South American Journal of Herpetology, 7(2), 2012, 63-78

ANURAN SPECIES COMPOSITION AND DISTRIBUTION PATTERNS IN BRAZILIAN CERRADO, A NEOTROPICAL HOTSPOT

Paula Hanna Valdujo[1,2,6], Débora Leite Silvano[3], Guarino Colli[4], and Marcio Martins[5]

[1] *Departamento de Ecologia, Universidade de São Paulo. Rua do Matão, travessa 14, CEP 05508-090, São Paulo, SP, Brasil.*
[2] *Pequi – Pesquisa e Conservação do Cerrado. SCLN 408 bl E sala 201, CEP 70856-550, Brasília, DF, Brasil.*
[3] *Laboratório de Zoologia, Universidade Católica de Brasília. Campus I – QS 07 Lote 01 EPCT, Águas Claras, CEP 71966-700, Brasília, DF, Brasil. E-mail: deborasilvano@gmail.com*
[4] *Depto. de Zoologia, Univ. de Brasília. Campus Universit. Darcy Ribeiro, CEP 70910-900, Brasília, DF, Brasil. E-mail: grcolli@unb.br*
[5] *Depto. de Ecologia, Univ. de São Paulo. Rua do Matão, travessa 14, CEP 05508-090, São Paulo, SP, Brasil. E-mail: martinsmrc@usp.br*
[6] *E-mail corresponding author: paula.valdujo@gmail.com*

Abstract. Species distribution patterns result from the combination of multiple factors acting over different spatial and temporal scales. We analyze the distribution patterns of anuran amphibians within the Cerrado domain of South America in a historical framework. First, we provide an updated list of species based on extensive research in zoological collections and fieldwork. We then explore patterns of endemism and the distribution of species occurring both in Cerrado and each of the adjoining domains, providing directions for future hypotheses tests. We found 209 anuran species occurring in localities within Cerrado. Among them, 150 are primarily associated with Cerrado, and 59 are typical of one of the Cerrado adjoining domains. Widespread species account for only 14% of the Cerrado typical species. Species occurring in Cerrado and one adjoining domain present a highly structured spatial pattern in which Amazonian species are restricted to the northwestern Cerrado, Atlantic species to the southeastern Cerrado, Caatinga species to the northeastern Cerrado, and Chaco species to the southwestern Cerrado. Cerrado endemics occur in most localities and in all regions, whereas narrow endemics (< 60,000 km^2) are restricted to mountain ranges in central, southeastern, and southwestern Cerrado. The limited distribution of species shared with one of the four adjoining domains highlights the influence of independent species pools more associated with other domains.

Keywords. Amphibians; Savanna; Endemism; Diversity.

Introduction

Studies on the geographical distribution of organisms may provide insights into the history of species assembly at the regional scale. One promising approach for defining the geographical extent of regional scale studies is the subdivision of the global terrestrial surface into ecoregions, which are defined as units containing unique assemblages of natural communities and species (Olson *et al.* 2001). However, species ranges vary significantly, even between closely related species, and are not necessarily restricted to one ecoregion or phytogeographical domain (McDonald *et al.* 2005). For instance, some species are distributed across entire continents, while others are primarily associated with a specific ecoregion but may slightly extend their range into adjoining ecoregions. At least three mechanisms are known to generate and maintain wide species ranges: i) broad ecophysiological tolerances, leading to high dispersal ability and maintenance of genetic and population flows, which prevent isolation and further speciation (Lester *et al.* 2007); ii) structurally similar habitats (*e.g.,* vegetation physiognomy) occurring in different ecoregions, leading to increased dispersal (Costa 2003); or iii) shared biogeographic history related to the occurrence of environmental refugia, due to past climatic fluctuations (Carnaval and Moritz 2008). The systematization and description of species distribution patterns in regions with high biodiversity is the first step towards understanding the relative importance of mechanisms by which these biotas are assembled.

The spread of worldwide species databases has supported regional and continental scale analysis of biodiversity (Buckley and Jetz 2007; Rahbek *et al.* 2007; Diniz-Filho *et al.* 2008) and the development of a wide range of tools to describe and analyze geographic patterns (Guo and Liu 2010; Laffan *et al.* 2010; Rangel *et al.* 2010). Therefore, in spite of some caveats and limitations, biodiversity databases assembled from natural history museum data are becoming increasingly useful (Graham *et al.* 2004). Electronic databases such as GBIF (Global Biodiversity Information Facility) and CRIA's Species Link (*Centro de Referência em Informação Ambiental,* an information system that integrates data from Brazilian biological collections) facilitate access to occurrence data. However, these databases are not error-proof, and checking the taxonomic identity of specimens and the accuracy of the spatial information through physical examination of specimens and field notes are mandatory (Graham *et al.* 2004). Continuous collecting efforts, taxonomic revisions and the discovery of new

species make the systematization of biodiversity data a highly dynamic activity, especially in the tropics, where knowledge about any taxonomic group is far from complete (Silvano and Segalla 2005). The increasing amount of information available for regional or continental scale analysis is allowing improved and better-supported conclusions over time.

Recent studies based on occurrence data of museum specimens from the Brazilian Cerrado (Diniz-Filho *et al.* 2004; Diniz-Filho *et al.* 2007; Diniz-Filho *et al.* 2008) described heterogeneity in anuran richness and endemism within the domain; with both reaching higher values in the southeastern portion. Although a sampling bias towards the southern part of the Cerrado is acknowledged (Diniz-Filho *et al.* 2005; Diniz-Filho *et al.* 2008), this bias is not the main reason for the heterogeneity in richness and endemism, since well-sampled sites located in different parts of the domain substantially differ in species composition and richness and confirm this trend (Eterovick and Sazima 2000; Brasileiro *et al.* 2005; Vaz-Silva *et al.* 2007; Brasileiro *et al.* 2008; Valdujo *et al.* 2009). Apart from the spatial ecological and environmental heterogeneity of the Cerrado (Silva *et al.* 2006), differences in species composition may also be favored by contacts with four major South American phytogeographic domains: Amazonia, Atlantic Forest, Caatinga and Chaco (Joly *et al.* 1999).

Based on an extensive database, herein we describe the geographic distribution patterns of anurans within Cerrado, regarding both endemism and faunal interchange with neighbor phytogeographic domains. We present an updated list of species occurring in Cerrado, identifying those that are typical of Cerrado and those that are typical from adjoining domains and occur marginally in Cerrado. We explore patterns of species composition and distribution from a historical perspective and provide directions for testing more specific hypotheses about historical and contemporary factors influencing species composition and distribution in Cerrado.

Methods

Study Area

We delimited the Cerrado extent following Brazil's official vegetation classification (Veloso *et al.* 1991). We included savanna vegetation as well as transition zones with other vegetation types. The resulting map widely corresponds to the Cerrado Ecoregion of Olson *et al.* (2001) and it is slightly different from the Cerrado biome (*sensu* the *Instituto Brasileiro de Geografia e Estatística*), since it does not include the northernmost region of the biome, which is actually covered by other vegetation types than savanna. We did not include savanna enclaves outside the core area of the Cerrado because we believe their biogeographic history is more complex and unique due to their isolation.

Data Collection

We assembled a database of anuran distribution in Brazilian Cerrado from museum specimen surveys, taxonomic literature records, and field surveys. Museum surveys consisted of two steps: first, we assessed collection records either from books or electronic databases, when available. We compiled field data referring to any species collected in a Cerrado locality, as well as any Cerrado typical species occurring either inside or outside this domain. We defined as "typical" Cerrado species those that occur in at least 30% of the Cerrado range or with at least 30% of their ranges within Cerrado. Next, we physically examined each specimen and made comparisons with type specimens, whenever possible, and with the taxonomic literature to check species identities. To allow comparisons of specimens housed in different museums, we photographed some individuals, especially type-specimens or topotypes. Since collections tend to organize specimens taxonomically, we could make sure that all available specimens from each species considered *a priori* as "Cerrado typical" were examined. This double-checking procedure enabled us to improve the inference of endemism. We included all records gathered from the taxonomic literature in the database, irrespective of the examination of specimens, since specimens referred in these papers had their identities determined by specialists. Amphibian taxonomy follows Frost (2011).

We examined 31,024 specimens collected in Cerrado localities and deposited in the following collections: Museu de Zoologia da Universidade de São Paulo (MZUSP), Museu Nacional do Rio de Janeiro (MNRJ), Coleção Herpetológica da Universidade de Brasília (CHUNB), Coleção Zoológica da Universidade Federal de Goiás (ZUFG), Museu Paraense Emílio Goeldi (MPEG), Coleção Zoológica da Universidade Federal do Mato Grosso (ZUFMT), Coleção Zoológica da Universidade Federal do Mato Grosso do Sul (ZUFMS), Museu de Zoologia

Adão Cardoso – Universidade Estadual de Campinas (ZUEC), Coleção Célio Haddad – Universidade Estadual Paulista, Campus Rio Claro (CFBH), Coleção Herpetológica do Museu de Ciências Naturais da PUC-Minas (MCN), Coleção do Departamento de Zoologia e Botânica (DZSJRP) housed at UNESP, São José do Rio Preto.

To fill in some gaps in Cerrado anuran surveys, from 2007 to 2009 we performed 101 days of fieldwork at 11 Cerrado localities in the states of Mato Grosso, Paraná, Bahia, Tocantins, and Maranhão. We sampled anurans mostly by active search (Crump and Scott Jr. 1994) and registered any species found visually or by their calls. Since we aimed simply to find as many species as possible, we conducted all surveys during the rainy season, when most species are active and breeding, sampling all different landscapes we could detect. We deposited voucher specimens in MZUSP, CHUNB and CFBH.

We produced point distribution maps based on anuran species occurrence within Cerrado. Since we present only a broad description of distribution patterns, all locations are represented by municipality centroids, irrespective of the exact location where specimens were collected. A number of examined specimens could not be assigned to any described species, but due to taxonomic problems involving many Neotropical anuran taxa, we adopted a more conservative criterion and did not list them as multiple undescribed taxa. We did not map species of *Pseudopaludicola* and the *marmoratus* group of genus *Leptodactylus,* except for *L. martinezi,* due to taxonomic problems that would bias the results. We then classified all listed species into one of the following categories: (1) endemic to Cerrado: any species restricted to Cerrado (including narrow endemics or at least highly associated to the delimited area that marginally occurs in any other domain; (2) widespread: generalist species that consistently occur in more than two domains, including both open and forest domains; (3) Chaco-Cerrado: species that occur in both Chaco and Cerrado domains; (4) Caatinga-Cerrado: species that occur in both Caatinga and Cerrado domains; (5) diagonal belt of open domains: species that occur in Caatinga, Cerrado, and Chaco domains; (6) Amazonia-Cerrado: species that occur in both Amazonia and Cerrado domains; (7) Atlantic Forest-Cerrado: species that occur in both Atlantic Forest and Cerrado domains; and (8) Southern Brazil-Cerrado: species that occur in both the southern Atlantic Forest (including Araucaria forest) and Cerrado domains. Furthermore, we classified species as either typical or marginal, representing respectively species that consistently occur in Cerrado (see above) or species primarily associated with other domains and known only from ecotonal zones within Cerrado. According to our definition, all endemic and widespread species are typical, whereas species in the other six categories are typical only if more than 30% of their distributions are located within Cerrado.

Table 1. Number of anuran species typical and marginal to Cerrado, according to the phytogeographical domains where they occur.

Distribution pattern	Typical	Marginal	Pooled
Endemic	108	—	108
Widespread	21	1	22
Chaco/Cerrado	3	7	10
Caatinga/Cerrado	3	6	9
Diagonal belt of open domains	5	0	5
Amazonia/Cerrado	5	9	14
Atlantic Forest/Cerrado	3	30	33
Southern Brazil/Cerrado	2	6	8
Total	150	59	209

Results

We recorded 209 species sampled from at least one locality within Cerrado (Appendix I), including 150 typical species and 59 marginal species. One hundred and eight species are endemic (51.7%). Seven out of the 150 typical species are undescribed but easily diagnosable taxa found either in surveyed collections or during fieldwork.

A high proportion of the listed species is restricted or strongly associated with Cerrado, while a smaller proportion is widespread. Endemic species accounted for 72.0% of the species primarily associated with Cerrado (typical). Only 14.0% of typical and 10.5% of all species are widespread. Most species that occur both in Cerrado and in one adjoining domain have marginal distributions in Cerrado, especially those occurring in Atlantic Forest (Table 1).

Distributions of species occurring in Cerrado and one adjoining domain (including typical and marginal species) are strongly structured. Species occurring in Cerrado and Amazonia are concentrated in the western and northern Cerrado (Fig. 1A), whereas species occurring in Atlantic Forest and Cerrado are concentrated in the southern and eastern Cerrado (Fig. 1B). Caatinga and Chaco species show a strongly non-overlapping distribution within Cerrado, occurring on the northeastern and southwestern portions,

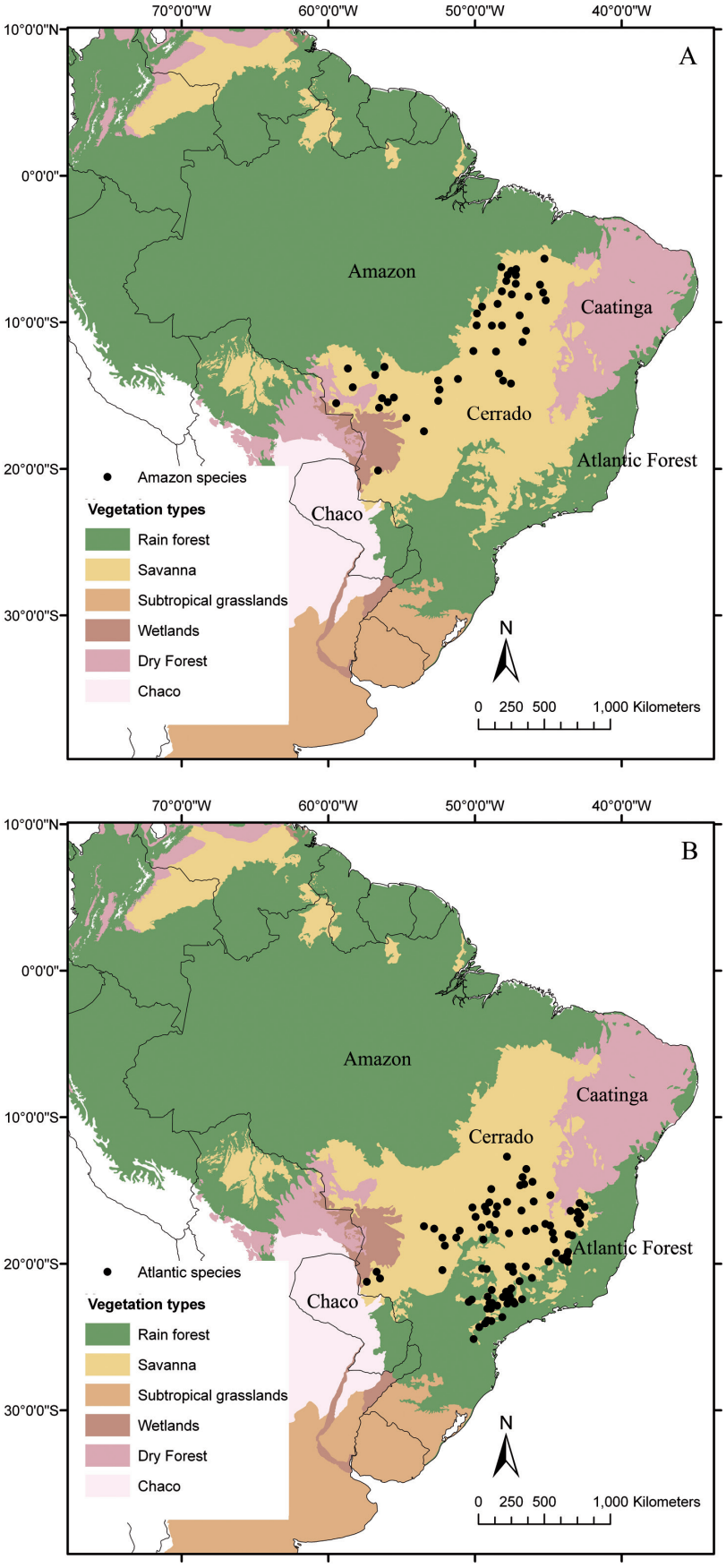

Figure 1. Distribution of anuran species within Cerrado. A = Species occurring in Amazonia and Cerrado. B = Species occurring in Atlantic Forest and Cerrado. Colors on map represent main vegetation types in South America (modified from Olson *et al.* 2001).

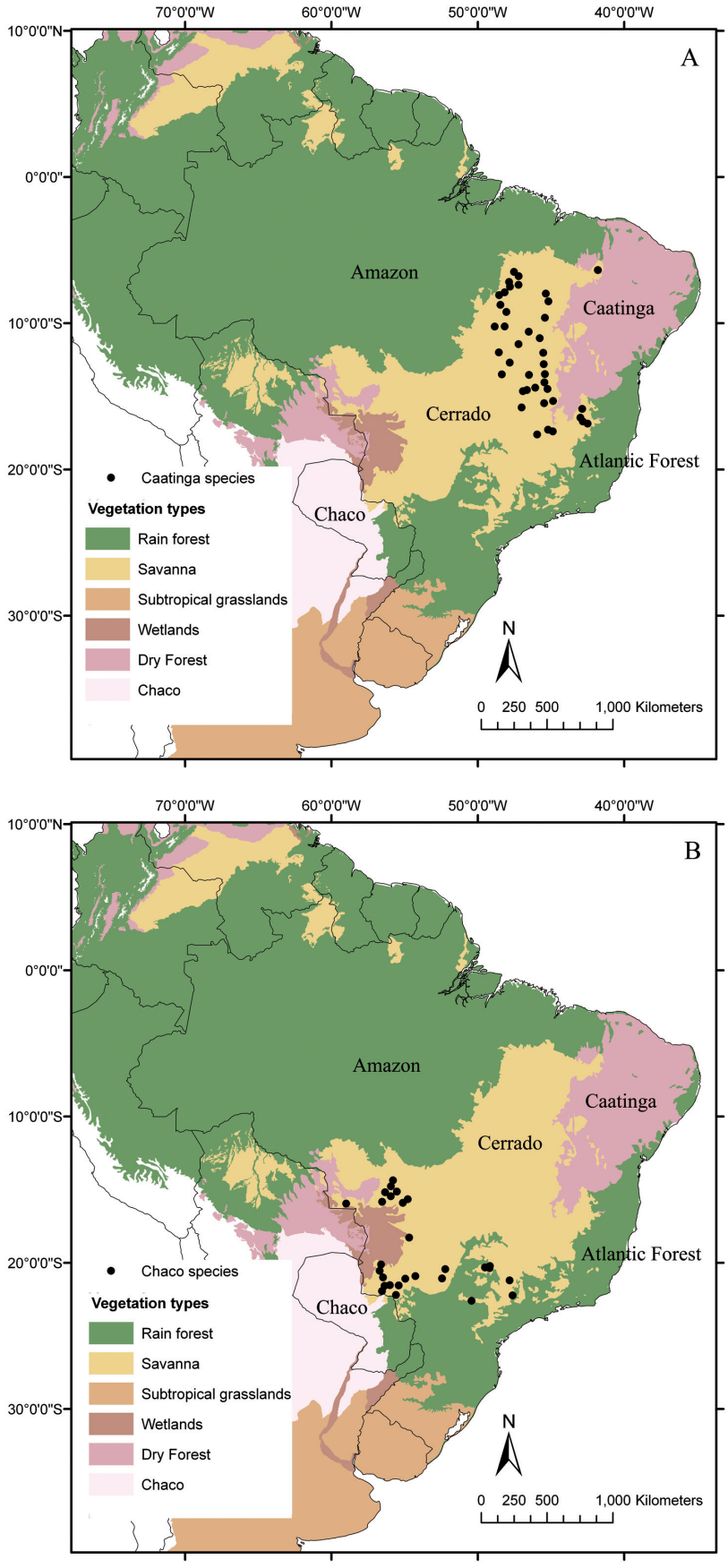

FIGURE 2. Distribution of anuran species within Cerrado. A = Species occurring in Caatinga and Cerrado. B = Species occurring in Chaco and Cerrado. Colors on map represent main vegetation types in South America (modified from Olson *et al.* 2001).

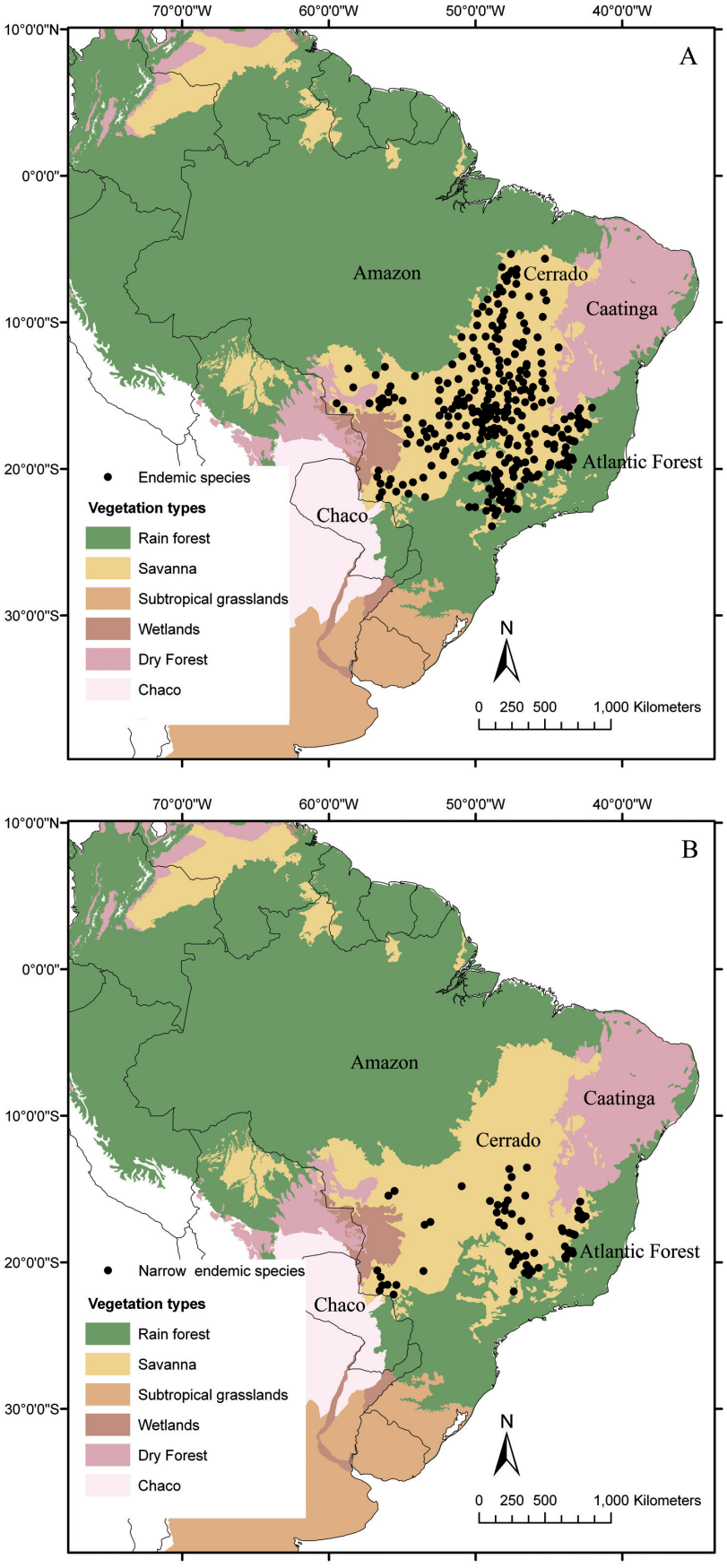

Figure 3. A = Distribution of anuran species endemic to Cerrado. B = Narrow endemics within Cerrado. Colors on map represent main vegetation types in South America (modified from Olson *et al.* 2011).

respectively (Figs. 2A and 2B). Although the pooled set of endemic species is distributed throughout the entire domain (Fig. 3A), narrow endemics (range size up to 60,000 km^2) are restricted to certain areas: Espinhaço mountain range, Canastra mountain range, Central plateau, upper Araguaia river basin, Guimarães mountain range and Bodoquena mountain range (Fig. 3B).

Discussion

The distribution patterns here described suggest that many Cerrado anurans have overlapping biogeographic histories. Although testing biogeographic hypotheses is beyond the scope of this paper, our results reveal some interesting patterns that are worth future testing within a phylogenetic framework. Cerrado species shared with adjoining domains have a remarkable distribution pattern, being restricted to regions adjacent to their typical domains. The limited distribution of these species, shared with one of the four adjoining domains, highlights the influence of independent species pools more associated with other domains. This pattern is similar to that described for forest birds in Cerrado (Silva 1996). Anuran species occurring both in Cerrado and Atlantic Forest do not co-occur with species occurring both in Cerrado and Amazonia. Similarly, anuran species occurring both in Cerrado and Chaco do not co-occur with species occurring both in Cerrado and Caatinga, although some other species are distributed throughout the diagonal belt of open formations in South America. Narrow endemics also have a structured distribution, which is not as evident when all endemics are pooled together. These geographic restrictions represent a remarkable historical component that contributes to species turnover among Cerrado localities and seems to be influenced by the low dispersal ability and high ecophysiological constraints of anurans (Hillman *et al.* 2009).

The geographic patterns here described are recurrent for species belonging to many unrelated lineages. For instance, the distributions of *Chiasmocleis albopunctata* (Microhylidae) and *Eupemphix nattereri* (Leiuperidae) are strongly associated with the limits of the Cerrado. Another pattern is represented by the Amazonian *Rhaebo guttatus* (Bufonidae) and *Osteocephalus taurinus* (Hylidae), which have partially coincident ranges in northeastern Cerrado. A third pattern is represented by the Atlantic Forest *Rhinella ornata* (Bufonidae) and *Hypsiboas albomarginatus* (Hylidae), which are restricted to the southeastern portion of Cerrado. Most species occurring in two domains, especially those shared between Atlantic Forest and Cerrado, are restricted to transition areas in Cerrado. The only Atlantic Forest species that occurs deep within Cerrado is *Aplastodiscus perviridis,* which seemingly has a disjunct distribution. *Pseudis bolbodactyla* has a unique distribution, with most of its range located within Cerrado, but also occurring deep within Atlantic Forest (Garda and Cannatella 2007).

Database Improvements

Our results differ both in terms of species composition and rate of endemism from previous assessments of Cerrado anurans (Colli *et al.* 2002; Diniz-Filho *et al.* 2004; Bastos 2007). The use of an extensive database, based on examined specimens, allowed us to access more detailed information and cover a greater part of Cerrado than previous studies. We found no evidence for the occurrence of 18 species listed in at least one of the previous studies. These differences are due to some species being currently under different names, under synonymy, or restricted to Pantanal, Atlantic Forest or Amazon. We added 75 described species not cited by any of the former lists, including recent descriptions and recent records in Cerrado. These differences result from recent collecting efforts in Cerrado and the inclusion in our database of specimens obtained from 11 zoological collections, which cover different parts of the domain.

We strongly believe that the total number of species we report does not reflect the actual richness of Cerrado anurans. The recent description of new species in Cerrado partially corroborates the pattern of new species being small-bodied, range-restricted, and distributed in northern Cerrado predicted by Diniz-Filho *et al.* (2005). Although species from southern and southeastern Cerrado are still being described (*e.g.,* Caramaschi *et al.* 2010; Toledo 2010), most recently described species are small bodied and range-restricted (*e.g.,* Pugliese *et al.* 2009; Cardoso and Pombal-Jr 2010; Nunes *et al.* 2010). Furthermore, apart from species recently discovered in the field, recent taxonomical revisions have revealed new species in northern Cerrado (Caramaschi 2010). Although we far surpassed the regional species richness of 160 species predicted by Diniz-Filho *et al.* (2005), we believe that the number of recognized species will increase even more in the next few years, given the high number of undescribed species that we found in collections and during fieldwork.

Centers of Endemism

The geographic ranges of endemic species vary greatly in size and location. Some species are widely distributed within the domain and also occur in transition areas in adjoining domains (*e.g., Eupemphix nattereri* and *Chiasmocleis albopunctata*), others are restricted to a river basin but are still widely distributed (*e.g., Dendropsophus anataliasiasi* and *Pseudis tocantins* in Araguaia/Tocantins river basins), and still others are restricted to a specific region (*e.g., Rhinella veredas* in the western plateau of Bahia) or to a very specific location (*e.g., Physalaemus deimaticus* and *Hylodes otavioi* in Serra do Cipó). With a few exceptions of very poorly known species, restricted range species are primarily distributed in mountainous regions. Several species were described from and are restricted to Serra do Cipó (*e.g., Bokermannohyla saxicola* and *Hypsiboas cipoensis*), Serra do Cabral (*e.g., Scinax cabralensis*), Serra da Canastra (*e.g., Bokermannohyla ibitiguara* and *Scinax maracaya*), Chapada dos Veadeiros (*e.g., Hypsiboas ericae* and *Leptodactylus tapiti*), and Chapada dos Guimarães (*e.g., Phyllomedusa centralis, Pristimantis crepitans*).

Twenty-one species are endemic to the Espinhaço mountain range, a transition zone between Cerrado and Atlantic Forest. Among them, 11 occur only on the Espinhaço western slope and summit. These regions are covered by Cerrado vegetation and by open montane vegetation, respectively; the latter vegetation type is known as "campo rupestre" and "campo de altitude" and is associated with rock outcrops and sandy soil (Safford 1999). Eight other species also occur in a few localities on the eastern slope, which is covered by Atlantic Forest. The Espinhaço range is recognized as an area of endemism for plants (Giulietti and Pirani 1988; Safford 1999; Calió *et al.* 2008), birds (Silva and Bates 2002), and, more recently, amphibians (Leite *et al.* 2008). Our results are consistent with Heyer's (1999) statement that many Cerrado endemics, or species shared with highlands on the eastern slopes of the Espinhaço range, where enclaves of open vegetation within Atlantic Forest can be found, are related to Atlantic Forest lineages.

Phylogenetic Relationships

Phylogenetic relationships among Cerrado species are still poorly known, since most were not included in recent comprehensive phylogenies (Faivovich *et al.* 2005; Frost *et al.* 2006; Grant *et al.* 2006; Heinicke *et al.* 2007). A notable exception is the recently published phylogeny of Phyllomedusidae (Faivovich *et al.* 2010), which reveals some interesting distribution patterns, described below. Some Cerrado endemics are more closely related to taxa distributed in other domains, such as Amazonia, Atlantic Forest, and Andes.

Seven species either belong to Atlantic Forest clades or have their sister-group in Atlantic Forest: *Pseudis tocantins* vs. *P. fusca* (Garda and Cannatella 2007), *Proceratophrys cururu* vs. *P. renalis* (Amaro *et al.* 2009), *Phyllomedusa megacephala* vs. *P. rhodei* (Faivovich *et al.* 2010), and *Phasmahyla jandaia* vs. all other Atlantic Forest endemic *Phasmahyla.* Moreover, *Ischnocnema penaxavantinho* belongs to the *I. verrucosa* series (Giaretta *et al.* 2007), *Physalaemus deimaticus* belongs to the Atlantic Forest *P. deimaticus* group (Nascimento *et al.* 2005), and *Thoropa megatympanum* belongs to an Atlantic genus. Cerrado endemics belonging to Amazonian and/or Andean clades include four species: *Scinax constrictus,* from the Amazonian *S. rostratus* group (Faivovich *et al.* 2005); *Barycholus ternetzi,* the sister-species of the *trans*-Andean *B. pulcher* (Hedges *et al.* 2008); and *Oreobates heterodactylus* and *O. remotus,* from a mostly Amazonian/Andean clade (Padial *et al.* 2008; Teixeira *et al.* 2012).

Some Cerrado endemics seem to be a product of *in situ* diversification. Some small clades are entirely composed of Cerrado endemics, such as the four species in the *Ameerega flavopicta* clade (Grant *et al.* 2006; Vaz-Silva and Maciel 2011), the four species in the *Bokermannohyla pseudopseudis* clade (Faivovich *et al.* 2005), and the four species in the *Phylomedusa ayeaye* clade (Faivovich *et al.* 2010). What is especially interesting about these clades is that they are partially sympatric and restricted to areas with steep relief and high altitudes. This pattern highlights the importance of mountain ranges to *in situ* diversification of Cerrado anurans. With the exception of *A. flavopicta,* all species have restricted ranges and are found on one mountaintop or mountain range. It is possible that future taxonomic and phylogenetic studies will reveal similar patterns in other clades, since many other species with restricted ranges were not included in the available phylogenic studies.

Future Directions

This paper is a first attempt to describe the distribution patterns of Cerrado anurans. This system shows great potential for testing ecological and historical

biogeographic hypotheses (*e.g.,* Werneck 2011, Werneck *et al.* 2011, 2012), due to its high richness and endemism and the occurrence of assemblages with representatives from different lineages, probably originating either in open domains or in adjoining forests domains. Apart from the historical component, represented by multiple species pools and geographic barriers, we expect that climatic and elevation gradients, microhabitat availability, and species interactions should also be important factors determining species distributions and assemblage composition in Cerrado. Testing these relationships may be a promising avenue towards understanding factors that drive faunal assembly at the local and regional scales.

Resumo

Os padrões de distribuição das espécies resultam da ação combinada de diversos fatores que agem em diferentes escalas espaciais e temporais. Nós analisamos os padrões de distribuição de anfíbios anuros do Cerrado sob uma perspectiva histórica. Inicialmente, nós fornecemos uma lista atualizada de espécies, baseada em uma busca extensiva em coleções zoológica e em campo. A partir desses resultados, nós exploramos padrões de endemismo e distribuição das espécies que ocorrem no Cerrado e em cada um dos domínios vizinhos, fornecendo subsídios para a elaboração de hipóteses a serem testadas futuramente. Encontramos 209 espécies de anuros que ocorrem em localidades do Cerrado. Destas, 150 possuem distribuição fortemente associada ao Cerrado (espécies típicas), enquanto que outras 59 são típicas de um dos domínios vizinhos e ocorrem apenas marginalmente no Cerrado. Espécies amplamente distribuídas perfazem 14% das espécies típicas do Cerrado. Espécies que ocorrem no Cerrado e em mais um domínio apresentam distribuição espacial bastante estruturada, com espécies amazônicas restritas à porção noroeste do Cerrado, espécies da Mata Atlântica restritas à porção sudeste do Cerrado, espécies da Caatinga restritas à porção nordeste do Cerrado e espécies do Chaco restritas à porção sudoeste. Espécies endêmicas do Cerrado foram encontradas em praticamente todas as localidades e em todas as regiões, enquanto aquelas de endemismo restrito (< 60.000 km^2) foram registradas apenas nas montanhas da porção central, sudeste e sudoeste do Cerrado. A distribuição limitada das espécies compartilhadas com um dos quatro domínios vizinhos destaca a influência de diferentes *pools* de espécies, mais associados com outros domínios.

Acknowledgements

We thank Renato Recoder, Mauro Teixeira Junior, Mariana Mira Vasconcelos, Renan Janke Bosque, Agustin Camacho, Carlos Cândido, Gabriel Costa, Mara Silva, Cristiano Nogueira, Alexandre Portella and Edson Cardoso for their help in fieldwork. Hussam Zaher (MZUSP), Marcos Carvalho (ZUFMT), Rogério Bastos (ZUFG), Felipe Toledo (ZUEC), Célio Haddad (CFBH), Luciana Nascimento (MCN PUC-MG), Denise Rossa-Feres (DZSJRP), Franco Leandro de Souza (UFMS), José P. Pombal Junior (MNRJ), Ulisses Caramaschi (MNRJ) and Ulisses Galatti (MPEG) gently allowed us to examine museum specimens under their care. Mariana Gomes helped organizing the database. We also thank Cristiano Nogueira, Jessie Knowlton, Marilia Gaiarsa, Gabriel Costa, Paulo Inácio Prado, Célio Haddad, Cynthia Prado, Ricardo Sawaya and two anonymous reviewers for revising the manuscript. This study was funded FAPESP (fellowship 2007/51956-6 and grant 06/58011-4), CAPES, CNPq, FAP-DF, Conservation International (CP-FY 08/017 and CP-FY 08/018), Neotropical Grassland Conservancy, and Fundação O Boticario de Proteção à Natureza (0747_20071 and 0798_20082). Pequi – Pesquisa e Conservação do Cerrado provided logistical and institutional support for this project.

References

Amaro, R. C., D. Pavan, and M. T. Rodrigues. 2009. On the generic identity of *Odontophrynus moratoi* Jim & Caramaschi, 1980 (Anura, Cycloramphidae). *Zootaxa,* 2071:61-68.

Bastos, R. P. 2007. Anfíbios do Cerrado. Herpetologia no Brasil II. *In:* L. B. Nascimento and M. E. O. Oliveira. Belo Horizonte, Sociedade Brasileira de Herpetologia: 87-100.

Brasileiro, C. A., E. M. Lucas, H. M. Oyamaguchi, M. T. C. Thomé, and M. Dixo. 2008. Anurans, northern Tocantins River Basin, states of Tocantins and Maranhão, Brazil. *Check List,* 4:185-197.

Brasileiro, C. A., R. J. Sawaya, M. C. Kiefer, and M. Martins. 2005. Amphibians of an open Cerrado fragment in southeastern Brazil. *Biota Neotropica,* 5:93-109.

Buckley, L. B. and W. Jetz. 2007. Environmental and historical constraints on global patterns of amphibian richness. *Proceedings of the Royal Society B: Biological Sciences,* 274:1167-1173.

Calió, M. F., J. R. Pirani, and L. Struwe. 2008. Morphology-based phylogeny and revision of *Prepusa* and *Senaea* (Gentianaceae: Helieae) — rare endemics from eastern Brazil. *Kew Bulletin,* 63:169-191.

Caramaschi, U. 2010. Notes on the taxonomic status of *Elachistocleis ovalis* (Schneider, 1799) and description of five new species of *Elachistocleis* Parker, 1927 (Amphibia, Anura, Microhylidae). *Boletim do Museu Nacional,* 1-32.

Caramaschi, U., C. A. G. Cruz, and M. V. Segalla. 2010. A new species of *Hypsiboas* of the *H. polytaenius* clade from the state of Paraná, Southern Brazil (Anura: Hylidae). *South American Journal of Herpetology,* 5:169-174.

Cardoso, M. W. and J. P. P. Pombal-Jr. 2010. A new species of small *Scinax* Wagler, 1830 (Amphibia, Anura, Hylidae) of the *Scinax ruber* clade from Cerrado of central Brazil. *Amphibia-Reptilia,* 31:411-418.

Carnaval, A. C. and C. Moritz. 2008. Historical climate modelling predicts patterns of current biodiversity in the Brazilian Atlantic forest. *Journal of Biogeography,* 35:1187-1201.

Colli, G. R., R. P. Bastos, and A. A. Araujo. 2002. The Character and Dynamics of the Cerrado Herpetofauna. The Cerrados of Brazil: ecology and natural history of a neotropical savanna. *In:* P. S. Oliveira and R. J. Marquis. New York, Columbia University Press: 223-239.

Costa, L. P. 2003. The historical bridge between the Amazon and the Atlantic Forest of Brazil: a study of molecular phylogeography with small mammals. *Journal of Biogeography,* 30:71-86.

Crump, M. L. and N. J. Scott Jr. 1994. Visual Encounter Surveys. Measuring and Monitoring Biodiversity: Standard Methods for Amphibians. *In:* W. R. Heyer, M. A. Donnelly, R. W. McDiarmid, L.-A. C. Hayek and M. S. Foster. Washington, Smithsonian Institution Press.

Diniz-Filho, J. A. F., L. M. Bini, C. M. Vieira, D. Blamires, L. Terribile, R. Bastos, G. de Oliveira, and B. Barreto. 2008. Spatial patterns of terrestrial vertebrate species richness in the Brazilian Cerrado. *Zoological Studies,* 47:146-157.

Diniz-Filho, J. A. F., L. M. Bini, C. M. Vieira, M. C. Souza, R. P. Bastos, D. Brandão, and L. G. Oliveira. 2004. Spatial patterns in species richness and priority areas for conservation of anurans in the Cerrado region, Central Brazil. *Amphibia-Reptilia,* 25:63-75.

Diniz-Filho, J. A. F., L. M. Bini, M. P. Pinto, T. F. L. V. B. Rangel, P. Carvalho, S. L. Vieira, and R. P. Bastos. 2007. Conservation biogeography of anurans in Brazilian Cerrado. *Biodiversity and Conservation,* 16:997-1008.

Diniz□Filho, J. A. F., R. P. Bastos, T. F. L. V. B. Rangel, L. M. Bini, P. Carvalho, and R. J. Silva. 2005. Macroecological correlates and spatial patterns of anuran description dates in the Brazilian Cerrado. *Global Ecology and Biogeography,* 14:469-477.

Eterovick, P. C. and I. Sazima. 2000. Structure of an anuran community in a montane meadow in southeastern Brazil: effects of seasonality, habitat, and predation. *Amphibia-Reptilia,* 21:439-461.

Faivovich, J., C. F. B. Haddad, D. Baêta, K.-H. Jungfer, G. F. R. Álvares, R. A. Brandão, C. Sheil, L. S. Barrientos, C. L. Barrio□Amorós, C. A. G. Cruz, and W. C. Wheeler. 2010. The phylogenetic relationships of the charismatic poster frogs, Phyllomedusinae (Anura, Hylidae). *Cladistics,* 26:227-261.

Faivovich, J., C. F. B. Haddad, P. C. A. Garcia, D. R. Frost, J. A. Campbell, and W. C. Wheeler. 2005. Systematic review of the frog family Hylidae, with special reference to Hylinae: phylogenetic analysis and taxonomic revision. *Bulletin of the American Museum of Natural History,* 294:1-240.

Frost, D. R. 2011. Amphibian Species of the World: an online reference. Version 5.5 (31 January, 2011). Electronic Database accessible at http://research.amnh.org/vz/herpetology/amphibia. *American Museum of Natural History,* New York, USA

Frost, D. R., T. Grant, J. Faivovich, R. H. Bain, A. Haas, C. F. B. Haddad, R. O. de Sa, A. Channing, M. Wilkinson, S. C. Donnellan, C. J. Raxworthy, J. A. Campbell, B. L. Blotto, P. Moler, R. C. Drewes, R. A. Nussbaum, J. D. Lynch, D. M. Green, and W. C. Wheeler. 2006. The amphibian tree of life. *Bulletin of the American Museum of Natural History,* 1-370.

Garda, A. A. and D. C. Cannatella. 2007. Phylogeny and biogeography of paradoxical frogs (Anura, Hylidae, Pseudae) inferred from 12S and 16S mitochondrial DNA. *Molecular Phylogenetics and Evolution,* 44:104-114.

Giaretta, A. A., D. Toffoli, and L. E. Oliveira. 2007. A new species of *Ischnocnema* (Anura: Eleutherodactylinae) from open areas of the Cerrado Biome in southeastern Brazil. *Zootaxa,* 1666:43-51.

Giulietti, A. M. and J. R. Pirani. 1988. Patterns of geographic distribution of some plant species from the Espinhaço range, Minas Gerais and Bahia, Brazil. Workshop on Neotropical Distribution Patterns Rio de Janeiro, Academia Brasileira de Ciências.

Graham, C. H., S. Ferrier, F. Huettman, C. Moritz, and A. Peterson. 2004. New developments in museum-based informatics and applications in biodiversity analysis. *Trends in Ecology & Evolution,* 19:497-503.

Grant, T., D. R. Frost, J. P. Caldwell, R. Gagliardo, C. F. B. Haddad, P. J. R. Koko, D. B. Means, B. P. Noonan, W. E. Schargel, and W. C. Wheeler. 2006. Phylogenetic systematics of dart-poison frogs and their relatives (Amphibia: Athesphatanura: Dendrobatidae). *Bulletin of the American Museum of Natural History,* 299:1-262.

Guo, Q. and Y. Liu. 2010. ModEco: an integrated software package for ecological niche modeling. *Ecography,* 33:1-6.

Hedges, S. B., W. E. Duellman, and M. P. Heinicke. 2008. New World direct-developing frogs (Anura: Terrarana): Molecular phylogeny, classification, biogeography, and conservation. *Zootaxa,* 1-182.

Heinicke, M. P., W. E. Duellman, and S. B. Hedges. 2007. Major Caribbean and Central American frog faunas originated by ancient oceanic dispersal. *Proceedings of the National Academy of Sciences of the United States of America,* 104:10092-10097.

Heyer, W. R. 1999. A new genus and species of frog from Bahia, Brazil (Amphibia: Anura: Leptodactylidae) with comments on the zoogeography of brazilian campos rupestres. *Proceedings of the Biological Society of Washington,* 112:19-39.

Hillman, S. S., P. C. Withers, R. C. Drewes, and S. D. Hillyard. 2009. Ecological and Environmental Physiology of Amphibians. New York, Oxford University Press Inc.

Joly, C. A., M. P. M. Aidar, C. A. Klink, D. G. McGrath, A. G. Moreira, P. Moutinho, D. C. Nepstad, A. A. Oliveira, A. Pott, M. J. N. Rodal, and E. V. S. B. Sampaio. 1999. Evolution of the Brazilian phytogeography classification systems: implications for biodiversity conservation. *Ciência e Cultura,* 51:331-348.

Laffan, S. W., E. Lubarsky, and D. F. Rosauer. 2010. Biodiverse, a tool for the spatial analysis of biological and related diversity. *Ecography,* 643-647.

Leite, F. S. F., F. A. Juncá, and P. C. Eterovick. 2008. Status do conhecimento, endemismo e conservação de anfíbios anuros da Cadeia do Espinhaço, Brasil. *Megadiversidade,* 4:182-200.

Lester, S. E., B. I. Ruttenberg, S. D. Gaines, and B. P. Kinlan. 2007. The relationship between dispersal ability and geographic range size. *Ecology Letters,* 10:745-758.

McDonald, R., M. McKnight, D. Weiss, E. Selig, M. O'Connor, C. Violin, and A. Moody. 2005. Species compositional similarity and ecoregions: Do ecoregion boundaries represent zones of high species turnover? *Biological Conservation,* 126:24-40.

Nascimento, L. B., U. Caramaschi, and C. A. G. Cruz. 2005. Taxonomic review of the species groups of the genus Physalaemus Fitzinger, 1826 with revalidation of the genera Engystomops Jiménez-de-la-Espada, 1872 and Eupemphix Steindachner, 1863 (Amphibia, Anura, Leptodactylidae). *Arquivos do Museu Nacional,* 63:297-320.

Nunes, I. R. R. Carvalho-Jr. and E. G. Pereira. 2010. A new species of *Scinax* Wagler (Anura: Hylidae) from Cerrado of Brazil. *Zootaxa,* 2514:24-34.

Olson, D. M., E. Dinerstein, E. D. Wikramanayake, N. D. Burgess, G. V. N. Powell, E. C. Underwood, J. A. D'Amico, I. Itoua, H. E. Strand, J. C. Morrison, C. J. Loucks, T. F. Allnut, T. H.

Ricketts, Y. Kura, J. F. Lamoreux, W. W. Wettengel, P. Hedao, and K. R. Kassem. 2001. Terrestrial ecoregions of the world: a new map of life on earth. *Bioscience,* 51:933-938.

Padial, J. M., J. C. Chaparro, and I. de-la-Riva. 2008. Systematics of *Oreobates* and the *Eleutherodactylus discoidalis* species group (Amphibia, Anura), based on two mitochondrial DNA genes and external morphology. *Zoological Journal of the Linnean Society,* 152:737-773.

Pugliese, A., D. Baêta, and J. P. Pombal-Jr. 2009. A new species of *Scinax* (Anura: Hylidae) from rocky montane fields in southeastern and central Brazil. *Zootaxa,* 2269:53-64.

Rahbek, C., N. J. Gotelli, R. K. Colwell, G. L. Entsminger, T. F. L. V. B. Rangel, and G. R. Graves. 2007. Predicting continental-scale patterns of bird species richness with spatially explicit models. *Proceedings of the Royal Society B: Biological Sciences,* 274:165-174.

Rangel, T. F. L. V. B., J. A. F. Diniz-Filho, and L. M. Bini. 2010. SAM: a comprehensive application for spatial analysis in macroecology. *Ecography,* 33:46-50.

Safford, H. F. 1999. Brazilian Paramos I. An introduction to the physical environment and vegetation of the campos de altitude. *Journal of Biogeography,* 26:693-712.

Silva, J. F., M. R. Fariñas, J. M. Felfili, and C. A. Klink. 2006. Spatial heterogeneity, land use and conservation in the cerrado region of Brazil. *Journal of Biogeography,* 33:536-548.

Silva, J. M. C. 1996. Distribution of Amazonian and Atlantic Forest Birds in Gallery Forests of the Cerrado Region, South America. *Ornitologia Neotropical,* 7:1-18.

Silva, J. M. C. and J. M. Bates. 2002. Biogeographic patterns and conservation in the South American Cerrado: a tropical savanna hotspot. *Bioscience,* 52:225-234.

Silvano, D. L. and M. V. Segalla. 2005. Conservation of Brazilian amphibians. *Conservation Biology,* 19:653-658.

Teixeira, M. J., R. C. Amaro, R. S. Recoder, M. A. S. Sena, and M. T. U. Rodrigues. 2012. A relict new species of *Oreobates* (Anura, Strabomantidae) from the Seasonally Dry Tropical Forests of Minas Gerais, Brazil, and its implication to the biogeography of the genus and that of South American Dry Forests. *Zootaxa,* 3158:37-52.

Toledo, L. F. 2010. Description of a new species of *Pseudopaludicola* Miranda-Ribeiro, 1926 from the state of São Paulo, Southeastern Brazil (Anura, Leiuperidae). *Zootaxa,* 2681:47-56.

Valdujo, P. H., R. S. Recoder, M. M. Vasconcellos, and A. S. Portella. 2009. Amphibia, Anura, São Desidério, western Bahia uplands, northeastern Brazil. *Check List,* 5:903-911.

Vaz-Silva, W. and N. M. Maciel. 2011. A new cryptic species of *Ameerega* (Anura: Dendrobatidae) from Brazilian Cerrado. *Zootaxa,* 2826:57-68.

Vaz-Silva, W., A. G. Guedes, P. L. Azevedo-Silva, F. F. Gontijo, R. S. Barbosa, G. R. Aloísio, and F. C. G. Oliveira. 2007. Herpetofauna, Espora hydroelectric power plant, state of Goiás, Brazil. *Check List,* 3:338-345.

Veloso, H. P., A. L. R. Rangel-Filho, and J. C. Lima. 1991. Classificação da vegetação brasileira, adaptada a um sistema universal. Rio de Janeiro, Fundação Instituto Brasileiro de Geografia e Estatística.

Werneck, F. P. 2011. The diversification of eastern South American open vegetation biomes: historical biogeography and perspectives. *Quaternary Science Reviews,* 30:1630-1648.

Werneck, F. P., C. Nogueira, G. C. Colli, J. W. Sites, JR., and G. C. Costa. 2012. Climatic stability in the Brazilian Cerrado: implications for biogeographical connections of South American savannas, species, richness, and conservation in a biodiversity hotspot. Journal of Biogeography.

Werneck, F. P., G. C. Costa, G. R. Colli, D. E. Prado, and J. W. Sites. 2011. Revisiting the historical distribution of Seasonally Dry Tropical Forests: new insights based on palaeodistribution modelling and palynological evidence. *Global Ecology and Biogeography,* 20:272-288.

Submitted 24 May 2012
Accepted 06 August 2012

Appendix I

Anuran species distributed in Cerrado, degree of association with the domain (typical or marginal), voucher specimen or citation, and locality where voucher specimen was collected. Nomenclature follows Frost (2011). Abbreviations: Assoc = degree of association with the Cerrado, Distrib = distribution pattern, E = Cerrado endemic, O = open domains, W = widespread, T = typical, AT = species that occur both in Atlantic Forest and Cerrado, AM = species that occur both in Amazonia and Cerrado, CA = species that occur both in Caatinga and Cerrado, CH = species that occur in Chaco and/or Pantanal, and Cerrado, S = species with meridional distribution occurring in Cerrado. Asterisks indicate species not referred by previous assessments. Species marked with "n/d" are still to be deposited in a zoological collection.

Espécie	Assoc	Distrib	Voucher/citation	Locality
Aromobatidae				
*Allobates brunneus**	T	E	ANSP 11241	Chapada dos Guimarães, MT
Allobates goianus	T	E	MZUSP 73706	Alto Paraíso, GO
Allobates aff. *brunneus**	T	E	MZUSP 127129	Guaraí, TO
Brachycephalidae				
*Ischnocnema penaxavantinho**	T	E	ZUEC 13639	Uberlândia, MG
Bufonidae				
*Melanophryniscus fulvoguttatus**	T	CHA	CHUNB 43325	Bodoquena, MS
Rhaebo guttatus	T	AM	CHUNB 43645	Alto Paraíso, GO
*Rhinella azarai**	M	CHA	EI 1438	Bela Vista, MS
*Rhinella cerradensis**	T	E	CHUNB 13790	Mineiros, GO
Rhinella granulosa	M	W	MZUSP 105782	Pirapora, MG
*Rhinella icterica**	M	AT	MZUSP 28389	Botucatu, SP
*Rhinella major**	M	AM	MZUSP 128246	Cuiabá, MT
Rhinella margaritifer	T	W	CHUNB 15589	Chapada dos Guimarães, MT
*Rhinella mirandaribeiroi**	T	E	MZUSP 71308	Minaçu, GO
Rhinella ocellata	T	E	CHUNB 28128	Alcinópolis, MS
Rhinella ornata	M	AT	MZUSP 13848	Botucatu, SP
Rhinella pombali	M	AT	MNRJ 22234	Grão Mogol, MG
Rhinella rubescens	T	E	CHUNB 32249	Brasília, DF
Rhinella schneideri	T	W	CHUNB 14237	Brasília, DF
*Rhinella scitula**	T	E	MNRJ 25894	Bonito, MS
*Rhinella inopina**	T	E	CHUNB 51110	São Desidério, BA
*Rhinella veredas**	T	E	CHUNB 38652	Cocos, BA
Centrolenidae				
Vitreorana aff. *eurygnata*	M	AT	ZUEC 2242	Santana do Riacho, MG
*Vitreorana uranoscopa**	M	AT	ZUEC 3679	Botucatu, SP
Ceratophrydae				
*Ceratophrys aurita**	M	AT	CHUNB 38786	Buritizeiro, MG
Cycloramphidae				
Odontophrynus americanus	M	S	CHUNB 49294	Bonito, MS
Odontophrynus cultripes	T	E	NHMW 16522	Lagoa Santa, MG
Odontophrynus monachus	T	E	ZUEC 4440	São Roque de Minas, MG
Odontophrynus salvatori	T	E	MNRJ 15870	Alto Paraíso, GO
*Proceratophrys boiei**	M	AT	Leite et al (2009)	Cristália, MG
Proceratophrys concavitympanum	T	AM	Amaro et al (2009)	Palmas, TO
Proceratophrys cururu	T	E	ZUEC 9557	Santana do Riacho, MG
Proceratophrys goyana	T	E	MNRJ 296	Serra da Mesa, GO
Proceratophrys moratoi	T	E	CFBH 12854	Itirapina, SP
Proceratophrys strussmannae	T	E	UFMT 7874	Araputanga, MT
Proceratophrys vielliardi	T	E	ZUEC 16239	Caldas Novas, GO
Thoropa megatympanum	T	E	MZUSP 56761	Jaboticatubas, MG

Espécie	Assoc	Distrib	Voucher/citation	Locality
*Thoropa miliaris**	M	AT	Leite et al (2009)	Botumirim, MG
Dendrobatidae				
*Adelphobates galactonotus**	M	AM	MZUSP 133222	Palmas, TO
Ameerega braccata	T	E	UFMT 7700	Chapada dos Guimarães, MT
Ameerega flavopicta	T	E	CHUNB 14925	Brasília, DF
Ameerega picta	T	E	MNRJ 25471	Bonito, MS
*Ameerega berohoka**	T	E	MNRJ 67263	Arenópolis, GO
Hylidae				
*Aplastodiscus leucopygius**	M	AT	MZUSP 74436	Botucatu, SP
Aplastodiscus perviridis	T	AT	CHUNB 17012	Brasília, DF
Bokermannohyla alvarengai	T	E	MZUSP 58264	Grão Mogol, MG
Bokermannohyla ibitiguara	T	E	MZUSP 72288	Alpinópolis, MG
*Bokermannohyla izecksohni**	M	AT	MZUSP 50178	Botucatu, SP
Bokermannohyla nanuzae	T	E	MZUSP 73648	Santana do Riacho, MG
Bokermannohyla pseudopseudis	T	E	CHUNB 43650	Alto Paraíso, GO
Bokermannohyla ravida	T	E	MZUSP 68498	Presidente Olegário, MG
Bokermannohyla sagarana	T	E	UFMG 4246	Joaquim Felício, MG
Bokermannohyla saxicola	T	E	MZUSP 76925	Santana do Riacho, MG
Bokermannohyla sazimai	T	E	MNRJ 4149	São Roque de Minas, MG
Corythomantis greeningi	M	CA	CFBH 10211	Grão Mogol, MG
Dendropsophus anataliasiasi	T	E	MZUSP 73790	Brejinho de Nazaré, TO
*Dendropsophus anceps**	M	AT	CCJJ 7819	Borebi, SP
Dendropsophus araguaya	T	E	MZUSP 66796	Alto Araguaia, MT
Dendropsophus branneri	M	AT	MCN 2831	Avaré, SP
Dendropsophus cerradensis	T	E	MNRJ 17293	Ribas do Rio Pardo, MS
Dendropsophus cruzi	T	E	CFBH 2939	Silvânia, GO
Dendropsophus elianeae	T	E	MNRJ 17297	Bela Vista, MS
Dendropsophus jimi	T	E	MNRJ 21980	Botucatu, SP
*Dendropsophus leucophyllatus**	M	AM	CHUNB 14250	Palmas, TO
Dendropsophus melanargyreus	T	W	UFMT 1409	Chapada dos Guimarães, MT
*Dendropsophus microps**	M	AT	JJ 7853	Avaré, SP
Dendropsophus minutus	T	W	CHUNB 42497	Brasília, DF
Dendropsophus nanus	T	W	ZUFG 2521	Serranópolis, GO
Dendropsophus rhea	T	E	MZUSP 9104	Pirassununga, SP
Dendropsophus rubicundulus	T	E	CHUNB 52345	Lagoa Santa, MG
*Dendropsophus sanborni**	M	S	ZUEC 12040	Itirapina, SP
Dendropsophus soaresi	M	CA	CHUNB 34060	Chapada Gaúcha, MG
Dendropsophus tritaeniatus	T	E	MZUSP 73656	Cuiabá, MT
*Hypsiboas albomarginatus**	M	AT	MZUSP 3068	Pirassununga, SP
Hypsiboas albopunctatus	T	W	ZUFG 3290	Mineiros, GO
*Hypsiboas boans**	M	AM	CHUNB 11143	Palmas, TO
*Hypsiboas botumirim**	T	E	MNRJ 40886	Botumirim, MG
Hypsiboas buriti	T	E	MNRJ 23476	Buriti, MG
*Hypsiboas caingua**	M	AT	MZUSP 16149	Botucatu, SP
Hypsiboas cipoensis	T	E	MNRJ 4039	Jaboticatubas, MG
Hypsiboas crepitans	T	W	CHUNB 44561	Buritizeiro, MG
Hypsiboas ericae	T	E	MNRJ 15875	Alto Paraíso, GO
Hypsiboas faber	M	AT	ZUEC 12024	Itirapina, SP
*Hypsiboas geographicus**	T	W	CHUNB 25729	Alcinópolis, MS
Hypsiboas goianus	T	E	MNRJ 3235	São João d'Aliança, GO
Hypsiboas lundii	T	E	ZUFG 3495	Goiânia, GO
Hypsiboas multifasciatus	T	AM	MNRJ 44713	Balsas, MA
Hypsiboas phaeopleura	T	E	MNRJ 19893	Alto Paraíso, GO

Espécie	Assoc	Distrib	Voucher/citation	Locality
Hypsiboas polytaenius	M	AT	MZUSP 7832	Botucatu, SP
Hypsiboas prasinus	M	AT	CFBH 2122	Jaguaraiaíva, PR
Hypsiboas punctatus	T	W	CHUNB 25727	Alcinópolis, MS
Hypsiboas raniceps	T	W	CHUNB 43635	Brasília, DF
Hypsiboas aff. *leucocheila**	T	E	CHUNB 24006	Britânia, GO
*Hypsiboas jaguariaivensis**	T	E	MNRJ 66203	Jaguariaiva, PR
Hypsiboas stenocephalus	T	E	MNRJ 23474	Sacramento, MG
Itapotihyla langsdorffii	M	AT	ZUEC 12025	Itirapina, SP
Lysapsus caraya	T	E	CHUNB 42737	Britânia, GO
Osteocephalus taurinus	T	AM	CHUNB51740	Carolina, MA
Phasmahyla jandaia	T	E	MZUSP 74443	Santana do Riacho, MG
Phyllomedusa araguari	T	E	ZUEC 12880	Perdizes, MG
Phyllomedusa ayeaye	T	E	CFBH 15672	Pedregulho, SP
Phyllomedusa azurea	T	E	MNRJ 27839	Mambaí, GO
Phyllomedusa bahiana	M	AT	CFBH 10205	Grão Mogol, MG
Phyllomedusa burmeisteri	M	AT	MNRJ 10094	Botucatu, SP
Phyllomedusa centralis	T	E	CFBH 15794	Chapada dos Guimarães, MT
Phyllomedusa hypochondrialis	M	AM	MNRJ 43920	Goiatins, TO
Phyllomedusa megacephala	T	E	MZUSP 134313	Santana do Riacho, MG
*Phyllomedusa nordestina**	T	CA	CHUNB 38438	Flores de Goiás, GO
Phyllomedusa oreades	T	E	CFBH 15796	Pirenópolis, GO
*Phyllomedusa sauvagii**	T	CHA	CFBH 14250	Bonito, MS
Phyllomedusa distincta	M	AT	CFBH 21022	Jaguaraiaíva, PR
Pseudis bolbodactyla	T	AT	CHUNB 38380	Flores de Goiás, GO
Pseudis platensis	M	CHA	MNRJ 41616	Corumbá, MS
Pseudis tocantins	T	E	MNRJ 2481	Porto Nacional, TO
Scinax acuminatus	M	CHA	CFBH 14195	Poconé, MT
*Scinax cabralensis**	T	E	MNRJ 42883	Joaquim Felício, MG
Scinax canastrensis	T	E	MNRJ 4147	São Roque de Minas, MG
Scinax centralis	T	E	MNRJ 17465	Silvânia, GO
Scinax constrictus	T	E	MNRJ 31205	Palmeiras, GO
Scinax curicica	T	E	MNRJ 26327	Santana do Riacho, MG
Scinax fuscomarginatus	T	W	MNRJ 33061	Buritizeiro, MG
Scinax fuscovarius	T	W	MNRJ 19942	Ivolândia, GO
*Scinax hiemalis**	M	AT	CFBH 4188	Botucatu, SP
*Scinax longilineus**	M	AT	Leite et al (2009)	Brumadinho, MG
*Scinax lutzorum**	T	E	MNRJ 51438	Aragominas, TO
Scinax machadoi	T	E	CFBH 6245	Jaboticatubas, MG
Scinax maracaya	T	E	CFBH 16	Alpinópolis, MG
*Scinax nasicus**	T	O	CFBH 14246	Bonito, MS
Scinax pinima	T	E	MNRJ 4999	Jaboticatubas, MG
Scinax pusillus	T	E	MNRJ 51492	Rio Verde, GO
*Scinax rogerioi**	T	E	CHUNB 49959	Brasília, DF
*Scinax similis**	M	AT	Silva et al 2008	Icém, SP
*Scinax skaios**	T	E	MNRJ 51492	Santa Rita do Novo Destino, GO
Scinax squalirostris	T	S	ZUFG 2717	Cristalina, GO
*Scinax tigrinus**	T	E	CHUNB 13165	Brasília, DF
Scinax x-signatus	T	W	MNRJ 34620	Pirapora, MG
Scinax sp gr *catharinae**	T	E	n/d	Luziânia, GO
Scinax aff *cruentommus**	T	E	n/d	Barra do Garças, MT
*Sphaenorhynchus caramaschii**	M	AT	CCJJ 7815	Avaré, SP
*Trachycephalus atlas**	M	CA	MNRJ 1178	Barreiras, BA
*Trachycephalus mambaiensis**	T	E	MZUSP 135715	Mambai, BA

Espécie	Assoc	Distrib	Voucher/citation	Locality
Trachycephalus nigromaculatus	M	AT	MNRJ 38859	João Pinheiro, MG
Trachycephalus venulosus	T	W	ZUFG 736	Pontalina, GO
Hylodidae				
Crossodactylus bokermanni	T	E	JJ 6044	Serra do Cipó, MG
Crossodactylus cyclospinus	M	AT	MNRJ 40220	Cristália, MG
Crossodactylus sp.*	T	E	MNRJ 50796	Passos, MG
Crossodactylus trachystomus	T	E	MNRJ 38466	Santana do Riacho, MG
Hylodes otavioi	T	E	MNRJ 4163	Jaboticatubas, MG
Leiuperidae				
Eupemphix nattereri	T	E	MZUSP 95173	Cuiabá, MT
*Physalaemus albifrons**	M	CA	MNRJ 1109	Barreiras, BA
Physalaemus albonotatus	M	CHA	MNRJ 45099	Cuiabá, MT
*Physalaemus biligonigerus**	M	S		
Physalaemus centralis	T	E	CHUNB 16245	Brasília, DF
*Physalaemus cicada**	M	CA	MZUSP	Peruaçu, MG
Physalaemus cuvieri	T	W	CHUNB 44765	Brasília, DF
Physalaemus deimaticus	T	E	MZUSP 56850	Santana do Riacho, MG
Physalaemus evangelistai	T	E	MZUSP 76570	Santana do Riacho, MG
*Physalaemus gracilis**	M	S	n/d	Jaguaraiaíva, PR
Physalaemus marmoratus	T	E	CHUNB 34027	Chapada Gaúcha, MG
*Physalaemus olfersii**	M	AT	Teixeira et al 2008	Botucatu, SP
Physalaemus sp.*	T	E	n/d	Barra do Garças, MT
*Pleurodema diplolister**	T	CA	CHUNB 22061	Cocos, BA
Pleurodema alium	T	E	MCNAM 7169	Grão Mogol, MG
Pseudopaludicola boliviana	M	CHA	MZUSP 52102	Vila Bela de Santíssima Trindade, MT
Pseudopaludicola falcipes	M	S	MZUSP 27081	Planura, MG
Pseudopaludicola mineira	T	E	MZUSP 55449	Santana do Riacho, MG
Pseudopaludicola mystacalis	T	W	MZUSP 4400	Nova Xavantina, MT
Pseudopaludicola saltica	T	E	MZUSP 25350	Brasília, DF
*Pseudopaludicola serrana**	T	E	ZUEC 2323	Santana do Riacho, MG
Pseudopaludicola ternetzi	T	E	MZUSP 27022	Jataí, GO
Leptodactylidae				
Leptodactylus bokermanni	M	AT	MZUSP 6388	Botucatu, SP
Leptodactylus camaquara	T	E	MZUSP 74291	Santana do Riacho, MG
Leptodactylus chaquensis	T	CHA	UFMT 1734	Chapada dos Guimarães, MT
Leptodactylus cunicularius	T	E	CFBH 782	Santana do Riacho, MG
*Leptodactylus elenae**	M	CHA	UFMS 725	Bonito, MS
Leptodactylus furnarius	T	E	CHUNB 13743	Mineiros, GO
Leptodactylus fuscus	T	W	CHUNB 44244	Buritizeiro, MG
Leptodactylus hylaedactylus	T	AM	CFBH 11405	Babaçulândia
Leptodactylus labyrinthicus	T	W	CHUNB 38761	São João d'Aliança, GO
Leptodactylus latrans	T	W	MZUSP 134142	Botucatu, SP
*Leptodactylus lineatus**	M	AM	MZUSP 91746	Vila Bela de Santíssima Trindade, MT
Leptodactylus martinezi	T	E	ZUFG 3124	Mineiros, GO
Leptodactylus mystaceus	T	W	MNRJ 38820	João Pinheiro, MG
Leptodactylus mystacinus	T	AT	CHUNB 25036	Brasília, DF
Leptodactylus petersii	M	AM	MZUSP 128554	Petrolina de Goiás, GO
*Leptodactylus plaumanni**	M	S	CFBH 21038	Jaguaraiaíva, PR
Leptodactylus podicipinus	T	O	MNRJ 1039	Barreiras, BA
Leptodactylus pustulatus	T	E	CHUNB 14922	Barra do Garças, MT
*Leptodactylus sertanejo**	T	E	ZUEC 13657	Uberlândia, MG
Leptodactylus syphax	T	O	MZUSP 101015	Chapada dos Guimarães, MT
Leptodactylus tapiti	T	E	CHUNB 49534	Alto Paraíso, GO

Espécie	Assoc	Distrib	Voucher/citation	Locality
Leptodactylus troglodytes	T	CA	CHUNB 41976	Mateiros, TO
*Leptodactylus vastus**	M	CA	MZUSP 66620	São Domingos, GO
Microhylidae				
Chiasmocleis albopunctata	T	E	CHUNB 25733	Mineiros, GO
Chiasmocleis centralis	T	E	MZUSP 7547	Aruanã, GO
Dermatonotus muelleri	T	O	CHUNB 44333	Buritizeiro, MG
Elachistocleis bicolor	T	S	CHUNB 49299	Bonito, MS
*Elachistocleis bumbameuboi**	T	E	CHUNB 51588	Carolina, MA
*Elachistocleis cesarii**	T	W	CHUNB 48356	Brasília, DF
*Elachistocleis matogrosso**	M	CHA	MNRJ 4812	Cuiabá, MT
*Elachistocleis piauiensis**	T	O	MNRJ 4814	Cuiabá, MT
Pipidae				
*Pipa pipa**	M	AM	MNRJ 55664	Bonópolis, GO
Ranidae				
Lithobates palmipes	M	AM	ZUFG 4727	Piranhas, GO
Strabomantidae				
Barycholos ternetzi	T	E	CHUNB 39090	Brasília, DF
Oreobates heterodactylus	T	E	MNRJ 5089	Cáceres, MT
*Oreobates remotus**	T	E	MZUSP 141708	Januária, MG
Pristimantis crepitans	T	E	UFMT 1383	Chapada dos Guimarães, MT
Pristimantis dundeei	T	E	UFMT 7353	Chapada dos Guimarães, MT
Pristimantis aff. *gutturalis**	T	E	CHUNB 51825	Carolina, MA
*Pristimantis ventrigranulosus**	T	E	MNRJ 75886	Piranhas, GO