *et al.* 2008). Additional studies are necessary to elucidate this hypothesis.

The combination of different capture methods is the best way to sample an area since it makes it possible to access the faunas from distinct habitats (Greenberg *et al.* 1994, Sawaya *et al.* 2008, Ribeiro-Júnior *et al.* 2008). Nevertheless, in spite of the fact that three capture methods were employed in our study area, both rarefaction and species accumulation curves did not stabilize, indicating the possibility of additional records for Castelo do Piauí in further studies.

The snake assemblage from Castelo is characterized by the prevalent abundance of specimens of Dipsadidae (representing 83.1% of the total number of records) and by the low abundance of Boidae, Colubridae, Elapidae and Viperidae specimens. The predominance of terrestrial, diurnal snakes was also observed in other communities from open areas or ecotones, such as PNSC (Rocha & Prudente 2010), Exu (Vitt & Vangilder 1983), Capivara (Araújo *et al.* 1998) and JFreitas (Rocha & Santos 2004). Although not tested, the few records of arboreal snakes are tentatively attributed to the low height and density of the vegetation, and the absence of aquatic species in the studied area can be attributed to the lack of water bodies.

Table II. Similarity matrix with similarity indexes between pairs of assemblages (italics), number of shared species (underline), and species richness (bold) in each assemblage. Subtitles: Cerrado-Caatinga transition: (1) Castelo do Piauí, state of Piauí, (2) José de Freitas, state of Piauí, (3) Parque Nacional de Sete Cidades (PNSC), state of Piauí. Cerrado: (4) Parque Nacional das Emas, state of Goiás, (5) Manso hydroelectric powerplant, state of Mato Grosso, (6) Itirapina, state of São Paulo, (7) Urbano Santos, state of Maranhão. Caatinga, (8) Exu, state of Pernambuco, (9) Dunas de São Francisco, state of Bahia, (10) Chapada do Apodi, Ceará and Rio Grande do Norte states, (11) Parque Nacional Serra da Capivara, state of Piauí.

	1	2	3	4	5	6	7	8	9	10	11
1	**19**	10	15	9	11	5	12	12	10	10	9
2	*0.370*	**18**	17	9	12	6	16	11	7	11	8
3	*0.536*	*0.680*	**24**	11	16	8	20	15	9	13	11
4	*0.170*	*0.173*	*0.196*	**43**	22	24	12	9	7	7	6
5	*0.229*	*0.261*	*0.333*	*0.361*	**40**	17	20	11	9	9	9
6	*0.100*	*0.125*	*0.154*	*0.436*	*0.288*	**36**	7	7	4	5	5
7	*0.273*	*0.410*	*0.488*	*0.176*	*0.351*	*0.106*	**37**	13	9	12	10
8	*0.444*	*0.407*	*0.517*	*0.167*	*0.224*	*0.143*	*0.295*	**20**	9	13	12
9	*0.313*	*0.206*	*0.237*	*0.119*	*0.167*	*0.073*	*0.176*	*0.265*	**23**	10	9
10	*0.357*	*0.423*	*0.433*	*0.127*	*0.180*	*0.100*	*0.273*	*0.500*	*0.313*	**19**	10
11	*0.360*	*0.320*	*0.393*	*0.115*	*0.196*	*0.109*	*0.238*	*0.522*	*0.310*	*0.417*	**15**

Eight of the 19 species (42.1%) recorded for the locality present wide geographic distributions, occurring in different biomes (such as the Cerrado, Caatinga, Pantanal, Amazon and Atlantic forests), while other seven species (36.8%) occur exclusively in Cerrado and Caatinga. Additionally, two species are found exclusively in the Caatinga – *Epicrates assisi* Machado, 1944 and *L. viridis*, and two in the Cerrado – *Liophis paucidens* (Hoge, 1953) and *Bothropoides lutzi* (Miranda-Ribeiro, 1915). Although *B. lutzi* can occur at the limits of the Caatinga, the species is considered typical of the Cerrado, according to Campbell & Lamar (2004). The presence of shared species with Cerrado and Caatinga, associated with the occurrence of transitional vegetation species (Castro & Costa 2007), indicate that the locality of Castelo do Piauí represents an ecotonal area, influenced by both types of biomes.

The similarity between assemblages from the Cerrado-Caatinga transition localities (Castelo, JFreitas and PNSC), the northeastern Cerrado (USantos), and the Caatinga (Apodi, Exu and Capivara) indicate that the geographical proximity of adjacent biomes have an influence on the composition of the fauna from Castelo. This fact can be corroborated by the presence of species in common with Cerrado and Caatinga assemblages, besides the presence of species with wide geographic distribution. However, species richness, faunal composition, and number of shared species in the above mentioned localities, as well as the formation of two distinct groups observed in our analysis – Cerrado and Caatinga – provide evidence that they have their own faunal identities, as previously argued by authors such as Colli *et al.* (2002), Rodrigues (2003), and Sawaya *et al.* (2008).

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Appendix. Specimens examined (MPEG: Museu Paraense Emílio Goeldi).

Brasil, *Piauí*: Castelo do Piauí: *Apostolepis cearensis* – MPEG 22760, MPEG 22762, MPEG 22810, MPEG 22814; *Boa constrictor* – CASTH 801 (not catalogued); *Bothropoides lutzi* – MPEG 22752, MPEG 22753, MPEG 22801; *Epicrates assisi* – MPEG 22750, MPEG 22768; *Leptodeira annulata* – MPEG 22746, MPEG 22751, MPEG 22781; *Liophis paucidens* – MPEG 22791, MPEG 22802; *Liophis poecilogyrus* – MPEG 22786, MPEG 22787, MPEG 22790, MPEG 22804, MPEG 22806, MPEG 22807, MPEG 22809, MPEG 22811, MPEG 22817; *Liophis viridis* – MPEG 22745, MPEG 22749, MPEG 22756, MPEG 22770, MPEG 22775, MPEG 22783, MPEG 22805, MPEG 22812; *Mastigodryas bifossatus* – MPEG 22788; *Micrurus ibiboboca* – MPEG 22772, MPEG 22789, MPEG 22793, MPEG 22803; *Oxyrhopus trigeminus* – MPEG 22765, MPEG 22767, MPEG 22769, MPEG 22777, MPEG 22796, MPEG 22815, MPEG 22816; *Philodryas nattereri* – MPEG 22744, MPEG 22747, MPEG 22754, MPEG 22757, MPEG 22758, MPEG 22759, MPEG 22773, MPEG 22782, MPEG 22784, MPEG 22800; *Phimophis iglesiasi* – MPEG 22748, MPEG 22780, MPEG 22792, MPEG 22795, MPEG 22797; *Pseudoboa nigra* – MPEG 22755, MPEG 22776; *Psomophis joberti* – MPEG 22779; *Spilotes pullatus* – MPEG 22743; *Thamnodynastes* sp. – MPEG 22761, MPEG 22763, MPEG 22766, MPEG 22774, MPEG 22778, MPEG 22794, MPEG 22808, MPEG 22771; *Xenodon merremii* – MPEG 22764, MPEG 22785, MPEG 22798, MPEG 22799, MPEG 22813.