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Habitat variation and lizard diversity in a Cerrado area of Central Brazil

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Abstract
Lizard richness, composition and local distribution were studied in a 6000 ha preserved tract of Cerrado in central Brazil. Recorded richness, with 17 species in seven families, is higher than most presented for Cerrado localities. The lizard assemblage is significantly structured in terms of local distribution, being dominated by species with strict and predictable habitat requirements, following the mosaic of available habitats. A large portion of the species recorded is exclusive to open, interfluvial habitats. Faunal overlap between gallery forests and open habitats was extremely restricted. Previous interpretations describing the Cerrado lizard fauna as depauperate and similar to the fauna of other open Neotropical domains were not corroborated. Instead, our results corroborate recent interpretations pointing out horizontal stratification and habitat patchyness as strong factors influencing the rich, complex and characteristic Cerrado lizard fauna.

Resumo
A riqueza, composição faunística e distribuição local de lagartos foram estudadas em fragmento de 6000 ha no Cerrado do Brasil central. Os valores de riqueza obtidos, com 17 espécies simpátricas em sete famílias, superam a maior parte dos obtidos em estudos prévios em localidades de Cerrado. A fauna local de lagartos está distribuída em mosaico, sendo composta por espécies com requerimentos estritos e previsíveis quanto ao tipo de ambiente, acompanhando manchas de hábitats disponíveis. O intercâmbio de fauna entre matas de galeria e áreas abertas foi muito reduzido. Interpretações anteriores descrevendo a fauna de lagartos do Cerrado como depauperada e similar à fauna de outros domínios abertos do continente não foram corroboradas. Ao contrário, nossos resultados corroboram interpretações recentes que apontam a estratificação horizontal e a distribuição em mosaico dos hábitats como importantes fatores de estruturação das ricas, complexas e características comunidades de lagartos do Cerrado.

Keywords: Squamata, lizards, Cerrado, richness, local distribution

Introduction

The Cerrado is the second largest Neotropical morphoclimatic domain (Ab'Sáber 1977), having recently been recognized as one of the 25 global biodiversity hotspots (Myers et al. 2000). However, in spite of its extension, its status as a priority target for biological inventories and conservation and the rapid pace of destruction of its original habitats (Ratter et al. 1997; Silva & Bates 2002), the Cerrado is one of the zoologically least studied Neotropical regions (Colli et al. 2002; Silva & Bates 2002). Thus, species richness, taxonomic composition and local and geographic distribution of the lizard fauna of central Brazilian savannas are still poorly documented (Vanzolini, 1988; Nogueira 2001; Colli et al. 2002). The Cerrado lizard fauna has been described as depauperate and poor in endemics (Vitt 1991; Vitt & Caldwell 1993), being similar to the fauna of the semi-arid Caatinga of northeastern Brazil, both dominated by habitat-generalist species (Vanzolini 1976, 1988). However, more extensive surveys are showing that central Brazilian lizard fauna is far from depauperate, presenting higher levels of species richness and endemism than previously detected (Colli et al. 2002).

According to Colli et al. (2002), one of the main factors influencing high local and regional diversity in

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the Cerrado herpetofauna is horizontal habitat stratification, with a wide range of different vegetation types (from forests to open grasslands) occurring side by side in the landscape, each harboring a different set of species. However, possible effects of local habitat patchyness on the structure of Cerrado lizard assemblages are still largely unstudied. Moreover, the study of habitat specialization is fundamental to the formulation and testing of hypotheses on speciation scenarios (Vanzolini 1988), evolution of morphological traits such as the relation of limb and tail size to substrate use (Losos et al. 1998; Kohlsdorf et al. 2001) and community evolution (Losos et al. 1998). Finally, such natural history information is also fundamental for the development of conservation strategies (Brooks et al. 1992; Greene 1994; Silva & Bates 2002).

Herein, we present the results of a survey of the lizard fauna of a tract of undisturbed Cerrado in the Brasília region, central Brazil. The aim of this study was to determine the effects of habitat variation on lizard species richness, composition and community structure within this Cerrado tract.

Materials and methods

Study area

The study was conducted in Área Alfa Cerrado Reserve (AACR , 16°00′S; 47°57′W, 1050 – 1150 m elevation, 6000 ha), a Brazilian Navy training area, 30 km south of Brasília, DF. It is located on the Brasília plateau, a tableland over quartzitic rocks of Precambrian age (RADAM 1982) that is part of the Central Brazilian shield in the core of the Cerrado (Ab'Sáber 1977; IBGE 1993). Predominant soil types in the study site are acidic, aluminum-rich red latosols. The climate is type Cwbl in the Köppen classification (RADAM 1982). The relief is dominated by gently-sloping plateaus (1100 – 1150 m), slightly tilted towards central lower areas along the main local drainage, the Saia Velha river. This first-order tributary of the Paraná river system runs north to south and divides the study area into eastern and western halves. Interfluvial savannas dominate the landscape in the study area. For an updated overview of Cerrado vegetation see Oliveira-Filho and Ratter (2002).

Sampled habitats

The three main habitat types in the Cerrado domain were sampled in AACR: cerrado grassland (campo sujo and campo cerrado), typical cerrado (cerrado *sensu-stricto*) and gallery forest. Two sampling units were selected for each of the first two habitat types, one on each side of Saia Velha river. This was not possible for gallery forest because the eastern bank of the river was seasonally flooded. Therefore, both sampling units were located on the western side. Distance between sampling units ranged from 150 (gallery forest) to ~ 2000 m (typical cerrado).

Typical cerrado (CEE and CEW sampling units) has semi-open vegetation with three well-defined layers. The arboreal layer is formed by stunted, contorted, barky trees (with abundant *Caryocar brasiliensis, Pterodon emarginatus* and *Vochysia thyrsoidea*), with a semi-closed canopy of up to 6 m. The second layer consists of scattered shrubs and caulescent palms of up to 1 m. The lower layer, denser in gaps left by the arboreal stratum, is formed by clumps of grasses and low (0.5 m) herbs. Arboreal nests and terrestrial mounds of termites and leaf-cutter ants (*Atta* spp.) are common, and cavities and burrows are present in the ground. The soil is formed by deep, well-drained, clay-rich, red latosols.

Cerrado grasslands (CGE and CGW) have a sparse arboreal stratum and dense grassy cover, dominated by *Echinolaena inflexa*. Cerrado grasslands in AACR are found surrounding riparian habitats (veredas, wet grasslands, and gallery forests). The grassy/herbaceous layer is dense and well-developed. Terrestrial termite mounds and ground burrows are common, as well as leaf-cutter ant (*Atta* spp.) nests. Deep clay-rich red latosols are the dominant soil type.

Gallery forests (GFW1 – 2) form a belt along the drainage. In the study area the width of the gallery forest is ~ 100 m, with sampling units located at least 15 m from the forest edge. These forests include large trees (*Copaifera langsdorfii, Hymenaea courbaril*), forming a closed canopy of 15 – 25 m. The understory is clear, with scattered herbs, ferns, low vines and plantlets. Fallen twigs and logs are abundant. The predominant soil type is dark, humic soil, rich in organic matter and covered by leaf litter.

Sampling method

We sampled lizards with pit-fall traps with drift fences (PTDF, Gibbons & Semlitsch 1981; Greenberg et al. 1994) complemented by active searches around PTDF sampling units. We installed a total of 120 pit-fall traps in the six sampling units. In each sampling unit five arrays of four 35 l buckets were installed. Buckets were buried in the ground and connected by a 5 m long x 0.5 m high plastic drift-fence (see Gainsbury & Colli 2003). Arrays were placed 15 m apart from each other, along linear transects through homogeneous, undisturbed habitat patches. These traps operated and were checked daily for 259 non-consecutive days, divided into six field trips: 20 October – 25 November 1999; 20 – 27 May 2000; 16 – 23 July 2000; 6 December 2000 – 7

January 2001; 23 May – 2 September 2001 and 26 January – 8 February 2002. Total sampling effort was 31 080 bucket-days, 10 360 per habitat type and 5180 per sampling unit. After the end of each field trip, all traps were closed with plastic lids until the next sampling period.

Most lizards were collected and deposited at Coleção Herpetológica da Universidade de Brasília (CHUNB) and Museu de Zoologia da Universidade de São Paulo (MZUSP). After a series of specimens was collected, individuals of abundant species were marked by clipping off the tip of the outermost finger of the right hand, and released at the capture site. Recaptured lizards were not included in the analyses.

Data analyses

Due to the heterogeneous nature of Cerrado landscapes, lizard richness was studied in two main spatial scales: biotope scale and landscape scale, or local species richness. To estimate local species richness, evaluate sampling results and allow future comparisons among sites (Soberón & Llorente 1993; Gotelli & Colwell 2001), a species accumulation curve based on number of individuals (Gotelli & Colwell 2001) for the total sampling effort (259 field days, each including 120 buckets plus 0.5 p/h of manual searches; 1000 randomizations of sampling order) was produced using EstimateS 5.0.1 (Colwell 1997). The accuracy of richness estimators was evaluated through comparisons with the known lizard richness for the Brasilia region (Colli et al. 2002; CHUNB and MZUSP collections).

Capture rates in PTDF between wet and dry seasons were compared using a chi-square test. Capture rates between ambush versus active foraging lizards and arboreal/semi-arboreal versus terrestrial/fossorial lizards (according to data in Colli et al. 2002, except for *Mabuya frenata* and *M. nigropunctata*, here considered as semi-arboreal) were compared using a Mann – Whitney U-test. All statistical analyses were performed using Statistica 6.1 (StatSoft 2003), with significance levels set at $\alpha = 0.05$.

A cluster analysis of the results in each PTDF sampling unit was performed to compare species composition and abundance in different habitats, using UPGMA as the grouping algorithm and modified Morisita – Horn index as a measure of similarity (see Magurran 1988), using MVSP 3.1 (Kovach 2000). Null model analysis was used to test for non-random patterns of co-occurrence among the lizard species in the six sampling units, using C-score index, 5.000 iterations, fixed sum constraint in row and columns, in the Co-occurrence module of EcoSim (Gotelli & Entsminger 2001; see similar analyses in Gainsbury & Colli 2003, comparing natural Cerrado isolates in southwestern Amazonia). A multivariate analysis of variance (MANOVA) was performed to test for statistical differences in lizard abundance among different habitat types. A stepwise discriminant analysis of the results in each PTDF array was performed to detect lizard species significantly ($\alpha = 0.15$, Tabachnick & Fidell 2001) associated with specific habitat types, with discriminant canonical functions obtained using the PROC DISCRIM procedure of SAS (SAS Institute Inc. 1988).

Phylogenetic relations and taxonomic comments

Lizard families were defined according to Estes et al. (1988), with the classification of Iguania following Frost et al. (2001). *Ophiodes* sp. is an undescribed species widespread in the Cerrado, largely sympatric with *O. striatus*, according to the revision in Borges-Martins (1998). *Enyalius* aff. *bilineatus* is an undescribed species related to *E. bilineatus*. The composition of the genus *Cercosaura* follows recent results in Doan (2003).

Results

Richness and faunal composition

We captured a total of 232 lizard specimens; 223 in PTDF plus nine during active searches. Voucher specimens collected during the study are listed in Appendix 1. Seventeen lizard species in seven families were recorded (Table I). The species accumulation curve (Figure 1) is past the inflexion point after 80 – 100 individuals. However, a clear asymptote was not observed, as some rare species were still being recorded close to the end of the sampling period. Most accurate non-parametric local richness estimator, based on comparisons with known richness values for the Brasilia region, was first-order Jacknife (23 ± 2 lizards).

No statistical differences (Mann – Whitney *U*-test; $n = 16$; $U = 13$; $p = 0.18$) were found in capture rates between ambush (Iguania in the studied assemblage) and active foragers (all Scleroglossa). Also no statistical differences were found in capture rates between arboreal/semi-arboreal (*Anolis meridionalis, Enyalius* aff. *bilineatus, Tropidurus* spp., *Mabuya frenata, M. nigropunctata*) and terrestrial/fossorial lizards (all remaining species; Mann – Whitney *U*-test; $n = 16$; $U = 25$; $p = 0.81$; microhabitat data modified from Colli et al. 2002, see methods). Capture rates did not differ between wet and dry seasons (Mann – Whitney *U*-test; $n = 12$; $U = 16$; $p = 0.74$).

Dominant species were, in order of abundance, *Cercosaura ocellata, Micrablepharus atticolus, Anolis*

Table I. Number of lizards collected in pit-fall traps in each sampling unit and habitat type. (M) Collected manually. This single specimen of *Polychrus acutirostris* was resting by day on a twig on a bush in cerrado grassland west.

		Cerrado Grassland		Typical Cerrado		Gallery Forest	
Taxon	***n***	**East**	**West**	**East**	**West**	**West1**	**West2**
IGUANIA							
Polychrotidae							
Anolis meridionalis Boettger, 1885	30	10	12	5	3	-	-
Polychrus acutirostris Spix, 1825 (M)	1	-	1	-	-	-	-
Leiosauridae							
Enyalius aff. *bilineatus*	27	-	-	-	-	10	17
Tropiduridae							
Tropidurus itambere Rodrigues, 1987	20	-	1	11	8	-	-
Tropidurus torquatus Wied-Neuwied, 1825	4	-	-	-	-	1	3
SCLEROGLOSSA							
Anguidae							
Ophiodes sp.	2	1	-	1	-		
Ophiodes striatus Spix, 1824	2	1	-	-	-		
Scincidae							
Mabuya dorsivittata Cope, 1862	27	10	12	2	-	2	1
Mabuya frenata Cope, 1862	1	-	-	1	-	-	-
Mabuya nigropunctata (Spix, 1825)	1	-	-			-	1
Teiidae							
Ameiva ameiva (Linnaeus, 1758)	7	-	2	1	4	-	-
Tupinambis duseni Lacèpéde, 1788	1	-	1	-	-	-	-
Gymnophthalmidae							
Bachia bresslaui (Amaral, 1935)	4	-	3	1	-	-	-
Cercosaura ocellata Wagler, 1830	47	11	12	20	4	-	-
Cercosaura schreibersii albostrigata (Griffin, 1917)	1	1	-	-	-	-	-
Colobosaura modesta (Reinhardt & Lütken, 1862)	6	-	-	-	-	3	3
Micrablepharus atticolus Rodrigues, 1996	43	5	6	14	18	-	-
Total	224	39	50	56	38	16	25

meridionalis, Mabuya dorsivittata, Enyalius aff. *bilineatus* and *Tropidurus itambere*. The dominant lineage, both in abundance and richness, was Gymnophthalmidae, with five sympatric species, two of which are the most frequently captured (Table I). Gekkonids were absent from our samplings, as well as teiids of the *Cnemidophorus ocellifer* species complex, common in other Cerrado localities (personal obs.). Of all species recorded, only *Polychrus acutirostris* was not obtained in pit-fall traps (Table I), but captured manually.

Local distribution

A non-random, structured pattern of habitat use was detected, with an observed C-score index significantly higher than the mean value obtained in 5000 simulated communities (observed: 1.80; mean of simulations: 1.54; $p < 0.001$).

Richness values were highest in cerrado grasslands, followed by typical cerrado and then by gallery forests (Table I). Most lizard species showed remarkable abundance differences among habitat patches (Table I). *Anolis meridionalis, Tropidurus itambere, Ameiva ameiva, Bachia bresslaui, Cercosaura ocellata* and *Micrablepharus atticolus* were only captured in open interfluvial habitats. Of these, *Tropidurus itambere* and *Micrablepharus atticolus* were more abundant in arboreal, typical cerrado, whereas *Anolis meridionalis* was more abundant in open grasslands (Table I). Three species, *Enyalius* aff. *bilineatus, Tropidurus torquatus* and *Colobosaura modesta*, were captured in the gallery forest only. *Mabuya dorsivittata* (Scleroglossa: Scincidae) was the only lizard found both in open and forested habitats, being however much more common in open habitats. Thus, faunal overlap between forest and open habitats was extremely restricted.

A cluster analysis comparing PTDF results in all six sampling units revealed that similar habitat patches harbor similar lizard assemblages (Figure 2). Thus, although adjacent and structurally similar, interfluvial savannas (cerrado grasslands and typical cerrado) differ in lizard composition and abundance, but form a coherent group of open areas, distinguished from gallery forests. Moreover, relatively distant interfluvial sites on both sides of the main drainage have similar habitat structure and similar lizard faunas. Thus, the lizard assemblage is comprised of habitat specialists following the mosaic of

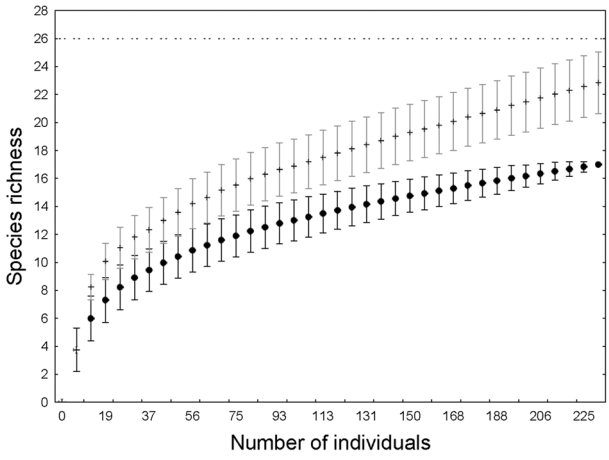

Figure 1. Species accumulation curve based on 1000 randomizations of sampling order of 223 lizards captured in 259 days of field work (pit-fall traps + active searches). Solid dots = mean simulated richness (17) ± sd. Crosses = estimated richness (23 ± 2); first-order Jacknife estimator ± sd. Dotted line = Lizard richness for the Brasilia region.

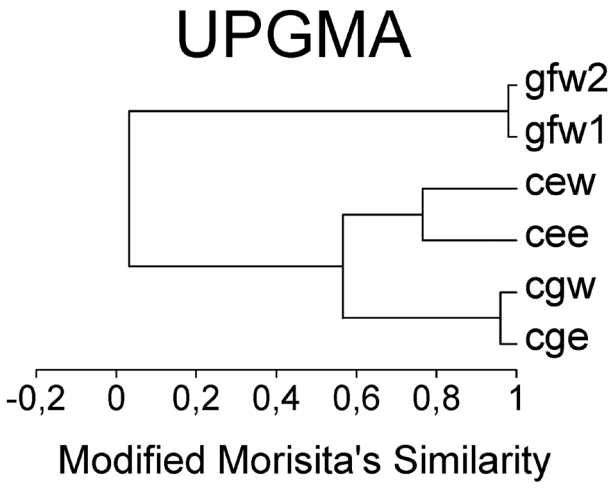

Figure 2. Dendrogram of similarity based on the abundance of lizards in pit-fall traps in each sampling unit. gf, gallery forest; ce, typical cerrado; cg, cerrado grasslands; e, east of the Saia Velha river; w, west of the Saia Velha river.

available habitat types (grasslands; typical cerrado; gallery forest).

Lizard abundance was significantly different among habitat types (MANOVA; Wilk's Lambda = 0.07; $p < 0.001$). A stepwise discriminant analysis detected *Tropidurus itambere*, *Enyalius* aff. *bilineatus*, *Micrablepharus atticolus* and *Mabuya dorsivittata* as the four species most strongly associated with specific habitat types, in order of decreasing association (Table II). These four species were entered into a canonical discriminant function. The first two canonical variables explained 100% of variation in lizard abundance among the three habitat types (Table III). The first canonical discriminant variable (eigenvalue 4.56) explained 74% of variation, describing an abundance gradient between gallery forest-dwelling *Enyalius* aff. *bilineatus* (positive coefficient) and remaining species (negative coefficients, Table III), all from interfluvial open areas, and showed highest positive means of scores in gallery forest and lowest, negative means of scores in typical cerrado (Table IV). The second canonical discriminant variable (eigenvalue 1.62) explained 26% of variation, describing an abundance gradient between grassland-dwelling *Mabuya dorsivittata* and *Micrablepharus atticolus* (negative coefficient) and *Enyalius* aff. *bilineatus* and *Tropidurus itambere*, (positive coefficient, Table III) from forested or arboreal habitats, with highest, positive means of scores in gallery forest; intermediate, positive means of scores in typical cerrado; and lowest, negative means of scores in cerrado grasslands (Table IV).

Table II. Lizard species selected as best predictors of habitat type, according to stepwise discriminant analysis on lizard abundance in three habitat types sampled with pit-fall traps in Área Alfa Cerrado Reserve, central Brazil.

Species	Step	*F*	*p*
Tropidurus itambere	1	28.21	< 0.001
Enyalius aff. bilineatus	2	21.29	< 0.001
Micrablepharus atticolus	3	4.27	0.03
Mabuya dorsivittata	4	2.90	0.07

Table III. Eigenvalues, percentage of explained variation, coefficient of determination, significance and raw coefficients of the first two canonical variables of discriminant function, based on lizard abundance in different habitat types in Área Alfa Cerrado Reserve, central Brazil.

Species	Canonical coefficient 1	Canonical coefficient 2
Eigenvalue	4.56	1.62
Cumulative explained variation	0.74	1.00
R^2	0.82	0.61
F	16.18	12.94
P	< 0.0001	< 0.0001
Enyalius aff. *bilineatus*	0.58	0.66
Mabuya dorsivittata	− 0.03	− 0.46
Micrablepharus atticolus	− 0.53	− 0.06
Tropidurus itambere	− 0.90	0.90

Discussion

The lizard assemblage at the study site is comprised of species with strict and predictable habitat requirements. Some species were selective even between adjacent interfluvial savannas, such as typical cerrado and cerrado grasslands, which had marked differences in lizard abundance. These findings contrast with descriptions of the Cerrado lizard fauna provided by

Table IV. Means of scores according to the two canonical variables of discriminant function on lizard abundance in pitfall traps in each of the three habitat types in Área Alfa Cerrado Reserve, central Brazil.

Habitat type	Canonical variable 1	Canonical variable 2
Cerrado grassland	0.26	− 1.65
Typical Cerrado	− 2.49	0.73
Gallery forest	2.48	1.01

Vanzolini (1976, 1988), describing Cerrado lizards as generalist species in terms of habitat use.

The effects of spatial heterogeneity in lizard local distribution have been documented in other continental open areas (Pianka 1966, 1967, 1969). In other open and heterogeneous landscapes, such as the Great Victoria desert, fire history is pointed as a determinant of habitat mosaics and lizard diversity (Pianka 1996). However, the effects of fire in lizard communities in the Cerrado remain largely unstudied (Araújo et al. 1996). Cerrado natural fire regimes may be interpreted either as a causative agent of local habitat distribution or a result of historical and structural differences among habitats (Cole 1986), reflecting differences in fire resistance and tolerance among vegetation types (Ramos-Neto & Pivello 2000; see discussions in Silva & Bates 2002).

The observed pattern of habitat segregation, with different species in different habitat patches, corroborates descriptions provided in Colli et al. (2002), stating that horizontal stratification is one of the main determinants of species richness and distribution of the Cerrado herpetofauna. A recent study of the lizard fauna of Cerrado enclaves in southwestern Amazonia showed that several species are tightly associated with unique ecogeographic features of the landscape, such as grasslands, sandy soils, rock outcrops (Gainsbury & Colli 2003). We interpret the patchy distribution of Cerrado lizard species and the fidelity to specific habitats and microhabitats as the result of accumulated historical, intrinsic differences among lineages in the area (see Cadle & Greene 1993; Vitt et al. 1999, 2003), although alternative hypotheses linked to competitive exclusion, prey abundances, and predation pressure may also be evoked (see review of lizard community evolution in Pianka & Vitt 2003).

The complex nature of the local faunal distribution may in part be responsible for the difficulties in observing or estimating species richness in short to medium-term studies. Not surprisingly, rare lizard species may still be recorded after exhaustive sampling efforts in highly heterogeneous sites (see results for Western Australia in Thompson et al., 2003). Despite the limitations of both observed richness (Brose et al. 2003; Gotelli & Colwell 2001) and species accumulation curves (see Thompson & Withers 2003; Thompson et al. 2003), our observed and estimated richness values were higher than most previously available for Cerrado localities (Vanzolini 1976; Vitt 1991; Vitt & Caldwell 1993; Gainsbury & Colli 2003; but see Colli et al. 2002).

Due to the heterogeneous nature of the local habitats, some of the 26 lizard species recorded in the Brasilia region (Colli et al. 2002; Nogueira 2001) may be absent from AACR, because of the absence of suitable habitats. However, others that are highly probable to occur there include the gallery forest-dwelling *Anolis chrysolepis brasiliensis* and open habitat lizards *Mabuya guaporicola, Kentropyx paulensis* and *Tupinambis merianae,* all present in conservation units of the Cerrado Biosphere Reserve (Phase 1, UNESCO 2000) adjacent to the study site (CHUNB and MZUSP collection data; Araújo et al. 1996).

We agree with recent results and interpretations describing Cerrado lizard assemblages as rich faunas, containing 14 – 26 species in up to 10 families, being similar to Amazonian assemblages in terms of local diversity (Colli et al. 2002), including different habitat types. However, comparisons between lizard faunal lists, within and outside the Cerrado (see Vitt 1991), may lead to mistaken conclusions due to important differences in sampling effort, area, habitat composition and lizard community attributes (Thompson et al. 2003).

One of the key concerns for lizard diversity studies in the Cerrado is to properly assess both biotope (homogeneous habitat) and local (heterogeneous landscape) species richness patterns. However, most previous descriptions of Cerrado lizard richness and faunal composition were based on limited ecological and distributional data, providing inadequate estimates (Colli et al. 2002) of diversity in this large, poorly studied, ancient (Ratter et al. 1997) and highly threatened Neotropical region (Ratter et al. 1997; Silva & Bates 2002). Further studies in different Cerrado localities, using comparable sampling methods, should provide information on whether the highly predictable local distributional patterns observed at AACR remain valid for different Cerrado regions, containing other species pools, different habitat compositions and subject to different evolutionary histories.

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Appendix

Voucher specimens

Ameiva ameiva - CHUNB 21787, 21789–791; MZUSP 93151–52. *Anolis meridionalis* - CHUNB 21792–799; MZUSP 91660–667, 93146–149. *Bachia bresslaui* - CHUNB 21800; MZUSP 91658–659. *Cercosaura ocellata* - CHUNB 21801-805; MZUSP 91669–677, 91691–706, 93132–139. *Cercosaura schreibersii albostrigata* - CHUNB 21834. *Colobosaura modesta* - CHUNB 21806–807; MZUSP 91656–657. *Enyalius* aff. *bilineatus* - CHUNB 21799, 21808, 21810–815; MZUSP 87707, 88856–857, 93142–145. *Mabuya dorsivittata* - CHUNB 21818–820, 24876; MZUSP 93150, 93154–166. *Mabuya frenata* - MZUSP 91655. *Mabuya nigropunctata* - MZUSP 93160. *Micrablepharus atticolus* - CHUNB 21821–832; MZUSP 91882–898. *Ophiodes striatus* - CHUNB 21833. *Ophiodes* sp. - MZUSP 93140–141. *Polychrus acutirostris* - CHUNB 21837. *Tropidurus itambere* - CHUNB 21842, 21844–845, 21847–851 MZUSP 91668, 93173–178. *Tropidurus torquatus* - CHUNB 21839–840. *Tupinambis duseni* - MZUSP 93131.