



**FAZENDA TRAPSA, A REFUGE OF MAMMALIAN DIVERSITY IN SERGIPE,  
NORTHEASTERN BRAZIL**

**Renata Rocha Déda Chagas<sup>1</sup>**

renata\_deda118@hotmail.com

**Eduardo M. Santos Júnior<sup>2</sup>**

e.marques@pitheciineactiongroup.org

**João Pedro Souza-Alves<sup>1</sup>**

joao.pedro@pitheciineactiongroup.org

**Stephen F. Ferrari<sup>3</sup>**

ferrari@pq.cnpq.br

<sup>1</sup> Programa de Pós-graduação em Desenvolvimento e Meio Ambiente, Universidade Federal de Sergipe, São Cristóvão, SE, Brazil.

<sup>2</sup> Programa de Pós-graduação em Ecologia e Conservação Universidade Federal de Sergipe, São Cristóvão, SE, Brazil.

<sup>3</sup> Departamento de Biologia, Universidade Federal de Sergipe, São Cristóvão, SE, Brazil.

**RESUMO**

**Fazenda Trapsa, um refúgio de diversidade de mamíferos de médio e grande porte em Sergipe, nordeste do Brasil.** Trabalhos de campo recentes na Fazenda Trapsa, uma propriedade privada localizada no Estado de Sergipe, tem revelado uma diversidade inesperada de mamíferos de médio e grande porte, apesar do seu relativo isolamento, intensa fragmentação e área total de floresta limitada (<500ha). Há mais de quinze anos o proprietário tem protegido sua fauna e flora. Esta fauna inclui espécies de mamíferos ameaçadas, além de um predador alfa, *Puma concolor* (Linnaeus, 1771). Esta área também é uma das únicas três em que ocorrem em simpatria duas espécies de primatas ameaçados, *Callicebus coimbrai* Kobayashi and Langguth, 1999 e *Cebus xanthosternos* Wied-Neuwied, 1826. O local também constitui uma extensão da distribuição geográfica de *Bradypus torquatus* Desmarest, 1816. O local tem um importante papel a exercer na conservação dos ecossistemas locais, especialmente em associação com outros fragmentos maiores de florestas mais ao sul.

**Palavras-chave:** Mamíferos, conservação, espécies ameaçadas, Sergipe.

**ABSTRACT**

**Fazenda Trapsa, a refuge of mammalian diversity in Sergipe, northeastern Brazil.** Recent fieldwork at the Fazenda Trapsa, a privately-owned site in the Brazilian state of Sergipe has revealed an unexpected diversity of mammals, despite its relative isolation, intense fragmentation and limited total area of forest (<500ha). The property's owner has protected its fauna and flora over the past fifteen years. This fauna includes endangered species of, mammals, in addition to an alpha predator, *Puma concolor* (Linnaeus, 1771). This is also one of only three sites at which two endangered primate species – *Callicebus coimbrai* Kobayashi and

Langguth, 1999 and *Cebus xanthosternos* Wied-Neuwied, 1826 – are known to occur in sympatry. The site also constitutes an important range extension for a third endangered species, *Bradypus torquatus* Desmarest, 1816. The site clearly has an important role to play in the conservation of local ecosystems, especially in association with other larger fragments of forest further south.

**Key Words:** Mammals, conservation, endangered species, Sergipe.

## INTRODUCTION

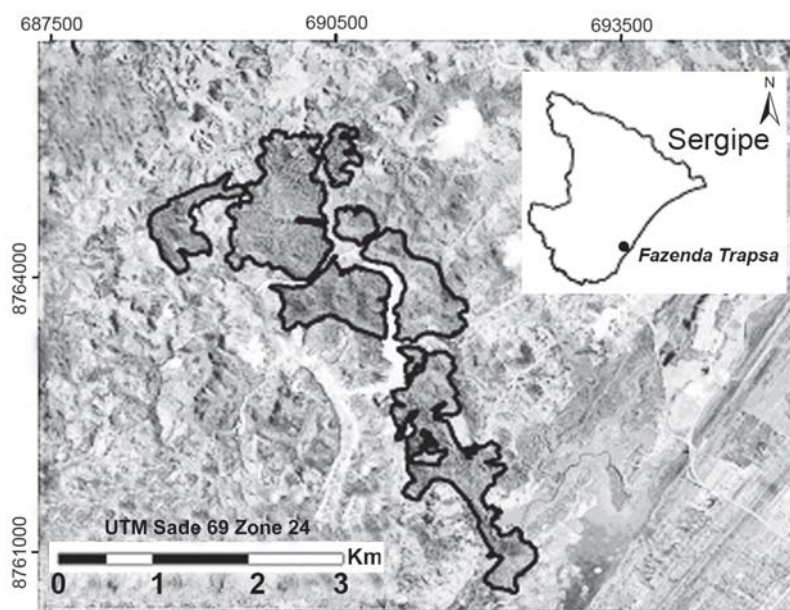
Less than half of the small Brazilian state of Sergipe was originally covered in Atlantic Forest, and some estimates (e.g. SIQUEIRA and RIBEIRO 2001) put the remaining cover at less than 1%, although a recent review, SANTOS (2009) has revealed that deforestation rates are similar to the average for the biome, with a little over 8% of the original cover remaining. However, this forest is distributed in isolated fragments of no more than 900 hectares, and mostly of less than 300 ha (JERUSALINSKY *et al.*, 2006).

Much of the recent conservation effort in the Atlantic Forest of Sergipe has concentrated on the primates, for a number of reasons, including their high degree of endemism, their ecological prominence, and their potential as flagship species (OLIVEIRA *et al.*, 2008). Until very recently, very little was known of the mammalian fauna of Sergipe (see OLIVEIRA *et al.*, 2005), although the discovery of Coimbra-Filho's titi, *Callicebus coimbrai*, by KOBAYASHI and LANGGUTH (1999), in particular, has revitalized interest in the region's fauna, with often surprising results, such as the discovery of a number of dozen sites at which this species occurs (JERUSALINSKY *et al.*, 2006).

One of these sites is the Fazenda Trapsa, in the south of the state, where fieldwork has been ongoing since 2006. Preliminary observations at the site indicated a relatively rich fauna of large-bodied mammals, despite the fact that the total area of forest is of only median size, by local standards. Subsequent research at the site has revealed that this locality has considerable potential for the conservation of the region's Atlantic Forest.

Fazenda Trapsa (11°12'S, 37°14'W) is an abandoned shrimp farm in the southern Sergipe municipality of Itaporanga d'Ajuda. While the property covers a total area of some 4000 hectares, the reserve of Atlantic Forest (Figure 1) is formed by a mosaic of eight fragments, varying in some from around 20 to 120 hectares. Since 1993, the property has been located within a state environment protection area (APA Litoral Sul: GOMES *et al.*, 2006), and the owner has prohibited hunting or other exploitation of natural resources from within the forest reserve.

Given its proximity to coastal formations (Figure 1) and in particular its extremely sandy soils, the vegetation is an arboreal restinga, with a species composition typical of the Atlantic Forest (SCARANO, 2002) but a canopy rarely exceeding a height of 15 m, and abundant lianas. A reservoir extends in



**Figure 1** - Aerial photograph of the Fazenda Trapsa, Sergipe, showing the forest reserve (outlined) and reservoir (white area). The striated area to the east is the coastal plain.

a north-south direction between the fragments of forest. While the habitat has suffered some modification over recent years, such as selective logging and localized fires, it is relatively well-preserved overall, with areas of both mature and secondary forest (CHAGAS, 2009; SOUZA-ALVES, 2010).

## METHODS

The collection of data on the local fauna began in September 2006, when initial surveys of the fragments were conducted, with the primary aim of assessing the local population of *Callicebus coimbrai* (SANTOS JUNIOR, 2007). Records of this species were collected with the aid of a playback system, in which a loudspeaker is used to broadcast recordings of titi vocalizations, to which the animals will normally respond by vocalizing or approaching the source of the broadcast.

Subsequently, CHAGAS (2009) conducted line transect surveys of the mammal populations in the four largest fragments at the site, covering a total distance of 476 km along eight different transects. Ongoing fieldwork at

the site is focusing on the ecology and behavior of *C. coimbrai* (SOUZA-ALVES, 2010), and includes the use of camera traps at trapping stations.

Records of mammals include direct observation of individuals, recognition of vocalizations, and the identification of tracks, feces, and burrows. Identification of tracks was based BECKER and DALPONTE (1999).

## RESULTS AND DISCUSSION

The surveys at Fazenda Trapsa provided records of 14 medium- to large-bodied mammal species (Table 1). All of the larger-bodied mammalian orders expected at the site were recorded. The three primate species known to occur in the region were observed at the site. The presence of *Cebus xanthosternos* (Figure 2) is important for a number of reasons, not least the fact that this species is considered to be critically endangered (KIERULFF *et al.* 2008). In addition, this site is only the third (BELTRÃO-MENDES *et al.* in press) at which this species is known to occur in syntopy with *Callicebus coimbrai*. This not only reinforces the importance of the site for the conservation of the region's mammals, but also the understanding of their ecological relationships.

In addition, the sighting of a small spotted cat (*Leopardus*) may correspond to one of the three following species that occur in the region: the relatively small-bodied margay (*L. wiedii*), the tigrina (*L. tigrinus*) and the larger ocelot (*L. pardalis*).

However, several other mammal species expected for the study area were not recorded. These species include a number of widespread and relatively common carnivores, such as tayras (*Eira barbara*), otters (*Lontra longicaudis*), and coatis (*Nasua nasua*). In particular, the coati is one of the carnivores most frequently recorded in surveys of mammals (GOMPPER and DECHER, 1998; CHIARELLO, 1999; CULLEN JR *et al.*, 2001). It remains unclear why these species were not recorded, and it is probably too early to confirm their absence from the area. The occurrence of kinkajous (*Potos flavus*) and raccoons (*Procyon cancrivorus*) was also expected in the study area, although these two species are nocturnal and are unlikely to be recorded without an appropriate methodological approach. Raccoons leave distinctive tracks, but none were observed within the study area, even though the species is known to occur in the city of Aracaju (SFF, Pers. Obs.). The white-lipped peccary (*Tayassu pecari*) is almost certainly absent from the study area due to extensive deforestation, which has provoked the disappearance of the species from most of eastern Brazil (TIEPOLO and TOMAS 2006).

A number of other species are of special interest here. One is the maned sloth, *Bradypus torquatus* (Figure 2), an endangered Atlantic Forest endemic which was thought to be extinct from Sergipe (AGUIAR 2004) until its discovery at the present study site (CHAGAS *et al.*, 2009).

**Table 1** - Species list for the larger mammals recorded at Fazenda Trapsa, Sergipe. V = visual record during surveys; v = visual record outside surveys; T = tracks; F = feces; B = burrow.

Order - Family - Species	Common name	Record
<b>ARTIODACTYLA, Cervidae</b>		
<i>Mazama americana</i> (Erxleben, 1777)	Red brocket deer	V/T
<b>CARNÍVORA, Canidae</b>		
<i>Cerdocyon thous</i> (Linnaeus, 1766)	Crab-eating fox	V
<b>Felidae</b>		
<i>Leopardus</i> sp.	Wild cat	v/T
<i>Puma concolor</i> (Linnaeus, 1758)	Puma	T/F
<b>LAGOMORPHA, Leporidae</b>		
<i>Sylvilagus brasiliensis</i> (Linnaeus, 1758)	Tapiti/Brazilian rabbit	V
<b>PRIMATES, Callitrichidae</b>		
<i>Callithrix jacchus</i> (Linnaeus, 1758)	Common marmoset	V
<b>Cebidae</b>		
<i>Cebus xanthosternos</i> Wied-Neuwied, 1826	Yellow-breasted capuchin	V
<b>Pitheciidae</b>		
<i>Callicebus coimbrai</i> Kobayashi & Langguth, 1999	Coimbra-Filho's titi	V
<b>RODENTIA, Agoutidae</b>		
<i>Agouti paca</i> (Linnaeus, 1766)	Paca	B
<b>Dasyproctidae</b>		
<i>Dasyprocta prymnolopha</i> Wagler, 1831	Agouti	V
<b>Caviidae</b>		
<i>Hydrochaeris hydrochaeris</i> (Linnaeus, 1766)	Capybara	V
<b>XENARTHRA, Bradipodidae</b>		
<i>Bradypus torquatus</i> Desmarest, 1816	Maned sloth	V
<b>Dasyopodidae</b>		
<i>Dasyopus novemcinctus</i> Linnaeus, 1758	Nine-banded armadillo	V/B
<b>Myrmecophagidae</b>		
<i>Tamandua tetradactyla</i> (Linnaeus, 1758)	Collared anteater	V

The puma was perhaps the mammal least expected to occur at the site, especially considering its spatial and dietary requirements (OLIVEIRA, 1994). It is unclear whether more than one individual is present in the study area, nor what the basis of the species' diet may be, although evidence from a sequence of tracks indicates that it does prey on capybaras at this site.

A number of other, relatively large-bodied terrestrial mammals were recorded at the site, in particular the red brocket deer, but also agoutis and pacas. The presence of all these species appears to be evidence of both relatively well-preserved habitat, and the protection provided by the owner of the fazenda, who prohibits any form of hunting on the property. The lack of any evidence of hunting at the site (e.g. shotgun shells, platforms, trails) suggests that this prohibition is relatively effective, and this is almost certainly a



**Figure 2** - Arboreal mammals observed at the Fazenda Trapsa, Sergipe: *Callicebus coimbrai* (A), *Cebus xanthosternos*, (B) and *Bradypus torquatus* (C).



fundamental factor in its conservation.

The Atlantic Forest of the state of Sergipe is perhaps one of the least well-known parts of the biome, and also one of the potentially most interesting, especially considering recent advances, such as the description of *Callicebus coimbrai*. The present study has returned surprising results in two main aspects. One is the presence of the endangered *Bradypus torquatus* at the Fazenda Trapsa that represent an important extension of their known present-day distributions.

The second aspect is the ecological implications of the presence at the site of a number of large-bodied species, in particular an alpha predator (*Puma concolor*). This reinforces the potential of even relatively small areas of local forest for the conservation of the local fauna (ANDRÉN, 1994). A number of larger fragments exist further south and west of the Fazenda Trapsa, and in some cases, the distances between sites are relatively short, reflecting a certain degree of connectivity among fragments, in particular for terrestrial species.

Given the results presented here, it would seem logical to orient further research at the site in two complementary directions. One is the use of appropriate trapping techniques (mechanical and camera) applied to the investigation of specific taxonomic groups. Investigation of some of these groups is already under way. The other is the study of ecological relationships among some primates and also among the larger carnivores and their prey at the site. Our results from the Fazenda Trapsa show that the region has considerable potential for conservation research

#### ACKNOWLEDGMENTS

We are especially grateful to Sr. Ary Ferreira for allowing us to conduct our research at the Fazenda Trapsa, and to José Elias ("Bóia") for his dedicated assistance in the field. We also thank Leandro Jerusalinsky for his collaboration. The authors were supported individually by the Deutscher Akademischer Austausch Dienst – DAAD (RRDC and JPJA), FAPITEC and IBAMA (EMSJ), and CNPq, to SFF (processes no. 302747/2008-7 and 476064/2008-2).

#### REFERENCES

- AGUIAR, J.M. 2004 - Species discussions. *Edentata* 6: 7-26.  
ANDRÉN, H. 1994 - Effects of fragmentation on birds and mammals in landscapes with different portions of suitable habitat: a review. *Oikos* 71: 366-355.  
BECKER, M.; and DALPONTE, J.C. 1999 - *Rastros de mamíferos silvestres*

- brasileiros.** Brasília, Editora UnB.
- BELTRÃO-MENDES, R.; CUNHA, A.A. and FERRARI, S.F. (in press) - New localities and perspectives on the sympatry between two endangered primates (*Callicebus coimbrai* and *Cebus xanthosternos*) in northeastern Brazil. *Mammalia*.
- CHAGAS, R.R.D. 2009 - Levantamentos das populações de *Callicebus coimbrai* Kobayashi and Langguth, 1999 em fragmentos de Mata Atlântica no sul do Estado de Sergipe, Brasil. (Msc. Dissertation). Programa de Pós-graduação em Desenvolvimento e Meio Ambiente, Universidade Federal de Sergipe, São Cristóvão.
- CHIARELLO, A.G. 1999 - Effects of fragmentation of atlantic forest on mammal communities in south-eastern Brazil. *Biological Conservation* 89: 71-82.
- CULLEN JR, L.; BODMER, E.R. and VALLADARES-PADUA. 2001 - Ecological consequences of hunting in Atlantic forest patches, São Paulo, Brazil. *Oryx* 35: 137-144.
- GOMES, L.J.; SANTANA, V. and RIBEIRO, G.T. 2006 - Unidades de conservação no estado de Sergipe. *Revista Fapese* 2: 101-112.
- GOMPPE, M.E. and DECHER, D.M. 1998 - *Nasua nasua*. *Mammalian species*. n. 580. New York, p. 1-9.
- IUCN. 2006 - 2006 Red List of Threatened Species. Disponível em: <http://www.iucnredlist.org>.
- JERUSALINSKY, L.; OLIVEIRA, M.M.; PEREIRA, R.F.; SANTANA, V.; BASTOS, P.C.R. and FERRARI, S.F. 2006 - Preliminary evaluation of the conservation status of *Callicebus coimbrai* Kobayashi and Langguth, 1999 in the Brazilian state of Sergipe. *Primate Conservation* 21: 25-32.
- KIERULFF, M.C.M.; MENDES, S.L. and RYLANDS, A.B. 2008 - *Cebus xanthosternos*. 2008 IUCN Red List of Threatened Species. Available at <http://www.iucnredlist.org/details/4074/0>; accessed on 2009/07/01.
- KOBAYASHI, S. and LANGGUTH, A. 1999 - A new species of titi monkey, *Callicebus Thomas*, from north-eastern Brazil (*Primates*, *Cebidae*). *Revista Brasileira Zoologia* 16: 531-551.
- OLIVEIRA, F.F.; FERRARI, S.F. and SILVA, S.D.B. 2005 - Mamíferos não-voadores. Pp. 77-91. In: CARVALHO, C.M. and VILAR, J.C. (Eds.) **Parque Nacional Serra de Itabaiana - levantamento da Biota. Aracaju**, IBAMA, Biologia Geral e Experimental (UFS).
- OLIVEIRA, P.P.; NASCIMENTO, M.T.; CARVALHO, F.A.; VILLELA, D.; KIERULFF, M.C.M.; VERULI, V.P.; LAPENTA, M.J. and SILVA, A.P. 2008 - Qualidade do habitat na área de ocorrência do mico-leão-dourado. Pp. 14-39. In: OLIVEIRA, P.P.; GRAVITOL, A.D. and RUIZ-MIRANDA, C. (Orgs.) **Conservação do mico-leão-dourado: enfrentando os desafios de uma paisagem fragmentada.** Editora da Universidade Estadual do



- Norte Fluminense Darcy Ribeiro.
- OLIVEIRA, T.G. 1994 - *Neotropical cats, ecology and conservation*. EDUFMA, São Luis.
- SANTOS JUNIOR, E.M. 2007 - **Observações preliminares sobre a ecologia comportamental do *Callicebus coimbrai* na Mata Atlântica de Sergipe**. (Undergraduate Dissertation) Departamento de Biologia, Universidade Federal de Sergipe, São Cristóvão.
- SANTOS, A.L.C. 2009 - **Diagnóstico dos fragmentos de Mata Atlântica de Sergipe através de sensoriamento remoto**. (Msc. Dissertation). Programa de Pós-graduação em Desenvolvimento e Meio Ambiente, Universidade Federal de Sergipe, São Cristóvão.
- SANTOS, C.N. 1992 - **Levantamento da mastofauna terrestre em áreas de mata ciliar da Estação Ecológica da Serra de Itabaiana-SE**. (Msc. Dissertation). Programa de Pós-graduação em Desenvolvimento e Meio Ambiente, Universidade Federal de Sergipe, São Cristóvão.
- SCARANO, F.R. 2002 - Structure, function and floristic relationships of plant communities in stressful habitats marginal to the Brazilian Atlantic Rainforest. *Annals of Botany* 90:517-524.
- SIQUEIRA, E.R. and RIBEIRO, F.E. 2001 - *A Mata Atlântica de Sergipe*. Embrapa Tabuleiros Costeiros, Aracaju.
- SOUZA-ALVES, J.P. 2010 - **Ecologia alimentar de um grupo de Guigó-de-Coimbra-Filho (*Callicebus coimbrai* Kobayashi and Langguth, 1999): perspectivas para a conservação da espécie na paisagem fragmentada do sul de Sergipe**. (Msc. Dissertation). Programa de Pós-graduação em Desenvolvimento e Meio Ambiente, Universidade Federal de Sergipe, São Cristóvão.
- TIEPOLO, L.M and TOMAS, M.T. 2006 - Ordem Artiodactyla. Pp. 283-303. In: REIS, N.R.; PERACCHI, A.L.; PEDRO, W.A. and LIMA, I.P. (Eds.) **Mamíferos do Brasil**. Londrina,

