

Amphibians from the Centro Marista São José das Paineiras, in Mendes, and surrounding municipalities, State of Rio de Janeiro, Brazil

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Abstract. The amphibian fauna of Brazil is one of the richest in the world, however, there is a lack of information on its diversity and distribution. More studies are necessary to increase our understanding of amphibian ecology, microhabitat choice and use, and distribution of species along an area, thereby facilitating actions for its management and conservation. Herein, we present a list of the amphibians found in one remnant area of Atlantic Forest, at Centro Marista São José das Paineiras and surroundings. Fifty-one amphibian species belonging to twenty-five genera and eleven families were recorded: Anura - Aromobatidae (one species), Brachycephalidae (six species), Bufonidae (three species), Craugastoridae (one species), Cycloramphidae (three species), Hylidae (twenty-four species), Hylodidae (two species), Leptodactylidae (six species), Microhylidae (two species), Odontophrynidae (two species); and Gymnophiona - Siphonopidae (one species). Visits to herpetological collections were responsible for 16 species of the previous list. The most abundant species recorded in the field were *Crossodactylus gaudichaudii*, *Hypsiboas faber*, and *Ischnocnema parva*, whereas the species *Chiasmocleis lacrimae* was recorded only once.

Keywords: Anura, Atlantic Forest, Biodiversity, Gymnophiona, Inventory, Check List.

Introduction

The Atlantic Forest extends along a great part of the Brazilian coast (Bergallo et al., 2000), formerly occupying an area of approximately 1.227.600 km² (Myers et al., 2000). Over the last two centuries, this biome has suffered from logging and cultivation of coffee, sugar cane and cocoa (Myers, 1988). As a result, the Atlantic Forest currently consists of 91,930 km² (7.5%) of its original vegetation cover, of which only 33,084 km² (2.7%) are protected (Myers et al., 2000). In fact, the few preserved fragments of forest are difficult to access due to land topography and its non-profitable

characteristics. The largest fragment of Atlantic Forest is located in the Serra do Mar mountain range, extending from the coast of São Paulo to the coast of Rio de Janeiro (Ribeiro et al., 2009).

The high precipitation in the Atlantic Forest domain (Bergallo et al., 2000) and the great latitudinal extension and altitudinal variation, from sea level to 2700 m (Pinto and Brito, 2005) are responsible for the different habitats found in this biome, such as restinga, mangrove, lowland forest, rainforest and cloud forest, contributing to its great biodiversity (Bergallo et al., 2000; Fundação SOS Mata Atlântica/INPE, 2010). The Atlantic Forest also has a high level of endemism (40% of vegetation and 42% of vertebrates), being one of the 25 biodiversity hotspots in the world (Myers et al., 2000). Among the vertebrates, amphibians are responsible for about 90% of those species endemic to this biome (Myers et al., 2000).

Brazil presents one of the richest amphibian faunas, with 946 species described (SBH, 2012), of which 64% are endemic (IUCN, 2013). New species are also frequently being described (e.g. Cruz et al., 2011; Da Silva and Alves-Silva, 2011; Pombal and Izecksohn, 2011). The identification of amphibian species and the

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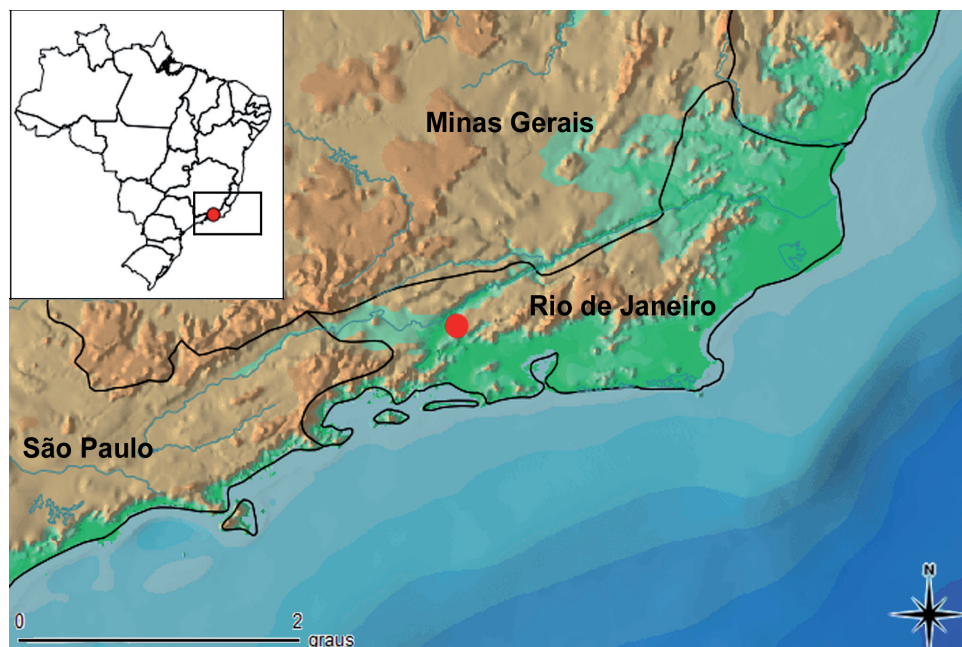


Figure 1. Centro Marista São José das Paineiras (red circle), Vassouras microregion, state of Rio de Janeiro, southeastern Brazil.

study of their ecology are fundamental for the success of conservationist actions (Heyer *et al.*, 1994) and, therefore, greater effort to this end should be encouraged. Moreover, a worldwide decline in amphibian species has been observed (Gardner, 2001), especially in the Atlantic Forest, where abundant species are gradually disappearing (Weygoldt, 1989). However, the threat level that these animals are facing is hard to infer due to the lack of adequate information on the natural history, taxonomy and distribution of species (Young *et al.*, 2001).

Several studies have been conducted in the Atlantic Forest domain (Silvano and Pimenta, 2003), in the northern (Silveira *et al.*, 2009; Almeida-Gomes *et al.*, 2010; Siqueira *et al.*, 2011), central (Almeida-Gomes *et al.*, 2008; Silva-Soares *et al.*, 2010) and southeastern (Carvalho-e-Silva *et al.*, 2008; Silva *et al.*, 2008; Pederassi *et al.*, 2011) regions of the state of Rio de Janeiro. Herein, we present a list of the amphibians found in one remnant area of Atlantic Forest, at Centro Marista São José das Paineiras (CMSJP), in the municipality of Mendes, state of Rio de Janeiro, southeastern Brazil. Amphibians of surrounding municipalities are also presented in order to enrich the list of species that may occur in the studied area.

Material and Methods

Study area

The study was conducted at Centro Marista São José das Paineiras (CMSJP), municipality of Mendes, microregion of Vassouras, located in the south-central region of the state of Rio de Janeiro, southeastern Brazil (Figure 1). Herpetological collections were consulted to improve the data, and included the municipalities of Engenheiro Paulo de Frontin, Miguel Pereira and Paracambi, located in the same microregion, in addition to Barra do Pirai and Pirai. All these municipalities are located in the south-central region of Rio de Janeiro, bordering the municipality of Mendes.

Centro Marista São José das Paineiras (22.50°S, 43.75°W, Datum “Córrego Alegre”) consists of 250 ha and an elevation of 431 meters a.s.l. and presents a well preserved area of primary forest (CMSJP, 2013).

Climate and Vegetation

The municipalities are part of the Atlantic Forest morphoclimatic domain (Ab’Saber, 1977) presenting warm and wet weather, with average annual temperature of 22°C (Ribeiro, 1998; Da Luz *et al.*, 2007). According

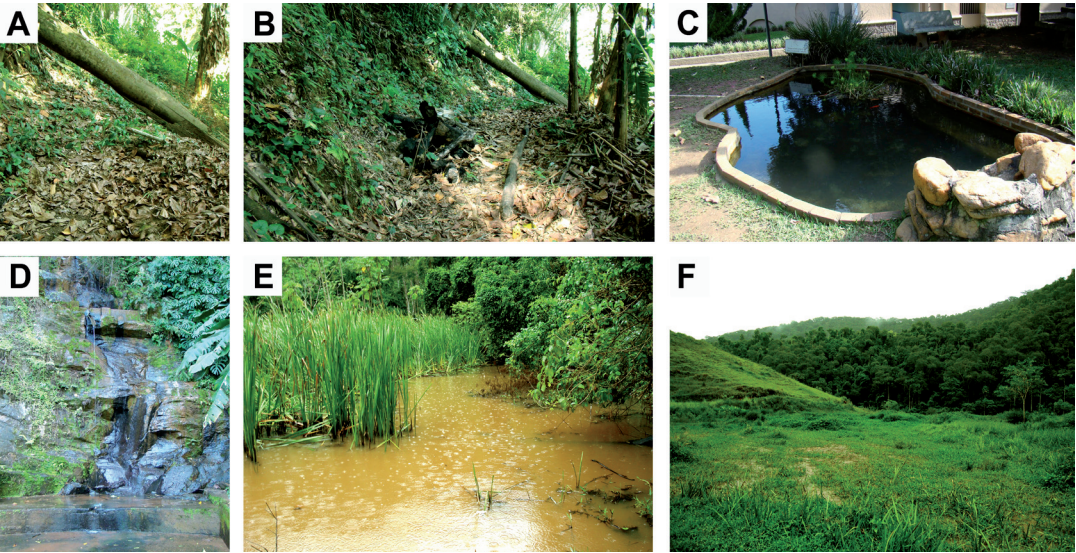


Figure 2. Some sampling sites in CMSJP. (A and B) Trails inside the forest with litter; (C) Artificial lake; (D) Waterfall; (E) Permanent marsh in open area; (F) Pond in the edge of a forest near the pasture. Photos A, B, C and D by Julia Bruner. Photos E and F by Beatriz Camisão and Luisa C. Alexandre.

to the Köppen classification, the climate is “cwa-type”, presenting a warm and rainy summer, with January being the hottest month of the year, and July the coldest (Furusawa and Cassino, 2006). Average rainfall is 1.200 mm per year (Nimer, 1989; Furusawa and Cassino,

2006). According to Rizzini (1979), this region is within the range of the Serra do Mar, with elevation ranging from 300 to 800 meters, and vegetation characterized as Lower Montane Rainforest.

Table 1. Description of the sampling sites at Centro Marista São José das Paineiras (CMSJP). Missing data (---) were provided to the sampling sites which had several coordinated. Coordinates datum = “Córrego alegre”.

Sampling sites	Description	Abbreviation	Coordinate
Trails	Trails inside the forest, with leaves accumulated on the ground, high trees and bromeliads.	Tr	-----
Waterfall	Small trickle of water associated with stones.	Wf	22.513917°S; 43.754639°W
Artificial Lake	Small oval rocky tank with marginal vegetation.	AL	22.514111°S; 43.754333°W
Marsh	Swamp in open area near the pasture, about 20 meters in length, depth ranging from one to four meters.	Ma	22.518556°S; 43.756306°W
Pond on forest edge	Flat area flooded in the rainy season that extends over a wide area, in the dry season stays restricted to the edges of the stream that bathes it.	PE	22.518083°S; 43.724667°W
Stream inside Forest	Small stream inside the forest that stretches for some trails.	SF	22.513556°S; 43.755139°W
Pond inside Forest	Flooded permanently bathed by a stream, situated within a trail.	PF	22.512500°S; 43.757083°W
Temporary pond inside Forest	Temporary pond in the forest, flooded in the rainy season.	TP	22.510278°S; 43.755417°W

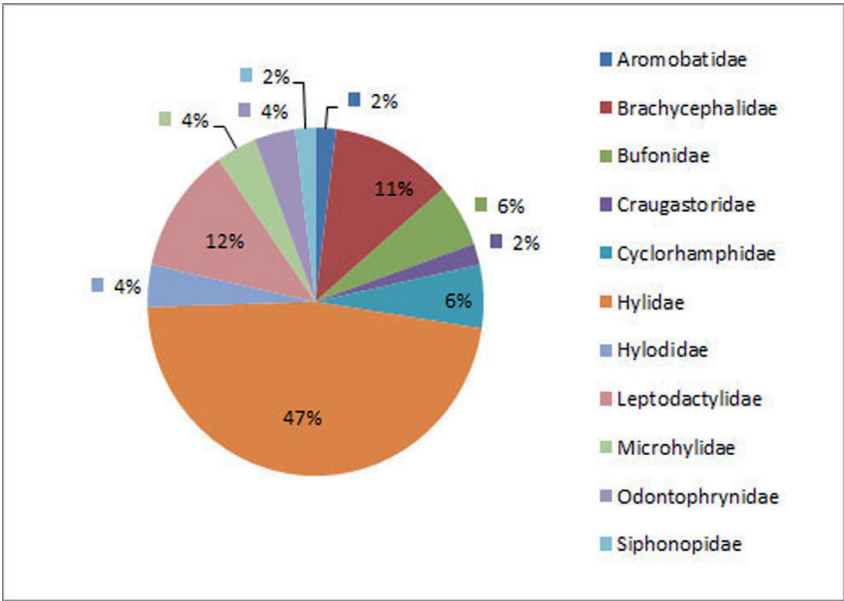


Figure 3. Relative diversity of the amphibian families recorded in CMSJP and surrounding municipalities, Rio de Janeiro state, southeastern Brazil.

Sampling

Fieldwork at CMSJP was carried out between April 2009 and December 2013, over the course of sixteen trips, each lasting three days and three nights, totalling forty-eight days in the wet and dry seasons. The search effort was carried out equally at all sampling sites. Visual and auditory surveys were conducted during the day and at night. The searches for amphibians were performed by looking under rocks, under trunks, in tree hollows, in bromeliads, under the leaf litter as well as in marshes, temporary and permanent ponds and streams (Figure 2). For the capture of tadpoles, sieves and funnel traps were used. Descriptions of sampling sites at CMSJP are presented in Table 1. Adults and tadpoles were collected, photographed, and then anesthetized and fixed according to Calleffo (2002). Specimens are deposited in the Amphibian Collection (ZUF RJ) of the Departamento de Zoologia, Universidade Federal do Rio de Janeiro (collecting permit 12164-ICMBio).

For the municipalities surrounding Mendes, data was gathered from the zoological collections at the Universidade Federal do Estado do Rio de Janeiro (Coleção de Anfíbios da Universidade Federal do Estado do Rio de Janeiro – UNIRIO), Universidade Federal Rural do Rio de Janeiro (Coleção Eugênio Izecksohn

– EI), Universidade Federal do Rio de Janeiro, Museu Nacional (Coleção de Anfíbios do Museu Nacional – MNRJ) and Universidade Federal do Rio de Janeiro (Coleção de Anfíbios do Departamento de Zoologia - ZUF RJ), covering more than 40 years of fieldwork. Examined specimens are given in Appendix 1.

The district of Sacra Família do Tinguá, municipality of Engenheiro Paulo de Frontin (22.53°S, 43.67°W, Datum “Córrego Alegre”) is 16 km from CMSJP, and is highlighted here due to the large number of amphibians collected there periodically, between 1969 and 1993.

Results and Discussion

Fifty-one species (Table 2) of amphibians were recorded and included data from surveys and herpetological collections, distributed among 25 genera and 11 families (Figure 3): Anura – Aromobatidae (one species), Brachycephalidae (six species), Bufo (three species), Craugastoridae (one species), Cycloramphidae (three species), Hylidae (24 species), Hylodidae (two species), Leptodactylidae (six species), Microhylidae (two species), and Odontophrynidae (two species); and Gymnophiona – Siphonopidae (one species).

Table 2. List of amphibian species (Frost 2013) from Barra do Pirai (BP), Centro Marista São José das Paineiras (CMSJP), Engenheiro Paulo de Frontin (EPF), Mendes (Md), Miguel Pereira (MP), Paracambi (Pa), Pirai (Pi), Sacra Família do Tinguá (SFT), and Vassouras (Va), South-Central Fluminense region, Rio de Janeiro state. Sampling sites: Artificial Lake (AL), Marsh (Ma), Pond inside Forest (PF), Pond on forest edge (PE), Stream inside Forest (SF), Temporary pond inside forest (TP), Trails (Tr), Waterfall (Wf). Missing sampling sites (---) were provided to the species that were found just on herpetological collections. Sample numbers does not reflect abundance. *Conservation status according IUCN (2013).

Taxa	Adult (N)	Tadpoles (N samples)	Locality	Conservation status*	Sampling sites
ORDER ANURA					
FAMILY AROMOBATIDAE Grant, Frost, Caldwell, Gagliardo, Haddad, Kok, Means, Noonan, Schargel, and Wheeler, 2006					
<i>Allobates olfersioides</i> (Lutz, 1925)	7		SFT and EPF	Vulnerable	---
FAMILY BRACHYCEPHALIDAE Günther, 1858					
<i>Brachycephalus didactylus</i> (Izecksohn, 1971)	8		SFT and EPF	Least Concern	---
<i>Brachycephalus margaritatus</i> Pombal and Izecksohn, 2011	2		SFT	Least Concern	---
<i>Ischnocnema parva</i> (Girard, 1853)	30		CMSJP, SFT, Md, EPF, Va, MP and Pa	Least Concern	Tr
<i>Ischnocnema cf. guentheri</i> (Steindachner, 1864)	18		CMSJP, EPF, Pa and Pi	Least Concern	Tr
<i>Ischnocnema hoehnei</i> (Lutz, 1958)	1		SFT	Least Concern	---
<i>Ischnocnema octavioi</i> (Bokermann, 1965)	6		CMSJP SFT and EPF	Least Concern	Tr
FAMILY BUFONIDAE Gray, 1825					
<i>Dendrophryniscus brevipollicatus</i> Jiménez de la Espada, 1870	2		SFT	Least Concern	---
<i>Rhinella icterica</i> (Spix, 1824)	12		CMSJP, EPF, MP, Pa and BP	Least Concern	PE and Ma
<i>Rhinella ornata</i> (Spix, 1824)	18		CMSJP, Md, EPF, MP, Pi and BP	Least Concern	PE and Ma
FAMILY CRAUGASTORIDAE Hedges, Duellman, and Heinicke, 2008					
<i>Haddadus binotatus</i> (Spix, 1824)	17		CMSJP, EPF, MP and Pa	Least Concern	Tr
FAMILY CYCLORAMPHIDAE Bonaparte, 1850					
<i>Cycloramphus brasiliensis</i> (Steindachner, 1864)	6		Pa and Pi	Near Threatened	---
<i>Thoropa miliaris</i> (Spix, 1824)	6		CMSJP and Pa	Least Concern	Wf e PE
<i>Zachaeus parvulus</i> (Girard, 1853)	17		CMSJP, SFT and EPF	Least Concern	TP
FAMILY HYLIDAE Rafinesque, 1815					
<i>Aplastodiscus eugenioi</i> (Carvalho-e-Silva and Carvalho-e-Silva, 2005)	11	1	CMSJP, SFT and EPF	Near Threatened	PF and Tr
<i>Bokermannohyla circumdata</i> (Cope, 1871)	19		EPF and Pi	Least Concern	---
<i>Dendropsophus anceps</i> (Lutz, 1929)	4		CMSJP	Least Concern	Ma
<i>Dendropsophus berthaltutae</i> (Bokermann, 1962)	2	1	CMSJP and Pi	Least Concern	Ma
<i>Dendropsophus bipunctatus</i> (Spix, 1824)	4		CMSJP, Md and Pa	Least Concern	Ma
<i>Dendropsophus decipiens</i> (Lutz, 1925)	9	1	CMSJP	Least Concern	Ma
<i>Dendropsophus aff. decipiens</i> (Lutz, 1925)	2		CMSJP		Ma
<i>Dendropsophus elegans</i> (Wied-Neuwied, 1824)	9	1	CMSJP and EPF	Least Concern	Ma and PE
<i>Dendropsophus meridianus</i> (B. Lutz, 1954)	15	1	CMSJP, Md and EPF	Least Concern	Ma and PE
<i>Dendropsophus minutus</i> (Peters, 1872)	11		CMSJP and Pi	Least Concern	Ma
<i>Hypsiboas albomarginatus</i> (Spix, 1824)	7	1	CMSJP, Md, EPF and Pa	Least Concern	Ma and AL
<i>Hypsiboas albopunctatus</i> (Spix, 1824)	3		EPF, Va and Pa	Least Concern	---
<i>Hypsiboas faber</i> (Wied-Neuwied, 1821)	18	2	CMSJP, EPF and MP	Least Concern	Ma, PF and AL
<i>Hypsiboas pardalis</i> (Spix, 1824)	6	1	SFT CMSJP, EPF and Pa	Least Concern	Wf and PE
<i>Hypsiboas semilineatus</i> (Spix, 1824)	73	1	CMSJP, Md, EPF, Va, MP, Pa, Pi and BP	Least Concern	Ma and PE
<i>Phyllomedusa burmeisteri</i> Boulenger, 1882	21	1	CMSJP, Md and EPF	Least Concern	Tr, Ma and AL
<i>Scinax alter</i> (Lutz, 1973)	4		CMSJP and EPF, Pa and Pi	Least Concern	Ma
<i>Scinax cuspidatus</i> (A. Lutz, 1925)	1		MP	Least Concern	---
<i>Scinax fuscovarius</i> (Lutz, 1925)	30		CMSJP, Md and MP	Least Concern	AL
<i>Scinax hayii</i> (Barbour, 1909)	3		SFT, CMSJP and EPF, MP, Pi	Least Concern	AL and Ma
<i>Scinax humilis</i> (A.Lutz and B. Lutz, 1954)	12		EPF, Pa and Pi	Least Concern	---
<i>Scinax similis</i> (Cochran, 1952)	2		CMSJP	Least Concern	---
<i>Scinax trapicheiroi</i> (A.Lutz and B. Lutz, 1954)	14		CMSJP and Pi	Near Threatened	SF and Wf
<i>Trachycephalus mesophaeus</i> (Hensel, 1867)	3		CMSJP	Least Concern	AL

Table 2. Continued.

FAMILY HYLODIDAE Günther, 1858						
<i>Crossodactylus gaudichaudii</i> Duméril and Bibron, 1841	30	2	CMSJP, Md, EPF, MP and Pi	Least Concern	SF	
<i>Hylodes phyllodes</i> Heyer and Cocroft, 1986	1		Pi	Data Deficient	---	
FAMILY LEPTODACTYLIDAE Werner, 1896						
<i>Adenomera marmorata</i> (Steindachner, 1867)	30		CMSJP, Md and EPF	Least Concern	Tr	
<i>Leptodactylus fuscus</i> (Schneider, 1799)	2		CMSJP and EPF	Least Concern	Ma, PE and AL	
<i>Leptodactylus latrans</i> (Linnaeus, 1758)	6		CMSJP, Md, MP and Pi	Least Concern	Ma, PE, AL and Wl	
<i>Leptodactylus mystacinus</i> (Burmeister, 1861)	1		CMSJP	Least Concern	Ma	
<i>Physalaemus cuvieri</i> Fitzinger, 1826	1		Pi	Least Concern	---	
<i>Physalaemus signifier</i> (Girard, 1853)	1		EPF	Least Concern	---	
FAMILY MICROHYLIDAE Günther, 1858						
<i>Chiasmocleis lacrimae</i> Peloso, Sturaro, Forlani, Gaucher, Motta, and Wheeler, 2014	4	1	CMSJP	Endangered	TP	
<i>Myersiella microps</i> (Duméril and Bibron 1841)	3		Md	Least Concern	---	
FAMILY ODONTOPHRYNIDAE Lynch, 1969						
<i>Proceratophrys appendiculata</i> (Günther, 1873)	1		MP	Least Concern	---	
<i>Proceratophrys boiei</i> (Wied-Neuwied, 1824)	13		CMSJP, EPF and MP	Least Concern	Tr	
ORDER GYMNOPTERODONTOMORPHI						
FAMILY SIPHONOPIDAE Bonaparte, 1850						
<i>Siphonops hardyi</i> Boulenger, 1888	1		CMSJP and Pa	Least Concern	Tr	

Visits to the zoological collections added 16 species not found in the field at CMSJP (Table 2; Appendix 1): *Allobates olfersioides*, *Brachycephalus didactylus*, *B. margaritatus*, *Bokermannohyla circumdata*, *Cycloramphus brasiliensis*, *Dendrophryniscus brevipollicatus*, *Hypsiboas albopunctatus*, *Hylodes phyllodes*, *Ischnocnema hoehnei*, *Myersiella microps*, *Physalaemus cuvieri*, *P. signifer*, *Proceratophrys appendiculata*, *Scinax cuspidatus*, *S. humilis* and *S. similis*.

According to the Red List of the International Union for Conservation of Nature (IUCN, 2013), the species *Aplastodiscus eugenioi* (Figure 4A) and *Scinax trapicheiroi* (Figure 4K) are classified as “Near Threatened”; *Chiasmocleis lacrimae* (= *C. carvalhoi* in the current IUCN’s website version; Figure 5H) as “Endangered” because their distribution is less than 500 km²; and *Allobates olfersioides* as “Vulnerable”. The other species are classified as “Least Concern”. However, *C. lacrimae* can be easily found in other regions of Rio de Janeiro State (Silva et al., 2008; Salles et al., 2009; Silva-Soares et al., 2010) and other states, such as Bahia (Pimenta et al., 2002), São Paulo (Araújo et al., 2009; Cicchi et al., 2009) and Espírito Santo (Tonini et al., 2010).

During the fieldwork at CMSJP, the most abundant species were *Crossodactylus gaudichaudii* (Figure 5E), *Hypsiboas faber* and *Ischnocnema parva*. *Chiasmocleis*

lacrimae was captured only once, on a rainy day at a temporary pond inside the forest, the highest and best preserved site at CMSJP. According to Izecksohn and Carvalho-e-Silva (2001), this species has an explosive breeding behaviour in ponds newly formed by intense rainfall, conditions that were present when it was collected.

Allobates olfersioides was recorded in Sacra Família do Tinguá (SFT) only in 1970 and 1971. It is a diurnal species found in leaf litter (Izecksohn and Carvalho-e-Silva, 2001). Despite its wide distribution, many populations have declined (Weygoldt, 1989; Izecksohn and Carvalho-e-Silva, 2001), and one of the assumptions for this fact is the presence of the fungus *Batrachochytrium dendrobatidis*, which was recorded in at least one population of the species (Carnaval et al., 2006). This fungus is suggested as being responsible for the decline of many species of amphibians around the world (Daszak et al., 1999; Weldon et al., 2004).

Dendrophryniscus brevipollicatus was recorded in SFT only in 1993. This fact may be due to the deforestation in the region, since this species depends on bromeliads in preserved areas (Izecksohn and Carvalho-e-Silva, 2001; Moraes et al., 2007).

Scinax trapicheiroi is endemic to the state of Rio de Janeiro and can be found in the coastal mountains. The type-locality of this species is the municipality of Rio de Janeiro, with distribution as far as Maricá, Saquarema,

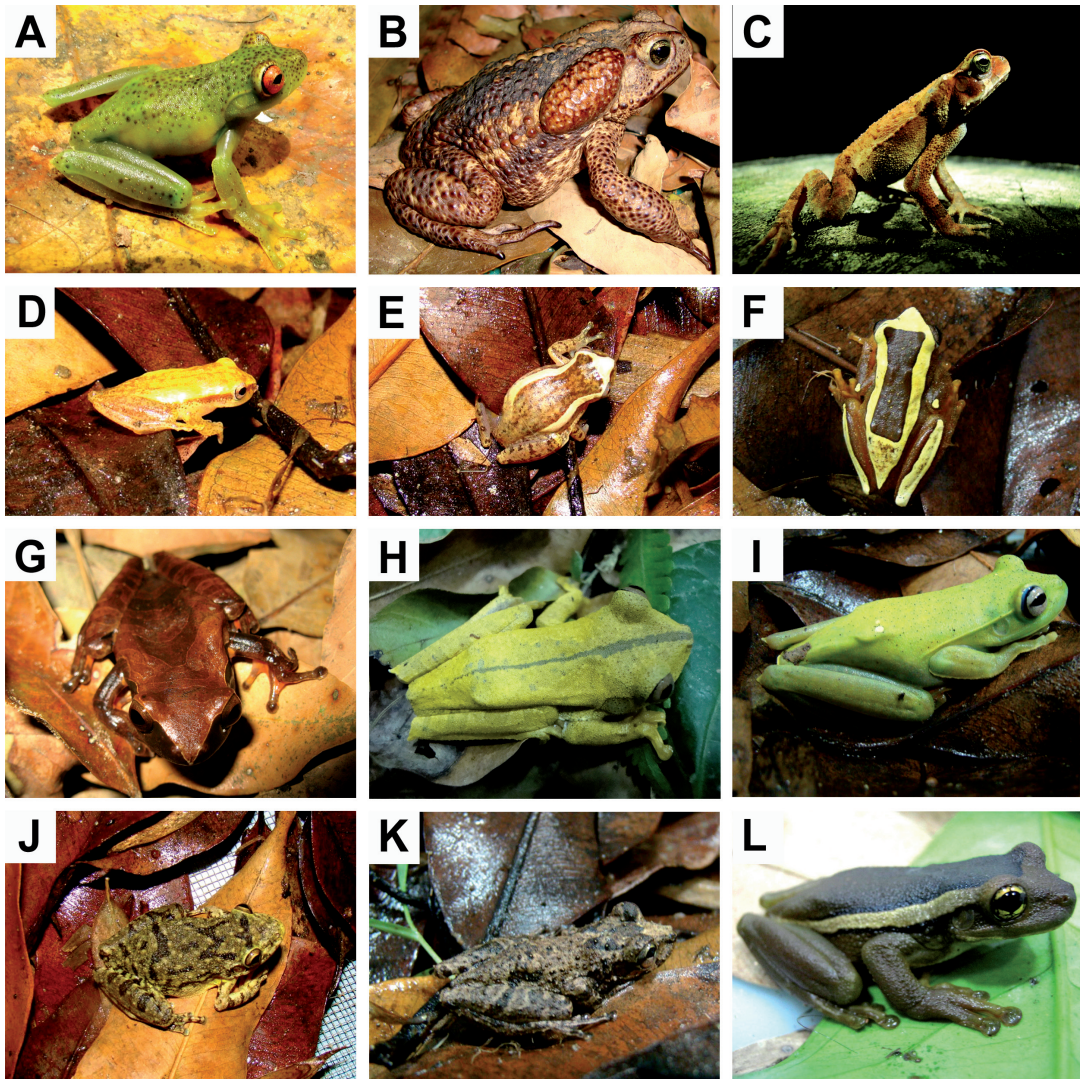


Figure 4. Specimens of anurans recorded at Centro Marista São José das Paineiras, Mendes, state of Rio de Janeiro, southeastern Brazil; A) *Aplastodiscus eugenioi*; B) *Rhinella icterica*; C) *R. ornata*; D) *Dendropsophus* aff. *decipiens*; E) *D. decipiens*; F) *D. elegans*; G) *D. anceps*; H) *Hypsiboas semilineatus*; I) *H. albomarginatus*; J) *Scinax fuscovarius*; K) *S. trapicheiroi*; L) *Trachycephalus mesophaeus*. Photos A and C by Vanessa Onofre. Photos D, E, F, G, I, J and K by Julia Bruner. Photos B and H by Beatriz Camisão and Luisa C. Alexandre.

Piraí, Ilha Grande, Angra dos Reis, Mangaratiba (Luna-Dias et al., 2009) and Bom Jesus de Itabapoana (Silveira, 2011). At CMSJP, *S. trapicheiroi* is found in abundance, thus a revision in its status in the Red List of the International Union for Conservation of Nature is suggested.

Ischnocnema octavioi is known from Floresta da Tijuca (type-locality), municipality of Rio de Janeiro, Reserva Ecológica de Guapiaçu, municipality of Cachoeiras de Macacu; municipality of Casimiro de Abreu, all in the state of Rio de Janeiro, and from the municipality of Matilde, in the state of Espírito Santo (Rocha et al. 2007; Vrcibradic et al., 2008; Frost, 2013). This species was recorded for the municipalities of Engenheiro Paulo

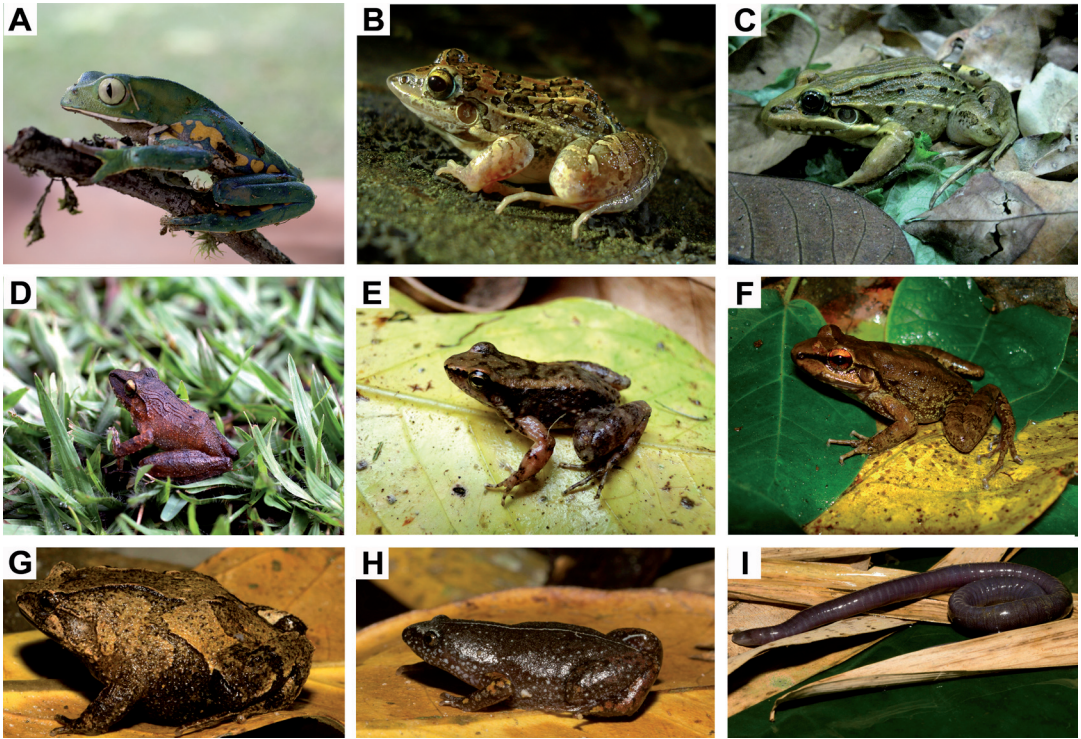


Figure 5. Specimens of anurans recorded at Centro Marista São José das Paineiras, Mendes, state of Rio de Janeiro, southeastern Brazil: A) *Phyllomedusa burmeisteri*; B) *Leptodactylus fuscus*; C) *L. latrans*; D) *Haddadus binotatus*; E) *Crossodactylus gaudichaudii*; F) *Thoropa miliaris*; G) *Zachaenus parvulus*; H) *Chiasmocleis lacrimae*; I) *Siphonops hardy*. Photos A, D, G, H and I by Axel Katz. Photo C by Beatriz Camisão and Luisa C. Alexandre. Photos B, E and F by Gisela Sobral.

de Frontin, Mendes and Pirai, extending its distribution 70 km NW from the type-locality. In spite of being commonly found in open areas and, although classified as least concern, its population is declining (IUCN, 2013).

According to Frost (2013), *Aplastodiscus eugenioi* occurs in the range of the Serra do Mar, in the adjacent portions of the states of Rio de Janeiro and São Paulo, in elevations up to 300 meters a.s.l. and *Dendropsophus bipunctatus* is restricted to coastal regions from the state of Bahia to Rio de Janeiro. Both species have been recorded in CMSJP, at an elevation of 431 m, representing new data for these species.

At CMSJP, *Aplastodiscus eugenioi*, *Dendropsophus elegans*, *D. meridianus*, *Hypsiboas albomarginatus* (Figure 4I), *H. faber*, *H. pardalis*, *H. semilineatus* (Figure 4H), *Leptodactylus fuscus* (Figure 5B), *L. latrans* (Figure 5C), *Phyllomedusa burmeisteri* (Figure

5A), *Rhinella icterica* (Figure 4B), *R. ornata* (Figure 4C), *Scinax hayii*, *S. trapicheiroi* and *Thoropa miliaris* (Figure 4F) were found in more than one sampling site (see Table 2). The sampling site “Marsh” was the site where most species were recorded, showing the great importance of that environment for the present study (Figure 6).

There is little information published on the fauna of amphibians from the South Central region of the state of Rio de Janeiro. This study shows the importance of this area that, although disturbed, still presents some fragments of preserved forest, harbouring 51 species. The CMSJP represents a potential area for conservation, since 35 of the 51 species recorded were found there, including species classified as “Near Threatened” (*Aplastodiscus eugenioi* and *Scinax trapicheiroi*), “Endangered” [*Chiasmocleis lacrimae* (= *C. carvalhoi*)] and “Vulnerable” (*Allobates olfersioides*). Moreover,

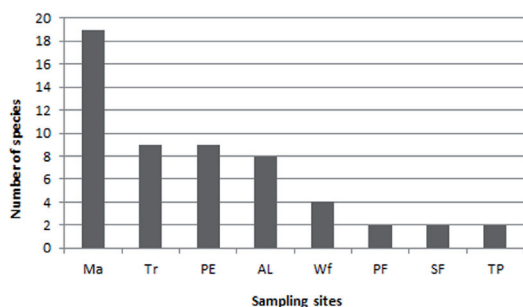


Figure 6. Number of species per sampling site. Marsh (Ma), Trails (Tr), Pond on forest edge (PE), Artificial lake (AL), Waterfall (Wf), Pond inside forest (PF), Stream inside forest (SF) and Temporary pond inside forest (TP).

the distribution ranges of *Aplastodiscus eugenioi*, *Dendropsophus bipunctatus*, and *Ischnocnema octavioi* were extended. Recently, the species *Brachycephalus margaritatus* was described from this region (Pombal and Izecksohn, 2011).

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References

- Ab'saber, A.N. (1977): Os domínios morfoclimáticos na América do Sul. Primeira aproximação. *Geomorfologia*, **52**: 1-22.
- Almeida-Gomes, M., Vrcibradic, D., Siqueira, C.C., Kiefer, M.C., Klaion, T., Almeida-Santos, P., Nascimento, D., Ariani, C.V., Borges-Junior, V.N.T., Freitas-Filho, R.F., Van Sluys, M. Rocha, C.F.D. (2008): Herpetofauna of an Atlantic Rain forest area (Morro São João) in Rio de Janeiro State, Brazil. *Anais da Academia Brasileira de Ciências*, **80**(2): 291-300.
- Almeida-Gomes, M., Almeida-Santos, M., Goyannes-Araújo, P., Borge-Júnior, V.N.T., Vrcibradic, D., Siqueira, C. C., Ariani, C.V., Dias, A.S., Souza, V.V., Pino, R.R., Van Sluys, M., Rocha, C.F.D. (2010): Anurofauna of an Atlantic Rain forest fragment and its surroundings in Northern Rio de Janeiro State, Brazil. *Brazilian Journal of Biology*, **70**(3): 871-877.
- Araújo, O.G.S., Toledo, L.F., Garcia, P.C.A., Haddad, C.F.B. (2009): The amphibians of São Paulo State. *Biota Neotropica*, **9**(4): 197-209.
- Bergallo, H. G.; Rocha, C.F.D.; Alves, M. A. S., Sluys, M.V. (2000): A Fauna Ameaçada de Extinção do Estado do Rio de Janeiro. Ed UERJ. 166 pp.
- Calleffo, M.E.V. (2002): Anfíbios. In: Técnicas de coleta e preparação de vertebrados para fins científicos e didáticos, p.43-74. Auricchio, P., Salomão, M.G. Eds., São Paulo, Instituto Pau Brasil de História Natural.
- Carnaval, A.C.O.Q.; Puschenдорф, R.; Peixoto, O.L.; Verdade, V.K., Rodrigues, M.T. (2006): Amphibian Chytrid Fungus Broadly Distributed in the Brazilian Atlantic Rain Forest. *Eco Health*, **3**(1): 41-48.
- Carvalho-E-Silva, A.M.T., Da Silva, G.R., Carvalho-e-Silva, S.P. (2008): Anuros da Reserva Rio das Pedras, Mangaratiba, RJ, Brasil. *Biota Neotropica*, **8**(1): 199-209.
- Cicchi, P.J.P., Serafim, H., Sena, M.A., Centeno, F.C., Jim, J. (2009): Herpetofauna em uma área de Floresta Atlântica na Ilha Anchieta, município de Ubatuba, sudeste do Brasil. *Biota Neotropica*, **9**(2): 201-212.
- CMSJP. Centro Marista São José das Paineiras. (2013): Disponível em: <http://marista.edu.br/hospedagem/2010/07/05/centro-marista-sao-jose-das-paineiras>. Last accessed on 10 December 2013.
- Cruz, C.A.G.; Nunes, I., De Lima, M.G. (2011): A new *Scinax* Wagler belonging to the *S. catharinae* clade (Anura: Hyliidae) from the State of Alagoas, northeastern Brazil. *Zootaxa*, **3096**: 18-26.
- Da Luz, C.F.P., Thomé, M.L., Barth, O.M. (2007): Recursos tróficos de *Apis mellifera* (Hymenoptera, Apidae) na região de Morro Azul do Tinguá, Estado do Rio de Janeiro. *Revista Brasileira de Botânica*, **30**(1): 29-36.
- Da Silva, H.R., Alves-Silva, R. (2011): A new bromeligenous species of the *Scinax perpusillus* group from the hills of the State of Rio de Janeiro, Brazil (Anura, Hyliidae). *Zootaxa*, **3043**: 54-68.
- Daszak, P., Berger, L., Cunningham, A.A., Hyatt, A.D. Green, D.E., Speare, R. (1999): Emerging Infectious Diseases and Amphibian Population Declines. *Emerging Infectious diseases*, **5**(6): 735-748.
- Frost, D.R. (2013): Amphibian Species of the World: an Online Reference. Versions 5.6 (9 January, 2013). Electronic Database accessible at: <http://research.amnh.org/vz/herpetology/amphibia/>. American Museum of Natural History, New York, USA. Last accessed on 28 October 2013.
- Fundação S.O.S. Mata Atlântica/INPE (2010): Atlas dos Remanescentes Florestais da Mata Atlântica Período 2008-2010, Dados Parciais dos Estados Avaliados até Maio de 2010 – Relatório. Fundação S.O.S Mata Atlântica/INPE, São Paulo.
- Furusawa, G.P., Cassino, P.C.R. (2006): Ocorrência e Distribuição de Calliphoridae (Diptera, Oestroidae) em um Fragmento de Mata Atlântica Secundária no Município de Engenheiro Paulo de Frontin, Médio Paraíba, RJ. *Revista de biologia e ciências da terra*, **6**(1):152-164.

- Gardner, T. (2001): Declining amphibian populations: a global phenomenon in conservation biology. *Animal Biodiversity and Conservation*, **24**(2): 25-44.
- Heyer, W.R., Donnely, M.A., Mcdiarmid, R.W., Hayek, L.C., Foster, M.S. (1994): Measuring and monitoring biological diversity. Standard methods for Amphibians. Smithsonian Institution Press, Washington. 384pp.
- IUCN. International Union for the Conservation of Nature (2013): Electronic Database accessible at: <http://www.iucn.org>. Last accessed on 28 October 2013
- Izecksohn, E., Carvalho-E-Silva, S.P. (2001): Anfíbios do Município do Rio de Janeiro. Editora UFRJ. Rio de Janeiro.
- Luna-Dias, C., Carvalho-E-Silva, S.P., Carvalho-E-Silva, A.M.P.T. (2009): Amphibia, Anura, Hylidae, *Scinax trapicheiroi*: Distribution extension. *CheckList*, **5**(2): 251-253.
- Moraes, R. A. D., Sawaya, R. J., Barrella, W. (2007): Composição e diversidade de anfíbios anuros em dois ambientes de Mata Atlântica no Parque Estadual Carlos Botelho, São Paulo, sudeste do Brasil. *Biota Neotropica* **7**(2): 1-10.
- Myers, N. (1988): Threatened Biotas: "Hot Spots" in Tropical Forests. *The Environmentalist* **8**(3): 187-208.
- Myers, N.; Mittermeier, R.A.; Mittermeier, C.G.; Da Fonseca, G.A.B, Kent, J. (2000): Biodiversity Hotspots for Conservation Priorities. *Nature*, **403**: 853-858.
- Nimer, E. (1989): Climatologia do Brasil. Instituto Brasileiro de Geografia e Estatística – IBGE, Rio de Janeiro, RJ, 421 pp.
- Pederassi, J., Lima, S.C.S.L., Souza, C.A.Dos S. (2011): Avaliação ecológica rápida de anfíbios anuros da RPPN Fazenda do Tanguá, Angra dos Reis, RJ, Brasil. *Anais do X Congresso de Ecologia do Brasil*, São Lourenço, MG, p 1-2.
- Pimenta, B.V.S., Cruz, C.A.G., Dixo, M. (2002): Geographic distribution: *Chiasmocleis carvalhoi*. *Herpetological Review*, **33**(3): 219.
- Pinto, L.P., Brito, C.W. (2005): Dinâmica da perda da biodiversidade na Mata Atlântica brasileira: uma introdução, pp. 27-30. In: C. Galindo-Leal & I. de G. Câmara (Eds.). *Mata Atlântica: Biodiversidade, ameaças e perspectivas*. Belo Horizonte. Fundação SOS Mata Atlântica and Conservação Internacional do Brasil.
- Pombal Jr., J.P., Izecksohn, E. (2011): Uma nova espécie de *Brachycephalus* (Anura, Brachycephalidae) do Estado do Rio de Janeiro. *Papéis Avulsos de Zoologia. Museu de Zoologia da Universidade de São Paulo*, **51**(28): 443-451.
- Ribeiro, L.S. (1998): Município de Engenheiro Paulo de Frontin, um pouco de sua história e da sua gente. Editora Sólón Ribeiro, Rio de Janeiro.
- Ribeiro, M.C., Metzger, J.P., Martensen, A.C., Ponzoni, F.J., Hirota, M. M. (2009): The Brazilian Atlantic Forest: How much is left, and how is the remaining forest distributed? Implications for conservations. *Biological Conservation*, **142**: 1141-1153.
- Rizzini, C.T. (1979): Tratado de fitogeografia do Brasil: aspectos ecológicos. São Paulo: Hucitec Edusp, v.2, 374 pp.
- Rocha, C.F.D., Vrcibradic, D., Kiefer, M.C. Almeida-Gomes, M., Borges-Junior, V.N.T., Carneiro, P.C.F., Marra, R.V., Almeida-Santos, P., Siqueira, C.C., Goyannes-Araújo, P., Fernandes, C.G.A., Rubião, E.C.N. and Van Sluys, M. (2007): A survey of the leaf-litter frog assembly from the Atlantic forest area (Reserva Ecológica de Guapiaçu) in Rio de Janeiro State, Brazil, with an estimate of frog densities. *Tropical Zoology*, **20**(1): 99-108.
- Salles, R.O.L., Weber, L.N., Siva-Soares, T. (2009): Amphibia, Parque Natural Municipal da Taquara, municipality of Duque de Caxias, state of Rio de Janeiro, Southeastern Brasil. *CheckList*, **5**(4):840-854.
- SBH. Sociedade Brasileira de Herpetologia. (2012): Brazilian reptiles – List of species. Electronic Database accessible at: <http://www.sberpetologia.org.br>. Last accessed on 26 July 2012.
- Silva, H.R., Carvalho, A.L.G., Bittencourt-Silva, G.B. (2008): Anfíbios da Marambaia: um remanescente naturalmente isolado de Restinga e Floresta Atlântica do Sudeste do Brasil. *Biota Neotropica*, **8**(4): 167-174.
- Silva-Soares, T., Hepp, F., Costa, P.N., Luna-Dias, C., Gomes, M.R., Carvalho-e-Silva, A.M.P.T., Carvalho e Silva, S.P. (2010): Anfíbios anuros da RPPN Campo Escoteiro Geraldo Hugo Nunes, Município de Guapimirim, Rio de Janeiro, Sudeste do Brasil. *Biota Neotropica*, **10**(2): 225-233.
- Silvano D.L., Pimenta B.V.S. (2003): Diversidade e distribuição de anfíbios na Mata Atlântica do Sul da Bahia. Corredor de Biodiversidade na Mata Atlântica do Sul da Bahia. CD-ROM, Ilhéus.
- Silveira, A.L., Salles, R.O.L., Pontes, R.C. (2009): Primeiro registro de *Rhinellapombali* e novos registros de *R. crucifer* e *R. ornata* no Estado do Rio de Janeiro, Brasil (Amphibia, Anura, Bufonidae). *Biotemas*, **22**(4): 231-235.
- Silveira, A.L. (2011): Geographic distribution: *Scinax trapicheiroi*. *Herpetological Review*, **42**: 109.
- Siqueira, C.C., Vrcibradic, D., Almeida-Gomes, M., Menezes, V.A., Borges-Junior, V.N.T., Hatano, F.H., Pontes, J.A.L., Goyannes-Araújo, P., Guedes, D.M., Van Sluys, M., Rocha, C.F.D. (2011): Composição de espécies e estimativa de densidade da anurofauna em uma área dentro do mais setentrional dos grandes remanescentes de Mata Atlântica (Parque Estadual do Desengano) do Estado do Rio de Janeiro, Brasil. *Biota Neotropica*, **11**(4): 131-137.
- Tonini, J.F.R., Carão, L.M., Pinto, I.S., Gasparini, J.L., Leite, Y.L.R., Costa, L.P. (2010): Tetrápodes não voadores da Reserva Biológica de Duas Bocas, Estado do Espírito Santo, Sudeste do Brasil. *Biota Neotropica*, **10**(3): 339-351.
- Vrcibradic, D., Almeida-Gomes, M., Sluys, M.V., Rocha, C.F.D. (2008): Amphibia, Anura, *Hylodes charadranaetes*, *Ischnocnema octavioi*, and *Euparkerella cochranæ*: Distribution extension. *Check List*, **4**(1): 103-106.
- Weldon, C. Du Preez, L.H, Hyatt, A.D. Muller, R., Speare, R. (2004): Origin of the Amphibian Chytrid Fungus. *Emerging Infectious Diseases*, **10**(12): 2100-2105.
- Weygoldt, P. (1989): Changes in the composition of mountains stream frog communities in the Atlantic mountains of Brazil: frogs as indicators of environmental deteriorations? *Studies on Neotropical Fauna and Environment*, **234**(4): 249-255.
- Young, B.E., Lips, K.R., Reaser, J.K., Ibanez, R., Salas, A.W., Cedeno, J.R., Coloma, L.A., Ron, S., La Marca, E., Meyer, J.R., Munoz, A., Bolanos, F., Chaves, G., Romo, D. (2001): Population declines and priorities for amphibian conservation in Latin America. *Conservation Biology*, **15**:1213-1223.

Appendix 1

Material examined -

ANURA:

Aromobatidae: *Allobates olfersioides* (EI: 8598-8600, 9942- 9945);

Brachycephalidae: *Brachycephalus didactylus* (ZUF RJ: 483, 484, 1274-1279), *Brachycephalus margaritatus* (MNRJ: 70100, 70101), *Ischnocnema parva* (ZUF RJ: 3155-3160, 6079, 11284-11286, 11292, 11297-11301, 11304, 11313-11315, 11321, 11322, 11903, 11979-11984, 11991-12001, 12143-12149, 12862-12866, 12888-12896, 13151-13153, 13784-13787, 13897, 13898, 13925, 14116-14123, 14277; EI: 7639-7654, 7658-7677, 7678-7680, 9957-9963, 10208-10214, 10881-10895), *Ischnocnema cf. guentheri* (ZUF RJ: 11287, 11294, 11296, 11989, 11990, 12004, 12005, 12150, 13154, 13782, 13787, 13886-13889, 13923, 13924, 14271), *Ischnocnema hoehnei* (EI: 8861), *Ischnocnema octavioi* (ZUF RJ: 13863, 13864, 13900, 14264; EI: 8583; MNRJ: 76534);

Bufo nidae: *Dendrophryniscus brevipollicatus* (ZUF RJ: 6077, 6078), *Rhinella icterica* (ZUF RJ: 11307-11309, 11869-11871, 11884, 13147, 13770-13773), *Rhinella ornata* (ZUF RJ: 11310-11312, 11872, 11873, 11892, 12903, 13148, 13775-13777, 13916, 13917, 14103-14105; EI: 10206, 10207);

Craugastoridae: *Haddadus binotatus* (ZUF RJ: 11303, 11905, 11987, 12873, 12899-12902, 13405, 13419, 13575, 13885, 13890, 14102, 14266; EI: 8745, 8783);

Cycloramphidae: *Cycloramphus brasiliensis* (MNRJ: 79603, 85492-96), *Thoropa miliaris* (ZUF RJ: 11288, 12141, 12142, 12877, 13404, 13774), *Zachaeus parvulus* (ZUF RJ: 3161, 13896; EI: 8594, 8595, 8747-8752, 9783-9788, 9892);

Hylidae: *Aplastodiscus eugenioi* (ZUF RJ: 5918, 11904, 12023 (tadpole), 12151, 12278, 12861, 13929, 14100, 14274; EI: 7526; MNRJ: 30677, 85497), *Bokermannohyla circumdata* (MNRJ: 21640-57, 21717), *Dendropsophus anceps* (ZUF RJ: 11886, 13568, 13569, 14269), *Dendropsophus berthaltzuae* (ZUF RJ: 12883 (tadpole), 13556, 14403), *Dendropsophus bipunctatus* (ZUF RJ: 11895, 12878, 13554, 14275), *Dendropsophus decipiens* (ZUF RJ: 13546-13553, 13793 (tadpole), 13920), *Dendropsophus aff. decipiens* (ZUF RJ: 13557, 13558), *Dendropsophus elegans* (ZUF RJ: 11889, 11896, 11900, 12020 (tadpole), 13559, 13560, 13873, 14101, 14272, 14273), *Dendropsophus meridianus* (ZUF RJ: 11881, 11890, 11899, 11901, 12024 (tadpole), 12910, 13157, 13542-13545, 13867-13871), *Dendropsophus minutus* (ZUF RJ: 11898, 12875, 12876, 13158-13161, 13781, 13783, 13880; EI: 10399), *Hypsiboas albomarginatus* (ZUF RJ: 11885, 12139, 12140, 13576, 13797 (tadpole),

13874, 13919, 14399), *Hypsiboas albopunctatus* (MNRJ: 20107, 51284, 79609), *Hypsiboas faber* (ZUF RJ: 11319, 11320, 11876-11880, 11883, 12027 (tadpole), 12138, 12858, 12859, 12884 (tadpole), 12860, 13570, 13778, 13883, 13884, 13918, 14267), *Hypsiboas pardalis* (ZUF RJ: 6073, 11897, 12028 (tadpole), 13879, 14268; EI: 10051, 10052), *Hypsiboas semilineatus* (ZUF RJ: 11894, 13794 (tadpole), 13875; EI: 8207-8261, 8484-8495, 10161), *Phyllomedusa burmeisteri* (ZUF RJ: 6074, 6075, 11887, 11888, 13561-13567, 13865, 13866, 13921, 13928 (tadpole); EI: 7430-7433, 8328, 9660-9669), *Scinax alter* (ZUF RJ: 11893, 12874, 13555, 13872), *Scinax cuspidatus* (MNRJ: 30698), *Scinax fuscovarius* (ZUF RJ: 1280-1283, 11291, 11882, 12153, 12912, 13571, 13572, 13860-13862, 13922; EI: 8329-8332, 8389, 8390, 8392, 10431-10436; MNRJ: 29813-29815), *Scinax hayii* (ZUF RJ: 6076, 12022, 13577), *Scinax humilis* (MNRJ: 76526-76533, 85501-04), *Scinax similis* (ZUF RJ: 13926, 13927), *Scinax trapicheiroi* (ZUF RJ: 11290, 12137, 12869-12872, 12911, 13150, 13779, 14109-14112, 14279), *Trachycephalus mesophaeus* (ZUF RJ: 12857, 13915, 14265);

Hylodidae: *Crossodactylus gaudichaudii*: (ZUF RJ: 11289, 12002, 12003, 12021 (tadpole), 12152, 12274-12277, 12279, 12280, 12281, 12730 e 12731 (tadpole), 12868, 12879-12882, 12904-12909, 13072, 13155, 13156, 13891-13894, 14113-14115, 14278; EI: 8579; MNRJ: 81114, 3075, 30692, 85533-34), *Hylodes phyllodes* (MNRJ: 85500);

Leptodactylidae: *Adenomera marmorata* (ZUF RJ: 11316, 11317, 11985, 11986, 12867, 13573, 13574, 13780, 13876-13878, 14276; EI: 8077-8108, 9658, 10008, 10561-10569), *Leptodactylus fuscus* (ZUF RJ: 11902, 13882), *Leptodactylus latrans* (ZUF RJ: 11305, 11306, 11318, 11891, 13146, 13881), *Leptodactylus mystacinus* (ZUF RJ: 14508), *Physalaemus cuvieri* (MNRJ: 85505), *Physalaemus signifer* (MNRJ: 21090);

Microhylidae: *Chiasmocleis lacrimae* (UNIRIO: 4078, 4079, 4081 (tadpole), 4080; ZUF RJ: 13788), *Myersiella microps* (ZUF RJ: 6383; EI: 9845, 9846);

Odontophrynidae: *Procerathophrys boiei* (ZUF RJ: 3154, 11293, 11302, 11874, 11875, 12006, 12897, 12898, 13895, 14106-14108, 14270); *Procerathophrys appendiculata* (MNRJ: 36524).

GYMNOPHIONA:

Siphonopidae: *Siphonops hardyi* (ZUF RJ: 14124).