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THE HERPETOFAUNA OF THE SERRA DO URUBU MOUNTAIN RANGE: A KEY BIODIVERSITY AREA FOR CONSERVATION IN THE BRAZILIAN ATLANTIC FOREST

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ABSTRACT

*The Serra do Urubu mountain range is considered a key biodiversity area. It is situated in the Pernambuco Endemism Center, one of the most threatened regions of the Brazilian Atlantic Forest. However, despite the high importance of this area little research on its herpetofauna has been performed. The present study presents an inventory of the herpetofauna of the region, through bibliographic review, searches in museum collections and field expeditions to the RPPNs Frei Caneca and Pedra D'Antas, in the municipalities of Jaqueira and Lagoa dos Gatos. The conservation status of the amphibians of the region is discussed. Five expeditions, between 2012 and 2013 were made. The methods employed were visual transect surveys, acoustic census and pitfall traps. We recorded a total of 46 amphibian species, belonging to nine families: Craugastoridae (3 spp.), Bufonidae (3 spp.), Ranidae (1 sp.), Hylidae (25 spp.), Leptodactylidae (8 spp.), Odontophrynidae (1 sp.), Hemiphractidae (2 spp.), Phyllomedusidae (2 spp.) and Microhylidae (1 sp.). We recorded 42 species of squamates: 16 species of lizards families Phyllodactylidae (1 sp.), Gekkonidae (1 sp.), Gymnophthalmidae (1 sp.), Polychrotidae (1 sp.), Leiosauridae (1 sp.), Tropiduridae (3 spp.), Dactyloidae (2 spp.), Diploglossidae (2 spp.), Teiidae (2 spp.), Scincidae (1 sp.), and Iguanidae (1 sp.); and 24 species of snakes: Boidae (3 spp.), Colubridae (2 spp.), Dipsadidae (13 spp.), Elapidae (2 spp.), Typhlopidae (1 sp.), and Viperidae (3 spp.). The occurrence of rare and/or threatened species such as the snakes *Dipsas sazimai*, *Lachesis muta* and *Sibynomorphus* sp. and the amphibians *Hylo-**

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mantis granulosa, *Chiasmocleis alagoana*, *Boana freicanecae* and *Phyllodytes gyrinaethes* reinforces the need for conservation measures at this highly threatened region of the Atlantic Forest.

KEY-WORDS: Anura; Northeastern Brazil; Pernambuco; Squamata; RPPN Pedra D'Antas.

INTRODUCTION

The Atlantic Forest is a global hotspot of biodiversity and one of the most threatened biomes worldwide (Myers *et al.*, 2000), sheltering high levels of endemic species with restricted distribution (*see* Silva & Castelleti, 2003; Haddad & Prado, 2005; Haddad *et al.*, 2013). The Atlantic Forest covers a very large area from the state of Rio Grande do Norte to the state of Rio Grande do Sul. It's a very heterogeneous biome, with significant differences in species composition and origin along the various endemism centers occurring between the north and south Atlantic Forest (Silva & Castelleti, 2003; Silva *et al.*, 2004; Carnaval *et al.*, 2014).

The Pernambuco Endemism Center (PEC) (*sensu* Prance, 1982; Silva & Castelleti, 2003) comprises the fragments of Atlantic Forest north of the São Francisco River; between the States of Rio Grande do Norte throughout Alagoas, in northeastern Brazil. The fauna and flora of this sub-geographical region are more closely related to Amazonia than to the southern Atlantic Forest (Santos *et al.*, 2007; Canedo & Haddad, 2012; Fouquet *et al.*, 2012). This is the most fragmented and threatened region in the Atlantic Forest, with only 2% (360.455 hectares) of original forest cover left, of which only 3.371 are protected in Conservation Units (Brown & Brown, 1992; Ribeiro *et al.*, 2009). The high level of deforestation since the colonial period, with accelerated rates of deforestation in the 1970's and 1980's, especially for sugar cane plantations and cattle grazing, lead to the actual disturbing level of deforestation in this region (Ranta *et al.*, 1998; Tabarelli *et al.*, 2005; Pereira *et al.*, 2014). Most of the publications on the herpetofauna of the altitudinal seasonal tropical forest of the PEC, deal with species descriptions (*e.g.*, Carnaval & Peixoto, 2004a; Rodrigues *et al.*, 2005; Freire *et al.*, 2010; Passos *et al.*, 2010; Gonçalves *et al.*, 2012); faunal inventories and natural history (*e.g.*, Santos & Carnaval, 2002; Silva *et al.*, 2006; Santana *et al.*, 2008; Santos & Santos, 2011; Moura *et al.*, 2011; Roberto *et al.*, 2015) or geographical distributional records (*e.g.*, Santos & Amorim, 2010; Santos & Santos, 2010; Vilela *et al.*, 2011; Rodrigues *et al.*, 2013a,b).

Despite the increase of reptile and amphibian inventories in the PEC, still there are many large gaps of this biogeographical region that needs more studies regarding species composition, natural history, geographical distribution and conservation status of the species, especially to promote conservation action.

The PEC harbors at least five threatened species of snakes: *Atractus caete* (endangered), *Bothrops muriciensis* (endangered), *Echivanthera cephalomaculata* (vulnerable), *Amerotyphlops amoipira* (endangered), *A. paucisquamus* (vulnerable); and four species of anurans *Hylomantis granulosa* (vulnerable), *Chiasmocleis alagoana* (vulnerable), *Phyllodytes gyrinaethes* (critically endangered) and *Physalaemus caete* (endangered) (MMA, 2014).

The present study aims to determine the composition, and the distribution of the herpetofauna of the the Serra do Urubu mountain range, a remnant of Atlantic Forest within the Pernambuco Endemism Center, and to discuss the conservation status of the herpetofauna in the area.

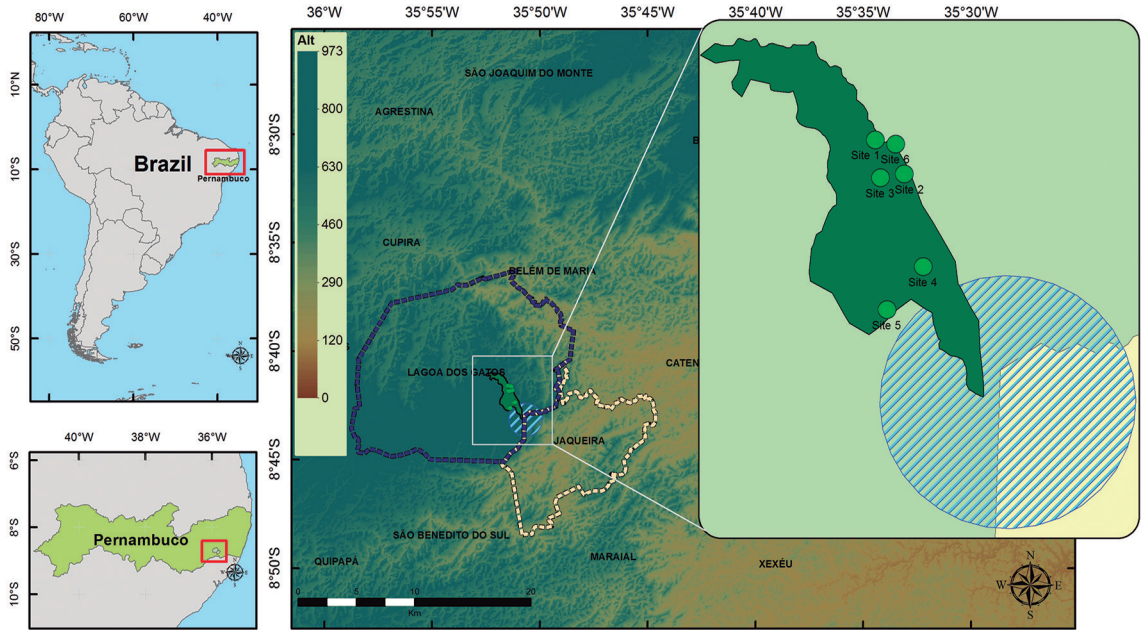
MATERIAL AND METHODS

Study area

The RPPN Pedra D'Antas (08°34'S, 35°37'W) has a total area of 330 hectares, located in the Serra do Urubu mountain range, in the municipalities of Lagoa dos Gatos and Jaqueira, State of Pernambuco, northeastern Brazil (Fig. 1). This Reserve lies adjacent to the RPPN Frei Caneca, (*see* fig. 1) and together these fragments cover approximately 1,200 hectares, being one of the largest remnants of Atlantic Forest in the region.

The Reserve is located in the Planalto of Borborema. The vegetation in the area is altitudinal seasonal tropical forest with 500-750 m of altitude (Veloso *et al.*, 1991), with a mean annual rainfall of 1,000-1,500 mm. The regional climate is hot and humid (Nimer, 1972), with four to five months of dry season between October to February and the wet season extending from March to September (IBGE, 1985).

We selected six study sites for the data collection, described as follow:



Legend

- Jaqueira
- Lagoa dos Gatos
- RPPN Pedra D'anta
- RPPN Frei Caneca

FIGURE 1: Map of RPPN Pedra D'Antas and RPPN Frei Caneca, at the Serra do Urubu mountain range municipalities of Jaqueira and Lagoa dos Gatos, Pernambuco State, Brazil, with the respective study sites.

- Site 1: (08°41'35.1"S, 35°51'27.8"W, 584 m). Secondary growth forest, with a predominance of arbustive-arboreal vegetation. Banana plantations, with a permanent stream. Presence of rocky outcrops, with accumulation of leaf litter.
- Site 2: (08°41'47.4"S, 35°51'17.3"W, 586 m). Secondary growth forest, with a predominance of arbustive-arboreal vegetation. Presence of rocky outcrops, with accumulation of leaf litter. Absence of bodies of water.
- Site 3: (08°41'48.8"S, 35°51'25.9"W, 592 m). Secondary forest, at the forest edge, 500 m away from the pond next to the center house in the RPPN. During the raining season a marsh is formed connecting with this pond.
- Site 4: (08°42'20.7"S, 35°51'10.4"W, 717 m). Primary forest, with arboreal vegetation 20-30 meters high, abundance of terrestrial and arboreal bromeliads. Without bodies of water.
- Site 5: (08°42'36.2"S, 35°51'23.5"W, 687 m). Primary forest, with arboreal vegetation 20-30 meters high, abundance of terrestrial and arboreal bromeliads. Located at the margins of the Açude das Moças pond. The pond is approximately 30 meters wide, with 3 km of length and a maximum depth of 10 meters.
- Site 6: (08°41'36.6"S, 35°51'20.5"W, 548 m). Permanent pond located next to the center

house in the RPPN, with a length of 1.5 km, 800 meters wide, and a maximum depth of 5 meters, arbustive-arboreal vegetation in the margins.

Information regarding the herpetofauna of RPPN Frei Caneca was gathered using bibliographic references (Santos & Carnaval, 2002; Santos & Santos, 2011; Moura *et al.*, 2011), and additional occasional records made by our team.

Surveys

Five expeditions were done at RPPN Pedra D'Antas, of four to seven days duration, in August and December of 2012, March, June and September of 2013. Totalizing 24 field days of effort.

For the herpetofauna inventory we selected four methodologies: visual and acoustic transect survey, pitfall traps and opportunistic encounter methodology. The visual and acoustic transect survey (*sensu* Crump & Scott Jr., 1994; Rödel & Ernst, 2004), consisted of five transects 250 × 2 meters, in Sites 1-5. Each transect was surveyed by two researchers for one hour of effort, during both daily and nightly periods. Totaling 35 transects surveyed, seven transects in each site (four nocturnal and three diurnal), with a total ef-

fort of 14 hours/man per transect of visual and acoustic surveys respectively.

At the same area of the transects we installed five stations of pitfall traps with drift fence (Cechin & Martins, 2000), each station was composed of eight 60 liter buckets in a linear arrangement, separated by a 1 meter high plastic fence, and each bucket installed 10 meters apart. Each station was separated by at least 1 km of distance. The traps remained opened for 18 nonconsecutive days, totaling 720 buckets/day.

At Site 6 only acoustic surveys for amphibians were performed, totaling 48 man/hours. For reptiles we also used the opportunistic encounter methodology to record species in the RPPN, outside our study sites, or recorded by others.

Voucher specimens were collected (under licence SISBIO 34734-1), euthanized with xilocaine anesthetic, fixed in formol 10% and conserved in alcohol 70%. The specimens were deposited at the Coleção de Herpetologia da Universidade Regional do Cariri (URCA-H), Crato, Ceará.

Data analysis

The effectiveness of the sampling effort was estimated based on rarefaction curves, through 10,000 randomizations of a matrix in which each row represents a species and its number of captures while each column represents one day of sampling effort (pitfall traps, visual transect survey, acoustic survey and opportunistic encounter). This analysis was performed using Past 3.1 (Hammer *et al.*, 2001). We use the program Estimates (Colwell, 2006) to estimate species richness through the indicators Jackknife I and ICE.

The taxonomy adopted follows (Frost, 2016 for amphibians, (Costa & Bérnils, 2014) for reptiles, with the exception of the lizard family Scincidae, where we follow (Pyron *et al.*, 2013). The conservation status of the species was classified according to (IUCN, 2016) and (MMA, 2014).

RESULTS

Amphibians

We recorded 38 amphibian species at RPPN Pedra D'Antas, all anurans, distributed in nine families: Hylidae was the most representative (n = 23 spp.), followed by Leptodactylidae (n = 8 spp.), Phyllomedusidae, Bufonidae and Craugastoridae (n = 2 spp.), Microhylidae, Ranidae, Odontophrynidae has only

one species (Table 1; Figs. 2-7). The visual transect survey methodology was able to detect 24 species, the acoustic survey detected 26 species, while the pitfall traps only captured seven species, but *Chiasmocleis alagoana* was only recorded through this method (Table 1). The rarefaction curve for amphibians tends close to reach an asymptote (Fig. 8), however the non-parametric richness estimators Jackknife I and ICE recovered 48 spp.

Chiasmocleis alagoana, *Dendropsophus soaresi* and *Scinax fuscomarginatus* were recorded for the first time in the Serra do Urubu Mountain range. We found three endangered species in RPPN Pedra D'Antas: *Hylomantis granulosa* which is classified as vulnerable by (MMA, 2014), *Chiasmocleis alagoana* (endangered), and *Phyllodytes gyrinaethes* classified as critically endangered. *Dendropsophus soaresi* and *Pithecopus nordestinus* were only found in the vicinities of the Reserve, in open deforested areas including provisory ponds. Seven species were recorded only in Site 6: *Dendropsophus haddadi* and *Scinax fuscomarginatus* vocalizing in Cyperaceae inside the pond; *Leptodactylus fuscus*, *L. troglodytes* and *L. vastus* at the margins of the pond; *Boana faber* in the arboreal vegetation at the forest edge, 15 meters away from the pond; and *Physalaemus cuvieri* inside the pond, at the water surface between the aquatic vegetation. This site has a total of 26 species recorded, followed by the Site 5 (n = 22 spp.), Site 3 (n = 16 spp.), 4 (n = 9), 1 and 2 (n = 6). Three species were recorded along all the study sites: *Pristimantis ramagii*, *Pristimantis* sp. and *Rhinella crucifer*. *Phyllodytes gyrinaethes* despite having been recorded at Site 2, was more abundant at Sites 4 and 5, while *P. edelmoi* was frequently recorded at Sites 3 and 4. *Proceratophrys renalis* was only found at Site 4, with low encounter rates. The hylids *Dendropsophus branneri*, *D. elegans*, *D. minutus*, *Scinax auratus*, *S. eurydice*, *S. fuscovarius* and *S. nebulosus* were associated with the large ponds in Sites 5 and 6. *Hylomantis granulosa* was found associated with permanent and provisory rocky streams in Sites 1 and 2.

Reptiles

We recorded 31 species of squamate reptiles at the RPPN Pedra D'Antas: two species of amphisbaenids (Amphisbaenidae), 12 species of lizards: Dactyloidae (n = 2 spp.), Diploglossidae (n = 1 sp.), Gekkonidae (n = 1 sp.), Gymnophthalmidae (n = 1 sp.), Leiosauridae (n = 1 sp.), Phyllodactylidae (n = 1 sp.), Polychrotidae (n = 1 sp.), Scincidae (n = 1 sp.), Teiidae (n = 1 sp.) and Tropiduridae (n = 2 spp.); and

TABLE 1: Amphibian species list, Serra do Urubu mountain range, recorded at RPPN Frei Caneca (Santos & Carnaval, 2002; Santos & Santos, 2009) and RPPN Pedra D'Antas (present study), discriminating the study sites, methodology (VTS = visual transect survey; AS = acoustic survey; PF = pitfall traps; VS = visual survey; * = opportunist encounter, outside the study sites), conservation status, according to MMA and IUCN (VU = vulnerable; EN = endangered; CR = critically endangered; NE = not evaluated; DD = data deficient); and Pernambuco Endemism Center endemic.

Order Anura	Serra do Urubu Mountain range											Conservation status	
	RPPN Pedra D'Antas						RPPN Frei Caneca	MMA, 2014	IUCN (2013)	endemic	PEC		
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6							
Family Bufonidae													
<i>Rhinella crucifer</i> (Wied-Neuwied, 1821)	PF	VTS,PF	PF	PF	PF	VS	Santos & Santos, 2009				LC		
<i>Rhinella granulosa</i> (Spix, 1824)							Santos & Santos, 2009				LC		
<i>Rhinella jimi</i> (Stevaux, 2002)	PF				VTS,PF	VS	Santos & Santos, 2009				LC		
Family Hemiphractidae													
<i>Gastrotheca fissipes</i> (Boulenger, 1888)							Santos & Santos, 2009				LC	X	
<i>Gastrotheca pulchra</i> Caramaschi & Rodrigues, 2007							Santos & Santos, 2009				DD		
Family Hylidae													
<i>Dendropsophus bunnleri</i> (Cochran, 1948)			VTS,AS			AS,VS	Santos & Santos, 2009				LC		
<i>Dendropsophus elegans</i> (Wied-Neuwied, 1824)				VTS		AS,VS	Santos & Santos, 2009				LC		
<i>Dendropsophus baddadi</i> (Bastos & Pombal Jr., 1996)						AS,VS	Santos & Santos, 2009				LC		
<i>Dendropsophus minutus</i> (Peters, 1872)					AS	AS,VS	Santos & Santos, 2009				LC		
<i>Dendropsophus oliveirai</i> (Bokermann, 1963)*			VTS				Santos & Santos, 2009				LC		
<i>Dendropsophus soaresi</i> (Caramaschi & Jim, 1988)							Santos & Santos, 2009				LC		
<i>Boana albonigrita</i> (Spix, 1824)			VTS,AS	VTS	VTS,AS	AS,VS	Santos & Santos, 2009				LC		
<i>Boana atlantica</i> (Caramaschi & Velosa, 1996)			VTS,AS			AS,VS	Santos & Santos, 2009				LC		
<i>Boana crepitans</i> (Wied-Neuwied, 1824)				VTS	VTS,AS	AS,VS	Santos & Santos, 2009				LC		
<i>Boana exastis</i> (Caramaschi & Rodrigues, 2003)		VTS,AS	VTS,AS	VTS,AS			Santos & Santos, 2009				LC		
<i>Boana faber</i> (Wied-Neuwied, 1821)						AS	Santos & Santos, 2009				LC		
<i>Boana freitanecae</i> (Carnaval & Peixoto, 2004)							Santos & Santos, 2009				DD	X	
<i>Boana raniceps</i> Cope, 1862					VTS	AS	Santos & Santos, 2009				LC		
<i>Boana semilineata</i> (Spix, 1824)				VTS,PF	VTS	AS	Santos & Santos, 2009				LC		
<i>Phyllodytes edelmoi</i> Peixoto, Caramaschi & Freire, 2003	VTS,AS		VTS,AS	AS	AS		Santos & Santos, 2009				DD	X	
<i>Phyllodytes gyrrinaethes</i> Peixoto, Caramaschi & Freire, 2003			AS	VTS,AS	VTS,AS		Santos & Santos, 2009		CR		DD	X	
<i>Scinax ananatus</i> (Wied-Neuwied, 1821)					VTS,AS	AS,VS	Santos & Santos, 2009				LC		
<i>Scinax eurylece</i> (Bokermann, 1968)					VTS,AS		Santos & Santos, 2009				LC		
<i>Scinax fuscumarginatus</i> (Lutz, 1925)					VTS,AS	AS	Santos & Santos, 2009				LC		

Order Anura	Class Amphibia						Serra do Urubu Mountain range				Conservation status			PEC endemic
	RPPN Pedra D'Antas						RPPN Frei Caneca	MMA, 2014	IUCN (2013)	MMA, 2014	IUCN (2013)	PEC endemic		
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6								
<i>Scinax</i> cf. <i>fuscovarius</i> (A. Lutz, 1925)			VTS,AS				Santos & Santos, 2009					NE		
<i>Scinax</i> sp. (clade <i>ruber</i>)					AS		*					NE		
<i>Scinax nebulosus</i> (Spix, 1824)			VTS,AS		AS		Santos & Santos, 2009					LC		
<i>Scinax pachycrus</i> (Miranda-Ribeiro, 1937)							Santos & Santos, 2009					LC		
<i>Scinax x-signatus</i> (Spix, 1824)							Santos & Santos, 2009					LC		
<i>Trachycephalus mesophaeus</i> (Hensel, 1867)*	*						Santos & Santos, 2009					LC		
Family Leptodactylidae														
<i>Adenomera</i> cf. <i>hylaedactyla</i>			VTS		AS		Santos & Santos, 2009					NE		
<i>Leptodactylus fuscus</i> (Schneider, 1799)					VS		Santos & Santos, 2009					LC		
<i>Leptodactylus</i> cf. <i>latrans</i>					VS		Santos & Santos, 2009					NE		
<i>Leptodactylus natalensis</i> A. Lutz, 1930			VTS,AS		AS		Santos & Santos, 2009					LC		
<i>Leptodactylus troglodytes</i> A. Lutz, 1926					VS,AS		Santos & Santos, 2009					LC		
<i>Leptodactylus vastus</i> A. Lutz, 1930					VS,AS		Santos & Santos, 2009					LC		
<i>Physalaemus cuvieri</i> Fitzinger, 1826					VS,AS		Santos & Santos, 2009					LC		
<i>Pseudopaludicola mystacalis</i> (Cope, 1887)					AS		Santos & Santos, 2009					LC		
Family Microhylidae														
<i>Chiasmocleis alagoana</i> Cruz, Caramaschi & Freire, 1999					PF						EM	DD	X	
Family Odontophrynidae														
<i>Proceratophrys renalis</i> (Miranda-Ribeiro, 1920)					VTS,PF		Santos & Santos, 2009					LC		
Family Phyllomedusidae														
<i>Hylomantis granulosa</i> (Cruz, 1989)			VTS		VTS		Santos & Santos, 2009					LC		
<i>Pithecopus norderstinus</i> Caramaschi, 2006*	*						Santos & Santos, 2009					LC		
Family Ranidae														
<i>Lithobates palmipes</i> (Spix, 1824)			VTS		PF		Santos & Santos, 2009					LC		
Family Craugastoridae														
<i>Pristimantis namagyi</i> (Boulenger, 1888)			VTS,PF		VTS		Santos & Santos, 2009					LC		
<i>Pristimantis</i> sp.1			VTS,PF		VTS		Santos & Santos, 2009					LC		
<i>Pristimantis</i> sp.2					VTS,PF		Santos & Santos, 2009					LC		
RPPN Richness							38			43				
Serra do Urubu mountain range richness							46							

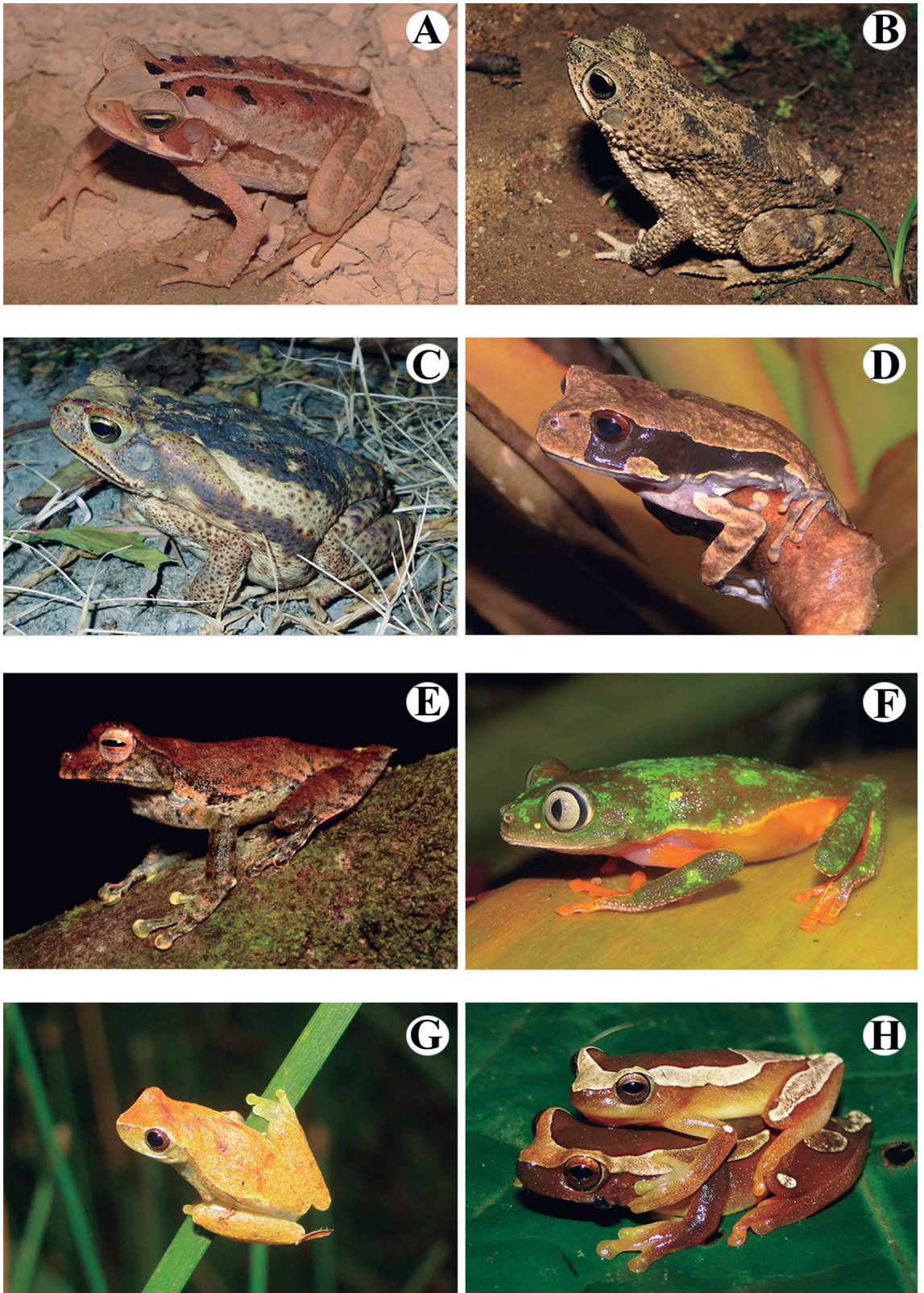


FIGURE 2: Amphibians species recorded at the Serra do Urubu mountain range. (A) *Rhinella crucifer*, (B) *Rhinella granulosa* (Photo by C.O. Gussoni), (C) *Rhinella jimi* (Photo by C.O. Gussoni), (D) *Gastrotheca fissipes*, (E) *Gastrotheca pulchra* (Photo by B. Lisboa), (F) *Hyalomantis granulosa*, (G) *Dendropsophus branneri*, (H) *Dendropsophus elegans*.

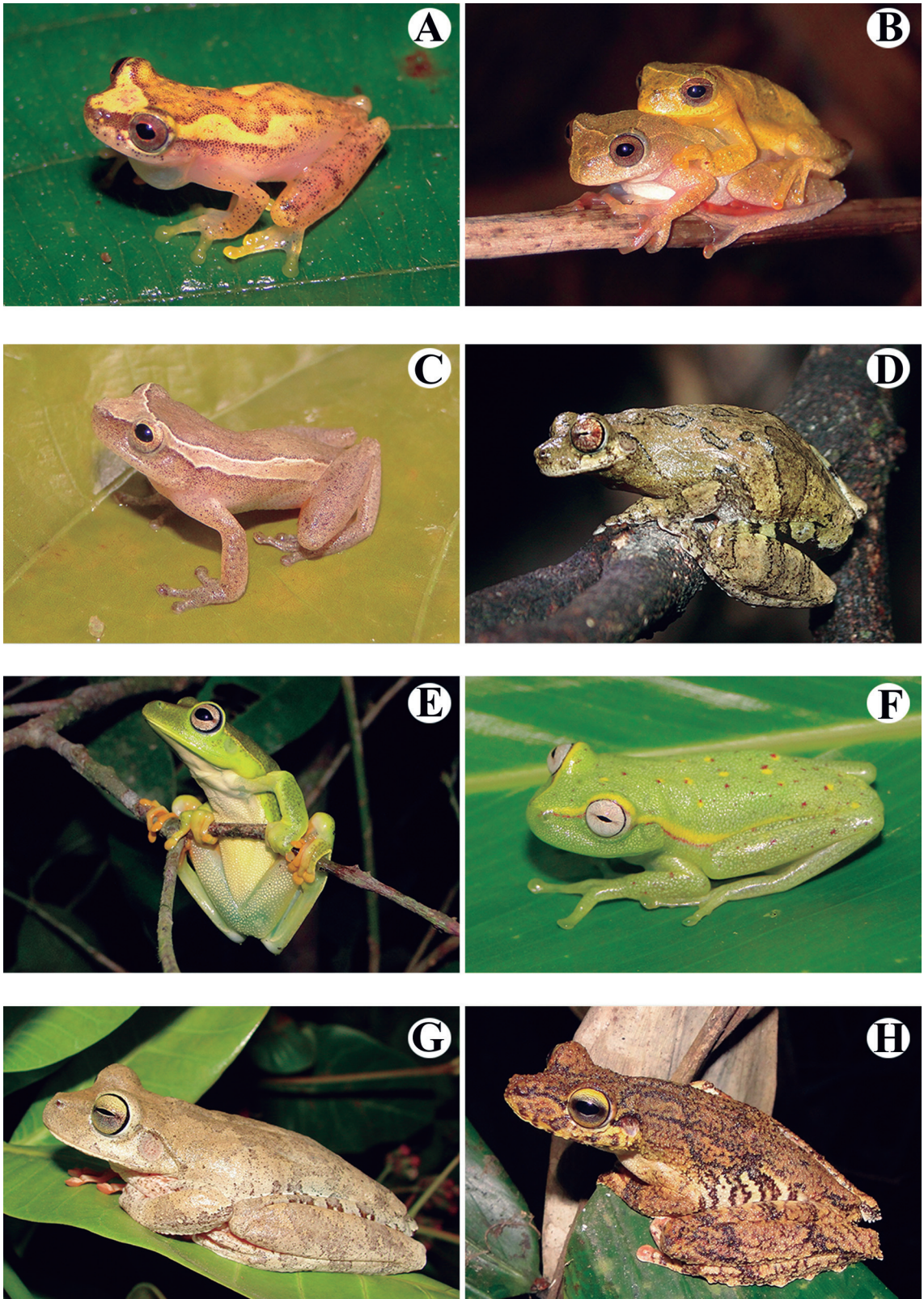


FIGURE 3: Amphibians species recorded at the Serra do Urubu mountain range. (A) *Dendropsophus baddadi*, (B) *Dendropsophus minutus*, (C) *Dendropsophus oliveirai*, (D) *Dendropsophus soaresi*, (E) *Boana albomarginata*, (F) *Boana atlantica*, (G) *Boana crepitans*, (H) *Boana exastis*.

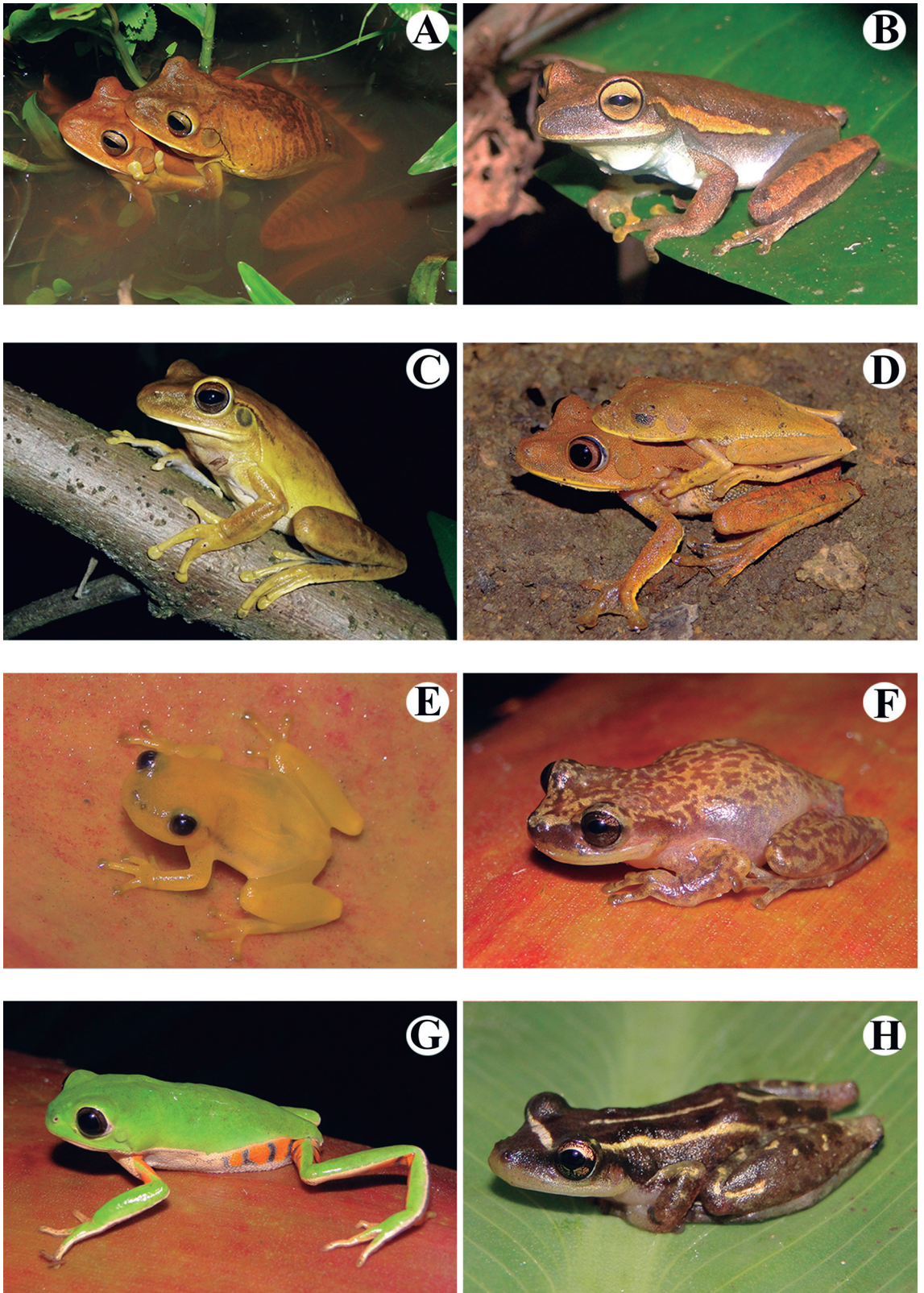


FIGURE 4: Amphibians species recorded at the Serra do Urubu mountain range. (A) *Boana faber*, (B) *Boana freicanecae*, (C) *Boana raniceps* (Photo by C.O. Gussoni), (D) *Boana semilineata*, (E) *Phyllodytes edelmoi*, (F) *Phyllodytes gyrinaethes*, (G) *Pithecopus nordestinus*, (H) *Scinax auratus*.

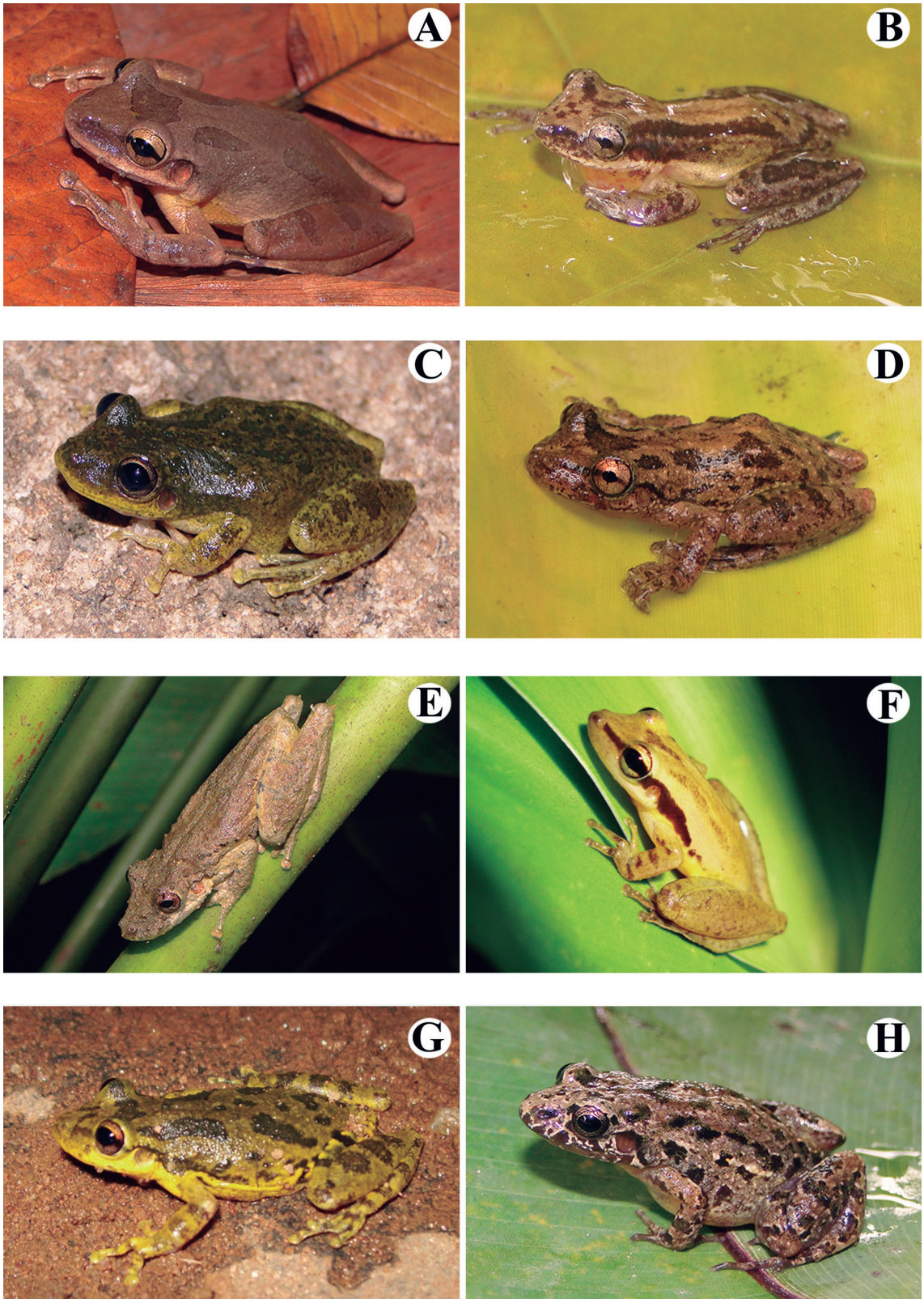


FIGURE 5: Amphibians species recorded at the Serra do Urubu mountain range. (A) *Scinax eurydice*, (B) *Scinax fuscomarginatus*, (C) *Scinax x-signatus* pattern 1, (D) *Scinax* clade *ruber*, (E) *Scinax nebulosus*, (F) *Scinax pachycrus*, (G) *Scinax x-signatus* pattern 2, (H) *Adenomera* cf. *hylaedactyla*.



FIGURE 6: Amphibians species recorded at Serra do Urubu mountain range. (A) *Leptodactylus fuscus*, (B) *Leptodactylus cf. latrans*, (C) *Leptodactylus natalensis*, (D) *Leptodactylus troglodytes*, (E) *Leptodactylus vastus*, (F) *Physalaemus cuvieri*, (G) *Pseudopaludicola mystacalis*, (H) *Chiastrocleis alagoana*.

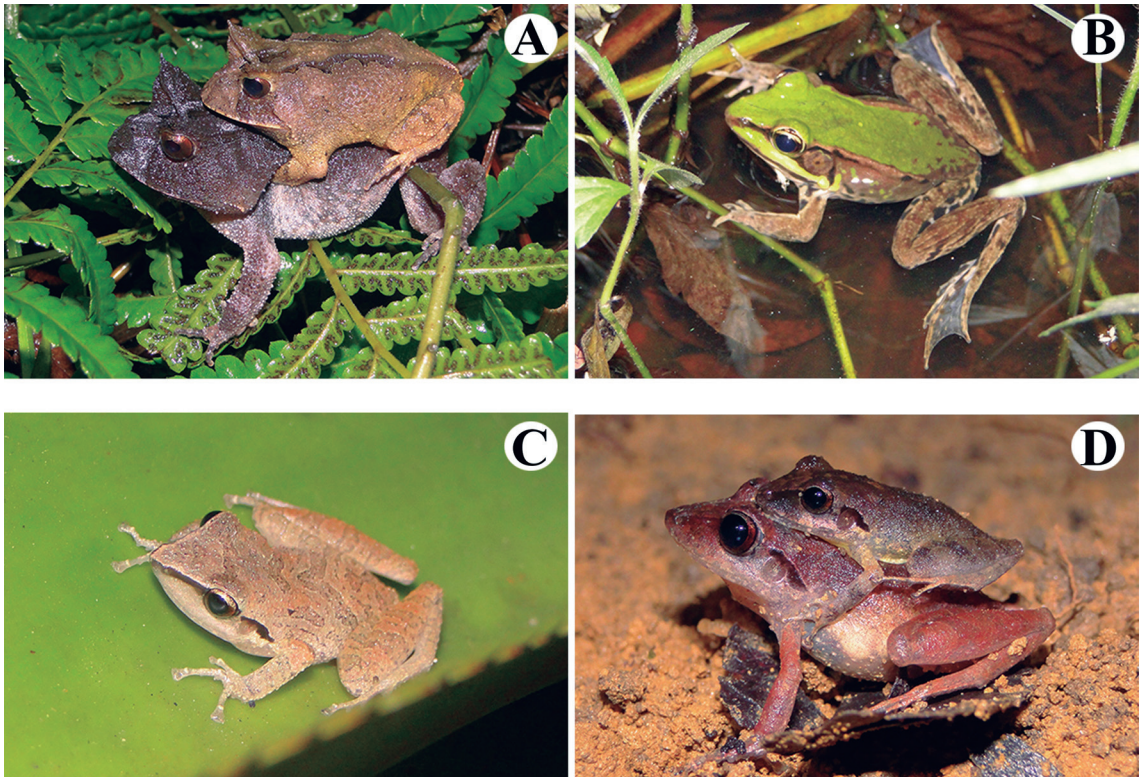


FIGURE 7: Amphibians species recorded at the Serra do Urubu mountain range. (A) *Proceratophrys renalis*, (B) *Lithobates palmipes*, (C) *Pristimantis ramagii*, (D) *Pristimantis* sp.

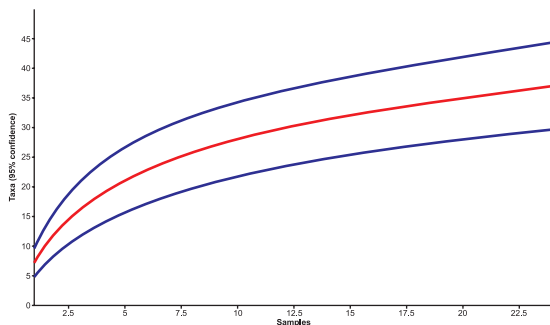


FIGURE 8: Sample rarefaction curve for amphibians in RPPN Pedra D'Antas, after 24 days of effort.

19 species of snakes: Boidae (n = 2 spp.), Colubridae (n = 1 sp.), Dipsadidae (n = 11 spp.), Elapidae (n = 2 spp.), Typhlopidae (n = 1 sp.), and Viperidae (n = 1 sp.) (Table 2; Figs. 9-14).

The visual transect survey detected 34% of the species (n = 11 spp.), with 19 individuals recorded. The lizard *Norops fuscoauratus*, and the snakes *Corallus hortulanus* and *Lachesis muta* were exclusively found by this methodology.

Despite the low capture rate 0,02 individuals/trap (n = 13), the pitfall traps recorded eight species. The lizard *Dryadosaura nordestina*, and the snakes *Taeniophallus affinis* and *Amerotyphlops arenensis* were exclu-

sively recorded by this method. The opportunistic encounter survey recorded the majority of reptiles species (18 spp.), including the amphisbaenids *Amphisbaena alba* and *A. pretrei*, the lizards *Hemidactylus mabouia*, and *Tropidurus semitaeniatus*; and the snakes *Atractus potschi*, *Boa constrictor*, *Dipsas sazimai*, *Imantodes cenchoa*, *Leptodeira annulata*, *Oxyrhopus petolaris*, *Pseudoboa nigra*, *Tantilla melanocephala*. The lizard *Ophiodon* sp. and the snake *Erythrolamprus aesculapii* were recorded by photographs taken by an ornithologist researcher who worked at the Serra do Urubu mountain range (Carlos Otávio Gussoni archives, *pers. com.*).

Regarding the lizard and amphisbaenids species richness, the rarefaction curve was close to reach an asymptote (Fig. 15). The estimators Jackknife I and ICE indicated the possible occurrence of 12 or 13 species in the area respectively, indicating that our sample effort was capable to detect at least 77% of the species (n = 10).

During the study period we recorded a total of 41 lizard specimens, (Table 3). *Dactyloa punctata* and *Enyalius* aff. *catenatus* were the most commonly captured species. The capture rates of snakes totalizes 22 captured species. The most captured species were *Xenopholis scalaris* (n = 4), *Amerotyphlops arenensis* (n = 4) and *Lachesis muta* with three individuals.

TABLE 2: Reptile species list, Serra do Urubu mountain range, recorded at RPPN Pedra D’Antas (present study), discriminating the study sites, methodology (VTS = visual transect survey; PF = pitfall traps; * = opportunist encounter, outside the study sites; ** = photographic record by the researcher Carlos Otávio Gussoni).

Order Squamata	RPPN Pedra D’Antas					RPPN Frei Caneca
	Site 1	Site 2	Site 3	Site 4	Site 5	
Family Amphisbaenidae						
<i>Amphisbaena alba</i> Linnaeus, 1758*						
<i>Amphisbaena pretrei</i> Duméril & Bibron, 1839*						
Family Dactyloidea						
<i>Norops fuscoauratus</i> (D’Orbigny, 1837)						
		VTS		VTS	VTS	Moura <i>et al.</i> , 2011 **
<i>Dactyloa punctata</i> (Daudin, 1802)						
Family Diploglossidae						
<i>Diploglossus lessonae</i> Peracca, 1890						
<i>Ophiodes</i> sp.**						
Family Gekkonidae						
<i>Hemidactylus mabouia</i> (Moreau de Jonnès, 1818)*						
Family Gymnophthalmidae						
<i>Dryadosaura nordestina</i> Rodrigues, Freire, Pellegrino & Sites Jr., 2005						
Family Iguanidae						
<i>Iguana iguana</i> (Linnaeus, 1758)						
Family Leiosauridae						
<i>Enyalius</i> aff. <i>catenatus</i>						
		VTS,PF	VTS,PF	VTS	VTS	Moura <i>et al.</i> , 2011
Family Phyllodactylidae						
<i>Gymnodactylus darwinii</i> (Gray, 1845)						
	VTS	VTS,PF				Moura <i>et al.</i> , 2011
Family Polychrotidae						
<i>Polychrus marmoratus</i> (Linnaeus, 1758)						
					VTS	
Family Scincidae						
<i>Mabuya nigropunctata</i> (Spix, 1825)						
		VTS				
Family Teiidae						
<i>Ameiva ameiva</i> (Linnaeus, 1758)**						
<i>Salvator merianae</i> (Duméril & Bibron, 1839)						
Family Tropiduridae						
<i>Strobilurus torquatus</i> Wiegmann, 1834						
<i>Tropidurus hispidus</i> (Spix, 1825)						
					VTS	Moura <i>et al.</i> , 2011
<i>Tropidurus semitaeniatus</i> (Spix, 1825)*						
Family Boidae						
<i>Boa constrictor</i> Linnaeus, 1758*						
<i>Corallus hortulanus</i> (Linnaeus, 1758)						
					VTS	Moura <i>et al.</i> , 2011
<i>Epicrates assisi</i> Machado, 1945						
Family Colubridae						
<i>Spilotes pullatus</i> Linnaeus, 1758						
<i>Tantilla melanocephala</i> (Linnaeus, 1758)*						
Family Dipsadidae						
<i>Atractus potschi</i> Fernandes, 1995*						
<i>Dipsas sazimai</i> Fernandes, Marques & Argôlo, 2010*						
<i>Erythrolamprus aesculapii</i> (Linnaeus, 1758)**						
<i>Imantodes cenchoa</i> (Linnaeus, 1758)*						
<i>Leptodeira annulata pulchriceps</i> Duellman, 1958*						
<i>Oxyrhopus petolarium</i> (Linnaeus, 1758)*						
<i>Oxyrhopus trigeminus</i> Duméril, Bibron & Duméril, 1854						
<i>Philodryas olfersii</i> (Lichtenstein, 1823)*						
<i>Pseudoboa nigra</i> (Duméril, Bibron & Duméril, 1854)*						
	VTS,PF					Moura <i>et al.</i> , 2011
<i>Sibynomorphus</i> sp.						
					PF	
<i>Taeniophallus affinis</i> (Günther, 1858)						
<i>Xenodon</i> sp.						
<i>Xenopholis scalaris</i> (Wucherer, 1861)*						
						**
		PF				

Order Squamata	RPPN Pedra D'Antas					RPPN Frei Caneca
	Site 1	Site 2	Site 3	Site 4	Site 5	
Family Elapidae						
<i>Micrurus</i> sp.*				PF		Moura <i>et al.</i> , 2011
<i>Micrurus lemniscatus carvalhoi</i> *						
Family Typhlopidae						
<i>Amerophlops arenensis</i> Graboski, Pereira-Filho, Silva, Prudente & Zaher, 2015			PF			
Family Viperidae						
<i>Bothrops bilineata</i> (Wied, 1825)						Moura <i>et al.</i> , 2011
<i>Crotalus durissus</i> Linnaeus, 1758						**
<i>Lachesis muta</i> Linnaeus, 1766	VTS	VTS				**
RPPN Richness			32			26
Serra do Urubu mountain range richness				42		

DISCUSSION

Amphibians

Previous research in the Serra do Urubu mountain range by (Santos & Carnaval, 2002) pointed to the occurrence of 22 anurans species, later (Santos & Santos, 2011) recorded 42 species in the RPPN Frei Caneca, municipality of Jaqueira. Comparing with our results in the RPPN Pedra D'Antas (n = 38 spp.), we can assume that RPPN Frei Caneca besides having a higher species richness, shelters unique species in the region such as *Gastrotheca fissipes*, *G. pulchra*, *Boana freicanecae*, and *Scinax pachycrus*, by the presence of specific habitats. The "Complexo do Cruzeiro" for example is a rocky outcrop area with high abundance of terrestrial bromeliads, suitable for *Gastrotheca* spp. and *Scinax pachycrus* (see Izecksohn *et al.*, 2009; Santos & Santos, 2011; Teixeira Jr. *et al.*, 2012; Haddad *et al.*, 2013). *Boana freicanecae* until now has only been found in the "Mata do Quengo" region, the most pristine area in the Serra do Urubu mountain range, in rocky streams inside de forest (Carnaval & Peixoto, 2004a; Santos & Santos, 2011).

Some species recorded by (Santos & Santos, 2011) at the RPPN Frei Caneca, were misidentified (*Dendropsophus* cf. *oliveirai*, *Phyllodytes luteolus*, *Phyllodytes* sp. and *Pseudopaludicola* sp.), and represent in fact *D. haddadi*, *Phyllodytes edelmoi*, *P. gyrinaethes*, and *Pseudopaludicola mystacalis* (Santos, E.M. *pers. com.*), all of them recorded at RPPN Pedra D'Antas.

Scinax x-signatus and *S. fuscovarius* were also recorded by (Santos & Santos, 2011) from the RPPN Frei Caneca., these two species were unassigned to any species group of *Scinax* and belong to the *Scinax ruber* clade (*sensu* Faivovich, 2002; Faivovich *et al.*, 2005). At the RPPN Pedra D'Antas we collected two species with a different color pattern *Scinax x-signatus* and

another slender species. This species we mostly found vocalizing in bromeliads, we called it *Scinax* sp. (clade *ruber*); it is also found at RPPN Frei Caneca.

Another taxonomically unresolved group is *Pristimantis* of northeastern Brazil. At the Serra do Urubu, (Santos & Santos, 2011) attest the occurrence of three species, one of them *P. ramagii*, and the other two *Pristimantis* sp.1 and *Pristimantis* sp.2. The species of this group present highly polymorphic variation (Napoli *et al.*, 2009). Taxonomic studies are needed to determine the range of all the *Pristimantis* species occurring both north and south of the São Francisco River. We found *Pristimantis ramagii* and *Pristimantis* spp., at RPPN Pedra D'Antas mainly differing in acoustic analysis.

Adenomera marmorata is also mentioned to occur at Serra do Urubu and in the Atlantic Forest of Pernambuco state (Moura *et al.*, 2011; Santos & Santos, 2011). However (Fouquet *et al.*, 2013), performed phylogenetic and biogeographic analyses of *Adenomera*, and delimited the populations of the Atlantic Forest of Pernambuco and Alagoas in the *Adenomera hylaedactyla* clade, closely related to the Maranhão and Pará populations. The clade *A. hylaedactyla* has the wider distribution in the genus, occurring east from French Guyana throughout the Brazilian Amazon region, the center of Brazil and the Atlantic Forest of northeastern Brazil, with a highly genetic structure among the different populations, possibly being a species complex (Fouquet *et al.*, 2013). So, until more elaborate taxonomic studies of the *Adenomera hylaedactyla* clade are made, we prefer to call the species that occurs at Serra do Urubu and in the Pernambuco State *Adenomera* cf. *hylaedactyla*.

Another species that occurs at the Serra do Urubu mountain range with unresolved taxonomy is a species of the *Leptodactylus latrans* complex (*sensu* de Sá *et al.*, 2014). De Sá *et al.* (2014) mentioned that

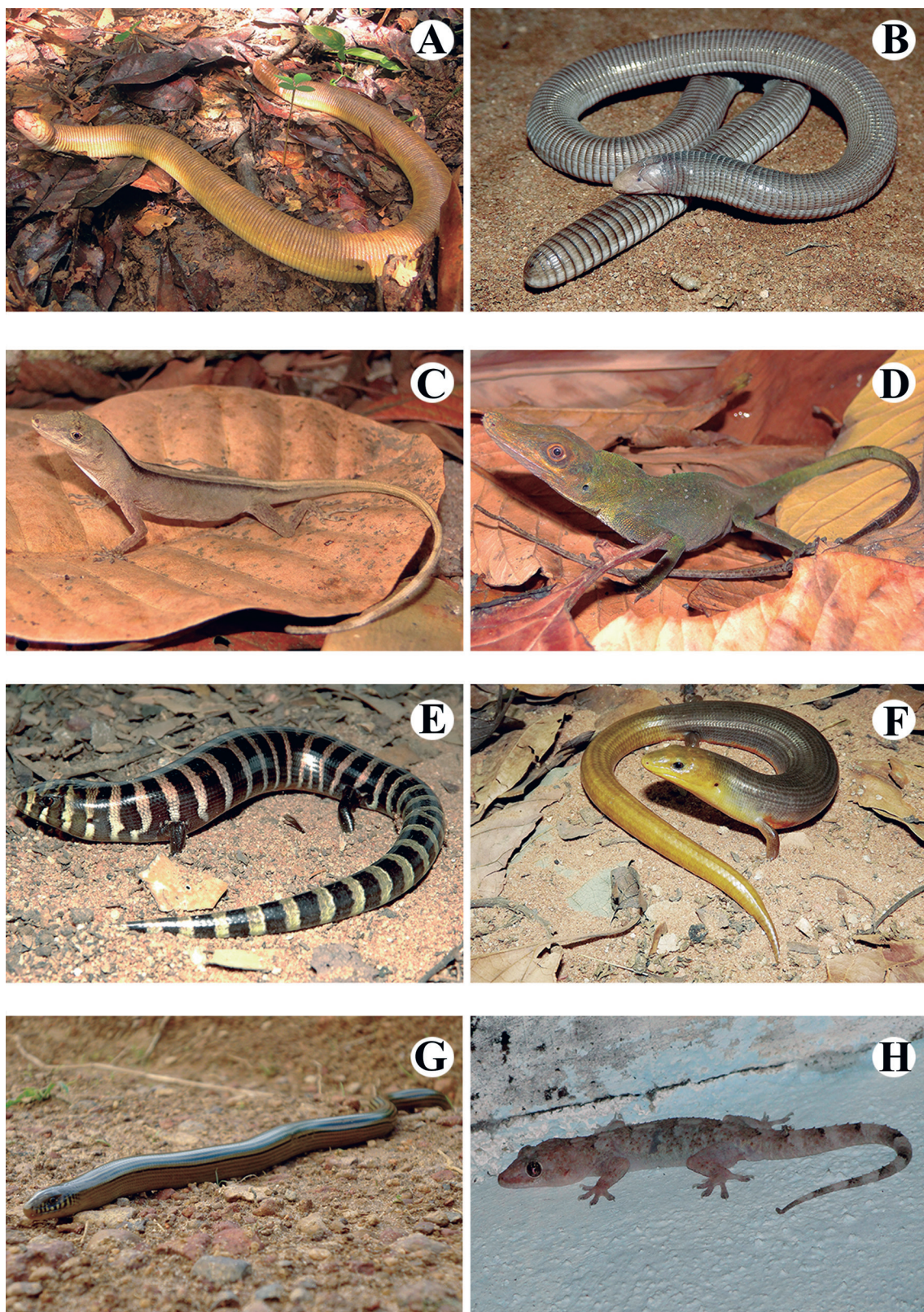


FIGURE 9: Reptile species recorded at the Serra do Urubu mountain range. (A) *Amphisbaena alba*, (B) *Amphisbaena pretrei*, (C) *Norops fuscauratus*, (D) *Dactyloa punctata*, (E) *Diploglossus lessonae* (juvenile), (F) *Diploglossus lessonae* (adult), (G) *Ophiodes* sp. (H) *Hemidactylus mabouia* (Photo by C.O. Gussoni).

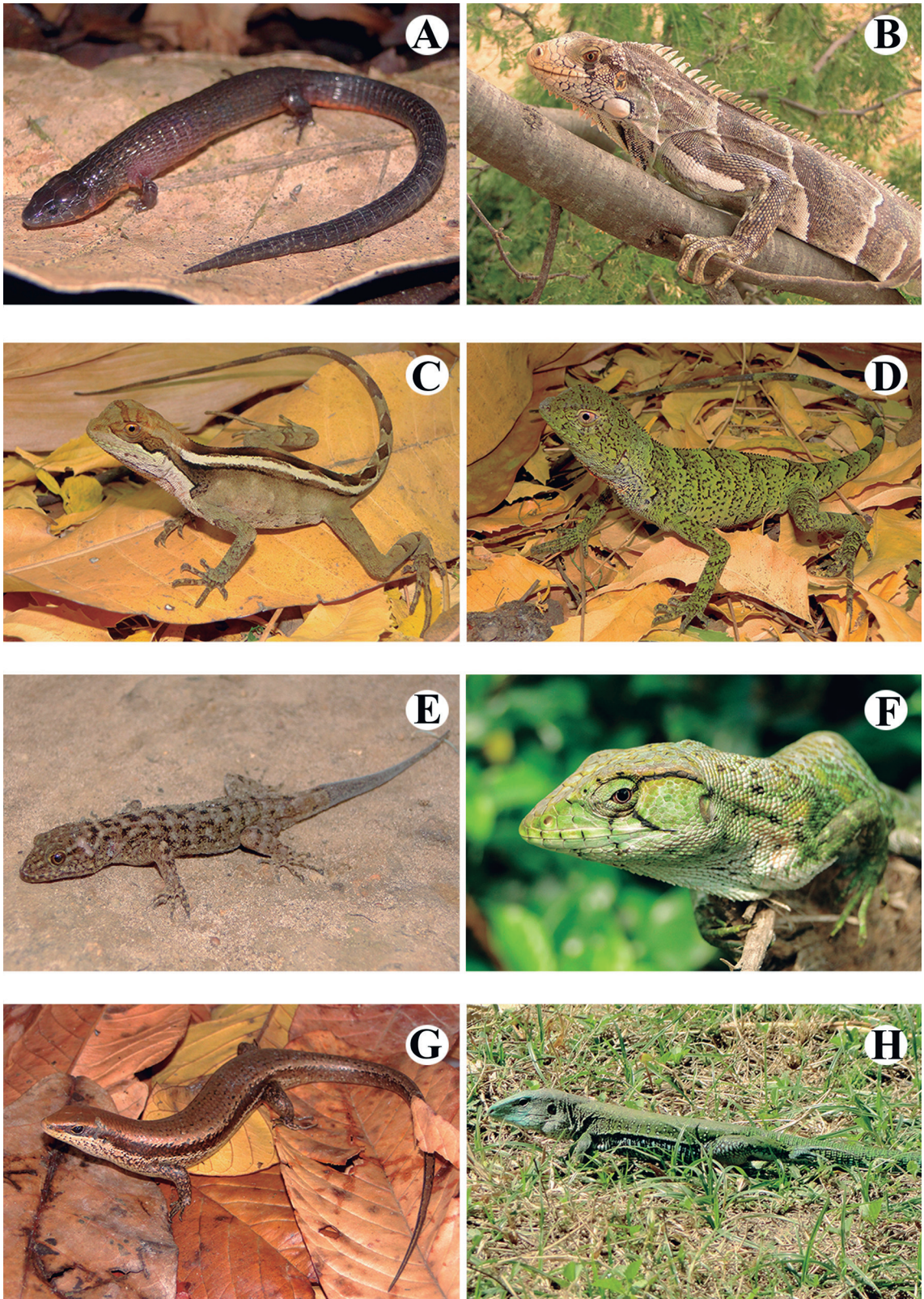


FIGURE 10: Reptile species recorded at the Serra do Urubu mountain range. (A) *Dryadosaura nordestina*, (B) *Iguana iguana*, (C) *Enyalius* aff. *catenatus* (fêmea), (D) *Enyalius* aff. *catenatus* (macho), (E) *Gymnodactylus darwini*, (F) *Polychrus marmoratus*, (G) *Mabuya nigropunctata*, (H) *Ameiva ameiva* (Photo by C.O. Gussoni).

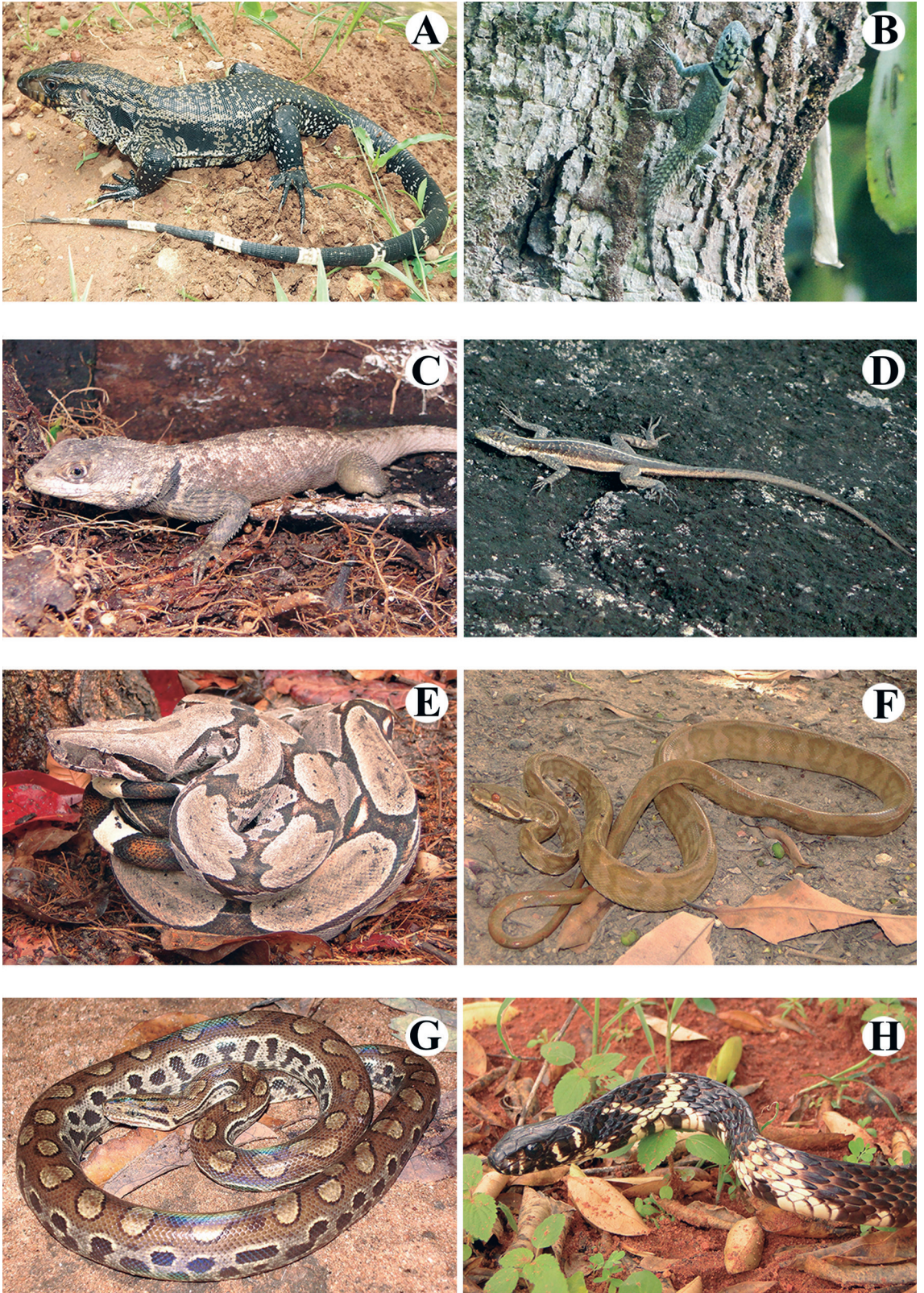


FIGURE 11: Reptile species recorded at the Serra do Urubu mountain range. (A) *Salvator merianae*, (B) *Strobilurus torquatus* (Photo by C.O. Gussoni), (C) *Tropidurus hispidus*, (D) *Tropidurus semitaeniatus* (Photo by C.O. Gussoni), (E) *Boa constrictor*, (F) *Corallus hortulanus*, (G) *Epicrates assisi*, (H) *Spilotes pullatus*.

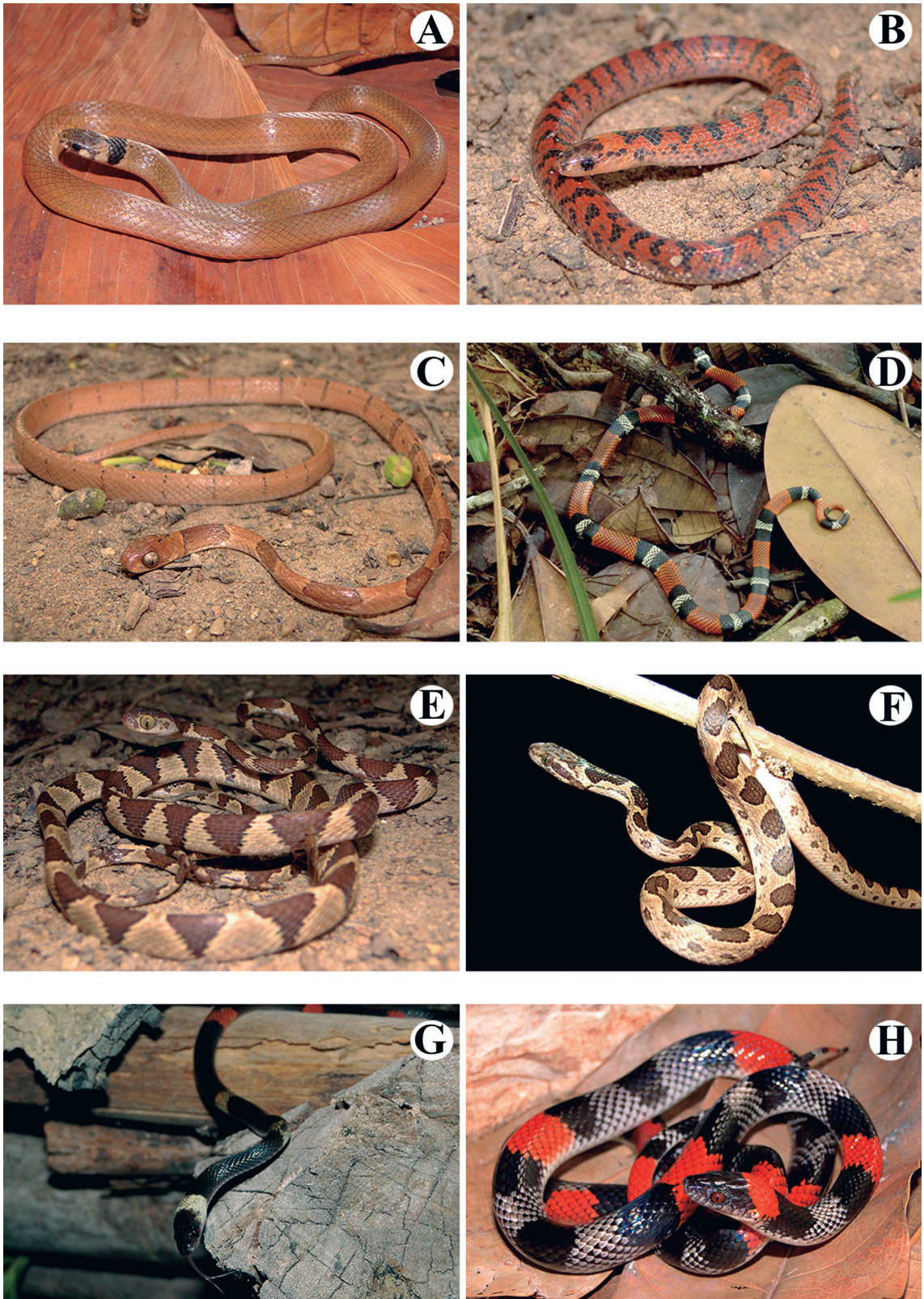


FIGURE 12: Reptile species recorded at the Serra do Urubu mountain range. (A) *Tantilla melanocephala*, (B) *Atractus potschi*, (C) *Dipsas sazimai*, (D) *Erythrolamprus aesculapii* (Photo by C.O. Gussoni), (E) *Imantodes cenchoa*, (F) *Leptodeira annulata*, (G) *Oxyrhopus petolarius* (Photo by C.O. Gussoni), (H) *Oxyrhopus trigeminus*.

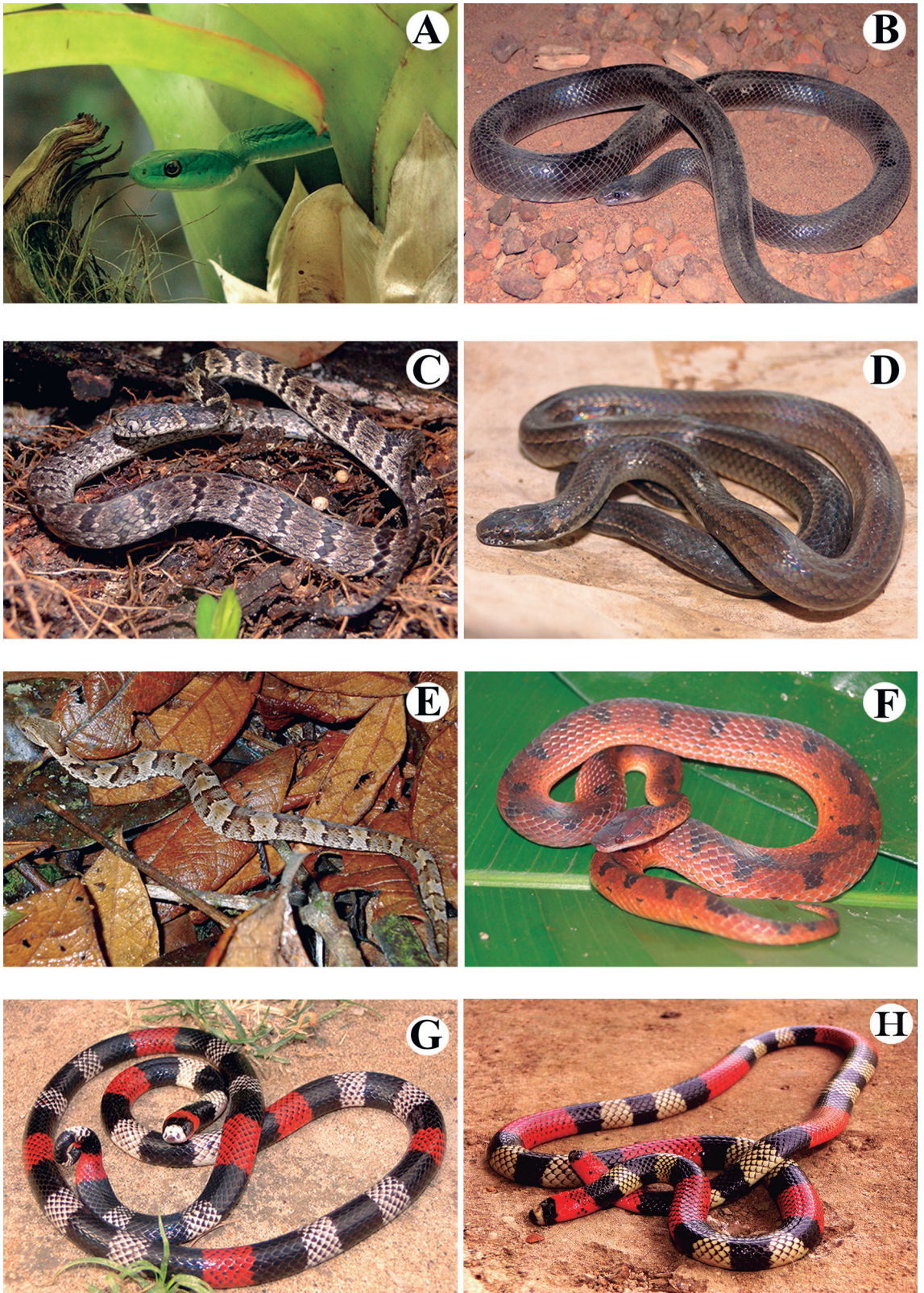


FIGURE 13: Reptile species recorded at the Serra do Urubu mountain range. (A) *Philodryas olfersii* (Photo by C.O. Gussoni), (B) *Pseudoboa nigra*, (C) *Sibynomorphus* sp. (D) *Taeniophallus affinis*, (E) *Xenodon* sp. (Photo by C.O. Gussoni), (F) *Xenopholis scalaris*, (G) *Micrurus* sp. (H) *Micrurus lemmiscatus carvalhoi*.



FIGURE 14: Reptile species recorded at the Serra do Urubu mountain range. (A) *Amerotyphlops arenensis*, (B) *Crotalus durissus*, (C) *Lachesis muta*.

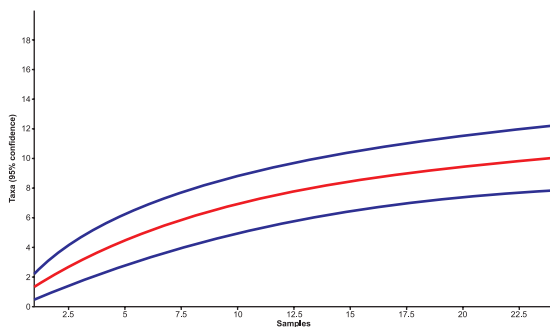


FIGURE 15: Sample rarefaction curve for lizards and amphibians in RPPN Pedra D'Antas, after 24 days of effort.

the taxonomy of the populations of *L. latrans* outside the type locality, state of Rio de Janeiro, is still unresolved and needs to be investigated. The individuals of Serra do Urubu do not have auxiliary dorsal folds, which differentiates them from *L. chaquensis* (de Sá *et al.*, 2014), and can be included in the *Leptodactylus latrans* complex.

Considering the inventory in the RPPN Frei caneca (Santos & Santos, 2011) and RPPN Pedra D'Antas we can affirm that the Serra do Urubu mountain range is the most diverse area of amphibians species in the Pernambuco state ($n = 46$ spp.), with 59% of the species that occur in the State (*see*

Santos & Carnaval, 2002; Moura *et al.*, 2011). The Serra do Urubu mountain range has one of the richest amphibian faunas of the Brazilian Atlantic Forest (*see* Dias *et al.*, 2014 for a review), and is the fourth richest area in the northeastern Atlantic Forest, only the Reserva Ecológica Michelin ($n = 48$ spp.) (Camurugi *et al.*, 2010), Serra da Jibóia and Serra do Timbó ($n = 53$ spp.) (Juncá, 2006), and RPPN Serra Bonita ($n = 80$ spp.) (Dias *et al.*, 2014), all in the state of Bahia, have a higher amphibian diversity.

Conservation status of amphibians at the Serra do Urubu mountain range

The majority of the species with occurrence at the Serra do Urubu are classified as least concern by the (IUCN, 2014) (76%, $N = 35$). Only five species are classified as data deficient: *Chiasmocleis alagoana*, *Gastrotheca pulchra*, *Boana freicanecae*, *Phyllodytes edelmoi* and *P. gyrinaethes*. However, according to the Brazilian National List of Endangered species *Chiasmocleis alagoana* (endangered) *P. gyrinaethes* (critically endangered) and *Hylomantis granulosa* (vulnerable) are at risk of extinction. (MMA, 2014). This gives the Serra do Urubu mountain range the status of the re-

TABLE 3: Distribution of the recorded reptile species along the study sites at RPPN Pedra D’Antas, municipality of Lagoa dos Gatos, Pernambuco, Brazil.

Lizards	Site 1	Site 2	Site 3	Site 4	Site 5
<i>Norops fuscoauratus</i>					1
<i>Dactyloa punctata</i>		1		1	
<i>Dryadosaura nordestina</i>			1	1	
<i>Enyalius</i> aff. <i>catenatus</i>		3	1	3	1
<i>Gymnodactylus darwini</i>	2	1			
<i>Mabuya nigropunctata</i>		1			
<i>Polychrus marmoratus</i>					1
<i>Tropidurus hispidus</i>					1
Serpentes					
<i>Corallus hortulanus</i>					1
<i>Lachesis muta</i>	2	1			
<i>Micrurus lemniscatus carvalhoi</i>				1	
<i>Sibynomorphus</i> sp.	2				
<i>Taeniophallus affinis</i>				1	
<i>Amerotyphlops arenensis</i>			3		
<i>Xenopholis scalaris</i>			2		

gion with most threatened amphibian species in the northeastern Atlantic Forest.

Some species had their conservation status evaluated by the IUCN red list almost ten years ago. This is the case for *Gastrotheca fissipes* classified as “Least concern”. This was considered to be a common species, with a wide geographic distribution from the coast zone up to 700 meters altitude, between the states of Pernambuco and Espírito Santo (Carnaval & Peixoto, 2004b). However, today it is known that at least two recently described species were confused with *G. fissipes*. *G. megacephala* which corresponds to the Atlantic Forest populations from South Bahia to Espírito Santo (Izecksohn *et al.*, 2009); and *G. recava*, the most generalist species, occurring from southeastern Bahia, south from the Reconcavo Bahiano (Teixeira Jr. *et al.*, 2012). Therefore *G. fissipes* is restricted to the Pernambuco Endemism Center, in the states of Pernambuco and Alagoas (Izecksohn *et al.*, 2009; Teixeira Jr. *et al.*, 2012). (Moura *et al.*, 2011) mentioned the occurrence of the species at the Parque Nacional de Dois Irmãos (200 hectares), municipality of Recife; Usina de São José (323 hectares), municipality of Igarassú; Brejo dos Cavalos (359 hectares), municipality of Caruaru; and Fazenda Buriti (110 hectares), municipality of Brejo da Madre de Deus; and found a population of this species at the Complexo Pedra do Cruzeiro (630 hectares), RPPN Frei Caneca, municipality of Jaqueira. The only documented record from the State of Alagoas is from the Estação Ecológica de Murici (Peixoto *et al.*, 2003), Conservation Unit with 6.116 hectares.

Despite the (IUCN, 2016) and (MMA, 2014) consider the species to be out of risk, the updated in-

formation on its restricted geographic distribution, and the habitat severely fragmented and disconnected in its occurrence area < 10.000 km², with a higher risk of habitat loss, makes this species feasible to be considered as Vulnerable B1ab (iii, iv).

Boana freicanecae, considered as data deficient by (IUCN, 2014), also has a very restricted distribution, it is only found at the type locality, in the Mata do Quengo region, at RPPN Frei Caneca, State of Pernambuco (Carnaval & Peixoto, 2004a; Santos & Santos, 2011; Moura *et al.*, 2011), and at Estação Ecológica de Murici, State of Alagoas (Cardoso *et al.*, 2006). The global geographic distribution of this species is less than 5.000 km², in isolated and fragmented areas. The presence of the fungi *Batrachochytrium dendrobatidis* in both areas of species occurrence (Carnaval *et al.*, 2006; Lisboa *et al.*, 2013), is another factor that can threaten the species survival. We believe that *B. freicanecae* should be classified as critically endangered B1ab (iii, iv).

Phyllodytes edelmoi is considered data deficient by (IUCN, 2014). The species distribution is similar to *P. gyrinaethes*, occurring in sympatry at Serra do Urubu and Estação Ecológica de Murici (Peixoto *et al.*, 2003; Roberto & Ávila, 2013). However this species is not restricted to the forested areas, occurring at forest edges, and open areas from sea level up to 650 a.s.l elevation (Peixoto *et al.*, 2003). At the Serra do Urubu mountain range the species was commonly found at Pedra do Cruzeiro Region, in the terrestrial bromeliads and at the forest edge. Other records of this species were from Mata do Catolé, municipality of Maceio. The species is endemic to the Pernambuco Endemism Center, occurring in fragmented areas with higher risk of deforestation, and can be classified as Vulnerable B1ab (iii, iv).

Chiasmocleis alagoana, considered as endangered by (MMA, 2014), occurs at the Engenho de Tapacurá, municipality of São Lourenço da Mata, Pernambuco State (Santos & Amorim, 2010), RPPN Pedra D’Antas, município de Jaqueira, Pernambuco, present study; Mata do Buraquinho, municipality of João Pessoa, State of Paraíba (Santana *et al.*, 2008), Mata do Catolé, municipality of Maceió and Mata do Cedro, municipality of Rio Largo, State of Alagoas Alagoas (Cruz *et al.*, 1999). It’s an explosive breeder species, reproducing in ephemeral ponds inside the forest (Nascimento & Skuk, 2006). At the Serra do Urubu mountain range only one individual was recorded, despite previous attempts to find the species in the region (Santos & Carnaval, 2002; Santos & Santos, 2011) showing the rarity of this species in the region.

Hylomantis granulosa is also a rare species at the Serra do Urubu mountain range, despite the occurrence of the species in disturbed areas in the RPPN Pedra D'Antas, the species was associated with the vegetation along the rocky streams inside the forest, being more abundant in the most pristine areas, such as Mata do Quengo at the RPPN Frei Caneca. Despite the rarity of the species in the region, *A. granulosa* has a wider geographic distribution than previously thought, occurring in the states of Alagoas, Bahia and Pernambuco (Haddad *et al.*, 2013); its wider geographic distribution doesn't match with the vulnerable category applied by the (MMA, 2014), so we agree with (Campos *et al.*, 2013) and (Carnaval & Peixoto, 2004c) who considered this species conservation status to be of least concern.

Reptiles

The reptile assemblage of the RPPN Pedra D'Antas is composed of a mix of forested and open area species, with the presence of rare species and/or considered endemic to other sub-biogeographical regions in the Atlantic Forest (*see* Roberto *et al.*, 2014).

Moura *et al.* (2011) compiled data regarding the reptiles of the RPPN Frei Caneca, and found a total of 19 species (10 species of lizards and nine snakes). Gathering the data of photographic records (Gussoni, C.O. personal archive, *pers. com.*) we were able to identify seven additional species records for the RPPN Frei Caneca: the lizards *Dactyloa punctata*, *Hemidactylus mabouia* and *Strobilurus torquatus*; and the snakes: *Crotalus durissus*, *Lachesis muta*, *Oxyrhopus petolarius* and *Xenodon* sp. When we combined the species of reptiles recorded at RPPN Pedra D'Antas and RPPN Frei Caneca (Serra do Urubu mountain range) we have a total of 42 species (24 snakes, 16 lizards and two amphisbaenids). This is the second most diverse area of the herpetofauna of Pernambuco state, after the Estação Ecológica de Tapacurá, municipality of São Lourenço da Mata, with 47 species of reptiles (Moura *et al.*, 2011).

Some species recorded at RPPN Pedra D'Antas deserve some consideration regarding their distribution and/or conservation status; discussed hereafter.

The snake *Xenopholis scalaris* has a predominantly Amazonian distribution, occurring in Brazil, Bolivia, Colombia, Ecuador, French Guyana and Peru (Duellman, 1978; Martins & Oliveira, 1999; Duellman, 2005; Jansen *et al.*, 2009; Ringler *et al.*, 2010). Even so the type locality is from a population at the Atlantic Forest of South Bahia, municipality of

São João da Mata (Wucherer, 1861); it has been recorded in the Atlantic Forest of Bahia, São Paulo and Rio de Janeiro states (Wucherer, 1861; Zaher *et al.*, 2011; Hamdan *et al.*, 2015). The record in the RPPN Pedra D'Antas is the first for the Pernambuco Endemism Center, increasing the geographic distribution of the species to an area 501 km north from its type locality. The species is considered rare in the Atlantic Forest and deserves be included in regional red lists along this biome (Hamdan *et al.*, 2015).

The record of *Erythrolamprus aesculapii* is the first for the state of Pernambuco. In northeastern Brazil the species was recorded previously in the states of Alagoas, Sergipe and Bahia (Uetz & Hösek, 2014)

Sibynomorphus sp. is an undescribed species, closely related to *S. neuwiedi* (Franco, F.L., *pers. com.*), previously thought to occur at the Brejos de altitude of Bananeiras and Pau-Ferro in the state of Paraíba, and at Brejo dos Cavalos, state of Pernambuco (Pereira-Filho & Montigelli, 2011), this is the first record of the species in the PEC.

Micrurus sp. corresponds to an undescribed species widely distributed in the Caatinga biome from sea level to about 800 meters of elevation (Guedes *et al.*, 2014).

Lachesis muta occurs mainly in primary forest but can occasionally be found in secondary disturbed forest (Campbell & Lamar, 2004; Rodrigues *et al.*, 2013b). The populations of the Atlantic Forest occur in very fragmented areas, with a higher risk of extinction because of the isolation of the forest fragments (Alves *et al.*, 2014). At the RPPN Pedra D'Antas the species was found in secondary forest close to rocky outcrops inside de forest, being one of the most captured snakes in this study. This highlights the importance of this forest fragment for the conservation of the species in northeastern Brazil.

The individuals of *Amerotyphlops arenensis* found at RPPN Pedra D'Antas present a particular low number of dorsal scales (197-205), when compared to the specimens of the type locality, municipality of Areia, State of Paraíba (204-225) (Graboski *et al.*, 2015), however the set of diagnostic characteristics agree with the description of *A. arenensis*, representing the second record outside the type locality, previously found by Roberto *et al.*, (2015) in the municipality of Quebrangulo, REBIO Pedra Talhada, in the state of Alagoas.

The taxonomic status of the *Enyalius catenatus* populations of the PEC also deserves attention. Rodrigues *et al.*, (2014) performed a phylogenetic and biogeographical analysis of *Enyalius*, and found the populations of *Enyalius catenatus* from the Atlantic

Forest in Alagoas State to be closely related to *Enyalius bibronii* instead of to the populations of *E. catenatus* from Bahia. The authors mentioned that the populations from Alagoas may represent a candidate species, deserving additional analyses and evaluation of additional specimens from these populations. Based on these findings we provisionally refer the populations of *E. catenatus* at the Serra do Urubu mountain range as *Enyalius* aff. *catenatus*, pending further phylogenetic and taxonomic studies. *Enyalius* aff. *catenatus* was the most common lizard species found at RPPN Pedra D'Antas, occurring both in secondary and primary forest.

Ophiodes sp. is probably an undescribed taxon. Unfortunately we did not capture any specimens, but based on the photographic record (Gussoni, C.O. personal archive, *pers. com.*), the specimens from Pedra D'Antas have a similar color pattern to the individuals from Serra da Ibiapaba, state of Ceará (see Loebmann & Haddad, 2010) and REBIO Pedra Talhada (Robert *et al.*, 2015). The collection of additional *Ophiodes* specimens from the humid forests of northeastern Brazil is still needed to assess the taxonomic status of these populations. The record of *Ophiodes* sp. is the first documented record from a locality within the State of Pernambuco. Moura *et al.*, (2011) mentioned the species occurrence in east Pernambuco, but didn't provide any reference regarding the locality or voucher specimens for this record.

FINAL REMARKS

The situation of the herpetofauna species in the Pernambuco Endemism Center is worrying; this sub-region is the most threatened and fragmented in the Atlantic Forest (Ribeiro *et al.*, 2009), suffering from high anthropic pressures (Tabarelli *et al.*, 2005). Studies on other faunal groups indicate that local population extinctions may result in less diverse communities.

Asfora & Pontes (2009), studying the small mammals in the fragments of Atlantic Forest in the PEC, found that the long history of deforestation in the region caused the extinction of the most specialized species, resulting in a less diverse community with many generalist species from open environments. A similar situation was found to exist for the large mammal assemblages at the RPPN Frei Caneca (Silva Jr. & Pontes, 2008); the authors conclude that 50% of the medium-sized and large sized mammals were extinct in this fragment. The entire remaining mammal community has a population density, which

lies below the viable minimum needed for long term survival.

Other alarming data are concern the bird species of the PEC, this region harbors 14 threatened taxa, 11 of them are endemic to this Atlantic Forest sub-region (Silveira *et al.*, 2003; Silva *et al.*, 2004; Barnett & Buzzetti, 2014; Pereira *et al.*, 2014), and three of them were recently considered extinct in the wild. These are *Cichlocolaptes mazarbarnetti*, *Glaucidium mooreorum* and *Philydor novaesi* (Pereira *et al.*, 2014; MMA, 2014). *Cichlocolaptes mazarbarnetti* and *Philydor novaesi* had a distribution similar to *Boana freicanecae* and *Phyllodytes gyrinaethes*, both these bird species are specialists in foraging in arboreal bromeliads. This illustrates the higher risk to specialized species of deforestation (Barnett & Buzzetti, 2014). For a series of important conservation actions proposed for the PEC (see Pereira *et al.*, 2014).

At the Serra do Urubu mountain range the elaboration and implementation of a management plan for both Conservation Units is extremely important. It is necessary to design and implement a proper zonation of the area, defining areas of integral protection, especially at the Mata do Quengo, Complexo do Cruzeiro at RPPN Frei Caneca, and Sites 4 and 5 at RPPN Pedra D'Antas where the most threatened species of amphibians *Hylomantis granulosa*, *Chiasmocleis alagoana*, *Gastrotheca fissipes*, *Boana freicanecae* and *Phyllodytes gyrinaethes* are concentrated.

RESUMO

O complexo da Serra do Urubu é considerado uma área chave para a conservação da biodiversidade, estando inserida no Centro de Endemismo de Pernambuco, uma das sub-regiões mais ameaçadas da Mata atlântica brasileira. Porém, apesar da alta importância dessa área, estudos relacionados com a herpetofauna local ainda são escassos. Para a elaboração da lista da herpetofauna da Serra do Urubu, foram feitas consultas na bibliografia, buscas em coleções herpetológicas e expedições de campo para a RPPN de Pedra D'Antas e RPPN Frei Caneca, localizadas nos municípios de Jaqueira e Lagoa dos Gatos. Uma discussão sobre o status de conservação dos anfíbios da região também foi realizada. Foram feitas cinco expedições entre os anos de 2012 e 2013, utilizando as metodologias de busca ativa em transectos lineares, censo auditivo e armadilhas de interceptação e queda. No total foram registrados 46 espécies de anfíbios anuros, pertencentes a nove famílias: Craugastoridae (3 spp.), Bufonidae (3 spp.), Ranidae (1 sp.), Hylidae (25 spp.), Leptodactylidae (8 spp.), Odontophrynidae (1 sp.), He-

miphraetidae (2 spp.), *Phyllomedusidae* (2 spp.) e *Microhylidae* (1 sp.). Com relação aos répteis foram registradas 42 espécies, sendo 16 de lagartos: *Phyllodactylidae* (1 sp.), *Gekkonidae* (1 sp.), *Gymnophthalmidae* (1 sp.), *Polychrotidae* (1 sp.), *Leiosauridae* (1 sp.), *Tropiduridae* (3 spp.), *Dactyloidae* (2 spp.), *Diploglossidae* (2 spp.), *Teiidae* (2 spp.), *Scincidae* (1 sp.), *Iguanidae* (1 sp.); e 24 de serpentes: *Boidae* (3 spp.), *Colubridae* (2 spp.), *Dipsadidae* (13 spp.), *Elapidae* (2 spp.), *Typhlopidae* (1 sp.), *Viperidae* (3 spp.). Espécies consideradas raras e/ou ameaçadas de extinção como as serpentes *Dipsas sazimai*, *Lachesis muta* e *Sibynomorphus* sp. e os anfíbios *Hylomantis granulosa*, *Chiasmocleis alagoana*, *Boana freicanecae* e *Phyllodytes gyrinaethes*, reforçam a necessidade de conservação dessa região de Mata atlântica extremamente ameaçada.

PALAVRAS-CHAVE: Anura; Nordeste do Brasil; Squamata; RPPN Pedra D'Antas.

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APPENDIX 1

Amphibians voucher specimens

Adenomera cf. *hylaedactyla* (URCA-H 552, 4157); *Chiasmocleis alagoana* (URCA-H 5092); *Dendropsophus branneri* (URCA-H 4171,4174,4181,5094,5122); *D. elegans* (URCA-H 4158, 5119, 6232, 6233); *D. haddadi* (URCA-H 6542); *D. minutus* (URCA-H 6227, 6235, 6238, 6339, 6243); *D. oliveirai* (URCA-H 5093, 5128); *Gastrotheca fissipes* (URCA-H 6539, 6545); *Boana albomarginata* (URCA-H 4141, 6236); *B. atlantica* (URCA-H 554); *B. crepitans* (URCA-H 547, 5113); *B. exastis* (URCA-H 551); *B. freicanecae* (URCA-H 6220, 6223, 6224); *B. semilineata* (URCA-H 4143, 4145, 4151, 4166); *Leptodactylus* cf. *latrans* (URCA-H 5106, 6221); *L. troglodytes* (URCA-H 5114, 6544); *Lithobates palmipes* (URCA-H 4147, 4148, 5078, 5080); *Phyllodytes edelmoi* (URCA-H 4169, 4175, 5089, 5091); *P. gyrinaethes* (URCA-H 4146, 4160, 4163, 4167); *Pithecopus nordestinus* (URCA-H 4149); *Physalaemus cuvieri* (URCA-H 6543); *Pristimantis* sp. (URCA-H 4153, 4159, 4164, 4165, 4173, 4176); *Proceratophrys renalis* (URCA-H 4138, 4139, 4142); *Pseudopaludicola mystacalis* (URCA-H 4172); *Rhinella crucifer* (URCA-H 4144, 4154, 4268); *R. granulosa* (URCA-H 562); *Scinax auratus* (URCA-H 4156, 4170, 4179); *S. eurydice* (URCA-H 5079, 5081, 5083); *S. fuscomarginatus* (URCA-H 5134); *S. x-signatus* (URCA-H 5115-5117); *S. clade ruber* (URCA-H 6540); *S. nebulosus* (URCA-H 4162, 5086, 6234, 6237).

APPENDIX 2

Reptile voucher specimens

Amphisbaena alba (URCA-H 6207); *A. pretrei* (URCA-H 6209); *Dactyloa punctata* (URCA-H 4183, 5064, 5069); *Atractus potschi* (URCA-H 5136); *Corallus hortulanus* (URCA-H 5105); *Dipsas sazimai* (URCA-H 5097); *Dryadosaura nordestina* (URCA-H 5135, 6222); *Enyalius* aff. *catenatus* (URCA-H 4131, 4133-4134, 5059-5063); *Gymnodactylus darwini* (URCA-H 4180, 5118, 5120); *Imantodes cenchoa* (URCA-H 5101); *Lachesis muta* (URCA-H 4152); *Leptodeira annulata* (URCA-H 6546); *Mabuya nigropunctata* (URCA-H 5066-5068); *Micrurus* sp. (URCA-H 5076); *Micrurus lemniscatus carvalhoi* (URCA-H 5098); *Oxyrhopus petiolaris* (URCA-H 5102, 6229); *Polychrus marmoratus* (URCA-H 4137, 6212); *Pseudoboa nigra* (URCA-H 5104); *Sibynomorphus* sp. (URCA-H 4135, 5100); *Taeniophallus affinis* (URCA-H 4136); *Tantilla melanocephala* (URCA-H 5077); *Tropidurus hispidus* (URCA-H 4132, 4150); *T. semitaeniatus* (URCA-H 5070); *Amerotyphlops arenensis* (URCA-H 5074, 5103, 5137); *Xenopholis scalaris* (URCA-H 5099, 6210, 6211).