

- Differential effects of forest degradation on primate populations. *Primates* 17(3): 401-411.
- BIO. 1998. Boletín Informativo, Instituto Alexander von Humboldt, Febrero – Abril 1998.
- Blumer, E. S. and Epple, G. Undated. *Saguinus leucopus*: Notes on its behavior and vocal repertoires. Department of Psychology, State University of New York, Stony Brook, NY. Unpublished manuscript.
- Calle, Z. 1992. Informe de actividades y resultados: Censo preliminar y recomendaciones para el manejo de un población natural de *Saguinus leucopus* en la zona de influencia del proyecto hidroeléctrico, La Miel II. Unpublished manuscript.
- Cortolima. 1997. *Caracterización Ambiental del Municipio de Mariquita*. Subdirección de Ordenamiento Territorial, CORTOLIMA, Colombia.
- Davies, N. and Houston, A. 1984. Territory economics. In: *Behavioral Ecology: An Evolutionary Approach*, J. Krebs and N. Davies (eds.), pp.148-169. Second edition. Blackwell Scientific Publications, Oxford.
- Defler, T. R. 2004. *Primates of Colombia*. Conservation International, Washington, DC.
- Defler, T. R., Rodríguez-M., J. V. and Hernández-Camacho, J. I. 2003. Conservation priorities for Colombian primates. *Primate Conserv.* (19): 1-18.
- Dietz, J. M., Peres, C. A. and Pinder, L. 1997. Foraging ecology and use of space in wild golden lion tamarins (*Leontopithecus rosalia*). *Am. J. Primatol.* 41: 289-305.
- Dunbar, R. 1988. *Primate Social Systems*. Chapman and Hall, London.
- Egler, S. 1992. Feeding ecology of *Saguinus bicolor* (Callitrichidae: Primates) in a relict forest in Manaus, Brazilian Amazonia. *Folia Primatol.* 59: 61-76.
- Green, K. 1978. Primate censusing in northern Colombia: A comparison of two techniques. *Primates* 19(3): 537-550.
- Hilton-Taylor, C. 2003. *2003 IUCN List of Threatened Species*. IUCN, Species Survival Commission (SSC), Gland, Switzerland, and Cambridge, UK. Website: <<http://www.redlist.org>>.
- Knogge, C. 1999. Tier-Pflanze-Interaktionen im Amazonas-Regenwald: Samenausbreitung durch die sympatrischen Tamarinenarten *Saguinus mystax* und *Saguinus fuscicollis* (Callitrichidae, Primates). Doctoral thesis, Universität Bielefeld, Bielefeld, Germany.
- Pachón, G. and Bohorquez, A. 1991. *Ecología Básica del Bosque Municipal de Mariquita, Tolima*. Fundación Segunda Expedición Botánica, Bogotá, Colombia.
- Peres, C. 1993. Diet and feeding ecology of saddle-back (*Saguinus fuscicollis*) and moustached (*S. mystax*) tamarins in an Amazonian terra firme forest. *J. Zool. Lond., Ser. B* 230: 567-592.
- Rylands, A. B. 1996. Habitat and the evolution of social and reproductive behavior in Callitrichidae. *Am. J. Primatol.* 38: 5-18.
- Schoener, T. 1968. Sizes of feeding territories among birds. *Ecology* 49(1): 123-141.
- Snowdon, C. and Soini, P. 1988. The tamarins, genus *Saguinus*. In: *Ecology and Behavior of Neotropical Primates*, Vol. 2, R. A. Mittermeier, A. B. Rylands, A. F. Coimbra-Filho and G. A. B. da Fonseca (eds.), pp.223-298. World Wildlife Fund, Washington, DC.
- Valladares-Pádua, C. 1993. The ecology and conservation of the black lion tamarins (*Leontopithecus chrysopygus*, Mikan, 1823). Doctoral thesis. University of Florida, Gainesville.
- Vargas, N. 1994. Evaluación del estado de las poblaciones de *Saguinus leucopus*, Günther, 1817 (Primates: Callitrichidae) para proponer áreas potenciales de conservación en el sector de la Dorada, Caldas. Fundación para la Promoción de la Investigación y la Tecnología, Pontificia Universidad Javeriana, Bogotá, Colombia.
- Vargas, N. and Solano, C. 1996. Evaluación del estado de dos poblaciones de *Saguinus leucopus* para determinar áreas potenciales de conservación en un sector de valle del Magdalena Medio, Colombia. *Neotrop. Primates* 4(1): 13-15.
- White, G. and Garrot, R. 1990. *Analysis of Wildlife Radio-Tracking Data*. Academic Press, London.

NEW RECORDS OF MARTINS' BARE-FACE TAMARIN, *SAGUINUS MARTINSI* (PRIMATES: CALLITRICHIDAE)

Leonardo de Carvalho Oliveira, Sylvia Miscow Mendel
José de Sousa e Silva Jr., Geraldo Wilson Fernandes

Introduction

Martins' bare-face tamarin, *Saguinus martinsi*, was described by Thomas (1912) as *Leontocebus martinsi*, based on material collected in the locality of Faro, left bank of the Rio Nhamundá, Pará, Brazil. The new species was named in honor of the collector of the holotype, Oscar Martins. Hershkovitz (1966) considered Martins' bare-face tamarin to be a subspecies of *S. bicolor*, reaffirming this taxonomic status in subsequent studies (Hershkovitz, 1970, 1977). Hershkovitz (1977) considered all bare-face tamarins as conspecifics and recognized three subspecies in this group: *S. b. bicolor* (Spix, 1823), *S. b. martinsi* and *S. b. ochraceus* Hershkovitz, 1966. Groves (2001, p.146) found this tamarin to be "extremely distinct" from *S. bicolor* and listed it as a full species and, although not having examined any specimens, provisionally placed *ochraceus* as a subspecies. Martins' bare-face tamarin is one of the least-studied taxa among the Neotropical primates, with just six localities of occurrence recorded and few specimens in museums (Thomas, 1912; Cruz Lima, 1945; Hershkovitz, 1977).

Most studies on the biology of bare-face tamarins refer to the pied tamarin, *S. bicolor* (Egler, 1986; Snowdon and Soini, 1988), while information on the biology of *S. martinsi* is restricted to its geographical occurrence. Bare-face tamarins are endemic to the Amazon rainforest, and all three taxa have very restricted distributions (Hershkovitz, 1977). As far as is known, *S. martinsi* is confined to the north of the Rio Amazonas, between the Rio Erepecurú and the Rio Nhamundá (Hershkovitz, 1977). Its northern limits are unknown. According to Hershkovitz (1977), the

northernmost record for *S. martinsi* is Cachoeira Porteira, based on a specimen from the Museu Paraense Emílio Goeldi (MPEG 420). Rylands (1985) indicated that the Rio Trombetas Biological Reserve, situated on the left bank of the Rio Trombetas, would be the only protected area where *S. martinsi* may occur.

The diet of *Saguinus bicolor* is largely composed of insects and fruits (Hershkovitz, 1977; Snowdon and Soini, 1988). Although there are few records of group sizes, it would seem that *S. bicolor*, as is typical of the genus, lives in groups of generally seven to nine individuals (Snowdon and Soini, 1988). It can be found in a great diversity of habitats, usually using lowland areas and evergreen humid forests (Mittermeier *et al.*, 1977). *S. bicolor* was the first callitrichid from the Brazilian Amazon to be listed as Critically Endangered, largely due to its minute range, which is centered on Manaus and is rapidly being deforested for both urban and rural development. In addition, *S. bicolor* is being replaced by the golden-handed tamarin, *Saguinus midas*, which has been expanding into the periphery of the pied tamarin's remaining habitat (Ayres *et al.*, 1980, 1982; Egler, 1983; Subirá, 1998a, 1998b; Rylands *et al.*, 2003). Although not facing equivalent threats from deforestation, very little is known of the status of *S. martinsi*, which would also seem to have a very restricted range and is quite possibly suffering a similar diminution in its range with its replacement by *S. midas*.

Here we provide an update on the geographic distribution of *S. martinsi*, describing 10 new records in the region of

the Rio Trombetas. In addition, we present data on the sizes of a number of groups observed in the Saracá-Taquera National Forest, west of the lower Rio Trombetas.

Methodology

Study area

Fieldwork was carried out in the Saracá-Taquera National Forest (429,600 ha), an area rich in bauxite, located in the district of Porto Trombetas (01°40'S, 56°00'W), municipality of Oriximiná, western Pará, Brazil. The study site is 100 km to the west of the confluence of the Rios Trombetas and Amazonas. The bauxite deposits are associated with a series of Tertiary boundaries, and are found under plateaux at altitudes varying from 150 to 200 m.

The extraction of bauxite requires the removal of the vegetation and of the first layer of soil. Bauxite is usually found at depths of 4 to 15 m, requiring heavy machinery to mine it. Noisy trucks and tractors work full time in three shifts a day. After extraction, the holes are filled with a mixture of soil and vegetational remains, and the area is reforested.

Our study concentrated on two of these plateaux: Almeidas and Bela Cruz. The vegetation there is classified as dense tropical forest in the sub-region of the lower plateaux of the Amazonian rainforest. The canopy is generally dense, reaching 30 to 40 m, with a sparse understorey, except in some areas where it is dense in shrubs and small trees reaching heights of 15 to 20 m. Common emergent tree species include *Dinisia excelsa*, *Bertholletia excelsa* and *Cedrelinga*

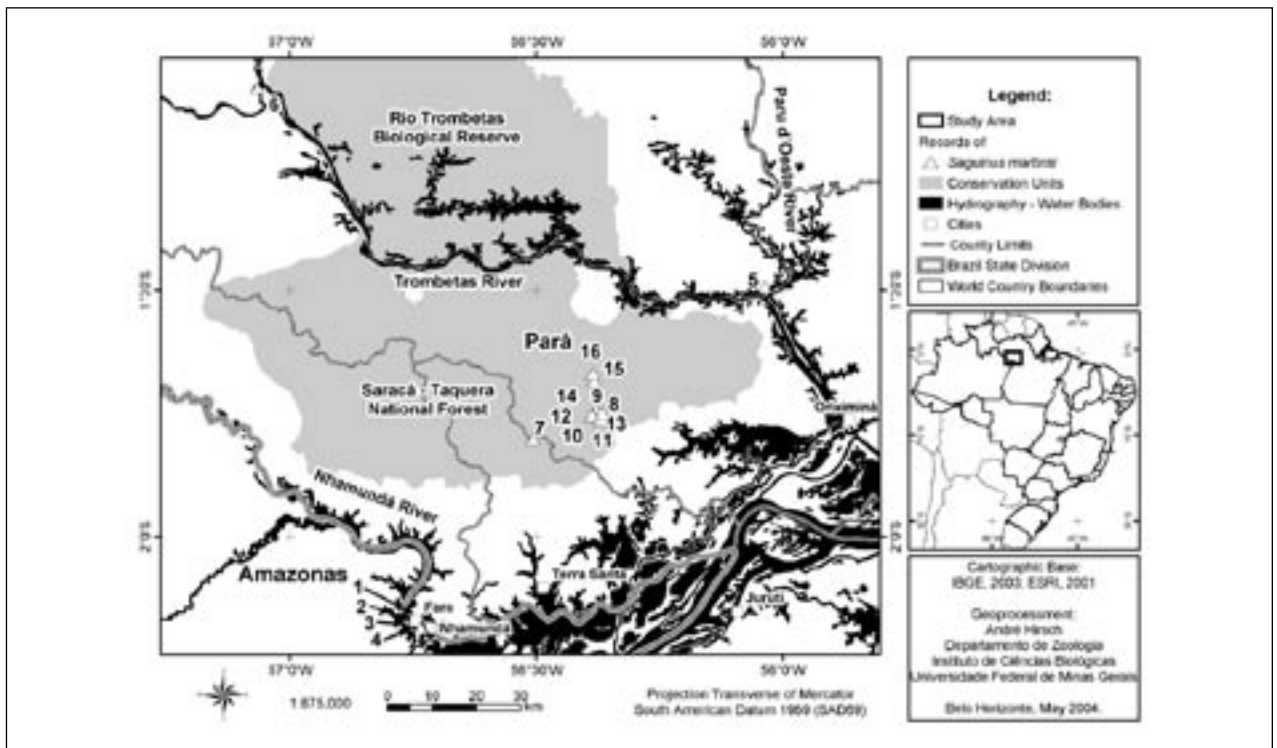


Figure 1. The Rio Trombetas Biological Reserve (385,000 ha) and the Saracá-Taquera National Forest (429,600 ha), indicating the plateaux where *Saguinus martinsi* groups were observed. Localities for *Saguinus martinsi* are included from the literature and from the present study (see Table 2).

catanaeformis (Brazil, MME-DNPM, Projeto RADAM, 1976). The Almeidas and Bela Cruz plateaus are 867 and 1500 ha, respectively. The deforestation of the Almeidas plateau started in August 2002, and will be completed by 2006. The deforestation of Bela Cruz plateau will start in 2008.

Field techniques

Fieldwork was carried out from July to November 2003 by two teams, each composed of one researcher and one field assistant. The censuses, restricted to locating primate groups, began at 06:00 and ended at 11:00 hrs. Sightings of monkeys were recorded *ad libitum* (Altmann, 1974). Geographic coordinates were taken using a Garmin eTrex GPS unit. On encountering a group, each survey team recorded the group size, time of the record, geographic coordinates and the stratum height occupied by the animals.

Table 1. Geographic coordinates and group size of *Saguinus martinsi* in the Saracá-Taquera National Forest, Pará, Brazil.

Date	Plateaus	Coordinates	Group size
29 July 2003	Plateau Almeidas	01°44'29"S, 56°22'40"W	6
2 August 2003	Plateau Almeidas	01°44'31"S, 56°22'44"W	4
29 August 2003	Plateau Bela Cruz	01°48'06"S, 56°30'24"W	3
21 November 2003	Plateau Almeidas	01°45'18"S, 56°23'06"W	4
22 November 2003	Plateau Almeidas	01°45'54"S, 56°22'12"W	5
23 November 2003	Plateau Almeidas	01°45'36"S, 56°22'19"W	8
24 November 2003	Plateau Almeidas	01°45'15"S, 56°23'16"W	1

Table 2. Geographic records of the occurrence of *Saguinus martinsi*.

Localities	References
1. Faro, left bank of the Rio Nhamundá (type locality), 02°11'S, 56°44'W	Cruz Lima (1945), Hershkovitz (1966, 1977), Thomas (1912), MNRJ 2844, MPEG 185
2. Fazenda Paraíso em Palha, municipality of Faro, near 02°11'S, 56°44'W	Hershkovitz (1977), MPEG 184
3. São José, Rio Nhamundá, near 02°11'S, 56°44'W	Hershkovitz (1977)
4. Iacarana, Rio Nhamundá, near 02°11'S, 56°44'W	Hershkovitz (1977)
5. Rio Erepecurú (=Rio Cuminá), right tributary of the Rio Paru d'Oeste, 01°30'S, 56°00'W	Cruz Lima (1945), Hershkovitz (1977)
6. Cachoeira Porteira, Rio Mapuera, municipality of Oriximiná, 01°05'S, 57°04'W	Hershkovitz (1977), MPEG 420
7. Plateau Bela Cruz, 01°48'S, 56°30'W	Present study
8. Plateau Almeidas, 01°44'S, 56°22'W	Present study
9. Plateau Almeidas, 01°44'S, 56°22'W	Present study
10. Plateau Almeidas, 01°45'S, 56°23'W	Present study
11. Plateau Almeidas, 01°45'S, 56°22'W	Present study
12. Plateau Almeidas, 01°45'S, 56°22'W	Present study
13. Plateau Almeidas, 01°45'S, 56°23'W	Present study
14. Bacaba Plateau, 01°45'S, 56°22'W	M. S. Brígida, pers. comm.
15. Reforestation area, 01° 41'S, 56°23'W	M. S. Brígida, pers. comm.
16. Lowland forest, 01°19'S, 56°22'W	M. S. Brígida, pers. comm.

Secondary data

Supporting data on occurrences of bare-face tamarins were acquired from the literature (Cruz Lima, 1945; Hershkovitz, 1966, 1977; Thomas, 1912) and an examination of the mammal collections of the Museu de Zoologia da Universidade de São Paulo (MZUSP), the Museu Nacional, Universidade Federal do Rio de Janeiro (MNRJ) and the Museu Paraense Emílio Goeldi (MPEG). An interview with Manoel Santa Brígida, a technician at MPEG, also provided useful information on three new records of this taxon.

Results

A group of *Saguinus martinsi* was observed for the first time on 29 July 2003. Another six records were later made by direct observations, five on the Almeidas plateau and one on the Bela Cruz plateau (Table 1, Figure 1). Group sizes varied from four to eight individuals (Table 1) and at least four different groups were found in the study area. All records occurred between 06:30 and 10:10 hrs. In all observations, the animals were using the middle strata of the forest, up to 20 m high.

M. S. Brígida also observed a number of *S. martinsi* groups in three areas in the Rio Trombetas region between 1997 and 2003 (Table 2). Figure 2 indicates the results of the review of the literature and of the scientific collections, in addition to the records produced in the present study. These data allow an update of the geographic distribution of *S. martinsi*.

Discussion and Conclusions

Although this study has doubled the number of recorded localities for *S. martinsi*, much more data is needed to better understand its geographical distribution. Although known to occur in the region of the Rio Trombetas (Hershkov-

itz, 1977), there are few field records from there. Its distribution includes only one strictly protected area, the Rio Trombetas Biological Reserve of 385,000 ha; we presume it occurs east of this river to the Rio Paru do Oeste (Erepecurú), but this remains to be confirmed (Rylands, 1985; Rylands and Bernardes, 1989). The correct delimitation of its range is of fundamental importance for its conservation. Although this is an area protected by the Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA), the two plateaux censused (and others) will be deforested in the coming years. Cachoeira Porteira remains the northernmost record of *S. martinsi*, albeit from a museum specimen, but it may occur further north. There are no doubts that its range is restricted, however, and potential threats include urbanization and the expansion of bauxite mining activities, besides the establishment of soybean plantations. Further studies are urgently needed to assess the status of *S. martinsi*, besides long-term research on its ecology and behavior.

Acknowledgements: We thank the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA), Porto de Trombetas, Pará, for permission to work in Saracá-Taquera National Forest, our colleagues from the Horto Florestal, Mineração Rio do Norte for their help, especially Alexandre Castilho, the coordinator of the project. Robert Young kindly helped with the English version of the text. We also thank Maria Socorro and André Hirsch for preparing the maps, and Diogo Loretto and Rodrigo Cambará Printes for their help in the field. We are indebted to Manoel Santa Brígida for information on the occurrences of *S. martinsi*. The Mineração Rio do Norte (MRN) and Planta Ltda. funded the study.

Leonardo de Carvalho Oliveira, Departamento de Ciências Biológicas e Museu de Ciências Naturais, Pontifícia Universidade Católica de Minas Gerais, Rua Dom José Gaspar 500, Coração Eucarístico, Belo Horizonte 30535-610, Minas Gerais, Brazil, e-mail: <leonardoco@pucminas.br>, **Sylvia Miscow Mendel**, Pós-Graduação em Ecologia, Conservação e Manejo da Vida Silvestre, ICB, Universidade Federal de Minas Gerais, Av. Antônio Carlos 6627, Pampulha, Belo Horizonte 30270-901, Minas Gerais, Brazil, e-mail: <smmendel@terra.com.br>, **José de Sousa e Silva Júnior**, Setor de Mastozoologia, Coordenação de Zoologia, Museu Paraense Emílio Goeldi, Caixa Postal 399, Belém 66040-170, Pará, Brazil, e-mail: <cazuza@museu-goeldi.br>, and **G. Wilson Fernandes**, Planta Ltda. e Laboratório de Ecologia Evolutiva de Herbívoros Tropicais, Departamento de Ecologia, Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais, Avenida Antônio Carlos 6627, Pampulha, Belo Horizonte 30270-901, Minas Gerais, Brazil, e-mail: <gwilson@mono.icb.ufmg.br>.

References

- Altmann, J. 1974. Observational study of behaviour: Sampling methods. *Behaviour* 49: 227-267.
- Ayres, J. M. R., Mittermeier, R. A. and Constable, I. D. 1980. A distribuição geográfica e situação atual dos sagüis-de-cara-nua (*Saguinus bicolor*). *Bol. FBCN*, Rio de Janeiro 16: 62-68.
- Ayres, J. M. R., Mittermeier, R. A. and Constable, I. D. 1982. Brazilian tamarins on the way to extinction? *Oryx* 16(4): 329-333.
- Brazil, MME-DNPM, Projeto RADAM. 1976. *Projeto RADAM. Folha SA.21 Santarém, Levantamento de Recursos Naturais*. 10. Ministério de Minas e Energia (MME), Departamento Nacional de Produção Mineral (DNPM), Rio de Janeiro.
- Cruz Lima, E. 1945. *Mammals of Amazônia. I. General Introduction and Primates. Contrib. Mus. Paraense Emílio Goeldi Hist. Nat., Ethnogr.*, Belém do Pará, Rio de Janeiro. 274pp.
- Egler, S. G. 1983. Current status of the pied tamarin in Brazilian Amazônia. *IUCN/SSC Primate Specialist Group Newsl.* (3): 20.
- Egler, S. G. 1986. Estudos bionômicos de *Saguinus bicolor* (Spix, 1823) (Callitrichidae, Primates) em uma mata alterada em Manaus, AM. Master's thesis, Universidade Estadual de Campinas, Campinas.
- Hershkovitz, P. 1966. Taxonomic notes on tamarins, genus *Saguinus* (Callitrichidae, Primates) with descriptions of four new forms. *Folia Primatol.* 4(5): 381-395.
- Hershkovitz, P. 1970. Dental and periodontal diseases and abnormalities in wild-caught marmosets (Primates-Callitrichidae). *Am. J. Phys. Anthropol.* 32(3): 377-394.
- Hershkovitz, P. 1977. *Living New World Monkeys (Platyrrhini) With an Introduction to Primates, Vol. 1.* The University of Chicago Press, Chicago.
- Mittermeier, R. A., Bailey, R. C. and Coimbra-Filho, A. F. 1977. Conservation status of the Callitrichidae in Brazilian Amazonia, Surinam, and French Guiana. In: *The Biology and Conservation of the Callitrichidae*, D. G. Kleiman (ed.), pp.137-146. Smithsonian Institution Press, Washington, DC.
- Rylands, A. B. 1985. Conservation areas protecting primates in Brazilian Amazonia. *Primate Conserv.* (5): 24-27.
- Rylands, A. B. and Bernardes, A. T. 1989. Two priority regions for primate conservation in the Brazilian Amazon. *Primate Conserv.* (10): 56-62.
- Rylands, A. B., Bampi, M. I., Chiarello, A. G., Fonseca, G. A. B. da, Mendes, S. L. and Marcelino, M. 2003. *Saguinus bicolor*. In: *2003 IUCN Red List of Threatened Species*. Website: <www.redlist.org>. Downloaded 6 March 2004.
- Snowdon, C. T. and Soini, P. 1988. The tamarins, genus *Saguinus*. In: *Ecology and Behavior of Neotropical Primates*, Vol. 2, R. A. Mittermeier, A. B. Rylands, A. F. Coimbra-Filho and G. A. B. da Fonseca (eds.), pp. 223-298. World Wildlife Fund, Washington, DC.
- Subirá, R. J. 1998a. Avaliação da situação atual das populações selvagens do sauím-de-coleira, *Saguinus bicolor bicolor* (Spix, 1823). Master's thesis, Universidade de Brasília, Brasília.
- Subirá, R. J. 1998b. The status of the pied tamarin, *Saguinus bicolor*. *Neotrop. Primates* 6: 128.
- Thomas, O. 1912. On small mammals from the lower Amazon. *Ann. Mag. Nat. Hist. Ser. 8*, 9: 84-90.