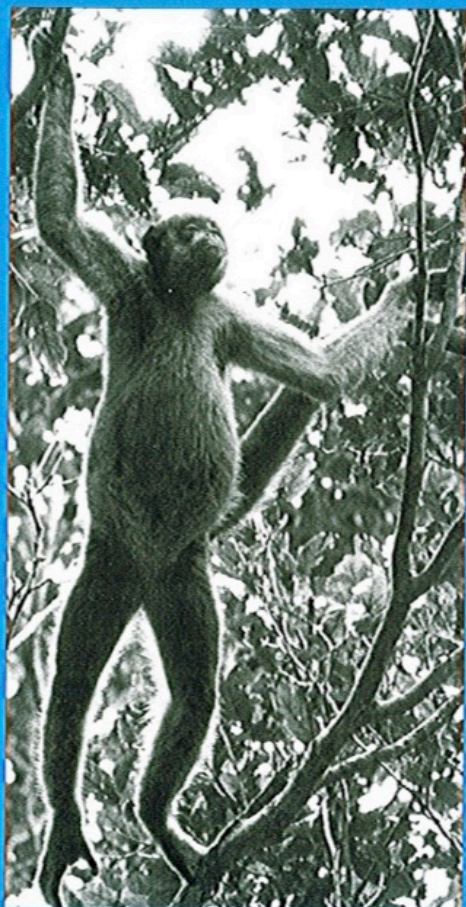# NEOTROPICAL
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SHORT ARTICLES

NEOTROPICAL PRIMATE FAMILY-GROUP NAMES REPLACED BY GROVES (2001) IN CONTRAVENTION OF ARTICLE 40 OF THE INTERNATIONAL CODE OF ZOOLOGICAL NOMENCLATURE

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Before 1961, it was customary to regard the validity of a family-group name as determined by the recognizability of its type genus. If the type genus was relegated to the synonymy of another genus, a family-group name with a stem derived from the senior generic synonym was substituted. The *International Code of Zoological Nomenclature* was then amended to protect the stability of family-group names from the potential effects of generic lumping. The rationale appears to be that, by 1960, most family-group names were well established, and most genus-group junior synonyms had been identified as such and, where appropriate, replaced. Groves (2001, p.126) correctly stated that the valid family-group name is now the earliest one applied, but failed to appreciate that Article 40 of the *International Code of Zoological Nomenclature* was expressly introduced to prevent this amendment from disrupting stability of scientific nomenclature. Article 40.2.1 not only allows, but insists that a family-group name "in prevailing usage", replaced before 1961 because its type genus was considered a junior synonym, should be maintained. This paper contends that, under the provisions of Article 40.2.1, Alouattinae Trouessart, 1897 (1825) and Aotidae Poche, 1908 (1865) are the correct family-group names for their type genera, *Alouatta* Lacépède, 1799 and *Aotus* Illiger, 1811. We urge the retention of Saimiridae Miller, 1912 (1900) to maintain its prevailing usage as the family-group name for its type genus *Saimiri* Voigt, 1831 but note that, in this instance, the provisions of Article 40.2.1 do not automatically ensure this preferred outcome. We reason that Callitrichidae Gray, 1821 is the correct family-group name for its type genus *Callithrix* Erxleben, 1777.

In his book, *Primate Taxonomy*, Groves (2001) replaced the family-group name Callitrichidae Thomas, 1903 with Hapalinae Gray, 1821 for the marmosets and tamarins (as a subfamily of the Cebidae). He replaced the family-group name Alouattinae Elliot, 1904 with Mycetinae Gray, 1825 for the howler monkeys; the family-group name Aotidae Poche, 1908 with Nyctipithecidae Gray, 1870 for the douroucoulis, night monkeys or owl monkeys; and the family-group name Saimirinae Miller, 1924 with Chrysotrichinae Cabrera, 1900 for the squirrel monkeys (Table 1).

Groves (2001) stated he was quoting Article 40 from the current (Fourth) edition of the *International Code of Zoological Nomenclature* (2000), and Rylands (2002, p.122) unfortunately omitted the key word "not" from section (a), which should have read, "…that family-group name is not to be replaced…" The Fourth edition, however, was not finalized when the manuscript of Groves' book was completed and, unaware that the wording had changed, Groves (2001) was therefore quoting from the previous (Third) edition of the Code (1985). Although its message remains essentially the same, to set the record straight, this is how Article 40 now reads in the current (Fourth) edition of the Code:

Article 40. Synonymy of the type genus.

40.1. **Validity of family-group names not affected**. When the name of a type genus of a nominal family-group taxon is considered to be a junior synonym of the name of another nominal genus, the family-group name is not to be replaced on that account alone.

40.2. **Names replaced before 1961**. If, however, a family-group name was replaced before 1961 because of the synonymy of the type genus, the substitute name is to be maintained if it is in prevailing usage.

40.2.1. A name maintained by virtue of this Article retains its own author but takes the priority of the replaced name, of which it is deemed to be the senior synonym.

Recommendation 40A. Citation of author and date. If the author and date are cited, a family-group name maintained under the provisions of Article 40.2.1 should be cited with its original author and date…followed by the date of its priority as determined by this Article; the date of priority should be enclosed in parentheses.

Groves (2001) contravened Article 40 in replacing at least two of the above four family-group names, in that Simpson (1945) had already replaced Nyctipithecinae by Aotinae and Mycetinae by Alouattinae, and these names had come into "prevailing usage".

Table 1. Platyrrhine family-group names employed by Groves (2001).

Family/Subfamily	Genera
Cebidae Bonaparte, 1831	
Hapalinae Gray, 1825	*Cebuella, Mico, Callithrix, Callimico, Leontopithecus, Saguinus*
Chrysotrichinae Cabrera, 1900	*Saimiri*
Cebinae Bonaparte, 1831	*Cebus*
Nyctipithecidae Gray, 1870	*Aotus*
Pitheciidae Mivart, 1865	
Pitheciinae Mivart, 1865	*Pithecia, Cacajao, Chiropotes*
Callicebinae Pocock, 1925	*Callicebus*
Atelidae Gray, 1825	
Atelinae Gray, 1825	*Ateles, Lagothrix, Oreonax, Brachyteles*
Mycetinae Gray, 1825	*Alouatta*

Simpson (1945, p.65) cited Mycetina Gray, 1825 and Alouatinae Trouessart, 1897 as synonyms of Alouattinae Elliot, 1904; and *Mycetes* Illiger, 1811 as a synonym of *Alouatta* Lacépède, 1799. Article 32.5.3.3 states that a family-group name formed from an incorrect subsequent spelling of a generic name is an incorrect original spelling and must be corrected. Cited as it was from Lacépède, "*Alouata*" is a misspelling, not a new name. Even though he misspelt it, Trouessart (1897, p.32) therefore should be cited as the author of Alouattinae. Simpson (1945, p.64) cited Nyctipithecinae Mivart, 1865 as a synonym of Aotinae Elliot, 1913; and *Nyctipithecus* Spix, 1823 and *Aotus* "Humboldt, 1811" as synonyms of *Aotes* "Humboldt, 1811". He was therefore well aware of the earlier family-group names, and his reason for replacing them is self-evident.

Using the recommended citation of author and date, Alouattinae Trouessart, 1897 (1825), and Aotidae Poche, 1908 (1865), both unequivocally "in prevailing usage", are thus the correct family-group names for their type genera, and take priority over all other family-group names based on those type genera and their synonyms. Groves (2001) should not have used Mycetinae and Nyctipithecidae, because in so doing he contravened Article 40. His precedent should not be followed.

Simpson (1945, p.65) cited Callitricidae Gray, 1821, Callithricina Gray, 1825, Harpaladae Gray, 1821 and Hapalidae Wagner, 1840 as synonyms of Callitrichidae Thomas, 1903; and *Hapale* Illiger, 1811 as a synonym of *Callithrix* Erxleben, 1777. Thomas (1903) discovered that *Callithrix* was based on a marmoset and not (as previously thought) on a titi monkey. He instigated the generic name *Callicebus* for the titis, and replaced the then prevalent *Hapale* with *Callithrix* for the marmosets, and the family-group name Hapalidae with Callitrichidae. The family-group name Callitricidae Gray, 1821, although misspelt, is clearly the same family-group name as Callithrichina Gray, 1825. Commencing with its vernacular name and ending with his concept of the type species, Gray (1821, p.298) specified the type genus as "Saimiri, Callitrix. Geoff. Simia sciurea. Lin". Groves' (2001, p.127) inference that "Callitrichinae/-idae Thomas 1903, for the marmosets and tamarins is preoccupied by the same name of Gray, 1825, for the titis" is accurate only if it can be demonstrated that *Callithrix* Geoffroy Saint-Hilaire, 1812 is a junior homonym of *Callithrix* Erxleben, 1777, rather than the same genus. Geoffroy (1812, p.112) did not cite the authorship of *Callithrix* and it is internally unclear whether he intended it as a new genus. Geoffroy and Cuvier (1795, p.461), however, do cite Erxleben as the author, precluding *Callithrix* Geoffroy, 1812 from being construed as a new name. That Gray (1821) misidentified the type genus is immaterial as ultimately the identity of a family-group name rests on the identity of the holotype, lectotype or neotype of the type species of the type genus of that family-group name. If the holotype, etc. is a marmoset then the family-group name belongs to marmosets, regardless of whether Gray (1821) applied it to the squirrel monkeys.

The type genus of Callitricidae Gray, 1821 was misidentified, but Thomas (1903) rectified that mistake, and the family-group name Callitrichidae is now "in prevailing usage" for the marmosets. The use of Hapalidae in W. C. O. Hill's influential monograph series *Primates: Comparative Anatomy and Taxonomy*" (Groves, 2001, p.127) does not alone constitute "prevailing usage". Hill (1957, pp.vii, 281) himself subscribed to the view that the priority of the type genus determines that of the family-group name, and indeed later abandoned Hapalidae. Hill (1972, pp.56, 76, 79, 164) initially repeatedly cited the two family-group names in tandem, but then formally recognized "Callithricidae" (p.164). Article 40.2.1 can be invoked to confirm the priority of Callitrichidae Gray, 1821 over Harpalidae Gray, 1821 or alternatively a First Reviser, such as Elliot (1913, p.xvii) can be sought. Callitrichidae Gray, 1821 is thus, after all, unequivocally the correct family-group name for the marmosets. This spelling, not Gray's (1821) original, accords with Article 29.3.1 (see *International Code of Zoological Nomenclature*, Third edition, 1985, Appendix D VII, Table 2, Part B, Greek noun genitive stem 24).

The case of Saimirinae is a little different. This name is at least twelve years older than Groves (2001, p.156) stated, and can be attributed as Saimiridae to Miller (1912, p.379). It is unlikely to significantly predate Miller (1912), as the priority of *Saimiri* Voigt, 1831 over *Chrysothrix* Kaup, 1835 was acknowledged only fifteen years earlier (Palmer, 1897). It cannot readily be conserved under the provisions of Article 40.2.1 because, before 1961, few authors recognized it. Fewer still (perhaps none, other than Cabrera, himself) seemed aware of the earlier name, Chrysothrichinae Cabrera, 1900. We have found no author before 1961 who specified or implied that he or she was replacing Chrysotrichinae (the correct spelling) because its type genus had become a junior synonym. But then again, as such replacement was standard practice, most might have felt no compulsion to justify their action. If Miller's (1912, 1924) awareness of the earlier name could be demonstrated, such replacement could be taken as read because, although including *Saimiri* in the subfamily Nyctipithecinae, Miller and Rehn (1901, p.297) simultaneously commented: "This name [Nyctipithecinae] is untenable since *Nyctipithecus* has been replaced by *Aotus*". Should a senior synonym of *Saimiri* Voigt, 1831 be discovered, *Saimiri* can be maintained under the provisions of Article 23.9. The only foreseeable threat to the stability of Saimiridae Miller, 1912 therefore is the strict application of the Law of Priority. Strictly interpreted, Article 40.2.1 demands a formal statement before 1961 of replacement of a family-group name because its type genus has become a junior synonym, but the overriding aim of the Code is stability of scientific nomenclature. If deemed necessary, this case could be referred to the Commission for a ruling, but the axiom "maintain prevailing usage" should suffice. Cabrera (1900), Anthony and Coupin (1931) and Groves (2001) are probably the only authors to employ Chrysotrichinae, so the approbation of "prevailing usage" rests indisputably with Saimiridae. We strongly advocate rejecting Chrysotrichinae as the family-

group name for the squirrel monkeys in favour of Saimiri-dae Miller, 1912 (1900).

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References

Anthony, R. and Coupin, F. 1931. Tableau résumé d'une classification générique des Primates fossiles et actuels. *Bull. Mus. Hist. Nat. Paris* (2)3: 566-569.

Cabrera Latorre, A. 1900. Estudios sobre una colleción de monos americanos. *Anal. Soc. Española Hist. Nat. Madrid* (2)9(29): 65-93.

Duncan, F. M. 1937. On the dates of publication of the Society's 'Proceedings,' 1859-1926. *Proc. Zool. Soc. Lond.* 107: 71-84.

Elliot, D. G. 1913. *A Review of the Primates.* Monograph Series, Volume 1, Lemuroidea: *Daubentonia* to *Indris*, Anthropoidea: *Seniocebus* to *Saimiri*. American Museum of Natural History, New York.

Geoffroy Saint-Hilaire, [É.]. 1812. Tableau des quadrumanes, ou des animaux composant le premier ordre de la classe des mammifères. *Annls. Mus. Hist. Nat. Paris* 19: 85-122.

Geoffroy [Saint-Hilaire], É., and Cuvier, G. 1795. Histoire naturelle des orangs-outangs. *Magazin Encycl.* 3: 451-463.

Gray, J. E. 1821. On the natural arrangement of vertebrose animals. *Lond. Med. Repository* 15: 296-310.

Gray, J. E. 1825. An outline of an attempt at the disposition of Mammalia into tribes and families, with a list of the genera apparently appertaining to each tribe. *Ann. Philos.* (new ser.) 10: 337-344.

Groves, C. P. 2001. *Primate Taxonomy.* Smithsonian Institution Press, Washington, DC.

Hill, W. C. O. 1957. *Primates. Comparative Anatomy and Taxonomy III. Pithecoidea Platyrrhini (Families Hapalidae and Callimiconidae).* Edinburgh University Press, Edinburgh.

Hill, W. C. O. 1972. *Evolutionary Biology of the Primates.* Academic Press, London and New York.

Miller, G. S., Jr. 1912. List of North American land mammals in the United States National Museum, 1911. *Bull. U. S. Natn. Mus.* (79): i-xiv, 1-455.

Miller, G. S., Jr. 1924. List of North American recent mammals 1923. *Bull. U. S. Natn. Mus.* (128): i-xvi, 1-673.

Miller, G. S., Jr. and Rehn, J. A. G. 1901. Systematic results of the study of North American land mammals to the close of the year 1900. *Proc. Boston Soc. Nat. Hist.* 30: 1-352.

Mivart, St. G. 1865. Contributions towards a more complete knowledge of the axial skeleton in the primates. *Proc. Zool. Soc. Lond.* 1865: 545-592. [Published in October 1865, see Duncan (1937, p.72).]

Palmer, T. S. 1897. Notes on the nomenclature of four genera of tropical American mammals. *Proc. Biol. Soc. Wash.* 11: 173-174.

Rylands, A. B. 2002. Two taxonomies of the New World primates – a comparison of Rylands *et al.* (2000) and Groves (2001). *Neotrop. Primates* 9(3): 121-124.

Simpson, G. G. 1945. The principles of classification and a classification of mammals. *Bull. Am. Mus. Nat. Hist.* 85: 1-350.

Thomas, O. 1903. Notes on South-American monkeys, bats, carnivores, and rodents, with descriptions of new species. *Ann. Mag. Nat. Hist.* (7)12: 455-464.

Trouessart, E.-L. 1897. *Catalogue mammalium tam viventium quam fossilium. Nova editio (prima completa).* Berlin, Friedländer und Sohn, pt. 1.

THE MURIQUI POPULATION OF THE ESTAÇÃO BIOLÓGICA DE CARATINGA, MINAS GERAIS, BRAZIL: UPDATES

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Introduction

The northern muriqui, *Brachyteles arachnoides hypoxanthus*, or *B. hypoxanthus*, is considered to be one of the 25 most critically-endangered primate taxa in the world (CI/IPS/PSG, 2002). Fewer than 500 northern muriquis are thought to survive today, distributed in small populations in the states of Minas Gerais and Espírito Santo. Although several new populations have been discovered in recent years, the 890 ha forest at the Estação Biológica de Caratinga (EBC), in Minas Gerais is still the largest population known, and the only one that is considered to be viable (Rylands *et al.*, 1998; Strier, 2000). In 2001, the EBC was transformed from a privately-owned forest into a federally-protected reserve, known as the RPPN Feliciano Miguel Abdala (Castro, 2001). Yet, despite the forest's new protected status, continued monitoring of the muriqui population there remains an urgent conservation priority. Long-term behavioral, ecological, reproductive, and demographic studies of the largest muriqui group at the EBC, known as the Matão group, have been underway since 1982 (Strier, 1999a). During the past 20 years, this group has more than tripled in size, increasing from 22 to 70 members as a result of low mortality among all age-sex classes, high fertility among females, which give birth at 3-year intervals, and a female-biased infant sex ratio. Males in this population remain in their natal groups for life, but females

routinely transfer out of their natal groups at a median age of 73.5 months, prior to the onset of puberty (Printes and Strier, 1999; Strier and Ziegler, 2000).

To date, all but two of the 28 natal females that survived to six years of age have transferred out of the Matão group, and until the late 1990s, the number of female emigrants and immigrants was similar. By the late 1990s, however, female emigrants from the Matão group began to out-number female immigrants, which came from a second large group, known as the Jaó group, in this forest (Strier, 1999b). During the first systematic census of the EBC primate community, conducted in August 1999, a total of 73 muriquis were sighted in Jaó (Strier *et al.*, 1999). This was substantially more than the 18 individuals previously known to inhabit the Jaó region of the forest, and confirmed prior suspicions that the entire population was expanding at a comparable rate to that of the Matão group. It also emphasized the importance of extending the EBC muriqui project to include the Jaó group, and the value of maintaining long-term demographic records on the survivorship and fertility of all females after they leave their natal groups.

Here, we present an update on the EBC muriqui population. We pool current data from the Matão study, which is now in its 21st year, with data from the forest-wide census conducted in August 1999 and new preliminary demographic data from the Jaó group, which has been monitored since March 2002. Altogether, we estimate there to be at least 171 individuals in the EBC population. We also document the successful immigrations of 13 females, originally from the Matão group, now fully integrated into the Jaó group, and confirm previous estimates on the age of first reproduction in female muriquis that disperse from their natal groups.

Methods

In August 1999, 16 experienced researchers who had conducted long-term studies on the EBC primates joined forces to survey the muriqui population and those of the other three species of sympatric primates, *Callithrix flaviceps*, *Cebus nigritus*, and *Alouatta guariba*. A brief description of the census can be found in Strier *et al.* (1999), and a more detailed discussion of census methods and results in the Matão region of the forest is currently underway (Mendes and Strier, in prep.). Our priorities in the Jaó region were focused on the muriquis there. Whenever muriquis were heard or sighted, observers remained in the area and searched until they obtained a complete count or the group was lost to view. Age and sex classes were noted, and familiar females, originally born in the Matão group and still recognizable to prior researchers, were identified whenever possible.

Between March-September 2002, 74 members of the Jaó group have been followed systematically. An additional seven individuals have recently been sighted, indicating that there are at least 81 individuals in Jaó. Like all members of the Matão group, muriquis in the Jaó group can be individually recognized by their natural markings. They have proved to be fairly easy to habituate, undoubtedly due to the prohibition on hunting that has long been respected in this forest, and to the fact that several of the adult females presently in the Jaó group had been previously accustomed to the presence of human observers since their births in the Matão group. Dates of births and emigrations are known for all of the Matão females recently identified in the Jaó group. At least two of these familiar females were seen carrying their first infants in August and September, respectively, and therefore provide the first confirmation of prior estimates of age at first reproduction in dispersing female muriquis.

Results

Muriqui Census, August 1999
At the time of the census, the Matão group was known to contain 64 members. An additional seven adult males, originally from Jaó, have been frequently sighted in the Matão part of the forest and account for about 10-12% of copulations involving Matão females (Strier *et al.*, 1993; Strier, 1997). A smaller group, thought to be a subset of the Jaó group and known as "Matão II" since the early 1990's (Strier *et al.*, 1993) was also known to use a small area of the Matão forest. During the Matão census, a total of 13 individuals in the Matão II group were sighted. In addition, the seven males from Jaó are now thought to associate primarily with the Matão II group. Together with the 64-member Matão group and the seven Jaó/Matão II males, there were at least 84 muriquis known in the Matão forest.

Muriquis were also sighted on the daily censuses in the Jaó region. The total of 73 muriquis in Jaó was based on the largest number of each age-sex class sighted on any occa-

Table 1. Natal Matão females identified in the Jaó group during the 1999 census and the 2002 study period.

Female	1999 Jaó Census	2002 Jaó Study Period
Brh	Present	Present, 1st birth 08/02
Cat	Present, with infant	Present
Den	Present	Present, 1st birth 09/02
Fa	Present	Present, with infant 09/02
Hel	Present	Present, with infant 09/02
Ma	Present	Present, with infant
Nd	Present, with infant	Present
Pri	Present	Present
Rs	Present	Present
Nn	Not sighted*	Present
Bri	Not sighted**	Present, with infant
Fl	Emigrated 10/0t0	Present
Kk	Emigrated 04/02	Present

*Not sighted during the 1999 census, but was seen with the Jaó group after she emigrated from the Matão group in November 1989 (Strier *et al.*, 1993).
**Not sighted during the 1999 census, but was seen with the Jaó group after her emigration in November 1995 (Printes and Strier, 1999).

sion. Altogether, 20 different adult males, 28 adult females, 1 subadult female, 10 juveniles, and 14 infants were counted. Combining the Jaó census results with those from the Matão side of the forest, we estimated the total EBC muriqui population to be at least 157 individuals at that time. Comparisons of the composition of the Matão and Jaó group indicated a higher proportion of adults in the Jaó group and of immatures in the Matão group, but the adult sex ratios in the two groups were similar (Fig. 1).

During the Jaó census, nine females were observed which were known to have been born in the Matão group and to have subsequently emigrated (Table 1). Two of them (Cat and Nd) were carrying dependent infants. Both of these females, as well as others that were not associated with infants, were known to have emigrated from the Matão group prior to the onset of puberty (Strier and Ziegler, 2000).

The Jaó Project
By September 2002, 74 members of the Jaó group could be recognized by trained observers. By this time, the Matão group had increased to 70 members, and the age structures of the two groups appear to have converged (Fig. 1). At least seven additional muriquis have been sighted in Jaó, but cannot yet be identified. All nine of the female immigrants from the Matão group identified during the census were still present, and an additional four natal Matão females have been identified with the Jaó group (Table 1). Two of these females (Nn and Bri) were known to have immigrated previously (Strier *et al.*, 1993; Printes and Strier, 1999), but were not sighted during the census. Two additional females from the Matão group that emigrated after the census, in October 2000 (Fl) and March 2002 (Kk), were also confirmed in Jaó.
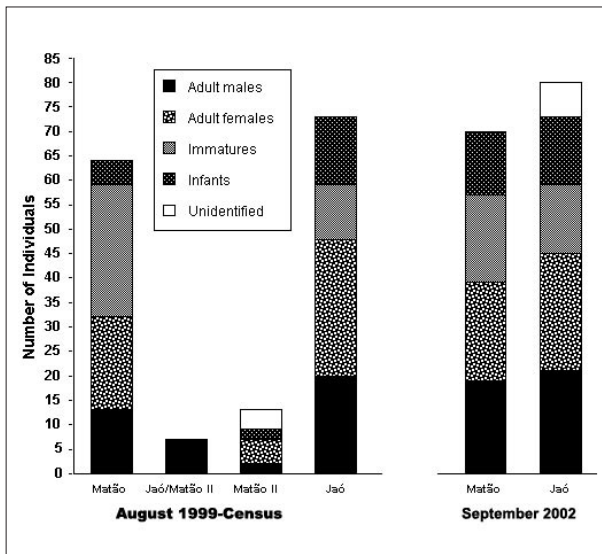
Figure 1. Age-sex composition of the EBC muriqui population. Matão and Jaó groups shown during the August 1999 census and during ongoing studies as of September 2002. Note that the Jaó/Matão II males and the Matão II group are still present as of 9/02.

Two of the immigrant females (Ma and Bri) from Matão were confirmed to be carrying dependent infants during the Jaó study period (Table 1). Two additional females were visibly nulliparous when they were sighted during early months of the Jaó study (Brh and Den), and gave birth to what we know to be their first infants in late August and early September 2002. Based on their birth records from the Matão group, we know they were 108 and 111 months of age at their first parturitions. These ages are remarkably similar to the 106.3 months estimated for Jaó females that were assumed to have immigrated into the Matão group at the same median age (73.5 months) at which Matão females have emigrated (Strier and Ziegler, 2000).

Two additional female immigrants from Matão (Fa and Hel) were observed with new infants in mid-late September 2002, when they were 123 and 131 months of age. If these are their first infants, they raise the median age at first reproduction for immigrants into Jaó to 117 months (n = 4), which is nearly a year older than that estimated for immigrants into Matão. However, neither of these females had been confidently classified as nulliparous prior to their September parturitions, and it is therefore possible that their September 2002 infants were not the first; possibly their previous infants had died.

Discussion

Our preliminary findings demonstrate the importance of expanding the demographic monitoring of the EBC muriquis to include the entire population, which we now estimate to include at least 171 individuals. These findings also provide insights into demographic processes that affect the different groups. For example, four natal Jaó females have immigrated into the Matão group since the census, while a fifth Jaó female that temporarily associated with the Matão group has since been sighted carrying a new infant in the Matão II group.

Nine Matão females have disappeared from their natal group since the August 1999 census. Of these, two were identified in the Jaó group, and four were ≤3 years of age when they were last sighted. This is much younger than the median age of 73.5 months (6.12 years) at which confirmed emigrations have occurred (Strier and Ziegler, 2000), and we assume that the disappearances of these females coincided with their deaths. Previous analyses of mortality patterns in the Matão group indicated a peak in mortality at approximately 3 years of age, which is also when mothers are pregnant with or carrying their next offspring (See appendix in Strier, 1993/1994). Although the only two suspected predations involved 13-month old infants (Printes *et al.*, 1996), the period during which mothers shift their reproductive efforts to future offspring appears to represent a particularly vulnerable time for young muriquis.

The remaining three Matão females that are presently unaccounted for were last sighted with the Matão group when they were about 5.5-6.65 years of age. It is possible that

they joined the Matão II group, or that they are present in Jaó, but have not yet been identified. Ongoing efforts in Jaó, and new efforts to periodically census the Matão II group (e.g., Possamai and Strier, in prep.) may ultimately provide confirmation of their whereabouts.

Monitoring the survivorship and subsequent fertility of dispersing females from both the Matão and Jaó groups is clearly important for evaluating the long-term viability of this population, and is therefore one of the primary objectives of the expanded, long-term muriqui project at this site. Although it has been possible to confirm female emigrations from the Matão group by tracking them into Jaó (e.g., Strier *et al.*, 1993; Printes and Strier, 1999), we have previously lacked systematic data on the number of natal females that leave the Jaó group, but fail to immigrate into the Matão group. As long-term demographic data on the Jaó group accumulate, we will be able to more accurately assess the mortality rates of dispersing females in this population.

The ages at first reproduction that could be confidently determined for the two females from the Matão group that immigrated into the Jaó group are similar to those previously estimated for females that immigrated into the Matão group from Jaó (Strier and Ziegler, 2000). However, if the other two infants born to Matão emigrants in September also represented first parturitions, the median age at first reproduction of females dispersing into Jaó would be older than that of females dispersing into Matão. It is possible that Jaó females are older than natal Matão females when they emigrate, or that ecological or demographic conditions in the two groups are responsible for differences in the ages at which immigrants first reproduce. Long-term monitoring will be necessary to confirm the ages at which female infants born in the Jaó group emigrate, and to determine whether there are differences in the ages at which female immigrants in the two groups reproduce.

Our preliminary documentation of age at first reproduction represents an important confirmation of a basic life history variable, and provides further support for the idea that female dispersal and delayed reproduction are associated in this species (Strier and Ziegler, 2000). However, larger sample sizes are still necessary to determine whether Jaó females leave their natal groups at the same ages as Matão females, and whether variation in age at first reproduction differs more between groups or within groups. Continued monitoring of the Jaó group will permit us to evaluate the ages at which other nulliparous females that join the Jaó group give birth to their first infants. It will also provide comparative perspectives on the life histories of Jaó females that remain and reproduce in their natal groups, as occasionally occurs among natal Matão females (Martins and Strier, submitted).

Like all long-term field studies, the demographic data on the EBC muriquis will continue to increase in value over time. It will be particularly important to monitor their demographic transitions and life history changes as the growth that has characterized this population over the past 20 years begins to slow, and to accompany the effects of the EBC's new protected status on the number of muriquis that this forest can support.

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References

Castro, M. I. 2001. RPPN Feliciano Miguel Abdala - A protected area for the northern muriqui. *Neotrop. Primates* 9: 128-129.

CI/IPS/PSG. 2002. The 25 most critically endangered primates. Report, Conservation International (CI), International Primatological Society (IPS), IUCN/SSC Primate Specialist Group (PSG). Web site: <www.conservation.org/xp/CIWEB/newsroom/press_releases/primates_kit/primates_report.pdf>.

Martins, W. P. and Strier, K. B. Submitted. Age at first reproduction in philopatric female muriquis (*Brachyteles arachnoides hypoxanthus*).

Printes, R. C. and Strier, K. B. 1999. Behavioral correlates of dispersal in female muriquis (*Brachyteles arachnoides*). *Int. J. Primatol.* 20: 941-960.

Printes, R. C., Costa, C. G. and Strier, K. B. 1996. Possible predation on two infant muriquis, *Brachyteles arachnoides*, at the Estação Biológica de Caratinga, Minas Gerais, Brasil. *Neotrop. Primates* 4: 85-86.

Rylands, A. B., Strier, K. B., Mittermeier, R. A., Borovansky J. and Seal, U. S. (eds.). 1998. *Population and Habitat Viability Assessment for the Muriqui (*Brachyteles arachnoides*).* IUCN/SSC Conservation Breeding Specialist Group (CBSG), Apple Valley, MN.

Strier, K. B. 1993/1994. Viability analyses of an isolated population of muriqui monkeys (*Brachyteles arachnoides*): Implications for primate conservation and demography. *Primate Conserv.* (14-15): 43-52.

Strier, K. B. 1997. Mate preferences in wild muriqui monkeys (*Brachyteles arachnoides*): Reproductive and social correlates. *Folia Primatol.* 68: 120-133.

Strier, K. B. 1999a. *Faces in the Forest: The Endangered Muriqui Monkey of Brazil.* Harvard University Press, Cambridge.

Strier, K. B. 1999b. Predicting primate responses to "stochastic" demographic events. *Primates* 40: 131-142.

Strier, K. B. 2000. Population viability and regional conservation priorities for muriquis (*Brachyteles arachnoides*) in Brazil's Atlantic forest. *Biotropica* 32(4b): 903-913.

Strier, K. B. and Ziegler, T. E. 2000. Lack of pubertal influences on female dispersal in muriqui monkeys (*Brachyteles arachnoides*). *Anim. Behav.* 59: 849-860.

Strier, K. B., Mendes, F. D. C., Rímoli, J. and Rímoli, A. O. 1993. Demography and social structure in one group of muriquis (*Brachyteles arachnoides*). *Int. J. Primatol.* 14: 513-526.

Strier, K. B., Mendes, S. L., Bragança, A. M., Coelho, C. C., Costa, C. G., Diaz, L. G., Dib, L. T., Gomes, J., Hirsch, A., Lynch, J. W., Nogueira, C. P., Odália Rímoli, A., Oliva, A. S., Printes, R. C., Rímoli, J. and Santos, R. R. 1999. Census of the primate community at the Estação Biológica de Caratinga, Minas Gerais, Brazil. *Neotrop. Primates* 7: 134-135.

REDISCOVERY OF *BRACHYTELES ARACHNOIDES HYPOXANTHUS* AT THE FAZENDA CÓRREGO DE AREIA, MINAS GERAIS, BRAZIL

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Waldney Pereira Martins, Simone Porfírio

On 1 December, 2001, we encountered a group of 13 *Brachyteles arachnoides hypoxanthus* in a forest in the Fazenda Córrego de Areia (18°26`S, 42°25´W, altitude 388-805 m, 60 ha), municipality of Peçanha, in the state of Minas Gerais (Fig. 1). The forest was surveyed as part of a project examin-ing primate populations and habitat fragmentation patterns over the entire Rio Doce basin in Minas Gerais (Hirsch, in prep.). The farm is in the Rio Suaçuí Grande valley, 26 km from the town of Peçanha. The first author, accompanied by personnel of the Minas Gerais State Forestry Institute (IEF/MG), flew over the area in a helicopter the previous day to estimate the extent of deforestation in this and a number of protected areas in the region. During the overflight we were able to identify an area of relatively well-preserved forest occupying one of the hilltops on the farm.

Using information obtained from local inhabitants, Aguirre (1971) concluded that *B. a. hypoxanthus* had been extinct in the region of the headwaters of the Rio Suaçuí Pequeno since 1945/47. Kinzey (1982), following Aguirre (1971), stated that *B. a. hypoxanthus* was *formerly* present in the region of Peçanha. However, in July 1981, 40 years on, Russell A. Mittermeier, Andrew Young and Carlos Alberto Machado Pinto found a population of eight individuals at the Fazenda Córrego de Areia (Mittermeier *et al.*, 1987). Rosa Lemos de Sá (pers. comm. in Strier, 1992) attempted to locate this group again in 1990, but without success.

In our two-days of fieldwork in 2001, we performed five playback points (playing recordings of muriqui vocalizations, spending 10 minutes at each: 5 minutes playing the tape recording with a 5-minute pause). We also made a detailed assessment of habitat structure at six further points. However, due to technical problems, we were unable carry out a full primate census of the Fazenda, and this is planned for our next field trip.

We obtained a positive response of muriqui calls on the third playback point. At this time, we were in a deep and humid mountain gorge surrounded by some trees esti-mated as being 30 m in height. The group we located was composed of four adult males, one sub-adult male, one juvenile male, two adult females each with a juvenile, one adult female with an infant, and one juvenile female. We stayed with the group for about 30 minutes till they moved away. During this period, some of the individuals vocal-ized frequently, several evidencing a certain degree of stress, probably related to our presence, possibly exacerbated by hunting pressure in the area. In the same gorge during the fifth playback session, we also detected a group of *Cebus robustus* of at least four individuals.

The forest in the Fazenda Córrego de Areia covers only 60 ha, but during the helicopter overflight we were able to obtain coordinates using a Garmin GPS III Plus, and with a Landsat 5 TM satellite image and an Arc View GIS 8.1 geographic information system (ESRI, 2001), we were able to estimate that it extends over 449 ha surrounding the hilltop. For the habitat structure assessment, we used the technique of Sample Points along a Transect. A circle of 6 m in radius (113.2 m²) was demarcated at each of six points at 300 m intervals along the transect (see Hirsch *et al.*, 1994; Hirsch, 1995, in prep.), the first placed 200 m inside the forest to avoid "edge effects". In general terms, the forest of Fazenda Córrego de Areia can be considered
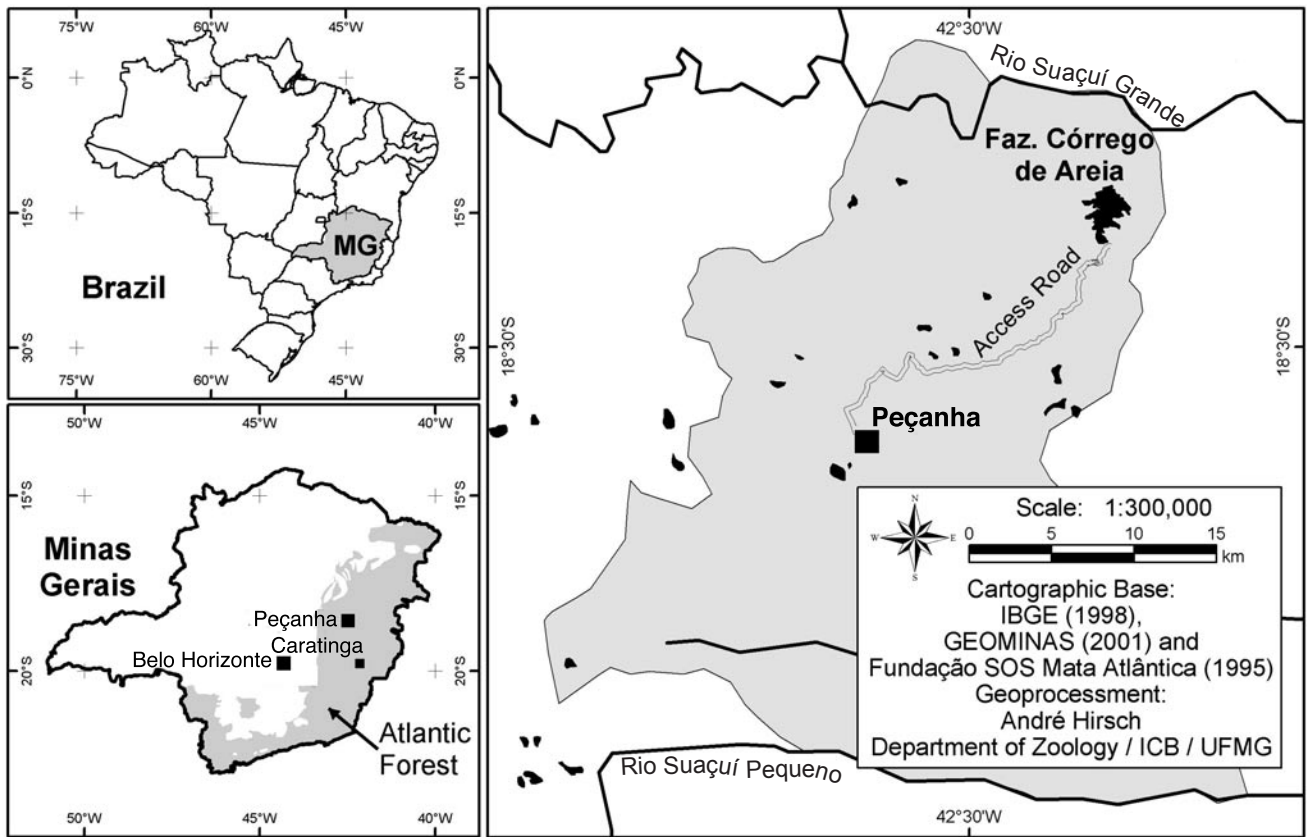
Figure 1. Location of the Fazenda Córrego de Areia and other forest fragments, municipality of Peçanha, Minas Gerais, Brazil.

Table 1. Habitat variable score of six points evaluated at Fazenda Córrego de Areia and other selected areas from Minas Gerais State that harbor *Brachyteles arachnoides hypoxanthus* populations.

Variables	Fazenda Córrego de Areia Peçanha	RPPN Feliciano Miguel Abdala Caratinga	Rio Doce State Park (Campolina) Marliéria	Fazenda Esmeralda Rio Casca
Area (ha)	449	957	35.976	56
Perimeter (km)	15.85	92.10	120.30	3.00
Ideal perimeter as a circle (km)	7.51	10.97	67.18	2.65
Deviation from ideal perimeter (%)	111.01	739.84	79.07	13.09
Average altitude (m)	597	550	310	348
Density of trees (trees/ha)	471.56	397.88	368.41	530.50
Tree DBH - average (cm)	27.35	19.20	23.21	18.77
N° of trees with DBH >10 cm	32	27	25	36
N° of trees with DBH >75 cm	1	2	2	0
Tree height average (m)	14.17	14.65	12.74	11.91
N° of trees with H >20 m	4	4	3	4
N° of dead trees and branches	24	11	12	16
N° of emergent trees	4	5	5	4
Canopy connectivity (0 to 3)	2	3	3	1
Presence of *Euterpe edulis* (yes/no)	Yes	Yes	Yes	No
Density of lianas (0 to 3)	1	1	2	3
Occurrence of gaps (Yes/No)	Yes	No	No	Yes
Occurrence of logging (Yes/No)	Yes	No	No	Yes
Occurrence of fire (Yes/No)	Yes	No	No	Yes

Source: Hirsch (*in prep.*).

Table 2. Demographic variable scores of *Brachyteles arachnoides hypoxanthus* from Fazenda Córrego de Areia and other selected areas from Minas Gerais State that harbor muriqui populations.

Variables	Fazenda Córrego de Areia Peçanha	RPPN Feliciano Miguel Abdala Caratinga [a,c]	Rio Doce State Park Marliéria	Fazenda Esmeralda Rio Casca
Area (ha)	449	957	35,976	56
Ecological density (ind./ha)	0.029	0.123	0.007	0.214
Total individuals	13	63	250[b]	12[b]
Adult males	4	14	na	na
Adult females	3	19	na	na
Juveniles	5	18	na	na
Infants	1	12	na	na
Sex ratio	1.33	0.74	na	na
Reproductive rate (infants/females)	0.33	0.63	na	na
Proportion young/adults	0.86	0.91	na	na

Source: a – Dias and Strier (in press); b – Rylands *et al.* (1998); c – only from Matão Group; na – not available.

as seasonal semideciduous forest following the classifications of Brazil, IBGE (1993), located near to the contact zone of the Atlantic Forest and Cerrado (bush savanna of Central Brazil). It is the most northwesterly location for the occurrence of *B. hypoxanthus*, 160 km from the Feliciano Miguel Abdala Private Reserve (Caratinga Biological Station), 153 km from the Rio Doce State Park, and 230 km from Belo Horizonte, the capital city of the state of Minas Gerais.

Comparing the forest and the muriqui population at the Fazenda Córrego de Areia with three other muriqui sites - two protected and one unprotected - we can conclude that it is of intermediate size, is far from ideal in its perimeter and, thus, suffers a strong edge effect, has steep terrain, a high density of large trees with many dead trees and branches, a canopy with intermediate connectivity, and suffers from logging and fires. The population density of the muriquis is relatively low and, compared to the RPPN Feliciano Miguel Abdala, the sex ratio is biased towards males, and the reproductive rate is low (a low young/adult ratio) (Tables 1 and 2).

The northern muriqui, *Brachyteles hypoxanthus*, is Critically Endangered (Hilton-Taylor, 2002). The finding of this population at the Fazenda Córrego de Areia exemplifies the widespread loss of its habitat through agricultural encroachment and forest fragmentation, and also a serious cause of threat to this species - hunting. Protection of the remaining small, privately-owned forests in the state of Minas Gerais, such as those in the vicinity of Peçanha, is now an essential strategy for the conservation of the northern populations of muriqui (Strier and Fonseca, 1996/1997; Rylands *et al.*, 1998). We were unable to ascertain if this was the only group living in this forest, but there are certainly no other forests that connect with it, and only a few other areas in the headwaters of Suaçuí Valley with sufficient area and habitat requirements. Muriqui populations such as this one will suffer increasing genetic homozygosity, and their future is dim (Strier, 2000).

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References

Aguirre, A. C. 1971. *O Mono* Brachyteles arachnoides *(É. Geoffroy)*. Academia Brasileira de Ciências, Rio de Janeiro. 53pp.

Brazil, IBGE. 1993. *Mapa de Vegetação do Brasil*. Escala 1:5.000.000, Projeção Policônica. Fundação Instituto Brasileiro de Geografia e Estatística (IBGE), Rio de Janeiro.

Dias, L. G. and Strier, K. B. In press. Effects of group size on ranging patterns in *Brachyteles arachnoides hypoxanthus*. *Int. J. Primatol.* 24(2).

ESRI. 2001. ArcView GIS v. 8.1. Environmental Systems Research Institute (ESRI), Redlands, CA.

Hirsch, A. In preparation. Fragmentação do habitat e estratégias de conservação de primatas na bacia do Rio Doce, Minas Gerais, utilizando um Sistema de Informação Geográfica. Doctoral thesis, Universidade Federal de Minas Gerais (UFMG), Belo Horizonte.

Hirsch, A. 1995. Censo de *Alouatta fusca* Geoffroy, 1812 (Platyrrhini, Atelidae) e Qualidade do Habitat em Duas Áreas com Remanescentes de Mata Atlântica em Minas Gerais. Master's thesis, Universidade Federal de Minas Gerais, Belo Horizonte.

Hirsch, A., Subirá, R. J. and Landau, E. C. 1994. Levantamento de primatas e zoneamento das matas da região do Parque Estadual do Ibitipoca, Minas Gerais, Brasil. *Neotrop. Primates* 2(3): 4-6.

Hilton-Taylor, C. 2002. *2002 IUCN Red List of Threatened Species.* Website: <http://www.redlist.org/>.

Kinzey, W. G. 1982. Distribution of some Neotropical primates and the model of Pleistocene forest refugia. In: *Biological Diversification in the Tropics*, G. T. Prance (ed.), pp.455-482. Columbia University Press, New York. Gazetteer. 53pp.

Mittermeier, R. A., Valle, C. M. C., Alves, M. C., Santos, I. B., Pinto, C. A. M., Strier, K. B., Young, A. L., Veado, E. M., Constable, I. D., Paccagnella, S. G. and Lemos de Sá, R. M. 1987. Current distribution of the muriqui in the Atlantic forest region of Eastern Brazil. *Primate Conserv.* (8): 143-149.

Rylands, A. B., Strier, K. B., Mittermeier, R. A., Borovansky, J. and Seal, U. S. (eds.). 1998. *Conserving Brazil's Muriqui: Population and Habitat Viability Assessment Workshop for the Muriqui (*Brachyteles arachnoides*).* IUCN/SSC Conservation Breeding Specialist Group (CBSG), Apple Valley, MN.

Strier, K. B. 1992. *Faces in the Forest: The Endangered Muriqui Monkeys of Brazil.* Oxford University Press, Oxford.

Strier, K. B. 2000. Population viabilities and conservation implications for muriquis (*Brachyteles arachnoides*) in Brazil's Atlantic forest. *Biotropica* 32(4b): 903-913.

Strier, K. B. and Fonseca, G. A. B. da. 1996/1997. The endangered muriquis in Brazil's Atlantic forest. *Primate Conserv.* (17): 131-137.

Um Caso de Rapto ou Transferência Acidental de Um Infante entre Bandos Vizinhos de *Alouatta guariba clamitans*

Vanessa Barbisan Fortes

Introdução

Uma ampla variedade de categorias de interação adulto-infante tem sido descrita na literatura primatológica, desde o cuidado parental e aloparental até situações extremas de agressão, como por exemplo o infanticídio. Nicolson (1987) classificou as interações fêmea-infante em duas principais categorias: afiliativo (cuidado maternal e alomaternal) e agressivo (abuso), destacando que a distinção entre elas nem sempre é clara. De acordo com Clarke (1990), o rapto ocorre quando o infante é forçadamente separado de sua mãe, sob protesto de ambos. Outros dois modos pelos quais infantes deixam ou são removidos de suas mães são: tomada, quando o infante é removido sem protesto, e transferência, quando o infante voluntariamente agarra-se a outro animal. Relações adulto-infante e cuidado parental em *Alouatta* são bem documentados na literatura (Altmann, 1959; Baldwin and Baldwin, 1973; Bolin, 1981; Sekulic, 1983; Neville *et al.*, 1988), assim como relatos de adoção (Izawa, 1989; Clarke and Glander, 1981; Agoramoorthy and Rudran, 1992). Já os relatos de rapto são menos freqüentes, havendo registros para *A. palliata* (Clarke, 1990) e *A. caraya* (Calegaro-Marques and Bicca-Marques, 1993). Raptos de infantes por indivíduos do mesmo grupo parecem ser mais freqüentes, havendo apenas um relato de rapto inter-grupo (Glander, 1974). Um possível caso de rapto inter-grupo em *Alouatta guariba clamitans* é apresentado por Marques and Ades (2000) para um infante de cerca de dois meses de idade, em que o macho envolveu-se no cuidado aloparental. Na maioria dos casos, o contexto em que a troca de infante ocorreu não foi observado, havendo apenas observações posteriores em que o infante encontrava-se com indivíduos de outro grupo. A seguir será descrito um caso de possível tentativa de rapto de um infante de *A. g. clamitans* por um bando vizinho, habitante de um fragmento de Floresta Estacional Decidual no município de Santa Maria, Rio Grande do Sul, Brasil.

Métodos

O registro comportamental aqui apresentado foi obtido durante um estudo da dieta e padrão de atividades de *Alouatta guariba clamitans* (bugio-ruivo) no município de Santa Maria (29°43'-29°44'S, 53°42'-53°44'W), Rio Grande do Sul, Brasil (Fortes, 1999). A área de estudo, pertencente ao Ministério do Exército, é denominada Campo de Instrução de Santa Maria (CISM). O CISM possui uma área total de 5,876 ha, com cerca de 20% de florestas nativas (Floresta Estacional Decidual), distribuídas em fragmentos de diferentes tamanhos entremeados por vegetação campestre. O grupo de bugios-ruivos estudado habitava um trecho do maior fragmento florestal existente na área, com cerca de 200 ha, no qual vários grupos foram visualizados.

Acompanhou-se um grupo de bugios-ruivos composto por dois machos adultos, um macho subadulto, três fêmeas adultas e uma fêmea juvenil no período de janeiro a dezembro de 1996. Uma das fêmeas deu à luz em janeiro, mas o infante desapareceu antes do primeiro mês de vida. As outras duas fêmeas deram à luz no mês de abril (infantes observados pela primeira vez em 24 de abril de 1996), sendo que os infantes sobreviveram até o final do período de estudos.

O relato a seguir decorre de observações feitas durante um encontro entre dois grupos vizinhos, o qual resultou

em uma aparente tentativa de rapto de um dos filhotes. O grupo principal de estudo é denominado G1 e o grupo vizinho, G2. Este último era composto por um macho adulto, dois machos subadultos, três fêmeas adultas e quatro indivíduos juvenis.

Observações

Parte da área domiciliar de G1 apresentou sobreposição com a área de G2. Os encontros entre os grupos eram freqüentes, especialmente durante a primavera e o verão, quando várias árvores na porção sobreposta de suas áreas domiciliares apresentavam frutos. Os dois grupos mostraram certa tolerância quanto à manutenção da proximidade entre eles, sendo que em algumas ocasiões chegaram a repousar na mesma árvore. Em 16 de fevereiro de 1996, um macho adulto e um macho subadulto de G1 aproximaram-se e deitaram na mesma árvore onde encontravam-se um macho subadulto e uma fêmea adulta de G2 sem que estes apresentassem qualquer reação agressiva. Em outras ocasiões, no entanto, os encontros desencadearam intensa vocalização, com participação de todos os membros do grupo.

No dia 2 de outubro de 1996, quando os infantes tinham cinco meses de idade, ocorreu um encontro entre os grupos às 16h 20min. Um macho juvenil de G2 que deslocava-se na periferia da área domiciliar de G1 passou para a mesma árvore onde as três fêmeas adultas e os infantes de G1 encontravam-se em repouso. Aparentemente não havia percebido a presença de G1 no local. Ao detectar as fêmeas adultas de G1 com seus filhotes, começou a saltar rapidamente entre os galhos e a morder ramos da árvore onde se encontrava, atraindo a atenção dos três machos de G1, os quais deslocavam-se em direção ao local. Estes machos começaram a vocalizar, afugentando o juvenil de G2. Logo os demais indivíduos de G2 (que não estavam visíveis) aproximaram-se, e seguiram-se 10 minutos de interação agonística entre os grupos, com intensa vocalização. Todos os membros de G1 (exceto os infantes) integraram-se a esta atividade. Decorrido este tempo, os dois grupos voltaram a alimentar-se e a realizar pequenos deslocamentos em árvores cujas copas tocavam-se. Às 16h 45min todos os indivíduos de G1 encontravam-se em repouso, exceto os dois infantes, que brincavam juntos. Nesta atividade, os infantes passaram para a árvore onde os indivíduos de G2 repousavam, aproximando-se até cerca de 3 m de uma fêmea adulta. Esta mostrou interesse pelos infantes, deslocando-se em direção a eles e deitando-se ao seu lado. Durante a brincadeira, um dos infantes repetidamente passava sobre o dorso desta fêmea. Enquanto realizava os registros comportamentais do grupo de estudo (G1), deixei de observar os infantes por cerca de 5 minutos. Fui surpreendida pela repentina movimentação e fuga de G2 e pela insistente vocalização (semelhante a um choro) de um infante. Era um dos infantes de G1 que havia sido levado no dorso da fêmea de com a qual brincara anteriormente. Em resposta à vocalização, a mãe deste infante deslocou-se rapidamente atrás de G2, seguida pelas outras duas fêmeas adultas e pela fêmea juvenil.

Quando G2 já havia se distanciado cerca de 60 m do local do incidente, a mãe do infante investiu em direção à fêmea "raptora", sendo afugentada por um macho adulto, uma fêmea adulta e um juvenil de G2. Porém, o infante conseguiu livrar-se e correu em direção à sua mãe durante esta disputa. Os machos adultos de G1 não se envolveram na tentativa de recuperar o infante, apenas deslocaram-se uma curta distância, permanecendo parados na árvore onde G2 estivera em repouso anteriormente. O episódio encerrou-se por volta das 17h10min.

Discussão

O interesse das fêmeas, especialmente as mais jovens, por filhotes de outras fêmeas é bastante freqüente. Calegaro-Marques e Bicca-Marques (1993) registraram elevada frequência de comportamento alomaternal realizado por fêmeas imaturas em *Alouatta caraya*. Tais comportamentos entre indivíduos do mesmo bando poderiam ser explicados pelo alto status social da mãe, pelo parentesco entre a díade mãe-filhote e a fêmea que exibe o cuidado alomaternal, ou ainda pelo possível papel que este comportamento desempenha no aprendizado do cuidado de filhotes por futuras mães. A adoção de infantes por indivíduos de outros grupos encontra pouco suporte nas duas primeiras explicações. Uma causa mais plausível seria a simples curiosidade de fêmeas nulíparas em relação aos infantes (Neville, 1972; Sekulic, 1983).

Agoramoorthy (1998) sugere como uma possível causa de adoção/rapto intergrupo a competição entre fêmeas, porém não deixa claro em que circunstâncias ocorreria esta competição. Em *Alouatta*, tanto machos quanto fêmeas emigram de seus grupos ao atingir a idade juvenil, e existe severa competição para permanecer no grupo natal (Jones, 1980). No caso ora relatado, entende-se que as possíveis vantagens para a fêmea "raptora", do ponto de vista competitivo, seriam a aquisição de habilidades maternas e a redução do sucesso reprodutivo da outra fêmea (mãe do infante raptado).

Embora a fêmea adulta de G2 tenha carregado o infante de G1 consigo por cerca de 60m, não é possível afirmar que o rapto foi intencional, embora seu interesse e curiosidade pelos infantes tenha ficado evidente quando aproximou-se deles e permitiu o contato físico. No entanto, também é possível que ela apenas tenha sido afugentada pela movimentação dos machos adultos de G1 e levado acidentalmente o infante em suas costas. Baldwin and Baldwin (1973) relatam que em três ocasiões uma fêmea adulta de *Alouatta palliata* que não era a mãe levantou-se e deslocou-se por certa distância levando agarrado a si um infante que previamente brincava sobre seu corpo, e que o mesmo retornou para sua mãe na primeira oportunidade. Porém tratava-se de um infante mais novo e do mesmo grupo.

O afastamento do infante de seu bando ocorreu sob protesto dele próprio e de sua mãe, com apoio das

demais fêmeas adultas. Não houve propriamente uma separação forçada entre o infante e sua mãe, pressuposto que caracteriza o rapto segundo a definição dada por Clarke (1990). O infante carregado pela fêmea de G2, estando com quase seis meses de idade, já apresentava grande independência, permanecendo no dorso da mãe apenas durante os deslocamentos mais longos, tanto que encontrava-se distante dela (inclusive em outra árvore) quando ocorreu o suposto rapto. Além disso, o contato com a fêmea de G2 ocorreu voluntariamente por parte do infante. As situações de rapto descritas na literatura envolvem a remoção agressiva do filhote do ventre da mãe e são mais freqüentes durante as primeiras semanas de vida dos infantes, quando estes permanecem a maior parte do tempo em contato com suas mães e são mais atrativos a outras fêmeas e juvenis. Desta forma, o fato de os animais de G1 terem "protestado" não invalida a hipótese de que a fêmea de G2 tenha carregado o filhote sem intenção, conforme já comentado anteriormente.

Agradecimentos

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Referências

Agoramoorthy, G. 1998. Intergroup infant transfer among red howlers, *Alouatta seniculus* in Venezuela: Adoption or kidnapping. *Neotrop. Primates* 6: 121-122.

Agoramoorthy, G. and Rudran, R. 1992. Adoption in free-ranging red howler monkeys *Alouatta seniculus* of Venezuela. *Primates* 33: 551-555.

Altmann, S. A. 1959. Field observations on a howling monkey society. *J. Mammal.* 40: 317-330.

Baldwin, J. D. and Baldwin, J. I. 1973. Interactions between adult females and infant howling monkeys (*Alouatta palliata*). *Folia Primatol.* 20: 27-71.

Bolin, I. 1981. Male parental behavior in black howler monkeys (*Alouatta palliata pigra*) in Belize and Guatemala. *Primates* 22: 349-360.

Calegaro-Marques, C. and Bicca-Marques, J. C. 1993. Allomaternal care in the black howler monkey (*Alouatta caraya*). *Folia Primatol.* 61: 104-109.

Clarke, M. R. 1990. Behavioral development and socialization of infants in a free-ranging group of howling monkeys (*Alouatta palliata*). *Folia Primatol.* 54: 1-15.

Clarke, M. R. and Glander, K. E. 1981. Adoption of infant howling monkeys (*Alouatta palliata*). *Am. J. Primatol.* 1: 469-472.

Fortes, V. B. 1999. Dieta, atividades e uso do espaço por *Alouatta fusca clamitans* (Primates: Cebidae) na Depressão Central do Rio Grande do Sul. Dissertação de Mestrado, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brasil.

Glander, K. E. 1974. Baby-sitting, infant sharing and adoptive behavior in mantled howling monkeys. *Am. J. Phys. Anthropol.* 41: 482.

Izawa K. 1989. The adoption of an infant observed in a wild group of red howler monkeys (*Alouatta seniculus).* *Field Studies of New World Monkeys, La Macarena, Colombia* 2: 33-36.

Jones, C. B. 1980. The functions of status in the mantled howler monkey, *Alouatta palliata* Gray: Intraspecific competition for group membership in a folivorous Neotropical primate. *Primates* 21: 389-405.

Maestripieri, D. 1994. Influence of infants on female social relationships in monkeys. *Folia Primatol.* 63: 192-202.

Marques, A. A. B. de and Ades, C. 2000. Male care in a group of wild *Alouatta fusca clamitans* in southern Brazil. *Folia Primatol.* 71: 409-412.

Neville, M. K. 1972. Social relations within troops of red howler monkeys (*Alouatta seniculus*). *Folia Primatol.* 18: 47-77.

Neville, M. K., Glander, K. E., Braza, F. and Rylands, A. B. 1988. The howling monkeys, genus *Alouatta*. 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.349-453. World Wildlife Fund-US, Washington, DC.

Nicolson, N. 1987. Infants, mothers and other females. In: *Primate Societies*, B. B. Smuts, D. L. Cheney, R. M. Seyfarth, R. W. Wrangham and T. T. Struhsaker (eds.), pp.330-342. University of Chicago Press, Chicago.

Sekulic, R. 1983. Spatial relationships between recent mothers and other troop members in red howler monkeys (*Alouatta seniculus*). *Primates* 24: 475-485.

On the Diagnostic Characters and Geographic Distribution of the "Yellow-handed" Titi Monkey, *Callicebus lucifer*, in Peru

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The recent review of the titi monkeys (*Callicebus*) by Van Roosmalen and co-workers (2002) has expanded our knowledge of the taxonomy and geographic distribution of this genus, but has also shown that considerable gaps still exist. Here we discuss some problems associated with the diagnostic characters and geographic distribution of the Peruvian titi monkeys.

Van Roosmalen *et al.* (2002) raised to species rank what were considered subspecies of *Callicebus torquatus* by

Hershkovitz (1990). For one of these, *Callicebus lucifer*, orange hands are given as one of the diagnostic characters. Hershkovitz (1990) also considered orange hands as distinguishing *Callicebus torquatus lucifer* from *Callicebus torquatus medemi*. Observations made by us at different localities in north-eastern Peru, however, cast some doubt on the general validity of this character as a distinguishing feature for this taxon.

In January 1982, EWH visited Mishana on the right bank of the Río Nanay (3°52.75'S, 73°29.50'W; GPS position in Räsänen *et al.*, 1998), the site where Warren Kinzey and his co-workers carried out their field studies of titi monkeys (see, for example, Kinzey, 1977). In the village of Mishana, a hunter was carrying a juvenile titi monkey on his shoulders (Fig. 1). It was easily identifiable as of the *Callicebus torquatus* group, the most prominent character being its whitish-creamy hands.

In August 2000, FEC saw an infant/young juvenile titi monkey kept as a pet in the village of Negro Urco, on the right bank of the Río Napo. The hands were white, only the tips of the hairs had some dirty-yellowish coloration, perhaps resulting from the animal walking on the earthen floor. In the forest near Negro Urco, he saw three wild titi monkeys at a distance of about 20 m. Observation of the animals with a binocular showed that the hands were whitish-creamy without any tendency towards yellow or orange.

In May 2002, FEC visited Santa María on the left bank of the upper Río Nanay, where he saw a juvenile titi monkey kept as a pet. The hairs of its hands were whitish-creamy, but the tips of the hair (which were partially sticking together as if dirty) were a brownish-yellowish colour.

Our observations of whitish-creamy hands, particularly of the pet in Mishana and the wild animals near Negro Urco, clearly contrast with the orange hands listed as a diagnostic

Figure 1. A pet *Callicebus lucifer*, Mishana, Río Nanay, Loreto, 3°52.75'S, 73°29.50'W, 7 February 1983. Photos © Eckhard W. Heymann. These photographs can be seen in colour at the following website: <http://www.dpz.gwdg.de/voe_page/peruvian_primates.htm>.

or distinguishing character by Van Roosmalen *et al.* (2002) and Hershkovitz (1990). There are four possibilities to account for this discrepancy. First, since the animals were juveniles, it is possible that they had not yet attained fully adult colouration. We are not aware of any information in the literature on ontogenetic changes in the colouration of titi monkeys. Second, hand colour might be variable within species or subspecies. The individuals we have seen might represent but one variety within the populations. No information is available on the variability of hand colour within populations of titi monkeys, although Pekka Soini has observed titi monkeys with variably whitish, dirty white and yellowish hair on the hands at Mishana and in areas near to Iquitos (south of the Nanay). Third, the titi monkeys from the Río Nanay and the Río Napo could differ from other populations of *C. lucifer*, and might perhaps represent a new species or subspecies. This possibility can only be explored by comparing representative specimens from the different areas. Fourth, the titi monkeys seen by us represent idiosyncratic forms, different from all other animals of the respective population. People might have captured these animals because they were different from the rest of the population. If this were the case, one might also suspect that "collections … acquired by purchasing live and dead animals from animal dealers who sent natives into the bush" (Van Roosmalen *et al.*, 2002, p.42) are biased towards idiosyncratic individuals which attracted the hunters' attention. The observation of white hands in wild individuals near Negro Urco is clear evidence against such an explanation. Under any circumstances, our observations suggests that orange hands cannot be taken as a diagnostic character of *C. lucifer* until more information is available on variation within and between populations and on whether or not ontogenetic changes in hand colouration do occur.

There is also an inconsistency in the current literature with regard to the geographic distribution of *C. lucifer* in Peru. Hershkovitz (1990, p.83) gives the area "between the Ríos Putumayo, Nanay and Amazonas", and Aquino and Encarnación, (1994, p.30), following Hershkovitz, state "north of the rivers Nanay and Amazonas to the Río Putumayo". The map provided by Van Roosmalen *et al.* (2002), however, does not include the area between the lower Napo and the Nanay.

The presence of *C. lucifer* at Mishana and close to Iquitos clearly indicates its distribution south of the lower Nanay, contrasting with the information provided by Hershkovitz (1990) and Aquino and Encarnación (1994). Sightings at Santa María and Negro Urco also provide clear evidence of its presence on the left bank of the upper Nanay and the right bank of the Napo. However, its presence in areas between the Napo and Nanay is less clear. It was not seen during brief surveys by FEC along the Río Chambira, an affluent of the left bank of the lower Nanay, and its affluent Río Pintoyacu. People on these rivers did not report the species to be present in the area, although they knew it from the Nanay and from the Río Mazán, an affluent of the right bank of the lower Napo. Summarizing the available

information, one might suspect that *C. lucifer* has a patchy distribution in Peru. Kinzey and Gentry (1979) had argued that *C. torquatus* is restricted to white-sand forests, but this hypothesis was convincingly rejected by Defler (1994) for *Callicebus (torquatus) lugens*. It would be premature to speculate on any ecological or edaphic factors relating to the distribution of *C. lucifer* in Peru until its full distributional range and the extent to which it may be patchy are known.

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References

Aquino, R. and Encarnación, F. 1994. Primates of Peru – Los Primates del Perú. *Primate Rep.* 40: 1-127.

Defler, T. R. 1994. *Callicebus torquatus* is not a white-sand specialist. *Am. J. Primatol.* 33: 149-154.

Hershkovitz, P. 1990. Titis, New World monkeys of the genus *Callicebus* (Cebidae, Platyrrhini): A preliminary taxonomic review. *Fieldiana Zoology, N.S.* (55): 1-109.

Kinzey, W. G. 1977. Diet and feeding behavior in *Callicebus torquatus*. In: *Primate Ecology: Studies of Feeding and Ranging Behaviour in Lemurs, Monkeys and Apes*, T. H. Clutton-Brock (ed.), pp.127-151. Academic Press, London.

Kinzey, W. G. and Gentry, A. H. 1979. Habitat utilization in two species of *Callicebus*. In: *Primate Ecology: Problem-Oriented Field Studies*, R. W. Sussman (ed.), pp.89-100. John Wiley & Sons, New York.

Räsänen, M., Linna, A., Irion, G., Rebata Hernani, L., Vargas Huaman, R. and Wesselingh, F. 1998. Geología y geoformas de la zona de Iquitos. In: *Geoecología y Desarollo Amazónico: Estudio Integrado en la Zona de Iquitos, Perú*, R. Kalliola and S. Flores Paitán (eds.), pp.59-137. Turun Yliopisto, Turku.

Van Roosmalen, M. G. M., Van Roosmalen, T. and Mittermeier, R. A. 2002. A taxonomic review of the titi monkeys, genus *Callicebus* Thomas, 1903, with the description of two new species, *Callicebus bernhardi* and *Callicebus stephennashi*, from Brazilian Amazonia. *Neotrop. Primates* 10(suppl.): 1-46.

Sobre a Localidade Tipo de *Mico marcai* (Alperin, 1993)

Ronaldo Alperin

Na época da descrição do material referente a *Callithrix argentata marcai* (Alperin, 1993), as únicas informações disponíveis quanto sua localidade tipo, encontravam-se nas próprias etiquetas de material no Museu Nacional, Rio de Janeiro: MN-2856 (holótipo, pele e crânio, macho adulto, Comissão Rondon, 9 de abril de 1914), MN-2851 (parátipo, sexo indeterminado, pele e crânio, Comissão Rondon, 10 de abril de 1914), MN-2857 (parátipo, sexo indeterminado, pele e crânio, Comissão Rondon, 08 de abril de 1914).

Foi no ano de 1914 que a Comissão Rondon integrou-se à expedição Norte-Americana do Presidente T. Roosevelt, formando assim uma Comissão Mista. A expedição Roosevelt-Rondon explorou naquele ano o rio da Dúvida e o rio Juruena, via o formador rio Papagaio. O material coletado de 1907 a 1914 pela Comissão Rondon foi destinado em parte ao Museu Nacional da Universidade Federal do Rio de Janeiro (UFRJ) e em parte ao American Museum of Natural History, Nova Iorque.

Do material coletado pela referida Comissão, muitos espécimes tinham etiquetas informando a origem como sendo o rio Castanho. Na época, foram consultados outros materiais de primatas e mamíferos cujas localidades referiam-se ao mesmo rio Castanho, mas muitas das vezes citado como "Rio Castanho (= Rio Roosevelt)" (vide também Hershkovitz, 1977).

Sendo assim a localidade tipo foi determinada como "Foz do Rio Castanho (= Rio Roosevelt), afluente esquerda do rio Aripuanã, Estado do Rio Amazonas, Brasil" (Alperin, 1993).

Segundo as anotações do própio Presidente Roosevelt, o nome "Castanho" era somente conhecido pelos seringueiros da região, sendo um nome completamente desconhecido pelos geógrafos, e na verdade tratava-se do principal afluente a esquerda do rio Aripuanã. Tal magnitude pode ser notado quando ele descreve: "Evidently the Castanho was, in length at least, substantially equal, and probably superior, to the upper Aripuanan..." (Roosevelt, 2000).

Descreve a sua importância como rio, para a formação do que era conhecido como o baixo Aripuanã: "The upper Aripuanan, a river of substantially the same volume as the Castanho, but broader at this point, and probably of less length, here joined the Castanho from the east, and the two together formed what the rubbermen called the lower Aripuanan."

Uma das principais confusões que foram feitas quanto a sua localização, muito provavelmente provém desta mesma época, conforme indica Roosevelt em seus escritos: "The mouth of this was indicated, and sometimes named, on the maps, but only as a small and unimportant stream."

A confusão do que seriam rios diferentes, como o Rio Castanho, o Rio Aripuanã, e Roosevelt, ao menos em termos nomenclaturais, fica bastante claro quando a própria Expedição Roosevelt nomeou o então "rio Roosevelt": "set forth the fact that we had now by actual exploration and investigation discovered that the river whose upper portion had been called the Dúvida on the maps of the Telegraphic Commission and the unknown major part of which we had

just traversed, and the river known to a few rubbermen, but to no one else, as the Castanho, and the lower part of the river known to the rubbermen as the Aripuanan (which did not appear on the maps save as its mouth was sometimes indicated, with no hint of its size) were all parts of one and the same river; and that by order of the Brazilian Government this river, the largest affluent of the Madeira, with its source near the 13th degree and its mouth a little south of the 5th degree, hitherto utterly unknown to cartographers and in large part utterly unknown to any save the local tribes of Indians, had been named the Rio Roosevelt."

Rylands *et al.* (2000), porém referência a uma possível confusão da nomenclatura da localidade tipo de *Mico marcai*: "The type locality as described by Alperin is confused in that the Rio Castanho is not a synonym of the Rio Roosevelt, and is a left bank affluent of the Rio Roosevelt, not the Rio Aripuanã." (p.74). Rylands (in litt., 02 de setembro de 2002) informou que a carta consultada indicava um pequeno igarapé, afluente esquerda do rio Roosevelt logo acima da sua boca, chamado Castanho. Porém, não tendo mais acesso à carta consultada naquela êpoca, fez nova consulta à *Carta do Brasil ao Milionésimo* (Brasil, Ministério do Planejamento e Coordenação Geral, Fundação IBGE, 1972). Nesse caso, o igarapé Castanho é desenhado como um pequeno afluente da margem esquerda do *rio Aripuanã* (não do rio Roosevelt), um pouco abaixo da boca do Rio Roosevelt. Indica também, um vilarejo chamado Castanho na margem esquerda do Rio Roosevelt, pouco acima de sua boca. O fato da existência de um igarapé Castanho pertíssimo da boca do rio Roosevelt (como afluente do rio Aripuanã ou do rio Roosevelt), fez com que Rylands indicasse que não tratava-se de um sinônimo do rio Roosevelt.

Figure 1. The type localities of *Mico marcai* (No. 1) and *Mico manicorensis* (No.2). Shading indicates the possible distribution of *M. manicorensis*.

Porém, para confirmar que Castanho e Roosevelt eram de fato sinônimos consultei na ocasião alguns mastozoólogos, como por exemplo o Dr. Mário de Vivo, e o próprio, afirmou categoricamente que ambos os nomes tratavam-se da mesma localidade. Da mesma forma, recentemente tive a oportunidade de consultar a base de dados GEOnet provido pela National Imagery and Mapping Agency e Governo dos Estados Unidos (GEOnet Names Server, web site: <http://www.nima.mil/gns/html/>), além da base de dados Alexandria Digital Library Gazetteer Server (Website: <http://fat-albert.alexandria.ucsb.edu:8827/gazetteer/>). Esses dois fontes informaram categoricamente que o rio do Castanho e o rio da Dúvida são sinônimos (variantes) do nome rio Roosevelt.

Assim, é possível concluir que a indicação de Rylands *et al.* (2000) vem de uma certa confusão de nomes já na época de 1914, e uma pequena imprecisão em pelo menos uma das cartas consultadas. Porém, Rylands *et al.* (2000; A. B. Rylands in litt.), nunca duvidaram que a informação disponível indicasse que a localidade tipo fica na margem esquerda do rio Roosevelt, perto de sua boca, exatamente como foi indicado por Alperin na sua descricao da espécie em 1993. O que falta é uma averiguação da presença de *Mico marcai* nesse local e levantamentos para acertar a sua distribuição geográfica, entretanto, uma revisão geográfica destes primatas está em preparação (Alperin, em prep**.**). Não se sabe o limite sul da distribuição de *Mico manicorensis* (Van Roosmalen, Van Roosmalen, Mittermeier and Rylands, 2000), conhecido da Seringal São Luis, margem leste do rio Madeira, perto da cidade de Manicóre (localidade tipo), e do baixo rio Mariepauá. O mapa de distribuição fornecido por Van Roosmalen *et al.* (2000: Fig. 2, p.5) indica que *M. manicorensis* se estende até a margem esquerda do rio Roosevelt, ao leste do rio Manicoré, cobrindo assim o localidade tipo de *M. marcai*. Essa suposição é evidentemente incorreta – *M. manicorensis* terá uma distribução mais restrita, e serão necessárias mais pesquisas de campo nessa região tão pouca conhecida para esclarecer a situação.

Referências

Alperin, R. 1993. *Callithrix argentata* (Linnaeus, 1771): Considerações taxonômicas e descrição de subespécie nova. *Bol. Mus. Para. Emílio Goeldi, Sér. Zool.* 9(2): 317-328.

Brasil, Ministério do Planejamento e Coordenação Geral, Fundação IBGE. 1972. *Carta do Brasil ao Milionésimo. Mapa No. 14 – Purus.* Fundação Instituto Brasileiro de Geografia e Estatística (IBGE), Rio de Janeiro.

Roosevelt, T. 2000. *Through the Brazilian Wilderness.* Cooper Square Press, New York.

Rylands, A. B., Schneider, H., Langguth, A., Mittermeier, R. A., Groves, C. P. and Rodríguez-Luna, E. 2000. An
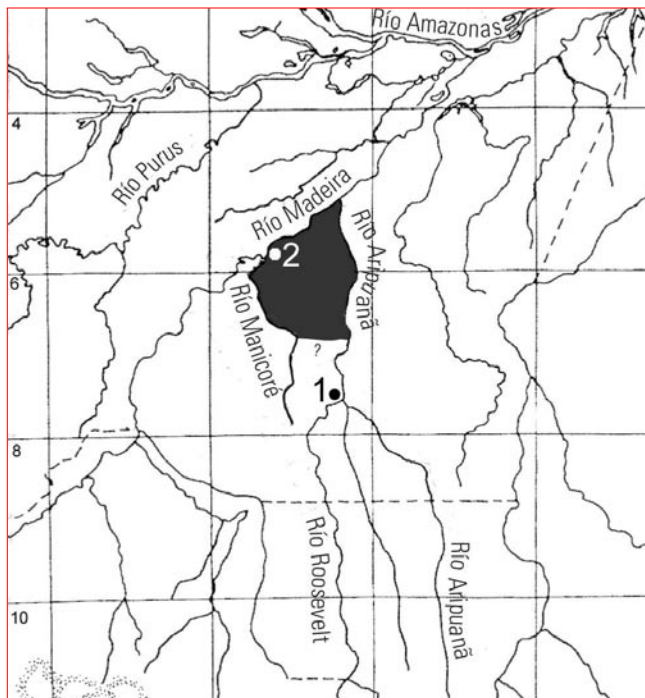
assessment of the diversity of New World Primates. *Neotrop. Primates* 8(2): 61-93.

Van Roosmalen, M. G. M., Van Roosmalen, T., Mittermeier, R. A. and Rylands, A. B. 2000. Two new species of marmoset, genus *Callithrix* Erxleben, 1777 (Callitrichidae, Primates), from the Tapajós/Madeira interfluvium, south central Amazonia. *Neotrop. Primates* 8(1): 2-18.

THE WORLD'S TOP 25 MOST ENDANGERED PRIMATES – 2002

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In January 2000, Conservation International and the IUCN/SSC Primate Specialist Group released a report - "The World's Top 25 Most Endangered Primates" - a list of threatened prosimians, monkeys and apes whose survival beyond the present century will depend heavily on actions taken now by our own species (Mittermeier *et al.*, 2000). The impetus for the original report came from two realities, one being the lack of any documented primate extinctions during the 20th century – a remarkable record in light of recorded losses among other groups of animals during the same period – and the other being the results of an assessment that identified approximately 120 of the world's estimated 640 species and subspecies of primate as being in serious danger of extinction within the next few decades. The Top 25 named in 2000 were merely the tip of the iceberg.

Two years later, we released a new report based on updated information, especially with regard to Asian primates. Since the 2000 report, the Species Survival Commission (SSC) of IUCN - The World Conservation Union launched a program of ongoing conservation status assessments for the world's threatened plant and animal species (Hilton-Taylor, 2002). As many experts had feared, the number of species threatened with extinction continues to rise despite our best efforts to ensure their survival. This new report considers preliminary results from primate workshops and assessments that have recently been conducted in Coimbatore, India for South Asia (Zoo Outreach Organisation / Conservation Breeding Specialist Group (CBSG) South Asia, in prep.), Indonesia (Supriatna *et al.*, 2002), Madagascar (Razanahoera-Rakotomalal *et al.*, 2002), and Vietnam (*A Conservation Action Plan for the Primates of Vietnam: 2001-2006*, in prep.), which recommend listing as many as 195 primate species and subspecies as endangered or critically endangered. New assessments indicate that, from approximately 20% only a few years ago, more than 30% - close to one in every three – of all primates are "Endangered" or "Critically Endangered". The increase from 120 taxa to almost 200 taxa largely reflects new information available from Asian countries. It is not surprising, there-fore, that Asia now accounts for almost 45% - only slightly less than half – of the world's most endangered primates, or not many less than the three other major regions where primates occur (the Neotropics, Africa and Madagascar) combined (Table 1).

Within these four regions, a total of 49 countries harbor wild populations of the world's most endangered primates: eight countries in the Neotropics, 24 in Africa, 16 in Asia, and Madagascar (a major primate region as well as a country). According to the most recent assessments, the top 10 nations, in terms of endangered primates, are shown in Table 2.

Madagascar and Brazil have long led the list of countries having the highest number of most endangered primates, but both have now been overtaken by Indonesia. Included on the new list of threatened primates are six endangered tarsier species found only in Indonesia. Prior to the Indonesian Conservation Assessment and Management Plan (CAMP) workshop, none had been considered endangered. However, all six of the newly-added species represent small, isolated, island populations; three of the six are new to science and as yet un-named. Firmly in the middle of the pack of nations are China, India and Vietnam, each with 15 endangered primate species and subspecies. Such significant levels of primate endangerment have been recognized for China and Vietnam for a number of years, but India's elevated standing stems from the Coimbatore CAMP workshop in March 2002 (Zoo Outreach Organisation / CBSG South Asia [affiliate of the IUCN/SSC Conservation Breeding Specialist Group] in prep.). The results also placed Sri Lanka on the Top 10 list, as the island nation's primates are largely endemic, and nine are critically endangered or endangered. Four Sri Lankan lorises, in fact, represent the only members of the primate family Lorisidae that are categorized as endangered at this time.

The larger primates, especially the colobines and small apes, represent the majority of Asia's most threatened species. Forty-eight members of the Asian colobine genera *Nasalis*, *Presbytis*, *Pygathrix*, *Rhinopithecus*, *Semnopithecus*, *Simias* and *Trachypithecus* are either endangered or critically endangered, representing just over half of their 90 species and subspecies. This situation parallels that of the gibbons, of which 15 of 28 taxa are now considered among the world's most endangered primates.

There are only three Asian great apes, the monotypic Sumatran orangutan (*Pongo abelii*) found on the Indonesian

Table 1. Numbers of Critically Endangered (CR) and Endangered (EN) primates (Hilton-Taylor, 2002).

Region	CR	EN	Total
Neotropics	17	17	34
Africa	10	33	43
Madagascar	10	21	31
Asia	18	69	87
Totals	55	140	195

Table 2. Top ten countries in terms of numbers of Critically Endangered (CR) and Endangered (EN) primates (Hilton-Taylor, 2002).

Country	CR	EN	Total
Indonesia	4	31	35
Madagascar	10	21	31
Brazil	10	9	19
China	5	10	15
India	2	13	15
Vietnam	5	10	15
Equatorial Guinea	0	11	11
Nigeria	1	9	10
Sri Lanka	1	8	9
Cameroon	1	7	8

island of Sumatra (reduced to as few as 2,500 individuals), and two subspecies of Bornean orangutan (*Pongo pygmaeus*), but all are endangered. This also holds true for all 10 species and subspecies of African apes – the four subspecies of common chimpanzee, the bonobo or gracile chimpanzee, and five types of gorilla. We humans (*Homo sapiens*), by contrast, represent the only species in the family Hominidae that is not endangered (With a global distribution and a population exceeding six billion, far from it!)

Our activities, in fact, are the principal cause for the decline of our closest living relatives. We have long cleared forests to support agriculture, degraded habitats by collecting fuelwood, logged to extract valuable timber, and hunted to provide meat for the table. Wild primate populations – as well as the populations of many other species - have suffered as a result. Live capture for the pet trade and export for biomedical research have become lesser concerns in recent decades, but still pose a threat to some species. Today, however, the most insidious threat is that of commercial hunting, which goes far beyond the subsistence needs of rural populations to supply major cities and international markets, where it fetches a premium. In Central and West Africa, commercial hunting is largely to supply food, and in Asia, especially in Indochina and China, to produce salves, balms and potions as well as food. In both cases, over-exploitation is creating an "empty forest syndrome" and contributing to the demise of wild primates in many countries.

We are not surprised, therefore, to find the overwhelming majority of endangered and critically endangered primates to be in the world's 25 biodiversity *hotspots*, that have been identified by Conservation International as covering merely 1.4% of Earth's land surface but holding more than 60% of all terrestrial plant and animal diversity (Myers *et al.*, 2000). Fifteen hotspots harbor populations of non-human primates, and the 195 critically endangered and endangered species and subspecies are in a dozen of them (Brooks *et al.*, 2002). Also, 48 (87%) of the 55 critically endangered primates and 124 (89%) of the 140 endangered primates are endemic to the hotspots, for a total of 172 (88%) of the current 195. Of the hotspots, six

should be considered the highest priorities for the survival of the world's most endangered primates – Indo-Burma, Madagascar, Sundaland, the Guinean Forests of West Africa, the Atlantic Forest of Brazil, and the Western Ghats/Sri Lanka. These hotspots cover approximately 500,000 km² - just over 0.3 % of Earth's land surface - yet hold 137, or roughly 70%, of the world's most endangered primates.

Information from this report will help to update the *IUCN Red List of Threatened Species*, though we realize that our assessment efforts to date have not examined all primate habitat regions sufficiently and still probably underestimate the number of threatened species, as well as their degree of threat. We recognize that new information continues to appear regarding the conservation status of threatened taxa and we do not consider any single document to be the final determinant of such a list. Also, we appreciate that our ability to safeguard primate diversity will depend not only on developing comprehensive lists of those species and subspecies we consider to be threatened, but also on drawing attention to those whose situation is most critical, highlighting the kinds of efforts that are being undertaken to save them, acknowledging both our successes and our failures, and continually re-examining the situation on a global scale so that we remain confident in establishing priorities for action.

The *World's Top 25 Most Endangered Primates - 2002* is more than a tally of those species with the fewest numbers of individuals remaining. We also recognize the importance of:
• Primate species recently discovered or rediscovered and known from only a few localities;
• species whose populations may have been considered stable only a few years ago but are now under severe pressure, in rapid decline and under serious threat of extinction; and
• varieties of primates that traditionally have not been recognized as distinct but are likely to be so as the result of ongoing genetic and field research.

In addition, it is important to remove species from the Top 25 list as their situation becomes less urgent or we feel that sufficient efforts and resources are being directed to their survival. While their conservation status and numbers may not change appreciably because of our efforts, we

Table 3. Numbers of Critically Endangered (CR) and Endangered (EN) primates (Hilton-Taylor, 2002) in six biodiversity hotspots (Myers *et al.*, 2000).

Hotspot	CR	EN	Total
Indo-Burma	11	20	31
Madagascar	10	21	31
Sundaland	5	23	28
Guinean Forests	5	20	25
Atlantic Forest	8	3	11
Western Ghats/Sri Lanka	2	9	11
Totals	41	96	137

Table 4. The 25 Most Endangered Primates –2002 (listed in taxonomic order).

Prolemur simus[1]	Greater bamboo lemur	Madagascar
Propithecus perrieri	Perrier's sifaka	Madagascar
Propithecus candidus	Silky sifaka	Madagascar
Leontopithecus caissara	Black-faced lion tamarin	Brazil
Cebus xanthosternos	Buff-headed capuchin	Brazil
Brachyteles hypoxanthus	Northern muriqui	Brazil
Procolobus badius waldroni	Miss Waldron's red colobus	Ghana and Côte d'Ivoire
Cercopithecus diana roloway	Roloway guenon	Ghana and Côte d'Ivoire
Cercocebus atys lunulatus	White-naped mangabey	Ghana and Côte d'Ivoire
Cercocebus galeritus galeritus	Tana River mangabey	Kenya
Procolobus rufomitratus	Tana River red colobus	Kenya
Cercocebus galeritus sanjei	Sanje mangabey	Tanzania
Presbytis natunae	Natuna banded leaf monkey	Indonesia
Simias concolor	Pig-tailed snub-nosed monkey	Indonesia
Trachypithecus delacouri	Delacour's langur	Vietnam
Trachypithecus poliocephalus[2]	Golden-headed langur, Cat Ba langur	Vietnam
Trachypithecus leucocephalus[2]	White-headed langur	China
Pygathrix nemaeus cinerea	Gray-shanked douc	Vietnam
Rhinopithecus avunculus	Tonkin Snub-nosed monkey	Vietnam
Rhinopithecus bieti	Yunnan Snub-nosed monkey	China
Rhinopithecus brelichi	Guizhou Snub-nosed monkey	China
Nomascus nasutus	Eastern black crested gibbon	China and Vietnam
Gorilla beringei beringei	Mountain gorilla	Democratic Republic of Congo, Rwanda, Uganda
Gorilla gorilla diehli	Cross River gorilla	Nigeria and Cameroon
Pongo abelii	Sumatran orangutan	Indonesia

[1] Formerly in the genus *Hapalemur*.

[2] The form *leucocephalus* is also considered to be a subspecies of *T. poliocephalus*, in which case the nomenclature would be *Trachypithecus poliocephalus poliocephalus* and *T. poliocephalus leucocephalus*.

may remove them in favor of other species to which we feel more attention should be given, or whose situations highlight conservation techniques or accomplishments that need to be shared with broader audiences. To arrive at the current list, we decided to drop species such as the golden lion tamarin (*Leontopithecus rosalia*), black lion tamarin (*L. chrysopygus*), yellow-tailed woolly monkey (*Oreonax flavicauda*) and golden-crowned sifaka (*Propithecus tattersalli*), since we consider that good progress has been or is being made to ensure the survival of each.

The original *World's Top 25 Most Endangered Primates* was well received. We have seen cases where a species' presence on the list has been used effectively by conservation organizations to raise funds to put researchers in the field, to train and supply forest guards, to conduct local public awareness campaigns, and to create new parks and reserves. In fact, the Margot Marsh Biodiversity Foundation, established in 1995, has rapidly become one of the world's most important sources of support for primate conservation, and actively solicits and supports proposals that focus on species appearing on this list.

The *World's Top 25 Most Endangered Primates – 2002* is presented in conjunction with the International Primatological Society (IPS), which recently held its 19th Congress in Beijing, China. The list was discussed during a special session at the Congress. Among the participants were many of the dedicated individuals whose work contributes to the continued survival of these species and subspecies, and other threatened primates worldwide. The full report, dated 7 October 2002, with profiles of each of the taxa, is available as a pdf file at: <www.conservation.org/xp/CIWEB/newsroom/press_releases/100702>.

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References

Brooks, T. M., Mittermeier, R. A., Mittermeier, C. G., Fonseca, G. A. B. da, Rylands, A. B., Konstant, W. R., Flick, P., Pilgrim, J., Oldfield, S., Magin, G. and Hilton-Taylor, C. 2002. Habitat loss and extinction in the hotspots of biodiversity. *Conserv. Biol.* 16(4): 909-923.

Hilton-Taylor, C. 2002. *2002 IUCN Red List of Threatened Species.* The World Conservation Union (IUCN), Species Survival Commission (SSC), Gland, Switzerland, and Cambridge, UK. URL: <www.redlist.org>.

Mittermeier, R. A., Konstant, W. R. and Rylands, A. B. 2000. The World's Top 25 most endangered primates. *Neotrop. Primates* 8(1): 49.

Myers, N., Mittermeier, R. A., Mittermeier, C. G., Fonseca, G. A. B. da and Kent, J. 2000. Biodiversity hotspots for conservation priorities. *Nature* 403: 853–858.

Razanahoera-Rakotomalal, M., Glander, K., Miadana Harisoa, F., Rabesihanaka, S., Hawkins, F., Katz, A., Byers, O. and Seal, U. S. (eds.). 2002. *Evaluation et Plans de Gestion pour la Conservation (CAMP) de la Faune de Madagascar: Lemuriens, Autres Mammifères, Reptiles et Amphibiens, Poissons d'eau douce. Rapport du Groupe Lemuriens.* Version Finale. IUCN/SSC Conservation Breeding Specialist Group (CBSG), Apple Valley, MN.

Supriatna, J., Manansung, J., Tumbelaka, L., Andayami, N., Indrawan, M., Darmawan, L., Leksono, S. M., Seal, U. S. and Byers, O. (eds.). 2001. *Conservation Assessment and Management Plan for the Primates of Indonesia: Final Report.* IUCN/SSC Conservation Breeding Specialist Group (CBSG), Apple Valley, MN.

MULTIPLE TRANSECTS OR MULTIPLE WALKS? A RESPONSE TO MAGNUSSON (2001)

Stephen F. Ferrari

Line transect surveying has been an extremely fruitful method for the study of platyrrhine populations, especially in the Amazon (Peres, 1997; Pontes, 1997; Lopes and Ferrari, 2000; Ferrari *et al.*, 1999, 2000, 2002), but also in the Brazilian Atlantic Forest (Cullen Jr. *et al.*, 2001; Chiarello, 2002). Survey data provide useful information on species diversity and population density, in addition to complementary data on behavioural and ecological parameters. Reliable estimates of both diversity and population density are dependent on good sampling, i.e. number of sightings (Buckland *et al.*, 1993; Peres, 1999; Ferrari *et al.*, 2002), which is determined by transect length. Most recent surveys have been based on a total transect length of at least 100 km, and almost invariably involve repeated walks of transects of less than 10 km in length.

Magnusson (2001) questioned the validity of this procedure, arguing that a short transect will sample an inadequately small area in most cases, and that repeated walks are not only relatively vulnerable to factors such as non-random ranging behaviour, but also constitute a form of pseudoreplication. The author recommends walking transects only once, which would require establishing and measuring 100 km of trails for a 100 km transect. Whatever the validity of the theoretical basis for this recommendation, there are a number of reasons for supporting the procedure in which a single short transect is walked repeatedly until total transect length is reached.

The principal reason for the repeated sampling of short transects is a practical one. To begin with, the preparation of a single kilometre of transect, which includes selection, orientation, trail clearance, marking and measurement, typically requires at least a day, depending on the availability of manpower and logistics (primarily, the distance from camp sites). Setting up a 100 km transect line would thus require a period of approximately four to five months, and the investment of financial resources rarely available for studies of this type. In addition, depending on the characteristics of the study site, it may be either impossible to accomodate a trail system of this size, or impractical due to logistic considerations. In any case, a transect of 100 km may not provide an adequate number of sightings for some or even all species, depending on the study area (Ferrari *et al.*, 2002).

Given these questions, the repeated sampling of short transects is virtually unavoidable for the collection of samples of adequate size, although this does not necessarily mean, as Magnusson (2001) implies, that researchers are unaware of its theoretical limitations. It also does not mean that this type of procedure is inadequate for the collection of reliable data on primate abundance, especially in relation to the objectives of most studies. On the contrary, the standard method currently used in primate surveys would seem to provide more reliable data, overall, than a single transect, as will be argued below.

The independence of samples appears to be the fundamental question here. Whatever the length of the transect, a basic assumption is that it will be located randomly in relation to the distribution of primates and their movements at the study site. At any given moment, then, the location of a surveyor on the transect should be random in relation to that of the resident primates. When repeating the same transect, what is crucial is the maintenance of an adequate interval of time between walks, to guarantee the independence of the samples. Any field primatologist will know that individuals of even the most sedentary species rarely remain at the same location in the forest for more than two or three hours, even if that location is a large fruit-bearing tree, which Magnusson (2001) identifies specifically as a major problem in the repeated-walks procedure.

The random placement of transects relative to the spatial distribution of primates, and the use of adequate intervals between walks should guarantee the reliability of the data collected using the "repeated-walks" procedure. As the primates will have a different distribution on each occasion, repeated walks do not constitute sampling replication, but

rather a means of accumulating a sample of adequate size. The only significant foreseeable problem with this procedure is that different habitat types within the study area may not be sampled adequately, although this will depend on a variety of factors, such as habitat heterogeneity. However, while the "single-transect" procedure might overcome this problem, it also has potential shortcomings. For example, if a species is both rare and patchily distributed at a study site, the chances of an encounter on a single walk of a long transect may be significantly reduced in comparison with repeated walks of a shorter transect, assuming that this transect traverses an area occupied by members of that species.

Despite whatever theoretical limitations it might have, repeated sampling of a transect may also provide information that would be unavailable from a single long transect. Repeated encounters with resident groups will almost invariably provide more accurate information on group composition and size, for example, an important parameter for the calculation of density estimates. In addition, more reliable data may be collected on variables such as habitat preferences, vertical stratification, and feeding ecology.

On balance, then, while the principal reason for adopting the repeated-walks procedure may be a practical one, it would seem to provide more reliable data than a single long transect. In fact, as long as walks are separated by an adequate interval of time, there appears to be no good reason for assuming that they are not independent samples of primate abundance. Perhaps the best support for the procedure comes from the multiple-site surveys that have provided important insights into both zoogeographic patterns (Peres, 1997; Ferrari *et al.*, 2000) and the effects of habitat fragmentation or hunting pressure (Lopes and Ferrari, 2000; Cullen Jr. *et al.*, 2001; Chiarello, 2002; Ferrari *et al.*, 2002). In all these cases, the application of the repeated-walks procedure permitted the surveying of many more sites than would have been possible using single transects, permitting a more systematic analysis of among-site variation.

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References

Buckland, S. T., Anderson, D. R., Burnham, K. P. and Laake, J. L. 1993. *Distance Sampling: Estimating Abundance of Biological Populations*. Chapman & Hall, London.
Chiarello, A. G. 2002. Primates of the Brazilian Atlantic Forest: The influence of forest fragmentation on survival. In: *Primates in Fragments*, L. K. Marsh (ed). Plenum Press, New York. In press.
Cullen Jr., L., Bodmer, R. E. and Valladares-Padua, C. 2001. Ecological consequences of hunting in Atlantic forest patches, São Paulo, Brazil. *Oryx* 35: 131-137.
Ferrari, S. F., Emídio-Silva, C., Lopes, M. A. and Bobadilla, U. L. 1999. Bearded sakis in southeastern Amazonia – back from the brink? *Oryx* 33: 346-351.
Ferrari, S. F., Iwanaga, S., Messias, M. R., Ramos, E. M., Ramos, P. C. S., Cruz Neto, E. H. and Coutinho, P. E. G. 2000. Titi monkeys (*Callicebus* spp., Atelidae: Platyrrhini) in the Brazilian state of Rondônia. *Primates* 41: 191-196.
Ferrari, S. F., Iwanaga, S., Ravetta, A. L., Freitas, F. C., Sousa, B. A. R., Souza, L. L., Costa, C. G. and Coutinho, P. E. G. 2002. Dynamics of primate communities along the Santarém-Cuiabá highway in southern central Brazilian Amazônia. In: *Primates in Fragments*, L. K. Marsh (ed.). Plenum Press, New York. In press.
Lopes, M. A. and Ferrari, S. F. 2000. Effects of human colonization on the abundance and diversity of mammals in eastern Brazilian Amazonia. *Conserv. Biol.* 14: 1658-1665.
Magnusson, W. 2001. Standard errors of survey estimates: What do they mean? *Neotrop. Primates* 9: 53-54.
Peres, C. A. 1997. Primate community structure at twenty western Amazonian flooded and unflooded forests. *J. Trop. Ecol.* 12: 381-405.
Peres, C. A. 1999. General guidelines for standardizing line-transect surveys of tropical forest primates. *Neotrop. Primates* 7: 11-16.
Pontes, A. R. M. 1997. Habitat partitioning among primates in Maracá Island, Roraima, northern Brazilian Amazonia. *Int. J. Primatol.* 18: 131-157.

DISTRIBUIÇÃO E SITUAÇÃO ATUAL DE CONSERVAÇÃO DE *ALOUATTA CARAYA* (HUMBOLDT, 1812) NO RIO GRANDE DO SUL, BRASIL

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Introdução

Dados sobre a distribuição e a densidade de populações de bugios ainda são escassos na literatura, assim como de suas áreas de ocorrência e uso do espaço. *Alouatta caraya*, contudo, possui uma vasta distribuição geográfica, que se estende desde o nível do mar até alcançar os 3.200 m de altitude (Giudice e Ascunce, 1998), e tem sido abordada e confirmada em diversos estudos científicos, mostrando uma extensa área de dispersão. A espécie vive nas florestas úmidas, nos bosques semi-deciduais com clima estacional, nas florestas de inundação, adaptando-se aos diferentes ambientes alterados pelo homem (Giudice e Ascunce, 1998). Habitam biomas como o Cerrado, a Caatinga e o Chaco, em ambientes com dados médios anuais de temperatura de 21.45°C, alcançando uma média de precipitação de 1.116 mm (Pastor Nieto e Williamson, 1998).

Eisenberg e Redford (1999) comentaram a distribuição de *A. caraya* localizando a espécie no sul do Brasil, norte da Argentina e leste do Paraguai, vivendo em habitats florestais,

enquanto que, na região do Chaco, ocorre, geralmente, nas matas de galeria ao longo dos rios Paraguai e Picomayo, assim como de pequenos rios que escoam no Chaco (Stallings, 1985). Pode também ser encontrada, esporadicamente, em toda a extensão de áreas florestais mais xerofíticas, vizinhas do Chaco. Na Bolívia ocorre na porção sul, estendendo-se à região centro-sul do Brasil (Cabrera, 1939; Olrog, 1984).

Kinzey (1982) mostrou sua ocorrência na porção oriental do Brasil, nos estados da Bahia, Mato Grosso, Minas Gerais, Goiás, São Paulo e Rio Grande do Sul. Enfatiza que a espécie é encontrada no leste do rio Paraná e no leste do rio São Francisco, que não constituem uma barreira para sua dispersão. Bicca-Marques (1990) descreveu a ocorrência de *A. caraya* no estado do Rio Grande do Sul, Brasil, situando o limite de sua distribuição no município de Alegrete (29°56'S, 55°59'W). O presente artigo objetiva mostrar dados recentes sobre a distribuição da espécie, seu *status* de conservação, o limite de ocorrência e o ponto de encontro de *A. caraya* e *Alouatta guariba clamitans*, obtidos pelo projeto: "Mapeamento, avaliação do *status* de conservação e abundância populacional de primatas no Rio Grande do Sul", desenvolvido pela Equipe de Primatas (EPRIM) da Universidade de Passo Fundo, cuja finalidade é a conservação dos primatas e a preservação de seus habitats naturais.

Metodologia

Área de estudo
O estado do Rio Grande do Sul apresenta ecossistemas heterogêneos, devido ao grande número de tipos de solos e à variação de altitude e de clima, refletindo-se na diversidade da composição florística das diferentes comunidades vegetais. Estão representados três tipos florestais: a) Bosques pluviais subtropicais da bacia do rio Uruguai, b) Encosta Atlântica, c) Floresta de Araucárias. Estas florestas, unidas aos bosques (capões), à Mata Ciliar (de galeria) e às formações de pastagem (140.000 km²) completam a fisionomia florestal do Rio Grande do Sul. A vegetação representa uma interessante transição entre os bosques subtropicais úmidos, a flora continental do Gran Chaco do Paraguai e as estepes do Uruguai e da Argentina (Schultz, 1957).

O Planalto Médio Rio-grandense é uma área elevada, que inclui toda a porção do estado ao norte da Depressão Central e da Campanha. Originalmente o Planalto era constituído de uma mistura bem equilibrada de campos abertos, que ocupavam a maior parte dos terrenos altos entre as bacias dos rios e as florestas. O homem, porém, alterou drasticamente a paisagem (Belton, 1994). A região fitoecológica na qual enquadra-se o Planalto Médio Rio-grandense denomina-se Floresta Ombrófila Mista. Ocupa uma superfície de 21.213 km² caracterizando-se por possuir o pinheiro-brasileiro, *Araucaria angustifolia,* como exemplar vegetal de destaque, com relevante importância fitogeográfica e comercial (uso da madeira, extração da celulose, etc.) (Brasil, IBDF, 1983). Salienta-se que o clima predominante para esse tipo fitoecológico é o super úmido, com as curvas ombrotérmicas verificadas sempre positivas (Brasil, IBGE /

Projeto RADAM-BRASIL, 1986). De toda a área existente apenas 3.166 km² possuem cobertura florestal original, representando somente 14,9% da superfície total.

Ao sul, onde ocorre a transição para a Depressão Central, as florestas latifoliadas ocupam a borda do Planalto, numa faixa que se estende de Jaguari, passando por Mata, São Pedro do Sul, Santa Maria, seguindo até o vale do rio Jacuí. Os principais municípios dessa região são: Carazinho, Cruz Alta, Espumoso, Ibirubá, Ijuí, Julio de Castilhos, Marau, Não-me-Toque, Panambi, Passo Fundo, Santa Bárbara do Sul, Soledade, Tapejara, Tapera e Tupanciretã (Fortes, 1959; Reitz *et al.*, 1983).

A região das Missões, caracterizada pela Floresta Estacional Decidual, abrange uma área de 31.326 km², situando-se entre os rios Ibicuí, Uruguai e Ijuí (Fortes, 1959; Brasil, IBGE / Projeto RADAM-BRASIL, 1986). Está localizada na encosta ocidental do Planalto Rio-grandense. Predomina geologicamente o basalto da Serra Geral e aluviões ao longo dos rios. Apresenta altitudes de 450 m, onde é bem perceptível, mais para o sul, na borda da serra, com altos contrafortes revestidos de formações matosas. Na porção junto ao rio Uruguai cai para 60-80 m (Brasil, IBDF, 1983). Possui arbustivos que acompanham os tributários desse rio, com vegetação de galeria. Ao norte verifica-se uma vegetação do tipo selvático, com matas densas. Entretanto, a vegetação predominante é a dos campos, com ocorrência de capões de mata. Ao longo dos grandes rios há extensas florestas altas, iguais às florestas latifoliadas do Alto Uruguai (Brasil, IBDF, 1983).

Métodos
O projeto teve início em janeiro de 2001, com caráter permanente, e com a intenção de investigar a ocorrência de espécies de primatas no estado do Rio Grande do Sul e seu *status* de conservação, bem como pesquisar a situação dos habitats onde fossem encontradas. Num primeiro momento foram enviados questionários às Secretarias Municipais de Agricultura e Meio Ambiente dos 497 municípios do estado, inquerindo sobre a ocorrência desses mamíferos no âmbito municipal, com a devida localização das áreas de ocupação na região, e com a possível identificação dos mesmos.

Após obtidas 60% de respostas iniciou-se a tabulação dos dados. Os municípios que responderam afirmativamente, foram envolvidos segundo as regiões fisiográficas a que pertencem, tomando como critério para agrupar as regiões, a extensão de cada uma delas, além do número de locais onde previamente fora detectada a presença de primatas. As espécies citadas foram plotadas no "Mapa de Municípios e Regiões Fisiográficas" do Estado do Rio Grande do Sul, escala 1:50.000. Efetivou-se, então, novos contatos com as prefeituras, e através delas, com proprietários de fazendas particulares e gerentes de Parques e Reservas, municipais e estaduais, para localização dos primatas, dando-se início ao trabalho de campo, com a busca direta dos bandos, nos bosques e nas matas de galeria.

Os bandos encontrados eram então registrados, censando-se os animais, considerando o tamanho e a composição sexo-etária do grupo: adultos (machos e fêmeas), sub adultos, juvenis e infantes; as características morfológicas da espécie (coloração da pelagem e tamanho) e alguns sinais de comunicação (vocalizações), registrando-se também o comportamento que realizavam. Coletou-se dados sobre habitat, tamanho da área, relevo, condições de preservação e tipo de floresta, além de verificar as ameaças antrópicas àquela população: fogo, caça, pesticidas, derrubadas de mata, etc. Nos locais de ocorrência foram marcadas as coordenadas geográficas (latitude e longitude), utilizando-se um GPS (Garmin-12 canais). Todos os bandos encontrados e seus respectivos ambientes florestais foram filmados e fotografados. Procurou-se identificar os limites das áreas de vida das espécies encontradas e a possível simpatria com *A. g. clamitans*, considerando também as barreiras naturais, que limitam os deslocamentos dentro do estado e para os estados limítrofes com o Rio Grande do Sul.

Adotou-se dois métodos para os censos: Transectos Lineares (MTL), para as áreas com mais de 10 ha, e para os fragmentos muito pequenos de mata (menos de 10 ha) os censos foram livres, rastreando toda a área, mais de uma vez, contando a totalidade dos indivíduos residentes. Estimou-se a densidade dividindo-se o número total de indivíduos do grupo (n), pelo tamanho da área, medida em hectares.

Resultados

De acordo com os resultados da enquete realizada junto aos municípios gaúchos, 193 confirmaram a ocorrência de *Alouatta* spp. (48,61% das respostas) sendo 29 as localidades em que, até o momento, obteve-se informação segura de ocorrência de *Alouatta caraya*.

O primeiro registro de *A. caraya* foi casual, pois a equipe de pesquisa esperava encontrar bandos de *A. g. clamitans*. O encontro deu-se numa propriedade particular, no município de Fortaleza dos Valos. Esse bando, composto então por 11 indivíduos, vive numa mata de 7 ha, isolado de outros bandos, que habitam bosques mais extensos (50 e 80 ha) na mesma propriedade. Decidiu-se então pesquisar quais outros municípios abrigavam populações dessa espécie, e quais os limites de encontro e de separação das duas espécies de bugios citadas para o Rio Grande do Sul.

Até o momento, realizou-se 28 expedições às áreas de estudo e foram visitados e registrados 13 municípios, que abrigam populações isoladas de *A. caraya*, vivendo adaptados em fragmentos muito pequenos de mata, nas regiões fisiográficas do Planalto Médio e das Missões. O tamanho médio das áreas estudadas foi de 15,17 ha, sendo o menor fragmento de 1, e o maior de 300 ha, sem contar a extensão das matas ciliares (Tabela 1).

Há municípios com apenas uma população de *A. caraya*, e outros com mais de dez, distanciadas umas das outras. A Tabela 1 mostra a densidade populacional até o momento reg-

istrada, em diferentes áreas de ocorrência da espécie, sem nenhuma possibilidade de encontro desses bandos. Exibe também quatro propriedades, onde foram encontrados dois bandos em cada uma, vivendo em fragmentos de tamanhos diferentes, distantes uns dos outros. Os indícios são de que os bandos formam uma só população, em cada uma dessas areas.

Na porção do Planalto onde se localizam os municípios de Fortaleza dos Valos, Boa Vista do Incra, Cruz Alta, Julio de Castilhos, Tupanciretã e Jari não ocorre o pinheiro-brasileiro (*Araucaria angustifolia*) e a fisionomia aparente é a de extensas áreas cultivadas. Há poucos bosques, reservados às propriedades rurais, com vegetação diferente da característica floresta ombrófila mista, ainda que apresentem algumas espécies arbóreas típicas do Planalto (Tabela 2). Trata-se de áreas de transição, em alguns municípios já classificadas como Savana (Tabela 1).

No município de Cruz Alta foi localizada uma população que ocorre em bosques de mata contínua de várias pequenas propriedades rurais. O bando (n=27 indivíduos) é frequentemente avistado numa delas, com 20 ha de mata preservada. O riacho que atravessa a mata deságua no rio Ivaí. Outra população observada transita nas matas de galeria do rio Ivaí, no ponto em que passa por esse município, estacionando, entretanto, numa mata ripária, bastante preservada, com 5 ha, no município de Tupanciretã.

Tupanciretã foi um dos municípios mais expressivos, até o momento visitado, onde registrou-se dez populações de *A. caraya*, localizadas em diferentes pontos; há informações de outras localidades no município onde ocorrem bandos. A EPRIM está investigando se constituem populações isoladas ou se são bandos pertencentes a uma única população. O município é o maior produtor de soja do estado, e os únicos bosques nativos são os de restinga, e mata ciliar que acompanha os rios. Tupanciretã é um divisor de águas das bacias dos rios Jacuí, Ivaí, Ibicuí, Ijuí, Toropi e do rio Jaguari.

Bozano é um pequeno município, recentemente emancipado do município de Ijuí. Situa-se ao sul do rio Ijuí (Bacia do Uruguai). Foi notificada a presença de um bando de *A. caraya* num capão de mata de 5 ha de uma pequena propriedade rural, muito próxima das matas ciliares do rio Ijuí. A cidade conta com uma área verde de 80 ha, onde os antigos moradores dizem que ouviam o "ronco do bugio", porém a água é escassa no local, e a diversidade faunística é pobre. O rio Ijui caracteriza o limite com o município de Ajuricaba, e nesse ponto tem mais de 100 m de largura. Nesse município foi declarada a existencia de uma população de *A. caraya* numa propriedade rural, entretanto com dados imprecisos sobre o tamanho do grupo.

Em Boa Vista do Incra, antigo Distrito de Cruz Alta foi atestado pelo orgão oficial, que há uma população deslocando-se na mata ciliar que acompanha o rio Ingaí, o qual despeja suas águas na Represa Passo Real (Fig. 1), e em matas recuperadas de propriedades particulares. Os rios

Tabela 1. Localização e densidade dos bandos de *Alouatta caraya* nas regiões fisiográficas: Missões e Planalto Médio Rio-grandense. Bioma: Floresta de Araucária.

Região fisiográfica	Região fitoecológica	Coordenadas IBGE - 2000	Município	Local	Coordenadas locais	Tamanho do Grupo	Área (ha)	Densidade (ind./ha)	Modo de detecção
Planalto Médio	Floresta Ombrófila Mista	28° 53' S / 52° 59' W	Campos Borges	Chácara São Pedro	28° 52' 391"S / 52° 57' 875"W	3	5	0,60	Informação
Planalto Médio	Floresta Ombrófila Mista - Savana	28° 08' S / 53° 02' W	Fortaleza dos Valos	Fazenda do Angico	28° 55' 928"S / 53° 21' 944"W	11 / 18	7 / 50	1,57 / 0,36	Visual / Informação
Planalto Médio	Floresta Ombrófila Mista - Savana	28° 08' S / 53° 04' W	Boa Vista do Incra	Fazenda Santa Maria	28° 59' 498"S / 53° 28' 366"W	2 / 2	3 / 12	0,67 / 0,17	Visual / Visual
Planalto Médio	Floresta Ombrófila Mista - Savana	28° 08' S / 53° 04' W	Boa Vista do Incra	Fazenda Lagoa	28° 55' 928"S / 53° 21' 944"W	3	10	0,30	Visual
Planalto Médio	Floresta Ombrófila Mista - Savana	28° 08' S / 53° 04' W	Boa Vista do Incra	Fazenda Itapevi	28° 54' 108"S / 53° 30' 242"W	5	4	1,25	Visual
Planalto Médio	Floresta Ombrófila Mista - Savana	28° 08' S / 53° 04' W	Boa Vista do Incra	Fazenda da Lagoa	28° 51' 045"S / 53° 24' 054"W	13	50	0,26	Visual
Planalto Médio	Savana	29° 01' S / 53° 08' W	Tupanciretã	Lageado do Celso	29° 06' 921"S / 53° 58' 454"W	13	2	6,50	Visual
Planalto Médio	Savana	29° 01' S / 53° 08' W	Tupanciretã	FEPAGRO-EMATER	29° 06' 960"S / 53° 58' 470"W	6 / 8	8 / 8	0,75 / 1,00	Visual
Planalto Médio	Savana	29° 01' S / 53° 08' W	Tupanciretã	Granja Particular Sr. Castro	28° 58' 749"S / 53° 37' 257"W	5	5	1,00	Visual
Planalto Médio	Savana	28° 23' S / 53° 54' W	Bozano: (Ijuí)	Granja Costa Beber	28° 57' 530"S / 53° 38' 302"W	3-4 ?	5	?	Informação
Planalto Médio	Savana	28° 07' S / 53° 07' W	Cruz Alta	Fazenda Três Capões	28° 49' 010"S / 53° 36' 008"W	1 / 27	20	? / 1,35	Visual / Informação
Planalto Médio	Savana	29° 03' S / 54° 02' W	Jari	Propriedade particular	29° 17' 543"S / 54° 12' 589"W	?	40	?	Informação
Planalto Médio	Savana	29° 02' S / 53° 07' W	Julio de Castilhos	Fazenda Coxilha Bonita	29° 01' 766"S / 53° 35' 349"W	4	9	0,44	Visual
Missões	Floresta Estacional Decidual	28° 07' S / 54° 00' W	Bossoroca	Gr. Escoteiros Guaranis	28° 42' 072"S / 54° 47' 505"W	5	?	?	Visual
Missões	Floresta Estacional Decidual	29° 02' S / 54° 05' W	Santiago	Terreno particular urbano	29° 10' 047"S / 54° 52' 177"W	4	1	4,00	Visual
Missões	Floresta Estacional Decidual	29° 05' S / 55° 09' W	São Francisco de Assis	Zona urbana Praça Central	29° 05' 380"S / 55° 09' 589"W	3	1,3	2,31	Visual

- Na tabela acima, quando as referências ao **modo de detecção** marcar **informação**, quer dizer que, não foram avistados os animais durante a expedição. Pessoas da região informaram que os primatas vivem naquela área.

- As densidades impossíveis de serem estimadas são as dos animais registrados nas matas ciliares, das quais não se sabe a área. Outra dificuldade para estimar a densidade é quando não se conseguiu precisar exatamente o tamanho dos grupos.

- As coordenadas dos municípios (cidades) foram confirmadas na planilha do Censo do IBGE - 2000. Os municípios emancipados em 2001 ainda permanecem oficialmente com as coordenadas dos municípios de origem, como é o caso de Bozano, antigo Distrito de Ijuí.

Tabela 2. Lista dos principais representantes arbóreos do Planalto Médio Rio-grandense.

Nome Comum	Família	*Espécie*
Pinheiro Brasileiro	Araucariaceae	*Araucaria angustifolia*
Guamirim	Myrtaceae	*Myrceugenia euosma*
Camboim	Myrtaceae	*Myrciaria tenella*
Araçá	Myrtaceae	*Psidium cattleianum*
Erva Mate	Aquifoliaceae	*Ilex paraguaiensis*
Camboatá Vermelho	Anacardiaceae	*Cupania vernalis*
Camboatá Branco	Sapindaceae	*Matayba eleagnoides*
Bracatinga	Mimosaceae	*Mimosa scabrella*
Guajuvira	Boraginaceae	*Patagonula americana*
Angico	Mimosaceae	*Parapiptadenia rigida*
Ariticum	Annonaceae	*Rollinia mucosa*
Cedro	Meliaceae	*Cedrela fissilis*
Amorinha Selvagem	Rosaceae	*Rubus* spp.
Guabiroba	Myrtaceae	*Campomanesia xanthocarpa*
Açoita Cavalo	Tiliaceae	*Luehea divaricata*
Coção	Erythroxylaceae	*Erythroxylum pelleterianum*
Canela Preta	Lauraceae	*Nectandra megapotamica*
Aroeira Mansa	Anacardiaceae	*Schinus terebinthifolius*
Carrapicho	Asteraceae	*Xanthium* spp.
Araçazeiro-do-Mato	Myrtaceae	*Myrcianthes gigantea*
Canela Amarela	Lauraceae	*Nectandra nitudula*
Cabreúva	Fabaceae	*Myrocarpus frondosus*
Grapiá	Caesalpinaceae	*Apuleia leiocarpa*
Jabuticabeira	Myrtaceae	*Myrciaria trunciflora*
Louro	Boraginaceae	*Cordia trichotoma*
Pessegueiro-Brabo	Rosaceae	*Prunus sellowii*
Tarumã	Verbenaceae	*Vitex megapotamica*
Vassourão Branco	Compositae	*Piptocarpha angustifolia*
Ipê Amarelo	Bignoniaceae	*Tabebuia chrysotricha*
Mamica de Cadela	Rutaceae	*Zanthoxylum rhoifolium*
Butiá	Palmae	*Butia eriospatha*
Pitangueira	Myrtaceae	*Eugenia uniflora*
Uvaia	Myrtaceae	*Eugenia pyriformis*
Coqueiro ou Jerivá	Palmae	*Syagrus romanzoffiana*
Uva-do-Japão	Rhamnaceae	*Hovenia* spp.
Sete Capotes	Myrtaceae	*Britoa selowiana*
Timbó	Mimosoideae	*Ateleia glazioviana*
Vacum	Sapindaceae	*Allophyllus guaraniticus*
Pimenteira	Anacardiaceae	*Schinus mole*
Cerejeira	Myrtaceae	*Eugenia involucrata*
Canela Pururuca	Lauraceae	*Cryptocarya cryptocarya*
Limão Bravo	Phytolaccaceae	*Segueiria langsdorffii*
Cafezinho-do-Mato	Flacourtiaceae	*Casearia sylvestris*
Caroba	Bignoniaceae	*Jacaranda micrantha*
Paineira	Bombacaceae	*Chorisia speciosa*
Farinha Seca	Fabaceae	*Machaerum stipitatum*
Rabo de Bugio	Leguminosae	*Lonchocarpus muehlbergianus*

Fonte: EPRIM (2001). Resultado das análises fitossociológicas realizadas no Parque Municipal de Sertão, e numa das áreas de uso de *A. caraya*, no município de Fortaleza dos Valos, RS.

Jacuizinho, Ivaí e Ingaí são afluentes que pertencem à bacia do rio Jacuí. Nesse município, até o momento, registrou-se quatro populações (Tabela 1).

Em Julio de Castilhos foi registrado um pequeno bando vivendo num capão de mata de 9 ha, totalmente cercado, na Fazenda Coxilha Bonita (Tabela 1). O arroio Japepó atravessa a mata e deságua no rio Ivaí. Ao que parece os bugios podem alcançar a mata ciliar com facilidade. As árvores ocupam o estrato médio inferior e superior, demonstrando um bom estado fitossanitário. Além de vários representantes da flora arbórea do Planalto, chama a atenção a presença de vários exemplares de podocarpos (*Podocarpus lambertii*), bastante antigos e bioindicadores da preservação desse bosque.

Campos Borges é um município situado na margem direita da Represa Passo Real, e abriga uma população de *A. caraya* (Tabela 1), que transita entre os bosques de propriedades particulares e a mata de galeria do rio Jacuizinho. Faz-se notar que, no distrito de Depósito (distante 28 km de Campos Borges) já foi registrada pela EPRIM, a presença de dois bandos de *A. g. clamitans*, locomovendo-se em ambas as margens do rio Jacuizinho, confirmando simpatria dessas espécies ao longo desse rio (Fig. 1). Supõe-se que antes de formada a Represa Passo Real, no ano 1972, bandos de ambas as espécies podiam deslocar-se pelos campos onde apareciam pequenos capões de mata, com presença de *Araucaria angustifolia,* entre Fortaleza dos Valos e Campos Borges, guardando a devida distância entre si. Acredita-se que as populações de *A. caraya* que ficaram confinadas na margem direita da Represa, pois a fitofisionomia da floresta ombrófila mista, com a presença de Araucária condiz mais com o habitat de *A.g. clamitans*.

Foi aplicado o MTL em busca de uma população de *A. caraya* no município de Jari, vivendo num bosque alterado de 40 ha, numa propriedade particular, sem que fosse possível visualizá-los. Nas matas de galeria do rio Jaguari, que corre a oeste da cidade de Jari, distante 45 km do município de Jaguari há relatos da presença de uma população de *A. g. clamitans* e outra de *A. caraya*, ainda não confirmada visualmente pela equipe de pesquisa. Entretanto, acredita-se que haja simpatria entre essas espécies, ao longo desse rio, como apontam os resultados obtidos na região das Missões.
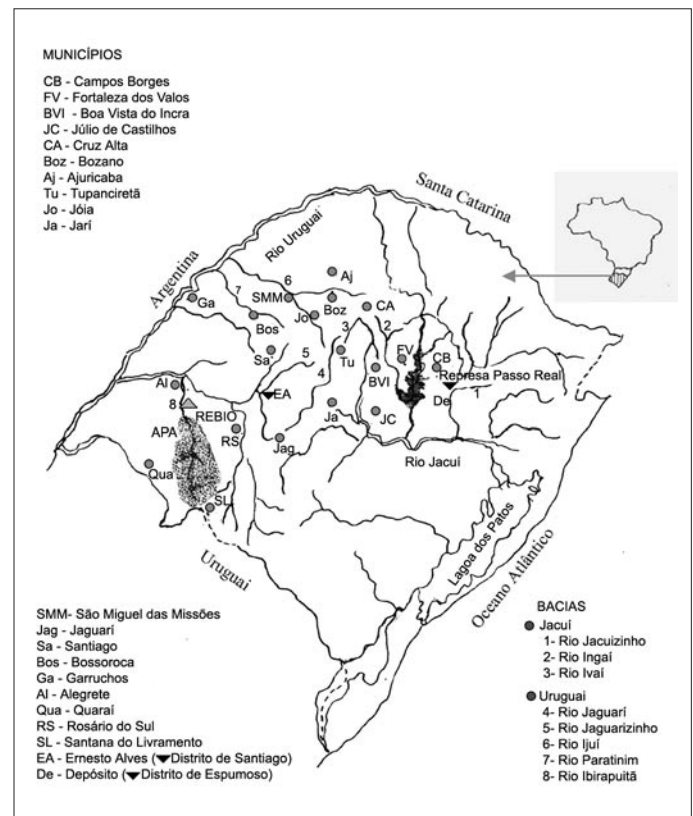
Jóia é o último município do Planalto situado à oeste da região, que tem limite com municípios da região fisiográfica das Missões. Nas duas propriedades visitadas pela Equipe de pesquisa foi possivel encontrar e registrar bandos de *A. caraya* com bom número de indivíduos. Os proprietários, assim como os donos de outras granjas, afirmaram que oferecem proteção aos animais. A situação dos bandos é confortável, visto que o seu hábitat está bem preservado, com árvores atingindo o estrato superior e subosque bem desenvolvido. Sobressaem exemplares de açucará (*Gleditschia amorphoides*), cujas folhas adocicadas são muito apreciadas pelos bugios. No interior da mata de 300 ha corre uma sanga grande, com bom volume de água, ainda engrossada pelos córregos da vizinhança, desaguando

no rio Chumi. No fragmento de 8 ha um córrego garante a umidade no interior do capão de mata.

A região das Missões tem características semelhantes à dos pampas gaúchos, com grandes extensões de terra e poucos bosques, caracterizando-se mais como campo nativo, com menor número de lavouras. Foram localizadas populações de *A. caraya* em Bossoroca, Santiago, São Francisco de Assis e em São Miguel das Missões (Tabela 1), com referências de pequenas populações vivendo em pontos distantes umas das outras, nos municípios de São Borja, Santo Antonio das Missões, Unistalda, Manoel Viana, Maçambará, Itacurubi e Eugênio de Castro, que ainda estão sendo investigados pela EPRIM.

Em Bossoroca, somando-se à população encontrada há relatos da presença de outros bandos de *A. caraya* nas matas de galeria do rio Piratinim. Os bandos observados e relatados no município de Garruchos também locomovem-se ao longo das matas ciliares dos rios Piratinim, Apochim e Uruguai (Fig. 1). Há relatos de que o bugio-preto ocorre em toda a extensão de mata de galeria que margeia o rio Uruguai.

Em Santiago, além da população estudada, a equipe local, participante do projeto, encontrou no município, cinco bandos, em pontos opostos uns dos outros, totalizando 39 indivíduos. Evidenciou-se a presença de *A. g. clamitans* e *A. caraya* no Distrito de Ernesto Alves, na porção oriental

MUNICÍPIOS

CB - Campos Borges
FV - Fortaleza dos Valos
BVI - Boa Vista do Incra
JC - Júlio de Castilhos
CA - Cruz Alta
Boz - Bozano
Aj - Ajuricaba
Tu - Tupanciretã
Jo - Jóia
Ja - Jarí

SMM- São Miguel das Missões
Jag - Jaguari
Sa - Santiago
Bos - Bossoroca
Ga - Garruchos
Al - Alegrete
Qua - Quaraí
RS - Rosário do Sul
SL - Santana do Livramento
EA - Ernesto Alves (▼Distrito de Santiago)
De - Depósito (▼Distrito de Espumoso)

BACIAS

● Jacuí
  1- Rio Jacuizinho
  2- Rio Ingaí
  3- Rio Ivaí
● Uruguai
  4- Rio Jaguari
  5- Rio Jaguarizinho
  6- Rio Ijuí
  7- Rio Paratinim
  8- Rio Ibirapuitã

Figura 1. Municípios e principais Bacias do Rio Grande do Sul, com registro de ocorrência de populações de *Alouatta caraya* (Fonte: IBDF, 1983, modificada por Thaïs Leiroz Codenotti, 2002).

do rio Jaguarizinho (coordenadas UTM: 6.746.000 m N; 720.000 m E), afluente do rio Jaguari.

São Francisco de Assis, curiosamente abriga na praça central da cidade uma família de bugios-pretos, composta por três indivíduos. Segundo informações, após a morte de um macho adulto, que ali vivia solitário, foram retirados da mata um macho e uma fêmea, que se reproduziram em 2001. A prefeitura declarou que existem bandos nas regiões interioranas do município.

São Miguel das Missões é um município que recebe turistas durante todo o ano, pois conserva as famosas ruinas das missões jesuíticas, sendo uma referência no estado, visto serem as únicas edificações de pedra, que resistiram à guerra e ao tempo. Foram visitadas duas fazendas, com 6 e 80 ha de matas preservadas, registrando-se um bando no fragmento menor. No "mato grande", como é chamado, não foi possível localizar o bando, que segundo o proprietário é numeroso. Dentro das matas aparecem apenas pequenos arroios. A vegetação desse município conserva muito das características arbóreas do Planalto, sobressaindo nos bosques exemplares de guabiju (*Myrcianthes pungens*), alecrim (*Holocalyx* spp.), branquilho (*Sebastiania klotzschiana*), ipê-roxo (*Tabebuia ipe* Mart.) e de pente-de-macaco (Bignoniaceae).

No município de Jaguarí, o rio Jaguarí atravessa a zona urbana da cidade, e foi registrada a presença de um bando de *A. g. clamitans,* na mata de galeria, ocorrendo em pequenos bandos noutros ponto da mata, ao longo do mesmo rio, e nas encostas elevadas de exuberante vegetação, que fazem parte da fisionomia da região. *A. caraya* não ocorre nesse ponto do rio. As espécies não são simpátricas. *A. g. clamitans,* encontra-se confinada entre populações de *A. caraya*, que vivem ao longo desse rio, estabelecendo assim um limite de uso de área entre as duas espécies. Ainda não se sabe onde estaciona *A. caraya*, e porque *A. g. clamitans* não avança da mesma forma.

Mais ao sul do estado, na região da Campanha, foi confirmada a presença de *A. caraya* habitando a APA Federal Rural do Ibirapuitã, criada pelo Decreto 529, de 20 de maio de 1992. Localizada no sudoeste do estado está definida geograficamente, de acordo com 9 pontos marcados ao longo de seus 260 km de perímetro, entre as coordenadas: 30°14'18"S, 55°29'36"W (limite norte), 30°51'48" S, 55°39'30"W (limite sul), 30°50'12"S, 55°34'12"W (limite leste) e, 30°05'42"S, 55°47'24" W. Possui 318.767 ha de área, percentualmente distribuidos entre quatro municípios: Alegrete (15,22% da área), Quaraí (12,22%), Rosário do Sul (15,75%) e, Santana do Livramento, que possui a maior parte dessa APA, correspondente a 56,81% da área total. A espécie ocorre também na Reserva Biológica do Ibirapuitã (Decreto nº 31.788 de 27-06-1982), compreendida entre as coordenadas (de 29°54' a 29°57'S e de 55°45' a 55°48'W), com uma área de 351,42 ha, localizada no município de Alegrete, na margem direita do rio Ibirapuitã, a 18 km da zona urbana. Trata-se da única área de proteção integral no

estado, a preservar porções de campos nativos e mata ciliar, onde ocorre o bugio-preto (SEMA – RS, 2002. O levantamento de fauna realizado por Marinho e Cunha (2001) confirma a presença da espécie. A distância entre a Reserva e a APA é de apenas 7 km, o que está levando o Ibama e a Prefeitura de Alegrete a pensarem num corredor ecológico, para ligar as duas áreas, o que seria de grande valia para a conservação de *A.caraya.*

Os bandos de *A. caraya* encontrados pela equipe (n = 25) são pequenos, com no mínimo 3 e no máximo 13 indivíduos (n = 156). Considerando a composição sexo-etária dos bandos, a média de indivíduos foi a seguinte: machos adultos 1,71 (n = 36); fêmeas adultas 3,04 (n = 70); juvenis 1,64 (n = 18) e infantes 1,45 (n= 16). Machos sub adultos nem sempre foram registrados nos bandos estudados, x = 1,45 (n = 16). As composições de bandos mais estranhas foram: um, composto por quatro machos adultos, um macho sub adulto, dois juvenis e apenas duas fêmeas adultas (supõe-se que poderá haver ruptura nesse bando, quando os machos disputarem entre si pela conquista das fêmeas); outro com três machos adultos e nove fêmeas adultas, fugindo ao padrão de tamanho de bando, compatível com o tamanho da área de uso. A presença de dois ou mais machos adultos no mesmo bando só foi observada e registrada recentemente.

Numa propriedade rural, na beira da estrada, no município de Tupanciretã foram avistados dois indivíduos isolados (uma fêmea adulta e um juvenil), alimentando-se no alto de uma paineira (*Chorisia speciosa* St. Hill), no acostamento da BR 158. A 150 m de distância, aproximadamente, há um bosque fragmentado de 2 ha, separado de outro maior por uma extensa lavoura de rotação de culturas, que está conectado com a mata de galeria do rio Ivaí. Acredita-se que o restante do bando estivesse próximo, numa dessas matas.

Os animais estudados demonstram uma condição física muito boa, com evidente massa corporal, nas matas com riqueza e exuberância de vegetação. Apenas um bando, em Tupanciretã, mostrou sinais de debilidade física (animais magros) e de tamanho corporal menor, que os anteriormente encontrados. Esses animais (n = 8) vivem em 2 ha de mata alterada e pobre em diversidade de espécies vegetais, no quintal de uma propriedade rural que, segundo os moradores estão ali há mais de 20 anos, deslocando-se pela mata ciliar próxima e retornando à propriedade. Comentaram que o bando era maior, porém animais jovens e infantes não alcançam a idade adulta. Após nove meses da primeira visita a essa propriedade, foi possível observar novamente esse bando, agora com 13 indivíduos, residindo de forma permanente no sitio. Demonstravam mais vitalidade, devido ao enriquecimento alimentar (com frutas), que os proprietários, por iniciativa própria, oportunizaram ao bando durante o inverno. Nesse grupo estão presentes 3 machos adultos, convivendo em harmonia. Foi observado na ocasião, que os bugios alimentavam-se de folhas de eucalipto (*Eucalyptus* sp.)!

Um dos resultados mais expressivos da pesquisa foi determinar o limite e o ponto de encontro de *A. caraya*, em simpatria com *A. g. clamitans,* no município de Santiago, na região das Missões, habitando as matas de galeria na porção oriental do rio Jaguarizinho, considerado um importante afluente do rio Jaguari, da bacia do rio Uruguai. No Planalto Médio as duas espécies estão em simpatria ao longo do rio Jacuizinho, afluente da bacia do rio Jacuí, entre os municípios de Espumoso e Campos Borges.

Dos resultados até o momento obtidos e das informações prestadas pelas Secretarias de Agricultura e Meio Ambiente, estabeleceu-se os limites de ocorrência de *A. caraya* no Rio Grande do Sul: ao sul ocorre na área da APA, correspondente ao município de Santana do Livramento (30°9'S, 55°5'W), na região da Campanha, vivendo nas matas de galeria do rio Ibirapuitã; o limite oeste, nas matas ciliares ao longo dos rios Piratinim, e Uruguai, município de Garruchos (28°2'S, 55°6'W), na região das Missões. O limite norte, no município de Ajuricaba (28°2'S, 53°7'W), aparecendo populações nas matas que acompanham os afluentes do rio Ijuí e o limite leste, no município de Campos Borges (28°53'S, 52°59'W), em bosques de propriedades particulares e nas matas de galeria, ao longo do rio Jacuizinho. Ambos os limites na região fisiográfica do Planalto Médio Rio-grandense (Fig. 1). As altitudes ocilam, de norte a sul, entre 350m no município de Ajuricaba, e 208 m em Santana do Livramento.

Discussão

Embora *Alouatta caraya* não seja considerada uma espécie em extinção (Emmons and Feer, 1990; Rylands *et al.*, 1995), no Rio Grande do Sul encontra-se vulnerável (Marques *et al.*, 2002). Os velozes, contínuos e abusivos desmatamentos, para uso agropecuário e para a construção de barragens em suas áreas de uso, vêm reduzindo drasticamente seu habitat e empurrando as populações residentes para áreas muito pequenas, cada vez menores, e cada vez mais pobres em espécies vegetais. Além do corte abusivo de árvores, o grande impacto sobre as matas é a presença contínua do gado, e de rebanhos de ovinos e suinos, que buscam abrigo no interior dos bosques, protegendo-se dos rigores do inverno, pisoteando a vegetação rasteira e inviabilizando a recuperação natural do estrato inferior. Por tratar-se de uma espécie arborícola, que depende da floresta para sobreviver, pode-se dizer que *A.caraya* está ameaçada pelos fortíssimos impactos que vem sofrendo, e se essa situação continuar, é previsível a inviabilização dessas populações, afetando a espécie num curto espaço de tempo.

Foram observados pelos proprietários de fazendas comportamentos agressivos por parte do macho, maltratando as fêmeas e eliminando os filhotes. Possivelmente trata-se de uma estratégia de proteção ao grupo, procurando manter o tamanho ótimo, de acordo com a capacidade de carga da área, resultado da disponibilidade de alimento, para a manutenção dos indivíduos do bando.

Sendo herbívoros generalistas, predominantemente folívoros, em muitas circunstâncias, os animais não conseguem ser suficientemente seletivos, devido a pobreza dos fragmentos onde vivem. Considerou-se que, se as barreiras para o deslocamento de *A. caraya* constituem verdadeiros impedimentos, a tendência pode ser a redução no tamanho do grupo, como estratégia de sobrevivência. Milton (1980) afirma que o padrão geral de utilização de vegetais observado para *Alouatta* compreende a ingestão de grande quantidade de poucas espécies vegetais e pequenas quantidades de muitas espécies. Assim, através da seletividade obtêm uma dieta equilibrada, de acordo com suas necessidades nutricionais.

Por outro lado *A. caraya* possui uma alta capacidade de adaptação física e comportamental, para viver em difíceis condições ecológicas. Bicca-Marques (1994) considera que a presença da espécie em habitat marginal é bom indicativo de seu grau de adaptabilidade a condições extremas. Entretanto, constatou-se que em alguns dos locais estudados, as populações apenas resistem, vivendo em fragmentos mínimos de mata, e em bandos muito isolados uns dos outros.
O apelo à sobrevivência é intenso e forte, e esses primatas continuam reproduzindo-se, porém podem estar gerando filhotes frágeis, enfraquecendo as possibilidades vitais das populações. Um risco evidente é a consangüinidade, que pode corroborar diretamente para o desaparecimento dessas populações. Embora sejam capazes de se locomoverem também no chão, atravessando áreas cultivadas, para alcançar bosques próximos, a extensão das lavouras em determinadas regiões é absurda, inviabilizando a troca de habitats e, consequentemente, isolando esses animais, que ficam impedidos de buscar parceiros sexuais noutras matas, diferente do que foi observado por Calegaro-Marques e Bicca-Marques (1996), em que animais jovens saíam do grupo familiar original dirigindo-se a outras áreas, para formar novos bandos.

A ocorrência de populações de *A. caraya* expandindo-se e povoando áreas de florestas ripárias e matas de galeria no Rio Grande do Sul, pode indicar o rompimento dessas barreiras, e estar corroborando com a melhoria do seu *status* de conservação. Kinzey (1982) mostra, claramente, uma separação entre as populações de *A. caraya* e *A. g. clamitans*, que ocorrem no centro e no leste dos estados brasileiros, sem referências às populações do Sul do Brasil. Um dos aspectos relevantes dos resultados obtidos foi a possibilidade de estabelecer limites de separação de *A. caraya* e *A. guariba clamitans*, no Rio Grande do Sul, deixando, entretanto, clara a possibilidade de haver ocorrido simpatria das duas espécies, em diferentes regiões do estado, antes da fragmentação e da destruição das florestas originais.

Conclusões

Dos resultados obtidos até o momento pode-se concluir que o *status* de conservação da espécie no Rio Grande do Sul é sério, mas ainda há possibilidade de reverter o quadro apresentado. Postulamos que:

- A simpatria entre *A. caraya* e *A. g. clamitans* pode ser um indicativo importante de preservação ambiental, e de riqueza de vegetação arbórea, sem que haja competição agressiva entre os grupos de espécies diferentes, na busca de alimento;

- a presença de *A. caraya* em áreas de municípios contíguos, no Rio Grande do Sul, deslocando-se em pequenos bandos, e assim traçando uma rota de distribuição, antes desconhecida, possa ser a chave para a sua conservação;

- onde houver restrições às suas estratégias de sobrevivência, as populações estarão fadadas ao desaparecimento;

- ações conjuntas e determinadas, como medidas diretas de recuperação de áreas alteradas pelo homem, como reposições florestais criteriosas, podem favorecer a conservação das populações dessa espécie no Rio Grande do Sul.

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Referências

Bicca-Marques, J. C. 1990. A new southern limit for the distribution of *Alouatta caraya* in the Rio Grande do Sul state, Brazil. *Primates* 31: 449-451.

Bicca-Marques, J. C. 1994. Padrão de utilização de uma ilha de mata por *Alouatta caraya* (Primates: Cebidae). *Rev. Brasil. Biol.* 54(1): 161-171.

Brasil, IBDF. 1983. *Inventário Florestal Nacional. Florestas Nativas - Rio Grande do Sul.* Ministério da Agricultura, Instituto Brasileiro de Desenvolvimento Florestal (IBDF), Departamento de Economia Florestal, Brasília.

Brasil, IBGE, 1983. *Recursos Naturais e Meio Ambiente: Uma Visão do Brasil.* Instituto Brasileiro de Geografia e Estatística (IBGE), Rio de Janeiro.

Brasil, IBDF. 1983. *Inventário Florestal Nacional. Florestas Nativas - Rio Grande do Sul.* Ministério da Agricultura. Departamento de Economia Florestal, Brasília. 345 pp.

Brasil, IBGE / Projeto RADAM-BRASIL. 1986. *Levantamento de Recursos Naturais.* Secretaria de Planejamento da Presidência da República. Vol. 3. Instituto Brasileiro de Geografia e Estatística (IBGE), Rio de Janeiro.

Cabrera, A. 1939. Los monos de la Argentina. *Physis* 16: 3-29.

Calegaro-Marques, C. e Bicca-Marques, J. C. 1996. Emigration in a black howling monkey group. *Int. J. Primatol.* 17(2): 229-237.

Eisenberg, J. F. and Redford, K. H. 1999. *Mammals of the Neotropics. The Central Neotropics. Volume 3. Ecuador, Peru, Bolivia, Brazil.* The University of Chicago Press, Chicago.

Emmons, L. H. and Feer, F. 1990. *Neotropical Rainforest Mammals. A Field Guide.* The University of Chicago Press. Chicago.

Fortes, A. B. 1959. *Geografia Física do Rio Grande do Sul.* Oficina Gráfica da Livraria Globo, Porto Alegre.

Giudice, A. M. e Ascunce, M. S. 1998. Presencia de *Alouatta caraya* fuera de su área de distribución natural. *Neotrop. Primates* 6(3): 82-86.

Kinzey, W. G. 1982. Distribution of primates and forest refuges. In: *Biological Diversification in the Tropics*, G. T. Prance (ed.), pp.459-482. Columbia University Press, New York.

Marinho, J.R. e Cunha, A. S. 2001. Mamíferos da Reserva Biológica do Ibirapuitã, RS, Brasil. *Resumos do I Congresso Brasileiro de Mastozoologia.* Porto Alegre, RS, Brasil. p. 98.

Marques, A. A. B. *et al.* 2002. Lista de espécies da fauna ameaçada de extinção no Rio Grande do Sul. Decreto nº 41.632 de 11 de junho de 2002. FZB/MCT - *PUCRS/PANGEA,* Porto Alegre. 52 p.

Milton, K. 1980. *The Foraging Strategy of Howler Monkeys: A Study in Primate Economics.* Columbia University Press, New York.

Olrog, C.C. 1984. El mono carayá. In: *Mamíferos - Fauna Argentina.* Vol I. Centro Editor de America Latina, Buenos Aires.

Pastor Nieto, R. e Williamson, D. K. 1998. The effect of rainfall seasonality on the geographic distribution of Neotropical primates. *Neotrop. Primates* 6(1):7-14.

Rambo, B. 1994. *A Fisionomia do Rio Grande do Sul.* 3ª ed. Unisinos, São Leopoldo.

Reitz, R., Klein, R. M. e Reis, A. 1988. *Madeiras do Rio Grande do Sul.* Companhia Rio-Grandense, Porto Alegre.

Rylands, A. B., Mittermeier, R. A. e Rodríguez-Luna E. R. 1995. A species list for the New World primates (Platyrrhini): Distribution by country, endemism, and conservation status according to the Mace-Lande system. *Neotrop. Primates* 3 (supl.): 113-164.

Rylands, A. B., Rodríguez-Luna, E. e Corté-Ortiz, L. 1996/1997. Neotropical primate conservation - the species and the IUCN/SSC Primate Specialist Group Network. *Primate Conserv.* (17): 46-69.

Santini, M. E. L. 1986. Padrões de atividade diária de *Alouatta caraya* (Primates, Cebidae) reintroduzido no Parque Nacional de Brasília. In: *A Primatologia no Brasil - 2*, M. T. de Mello (ed.), pp.293-304. Sociedade Brasileira de Primatologia, Brasília.

Schultz, A. R. 1957. Some phytogeografical and phytological data from Rio Grande do Sul, Brazil. *Veg. Acta Geo-Botânica* 7: 355-361.

Schultz, A. R. 1960. *Aspectos Peculiares da Flora Sul-Rio-Grandense.* Faculdade de Filosofia. Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre.

SEMA - RS. 2002. <www.sema.rs.gov.br/sema/html/bioconh7.htm>.

Stallings, J. R. 1985. Distribution and status of primates in Paraguay. *Primate Conserv.* (6): 51-58.

DENSIDAD DE LOS MONOS AULLADORES (*ALOUATTA SENICULUS*) EN UN BOSQUE SUBANDINO, RISARALDA, COLOMBIA

Alba Lucia Morales-Jiménez

Introducción

En las últimas décadas la abundancia de primates no humanos ha declinado rápidamente a lo largo del Neotrópico (Stoner, 1994) y por esto se hace necesario realizar censos y monitoreos de las poblaciones de diferentes especies de primates, con el fin de documentar la disminución de las poblaciones y plantear acciones para su conservación a largo plazo (Chapman, 1988 en Stoner, 1994; Thorington y Heltne, 1976).

En Colombia la destrucción del bosque andino ha llegado a un punto crítico (Cavelier y Etter, 1995; Van der Hammen, 1995;) más del 90% del bosque subandino ha desaparecido (Cavelier, 1993), y es muy poco lo que conocemos de los primates que habitan este tipo de bosques. Aunque el mono aullador (*Alouatta seniculus*) es una especie de amplia distribución y no se encuentra en peligro de extinción (Hilton-Taylor, 2002), las poblaciones andinas pueden estar en peligro debido a la destrucción de sus hábitats.

Los monos aulladores se encuentran generalmente en los bosques de galería de los llanos orientales, bosques tropicales deciduos y bosques lluviosos (Hernández-Camacho y Cooper, 1976), sin embargo también pueden encontrarse en zonas de bosques fríos y húmedos hasta los 3200 m de altitud (Hernández-Camacho y Cooper, 1976; Gaulin y Gaulin, 1982). *A. seniculus* ha sido principalmente estudiada en bosques de zonas bajas y es muy poco lo que se conoce sobre su ecología en bosque subandino y andino (Cabrera 1994; Gaulin y Gaulin, 1982).

En este artículo se presenta la estimación de la densidad de los monos aulladores en el Santuario de Fauna y Flora Otún Quimbaya. usando el método de triangulación de aullidos propuesto por Brockelman y Ali (1987) y Sutherland (1996).

Zona de Estudio

El Santuario de Fauna y Flora Otún Quimbaya se encuentra en la Vereda La Suiza, Municipio de Pereira, Departamento de Risaralda, Colombia (4º43'N, 75º34'O) (Herrera y Sánchez, 1996). Está ubicado sobre el flanco occidental de la Cordillera Central entre los 1850 y 2250 m de altitud. Abarca 489 ha de las cuales 30 se encuentran reforestadas con especies exóticas como *Fraxinus chinensis* y *Pinus patula*. Se caracteriza por presentar un régimen de lluvias bimodal, con lluvias entre marzo-mayo y septiembre-diciembre. El promedio anual de precipitación es de 2535 mm y la temperatura promedio es de 15,31 ºC (CENICAFE, 1999). Esta área corresponde a un bosque subandino (Rangel, 1991).

Métodos

Para estimar la densidad de monos aulladores se utilizó el método de triangulación de aullidos propuesto por Brockelman y Ali (1987) y Sutherland (1996). El método consiste en la elaboración de un mapa mediante la triangulación de las vocalizaciones escuchadas por tres personas en el área de muestreo. La ubicación de los investigadores se hizo por medio del registro de las coordenadas geográficas usando un Sistema de Posicionamiento Global o GPS por sus siglas en inglés. Cada investigador, cuando escucho un aullido, registró la hora de inicio del mismo, la dirección con ayuda de una brújula y cualquier característica vocal que pudiera ayudar en la diferenciación de los grupos.

El área de escucha estuvo delimitada por los límites naturales de las montañas y los valles, y por el alcance de escucha de los investigadores. El punto en el que se cruzaron los datos de los tres observadores indicó la presencia de un grupo de aulladores, es decir que grupos que sólo eran escuchados por una o dos personas eran considerados fuera del área de escucha. Los datos colectados fueron ubicados en un mapa de la zona y en una fotografía aérea. El muestreo se realizó durante 30 días entre julio y agosto de 1999. Los datos se tomaron entre las 5:00 y las 9:00 am.; horas en las que los aullidos son más frecuentes.

Para estimar la densidad de grupos se utilizó la formula propuesta por Brokelman y Ali (1987), $D = fn/A$. Donde D es la densidad estimada, n es el número de grupos escuchados en un periodo de muestreo , A es el área de escucha y f es el factor de corrección que corrige el hecho de que no todos los grupos vocalizan durante un periodo de muestreo . Este factor es igual a $1/p(m)$, donde $p(m)$ es la proporción de grupos que se espera vocalicen en un periodo de muestreo de m días.

Después de obtener el número de grupos en el área de escucha, se procedió a buscarlos con el fin de determinar el número de individuos por grupo y así estimar la densidad de individuos por km².

Resultados

El área de escucha calculada fue de 116 ha. La densidad estimada fue de 5,2 grupos/km². Durante los recorridos se encontraron 6 grupos dentro del área de escucha con un promedio de 6 individuos por grupo, con un rango entre 3 y 9 (Tabla 1). La densidad de individuos dentro del área de escucha fue 31,3/km². Los grupos estaban conformados en su mayoría por individuos adultos (73,3%) y la proporción de machos y hembras encontrada fue de 1:1 (χ^2 0.05, 1 gl = 0.1428).

Discusión

La densidad de monos aulladores estimada para el Santuario de Fauna y Flora Otún Quimbaya durante el mes de muestreo se encuentra dentro de los valores registrados para la especie (Tabla 2) en otras zonas. No obstante, la comparación de ese valor con el o calculado para otro bosque subandino colombiano en la Finca Meremberg, a 2300 metros de altitud, (Gaulin y Gaulin, 1982) muestra que la densidad obtenida en este estudio dobla su valor. Este hecho podría indicar que el Santuario está mejor conservado o que su bosque es de mejor calidad y por lo tanto puede sostener más monos aulladores. Por otra parte se debe tener en cuenta que ese dato corresponde a un sólo mes del año (época con menor precipitación), lo cual puede estar influyendo en el resultado obtenido. Es posible que la densidad de esta especie varíe a lo largo del año.

Al comparar la densidad de los monos aulladores de los dos estudios realizados en bosques subandinos con la registrada para zonas bajas, podemos ver que la densidad tiende a ser más baja en zonas de mayor altitud. La densidad promedio en zonas de baja altitud fue de 69,59 individuos/km², mientras que las obtenidas en este estudio y en la Finca Meremberg fueron de 31,33 individuos/km² y de 15 individuos/km² (calculado de los datos de Gaulin y Gaulin, 1982) respectivamente. Esta diferencia podría sugerir que los bosques en zonas altas podrían sostener menos monos aulladores que los bosques en zonas de baja altitud, lo

que concuerda con lo encontrado por Durham (1971 en Gaulin *et al.*, 1980) para *Ateles paniscus*. Ese autor halló que la densidad de alimento, especialmente de frutos, está inversamente correlacionada con la altitud, y así mismo, con el tamaño de los grupos de *Ateles paniscus*.

Aunque *Alouatta seniculus* es una especie altamente folívora (Milton, 1993; Rockwood y Glander, 1979) no se debe ignorar la cantidad de frutos que ingieren (Chiarello y Galleti, 1994; Julliot, 1997). Los frutos pueden representar entre el 25,5% y el 42,3% de la dieta (Gaulin y Gaulin, 1982; Gilbert, 1994; Julliot y Sabatier, 1993). Si la densidad de frutos es menor en zonas altas, los grupos tendrán que recorrer mayores distancias para suplir sus requerimientos energéticos, ocuparán áreas de acción más grandes, sus grupos tal vez serán de menor tamaño y sus densidades menores.

Se ha encontrado que la densidad es una variable dependiente de la disponibilidad y distribución de recursos como alimento, agua y lugares seguros para el descanso (Dunbar, 1988; Gaulin y Gaulin, 1982; Gaulin *et al.*, 1980; Krebs y Davies, 1984; Mace *et al.*, 1984; Stevenson y Quiñones, 1993). La dispersión espacial de los consumidores puede estar limitada por la distribución de un recurso crítico (Altmann, 1974 en Krebs y Davies, 1984), su calidad y dispersión influencia el tamaño de los grupos en una gran variedad de especies. Un área con una baja calidad y/o cantidad de recursos alimenticios puede sostener menos consumidores, a diferencia de uno de buena calidad (Greenwood y Swingland, 1984; Krebs y Davies 1984;).

Aunque el tamaño de los grupos está dentro de lo registrado para la especie (Tabla 2), el promedio para zonas bajas fue de 7,5 individuos por grupo, en tanto que, y para zonas altas fue de 6,8. Esto podría apoyar la hipótesis de que a mayor altitud menor densidad y/o calidad de los recursos alimenticios para esta especie, y por lo tanto, menor densidad de consumidores.

La sugerencia de que la densidad de monos aulladores en zonas andinas es más baja que en zonas de menor altitud, es un dato importante a ser considerado en la realización de planes de manejo y conservación de estas poblaciones, ya que sus requerimientos en este tipo de bosque son diferentes a los de otras altitudes. Es importante seguir realizando estudios poblacionales, de monitoreo de la

Tabla 1. Composición de los grupos de monos aulladores (*Alouatta seniculus*) en el Santuario de Fauna y Flora Otún Quimbaya.

Grupo	Machos Adultos	Hembras Adultas	Machos Juveniles	Hembras Juveniles	Infantiles	Total
1	3	4	1	0	1	9
2	2	2	0	1	1	6
3	2	3	1	1	0	7
4	2	1	0	0	0	3
5	1	2	1	1	0	5
Promedio	2	2,4	0,6	0,6	0,4	6
Desviación estándar	0,71	1,14	0,55	0,55	0,55	2,24

densidad poblacional y de requerimientos de hábitat de esta especie en un ecosistema tan amenazado como los bosques andinos, con el fin de proteger sus poblaciones a largo plazo.

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Referencias

Aquino, R., Bodmer, R. y Gil, J. G. 2001. Mamíferos de la Cuenca del Río Samiria: Ecología Poblacional y Sustentabilidad de la Caza. Universidad Nacional Mayor de San Marcos, Instituto de Investigaciones de Ciencias Biológicas Antonio Raimondi, Lima, Peru.

Braza, F., Álvarez, F. y Azcarate, T. 1981. Behavior of the red howler monkey (*Alouatta seniculus*) in the Llanos of Venezuela. *Primates* 22(4): 459-473.

Brockelman, W. Y. y Ali, R. 1987. Methods of surveying and sampling forest primate populations. En: *Primate Conservation in the Tropical Rain Forest*, C. W. Marsh y R. A. Mittermeier (eds.), pp.23-42. Alan R. Liss, New York.

Cabrera J. A. 1994. Ecología y demografía del mono aullador (*Alouatta seniculus*) en un bosque andino bajo, en el Parque Regional Natural Ucumarí. En: *Ucumarí, Un Caso Típico de la Diversidad Biótica Andina*, O. Rangel-CH. (ed.), pp.399-419. Corporación Autónoma Regional de Risaralda (CARDER), Pereira, Colombia.

Cavelier, J. 1993. Deforestation of montane rain forest in Colombia as a result of illegal plantation of opium (*Papaver somniferum*). En: *Neotropical Montane Forests: Biodiversity and Conservation,* H. Balslev (ed.), p.23. AARHUS University Press, Denmark.

Cavelier, J. y Etter, A. 1995. Deforestation by opium plantations. En: *Biodiversity and Conservation of Neotropical Montane Forests*, S. Churchill, H. Balslev, E. Forero y J. Luteyn. (eds.), pp.541-550. The New York Botanical Garden, New York.

CENICAFE. 1999. Anuario Metereológico Cafetero 1989-1998. Federación Nacional de Cafeteros de Colombia. Centro Nacional de Investigaciones de Café 1989-1998. CENICAFÉ, Chinchina, Colombia.

Chiarello, A. G. y Galleti, M. 1994. Conservation of the brown howler monkey in south-east Brazil. *Oryx* 28(1): 37-42.

Tabla 2. Densidad y tamaño promedio de grupos de los monos aulladores (*Alouatta seniculus*) en bosques Neotropicales.

Localidad	Tipo de Bosque	Densidad (ind./km²)	Tamaño promedio de grupo	Altitud (m)	Autor
Bolivia	Bosque siempre verde	120	7,4	-	Freese *et al.* (1982)
Venezuela, Área occidental Hato Masaguaral	Bosque abierto semi-deciduo	83-118	8,46	73-100	Neville (1972), Sekulic (1982), Crockett y Eisenberg (1987)
Trinidad, Bosque Bush Bush	Bosque estacional siempreverde	114	7,5	Hasta 940	Neville (1972)
Venezuela, Área oriental y central, Hato Masaguaral	Bosque de galería semi-deciduo	108	9,6	73-100	Neville (1972)
Venezuela, Hato El Frío	Bosque de galería	54	6,3	-	Braza *et al.* (1981)
Venezuela, Hato Masaguaral	Bosque de galería semi-deciduo	50	8,3	73-100	Crockett y Eisenberg (1987)
Perú, Pacaya-Samiria	Bosque húmedo tropical	36	5,5	-	Soini (1986)
Perú, Río Samiria	-	29,5	5	-	Freese (1975)
Perú, Río Samiria	Bosque Inundable	9.5	-	-	Aquino *et al.* (2001)
Perú, Cocha Cashu (Manú)	-	24	5	-	Freese (1975)
Colombia, La Macarena	Bosque húmedo tropical	10	7,5	350-450	Stevenson (1991)
Colombia, Finca Meremberg	Bosque montano siempreverde	*c.*15	9	2300	Gaulin y Gaulin (1982)
Colombia, SFF Otún Quimbaya	Bosque Subandino	31,3	6	1850-2250	Presente estudio

Crockett, C. M. y Eisenberg, J. F. 1987. Howlers: Variation in group size and demography. En: *Primate Societies*, B. B. Smuts, D. L. Cheney, R. M. Seyfarth, R. W. Wrangham y T. T. Struhsaker (eds), pp.54-68. University of Chicago Press, Chicago.

Dunbar R. I. M. 1988. *Primate Social Systems*. Chapman & Hall. London.

Freese, C. H. 1975. A census of non-human primates in Peru. In: Primate Censusing Studies in Peru and Colombia. Report, National Academy of Sciences, Project AMRO-0719, pp.17-41. Pan American Health Organization, Washington, DC.

Freese, C. H., Heltne, P. G. Castro R. N. and Whitesides, H. 1982. Patterns and determinants of monkey densities in Peru and Bolivia, with notes on distributions. *Int. J. Primatol.* 3: 53-90.

Gaulin, S. y Gaulin, C. 1982. Behavioral ecology of *Alouatta seniculus* in Andean Cloud Forest. *Int. J. Primatol.* 3(1): 1-29.

Gaulin, S., Knight, D. y Gaulin, C. 1980. Local variance in *Alouatta* group size and food availability on Barro Colorado Island. *Biotropica* 12: 137-143.

Gilbert, K. 1994. Endoparasitic infection in red howler monkeys (*Alouatta seniculus*) in the central Amazonian basin: A cost of sociality? PhD dissertation, The State University of New Jersey, New Jersey.

Greenwood, P. J. y Swingland, I. R. 1984. Animal movement: Approaches, adaptations and constraints. En: *The Ecology of Animal Movement*, I. R. Swingland y P. J.Greenwood (eds), pp.1-6. Clarendon Press, Oxford.

Hernández-Camacho, J. y Cooper, R. 1976. The non-human primates of Colombia. En: *Neotropical Primates: Field Studies and Conservation,* R. W. Thorington Jr. and P. G. Heltne (eds.), pp.35-69. National Academy of Sciences, Washington, DC.

Herrera, J. D. y Sánchez, G. 1996. Propuesta para el establecimiento y la delimitación del Santuario de Fauna y Flora Otún Quimbaya (Risaralda, Colombia). Reporte sin publicar. Unidad Administrativa Especial del Sistema de Parque Nacionales Naturales. Ministerio del Medio Ambiente, Bogotá, Colombia.

Hilton-Taylor, C. 2002. *2002 IUCN Red List of Threatened Species*. Gland, Switzerland Website: <http://www.redlist.org/>.

Julliot, C. 1997. Impact of seed dispersal by red howler monkeys *Alouatta seniculus* on the seedling population in the understorey of tropical rain forest. *J. Ecol.* 85: 431-440.

Julliot, C. y Sabatier, D. 1993. Diet of red howler monkey (*Alouatta seniculus*) in French Guiana. *Int. J. Primatol.* 14: 527-550.

Krebs, J. R. y Davies, N. B. 1984. *Behavioural Ecology: An Evolutionary Approach*. 2a. ed. Blackwell Scientific Publications, Oxford.

Mace, G., Harvey, P. y Clutton-Brock, T. H. 1984. Vertebrate home-range size and energetic requirements. En: *The Ecology of Animal Movement*, I. R. Swingland y P. J. Greenwood (eds), pp.32-53. Clarendon Press, Oxford.

Milton, K. 1993. Dieta y evolución de los primates. *Investigación y Ciencia* (Octubre): 56-63.

Neville, M. K. 1972. The population structure of red howler monkeys (*Alouatta seniculus*) in Trinidad and Venezuela. *Folia Primatol.* 17: 56-86.

Neville, M. K. 1976. Census of primates in Peru. En: *First Inter-American Conference on Conservation and Utilization of American Nonhuman Primates in Biomedical Research*, Pan-American Health Organization (PAHO), Publication No. 317, pp.19-29. Washington, DC.

Rangel-CH. J. O. 1991. Vegetación y ambiente en tres gradientes montañosos de Colombia. Tesis de Doctor, Universidad de Amsterdam, Amsterdam.

Rockwood, L. L. y Glander, K. E. 1979. Howling monkeys and leaf cutting ants: Comparative foraging in a tropical deciduous forest. *Biotropica* 11: 1-10.

Sekulic, R. 1982. Daily and seasonal patterns of roaring and spacing in four red howler *Alouatta seniculus* troops. *Folia Primatol.* 39: 22-48.

Soini, P. 1986. A synecological study of a primate community in the Pacaya-Samiria National Reserve, Peru. *Primate Conserv.* (7): 63-71.

Stevenson, P. 1991. Relación entre la abundancia de frutos y las estrategias alimenticias de 4 especies de primates, en la Macarena - Colombia. Informe final, Fundación para la Promoción de la Investigación y la Tecnología, Banco de la República, Bogotá.

Stevenson, P. y Quiñones, M. 1993. Vertical stratification of four New World primates at Tinigua National Park, Colombia. *Field Studies of New World Monkeys, La Macarena, Colombia* 8: 11-18.

Stoner, K. E. 1994. Population density of the mantled howler monkey (*Alouatta palliata*) at La Selva Biological Reserve, Costa Rica: A new technique to analyze census data. *Biotropica* 26: 332-340.

Sutherland, W. 1996. *Ecological Census Techniques*. Cambridge University Press, Cambridge.

Thorington Jr., R. W. y Heltne, P. G. (eds.). 1976. *Neotropical Primates: Field Studies and Conservation*. National Academy of Sciences, Washington, DC.

Van der Hammen, T. 1995. Global change, biodiversity and conservation of Neotropical montane forest. En: *Biodiversity and Conservation of Neotropical Montane Forest*, S. Churchill, H. Balslev, E. Forero y J. Luteyn (eds.), pp.603-607. The New York Botanical Garden, New York.

Genital Displays by Adult Male and Female Mantled Howling Monkeys, *Alouatta palliata* (Atelidae): Evidence for Condition-Dependent Compound Displays

Clara B. Jones

Introduction

Behavioral displays are thought to have arisen for the inter-individual assessment of information to resolve conflicts of interest and to avoid the risks of serious injury that may result from costly fights (Krebs and Davies, 1993). Displays

are considered to represent stereotyped or ritualized intention movements, ambivalent responses, or redirected acts (Tinbergen, 1952). The stereotyped and ritualized behaviors of mantled howling monkeys (*Alouatta palliata*) have been noted by several authors (Carpenter, 1934; Crockett and Eisenberg, 1987; Jones, 1980, 2000), although most reports are anecdotal. This brief report provides empirical data on stereotyped genital displays of adult male and female mantled howlers, concluding that they represent elements of compound, condition-dependent displays.

Methods

Study site and animals
The study (Jones, 1980, 1985, 2000 and references) was conducted in 1976 and 1977 at Hacienda La Pacifica, Cañas, Guanacaste, Costa Rica (10°18'N, 85°07'W). Marked animals (Scott *et al.*, 1976) in two *A. palliata* groups were studied in two habitats (Frankie *et al.*, 1974) of seasonal tropical dry forest (riparian habitat, Group 5: three adult males, 15 adult females, 401 h observation; deciduous habitat, Group 12: two adult males, eight adult females, 114 h observation).

In Group 5, Y male was highest-ranking, G male, second-ranking, and R male, lowest-ranking. The sub-adult, LT male, entered the hierarchy in 1977. In Group 12, S male was dominant, and Z male subordinate. In previous reports (e.g., Jones, 1980), Z male was labeled "R_{12}", but to avoid confusion with R male of Group 5, this Group 12 male has been re-labeled "Z." Procedures for determining dominance hierarchies may be found in Jones (1980). Group 12 was followed by radio-tracking (AVM SM-1 sending at 296 Mhz with a model LA 12 receiver [AVM Instrument Company, U.S.A.]).

Results are based upon randomized focal and *ad libitum* observations (Altmann, 1974). Modal social organization of mantled howlers is multimale-multifemale, yielding a polygynandrous mating system (Carpenter, 1934; Glander, 1980; Jones, 1980, 1985, 2000; Jones and Cortés-Ortiz, 1998; Crockett and Eisenberg, 1987). Mantled howler males are characterized by a predominantly white scrotum against dark pelage (Jones, 1999), and the females' labia are a variegated mix of black and white pigmentation (Jones, 1997). Cycling females exhibit genital swelling and color change (Glander, 1980; Jones, 1985), presumably corresponding to cycle stage.

Definitions
In this short report, "display" means one event. Genital display by males (GDM) signifies an adult male exposing his scrota to another individual, usually with the tail extended vertically. Genital display by females (GDF) indicates an adult female exposing her genital region to another individual, usually with her tail in a vertical position. These postures were considered to be "stereotyped" or "ritualized" because, when expressed, the animal's behavior appeared to "freeze" (Lorenz, 1951 quoted in Eibl-Eibesfeldt, 1970)

and to occur with "typical intensity" (Morris, 1957). The initiation and termination of a GDM or a GDF event was determined by the beginning and ending, respectively, of the frozen posture. The recipient (the "receiver") of the display's signal was presumed to be the nearest neighbor of the displaying individual (the "sender"). "Copulation" means dorso-ventral mounting with intromission, with or without ejaculation. "Displacement" means that one animal (sender or receiver) moved at least 1 m away from the other (sender or receiver). Two males were judged to be in coalition against a third if the two were observed to cooperatively displace the third (Jones, 1980, 2000).

Data analysis
The non-parametric Chi square (χ^2) "goodness of fit" test is employed with alpha set at 5%. All tests are two-tailed.

Results

In Group 5, 42 GDMs were displayed by Y male, 47 by G male, 26 by R male, and four by LT male ($\chi^2 = 37.8$, df = 3, p≤0.001). Thus, males of this group were not likely to display equally, and Y and G males were most likely to exhibit GDMs. GDMs occasionally escalated; six times to displacements and four times to chases, but never to fights. GDMs occurred in association with sexual behavior ("lingual gestures" [Carpenter, 1934; Jones, 1985], sexual solicitations [Jones, 1985], herding, copulation [Jones, 1985]: n = 18), vocalizations (see Jones, 1980, 2000: n = 26), "branch-break" displays (Glander, 1975; Jones, 2000: n = 12), urination (Glander, 1975, 1980; Jones, 2002, 2003: n = 4), and branch marking (Glander, 1975: perineal or chin marking: n = 3). Thus, GDMs may be components of "compound displays" (Bradbury and Vehrencamp, 1998) including visual, auditory, and olfactory signals. Females who were the recipients of GDMs or who were associated with displaying males were noted to be cycling on 14 occasions.

Y male displayed 13 times to G, eight times to R, four times to LT, 10 times to G and R males in coalition against Y, and six times to females ($\chi^2 = 5.96$, df = 4, p>0.05). Thus, Y male displayed equally to his recipients. The recipient of one GDM by Y male was undetermined. G male exhibited GDMs 17 times to Y male, 15 times to R, three times to LT, three times to Y and R in coalition against G, once to R and LT in coalition against G, once to an adult male of another group (Group 10), once to a transient, subadult male, and six times to females ($\chi^2 = 50.14$, df = 7, p≤0.001). G male, then, was most likely to display to Y and R males. R male displayed eight times to Y, 11 times to G, twice to LT, and five times to females ($\chi^2 = 6.94$, df = 3, p>0.05). Thus, R male was equally likely to display to his recipients.

In Group 12, GDMs by S male occurred 37 times, by Z male, 18 ($\chi^2 = 6.56$, df = 1, p≤0.02). Thus, the dominant male, S, was more likely than the subordinate, Z, to display. S male exhibited GDMs 19 times to Z and 16 times to females ($\chi^2 = 0.26$, df = 1, p>0.05). The dominant male in

Group 12, then, is equally likely to display to his recipients. Z male exhibited GDMs eight times to S and nine times to females ($\chi^2 = 0.06$, df = 1, p>0.05). Thus, Z male, also, was equally likely to display to his recipients. The recipient of one GDM by Z was undetermined.

Females of Group 5 exhibited 42 GDFs, nine times to Y male, 15 times to G male, eight times to R male, once to LT male, three times to G and R males in coalition against Y, twice to Y and R males in coalition against G, and four times to other females ($\chi^2 = 24.68$, df = 6, p≤0.001). Thus, females were most likely to display to G male. GDFs occurred in association with female-female displacements (n = 11), vocalizations (n = 1), chasing (Jones, 2000: n = 2), fighting by females (Jones, 2000: n = 1), genital inspection by males (n = 4), urination (Jones, 2002, 2003: n = 3), copulation (n = 1), grooming (Jones, 1979: n= 1), and huddling (Glander, 1975; Jones, 1980: n= 1). As for males, then, GDFs may be components of "compound displays." Females (either sender or receiver) were noted to be cycling on three occasions.

Females of Group 12 exhibited GDF's nine times, twice to S male, three times to Z male, and four times to other females ($\chi^2 = 0.66$, df = 2, p>0.05). Females of Group 12, then, are equally likely to display to their recipients. In this group, GDF's by one female to another occurred in association with copulation (Jones, 1985: n = 2) or fighting (n = 1), and these displays were exhibited on four occasions when either the displaying female, the receiver, or both were cycling. Vocalizations were noted to accompany GDFs on one occasion in Group 12.

Discussion

Similar to patterns of marking (Eisenberg, 1981), genital displays by adult mantled howlers are most likely to be derived from "simple movements of elimination." While it is possible that genital displays function as "contact-promoting behavior" (Eisenberg, 1981), less likely, as appeasement, I have observed these displays by mantled howlers in Panama (_A. p. aequatorialis_) and Mexico (_A. p. mexicana_), as well as Costa Rica (_A. p. palliata_), and, in all cases, genital displays appear to be used to control other individuals (see Jones, 1980, pp.394-395) and, possibly, to communicate threat. Supporting the latter view is the finding that GDMs and GDFs sometimes escalate to agonistic behavior(s), although wounds have never been observed on the scrota of male mantled howlers (N. J. Scott, Jr., pers. comm.; C. B. Jones, pers. obs.) or on the perineal area of females (C. B. Jones, pers. obs.).

In Groups 5 and 12, high-ranking males were most likely to exhibit GDMs. If genital displays are costly to males in time, energy, exposure to predation, and/or risks from fights, they may represent reliable ("honest") displays of quality which only high-ranking males can afford (see Andersson, 1994). Males of both groups displayed to their recipients with equal frequency with the exception

of Group 5's second-ranked male, G, who was most likely to display to Y and R males. This pattern may reflect the complexity of interactions which results when the number of males in a group increases as well as G's reliance upon a display unlikely to escalate in his competitive relations with other males. G's employment of genital displays, then, may reflect a safe strategy in highly competitive conditions.

Supporting the interpretation that G's displays to other males reflected male-male competition is the finding that females of Group 5 were most likely to exhibit GDFs to G male, although females of Group 12 were equally likely to display to S and Z. The "skew" in copulations in Group 12, however, was much higher than in Group 5 (Jones, 1985), possibly demonstrating, again, the complexity of interactions with an increase in male numbers. The present results support the view that GDMs and GDFs reflect interindividual competition since they occurred in association with sexual behavior as well as displacements, chases, and related agonistic responses. GDMs and GDFs appear to be conditional signals dependent upon phenotype or environment ("best of a bad situation rules": Brockmann, 2001), which are likely to be displayed for purposes of assessment when individual quality varies over time (e.g., because of nutritional state, fatigue, cycling stage, health: see Payne and Pagel, 1996). Future research is required to further document stereotyped and ritualized responses (including vocalizations) and their functions in howlers, and to assess the relative significance of elements of "compound displays" in _A. palliata_, other members of this genus, and, particularly, adults of other polygynandrous primates (see, for example, Smuts and Watanabe, 1990).

Acknowledgments

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References

Altmann, J. 1974. Observational study of behavior: Sampling methods. _Behaviour_ 49: 227-267.

Andersson, M. 1994. _Sexual Selection_. Princeton University Press, Princeton, NJ.

Bradbury, J. W. and Vehrencamp, S. L. 1998. _Principles of Animal Communication_. Sinauer Associates, Inc., Sunderland, MA.

Brockmann, H. J. 2001. The evolution of alternative strategies and tactics. *Adv. Stud. Behav.* 30: 1-51.

Carpenter, C. R. 1934. A field study of the behavior and social relations of howling monkeys. *Comp. Psychol. Monog.* 10: 1-168.

Crockett, C. M. and Eisenberg, J. F. 1987. Howlers: Variations in group size and demography. In: *Primate Societies*, B. B. Smuts, D. L. Cheney, R. M. Seyfarth, R. W. Wrangham and T. T. Struhsaker (eds.), pp.54-68. University of Chicago Press, Chicago.

Eibl-Eibesfeldt, I. 1970. *Ethology: The Biology of Behavior.* Holt, Rinehart and Winston, New York.

Eisenberg, J. F. 1981. *The Mammalian Radiations: An Analysis of Trends in Evolution, Adaptation, and Behavior.* The University of Chicago Press, Chicago.

Frankie, G. W., Baker, H. G. and Opler P. A. 1974. Comparative phenological studies of trees in tropical wet and dry forests in the lowlands of Costa Rica. *J. Ecol.* 62: 881-919.

Glander, K. E. 1975. Habitat and resource utilization: An ecological view of social organization in mantled howling monkeys. Doctoral dissertation, University of Chicago.

Glander, K. E. 1980. Reproduction and population growth in free-ranging mantled howling monkeys. *Am. J. Phys. Anthropol.* 53: 25-36.

Jones, C. B. 1979. Grooming in the mantled howler monkey, *Alouatta palliata* Gray. *Primates* 20: 289-292.

Jones, C. B. 1980. The functions of status in the mantled howler monkey, *Alouatta palliata* Gray: Intraspecific competition for group membership in a folivorous Neotropical primate. *Primates* 21: 389-405.

Jones, C. B. 1985. Reproductive patterns in mantled howler monkeys: Estrus, mate choice and copulation. *Primates* 26: 130-142.

Jones, C. B. 1997. Subspecific differences in vulva size between *Alouatta palliata palliata* and *A. p. mexicana*: Implications for assessment of female receptivity. *Neotrop. Primates* 5: 46-48.

Jones, C. B. 1999. Testis symmetry in the mantled howling monkey. *Neotrop. Primates* 7: 117-119.

Jones, C. B. 2000. *Alouatta palliata* politics: Empirical and theoretical aspects of power. *Prim. Rep.* 56: 3-21.

Jones, C. B. 2002. How important are urinary signals in *Alouatta*? *Lab. Prim. Newsl.* 41: 15-17.

Jones, C. B. 2003. Urine-washing behaviors as condition-dependent signals of quality by adult mantled howler monkeys (*Alouatta palliata*). *Lab. Prim. Newsl.* 42: 12-14.

Jones, C. B. and Cortés-Ortiz, L. 1998. Facultative polyandry in the howling monkey (*Alouatta palliata*): Carpenter was correct. *Bol. Primatol. Latinoamericano* 7: 1-7.

Krebs, J. R. and Davies, N. B. 1993. *An Introduction to Behavioural Ecology.* Blackwell Scientific Publications, Oxford.

Morris, D. 1957. "Typical intensity" and its relation to the problem of ritualization. *Behaviour* 11: 1-12.

Payne, R. J. H. and Pagel, M. 1996. Escalation and time costs in displays of endurance. *J. Theor. Biol.* 183: 185-193.

Scott Jr., N. J., Scott, A. F. and Malmgren, L. A. 1976. Capturing and marking howler monkeys for field behavioral studies. *Primates* 17: 527-534.

Smuts, B. B. and Watanabe, J. M. 1990. Social relationships and ritualized greetings in adult male baboons (*Papio cynocephalus anubis*). *Int. J. Primatol.* 11: 147-172.

Tinbergen, N. 1952. "Derived" activities: Their causation, biological significance, origin, and emancipation during evolution. *Quart. Rev. Biol.* 27: 1-32.

Squirrel Monkey (*Saimiri sciureus*) Rehabilitation in French Guiana: A Case Study

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Introduction

Rehabilitation can be an effective conservation tool (Kleiman, 1989). Although controversial (Soave, 1982; Harcourt, 1987), some experiences are undoubtedly positive (Rijksen, 1974; McGrew, 1983; Dillon Morin, 1994; Nogueira *et al.*, 1994; Ades, 1998; Harding, 1998). One of the difficulties of rehabilitation attempts is the lack of available referenced case studies, whatever their success. Since the late seventies, the Pasteur Institute of French Guiana has used the squirrel monkey (*Saimiri sciureus*) as an experimental model for the study of human malaria. In addition to the captive colony, the Institute managed an island where 150 wild monkeys originating from French Guiana and Suriname were introduced in 1981 (de Thoisy and Contamin, 1998). To date, the resident population totals approximately 100 animals (de Thoisy *et al.*, 2002). The initial aim of this study, requested by the manager of the colony of the Pasteur Institute, was to conduct a rehabilitation experiment with a group of common squirrel monkeys in order to assess the reliability of this management option for unwanted individuals, either post-experimental or old breeders.

Basic recommended rules, as indicated for any primate transfers (Konstant and Mittermeier, 1982), concern (i) *the release area*: suitability of the habitat, availability of feeding resources for both the resident population and the introduced animals, (ii) *the candidate animals' potential for successful rehabilitation*: ability to support the inherent stress, ability to feed according to needs, and (iii) *the release protocol*: methodology, accounting for ecological features such as seasonality and phenological patterns (for instance, fruiting patterns in the area). Since optimal conditions were indicated for this case study, this attempt also aimed to contribute to the knowledge of the ability of primates to be rehabilitated.

Methods

The release area was a 56-ha island offshore from Cayenne (4°54'N, 52°12'W), French Guiana. The island is covered with dense secondary forest. The resident squirrel monkey population was studied prior to the release (de Thoisy *et al.*, 2002) and is organized in four permanent troops, each comprising 23 to 25 individuals. No other primates are present, nor any perceived competitors and predators of the squirrel monkeys.

Rehabilitation protocol: The release animals
A group of 14 monkeys was formed, consisting of post-experimental and old breeders. The group included three males and nine females, two of them pregnant. Males were born in the colony from wild-born parents and were 9 to 12 years old; six of the females were wild-born (they had been caught in the wild between 1986 and 1988, for the establishment of the colony); the others were captive-born.

Rehabilitation protocol: Chronology
November 1998 to February 1999: the 14 animals were put together in an isolated cage in the Pasteur Institute colony. During this period, the two pregnant females gave birth. Monkeys were fed with their customary pellets.
February 1999 to May 1999: the monkeys were transferred to the island, and maintained in a large enclosure (6 m x 4 m x 4 m) in an area unoccupied by resident monkeys. There were small trees in the cage. During the first two months, monkeys were fed *ad libitum* with pellets, fruits from the forest and insects. During the following two months, artificial food was reduced. To train the squirrel monkeys, food was irregularly thrown in the cage, and artificial sprinkling reproduced rain. The scan-sampling method (Altmann, 1974) was used to assess their behavior, for a total of 78 hrs of observation.

May 1999: the enclosure was opened. Follow-up observations lasted 15 weeks (247 hrs). The following behaviors were noted: feeding, foraging, rest, locomotion, and social interactions. Feeding items were: fruits, flowers, insects, and leaves. Ranging was recorded by noting the individuals' presence in ¼-ha grid cells. Vertical use of the forest was recorded by height categories: level 1 - ground, level 2 - less than 3 m high, level 3 - from 3 to 10 m, level 4 - 10 to 20 m, and level 5 - upper canopy.

Results

First stage: Prior to release
As soon as the troop reached the enclosure on the island, strong differences were noticed between wild- and captive-born monkeys. For example, captive-born monkeys feeding mainly on pellets, spent 40% of their time foraging, *vs.* 65% for wild-born, which fed much more on insects. In the same way, the captive-born animals spent over 70% of their time on the ground *vs.* only 25% for wild-born. During the two months in this cage, no improvement was observed in captive-born monkeys, and two males died from starvation.

By contrast, the wild-born monkeys continuously increased their locomotion and foraging efficiency.

Second stage: Post- release
Behavioral differences increased between the wild-born and captive-born monkeys. After one month, captive-born individuals were feeding on the ground on fallen fruits and leaves, and mushrooms. The wild-born animals, on the other hand, increased their diet diversity. For instance, only one fruit species was consumed during the first week, four after the second week, and nine after six weeks. They became increasingly efficient in their foraging and hunting of arthropods, larvae, bird's eggs, and lizards, and in approximating the foraging patterns observed in the residents (de Thoisy *et al.*, 2002; F. Bayard *et al.*, unpubl. data).

While wild-born monkeys spent 75% of their time in the upper levels, the captive-born spent only 47% of the time up to 10 m high, and during 25% of the activity time they were on the ground. No progress was perceptible in their feeding behavior. After one month, the decision was taken to stop the re-introduction of the captive-born section; the animals were caught and brought back to the colony. The study then focused on the wild-born monkeys which remained. During the two first months, the group exhibited an intense exploratory behavior resulting in the regular use of 7 ha; during the second part of the follow-up, their range size remained stable at 9.5 ha for the entire study period.

Contacts with resident squirrel monkeys were rare, and recorded only 12 times during the 15 weeks of follow-up. Although no aggressive interactions were observed, we believe that a male of the re-introduced group was killed by residents. In the 11th week two males which came from the resident population entered the rehabilitated group.

Discussion

Release of captive primates in the wild, once accepted for conservation (see for instance Beck *et al.*, 1991), political, or ethical reasons (Harcourt, 1984), has to deal with a number of problems. They include certifying the suitability of the habitat and making sure it is protected (Konstant and Mittermeier, 1982), besides training to give the animals the necessary skills to live in the forest. The use of islands may help to increase the success rate of rehabilitation (Agoramoorthy and Hsu, 1999). In our case, previous studies confirmed the suitability of the release site (de Thoisy *et al.*, 2002) in terms of the habitat and the lack of predators (Beck *et al.*, 1991). The two main difficulties facing the squirrel monkeys were the search for food, and the necessary socialization to form a coherent group (Rijksen, 1974; Kessel and Brent, 2001). In our study case, the pre-release period was long, and we focused on these two critical points: we conclude that our protocol and methods allowed for a successful rehabilitation of the wild-born females and their offspring. Their capacity to locate feeding resources and forage efficiently reemerged successfully despite 10 to 15 years spent in captivity. The status of the reproductive

females may also have contributed to this success, allowing these introduced animals not to be rejected by residents (Agoramoorthy, 1995). After four months, however, the diet diversity was still lower than that of the residents, and the home range was smaller (de Thoisy *et al.*, 2002), but the constant improvement in their ranging and foraging, and the fact that two resident males had entered the group, allow us to predict an optimistic outcome.

By contrast, the rehabilitation attempt was definitively a failure for the captive-born individuals. Despite the fact that they were in a group with wild-born animals, their incapacity to learn from them was notable. Aveling and Mitchell (1981) emphasized that a captive existence in the infant and early juvenile stages severely restricts the chances of learning to adapt fully to a free-ranging life. Greater efforts may be required, but costs of such rehabilitation programs may be incompatible with their effectiveness in conservation terms.

This experiment showed that (i) with current procedures, rehabilitation cannot be considered as a management option for the captive-born component of the colony; (ii) at least in the case of such a highly adaptable species as the common squirrel monkey, rehabilitation can be surprisingly successful for wild-born animals, with an adequate training pre-release period, knowledge of the release area and knowledge of the ecoethological patterns of the resident population; (iii) even with optimized conditions, primate rehabilitation has its own limitations: costs and conservation relevance have to be evaluated and confronted prior to undertaking such controversial and risky programs.

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References

Ades, G. W. J. 1998. Wildlife rescue and management of Kadoorie farm rescue and rehabilitation center in Hong Kong. *Zoos' Print* 13: 9-13.

Agoramoorthy, G. 1995. Red howling monkey (*Alouatta seniculus*) reintroduction in a gallery forest of Hato Flores Moradas, Venezuela. *Neotrop. Primates* 3: 9-10.

Agoramoorthy, G. and Hsu, M. J. 1999. Rehabilitation and release of chimpanzees on a natural island: Methods hold promise for other primates as well. *J. Wild. Rehab.* 22: 3-7.

Altmann, J. 1974. Observational study of behavior: Sampling methods. *Behaviour* 49: 237-265.

Aveling, R. and Mitchell, A. 1981. Is rehabilitating orang-utans worthwhile? *Oryx* 16: 263-271.

de Thoisy, B. and Contamin, H. 1998. The squirrel monkey breeding colony of the Pasteur Institute, Cayenne, French Guiana. *Neotrop. Primates* 6: 14-18.

de Thoisy, B., Louguet, O., Bayart, F. and Contamin, H. 2002. Behavior of squirrel monkeys (*Saimiri sciureus*) - 16 years on an island in French Guiana. *Neotrop. Primates* 10(2): 73-76.

Dillon Morin, T. 1994. Gibbon rehabilitation project, Phuket, Thailand. *Asian Primates* 4: 3-8.

Harcourt, A. H. 1987. Options for unwanted or confiscated primates. *Primate Conserv.* (8): 111-113.

Harding, J. L. 1998. The first stages of rehabilitation of a family of white-handed gibbons *Hylobates lar. Australasian Primatol.* 12: 2-8.

Kessel, A. and Brent, L. The rehabilitation of captive baboons. *J. Med. Primatol.* 30: 71-80.

Kleiman, D. G. 1989. Reintroduction of captive mammals for conservation. *BioScience* 39: 14-16.

Konstant, W. R. and Mittermeier, R. A. 1982. Introduction, reintroduction and translocation of Neotropical primates: Past experiences and future possibilities. *Int. Zoo Yearb.* 22: 69-77.

McGrew, W. C. 1983. Chimpanzees can be rehabilitated. *Lab. Prim. Newsl.* 22: 2-3.

Nogueira, P., Carvalho, A. R., Oliveira, L. P., Veado, E. M. and Strier, K. B. 1994. Recovery and release of an infant muriqui, *Brachyteles arachnoides*, at the Caratinga Biological Station, Minas Gerais, Brazil. *Neotrop. Primates* 2: 3-5.

Rijksen, H. D. 1974. Orang-utan conservation and rehabilitation in Sumatra. *Biol. Conserv.* 6: 20-25.

Soave, O. 1982. The rehabilitation of chimpanzees and other apes. *Lab. Prim. Newsl.* 21: 3-8.

News

The 2002 IUCN Red List of Threatened Species

In the wake of the World Summit on Sustainable Development, with the state of the environment fresh in the minds of the global community, on 8 October, 2002, IUCN released its updated Red List of Threatened Species, one of the key tools used to determine the status of the Earth's biodiversity. It marks the first of what will be annual updates to the List. The figures will change each year as new species assessments are included, currently-listed species are re-assessed, and species undergo taxonomic revisions. An information package is available on the SSC website <iucn.org/themes/ssc> in English, French and Spanish, including a news release outlining several significant additions to the Red List and notable shifts in status.

There are a number of significant changes to the List since the release of the last edition in September 2000. Over 400 new species assessments have been included, 124 of these entering one of the threatened categories: Critically Endangered (CR), Endangered (EN), or Vulnerable (VU) (see definitions). There have also been nearly 200 re-assessments of species already listed. There are now 11,167 species threatened with extinction, an increase of 121 since 2000 with several new additions to the Red List and notable shifts in status.

In 2000, there were 5,611 plants assessed as threatened (1,014 CR, 1,266 EN, 3,331 VU). With the addition of Mexican and Brazilian cactus assessments, the figure is now 5,714 (1,046 CR, 1,291 EN, 3,377 VU) but there is much 'catching up' to do in plant assessments. With only approximately 4% of the world's described plants evaluated, the true percentage of threatened plant species is much higher. Most of the plant species listed are trees, since these have been relatively thoroughly assessed.

A total of 811 species are now assessed as Extinct and Extinct in the Wild, with seven additions to these categories since 2000, including the sea mink (*Mustela macrodon*) last seen in 1860, the Réunion Island sheldgoose (*Mascarenachen kervazoi*) extinct around 1710, and two hippo species (*Hippopotamus lemerlei* and *H. madagascariensis*) extinct around 1500 AD. Since 2000, two species previously assessed as Extinct have been rediscovered - the Lord Howe Island stick insect (*Dryococelus australis*) and the Bavarian pine vole (*Microtus bavaricus*).

A major analysis of the Red List will be conducted approximately every four years with the next one due in 2004. As stated in 2000, Indonesia, India, Brazil and China are among the countries with the most threatened mammals and birds, while plant species are declining rapidly in South and Central America, Central and West Africa, and Southeast Asia.

Habitat loss and degradation affect 89% of all threatened birds, 83% of mammals, and 91% of threatened plants assessed. Habitats with the highest number of threatened mammals and birds are lowland and montane tropical rainforest. Freshwater habitats are extremely vulnerable with many threatened fish, reptile, amphibian and invertebrate species.

Notes
Major analyses of the Red List were produced in 1996 and 2000. The 1996 List revealed that one in four mammal species and one in eight bird species face extinction, while the 2000 List confirmed that the global extinction crisis is as bad or worse than believed. Dramatic declines in populations of many species, including reptiles and primates were reported.

Numbers of threatened species on the Red List change from year to year, not only because new species are added to the list. Research scientists working around the world bring a constant flow of new information and this improved knowledge can result in species being upgraded to a higher threat category or, in cases where the situation is more optimistic than previously realised, downgraded to a lower threat category. Other changes may be the result of taxonomic revisions such as a species being re-classified as a subspecies and vice-versa. However, some species have moved into a different category as a result of a genuine change in conservation status.

The IUCN Red List includes extinctions that have occurred since 1500 AD. For the 2002 Red List, a revision of the extinctions list resulted in 15 species being removed because they are considered to have become extinct before 1500 AD. Also, as with the threatened categories, species can sometimes move out of the Extinct category as a result of taxonomic changes or uncertainties, such as the marbled toadlet (*Uperoleia marmorata*).

The Red List is based on information supplied by IUCN's Species Survival Commission (SSC), a network of 7,000 experts on plants, animals and conservation issues, and data from a number of partner organizations. All bird data are supplied by BirdLife International. Collectively, this network holds what is the most complete scientific knowledge base on the biology and current conservation status of species.

As the Red List expands to include complete assessments for the various taxonomic groups, a more detailed analysis of the statistics every four to five years will allow better comparison between years and a better understanding of the general trends in biodiversity over time. Targets have been set to assess all amphibians by 2003 (approximately 5,000 species); reptiles by 2005 (approximately 8,000 species); freshwater fish by 2005 (approximately 10,000 species), sharks, rays and chimaeras by 2004 (approximately 1,000 species); freshwater molluscs by 2004 (approximately 5,000 species). Plants, invertebrates and marine species will follow. By 2008 it is hoped that a worldwide biodiversity assessment will be possible.

To help meet these ambitious targets, a Red List consortium has been formed involving IUCN and its Species Survival Commission, BirdLife International, Conservation International's Center for Applied Biodiversity Science, The Ocean Conservancy, and NatureServe. This consortium aims to raise US$20 million to strengthen and expand Red Listing activities.

Species Information Service - SIS
The Red List is produced by the IUCN Species Survival Commission (SSC) - a network of some 7,000 species experts working in almost every country in the world - and data from a number of partner organizations. Collectively, this network holds what is probably the most complete scientific knowledge base on the biology and current conservation status of species. All data underlying the Red List will eventually be maintained in a series of databases that

Table 1. The Neotropical primates listed in the *2002 IUCN Red List of Threatened Species*. CR = Critically Endangered, EN = Endangered, VU = Vulnerable, and DD = Data Deficient. Criteria used for the assessment are those of IUCN (1994) (Version 2.3).

Species	Common name	Status	Criteria
Aotidae (6)			
Aotus hershkovitzi	Hershkovitz's night monkey	DD	
Aotus lemurinus	Lemurine night monkey	VU	B1+2c
A. lemurinus brumbacki	Brumback's night monkey	VU	B1+2c
A. lemurinus griseimembra	Grey-legged night monkey	EN	B1+2abcde
A. lemurinus lemurinus	Colombian night monkey	VU	B1+2c, C2a
A. lemurinus zonalis		DD	
Aotus miconax	Andean night monkey	VU	A1c, B1+2c
Atelidae (20)			
Alouatta belzebul ululata	Red-handed howling monkey	CR	B1+2abcde, C2a
Alouatta guariba	Brown howler	VU	A1c
A. guariba clamitans	Southern brown howling monkey	VU	A1c
A. guariba guariba	Northern brown howling monkey	CR	B1+2abcde, C2a, D
Alouatta seniculus amazonica	Red howling monkey	DD	
Alouatta seniculus juara	Red howling monkey	DD	
Alouatta seniculus puruensis	Red howling monkey	DD	
Ateles belzebuth	White-bellied spider monkey	VU	A1c
Ateles geoffroyi fusciceps	Brown-headed spider monkey	CR	B1+2abcde, C2a
Ateles geoffroyi grisescens	Hooded spider monkey	EN	B1+2abcde, C2a
Ateles geoffroyi rufiventris	Colombian spider monkey	VU	A1c, B1+2c
Ateles hybridus	Variegated spider monkey	EN	B1+2abcde
A. hybridus brunneus	Brown spider monkey	EN	B1+2abcde
A. hybridus hybridus	Variegated spider monkey	EN	B1+2abcde
Ateles marginatus	White-whiskered spider monkey	EN	B1+2abcde
Brachyteles arachnoides	Southern muriqui	CR	B1+2abcde, C2a
Brachyteles hypoxanthus	Northern muriqui	CR	B1+2abcde, C2a
Lagothrix cana		VU	A1c
L. cana cana	Geoffroy's woolly monkey	VU	A1c
L. cana tschudii		VU	A1c
Lagothrix lugens	Colombian woolly monkey	VU	A1c+2c
Lagothrix poeppigii		VU	A1c
Oreonax flavicauda	Yellow-tailed woolly monkey	CR	B1+2abcde, C2a
Callitrichidae (20)			
Callimico goeldii	Goeldi's monkey	VU	A1c
Callithrix aurita	Buffy-tufted-ear marmoset	EN	B1+2abcde, C2a
Callithrix flaviceps	Buffy-headed marmoset	EN	B1+2abcde, C2a
Callithrix geoffroyi	Geoffroy's tufted-ear marmoset	VU	B1+2b, C2a
Callithrix saterei	Sateré marmoset	DD	
Leontopithecus caissara	Black-faced lion tamarin	CR	B1+2abcde, C2a, D
Leontopithecus chrysomelas	Golden-headed lion tamarin	EN	B1+2abcde, C2a
Leontopithecus chrysopygus	Black lion tamarin	CR	B1+2abcde, C2a
Leontopithecus rosalia	Golden lion tamarin	CR	B1+2abcde, C2a
Mico chrysoleucus	Golden-white tassel-ear marmoset	VU	B1+2c
Mico leucippe	Golden-white bare-ear marmoset	VU	B1+2c
Mico marcai	Marca's marmoset	DD	

Table 1. *continued*

Mico nigriceps	Black-headed marmoset	VU	B1+2c
Saguinus bicolor	Pied tamarin	EN	B1+2abcde, C2a
Saguinus fuscicollis crandalli	Crandall's saddleback tamarin	DD	
Saguinus fuscicollis cruzlimai	Cruz Lima's saddleback tamarin	DD	
Saguinus imperator imperator	Black-chinned emperor tamarin	VU	A1c, B1+2c
Saguinus leucopus	Silvery-brown bare-face tamarin	VU	A1c, B1+2c, C2a
Saguinus nigricollis hernandezi	Hernández-Camacho's black mantle tamarin	VU	A1c, B1+2c
Saguinus oedipus	Cotton-top tamarin	EN	B1+2abcde, C2a
Cebidae (17)			
Cebus albifrons adustus	Brown-faced capuchin	DD	
Cebus albifrons aequatorialis	Ecuadorian capuchin	DD	
Cebus albifrons cesarae	Shock-headed capuchin	DD	
Cebus albifrons cuscinus		DD	
Cebus albifrons leucocephalus		DD	
Cebus albifrons malitiosus		DD	
Cebus albifrons trinitatis	Trinidad white-fronted capuchin	CR	B1+2abcde, C2a
Cebus albifrons versicolor	Varied capuchin	DD	
Cebus albifrons yuracus	Andean white-fronted capuchin	DD	
Cebus apella margaritae	Margarita Island capuchin	CR	B1+2abcde, C2a
Cebus apella robustus	Robust tufted capuchin	VU	B1+2c
Cebus capucinus curtus	Gorgona white-fronted capuchin	VU	B1+2c
Cebus olivaceus kaapori	Ka'apor capuchin	VU	A1c, B1+2c
Cebus xanthosternos	Buff-headed or yellow-breasted capuchin	CR	B1+2abcde, C2a
Saimiri oerstedii	Central American squirrel monkey	EN	B1+2abcde, C2a
S. oerstedii citrinellus	Grey-crowned Central American squirrel monkey	CR	B1+2abcde, C2a
S. oerstedii oerstedii	Black-crowned Central American squirrel monkey	EN	B1+2abcde, C2a
Saimiri vanzolinii	Vanzolini's squirrel monkey	VU	B1+2c, C2a
Pitheciidae (17)			
Cacajao calvus	Bald uakari	VU	A1cd
C. calvus calvus	White bald-headed uacari	EN	B1+2abcde
C. calvus novaesi	Novaes' bald-headed uacari	EN	B1+2abcde
C. calvus rubicundus	Red bald-headed uacari	EN	B1+2abcde
C. calvus ucayalii	Ucayali bald-headed uacari	VU	A1c
Callicebus barbarabrownae	Northern Bahian blond titi	CR	B1+2abcde
Callicebus coimbrai	Coimbra-Filho's titi	CR	B1+2c, C2a
Callicebus medemi	Medem's collared titi	VU	B1+2c, C2a
Callicebus melanochir	Southern Bahian masked titi	VU	A1c
Callicebus nigrifrons	Black-fronted titi	VU	A1c
Callicebus oenanthe	Andean titi monkey	VU	B1+2c
Callicebus olallae	Beni titi monkey	DD	
Callicebus ornatus	Ornate titi monkey	VU	A1c, B1+2c
Callicebus personatus	Northern masked titi	VU	A1c, B1+2c
Chiropotes satanas satanas	Black saki	EN	B1+2abcde
Chiropotes satanas utahicki	Uta Hick's bearded saki	VU	A1c
Pithecia monachus milleri	Miller's monk saki	VU	A1c, B1+2c
Pithecia monachus napensis	Napo monk saki	DD	

make up the SSC's emerging Species Information Service (SIS). This is a major initiative that aims to make the vast amount of information held by the SSC network easily and quickly accessible to users around the world.

Taxonomic standards have been adopted and all species on the IUCN Red List should conform to these by the year 2003. Adherence to the documentation and taxonomic standards will bring greater credibility and transparency to listings, and allow better analyses of the findings. Status assessments included in the IUCN Red List are also open to formal challenge. Petitions may be made against particular listings but only on the basis of the Red List Categories and Criteria and in reference to supporting documentation accompanying the listing. Petitions may not be made for political or economic reasons.

Neotropical Primates
Table 1 shows the threatened and data deficient (DD) Neotropical primates as they are listed in the *2002 IUCN Red List of Threatened Species*. They total 80: Aotidae – 6; Atelidae – 20; Callitrichidae – 20; Cebidae – 17; Pitheciidae – 17. Of these, 15 are ranked as Critically Endangered (CR), 15 are Endangered (EN), 31 are Vulnerable (VU) and 19 are Data Deficient (DD).

In 2003, this list will be revised, adjusting the taxonomy to take into account recent revisions, and also to adapt the status assessments to the new 2000 IUCN criteria (Version 3.1) (IUCN, 2001). We would be most grateful for any information on these or other species and subspecies, which would contribute to their re-assessment using the new criteria. Correspondence concerning this should be sent to Anthony B. Rylands (address below).

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References

IUCN. 1994. *IUCN Red List Categories*. IUCN Species Survival Commission. IUCN, Gland, Switzerland.
IUCN. 2001. *IUCN Red List Categories and Criteria. Version 3.1*. IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK.

WILD POPULATIONS OF SPIDER MONKEYS (*ATELES GEOFFROYI*) IN EL SALVADOR, CENTRAL AMERICA

With an area of 21,000 km² and 6.3 million inhabitants, El Salvador is the smallest country in Central America, and the only one lacking an Atlantic coast. It is divided into 14 departments in three zones: West, Central and East.

The black-handed spider monkey, *Ateles geoffroyi*, is the only non-human primate occurring there, but very little is known of its populations and habitats. Spider monkeys are mentioned in the 19th century travel book "Incidents of Travel in Central America, Chiapas and Yucatán", written by J. L. Stephens and illustrated by F. Catherwood (1841). *A. geoffroyi* was also included in a general list of the country's mammals in a study conducted by Burt and Stirton in 1926 (published in 1961). Mayan artefacts from the Classic Period (300 AD – 1000 AD) which represent animal figures, include spider monkey shapes, as well as other monkeys that are now locally extinct (David J. Guzmán, National Museum, San Salvador, El Salvador). Here I report on a population survey of *A. geoffroyi* that I will be carrying out in two protected areas. This is the first study of this species in El Salvador.

Study sites
The two areas included in the study will be Chaguantique and El Tercio, in the Department of Usulután in the southeast of the country. They are part of El Salvador's System of Protected Areas – SISAP (SEMA, 1994), but management plans necessary for the protection of the monkeys are lacking. Rangers now control subsistence hunting and the exploitation of the forests for fuelwood and commercial wood products practiced in the past, and local communities have changed their attitudes towards the forests and the wildlife, now recognizing the potential for eco-tourism in these areas.

In Chaguantique, cattle were also a problem, entering the forest and trampling and grazing on the undergrowth, preventing natural regeneration. The Community Cooperative, however, recently donated materials to fence it off, a measure which, besides benefiting the forest, was advantageous to local farmers who would spend many hours searching for their livestock. Villagers still go through the forest on bicycles to reach the plantation fields where they work. By comparison, the El Tercio forest has suffered less impact because the local community is 8 km away, and rangers (four of them) have been working there for longer. Their presence has prevented people from destroying the forest and disturbing the monkeys and other wildlife, and has resulted in increased natural forest regeneration.

The two areas are surrounded by agricultural land; sugar cane is the main crop in El Tercio and maize in Chaguantique. The use of herbicides and pesticides has affected the soils, the forests and the wildlife, as has the burning of crop residues and the use of fire to clear land, which has resulted in some forest fires in the past. Residents of both communities suffer from extreme poverty, and firewood especially is a vital resource. They are now interested in conserving the forests and the wildlife, however, and are receptive to developing alternative plans to lessen their impact on them.

Aims of the project
The main objective is to estimate the spider monkey populations and densities in Chaguantique and El Tercio, comparing the two areas, carrying out a preliminary habitat

assessment, and identifying the tree species they use for food. Aspects of their behaviour will also be recorded and compared. The wildlife of El Salvador has suffered greatly from the destruction of its natural vegetation, due not only to rapid population growth but also natural phenomena such as hurricanes and earthquakes. The aim is to achieve a full assessment of each area in terms of its effectiveness in protecting the spider monkeys that occur there.

Methods

The surveys will be done by direct observations from established trails (White, 1986) with the help of two local guides from each community. Daily observation data sheets will include weather conditions, time of contact, the identification of the spider monkeys encountered, and their behaviour patterns at the time of their detection (feeding, locomotion, resting). Densities will be estimated using repeat transect surveying (NRC, 1981). Leaves, flowers and fruits eaten by the monkeys will be identified and collected when necessary.

Other spider monkey populations in the country

Spider monkeys still occur in forests in Nancuchiname, La Normandía and Cerro El Mono in the Department of Usulután, in Conchagua in the Department of La Unión (East zone) (López-Zepeda, 1999), and also in Montecristo National Park in the Department of Santa Ana in the northwest (J. Latin, 2002, pers. comm.). Surveys are needed to identify other areas where spider monkeys still occur.

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References

Burt, H. W. and Stirton, R. A. 1961. The Mammals of El Salvador. *Misc. Publ. Mus. Zool.,* Univ. Michigan, Ann Arbor 117: 1-69.

Latin, J. 2002. Wildlife Biologist, Director of Montecristo National Park, Santa Ana, El Salvador.

López-Zepeda, E. 1995. *Plan de Manejo de la Reserva Natural Estricta de Conchagua*. Ministerio de Obras Públicas, Dirección General de Caminos. San Salvador, El Salvador.

NRC. 1981. *Techniques for the Study of Primate Population Ecology*. National Academy Press, Washington, DC.

SEMA. 1994. *Sistema Salvadoreño de Áreas Protegidas (SISAP)*. Secretaria del Medio Ambiente de El Salvador (SEMA), San Salvador.

Stephens, J. L. 1996. *Incidents of Travel in Central America, Chiapas and Yucatán (1841)*. Smithsonian Institution Press, Washington, DC.

UICN. 1999. *Listas de Fauna de Importancia para la Conservación en Centro América y México, 1999*. Unión Mundial para la Naturaleza (UICN), San José, Costa Rica.

White, F. 1986. Census and preliminary observations on the ecology of the black-faced black spider monkey, *Ateles paniscus chamek*, in Manu National Park, Peru. *Am. J. Primatol.* 11: 125-132.

EUROPEAN STUDBOOK FOR SPIDER MONKEYS

Pierre Gay of the Parc Zoologique de Doué La Fontaine, France, EEP Studbook Keeper and EEP Coordinator for the Colombian black spider monkey and the variegated spider monkey, has released the 2001 (Number 7) studbook for the European populations of spider monkeys. It includes a complete historical listing for captive *Ateles fusciceps robustus* and listings of all living individuals and their ancestors for *A. belzebuth*, *A. chamek*, *A. geoffroyi* - light phase, *A. geoffroyi* – dark phase, *A. hybridus*, *A. paniscus* and *Ateles* hybrids, along with recommendations regarding management of the populations for 2002-2003.

The studbook records (up to 31 December 2001) a total of 370 spider monkeys in European collections; an increase of 13 from 31 December 2000. This was due to the addition of records of an *Ateles hybridus* population (2.3.0) in the Thuringer Zoo Park, Germany, and of *Ateles fusciceps robustus* from Singapore Zoological Gardens (3.9.0).

There are very few captive *A. belzebuth*, with six individuals (3.3.0) in four institutions in Europe, just one female in a North American zoo, one male in New Zealand, and two individuals in Brazilian zoos. The studbook concludes that there is no future for a breeding program in Europe. The black-faced black spider monkey, *A. chamek*, is being kept in nine European institutions, totaling 12 animals (8.3.1). The recommendation is to explore the possibilities of reinforcing the stock through Brazilian zoos, where 42 *A. chamek* are registered in 15 institutions, and at least four groups are breeding.

There is a large population of *A. fusciceps robustus* in Europe: 181 animals (68.105.8) in 42 institutions. There were 11 infants born in 2000, 10 of which survived. Another 131 *A. f. robustus* are living in 37 institutions in

the North American region. Studbooks for Colombian and Ecuadorian *A. f. robustus* will be published in 2002. This year, the Parc Zoologique de Doué La Fontaine initiated a 6-month survey project for *A. f. fusciceps* in Ecuador, which is being managed by Diego Tirira, an Ecuadorian biologist working with Ecociencia and Simbioe. The last survey was carried out by Madden and Albuja in 1986. The zoo is also supporting the construction of rehabilitation enclosures in collaboration with ECOLOMBIA, an NGO based in Medellin. They are being built on an estate called La Pintada, south of Medellin, and will house both *A. f. robustus* and *A. hybridus*. In June 2001, there were 12 *A. f. robustus* and six *A. hybridus* housed there. Doué La Fontaine is also hoping to initiate surveys for *A. f. robustus* in the Parque Nacional Farallones de Cali, in collaboration with the Cali Zoo, Colombia.

The Mesoamerican spider monkeys are separated only in terms of their having darker or lighter pelage. Light phase *A. geoffroyi* is being kept in 12 institutions in Europe (47 animals – 19.26.2). There are many more in North America (323 animals in 1996) and Australia (73 animals in 1996). In North America, the studbook is now distinguishing subspecies. Dark phase *A. geoffroyi* is scarcer in Europe – 25 (11.14.0) in nine institutions. In 1996, there were 65 dark phase *A. geoffroyi* in North America, and a further 27 in Australia. The recommendation in the European studbook is to avoid new imports because the population is too small to be managed.

At the end of 2001, *A. hybridus* numbered 36 animals (11.25.0) in seven European institutions. Individuals in the Thuringer Park Zoo, Germany, were karyotyped and found to be pure *A. hybridus*. There are rather fewer variegated spider monkeys in North America (29 [2.17.0] in 11 institutions at the end of 1999), but they are numerous in Colombian and Venezuelan zoos. and the recommendation in the studbook is to pursue possibilities of reinforcing the European stock with the imminent publication of studbooks for these regions. In 2001, Doué La Fontaine supported a survey of *A. hybridus* in a forest close to the Río Magdalena (La Finca Arizona, municipality of La Dorada, Department of Caldas), which had been undergoing deforestation. Four species were still surviving there (*Alouatta seniculus, Saguinus leucopus, Aotus lemurinus* and *Cebus capucinus*), but evidently no spider monkeys remained. Local people reported that they liked to boil spider monkey bones to produce a soup which was effective in treating malaria, and this was considered to be an aggravating factor in their disappearance, besides forest destruction.

The red-faced black spider monkey, or Guiana spider monkey, *Ateles paniscus*, was recorded from six institutions, totaling 22 animals (11.11.0). Only three *A. paniscus* are kept in North American zoos. The Brazilian studbook for this species counted 39 individuals in 16 institutions, including three breeding groups. Some of the oldest individuals in Europe had died in 2001, making the population easier to manage and the decision as to whether to persist

with breeding this species was considered to be dependant on the holding institutions transferring animals and the reinforcement of the stock through exchanges with Brazilian zoos. The Doué La Fontaine Zoo initiated a census of *A. paniscus* in French Guiana in 2001, sponsored by "La Vallée des Singes" Primate Park in Romagne, France, and the Association Kwata "Étude & Conservation de la Faune de Guyane", based in Cayenne. A short report on the survey by Benoît de Thoisy, which covered 15 sites, is included in the studbook.

The final section in the studbook lists the hybrid spider monkeys in European zoos, 41 in all (15.25.1) at the end of 2001, with the recommendation that, while maintaining them in social groups, they should not be allowed to breed. The studbook includes a guide for collecting blood samples for chromosome analysis for species identification, and addresses of where they can be sent for analysis.

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References

Madden, R. H. and Albuja, L. 1986. The conservation status of *Ateles fusciceps fusciceps* in the Reserva Ecologica Cotacachi-Cayapas, northwestern Pacific lowlands, Ecuador, South America. Unpublished report, World Wildlife Fund-US, Washington, DC, 79pp.

de Thoisy, B. 2002. Primates conservation status in French Guiana: A preliminary assessment. In: *European Regional Studbook for the Spider Monkeys* Ateles *ssp.* Ateles fusciceps robustus *E.E.P.,* Ateles hybridus *E.E.P.* No. 7, P. Gay (compiler), European Association of Zoos and Aquaria (EAZA), Parc Zoologique de Doué La Fontaine, Doué La Fontaine, France.

Gay, P. (compiler). 2002. *European Regional Studbook for the Spider Monkeys* Ateles *ssp.* Ateles fusciceps robustus *E.E.P.,* Ateles hybridus *E.E.P.* No. 7. European Association of Zoos and Aquaria (EAZA), Parc Zoologique de Doué La Fontaine, Doué La Fontaine, France. As of 31 December 2001.

Johnson, L. 2002. A study to investigate the effects that various feeding enrichments have on the behavioural diversity of a colony of spider monkeys (*Ateles fusciceps robustus*) housed at Chester Zoo. BSc dissertation abstract in: *European Regional Studbook for the Spider Monkeys* Ateles *ssp.* Ateles fusciceps robustus *E.E.P.,* Ateles hybridus *E.E.P.* No. 7, P. Gay (compiler), European Association of Zoos and Aquaria (EAZA), Parc Zoologique de Doué La Fontaine, Doué La Fontaine, France.

Watson, A. M. 2002. The social behaviour and interactions of captive Colombian black spider monkeys, *Ateles fusciceps robustus.* BSc dissertation abstract in: *European Regional Studbook for the Spider Monkeys* Ateles *ssp.* Ateles fusciceps robustus *E.E.P.,* Ateles hybridus *E.E.P.* No. 7, P. Gay (compiler), European Association of Zoos and

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INBREEDING AVOIDANCE IN COMMON MARMOSETS (*CALLITHRIX JACCHUS*)

In August 2001, Marcelina Souza de Oliveira successfully defended her Doctoral thesis, "Sexual inhibition, inbreeding avoidance and mate monopolisation in captive common marmosets (*Callithrix jacchus*)", at the University of Zürich, Switzerland. Marcelina graduated at the Federal University of Rio Grande do Norte in 1992, and completed her Master's thesis (a comparison of activity patterns and infant carrying in *Callithrix jacchus* and *Leontopithecus chrysomelas*) there in 1996. Her supervisor for her doctoral thesis was Prof. Robert Martin, formerly Director of the Institute of Anthropology of Zürich University, but currently at the Field Museum of Natural History, Chicago. The study was supported by the Brazil Science Council (CNPq) and the A. H. Schultz Stiftung. The basic design of the study owed a great deal to the extensive knowledge and skills of Dr. Gustl Anzenberger. The animal management staff of the primate station (Universität Zürich-Irchel), with their skilled care and maintenance of the marmosets, were most supportive, and Dr. Ann-Kathrin Oerke kindly assisted with the ultrasonography tests. The following is a summary of the thesis.

One of the most fascinating and challenging topics arising from the essentially monogamous breeding system of common marmosets (*Callithrix jacchus*) concerns the mechanism by which reproduction is inhibited in socially subordinate individuals. However, within established social groups of common marmosets, it is not possible to distinguish whether an "incest taboo" (Abbott, 1984) results "passively" from the mechanism of sexual suppression or "actively" from avoidance of mating with close kin.

The two possible mechanisms countering inbreeding, namely sexual suppression and familiarity, can be separated to some extent by means of an experimental approach as performed in this study. The study investigated the following questions in a series of experiments. 1) Whether adult daughters in normally developed family groups would show signs of ovarian activity (assessing also whether there were differences in testosterone levels from fathers and adult sons in normally developed family groups). 2) What are the effects of external encounters with partitioned unfamiliar opposite-sexed conspecifics (i.e., potential sexual partners) on the behaviour and endocrinology of adult daughters and sons which are otherwise still kept in contact with their families? 3) Whether adult brother-sister dyads taken from their families and subsequently housed as single heterosexual pairs would alter their behaviour and endocrinology during encounters with single unfamiliar conspecifics of the same sex. 4) Whether previously subordinate adult males and females taken from different families and subsequently housed as single heterosexual pairs would alter their

behaviour and endocrinology, and whether previously subordinate adult males derived from different families would respond with mate monopolisation during encounters with single unfamiliar conspecifics of the same sex.

The study involved 12 adult common marmosets, six daughters and six sons, from the colony of the Anthropological Institute at Zürich University, initially living in three family groups. Subjects were housed successively under one of the following social conditions: 1) in contact with the family group; 2) removed from the family but housed with a sibling of the opposite sex; and 3) paired with an unfamiliar conspecific of the opposite-sex. Encounter tests were conducted under all three conditions. Urinary hormone levels (oestrogen, pregnanediol and testosterone) were all measured by immunoassay in addition to the collection of behavioural data.

The results clearly showed that reproductive impairment of subordinate offspring, a keystone of the social structure of captive common marmosets, fully applies to all daughters and sons not only when in contact with the family group but also when kept as brother-sister pairs. Adult males and females did not reproduce in the family group or brother-sister dyad context even when males did not show evidence of physiological suppression and females presented sporadic cycles. In contrast to pairs of related adults, the formation of isolated unrelated male-female pairs rapidly led to courtship, mate monopolisation, sexual behaviour and breeding. All members of unrelated pairs were seen performing tongue-flicking behaviour, copulating regularly after pairing, and performing behaviours to exclude the proximity of the partner to unfamiliar same-sex individuals (rivals). In the brother-sister dyads, none of the six females performed tongue-flicking solicitation or received attempted or actual mounts from their brothers, and mate monopolisation behaviours were mild or absent.

Altered and reduced levels of ovarian hormones in subordinate females housed in family groups or with a brother do not explain the reduction or lack of expression of sexual behaviour by the females. Kendrick and Dixson (1983) showed that hormonal deficits in ovariectomised female marmosets do not abolish either proceptive or receptive behaviour. In the case of males, excreted levels of testosterone were sufficient to maintain sexual interest and copulatory behaviour from the first experimental phase onwards. Certainly, there was in most cases no difference between fathers and non-breeding adult sons in testosterone levels. However, sexual behaviour and pregnancy occurred only in the last phase, when individuals were paired with unfamiliar animals. Furthermore, the lack of previous sexual experience cannot account for the absence of copulatory behaviour, because all the sexually inexperienced males (n = 6) and females (n = 6) copulated as soon they were paired with unfamiliar individuals.

The results revealed that brother-sister pairs of adult male and female common marmosets show impaired reproduc-

tive performance compared to pairs of unrelated males and females, strongly suggesting inbreeding avoidance. It can be concluded that the individuals were opting to wait and breed only with unfamiliar animals.

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References

Abbott, D. H. 1984. Behavioral and physiological suppression of fertility in subordinate marmoset monkeys. *Am. J. Primatol.* 6: 169-186.

Kendrick, K. M. and Dixson, A. H. 1983. The effect of the ovarian cycle on the sexual behaviour of the common marmoset (*Callithrix jacchus*). *Physiol. Behav.* 30: 735-742.

Oliveira, M. S. de. 2002. Sexual inhibition, Inbreeding Avoidance and Mate Monopolisation in Captive Common Marmosets (*Callithrix jacchus*). Doctoral thesis, University of Zürich, Zürich. 187pp.

CONSERVATION INTERNATIONAL DO BRASIL E O MUSEU PARAENSE EMÍLIO GOELDI LANÇAM O PROJETO BIOTA-PARÁ

No dia 22 de outubro de 2002, Conservation International do Brasil e o Museu Paraense Emílio Goeldi lançaram o Projeto BIOTA-PARÁ. Esta iniciativa tem como objetivo consolidar as informações sobre a biodiversidade do Estado do Pará visando orientar com base científica as decisões políticas sobre a conservação e o uso sustentável da biodiversidade do segundo mais extenso estado brasileiro. No seu primeiro ano, o projeto gerará dois produtos principais: (a) a lista de espécies ameaçadas de extinção no Estado e (b) o diagnóstico da biodiversidade do Centro de Endemismo Belém, o setor mais desmatado de toda a Amazônia Brasileira.

A lista de espécies ameaçadas de extinção no Estado é um dos instrumentos básicos previstos na Lei 6.462, que dispõe sobre a Política Estadual de Florestas, sancionada pelo Governador Almir Gabriel em 4 de julho de 2002. Esta será a primeira vez que o Pará elaborará a sua lista de espécies ameaçadas de extinção, mas sabe-se que atualmente muitas espécies deveriam constar, especialmente aquelas que são exploradas pelo homem e aquelas com distribuição restrita. Entre as espécies/subespécies que ocorrem no Pará e que estão listadas na atual lista oficial de animais brasileiros ameaçados de extinção estão o saguí-branco (*Mico leucippe*), o saguí-de-Santarém (*Mico humeralifer*), o cuxiú-de-nariz-branco (*Chiropotes albinasus*), o cuxiú-preto (*Chiropotes satanas*), o guará (*Eudocimus ruber*), a arara-azul-grande (*Anodorhynchus hyacinthinus*), o mutum-pinima (*Crax fasciolata pinima*) e a ararajuba (*Guarouba guarouba*).

O processo de elaboração da lista de espécies consistirá de três etapas: (a) preparatória, com a formação de uma lista de espécies candidatas obtida a partir de indicações de especialistas; (b) decisória, com a realização de uma reunião de trabalho para definir quais as espécies que deverão integrar a lista; e (c) final, com a preparação e encaminhamento da lista ao órgão responsável para a sua homologação. A lista estará pronta até setembro de 2003.

A elaboração da lista de espécies ameaçadas de extinção no Pará é um instrumento essencial para direcionar as ações de conservação no Estado e assim evitar a perda das espécies e dos ecossistemas nos quais elas vivem. "A parceria entre o Museu Paraense Emílio Goeldi e a Conservation International do Brasil é muito importante, pois as duas instituições compartilham a visão de que o estudo e a conservação da biodiversidade devem ser uma parte importante de todas as políticas públicas do Pará", comenta o Dr. Peter Mann de Toledo, Diretor-Geral do Museu Paraense Emílio Goeldi.

O Pará possui 1.253.164 km² de extensão. Aproximadamente 16% (*c.* 200.000 km²) das suas florestas e campos já foram alterados pela atividade humana. Segundo os dados do INPE, a taxa anual de desmatamento entre 1998 e 2000 no Pará foi de 6.700 km²/ano, ou seja, cerca de 4.589 campos de futebol por dia. O desmatamento é a principal ameaça às espécies de plantas e animais, especialmente aquelas que possuem distribuição muito reduzida e vivem em densidades populacionais muito baixas.

A Amazônia não é homogênea, pois cada setor deste enorme bioma possui o seu próprio conjunto de espécies endêmicas, ou seja, espécies que não ocorrem em nenhuma outra região do planeta. As áreas que possuem duas ou mais espécies endêmicas são denominadas de centros de endemismo. Um dos mais bem marcados centros de endemismo da Amazônia brasileira é o de Belém, no extremo leste do bioma, e incorporando todas as florestas e ecossistemas associados a leste do rio Tocantins e toda a Amazônia Maranhense. Este centro foi identificado com base em estudos de plantas, aves e borboletas florestais.
"Esta região é o setor mais ameaçado da Amazônia Brasileira, pois cerca de 60% das suas florestas já foram desmatadas e as poucas florestas que restam continuam sob grande pressão", comenta Ima Célia Vieira, Coordenadora de Pesquisa e Pós-Graduação do Museu Paraense Emílio Goeldi e que desenvolve pesquisas nesta região por mais de 10 anos. Um estudo recente, feito por Júlio Roma (Universidade de Brasília), José Maria C. da Silva (Conservation International do Brasil) e David Oren (The Nature Conservancy do Brasil) com as aves, indicou que das 531 espécies registradas, cerca de 116 (22%) estavam ameaçados de extinção local. A situação da biota do centro de endemismo de Belém é similar à situação da biota da Floresta Atlântica e se nada for feito urgentemente, poderemos ter uma extinção em massa, a primeira deste tipo a atingir a Amazônia desde a entrada do homem na região.

O Museu Goeldi e a Conservation International do Brasil estarão elaborando um diagnóstico da biodiversidade do

centro de endemismo de Belém para, junto com outras organizações, governo estadual, governos municipais, lideranças indígenas e comunidades locais, desenvolver um plano emergencial de consenso para garantir a conservação da biodiversidade da região. "Uma reunião com todos os setores envolvidos será realizada em agosto de 2003 para definirmos um conjunto de ações concretas, mas, desde já, podemos antecipar que entre estas estarão incluídas a implementação efetiva das unidades de conservação que já foram criadas na região e o estabelecimento de corredores ecológicos, através da criação de reservas privadas (RPPNs) e da restauração de florestas em áreas críticas e que hoje estão degradadas", comenta Tereza Cristina Ávila Pires, pesquisadora do Museu Goeldi e coordenadora do Programa BIOTA-Pará.

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INTERNATIONAL COMMITTEE FOR *CEBUS XANTHOSTERNOS* AND *CEBUS ROBUSTUS*

The Committee for the Conservation and Management of the yellow-breasted capuchin, *Cebus xanthosternos*, and the robust tufted capuchin, *Cebus robustus*, (*sensu* Silva Jr., 2001) met on 23-24 October, 2002, in Ilhéus, Bahia, Brazil. Cecília Kierulff, of Conservation International do Brasil, is the new Chair for this Committee, which serves in an advisory capacity to the Instituto Brasileiro do Meio Ambiente e de Recursos Naturais Renováveis (IBAMA), the Brazilian wildlife authority. IBAMA sponsored and funded the meeting.

Attending the meeting were state and federal IBAMA officials, and representatives from the local NGO Instituto de Estudos Sócio-Ambientais do Sul da Bahia (IESB), the State University of Santa Cruz (UESC), the Rio de Janeiro Primate Center (FEEMA/CPRJ), and the Brazilian, European, and North American zoo communities. The meeting agenda included discussions of the current status of these two endangered Atlantic Forest taxa in the wild, field research priorities, strategies for dealing with animals held in rescue centers or private hands, and the management of the captive population.

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Reference

Silva Jr., J. de S. 2001. Especiação nos macacos-prego

e caiararas, gênero *Cebus* Erxleben, 1777 (Primates, Cebidae). Doctoral thesis, Universidade Federal do Rio de Janeiro, Rio de Janeiro. 377pp.

MOUNTAINS OF TUMUCUMAQUE NATIONAL PARK

The Mountains of Tumucumaque National Park of 3.8 million ha, the largest strictly protected area for tropical forest in the world, was created on 22 August 2002. Occupying an estimated 26.5% of the Brazilian state of Amapá and a small part of Pará (west of the Rio Jari), it lies along the frontier of Brazil with French Guiana, bounded by the upper Rio Jarí in the west, and by the headwaters of the Rio Araguari in the east. It includes the headwaters of the Rios Oiapoque, Jari and Araguari, covering a remote and very largely untouched region of montane Amazon forests along the Serra do Tumucumaque and Serra Lombarda, which Fearnside and Ferraz (1995) indicated as one of the most poorly represented vegetation formations in Amazonian protected areas. The region was targeted as of top priority in the Workshop "Biological Priorities for Conservation in Amazonia", held in Manaus in 1990 (Area 57 - Suriname - Guiane Française – Amapá; Rylands *et al.*, 1991) and the 1999 workshop in Macapá, Amapá, "Avaliação e Identificação de Ações Prioritárias para a Conservação, Utilização Sustentável e Repartição de Benefícios da Biodiversidade na Amazônia Brasileira" (EG019 - Alto Rio Jari-Tumucumaque, EG012 - Médio Oiapoque; Silva *et al.*, 2001; Veríssimo *et al.*, 2001). The Park lies within the Guianas Tropical Forests Ecoregion (NT0125; Ferreira *et al.*, 2001) and also covers parts of the Pleistocene refuge areas proposed by Prance (1973) for plants (Guiana), by Haffer (1969) for birds (Guiana), and by Brown (1975, 1977) for forest butterflies (Oyapock).

The land was transferred from the Institute of Colonization and Agrarian Reform (INCRA) to the Brazilian Institute for the Environment (IBAMA) as a compensatory measure exempting them from forests unduly destroyed in agro-extractivist reserves and colonization projects established in other parts of Amazonia. Legislation in Brazil's Forest Code (Código Florestal, Lei No.4.771, 15 de setembro de 1965) limits the extent of deforestation permissible on any property (maintenance of the so-called "Legal Reserve"). Legislation established in 2001 (Medida Provisória 2.166/01, Artigo 44, Inciso III, Parágrafo 4º) allowed, under certain conditions, for the "Legal Reserve" to be established in a region outside of the property. This resulted in a number of areas being transferred from INCRA to IBAMA, and the creation, in August 2001, of the Barreiro das Antas Extractivist Reserve (107,000 ha), the Rio Cautário Extractivist Reserve and the Serra da Cotia National Park (283,000 ha), all in the state of Rondônia, and three National Forests (Mulata in Pará, Pau Rosa in Amazonas, and Santa Rosa dos Purus in Acre), totaling 1.29 million ha.

The creation of the Mountains of Tumucumaque National Park consolidates a highly significant section of a planned

ecological corridor for the forests of the Guayana Shield, the "Guayana Shield Tropical Wilderness Corridor", a major program of Conservation International and its regional Guianas and Brazil programs. The corridor comprises a series of protected areas of various categories from Brazil, through French Guiana, Suriname and Guyana. Tumucumaque is contiguous with a large Indigenous Area (Tumucumaque Indigenous Park) to the west, which links to Sipaliwini Natural Reserve in southern Suriname (an Important Bird Area [IBA] identified by BirdLife International; Wege and Long, 1995), and two proposed protected areas, also in southern Suriname in the regions of Orange Gebergte and Tirió, which in turn would link with the Central Suriname Natural Reserve of 1,600,000 ha (see Mittermeier, 1999). Tumucumaque abuts a large reserve under consideration in southern French Guiana on the border with Brazil and, as can be seen in Figure 1, connects with a series of other protected areas in Brazil, including the Waiapi Indigenous reserve, the State Sustainable Development reserve of Iratapuru, the Jari Ecological Station, the Amapá National Forest and the Rio Cajari Extractivist Reserve. The primates protected in the Mountains of Tumucumaque National Park include (according to their geographic distributions): *Saguinus midas, Saimiri sciureus sciureus, Cebus apella, Cebus olivaceus, Pithecia pithecia pithecia, Chiropotes sagulatus* (see Silva Jr. and Figueiredo, 2002), *Alouatta seniculus* (*Alouatta macconnelli, sensu* Groves, 2001) and *Ateles paniscus.*

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References

Brown Jr., K. S. 1975. Geographical patterns of evolution in Neotropical Lepidoptera. Systematics and derivation of known and new Heliconiini (Nymphalidae: Nymphalinae). *J. Entomol.* 44(3): 210-242.

Brown, Jr. K. S. 1977. Centros de evolução, refúgios e conservação de patrimônios genéticos na região tropical: Padrões de diferenciação em Ithomiinae (Lepidoptera: Nymphalidae). *Acta Amazonica* 7(1): 75-137.

Fearnside, P. M. and Ferraz, J. 1995. A conservation gap analysis of Brazil's Amazonian vegetation. *Conservation Biology* 9: 1134-1147.

Groves, C. P. 2001. *Primate Taxonomy.* Smithsonian Institution Press, Washington, DC.

Haffer, J. 1969. Speciation in Amazonian forest birds. *Science* 165: 131-137.

Mittermeier, R. A. 1999. The Central Suriname Nature Reserve. *Neotrop. Primates* 7(2): 59-60.

Rylands, A. B., Huber, O. and Brown, K. S., Jr. 1991. *Workshop-90, Biological Priorities for Conservation in Amazonia.* Map. Scale 1:5,000,000. Instituto Brasileiro do Meio-Ambiente e dos Recursos Naturais Renováveis (IBAMA), Brasília, Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus, and Conservation International, Washington, DC.

Silva Jr., J. S. and Figueiredo, W. M. B. 2002. Revisão sistemática dos cuxiús, gênero *Chiropotes* Lesson, 1840
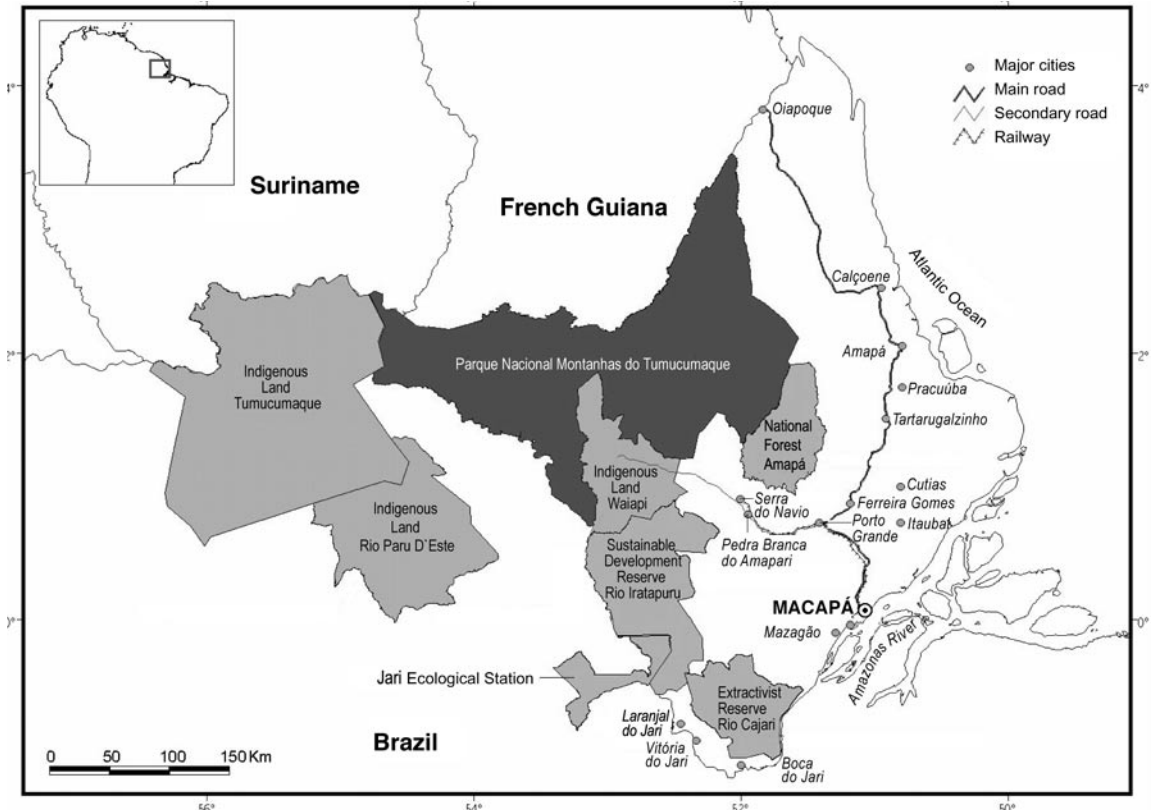
Figure 1. Location of the Mountains of Tumucumaque National Park, northern Brazilian Amazonia.

(Primates, Pitheciidae). In: *Livro de Resumos: X° Congresso Brasileira de Primatologia: Amazônia - A Última Fronteira*, p.21. Sociedade Brasileira de Primatologia, Belém, 10-15 November, 2002.

Silva, M. N. F. da, Rylands, A. B. and Patton, J. L. 2001. Biogeografia e conservação da mastofauna na floresta amazônica brasileira. In: *Biodiversidade na Amazônia Brasileira: Avaliação e Ações Prioritárias para a Conservação, Uso Sustentável e Repartição de Benefícios*, A. Veríssimo, A. Moreira, D. Sawyer, I. dos Santos, L. P. Pinto & J. P. R. Capobianco (eds.), pp.110-131, 471-475. Instituto Socioambiental, Estação Liberdade, São Paulo.

Veríssimo, A., Moreira, A., Sawyer, D., Santos, I. dos, Pinto, L. P. and Capobianco, J. P. R. (eds.). 2001. *Biodiversidade na Amazônia Brasileira: Avaliação e Ações Prioritárias para a Conservação, Uso Sustentável e Repartição de Benefícios*. Instituto Socioambiental, Estação Liberdade, São Paulo.

Wege, D. C. and Long A. J. 1995. *Key Areas for Threatened Birds in the Neotropics*. BirdLife International Conservation Series, No. 5, Cambridge.

SUCCESSFUL RAINFOREST CAMPAIGN CLOSED

The EAZA Rainforest Campaign for the Atlantic forest and the four lion tamarin species was officially ended during the annual EAZA Conference in Barcelona, 17-22 September 2002. The Campaign Planning Group, David Field (Dublin Zoo, Ireland), Bengt Holst (Copenhagen Zoo, Denmark), Kristin Leus (Antwerp Zoo, Belgium), and Jeremy J. C. Mallinson (until recently of the Durrell Wildlife Conservation Trust, Jersey), arranged for a special plenary symposium on lion tamarins during the conference to celebrate the success of the two-year campaign. Kristin Leus, David Field and Bengt Holst presented the results of the campaign. Fabiana Prado (IPÊ - Institute for Ecological Research, Brazil), leader of the conservation education project for the black-faced lion tamarin, talked of her successful work with the women in the local communities on the island of Superagüi, who are making puppets, masks, embroidered towels and suchlike for sale to tourists and, while considerably increasing their income, producing an awareness and pride of the lion tamarins occurring there and the need to protect the island's fragile natural ecosystems. Anthony Rylands (Center for Applied Biodiversity Science, Conservation International, USA) summarized the status of the four species and highlighted the importance of the four lion tamarin conservation programmes for the conservation of the Atlantic rainforest in general. He showed how the four lion tamarin conservation programmes were comprised of multiple and complementary components coordinated by the Lion Tamarin Conservation Committee, and how zoos contribute to all both directly and indirectly. Cláudio Valladares-Padua (founder and Director of IPÊ), shared his vision of future conservation efforts for the Atlantic Rainforest. Corridors - not only between forest fragments but also connecting protected areas on a big scale – can ensure the conservation of biodiversity to a much higher degree than considering all protected areas as separate units. The presentation was supported by a video about the use of corridors in conservation programmes. Last, but not least, the General Coordinator for Fauna and Flora in Brazil and representative of IBAMA (the Brazilian Environmental Agency), Maria Iolita Bampi, officially closed the campaign and conveyed the gratitude of the Brazilian Government to all participants. She stressed the significant impact of the campaign, not only on existing conservation projects, but also on future conservation activities in the region. She encouraged a strengthening of the ties between European zoos and ongoing conservation projects in the Atlantic Rainforest in the future.

What did we achieve?

The campaign far exceeded the goals set in 2001. Ninety EAZA zoos from 20 different countries participated in the campaign with activities ranging from poster exhibits to a total transformation of the zoo into a South American landscape. Some of these activities were described in the last two issues of *EAZA News*, and some can be seen on the websites of the zoos in question. But common to all activities, they were launched with tremendous enthusiasm and all had a significant impact. Fund-raising was extremely successful. By the 16 September 2002, the campaign had raised Euro 145.876,99, but this only covered contributions from around 60% of the participants, and we expect to exceed Euro 200,000 at the end of 2002, when most zoos finish the official part of their campaign. Naturally, it is difficult to measure the increase in public awareness about the Atlantic Rainforest. However, PR activities have been comprehensive in all countries, and the message has thus been widely spread. Links were established between European zoos and Brazilian zoos, and between European zoos and conservation projects, and it is now up to the zoos involved to keep up the momentum. Conservation is not made by single contributions. Conservation relies on long-term commitment. It is our sincere hope that the participating zoos will continue their support in the years to come. Only through such long-term commitment can we be sure to make a difference.

Bengt Holst, Vice Director, Copenhagen Zoo, Sdr. Fasanvej 79, DK-2000 Frederiksberg, Denmark, e-mail: <eh@zoo.dk>.

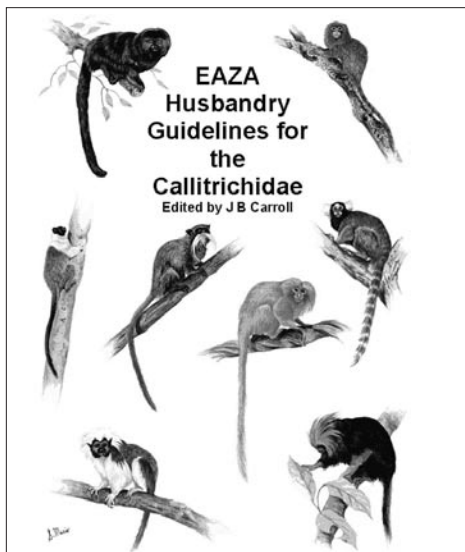## EAZA HUSBANDRY GUIDELINES FOR THE CALLITRICHIDAE AND THE EAZA REGIONAL COLLECTION PLAN

EAZA Husbandry Guidelines for the Callitrichidae

The Callitrichidae Taxon Advisory Group of the European Association of Zoos and Aquaria (EAZA) launched its first edition of the *EAZA Husbandry Guidelines for the Callitrichidae* at its recent meeting held in September 2002 in Barcelona, Spain.

The *Guidelines* were multi-authored, with nine contributors. We set out to report on our understanding of best practice rather than attempt to present a review of all the husbandry practices undertaken by European zoos. All of the authors have considerable hands-on experience of the husbandry and management of captive marmosets and tamarins. We also reviewed the biology of the callitrichids, which, of course, underpins good husbandry practice.

The *Guidelines* are divided into two major sections. Section 1 is on the Callitrichidae in the wild and comprises species accounts, giving a very brief overview of distribution, CITES status, Red List status, and status in the EAZA Regional Collection Plan for Callitrichidae. Section 2 is on Callitrichidae in captivity and contains seven chapters. These cover marking and registration, capture and transport, housing, social behaviour and management of social groups, reproduction and hand-rearing, control of breeding, nutrition, and veterinary care. They contain a considerable amount of background information on social behaviour, nutrition, and reproduction based on reviews of relevant literature. The authors are Eric Bairrão Ruivo (Lisbon Zoo, Portugal), Tine Griede (Independent Zoo Consultant, Netherlands) Ken Gold (Independent Zoo Consultant, USA), Warner Jens (Apenheul, Netherlands), Stewart Muir (Shaldon Wildlife Trust, Devon, UK), Gabor Gozi (Zoo Szeged, Hungary), Thierry Petit (Zoo La Palmyre, France), Kristin Leus (Antwerp Zoo, Belgium) and Bryan Carroll (Bristol Zoo, UK), who also edited the *Guidelines*.

We now plan to translate the Guidelines into Spanish and Portuguese, so that they can be made available to non-English speakers in South America. We also hope that in time the *Guidelines* will be available through the EAZA website and through the ISIS/WAZA Studbook Library. In the meantime they are available in English on CD Rom from Bryan Carroll at Bristol Zoo Gardens. The cost is £5.00

Figure 1. Cover page of the *EAZA Husbandry Guidelines for the Callitrichidae*, by Stewart Muir (Shaldon Wildlife Trust, Devon, UK).

sterling (+ postage and packing), and the money raised is being put towards the production of CD Rom versions in Spanish and Portuguese which, when produced, will be donated to South American zoos.

EAZA Regional Collection Plan for the Callitrichidae 2002

The Regional Collection Plan (RCP) for the Callitrichidae was developed at a meeting of the Callitrichidae Taxon Advisory Group (TAG) in Amsterdam in March 2002. This was the first mid-year meeting of the TAG following the division of the EAZA Primate TAG into five smaller TAGs, namely the Ape TAG, the Old World Monkey TAG, the Cebid TAG, the Callitrichid TAG and the Prosimian TAG. The Callitrichidae RCP was developed through review of the relevant section of the EAZA Primate RCP (1996). The RCP is comprised of three tables:

Table 1 is entitled 'Taxa recommended for EAZA management', and shows (highlighted in blue) all the species for which EAZA management is recommended. There are three levels of management. The highest level is the EEP (European Endangered Species Programme) in which a studbook is held and a nominated species co-ordinator makes recommendations for population management based on the studbook and on predefined genetic and demographic goals. The second level of management is the ESB (European Studbook) in which a studbook is maintained and the studbook keeper may advise on pairings and other aspects of population management. The third level of management is 'Monitor' in which a designated person monitors the species' population trends on behalf of the TAG. This may be done through surveys but does not necessarily involve the development of a full studbook. Most of the species recommended for management are already present in the region. Some are not, but considering their status in the wild, the immediate establishment of a managed programme is recommended should animals come into the region.

Table 2 is entitled 'Taxa present in EAZA collections not currently recommended for EAZA management'. It lists the callitrichid species held in EAZA zoos for which no management programme is currently recommended. They are highlighted in red.

Table 3 is entitled 'Taxa not present in EAZA collections not currently recommended for EAZA management'. It lists the species not held in EAZA zoos for which at this time no programme is recommended. They are also highlighted in red.

The EAZA Regional Collection Plan will be reviewed annually by the TAG, and it is likely that recommendations for certain species will change over the years as a result of either a change of status in the wild, or of changes affecting their status in captivity.

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Coiba Island, Panama

Number 7, September 2002, of *Ícaro*, the magazine of the Panamanian Asociación Nacional para la Conservación de la Naturaleza (ANCON) (website: <http://ancon.org/>) is dedicated to the Island of Coiba. Coiba is in the Gulf of Montijo off the Pacific coast of Panama, and has two primates: the white-faced capuchin monkey, *Cebus capucinus imitator*, known locally as "cariblanco", and the Coiba Island howling monkey, *Alouatta coibensis coibensis*, or "el mono kun-kun", endemic to Coiba and the smaller neighbouring island of Jicarón. It is an excellent review, including beautifully illustrated articles on the natural history of the island, its flora (*c.*1450 species in lowland tropical forest, premontane tropical forest, swamp forest and mangroves) and fauna (36 species of mammals, including an endemic agouti, *Dasyprocta coibae*, 147 species of birds, and 39 amphibians and reptiles) and the immensely rich coral reefs (claimed to be the second largest in the eastern American Pacific), and its history (which includes a penal colony currently being closed down). Pedro Méndez Carvajal and Ivelisse Ruíz B. provide a short text and photos of the Coiba howling monkey (pp.28-30). Coiba was declared a National Park of 270,125 ha in 1992 (Resolución J. D. No. 021 of 17 December, 1991), which covers the islands of Coiba, Rancheria, Jicarón, Jicarita, Canal de Afuera, Uva, Contreras, Pájaros and Brincanco, as well as a large area of the continental platform. Coiba Island itself is 53,528 ha, of which about 60% is forested. Jicarón, the largest of the eight islands around Coiba, is 2,002 ha. A management plan was prepared during 1993/1994 and approved by the Instituto de Recursos Naturales Renovables - INRENARE (today the Autoridad Nacional del Ambiente - ANAM) in 1996. A Biological Station for research, inventories, monitoring and management is being set up on the north part of the island. The future of the park is currently under discussion and threatened, with pressure from the government to allow for its development as a tourist resort.

Pedro G. Méndez Carvajal, Sociedad Mastozoológica de Panamá, Comisión de Primatología, Instituto Smithsonian de Investigaciones Tropicales, Apartado 797, Panamá zona 1, República de Panamá. E-mail: <mendezp@bci.si.edu>.

Reference

Melayos, M., Monge, C., Posse, F. and Castroviejo, S. 1997. *Guia de Campo del Parque Nacional de Coiba (Panama)*. Agencia Española de Cooperación Internacional (AECI), Spain. 215pp.

O Parque Estadual Carlos Botelho, São Paulo, Comemora 20 Anos Protegendo Muriquis, *Brachyteles arachnoides*

Uma comemoração dos vinte anos de criação do Parque Estadual Carlos Botelho, administrado pelo Instituto Florestal de São Paulo, foi realizada no dia 15 de setembro no Centro de Visitantes Marco Antônio dos Santos, em São Miguel Arcanjo (SP). É uma das mais importantes unidades de conservação do Estado de São Paulo, abrigando uma população significativa do muriqui, *Brachyteles arachnoides.* O parque, com uma área de 37.644 ha, se localiza na região sudoeste do estado, estendendo-se pelos municípios de São Miguel Arcanjo, Capão Bonito, Sete Barras e Tapiraí. A sua criação se deu com a unificação, por meio do Decreto Estadual nº 19.499, de 10 de setembro de 1982, de quatro reservas florestais denominadas Carlos Botelho, Capão Bonito, Travessão e Sete Barras, na Serra de Paranapiacaba. O nome Carlos Botelho é uma homenagem ao médico urologista que foi secretário da Agricultura, Viação e Obras Públicas do Estado em 1904, na gestão de Jorge Tibiriçá. Nascido em Piracicaba, em 1855, e falecido em 1947, foi considerado o pioneiro da urologia no Brasil. Junto com outras unidades de conservação da região, o parque integra desde 1991 a Zona Núcleo da Reserva da Biosfera da Mata Atlântica. Em 30 de novembro de 1999, foi reconhecido pela UNESCO como Sítio do Patrimônio Mundial Natural.

No Parque Estadual Carlos Botelho está em desenvolvimento o projeto de longo prazo Ecologia e Comportamento de Muriquis do Sul (*Brachyteles arachnoides).* Em desenvolvimento há 16 anos, representa a continuidade dos esforços iniciais de Karen B. Strier, para o estabelecimento de um sítio de pesquisas com muriquis em uma floresta com mínimo grau de perturbação antrópica. Coordenado por Maurício Talebi Gomes desde 1996, no presente momento recebe suporte logístico do Instituto Florestal do Estado de São Paulo - SP e da Associação Pró-Muriqui. Este projeto possui por estudo principal a pesquisa de Doutorado de Maurício Talebi Gomes pelo Departamento de Ciências Biológicas da Universidade de Cambridge, UK, sob orientação da Dra. Phyllis C. Lee.

Este estudo, entitulado "Fatores que afetam a escolha do alimento em muriquis do sul" aborda a seleção do alimento em suas variáveis químicas - *macronutrientes* (proteína total, FDA, FDN, lipídeos e energia) e *compostos secundários* (taninos e fenóis) - e físicas (reflectância, ph, geometria e dureza), através do Kit para análise físicoquímica do alimento de primatas em campo (Lucas *et al.*, 2001). Suas hipóteses principais explorarão quais são as variáveis melhores predictoras da escolha do alimento, e de que forma a composição de grupo e o sucesso reprodutivo são influenciados de acordo com as variações sazonais na disponibildade dos items alimentares no ambiente de Floresta Sub Tropical de Montana. As agências financiadoras são: O Conselho Nacional de Pesquisa – CNPq, Processo 200256-998; WWF do Brasil;

e o Margot Marsh Biodiversity Foundation através do Primate Action Fund, Conservation International, USA. O Departamento de Anatomia da Universidade de Hong Kong, gentilmente cedeu o equipamento para as análises citado na referência. Maiores informações sobre este projeto podem ser encontradas no site da Associação Pró-Muriqui: <www.muriquionline.hpg.com.br>.

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Reference

Lucas, P. W., Beta. T., Darvell. B. W., Dominy, N. J., Essackjee, H. C., Lee, P. K., Osorio, D., Ramsden, L., Yamashita, N. and Yuen, T. D. B. 2001. Field kit to characterize physical, chemical and spatial aspects of potential primate foods. *Folia Primatol.* 72: 11-25.

Field course "Ecology of New World Primates" – Curso de campo "Ecología de Primates Neotropicales"

A 3-week field course on the "Ecology of New World Primates" was held from 11 September to 5 October 2002 at the Estación Biológica Quebrada Blanco (EBQB), Reserva Comunal Tamshiyacu-Tahuayo, in north-eastern Peru. This course was part of a series initiated in 2000 within the framework of cooperation between the Faculties of Forestry Engineering and Biological Sciences of the Universidad Nacional de la Amazonía Peruana (UNAP) and the Deutsches Primatenzentrum (DPZ, German Primate Center) (see *Neotropical Primates* 8: 120-121, 2000, and 10: 32, 2002). Five Peruvian forestry and biology students from UNAP and five German biology students from the Justus Liebig-Universität Giessen (JLU) participated in the course, which was directed by Eckhard W. Heymann from DPZ.

The students observed groups of well-habituated moustached and saddle-back tamarins (*Saguinus mystax*, *Saguinus fuscicollis*) and joined PhD student Britta Müller from DPZ in her comparative ecological-parasitological study. They also carried out habitat sampling with plots and using plotless methods. Activities of frugivores other than tamarins were examined during focal tree observations. There was ample opportunity for "natural history" observations in the tropical rain forest environment. A highlight, which unfortunately only a minority of participants could experience, was an encounter with a large troop of red uakaris (*Cacajao calvus ucayalii*) traveling through the study area. The course was also a forum for Peruvian and German students to meet and exchange their views of the world and learn about their different cultures. The amicable atmosphere and the friendships that built up during the course were a great experience for everybody.

Un curso de campo sobre "Ecología de Primates Neotropicales" se realizó entre el 11 de setiembre y el 05 de octubre 2002 en la Estación Biológica Quebrada Blanco (EBQB), Reserva Comunal Tamshiyacu-Tahuayo, nor-oriente peruano. Este curso fue el punto culminante de una serie de cursos iniciados en octubre 2000 en el margen de cooperación entre las Facultades de Ingeniería Forestal y de Ciencias Biológicas de la Universidad Nacional de la Amazonía Peruana (UNAP) y el Deutsches Primatenzentrum (DPZ, Centro Alemán de Primates) (véase *Neotropical Primates* 8: 120-121, 2000, y 10: 32, 2002). Cinco estudiantes de ingeniería forestal y de biología de la UNAP y cinco estudiantes de biología de la Justus Liebig-Universität Giessen (JLU) participaron en este curso que fue dirigido por Eckhard W. Heymann del DPZ.

Los estudiantes observaban manadas muy bien habituadas de los "pichicos barba blanca" y "pichicos comunes" (*Saguinus mystax, Saguinus fuscicollis*) y acompañaron a la estudiante de doctorado Britta Müller, del DPZ, en su estudio comparativo ecológico-parasitológico. Además, realizaban muestreos de la estructura de vegetación mediante de metodos de cuadrantes y de "plotless methods". Observaciones de "arboles focales" presentaban oportunidades para examinar las actividades de otros frugívoros. Finalmente, había amplia oportunidad de hacer observaciones de "historia natural" en el ambiente de un bosque tropical.

El colmo del curso que infelizmente solamente una minoría de los participante podía experimentar era el encuentro con una gran manada de huapos rojos (*Cacajao calvus ucayalii*), pasando por la zona de estudios. El curso también era una oportunidad para el encuentro entre estudiantes peruanos y alemanes, para el intercambio de sus experiencias personales y para conocer a una cultura diferente. El ambiente amistoso y el crecimiento de amistades durante el curso era una experiencia muy positiva para todos los participantes.

Biodiversity Foundation. Estamos muy agradecidos a estas organizaciones. Tambíen estamos muy agradecidos a Olympus Deutschland por la donación de una camera digital, y a Kodak Deutschland y Karstadt AG Giessen por la donación de películas fotográficas.

Eckhard W. Heymann, Abteilung Verhaltensforschung & Ökologie, Deutsches Primatenzentrum, Kellnerweg 4, D-37077 Göttingen, Germany, e-mail: <eheyman@gwdg.de>.

New Master's Programme in Primatology – University of Surrey Roehampton

The University of Surrey Roehampton, UK, is offering a one-year Master of Research (MRes) degree programme starting in September 2003. This programme provides a unique opportunity to study primate biology in depth. It will teach original research and place findings into a theoretical context, providing preparation for advanced research (PhD and consultancy work). It combines theoretical investigation with laboratory and field work on a range of topics. Practical investigations will be carried out in zoos, local habitats, museums and laboratories. After the first semester the emphasis is on independent study, with all students carrying out an in-depth piece of original research. This is written up as a dissertation and a paper in a form suitable for publication in a peer-reviewed scientific journal. The key areas of study are:

• Ecology and behaviour: Methods used in surveying and gathering biological information, methods of recording behaviour in the field.
• Diet and foraging: Observing and investigating behavioural and physical dietary adaptations, field and laboratory techniques for gathering data, analysing nutritional and foraging data from wild and captive primates.
• Life-history evolution: Allometry, reproductive life history variables, comparative analysis of life-history and brain size evolution.
• Reproduction: Laboratory techniques for gathering data and analysing reproductive hormone data in wild and captive primates. The evolution of mating strategies.
• Zoos and museums as a resource for the study of primates and the ethics of studying captive primates.
• Methods of analysing physical and behavioural adaptations (e.g. locomotion, sensory systems). Phylogenetic reconstructions and interpretations of adaptations.

For further details, contact: School of Life and Sport Sciences, University of Surrey Roehampton, West Hill, London SW15 3SN, UK, Tel: 020 8392 3524, e-mail: <life_sciences@roehampton.ac.uk>, URL: <http://www.roehampton.ac.uk/prospectus/postgraduate.asp?file=primatology>.

Canopy Biology, Tree Climbing Strategies and Primate Ecology

A mixed Workshop/Symposium "Canopy Biology, Tree Climbing Strategies and Primate Ecology" was held during the XIXth International Primatological Society Congress in Beijing, China, August 4-9, 2002. It explored the ecology of the canopy from a primate's point of view. The first part of the half-day gathering presented communications for better understanding the primate canopy (field study and modelling). The second part focused on both tree climbing techniques and canopy access strategies. Each tree is now accessible, regardless of its height, size, shape and complexity. Canopy access is safe and provides the exceptional advantage of complete autonomy to the researcher (individual trees can be climbed on a needed basis). The first section of the Workshop was used by experienced climbers to present and exchange ideas on techniques, tricks, gears and strategies. A teaching lesson was provided to interested volunteers. Alain Houle presented a proposal to the Council of the International Primatological Society (IPS) for the production of a guide to techniques and safety precautions for climbing trees. The Symposium that he and Emmanuelle Grundmann organized during the IPS Congress included the following themes: habitat and microhabitat description such as physical milieu, light availability, food (color vision, distribution in crowns, biomass, quality, density and defendability), foraging efficiency (the concept of "giving-up density"), sleeping sites, nest building and nesting behavior of apes, lemurs and galagos (galagos and nests of galagos were accidentally found within chimpanzee nests in Kibale), DNA analyses derived from hairs collected in nests, information sharing (visual scan from adjacent and emergent trees), and physical anthropology (branch structures and strength, limited number of paths). Accessing the canopy contributes to our knowledge of primates by bringing original information otherwise unavailable.

Alain Houle, Département des Sciences Biologiques, Université du Québec à Montréal, C.P. 8888, Succ. Centre-Ville, Montréal, Canada H3P 3C8, e-mail: <ahoule@globetrotter.net>, and **Emmanuelle Grundmann**, Laboratoire de Conservation des Espèces Animales/Laboratoire d'Éco-anthropologie, Museum d'Histoire Naturelle de Paris, 57 rue Cuvier, 75005 Paris, France, e-mail: <emmanuelle.grundmann@wanadoo.fr>.

Species Information Service (SIS) - Progress

The Species Information Service (SIS) aims to become a worldwide species information resource (with interlinked databases of species-related information managed by SSC's network of Specialist Groups). The latest in a series of activity reports related to its development is now available. For an update on the progress during 2002, visit: <http://www.iucn.org/themes/ssc/sis/sis7.html>.

CHICAGO ZOOLOGICAL SOCIETY GRANTS FOR SSC SPECIALIST GROUPS

The Chicago Zoological Society makes annual grants to SSC Specialist Groups from its Chicago Board of Trade Endangered Species Fund for small projects identified in Action Plans or other group priority-setting exercises. There are two grant cycles a year, the first with awards in May and the second with awards in October. Proposals for the first round are due by e-mail by 22 March, 2003 and should be for work to be conducted in 2003. The Fund supports small projects, usually up to $5,000, and considers proposals on a specific threatened (or near threatened) species, or a specific habitat that is of high value or also threatened. Priority is given to projects that are clearly of critical need for the species or habitat that are likely to provide immediate results. Education and communications projects are welcome. Strict biological research projects are not a priority unless there can be a direct application of the results. Projects that have been identified in published or pending Action Plans take priority. The Specialist Group Chair (or other officer of the group) must endorse any proposal submitted on a Group's behalf. Proposals and requests for more detailed guidelines should be submitted by e-mail to: Tim Sullivan at: <tisulliv@brookfieldzoo.org>.

L. S. B. LEAKEY FOUNDATION

During the budget year 2001-2002, the L. S. B. Leakey Foundation awarded 62 research grants to the tune of $646,830 and ranging from $2,650 to $20,000. Those concerned with Neotropical primates included: Early Miocene primates and other mammals of southern Patagonia – Fabian Marcelo Tejedor; Evolution of brachiation in atelines: A phylogenetic comparative study – Andrea Jones; Golden-backed uacari foraging ecology: Dietary specialists in Amazonian seasonal swamp forests – Adrian Barnett; Socioecology and population genetics of monogamous primates in Eastern Ecuador - Anthony DiFiore; The vexing question of trichromacy in *Brachyteles* and *Lemur catta* – Nathaniel Dominy; Behavioral dimorphism in monogamous owl monkeys of the Gran Chaco – Eduardo Fernandez-Duque. Deadline for grant applications: 5 January 2003. For information on grants and membership of the L. S. B. Leakey Foundation: The Leakey Foundation, P. O. Box 29346, San Francisco, CA 94129-0346, USA. Webpage: <www.leakeyfoundation.org>. Source: *AnthroQuest* (14), Fall 2002.

SOPHIE DANFORTH CONSERVATION BIOLOGY FUND

Roger Williams Park Zoo accepts proposals for the Sophie Danforth Conservation Biology Fund of the Rhode Island Zoological Society. Annual awards of up to $1000 are granted to conservation programs that protect threatened wildlife and habitats worldwide. Field studies and other projects that demonstrate a multi-disciplinary approach to biodiversity and ecosystem conservation, as well as projects that involve in-country collaborators, receive highest funding priority. Environmental education programs, development of techniques that can be used in a natural environment, and captive propagation programs that stress an integrative approach to conservation are also appropriate. Deadline for submissions is May 31. Grant recipients will be notified by September 3. Proposal guidelines and additional information are available on the Roger Williams Park Zoo website at: <www.rogerwilliamsparkzoo.org>, in the Conservation section, or may be acquired by contacting Stacia Martin at <smartin@rwpzoo.org>.

SMITHSONIAN BIODIVERSITY TRAINING COURSES

The director and staff of the Smithsonian Institution's Monitoring and Assessment of Biodiversity Program are pleased to announce the international biodiversity conservation curriculum for 2003. The two complementary courses that form this year's curriculum offer a complete and essential program for conservation biologists, ecologists, resource managers and environmental leaders. The Biodiversity Assessment and Monitoring for Adaptive Management course guides you through the process of designing and implementing local and regional biodiversity monitoring programs. The Environmental Leadership course emphasizes communication skills to facilitate your interaction with managers, decision-makers and resource personnel.

Biodiversity Assessment and Monitoring for Adaptive Management, 30 April – 2 June, 2003. This intensive five-week SI/MAB course is a must for resource managers, ecologists, biologists, environmental educators and consultants. It is led by more than 40 internationally recognized instructors and speakers. The course is divided into eight modules, the first of which provides a framework for biodiversity assessment and monitoring, strengthened by a basic background in Geographical Information Systems and statistics. Six modules follow on assessment and monitoring of vegetation, aquatic systems, arthropods, amphibians and reptiles, birds, and mammals. The final module integrates the preceding seven and focuses on developing site-based multitaxa monitoring for adaptive management. *Investment*: US$4,500 covers your tuition, lodging, meals, local transportation, and course materials. Airfares are not included.

The Smithsonian Environmental Leadership Course, 7-19 September, 2003. Strong leadership skills are essential for effective conservation. The communication skills and strategies of exceptional leaders are taught in this course in a friendly learning environment. The Smithsonian Environmental Leadership course includes the exploration of topics such as Foundation Skills for the Environmental Leader, Negotiation and Conflict Resolution Strategies, Creating Compelling Futures, and Impactful Environmental Communication. The learning structure of the course is composed of demon-

strations, background information, and personal and group exercises. Speakers and numerous case-specific examples are presented. Investment: US$2,750 covers your tuition, lodging, meals, local transportation, and course materials. Airfares are not included. At the moment, we have limited scholarships for Latinos. We hope to increase the number and scope of scholarships we can offer in the near future.

For more information, contact: Geri Philpott, Smithsonian Institution, MAB Program, PO Box 37012, Attn: MRC 705, Washington, DC 20013-7012, Tel: 202.357-4793, Fax 202.786-2557, e-mail: <gphilpott@ic.si.edu>. WWW address: <www.si.edu/simab>.

PRIMATE SOCIETIES

10TH BRAZILIAN CONGRESS OF PRIMATOLOGY

The tenth congress of the Brazilian Primatology Society (SBPr) was held at the Universidade Federal do Pará (UFPa) in Belém in the second week of November, 2002. The event represented a number of landmarks for the society, including its first meeting of the millenium, and the first to be held in the Amazon. Attendance was down from that of the previous meeting in 1999, but it exceeded the organisers' expectations, given practical considerations such as problems with the scheduling of the event and the distance of Belém from most other urban centres. In fact, the two hundred or so participants represented no less than eighteen of Brazil's 26 states, and all five major geographic regions, as well as a small handful of foreign countries. The event was also well attended by local students, most of whom rarely have an opportunity to interact directly with scientists from other parts of the country.

The opening ceremony was marked by a moment's reflection on the recent loss of Cláudio Nogueira, an upcoming young primatologist from São Paulo whose absence from the congress was as unexpected as it was tragic. Cláudio attended all the recent SBPr meetings, and was familiar to many of those present in Belém, who remembered him for his high spirits and his enthusiasm as a scientist.

The opening lecture was given by Dr. Horacio Schneider, ex-president of the SBPr and a pioneering geneticist who has made a significant contribution to our knowledge of platyrrhine phylogeny. His talk on the history of primatology in Brazilian Amazonia, with predictable emphasis on genetics, was well received, and set the tone for the rest of the meeting.

Invited talks during the congress covered most fields of primatology, with a predominantly local flavour. To begin with, José Augusto Muniz presented an overview of research at the National Primate Centre, Belém. The history and current research perspectives of the Goeldi Museum and its primatologists were covered, respectively, by Peter Mann de Toledo and José de Sousa e Silva Jr., while research at

UFPa was represented by Artur Silva (the prion gene) and Olavo Galvão (cognitive studies). From further afield, Carlos Ruiz-Miranda (UENF) presented an update from the Golden Lion Tamarin Association, and André Hirsch (UFMG) explained the nuts and bolts of his research team's geographic database, BDGEOPRIM. Even further afield, Adrian Barnett (Roehampton) presented an entertaining talk on his many experiences as a scientific journalist.

Round tables were just as diverse, beginning with cytogenetics and genetic applications for conservation chaired by local geneticists Cleusa Nagamachi and Maria Paula Schneider, respectively. Capuchins, howler monkeys and the pitheciines were the subjects of discussions organised by José Rímoli (UCDB), Ana Alice Marques (UNISINOS) and José S. Silva Jr. Carla Castro (UFRN) chaired an interesting table on seed dispersal, and outgoing president, Stephen Ferrari (UFPa) allowed himself a doubleheader of "current research in the Amazon" and "habitat fragmentation and population management". Round tables had between three and five participants, and often resulted in lively discussion.

Oral presentations and posters were organised into four main groups: Conservation and ecology, ethology and management, genetics and biomedical studies, and morphology and phylogeny. Around a hundred papers were presented in all, of which more than two thirds reported on field studies.

The volume of abstracts includes 167 titles. A limited number of volumes are still available for a small handling fee (contact <ferrari@ufpa.br>).

"Extracurricular" activities included five mini-courses and excursions to both the Goeldi Museum and the National Primate Centre. The mini-courses covered a variety of topics, from molecular phylogeny (Horacio Schneider and Iracilda Sampaio, UFPa) to observational studies (Dida Mendes, PUC-GO and Gustavo Canale, UFGO). Muniz, Rodrigo Valle and Francisco Alves dealt with the captive management of endangered species at the National Primate Centre, while psychologists Olavo Galvão and Romariz Barros presented their experimental "school" for capuchins at UFPa. Last but not least, Ana Alice Marques covered techniques in conservation and management. Visits to the zoological collection of the Goeldi Museum and the Primate Centre were perhaps the high point of the meeting for many participants, who had the chance to observe at close quarters many species and specimens rarely, if ever seen outside the Amazon.

As in previous years, the general assembly of the SBPr was held at the end of the meeting, and the society's new president, Júlio César Bicca-Marques, and his officers, all from southern Brazil, were elected unanimously. The outgoing president (Stephen Ferrari) and treasurer (José Rímoli) accepted responsibility for publication of the proceedings (volume 9 of the series *A Primatologia no*

Brasil), which they hope will be ready before the end of 2003. A number of members also took the opportunity to express their satisfaction with the event, which was especially gratifying to the organisers, given the many setbacks faced during the preceding months. All in all, the large number, variety and scientific excellence of the papers presented reflected very favourably on the evolution of Brazilian primatology in all of the country's geographic regions and biomes.

Acknowledgments: The congress was made possible by a grant from CNPq and the support of UFPa. Special thanks are due to José Rímoli for his management of finances. The organising committee was formed by Gustavo Canale, Ita Oliveira, Taíssa Pianta and Vanner Boere, and Socorro Prado and her team were responsible for the smooth running of the event.

Stephen F. Ferrari, Departamento de Genética, Universidade Federal do Pará, Caixa Postal 8607, 66.075-900 Belém, Pará, Brazil, e-mail: <ferrari@ufpa.br>.

Sociedade Brasileira de Primatologia (SBPr)

The following were elected as officers of the Brazilian Primatological Society (SBPr) during a general meeting held during the Society's Xth Congress held at the Universidade Federal do Pará, Belém, 10-15 November 2002: *President*: Júlio César Bicca-Marques (Pontifícia Universidade Católica do Rio Grande do Sul - PUCRS); *Vice-president*: Cristina Santos (Universidade do Sul de Santa Catarina - UNISUL); *1st Secretary*: Márcia Maria de Assis Jardim (Parque Zoológico de Sapucaia do Sul – PZ/FZBRS); *2nd Secretary*: Marcos de Souza Fialho (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis - IBAMA); *1st Treasurer*: Ana Alice Biedzicki de Marques (Universidade do Vale do Rio dos Sinos - UNISINOS); *2nd Treasurer*: Urbano Lopes Bobadilla (Universidade Luterana do Brasil - ULBRA). All Society members are encouraged to contact the 1st Treasurer, Ana Alice Biedzicki de Marques, to check on any annuities due. Brazilian primatologists who are not members of the Society should take measures to correct the situation!

Júlio César Bicca-Marques, Faculdade de Biociências/ PUCRS, Avenida Ipiranga, 6681 Pd. 12A, 90619-900 Porto Alegre, Rio Grande do Sul, Brasil, Tel: (55) (51) 3320-3545 ext. 4742, Fax: (55) (51) 3320-3612, e-mail: <jcbicca@pucrs.br> and **Ana Alice Biedzicki de Marques**, Centro de Ciências da Saúde/UNISINOS, Av. Unisinos 950, 93022-000 São Leopoldo, Rio Grande do Sul, Brasil, Tel: (55) (51) 3366-8092, email: <anaalice@cpovo.net> or <anaalice@bios.unisinos.br>.

IPS - Developing Successful Conservation Initiatives For Primates: From Field Science To Conservation Programs

The conservation community is increasingly recognizing that effective conservation of nonhuman primates requires the leadership of scientists and trained professionals from primate-habitat countries. The XIXth Congress of the International Primatological Society, held in Beijing, China, in August 2002, provided an ideal setting in which to hold an intensive 3-day training workshop in primate conservation techniques for the future leaders of conservation around the globe. Workshops of this type have been held at previous IPS Congresses; in 1994 (Indonesia), in 1996 (USA), and in 1998 (Madagascar). Participants at these workshops have spoken strongly of their value for younger primatologists working in regions with few opportunities for scholarly exchange of this type.

IPS brought together 22 conservationists from 11 primate habitat countries (Colombia, Malaysia, India, Nepal, Gabon, Kenya, Nigeria, Democratic Republic of Congo, Uganda, Vietnam, China) for the 2002 IPS pre-congress workshop entitled, "Developing Successful Conservation Initiatives for Primates: From Field Science to Conservation Programs." Andrés Link Ospina, investigator at the Centro de Investigaciones Ecológicas La Macarena in the northwestern Amazon, Colombia, and currently studying the feeding behavior and diet of spider monkeys, *Ateles belzebuth*, was the single representative from South America.

The overall goal of the workshop was to enhance the potential of young professionals and students from primate-habitat countries around the globe to develop and/or improve *in situ* conservation programs. This goal was met by providing participants with training in appropriate skills and problem-solving methods, and by developing supportive professional relationships with peers and with more senior conservationists. Our specific objectives outlined below provided the students with clear expectations and the opportunity to work with and learn from our instructors and each other. The objectives were:

- To provide a forum in which participants have ample opportunity to exchange information and ideas on primate conservation.
- To develop conservation initiatives into long-term sustainable programs.
- To understand what makes field conservation programs successful.
- To understand what tools are available to assist in developing a program.
- To provide young professionals with mentored practice in fund-raising and communication with relevant institutions, such as NGOs and governmental bodies, that influence the development and implementation of conservation policy.

We were very pleased to have assembled an extremely knowledgeable cadre of instructors that represented a diverse background in global conservation issues. Our eight instructors, Mukesh Chalise (Natural History Society of Nepal), Bill Konstant, (Conservation International), Rob Lee (Wildlife Conservation Society, Indonesia), Colleen McCann (Wildlife Conservation Society, New York), Claudio Padua (IPÊ - Instituto de Pesquisas Ecológicas, Brazil), Anthony Rylands (Conservation International), Hanta Rasamimanana (University of Antananarivo, Madagascar), and Anne Savage (Proyecto Tití, Colombia, and Disney's Animal Kingdom, Florida) provided lectures on: 1) Developing Conservation Programs; 2) Developing a Conservation Management Plan for the Species; 3) Education and Community Based Programs; 4) Economic Alternatives to Assist Communities in Protecting Species/Habitat; 5) Influencing Decision Makers about Conservation; 6) Resources and Funding Opportunities; and 7) Program Evaluation. Students were given journal assignments and small group activities throughout the workshop in an effort to integrate this new information into their existing programs.

Course evaluations indicated 100% satisfaction with the workshop and the students benefited greatly by meeting new colleagues. We have produced a web page (<www.csew.com/ips/pre-congress.htm>, linked to the IPS web page) to highlight the accomplishments and provide the students with access to the lecture material presented during the workshop. This web page will allow the students and instructors to remain in communication with one another and provide us with a forum to continue to update everyone on significant events.

This workshop would not have been possible without the generous support of the Margot Marsh Biodiversity Fund, Disney Wildlife Conservation Fund, American Society of Primatologists, Conservation International's Primate Action Fund, Primate Conservation, Inc., and the Primate Society of Japan. Fuwen Wei (Institute of Zoology, Chinese Academy of Sciences), General Secretary for the XIXth IPS Congress, was immensely supportive and helpful in assisting with the logistical aspects of hosting the workshop in China. Ren Baoping, Zhou Jiang, Zhang Peng, and Zhou Qihai were also most kind, providing support throughout the workshop.

Continuing the support of pre-congress workshops is a priority for IPS. They provide an opportunity to bring individuals together for a cultural exchange that addresses the development of sustainable conservation programs for the future. Comments by the students such as "This experience has increased my confidence on resolving local problems I had earlier thought were restricted to my case only," and "I have learned to think differently on what was previously a one-way view of situations," clearly demonstrate the impact and the benefit this type of training has in developing future leaders in conservation.

A similar workshop will be held in conjunction with the XXth IPS Congress in Torino, Italy, in August of 2004.

Please see the IPS web page <http://www.primate.wisc.edu/pin/ips.html>, for upcoming information.

Anne Savage, Disney's Animal Kingdom, Conservation Station Administration, PO Box 10,000, Lake Buena Vista, FL 32830, USA, **Cláudio Valladares-Pádua**, IPÊ - Instituto de Projetos e Pesquisas Ecológicas, Caixa Postal 47, 12960-000 Nazaré Paulista, São Paulo, Brazil, **Colleen McCann**, The Wildlife Conservation Society, Bronx Zoo, Bronx, New York, NY 10460, USA, and **Dorothy M. Fragaszy**, Department of Psychology, University of Georgia, Athens, GA 30602-3013, USA.

EUROPEAN MARMOSET RESEARCH GROUP

Members of the European Marmoset Research Group (EMRG) share a common scientific interest in callitrichids, covering a broad range of scientific disciplines, resulting from the study of the marmosets and tamarins in laboratories as well as in natural habitats. The EMRG coordinating committee is comprised of the following researchers: Christopher Pryce, President and Newsletter Editor; Christian Schnell, Treasurer; Leah Scott, Liaison/Promotion; and Michael Schwibbe, Webpage Manager (at <http://www.dpz.gwdg.de>).

The EMRG promotes informal and formal meetings, and produces a newsletter, edited by Christopher Pryce. Number 6 was distributed in March 2002. Most EMRG activity is concentrated into workshops, which provide a forum for intensive information exchange. Workshop delegates are united by the animal species with which they work rather than the subject area. The aim is to bring together as many basic and applied life science disciplines as possible, with the rationale that the information exchange across disciplines will improve the quality of callitrichid husbandry and veterinary care, improve the quality of science within disciplines, and foster collaboration across disciplines.

Regional representatives are responsible for coordination of EMRG membership and activity in their respective countries and, across the Atlantic, continents. Three regional representatives have stood down from their posts recently. Anthony Rylands (Center for Applied Biodiversity Science, Conservation International, Washington DC), former Rep for South America, has been replaced by Stephen F. Ferrari. Stephen has close to 20 years of experience in studying callitrichids in their natural habitats, including detailed studies of social organization, feeding and activity patterns, as well as the discovery and description of callitrichid species new to science. Anne-Dominique Degryse and Isabelle Allmann were EMRG Reps for France and Switzerland, respectively, for several years. They are both veterinarians by training with considerable experience in the health management of marmoset colonies. The new Rep for France is Guillaume Chevalier and that for Switzerland is Patricia Gerber. Annette Domeney retired as EMRG Secretary from

1999-2001. She contributed significantly in the preparation of the grants, organization of the first workshop, and in promoting the importance of EMRG with colleagues in industry. She is now working as an independent consultant in the biotechnology industry. The current regional representatives are as follows: *France* - Guillaume Chevalier; *Germany* - Susanne Rensing; *Italy* - Augusto Vitale; *The Netherlands* - Bert 't Hart; *Scandinavia* - Tomas Ljungberg; *Switzerland* - Patricia Gerber; *United Kingdom* - Peter Pearce; *U.S. and Central America* - David Abbott; *South America* - Stephen Ferrari.

The March newsletter of the EMRG (No. 6) provided a report on the meeting held at the University of Manchester, 25-26 July 2001, which was chaired by Peter Pearce and attended by more than 40 people, including representatives from academia, industry and the Royal Society for the Prevention of Cruelty to Animals (RSPCA). The last meeting, the second to be funded by the European Commission High-Level Scientific Conference Fund, was in Paris on October 14-16th, at the Forest Hills Hotel, Paris, France.

The March newsletter also contains information on the activities of the European Federation of Primatology (EFP). The President of the EFP is Peter Kappeler, and Bertrand Deputte is the Treasurer. Christopher Pryce, President of EMRG, is the country representative for Switzerland. The EMRG are also considering republishing the 1997 *Handbook of Marmosets and Tamarins in Biological and Biomedical Research*, which covers basic issues such as husbandry and veterinary care as well as more applied subjects.

Christopher Pryce, Behavioural Neurobiology Laboratory, Swiss Federal Institute of Technology – Zürich, Schorenstrasse 16, CH-8603 Schwerzenbach, Switzerland, Tel: +41 1 655 7386, Fax: +41 1 655 7203, e-mail: <pryce@behav.biol.ethz.ch>. Website: <www.behav.ethz.ch>.

ASP CONSERVATION AND EDUCATION COMMITTEE AWARDS 2002

The Conservation Committee of the American Society of Primatologists, chaired by Randall Kyes, gave their 2002 Conservation Award to Pierre Kakule Vwirasihikya who works with the Dian Fossey Gorilla Fund International, in the Democratic Republic of Congo. Conservation Small Grants (up to $1,500) were awarded to 11 people. Projects from the Neotropics included: "The brown howler monkey, *Alouatta guariba clamitans*, in a fragmented landscape in south Brazil" - Soraya Ribeiro; "Habitat fragmentation and genetic variability of populations of *Alouatta pigra* (Primates: Cebidae) in the Yucatán Peninsula, Mexico: Implications for conservation" – Monica A. Pimenta; "Assessment of primate populations at the Puré River, Colombian Amazon" – Erwin Palacios; and "Forest destruction effects on a population of black-and-gold howler monkeys (*Alouatta caraya*) in northern Argentina"

– Gabriel E. Zunino. For information on ASP Conservation Small Grants, contact: Gabriele Lubach, e-mail: <grlubach@facstaff.wisc.edu>.

Neotropical primatology shone at the 25th Annual Meeting of the ASP at Oklahoma University, Oklahoma, 1-4 June, 2002. The following students were given awards by the Education Committee. *Outstanding Paper Presentation*: Sarah Henkerson – "The alarm reactions of neighboring groups have long-term effects on marmosets", co-authored with Kimberly Short, Kimberlee Bachand and Nancy Caine. *Honorable mention*: John Ruys – "Differences in personality and neuroendocrine responses to pharmacological treatment in adult male rhesus macaques (*Macaca mulatta*)", co-authored with John Capitanio and Sally Mendoza. *Outstanding Poster Presentation*: Michael Rukstalis – "Social context affects vocal structure in a callitrichid primate (*Callithrix kuhlii*)", co-authored with Jeffrey Fite and Jeffrey French. *Honorable mention*: Pablo Stevenson – "Weak relationships between dominance and foraging efficiency in Colombian woolly monkeys (*Lagothrix lagothricha*) at Tinigua Park". From: *ASP Bulletin* 26 (2/3), August/September 2002.

ASP STANDING COMMITTEE CHAIRS – 2002-2004

The President of the American Society of Primatologists (2002-2004) is Jeffrey A. French (Department of Psychology, University of Nebraska at Omaha, Omaha, NE 68182, e-mail: <jfrench@mail.unomaha.edu>), the President-Elect is Steve Schapiro (UTMDACC, Bastrop, Texas, e-mail: <sschapir @mdanderson.org>), and the Executive Secretary is Toni Zeigler (University of Wisconsin-Madison, Wisconsin, e-mail: <ziegler@primate.wisc.edu>). The following people have been elected as Chairs of the various ASP Committees. *Program Committee* – Marilyn Norconk, Department of Anthropology, Kent State University, 236 Lowry Hall, Kent, OH 44242, e-mail: <mnorconk@kent.edu>; *Awards and Recognition Committee* – Gabriele Lubach, Harlow Primate Lab, University of Wisconsin, 22 N. Charter Street, Madison, WI 53715-1239, e-mail: <grlubach@facstaff.wisc .edu>; *Research and Development Committee* – J. Dee Higley, National Institute on Alcohol Abuse and Alcoholism, NIH Animal Center, PO Box 529, Bldg 112, Room 205, Poolesville, MD 20837-0529, e-mail: <higleyd@1ce.nichd.nih.gov>; *Education Committee* – Susan Howell, Primate Foundation of Arizona, PO Box 20027, Mesa, AZ 85277-0027, e-mail: <suehpfa@qwest.net>; *Conservation Committee* – Janette Wallis, Department of Psychiatry and Behavioral Science, University of Oklahoma Health Sciences Center, PO Box 26901, Oklahoma City, OK 73104-5020, e-mail: <janette-wallis@ouhsc.edu>; and *Membership and Finance Committee* – Evan Zucker, Department of Psychology, Loyola University, New Orleans, LA 70118, e-mail: <zucker@loyno.edu>. ASP website: < http://www.asp.org/ >. From: *ASP Bulletin* 26 (2/3), August/September 2002.

PSGB Conservation Working Party – Conservation Grants

The Conservation Working Party of the Primate Society of Great Britain (PSGB) is involved with all aspects of primate conservation and in addition administers the PSGB Conservation Grants. These are awards, typically in the region of £500, to assist research of benefit to primate conservation and primate conservation education. There are two application rounds per year and the next deadline is 28th February 2003. Application materials and further information are available at <www.psgb.org>, under Conservation Working Party.

Anna T. C. Feistner, Convenor, PSGB Conservation Working Party, Durrell Wildlife Conservation Trust, Les Augrès Manor, Trinity, Jersey JE3 5BP, British Isles, Tel: +44 (0)1534 860000, Fax: +44 (0)1534 860001, e-mail <Anna.Feistner@durrell.org>.

Recent Publications

Primate Specialist Group Publications – *African Primates*

Thomas M. Butynski (Senior Editor) and Debra L. Forthman (Editor) are pleased to announce the publication of a combined issue of Volume 4, numbers 1 and 2 (1999-2000) of the Journal and Newsletter of the Africa Section of the PSG, *African Primates*. A bumper issue of 107 pages with excellent articles, notes and news items. The articles include the following: A survey of nocturnal prosimians at Moca on Bioko Island, Equatorial Guinea – L. Ambrose & A. W. Perkin, pp.4-10; Primates of the Comoé National Park, Ivory Coast – F. Fischer, M. Gross & B. Kunz, pp.10-15; The endemic primates of the Udzungwa Mountains, Tanzania – Carolyn Ehardt, pp.15-26; Conservation of Thollon's red colobus *Piliocolobus tholloni*, Democratic Republic of Congo – J. A. M. Thompson, pp.27-32; Increasing threats to the conservation of endemic endangered primates and forests of the lower Tana River, Kenya – J. Wieczkowski & D. N. M., Mbora, pp.32-40; Darting, individual recognition, and radio-tracking techniques in grey-cheeked mangabeys *Lophocebus albigena* of Kibale National Park, Uganda – W. Olupot, pp.40-50; Survey of the Angolan black-and-white colobus monkey *Colobus angolensis palliatus* in the Diani Forests, Kenya – E. M. Kanga & C. M. Heidi, pp.50-54; Anti-predator behavior of male hamadryas baboons *Papio hamadryas* in Eritrea – D. Zinner, F. Pelaéz & D. Berhane, pp.54-58; Death of a chimpanzee *Pan troglodytes schweinfurthii* in a trap in Kasokwa Forest Reserve, Uganda – J. Munn & G. Kalema, pp.58-62.

African Primates is produced in collaboration with Conservation International, Washington, DC, and the IUCN Eastern African Regional Office, Nairobi, Kenya. It is on Primate Info Net (PIN) at <www.primate.wisc.edu/pin/newslett.html>. For more information: Debra L. Forthman, Editor – *African Primates*, Zoo Atlanta, 800 Cherokee Avenue SE, Atlanta, Georgia 30315-1440, USA.

Primate Specialist Group Publications – *Asian Primates*

Recently published was a combined issue of *Asian Primates*, Volume 8, numbers 1 (June 2002) & 2 (September 2002). Edited by Ardith A. Eudey, Vice-chairwoman for Asia of the PSG, it has a nice color photo of *Nycticebus pygmaeus* (by H. Fitch-Snyder) on the front and includes seven articles. A preliminary survey of lorises (*Nycticebus* spp.) in northern Vietnam – H. Fitch-Snyder & Vu Ngoc Thanh, pp.1-3; The gray-shanked douc: Survey results from Tien Phouc, Quang Nam, Viet Nam – L. K. Lippold and Vu Ngoc Thanh, pp.3-6; Assessment of the sale of primates at Indonesian bird markets – N. Malone, A. R. Purnama, M. Wedana and A. Fuentes, pp.7-11; Diet and feeding behavior of Assamese macaque (*Macaca assamensis*) – S. Mitra, pp.12-14; Sleeping trees ad survival of langurs in Kumbhalgarh Wildlife Sanctuary in Aravalli Hills, India – A. K. Chhangani, pp.14-17; Massive habitat loss for primates in Assam's Sonitpur District – A.. Choudhury, pp.18-20; The primates of China: Biogeography and conservation status – Zhang Yongzu, Chen Liwei, Qu Wenyuan and C. Coggins, pp.20-22.

Besides news items, reviews and information on funding sources and meetings, this issue also includes a report on the Orang Re-introduction and Protection Workshop, held 15-18 June 2001 at Balikpan, East Kalimantan, Indonesia, and news of developments at the Javan Gibbon Rescue and Rehabilitation Center. For more information: Ardith A. Eudey, Editor *Asian Primates*, 164 Dayton Street, Upland, CA 91786-3120, USA, e-mail: <eudey@aol.com>.

Species

Number 38 of *Species*, the newsletter of the Species Survival Commission of IUCN, is available on the web. It has a special feature that will benefit all those working in the field of conservation: Lessons learned in fundraising! Several of the IUCN/SSC Specialist Groups offer advice and share their experiences on how to effectively source funding to continue their important work. With an introductory message from SSC Chair David Brackett, news stories from the network, and updates from the Specialist Groups and SSC Programmes, *Species* 38 is well worth a read to stay tuned with the happenings within the Commission. The current issue, along with back issues of *Species*, is available at <http://www.iucn.org/themes/ssc/species/spec-int.htm>.

RAPID ASSESSMENT PROGRAM – EASTERN KANUKU MOUNTAINS, GUYANA

The Rapid Assessment Program (RAP) of the Center for Applied Biodiversity Science at Conservation International, Director, Leeanne Alonso, has published the final report from their expedition to the Eastern Kanuku Mountains, on the lower Kwitaro River in Guyana, 20-29 September 2001. Collaborators in this expedition included the Guyana Regional Office of Conservation International, the Environmental Protection Agency (EPA) of Guyana, the Centre for the Study of Biological Diversity, Greater Georgetown, Guyana, and Tropenbos International, Wageningen, The Netherlands.

The Kanuku Mountain Range is located in the Rupununi region of southwestern Guyana, and the RAP survey concentrated on the lowland seasonally inundated and terra firme evergreen tropical rainforest along the lower Kwitaro and Rewa Rivers (affluents of the Essequibo) at the eastern edge of the Eastern Kanuku range. In some years, flooding in the surrounding savannahs mixes with Brazil's Rio Branco savannahs to combine biological elements of both the Guayana Shield and Amazon catchments. High biodiversity and low human habitation makes this area a key target for conservation intitiatives. The Kanuku Mountains are under no legal protection status, although scientific surveys have already documented a high regional vertebrate diversity, healthy populations of many threatened species, diverse habitats, from swamp forest and savannah along the Rupununi River to cloud forest on the Kanuku Mountains, and high tree species richness of plant communities typical of both the Amazon basin and the Guayana Shield. In 1993, there was a RAP expedition to the western part of the Kanuku range and the Rewa River, and the results suggested that the eastern range would be even richer in biodiversity. The 2001 RAP confirmed this. The number of mammal species was high (52 recorded on the expedition). The results of the bat survey brought the total species for the region to 89, and overall about 70% of the mammals and 53% of all the birds known to occur in Guyana were found there. The Rupununi River contains one of the richest fish faunas on Earth, and the results from this short survey showed that the Kwitaro and Rewa Rivers follow this trend. Plant communities were confirmed to be among the most diverse in Guyana and showed little sign of human disturbance. The RAP expedition resulted in a number of new records for the Eastern Kanuku range – 40 species of plants, 63 species of birds, 113 species of fish (the fish fauna had not been surveyed before!), and five mammals. All of the eight primates of Guyana occur there. Non-volant mammals were studied by Jim Sanderson (Conservation International, Washington, DC) and Leroy Ignacio (Shulinab Village, Region 9, Guyana) and the bats by Burton K. Lim (Royal Ontario Museum, Toronto, Canada) and Zacharias Norman (Wowetta, Region 9, Guyana). Appendices include gazetteers of the localities, and species lists for plants, fishes, birds and mammals.

For copies of this report, please write to: RAP Program, Center for Applied Biodiversity Science, Conservation International, 1919 M Street NW, Suite 600, Washington, DC 20036, USA. Website: <www.biodiversityscience.org>.

SPECIAL ISSUE OF THE *INTERNATIONAL JOURNAL OF PRIMATOLOGY* – EVOLUTIONARY THEORY AND PRIMATE BEHAVIOR

Dario Maestripieri (Committee on Evolutionary Biology, The University of Chicago) and Peter Kappeler (Deutsches Primatenzentrum, Göttingen) were the guest editors for a special issue of the *International Journal of Primatology*, Vol. 23(4), August 2002, dedicated to "Evolutionary Theory and Primate Behavior". According to Maestripieri and Kappeler "the specific goal…is to examine some of the best known evolutionary theories of behavior and discuss critically whether the findings of primate behavioral research are consistent with them." They conclude that not all hypotheses derived from evolutionary theory have been consistently supported by primate data, but that the adaptationist program of Ernst Mayr (*Am. Nat.* 121: 324-333, 1983) has been of enormous heuristic value for primate behavioral research. The contributions of this volume pay tribute to the fact that the evolutionary hypotheses have stimulated a great deal of research and have produced a significant amount of new knowledge on the behavioral biology of nonhuman primates. "Such research and knowledge have often led to formulation of new and more sophisticated evolutionary hypotheses and a better appreciation of the degree to which the behavior of primates is adapted to their ecological and social environment." The editors hope that the articles in the special issue will encourage more primatologists to seriously consider tests of adaptive hypotheses as part of their research, so that the gap with mainstream evolutionary biology will eventually be closed.

The issue includes the following articles. Evolution of primate social systems – P. M. Kappeler & C. P. van Schaick, pp.707-740; Avoiding predators: Expectations and evidence in primate antipredator behavior – C. B. Stanford, pp.741-757; Competition for resources and its behavioral consequences among female primates – A. Koenig, pp.759-783; Modelling primate behavioral ecology – R. I. M. Dunbar, pp.785-819; Primate communication: By nature honest? By experience wise? – H. Gouzoules & S. Gouzoules, pp.821-848; Kin selection in primate groups – J. B. Silk, pp.849-875; Sexual selection and mate choice – A. Paul, pp.877-904; Sex-biased parental investment in primates – F. Bercovitch, pp.905-921; Parent-offspring conflict in primates – D. Maestripieri, pp.923-951.

BOOKS

Lion Tamarins: Biology and Conservation, edited by Devra G. Kleiman and Anthony B. Rylands, 2002. 422pp. Smithsonian Institution Press, Washington, DC. Zoo and Aquarium Biology and Conservation Series. ISBN

1-58834-072-4. Price: US$45.00, £34.50. Awareness of the plight of the lion tamarins, small primates endemic to the widely decimated tropical forests of eastern Brazil, was incipient in the 1960s, but the 1970s galvanized multinational efforts to save them - through captive breeding and, later, major programs to protect them and their forests in the wild. Thirty years on, this book records the history of the conservation efforts for the four species; the golden, golden-headed, black and black-faced lion tamarins - the last discovered only in 1990 - and summarizes the main fields of research on their physiology, demography, genetics, diseases, behavior and ecology. Protecting the small fragments of forest remaining in their already diminutive ranges has demanded the commitment of governments as well as non-governmental organizations and, not least, local communities which, at the end of the day, hold the key to the fate of these animals. Remarkable over the years has been the collaborative and groundbreaking efforts on the part of zoos, initially supporting research and pioneering an exemplary global breeding program - providing as such the wherewithal for their re-introduction to the wild - and latterly contributing significantly to monitoring and studies of their life in their natural habitats. Saving species demands the application of many disciplines — well illustrated here by the diversity of talents and areas of expertise of the 50 authors who have contributed. The story of the lion tamarins is a case study - highlighting the conservation role of zoos, the essential element of research for endangered species programs, and above all the need for dedication and endurance in the most difficult task of all — the protection of natural habitats. The book is dedicated to Adelmar F. Coimbra-Filho. *Contents*: Foreword by R. A. Mittermeier; Introduction and Acknowledgments – D. G. Kleiman & A. B. Rylands. *Part I. The History and Status of Lion Tamarins*. 1. A history of lion tamarin research and conservation – A. B. Rylands, J. J. C. Mallinson, D. G. Kleiman, A. F. Coimbra-Filho, R. A. Mittermeier, I. de G. Câmara, C. B. Valladares-Padua & M. I. Bampi, pp.3-41; 2. Distribution and status of lion tamarins - A. B. Rylands, M. C. M. Kierulff & L. P. de S. Pinto, pp.42-70; 3. The role of non-governmental organizations and the International Committee for the Conservation and Management of *Leontopithecus* in Lion Tamarin Conservation - D. M. Rambaldi, D. G. Kleiman, J. J. C. Mallinson, L. A. Dietz & S. M. Pádua, pp.71-94; 4. History, management and conservation role of the captive lion tamarin populations - J. D. Ballou, D. G. Kleiman, J. J. C. Mallinson, A. B. Rylands, C. B. Valladares-Padua & Kristin Leus, pp.95-114. *Part II. The Biology of Lion Tamarins*. 5. Genetics and evolution of lion tamarins - H. N. Seuánez, A. DiFiore, M. A. M. Moreira, C. A. da S. Almeida & F. C. Canavez, pp.117-132; 6. Lion tamarin reproductive biology - J. A. French, K. de Vleeschouwer, K. Bales & M. Heistermann, pp.133-156; 7. Behavioral ecology of lion tamarins - M. C. M. Kierulff, B. Raboy, P. Procópio de Oliveira, K. Miller, F. C. Passos & F. Prado, pp.157-187; 8. Mating system and group dynamics in lion tamarins - A. J. Baker, K. Bales & J. M. Dietz, pp.188-212; 9. Infant care in lion tamarins - S. D. Tardif, C. V. Santos, A. J. Baker, L. van Elsacker, A. T. C. Feistner,

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The Primate Fossil Record, edited by Walter Carl Hartwig, Cambridge Studies in Biological and Evolutionary Anthropology 33, 2002. Cambridge University Press, Cambridge, UK. 540pp. ISBN: 0-521-66315-6. Price: $175.00, £120.00 (hardback). *The Primate Fossil Record* is the first comprehensive treatment of primate paleontology in more than 20 years. Profusely illustrated and up to date, it captures the complete history of the discovery and interpretation of primate fossils. The chapters range from primate origins to the advent of anatomically modern humans. Each emphasizes three key components of the record of primate evolution: history of discovery, taxonomy of the fossils, and evolution of the adaptive radiations they represent. *The Primate Fossil Record* summarizes objectively the many intellectual debates surrounding the fossil record and provides a foundation of reference information on the last two decades of astounding discoveries and worldwide field research for physical anthropologists, paleontologists and evolutionary biologists. Includes chapters on: The origin of primates - D. T. Rasmussen, pp.5-9; The origin and diversification of anthropoid primates - M. Dagosto, pp.125-132; Platyrrhine paleontology and systematics: The paradigm shifts – A. L. Rosenberger, pp.151-159; Early platyrrhines of southern South America - J. G. Fleagle & M. F. Tejedor, pp.161-173; Miocene platyrrhines of the northern Neotropics – W. C. Hartwig & D. J. Meldrum, pp.175-188; Extinct Quaternary platyrrhines of the Greater Antilles and Brazil - R. D. E. MacPhee & I. Horovitz, pp.189-200. Despite the price – evidently indispensable. *Available from*: Cambridge University Press, 40 West 20th Street, New

York, NY 10011-4211, USA, Tel: 1-800-872-7423, Fax: 914-937-4712, e-mail: <directcustserve@cambridge.org>. Web site: <http://www.cambridge.org>.

Eat or Be Eaten: Predator Sensitive Foraging Among Primates, edited by Lynne E. Miller, 2002. 306pp. Cambridge University Press, Cambridge. ISBN 0 521 80451 5 (hardback), 0521 01104 3 (paperback). Price: £75.00 (hardback), £27.00 (paperback). Predator sensitive foraging represents the strategies that animals employ to balance the need to eat against the need to avoid being eaten. Ecologists working with a wide range of taxa have developed sophisticated theoretical models of these strategies, and have produced elegant data to test them. However, only recently have primatologists begun to turn their attention to this area of research. This book brings together primary data from a variety of primate species living in both natural habitats and experimental settings, and explores the variables that may play a role in their behavioral strategies. *Eat or Be Eaten* encourages further discussion and investigation of the subject. *Contents*: 1. An introduction to predator sensitive foraging – L. E. Miller. *Part I. Biological Variables*. 2. Dangers in the dark: Are some nocturnal primates afraid of the dark? - S. K. Bearder, K. A. I. Nekaris & C. A. Buzzell; 3. Predation sensitive foraging in captive tamarins – M. J. Prescott & H. M. Buchanan-Smith; 4. Seeing red: Consequence of individual differences in color vision in callitrichid primates – N. G. Caine; 5. Predator sensitive foraging in Thomas langurs – E. H. M. Sterck. *Part II. Social Variables*. 6. The role of group size in predator sensitive foraging decisions for wedge-capped capuchin monkeys (*Cebus olivaceus*) – L. E. Miller; 7. Group size effects on predation sensitive foraging in wild ring-tailed lemurs (*Lemur catta*) – M. E. Sauther; 8. Species differences in feeding in Milne Edwards' sifakas (*Propithecus diadema edwardsi*), rufous lemurs (*Eulemur fulvus rufus*), and red-bellied lemurs (*Eulemur rubriventer*) in southern Madagascar: Implications for predator avoidance - D. J. Overdorf, S. G. Strait & R. G. Seltzer; 9. Evidence of predator sensitive foraging and traveling in single- and mixed-species tamarin groups – P. A. Garber & J. C. Bicca-Marques; 10. Predator (in)sensitive foraging in sympatric female vervets (*Cercopithecus aethiops*) and patas monkeys (*Erythrocebus patas*): A test of ecological models of group dispersion – L. A. Isbell & K. J. Enstam; 11. Predation risk and antipredator adaptations in white-faced sakis, *Pithecia pithecia* – T. M. Gleason & M. A. Norconk. *Part III. Environmental Variables*. 12. Foraging female baboons exhibit similar patterns of antipredator vigilance across two populations – R. A. Hill & G. Cowlishaw; 13. Foraging and safety in adult female blue monkeys in the Kakamega Forest, Kenya – M. Cords; 14. Predicting predation risk for foraging, arboreal monkeys – A. Treves; 15. Predator sensitive foraging in ateline primates – A. Di Fiore; 16. Antipredatory behavior in gibbons (*Hylobates lar*, Khao Yai / Thailand) – N. L. Uhde & V. Sommer. *Available from*: Cambridge University Press, 40 West 20th Street, New York, NY 10011-4211, USA, Tel: 1-800-872-7423, Fax: 914-937-4712, e-mail: <directcustserve@cambridge.org>. Web site: <http://www.cambridge.org>.

Infanticide by Males and Its Implications, edited by Carel P. van Schaik and Charles H. Janson, 2002. Cambridge University Press, Cambridge UK. 584pp. ISBN 0 521 77295 8 (hardback), 0 521 77498 5 (paperback). Price: £80.00 (hardback), £29.95 (paperback). Male primates, carnivores and rodents sometimes kill infants that they did not sire. Is this bizarre behavior a pathological aberration, or does it instead reflect an adaptive strategy for males in certain circumstances? In this unique comparative study of the dark side of social relationships, particularly in primates, including humans, the extent to which social organization and reproductive behavior reflect evolved countermeasures against the threat of infanticide is explored. *Contents*: Foreword – S. B. Hrdy; Preface - C. P. van Schaik & C. Janson; *Part I. Introduction*: 1. The holy wars against infanticide: Which side are you on and why? – V. Sommer; 2. Infanticide by male primates: The sexual selection hypothesis revisited - C. P. van Schaik; 3. Vulnerability to infanticide by males: Patterns among mammals - C. P. van Schaik; *Part II. Infanticide by Males: Case Studies*. 4. Infanticide in red howlers: Female group size, male composition and a possible link to folivory – C. M. Crockett & C. H. Janson; 5. Infanticide in Hanuman langurs: Social organization, male migration and weaning age – C. Borries & A. Koenig; 6. Male infanticide and defense of infants in Chacma baboons - R. A. Palombit, D. L. Cheney, J. Fischer, S. Johnson, D. Rendall, R. M. Seyfarth & J. B. Silk; 7. Infanticide by males and female choice in wild Thomas's Langurs - R. Steenbeek; 8. The evolution of infanticide in rodents: A comparative analysis – D. T. Blumstein; 9. Infanticide by male birds – J. P. Viega; *Part III. Behavioural Consequences of Infanticide by Males*: 10. Prevention of infanticide: The perspective of infant primates – A. Treves; 11. Infanticide and the evolution of male-female bonds in animals - R. A. Palombit; 12. The other side of the coin: Infanticide and the evolution of affiliative male-infant interactions in Old World primates - A. Paul, S. Preuschoft & C. P. van Schaik; 13. Female dispersal and infanticide avoidance in primates - E. H. M. Sterck and A. H. Korstjens; 14. Reproductive patterns in eutherian mammals: Adaptations against infanticide - M. A. van Noordwijk & C. P. van Schaik; 15. Paternity confusion and the ovarian cycles of female primates - C. P. van Schaik, J. K. Hodges & C. L. Nunn; 16. Social evolution in primates: The relative roles of ecology and intersexual conflict – C. L. Nunn & C. P. van Schaik; *Part IV. Infanticide by Females*: 17. Infanticide by female mammals: Implications for the evolution of social systems - L. Digby; 18. 'The hate that love generated' - sexually selected neglect of one's own offspring in humans - E. Voland & P. Stephan; *Part V. Conclusion*: 19. The behavioral ecology of infanticide – C. H. Janson and C. P. van Schaik. Available from: Cambridge University Press, 40 West 20th Street, New York, NY 10011-4211, USA, Tel: 1-800-872-7423, Fax: 914-937-4712, e-mail: <directcustserve@cambridge.org>. Web site: <http://www.cambridge.org>.

Primate Dentition: An Introduction to the Teeth of Nonhuman Primates, by Daris R. Swindler, 2002. Cambridge University Press, Cambridge, UK. Price: £55.00. ISBN:

0 521 65289 8. 312pp. Primate dentitions vary widely both between genera and between species within a genus. This book is a comparative dental anatomy of the teeth of living non-human primates that brings together information from many disciplines to present the most useful and comprehensive database possible in one consolidated text. The core of the book consists of comparative morphological and metrical descriptions with analyses, reference tables and illustrations of the permanent dentitions of 85 living primate species to establish a baseline for future investigations. The book also includes information on dental microstructure and its importance in understanding taxonomic relationships between species, data on deciduous dentitions, prenatal dental development and ontogenetic processes, and material to aid age estimation and life history studies. Primate Dentition will be an important reference work for researchers in primatology, dental and physical anthropology, comparative anatomy and dentistry as well as vertebrate paleontology and veterinary science. *Contents*: Preface; 1. Introduction; 2. Dental anatomy; 3. Dental development; 4. The deciduous dentition; 5. Superfamily Lemuroidea; 6. Family Cebidae; 7. Family Cercopithecidae; 8. Hylobatidae; 9. Pongidae; Odontometric appendix; Dental eruption appendix; Glossary. *Available from*: Cambridge University Press, 40 West 20th Street, New York, NY 10011-4211, USA, Tel: 1-800-872-7423, Fax: 914-937-4712, e-mail: <directcustserve@cambridge.org>. Web site: <http://www.cambridge.org>.

ARTICLES

Achenbach, G. G. & Snowdon, C. T. 2002. Costs of caregiving: Weight loss in captive adult male cotton-top tamarins (*Saguinus oedipus*) following the birth of infants. *Int. J. Primatol.* 23(1): 179-189.

Andresen, E. 2002. Primary seed dispersal by red howler monkeys and the effect of defecation patterns on the fate of dispersed seeds. *Biotropica* 34(2): 261-272.

Arms, A., Voges, D., Fischer, M. S. & Preuschoft, H. 2002. Arboreal locomotion in small New World monkeys. *Z. Morphol. Anthropol.* 83(2/3): 243-263.

Ascunce, M. S., Hasson, E. & Mudry, M. D. 2002. Description of the cytochrome c oxidase subunit II gene in some genera of New World monkeys (Primates, Platyrrhini). *Genetica* 114(3): 253-267.

Asensio, M. & Gómez-Marin, F. 2002. Interspecific interaction and predator avoidance behavior in response to tayra (*Eira barbara*) by mantled howler monkeys (*Alouatta palliata*). *Primates* 43(4): 339-341.

Aureli, F., Cords, M. & Van Schaik, C. P. 2002. Conflict resolution following aggression in gregarious animals: A predictive framework. *Anim. Behav.* 64: 325-343.

Bard, K. A. 2002. Primate parenting. In: *Handbook of Parenting, Vol. 2. Biology and Ecology of Parenting*, 2nd ed., M. H. Bornstein (ed.), pp.99-140. Lawrence Erlbaum, Mahwah, NJ.

Barrett, L. 2002. *Eat or be Eaten: Predator Sensitive Foraging Among Primates*. Edited by Lynne E. Miller. Cambridge:

Cambridge University Press (2002). Pp. xi+297. Price £80.00 hardback, £29.95 paperback. *Anim. Behav.* 514-515. (Book review).

Bayfield, A. & Young, R. J. 2002. The effect of parental age gap on the sex ratio of golden lion tamarins born in zoos. *Folia Primatol.* 73(4): 214-216.

Brooks, T. M., Mittermeier, R. A., Mittermeier, C. G., Fonseca, G. A. B. da, Rylands, A. B., Konstant, W. R., Flick, P., Pilgrim, J., Oldfield, S., Magin, G. & Hilton-Taylor, C. 2002. Habitat loss and extinction in the hotspots of biodiversity. *Conserv. Biol.* 16(4): 909-923.

Carbone, L., Ventura, M., Tempesta, S., Rocchi, M. & Archidiacono, N. 2002. Evolutionary history of chromosome 10 in primates. *Chromosoma* 111(4): 267-272.

Cartmill, M., Lemelin, P. & Schmitt, D. 2002. Support polygons and symmetrical gaits in mammals. *Zool. J. Linn. Soc.* 136(3): 401-420.

Cropp, S., Boinski, S. & Li, W. H. 2002. Allelic variation in the squirrel monkey X-linked color vision gene: Biogeographical and behavioral correlates. *J. Molec. Evol.* 54(6): 734-745.

de La Torre, S. & Snowdon, C. T. 2002. Environmental correlates of vocal communication of wild pygmy marmosets, *Cebuella pygmaea. Anim. Behav.* 63(5): 847-856.

Derrington, A. M., Parker, A., Barraclough, N. E., Easton, A., Goodson, G. R., Parker, K. S., Tinsley, C. J. & Webb, B. S. 2002. The uses of colour vision: Behavioural and physiological distinctiveness of colour stimuli. *Phil. Trans. Roy. Soc. London B* 357: 975-985.

De Vleeschouwer, K., Leus K. & Van Elsacker, L. 2002. Comments from the AZA Contraception Advisory Group on evaluating the suitability of contraceptive methods in golden-headed lion tamarins (*Leontopithecus chrysomelas*): Reply to DeMatteo *et al. Anim. Welfare* 11(3): 349-350.

Diaz, D., Daubenberger, C. A., Zalac, T., Rodriguez, R. & Patarroyo, M. E. 2002. Sequence and expression of MHC-DPB1 molecules of the New World monkey *Aotus nancymaae*, a primate model for *Plasmodium falciparum. Immunogenet.* 54(4): 251-259.

Dixson, A. F. & Anderson, M. J. 2002. Sexual selection, seminal coagulation and copulatory plug formation in primates. *Folia Primatol.* 73: 63-69.

Estrada, A., Mendoza, A., Castellanos, L., Pacheco, R., Van Belle, S., Garcia, Y. & Muñoz, D. 2002. Population of the black howler monkey (*Alouatta pigra*) in a fragmented landscape in Palenque, Chiapas, Mexico. *Am. J. Primatol.* 58: 45-55.

Fernandez-Duque, E. & Huntington, C. 2002. Disappearances of individuals from social groups have implications for understanding natal dispersal in monogamous owl monkeys (*Aotus azarai*). *Am. J. Primatol.* 57(4): 219-225.

Fleagle, J. G. 2002. Primates. In: *Encyclopaedia of Evolution*, M. Pagel (ed.), pp.931-934. Oxford University Press, Oxford.

Fuentes, A. 2002. Patterns and trends in primate pair bonds. *Int. J. Primatol.* 23(5): 953-978.

García, F., Ruiz-Herrera, A., Egozcue, J., Ponsà, M. & Garcia, M. 2002. Chromosomal homologies between *Cebus* and *Ateles* (Primates) based on ZOO-FISH and G-banding comparisons. *Am. J. Primatol.* 57(4): 177-188.

Gerber, P., Schnell, C. R. & Anzenberger, G. 2002. Behavioural and cardiophysiological responses of common marmosets (*Callithrix jacchus*) to social and environmental changes. *Primates* 43(3): 201-216.

Ghazanfar, A. A., Smith-Rohrberg, D., Pollen, A. A. & Hauser, M. D. 2002. Temporal cues in the antiphonal long-calling behaviour of cottontop tamarins. *Anim. Behav.* 64: 427-438.

Gippoliti, S. & Amori, G. 2002. Anthropochorous wild mammal taxa and conservation lists. *Conserv. Biol.* 16(4): 1162-1164.

Gippoliti, S. & Visalberghi, E. 2001. Order Primates: Species checklist, Italian name and degree of threat. *Rivista di Antropologia* (79): 33-44. In Italian.

Gouzoules, H. & Gouzoules, S. 2002. Primate communication: By nature honest, or by experience wise? *Int. J. Primatol.* 23(4): 821-848.

Gros-Louis, J. 2002. Contexts and behavioral correlates of trill vocalizations in wild white-faced capuchin monkeys (*Cebus capucinus*). *Am. J. Primatol.* 57(4): 189-202.

Hauser, M., Pearson, H. & Seelig, D. 2002. Ontogeny of tool use in cottontop tamarins, *Saguinus oedipus*: Innate recognition of functionally relevant features. *Anim. Behav.* 64: 299-311.

Hauser, M. D., Santos, L. R., Spaepen, G. M. & Pearson, H. E. 2002. Problem solving, inhibition, and domain specific experience: Experiments on cottontop tamarins, *Saguinus oedipus. Anim. Behav.* 64: 387-396.

Hauser, M. D., Weiss, D. & Marcus, G. 2002. Rule learning by cotton-top tamarins. *Cognition* 86(1): B15-B22.

Hewitt, G., MacLarnon, A. & Jones, K. E. 2002. The function of laryngeal air sacs in primates: A new hypothesis. *Folia Primatol.* 73: 70-94.

Heymann, E. W., Encarnación, F. & Canquin Y., J. E. 2002. Primates of the Río Curaray, northern Peruvian Amazon. *Int. J. Primatol.* 23(1): 191-201.

Hrdlicka, L. & Stringfield, C. 2002. Tamarins. In: *Hand-rearing Wild and Domestic Mammals*, L. J. Gage (ed.), pp.114-117. Iowa State Press, Ames.

Hrdy, S. B. 2002. Motherhood. In: *Encyclopaedia of Evolution*, M. Pagel (ed.), pp.E55-E65. Oxford University Press, Oxford.

Jones, C. B. 2002. Negative reinforcement in primate societies related to aggressive restraint. *Folia Primatol.* 73: 140-143.

Kappeler, P. M. 2002. Primate biogeography. In: *Encyclopaedia of Evolution*, M. Pagel (ed.), pp.939-942. Oxford University Press, Oxford.

Kaumanns, W., Krebs, E. & Schwitzer, C. 2002. Primate husbandry at the Cologne Zoo. *Z. Kölner Zoo* 45(3): 103-116. In German.

Kawamura, S., Takenaka, N., Hiramatsu, C., Hirai, M. & Takenaka, O. 2002. Y chromosomal red-green opsin genes of nocturnal New World monkey. *FEBS Letters* 530(1-3): 70-72.

Kay, R. F., Williams, B. A. & Anaya, F. 2002. The adaptation of *Branisella boliviana*, the earliest South American monkey. In: *Reconstructing Behavior in the Primate Fossil Record*, J. M. Plavcan, R. F. Kay, W. L. Jungers & C. P. van Schaik (eds.), pp.339-370. Kluwer Academic / Plenum Press, NY.

Kimura, T. 2002. Primate limb bones and locomotor types in arboreal or terrestrial environments. *Z. Morphol. Anthropol.* 83(2/3): 201-219.

Leca, J. B., Fornasieri, I. & Petit, O. 2002. Aggression and reconciliation in *Cebus capucinus. Int. J. Primatol.* 23(5): 979-998.

Ludeke, J. S. 1999. The preparation of a monkey *Chiropotes satanas* cat. no. 85176 from the Natural History Museum of Berlin. *Praeparator* 45(1): 21-29. In German.

Marks, J. 2002. *Primate Encounters: Models of Science, Gender, and Society*. Shirley C. Strum and Linda Marie Fedigan, University of Chicago Press, Chicago, Illinois, 2000, xvi + 636pp., $35/£22.50 (cloth). *Int. J. Primatol.* 23(1): 227-229. (Book review).

Matos, D. M. S. & Bovi, M. L. A. 2002. Understanding threats to biological diversity in southeastern Brazil. *Biodiv. Conserv.* 11: 1747-1758.

Mayeaux, D. J., Mason, W. A. & Mendoza, S. P. 2002. Developmental changes in responsiveness to parents and unfamiliar adults in a monogamous monkey (*Callicebus moloch*). *Am. J. Primatol.* 58: 71-89.

Milton, K. 2002. Hunter-gatherer diets: Wild food signals relief from diseases of affluence. In: *Human Diet: Its Origin and Evolution*, P. S. Ungar & M. F. Teaford (eds.), pp.111-122. Bergin & Garvey, Westport, CT.

Müller, A. E. & Anzenberger, G. 2002. Duetting in the titi monkey *Callicebus cupreus*: Structure, pair specificity and development of duets. *Folia Primatol.* 73: 104-115.

Natori, M. 2002. Allometric scaling of platyrrhine molars and relationships between their relative size and loss of the third molar in the Callitrichinae. *Reichorui Kenkyu – Primate Research* 18(1): 49-57. In Japanese.

Natori, M. 2002. Allometric scaling in the molars of titi monkeys. *Reichorui Kenkyu – Primate Research* 18(1): 59-67. In Japanese.

Norconk, M. A., Oftedal, O. T., Power, M. L., Jakubasz, M. & Savage, A. 2002. Digesta passage and fiber digestibility in captive white-faced sakis (*Pithecia pithecia*). *Am. J. Primatol.* 58(1): 23-34.

Nunn, C. L. & Van Schaik, C. P. 2002. A comparative approach to reconstructing the socioecology of extinct primates. In: *Reconstructing Behavior in the Primate Fossil Record*, J. M. Plavcan, R. F. Kay, W. L. Jungers & C. P. van Schaik (eds.), pp.159-215. Kluwer Academic / Plenum Press, NY.

Panger, M. A., Perry, S., Rose, L., Gros-Louis, J., Vogel, E., Mackinnon, K. C. & Baker, M. 2002. Cross-site differences in foraging behavior of white-faced capuchins (*Cebus capucinus*). *Am. J. Phys. Anthropol.* 119(1): 52-66.

Rapaport, L. G. & Ruiz-Miranda, C. R. 2002. Tutoring in wild golden lion tamarins. *Int. J. Primatol.* 23(5): 1063-1070.

Rodrigues, F. H. G., Silveira, L., Jacomo, A. T. A., Carmignotto, A. P., Bezerra, A. M. R., Coelho, D. C., Garbogini, H., Pagnozzi, J. & Hass, A. 2002. Composition and characterization of the mammal fauna of Emas National Park, Goiás, Brazil. *Rev. Brasil. Biol.* 19(2): 589-600. In Portuguese.

Ruiz-Miranda, C. R., Archer, C. A. & Kleiman, D. G. 2002. Acoustic differences between spontaneous and induced long calls of golden lion tamarins, *Leontopithecus rosalia. Folia Primatol.* 73: 124-131.

Schmidt, M., Voges, D. & Fischer, M. S. 2002. Shoulder movements during quadrupedal locomotion in arboreal primates. *Z. Morphol. Anthropol.* 83(2/3): 235-242.

Serio-Silva, J. C. & Rico-Gray, V. 2002. Interacting effects of forest fragmentation and howler monkey foraging on germination and dispersal of fig seeds. *Oryx* 36(3): 266-271.

Sharpe, R. M., Martin, B., Morris K., Greig, I., McKinnell, C., McNeilly, A. S. & Walker, M. 2002. Infant feeding with soy formula milk: Effects on the testis and on blood testosterone levels in marmoset monkeys during the period of neonatal testicular activity. *Hum. Reprod.* 17(7): 1692-1703.

Smith, R. J. & Cheverud, J. M. 2002. Scaling of sexual dimorphism in body mass: A phylogenetic analysis of Rensch's rule in primates. *Int. J. Primatol.* 23(5): 1095-1135.

Snowdon, C. T. & de la Torre, S. 2002. Multiple environmental contexts and communication in pygmy marmosets (*Cebuella pygmaea*). *J. Comp. Psychol.* 116: 182-188.

Soltis, J. 2002. Do primate females gain nonprocreative benefits by mating with multiple males? Theoretical and empirical considerations. *Evol. Anthropol.* 11(5): 187-197.

Soltis, J. & McElreath, R. 2001. Can females gain extra paternal investment by mating with mutliple males? A game theoretic approach. *Am. Nat.* 158: 519-529.

Souza, L. L. de, Ferrari, S. F., Costa, M. L. de & Kern, D. C. 2002. Geophagy as a correlate of folivory in red-handed howler monkeys (*Alouatta belzebul*) from eastern Brazilian Amazonia. *J. Chem. Ecol.* 28(8): 1613-1621.

Strum, S. C. 2000. *Primate Males*. Peter M. Kappeler, Cambridge University Press, Cambridge, U.K., 2000, xii + 316pp. $85.00 (hardback); $37.95 (paperback). *Int. J. Primatol.* 23(1): 223-225. (Book review).

Surridge, A. K. & Mundy, N. I. 2002. Trans-specific evolution of opsin alleles and the maintenance of trichromatic colour vision in callitrichine primates. *Molec. Ecol.* 11(10): 2157-2169.

Tardif, S. D. Layne, D. G., Cancino, L. & Smucny, D. A. 2002. Neonatal behavioural scoring of common marmosets (*Callithrix jacchus*): Relation to physical condition and survival. *J. Med. Primatol.* 31(3): 147-151.

Tardif, S. D., Layne, D. G. & Smucny, D. A. 2002. Can marmoset mothers count to three? Effect of litter size on mother-infant interactions. *Ethology* 108(9): 825-836.

Tejedor, M. F. 2002. Primate canines from the early Miocene Pinturas formation, southern Argentina. *J. Hum. Evol.* 43(2): 127-141.

Tello, N. S., Huck, M. & Heymann, E. W. 2002. *Boa constrictor* attack and successful group defence in moustached tamarins, *Saguinus mystax. Folia Primatol.* 73: 146-148.

Tsujimoto, S. & Sawaguchi, T. 2002. Working memory of action: A comparative study of ability to selecting response based on previous action in New World monkeys (*Saimiri sciureus* and *Callithrix jacchus*). *Behav. Processes* 58(3): 149-155.

Ungar, P. 2002. Reconstructing the diets of fossil primates. In: *Reconstructing Behavior in the Primate Fossil Record*, J. M. Plavcan, R. F. Kay, W. L. Jungers & C. P. van Schaik (eds.), pp.261-296. Kluwer Academic / Plenum Press, NY.

Veracini, C., Galleni, L. & Forti, M. 2002. The concept of species and the foundations of biology, a case study: The *Callithrix jacchus* group (Primates – Platyrrhini). *Rivista di Biologia / Biology Forum* 95(1): 75-100.

Wallis, O. C. & Wallis, M. Characterisation of the GH gene cluster in a New World monkey, the marmoset (*Callithrix jacchus*). *J. Molec. Endocrinol.* 29(1): 89-97.

Washabaugh, K. F., Snowdon, C. T. & Ziegler, T. E. 2002. Variations in care for cottontop tamarin, *Saguinus oedipus*, infants as a function of parental experience and group size. *Anim. Behav.* 63(6): 1163-1174.

Weiss, D. J. & Hauser, M. D. 2002. Perception of harmonics in the combination long call of cottontop tamarins, *Saguinus oedipus. Anim. Behav.* 64: 427-438.

Werdenich, D. & Huber, L. 2002. Social factors determine cooperation in marmosets. *Anim. Behav.* 64(5): 771-781.

Witte, H, Preuschoft, H. & Fischer, M. S. 2002. The importance of the evolutionary heritage of locomotion on flat ground in small mammals for the development oof arboreality. *Z. Morphol. Anthropol.* 83(2/3): 221-233.

Williams-Guillén, K. & McCann, C. 2002. Ecology and conservation of mantled howler monkeys (*Alouatta palliata*) in Nicaraguan shade coffee plantations. *ASP Bulletin* 26(2/3): 4.

Youlatos, D. 2002. Positional behavior of black spider monkeys (*Ateles paniscus*) in French Guiana. *Int. J. Primatol.* 23(5): 1071-1093.

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Chaput, K. H. 2002. The nature of intergroup interactions in the black howling monkey of Belize (*Alouatta pigra*). Master's Abstracts 40(4): 876.

Cheung, S. W., Wong, A. & Blake, D. T. 2002. Spectral and temporal learning properties and their functional modality in marmoset vocal plasticity. *J. Investigative Med.* 50: 84A.

Gilchrist, R. B., Pritchard, L., Amato, F., Ritter, L. J., Armstrong, D. T. & Norman, R. J. 2002. Characterization of the role of FSH in the marmoset monkey: Comparison

of FSH levels in natural cycles, prostaglandin F-2 alpha-regulated cycles, and socially subordinate animals. *Biol. Reprod.* 66(suppl.): 280.

Lynch, J. W. 2002. Male behavior and endocrinology in wild tufted capuchins, *Cebus apella nigritus. Diss. Abstr. Int.* A62(11): 3844.

Moheno, M. B. 2002. Prevalencia de parásitos gastroentéricos en primates (*Alouatta pigra y Ateles geoffroyi yucatanensis*) localizados en hábitat conservado y fragmentado de Quintana Roo, México. *Lab. Prim. Newsl.* 41(4): 10.

Urbani, B. & Urquiza-Haas, T. 2002. Corte inovador de frutas por el mono capuchino pardo (*Cebus apella*) en cautiverio. *Lab. Prim. Newsl.* 41(4): 10.

Selected abstracts from the *American Journal of Physical Anthropology* 34 (suppl.) 2002.

Ackermann, R. R. What can morphological variation tell us about phylogenetic divergence, p.35.

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Selected abstracts from the 25th Annual Meeting of the American Society of Primatologists, Oklahoma City, 1-4 June, 2002, in: *American Journal of Primatology* 57(suppl. 1), 2002.

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Meetings

Primer Congreso Mesoamericano de Areas Protegidas, 10 al 14 de marzo del 2003, Hotel Intercontinental, Centro de Convenciones, Managua, Nicaragua. Objetivos: Actualizar y dar a conocer el estado actual de manejo de los sistemas nacionales de áreas protegidas de Mesoamérica; proporcionar a los gobiernos e instituciones administradoras de áreas protegidas de la Región, una plataforma de diálogo y posicionamiento para el Congreso Mundial de Parques; sensibilizar a la opinión pública y a los tomadores de decisión, acerca de la importancia de las áreas protegidas como instrumento para el desarrollo social y económico de la region; definir mecanismos de cooperación regional e internacional que contribuyan al fortalecimiento de la gestión de las áreas protegidas. *Informaciones*: Comité Organizador Primer Congreso Mesoamericano de Áreas Protegidas, Ministerio del Ambiente y los Recurso Naturales – MARENA, Km. 12½ Carretera Norte. Managua, Nicaragua, Tel: (505) 2 33 00 78, Fax: (505) 2 33 00 78, e-mail: <congreso.ap@biomeso.net>.

Primer Congreso Internacional de Conservación de Vida Silvestre, 19-22 de marzo de 2003, Hotel Dann Carlton, Medellín, Colombia. Organizadores: Departamento Administrativo del Medio Ambiente de Antioquia, La Fundación Ecolombia, Corantioquia, el Área Metropolitana de Medellin, la Universidad de Antioquia, el Jardín Botánico, el Wildlife Center of Virginia y el Zoológico Santa Fé. Areas Temáticas: Rehabilitación y restauración, Conservación, Participación y educación en la conservación, Sociedad y conservación, Estrategias financieras para la conservación, Desarrollo Sostenible y Conservación. Algunos de los conferencistas son: Philippe Cousteau (Conservación de ecosistemas marinos); Anne Savage (Proyecto Tití), y Juan Mayr (Ex-ministro del Medio Ambiente - La guerra y sus efectos en la conservación). Para obtener mayor información: e-mail: <congreso2003@epm.net.co>.

Student Conference on Conservation Science, 26 – 28 March, 2003, Conservation Biology Group, Department of Zoology, University of Cambridge. "Building links among young conservation scientists and practitioners". Plenary lectures: Elizabeth Bennett (Wildlife Conservation Society), Andrew P. Dobson (Princeton University), Bob Pressey (New South Wales National Parks and Wildlife Service) and Achim Steiner (Director-General, IUCN World Conservation Union). Web site: <http://www.zoo.cam.ac.uk/sccs/index.html>.

Primate Society of Great Britain (PSGB) Spring Meeting 2003, 10-11 April, 2003, School of Psychology, University of St. Andrews, Fife, Scotland. Abstracts for oral

presentations, deadline: 10 January, 2003. Plenary talks will be on Primate Cognition. Invited speakers include; Andrew Whiten, Hannah Buchanan-Smith, Kevin Laland and Debbie Custance. For more information: Dr. Klaus Zuberbuhler, e-mail: <kz3@st-and.ac.uk>, or Gillian Brown, e-mail: <grb1000@cam.ac.uk>.

II Congresso Brasileiro de Mastozoologia, 26-29 June, 2003, Pontifícia Universidade Católica de Minas Gerais, Belo Horizonte, Brazil. The second congress of the Sociedade Brasileira de Mastozoologia (SBMz), organized by a team from the Museu de Ciências Naturais at the university, along with the Fundação Biodiversitas, Conservation International do Brasil, and the Federal Universities of Viçosa and Minas Gerais. Three major areas: "Ecology, conservation and behavior", "Systematics, morphology and genetics", and "Biogeography, paleontology and evolution". Offers to give mini-courses: deadline 7 February 2003. President of the Organizing Committee: Edeltrudes M. V. C. Câmara (PUC/MG). Coordinator of the Scientific Committee: Gisele M. L. Del Giudice (UFV). For more information: <congresso-masto@pucminas.br>.

17th Annual Meeting of the Society for Conservation Biology, 28 June - 2 July 2003, Duluth, Minnesota, USA. For more Information: Kris Lund, University of Minnesota Duluth, Continuing Education, 251 Darland, 1049 University Drive, Duluth, MN 55812-3011, USA, Tel: 218-726-7810, Fax: 218-726-6336, e-mail: <2003@cons ervationbiology.org>, Web site: <http://www.conservation biology.org/2003>.

4th European Congress of Mammalogy, 27 July - 1 August, 2003, Brno, Czech Republic. Hosted by the Institute of Vertebrate Biology, Academy of Sciences of the Czech Republic. Information and the pre-registration form are available on the website <http://www.ivb.cz>. Any questions about organization should be directed to Jan Zima, Organising Committee, e-mail: <ecm@IVB.cz>. Information and pre-registration form available on the website: < http://www.ivb.cz>.

7th World Multi-Conference on Systemics, Cybernetics and Informatics, 27-30 July, 2003, Sheraton World, Orlando, Florida, USA. Organized by The International Institute of Informatics and Systemics (IIIS). The emphasis of this meeting will be Environmental Conservation Systems. Deadline: Submission of abstracts/paper drafts and invited session proposals – 18 December, 2002. Program Committee Chair - William Lesso; General Chair - Nagib Callaos, e-mail: <nacallao@telcel.net.ve>; Organizing Committee Chair - Belkis Sanchez. Conference Secretariat, e-mail: <sciconfer@cantv.net>. Web page: <http: //www.iiisci.org/sci2003/>.

26th Meeting of the American Society of Primatologists, 30 July - 2 August, 2003, hosted by the Department of Anthropology, University of Calgary, Alberta. Proposals for symposia, contact Marilyn Norconk, e-mail:

<mnorconk@kent.edu>. Deadline for abstracts: 1 March 2003. Conference materials are now available at: <http: //www.asp.org/asp2003/index.html>.

9th Congress of the European Society for Evolutionary Biology, 18-24 August, 2003, Leeds, UK. For more information, website: <www.eseb.org>.

28th International Ethological Conference, 20-27 August 2003, Costão do Santinho Resort, Florianopolis, Brazil. On behalf of the International Council of Ethologists and hosted by the Brazilian Society of Ethology. Deadline for submission of symposia: 31 January 2003. Deadline for submission of abstracts, financial aid applications, and standard reduced registration rate: 20 February 2003. For more information on the conference contact: Professor Kleber del Claro, e-mail: <delclaro@ufu.br>, or on the scientific program, contact Professor Regina Macedo, e-mail: <rhmacedo@unb.br>. Web site: <http://www.iec2003.org/ home.htm>.

VI Congresso de Ecologia do Brasil, 9 a 14 de novembro de 2003, Fortaleza, Ceará. Tema: "Ecossistemas brasileiros: manejo e conservação". Realização: Sociedade Brasileira de Ecologia e a Universidade Federal do Ceará (UFC). Doze principais simpósios temáticos: 1) Floresta Pluvial Tropical Amazônica, 2) Floresta Pluvial Tropical Atlântica, 3) Floresta Temperada com Araucária, 4) Florestas Estacionais, 5) Cerrado, 6) Caatinga, 7) Complexo do Pantanal, 8) Ecossistemas Aquáticos continentais e marinhos, 9) Biodiversidade, Unidades de Conservação, Bioindicadores ambientais, 10) Ecologia da Paisagem, 11) Educação ambiental, 12) Ensino de Ecologia. Maiores informaçoes: <geograf@ufc.br>, <vcs@ufc.br>.

4th Göttinger Freilandtage - Cooperation in Primates and Humans: Mechanisms and Evolution, 9-12 December 2003, an international conference hosted by the German Primate Center (DPZ), Göttingen, focusing on cooperation in primates and humans. Invited speakers will summarize and evaluate recent empirical and theoretical work dealing with mechanisms and evolutionary consequences of cooperation, including altruism, reciprocity, kin selection, nepotism, game theory, market models, cooperative hunting, cooperative breeding, food sharing, reconciliation, coalitions, group selection and culture. Confirmed invited speakers include F. Aureli, L. Barrett, C. Boesch, B. Chapais, T. Clutton-Brock, E. Fehr, P. Hammerstein, B. König, M. Milinski, J. Mitani, R. Noe, C. van Schaik, J. Silk, R. Trivers and F. de Waal. We cordially invite you to submit abstracts for relevant oral (15 minute) and poster contributions. The conference is also open to guests without presentations. Deadline for submission of abstracts for spoken papers or posters is 1 August, 2003. Guests must also register in advance by 15 October, 2003. Additional details available from Peter Kappeler (pkappel@gwdg.de) and the conference web site: <http://www.dpz.gwdg.de/ voe_page/GFT2003/index.htm>.