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Neotropical Primates

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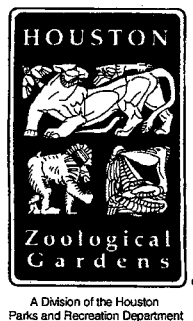
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The black-headed uacari, *Cacajao melanocephalus ouakaryi*.

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ALTERNATIVE MALE REPRODUCTIVE BEHAVIORS IN THE BELIZEAN BLACK HOWLER MONKEY (*ALOUATTA PIGRA*)

Robert H. Horwich
Robin C. Brockett
Clara B. Jones

Introduction

Individuals differ in many aspects of reproductive behavior. Two or more reproductive phenotypes may be expressed during the lifetime of an individual and between individuals within the same population (Austad, 1984). Variation in mating patterns may be studied for an understanding of differential costs and benefits to survival and reproductive success of alternative reproductive behaviors (ARBs). In this paper we describe ARBs in male black howler monkeys (*Alouatta pigra*).

The study of ARBs in primates has a long history (Hrady, 1974; Clarke, 1983; Horwich, 1983; Boggess, 1984; Smuts, 1985; Jones, 1995). ARBs entail all discrete tactics and strategies employed to maximize reproductive benefits (Austad, 1984). Dixson's (1998) discussion of ARBs by male primates shows that they exhibit various responses to gain access to group membership and receptive females. Among these responses, infanticide is, perhaps, the most controversial and widely discussed. ARBs will arise whenever individuals compete for mates, and sexual selection theory predicts that males will be most likely to compete for mates since females, or, rather, their fertilizable ova, are expected to be limiting resources (Trivers, 1972). Smuts (1987) found that the expression of ARBs in male primates is related to age, demography and life-history, stochastic effects (e.g., "accidents of history"), and unique traits of individuals (e.g., temperament or intelligence). Smuts' conclusions support the view that the diversity of intraspecific reproductive behaviors results from adaptive responses to local conditions, in particular, the operational sex ratio within populations (the ratio of males to females fecund at a given time), which provides a measure of the intensity of sexual selection among competitors (Emlen and Oring, 1977; also see Leland *et al.*, 1984).

Animals, Study Site, and Method

We conducted *ad libitum* observations of marked *A. pigra* at the Community Baboon Sanctuary (CBS), Belize. The CBS is a managed reserve of >18 sq. mi. formed in 1985 by a cooperative agreement among private landowners (Horwich, 1990). Located at 17°33'N, 88°35'W, the CBS is a mosaic of small farms, pastures and tropical moist forest fragments, including riparian habitat along the Belize River (see Horwich and Lyon, 1990). The study area has mapped trails, and >1500 trees are mapped and identified. Rhythms in plant communities are seasonal, with new leaf production occurring primarily at the beginning of the rainy season (late

May or June) (Horwich and Lyon, 1990). In northern Belize there are two flowering peaks. The largest peak occurs during the dry season (February through May) with a second, smaller peak occurring about one month after the rainy season begins (Horwich and Lyon, 1990). Fruiting activity is variable, within and between tree species (Horwich and Lyon, 1990). At any one time in northern Belize, there are at least some tree species producing fruit. Seasonally, there are two fruiting peaks: near the end of the dry season and a month or so after the start of the rainy season. Howler monkeys are wholly herbivorous, and phenological perturbations may have significant consequences for their populations.

Black howlers, large atelids, are generally polygynous (single breeding male) with a modal group size of one adult male to several adult females and immatures (Ostro *et al.*, 1999; Horwich, unpublished data), although multimale-multifemale (polygynandrous) groups may be found. Studies of demography, ecology, social organization and behavior are in their early stages (e.g., Horwich, 1983; Silver *et al.*, 1998; Ostro *et al.*, 1999). Groups have been censused since 1985, and systematic observations, including marking of animals and collection of morphometric data have been carried out since the early 1990's.

Results

Primary Patterns

Table 1 shows male displacements within black howler monkey groups at the CBS between 1992 and 1997. "Displacement" is used to mean that when one or more males enter an established unit, one or more males are expelled. Several patterns are noteworthy. First, males may transfer alone or in association with one or more males. When more than one male act together, they are always successful at expelling resident males from their groups, although male alliances or coalitions are not a necessary condition for successful expulsion. BBLT, for instance, expelled O in March, 1995. It is important to note, however, that, while single males successfully expelled a group male on two occasions, transferring males moving alone generally joined an existing group without expelling resident males. In 1992, for example, WRT successfully joined the Baptist troop without aggression and without expelling any males from the troop. WRT later left Baptist troop with BWB to displace Scar from the adjacent Fig troop in 1993 (Table 1).

Table 1 also demonstrates that changes in male membership within groups was not always accompanied by overt male-male aggression. Overt aggression among males appears to be most likely when resident males are expelled or when a transferring male attempts to enter a multi-male group. Infant disappearance also appears most likely in these conditions.

Of further interest, as reported in Brockett *et al.* (1999), we have identified a "cascade effect" in male takeovers whereby takeover by an extra-group male may precipitate a resident male to leave his group and initiate a takeover of another group (e.g., BBLT's takeover of Roxie troop in March, 1995 and LRT's takeover of Bamboo troop in November, 1995). The effect that we describe may be a response to some threshold of group den-

sity, possibly responsive to interaction rates, and expresses the potential for stochastic dynamics of population processes.

Transferring males were observed to attempt copulation or to copulate with resident females more than 50% of the time. These events were almost always associated with male-male aggression and subsequent infant disappearance. There appears to be a suite of associated responses for which sex and aggression, including infanticide, are correlated, although because aggression is not associated with every transfer event, its costs must often outweigh its benefits.

Secondary Patterns

Several additional aspects of male reproductive behavior were observed. First, males may disperse from groups of origin, sometimes their natal groups, and "float" in unoccupied habitat or remain peripheral to an intact group on its home range. Peripheral males have been observed to interact with group members, usually adult females in a sexual context. The role of females in determining who leads their social unit requires further study.

On one occasion, an expelled adult male and female were observed to form a new group, showing that new groups may form from a process of forced fissioning. In another instance, displaced individuals (an adult male, an adult female, and an immature) were observed wandering within the home ranges of two established groups. This result suggests that population density at the study site is high and that habitat is saturated; thus, all social units may not have home ranges.

Our observations suggest that "sperm competition" (see Birkhead and Moller, 1998) may be a significant evolutionary force in both single-male and multimale-multifemale groups of *A. pigra*. Transferring males, for example, were observed to solicit group females, and vice versa, before the male successfully obtained group membership or left a group's home range (see Horwich, 1983). Horwich (1983) observed copulations between a female of one group and an extra-group male, and even occasional copulations could generate "sperm

competition". In multimale-multifemale groups, newly-transferred males and resident males were observed to copulate with the same resident females during the same estrus cycles, suggesting "facultative polyandry" in *A. pigra* as has been reported for *A. palliata* (Jones and Cortés-Ortiz, 1998).

Discussion

Figure 1 is a diagram of the ARBs exhibited by *A. pigra* in the present study, as well as those ARBs suspected but not directly observed. Our observations are preliminary, particularly since we have limited data on age, kinship, and dominance rank. However, it is clear that males exhibit creative and highly variable reproductive tactics, highlighting the plasticity of social organization in *Alouatta* as discussed by other authors (e.g., Crockett and Eisenberg, 1987). The diversity of mating tactics that we describe for *A. pigra* are similar to those observed in other polygynous or polygynandrous societies (see Dixson, 1998) except that we have not observed all male groups of >2 individuals (e.g., patas, Hanuman langurs), we have not observed a male capture and guard one or more juvenile females until sexual maturity is attained (e.g., *Hamadryas* baboon), we have not positively documented the acquisition of one or more females by a male from an established group to form a new group (e.g., gorilla), nor have we positively documented the inheritance of a group by a natal male (e.g., gelada and *Hamadryas* baboons). Interspecific differences in ARBs are likely to be a function of phylogeny and ecology as well as the factors noted by Smuts (1987, see Introduction).

Future research must clarify the role that male alliances and coalitions play in successful group takeovers as well as successful resistance of takeovers. While our results suggest that males belonging to multimale-multifemale groups successfully prevent extra-group males from expelling group males, multimale-multifemale groups may not prevent the entry of a persistent intruder (see Moore, 1999). Related to these events is the role of male-female relations in determining successful takeover and male tenure.

Table 1. Male displacements observed (1992-1997) at the Community Baboon Sanctuary and associated events.

Dates of events	Transferring male(s)	Troop of origin	Troop entered	Male(s) displaced	Aggression observed	Copulation attempt or copulation observed	Infant disappearance
1993	UM, TLT	Bamboo	Wade	LLT (GWG)	Yes	?	?
1993	WRT, BWB	Baptist	Fig	Scar	No	No	No
Feb-Mar 1995	BWB	Fig	Roxie	BBLT, UM1	Yes	Yes ¹	Yes ²
March 1995	BBLT	Roxie <i>via</i> Baptist & Fig	Baizar	O	Yes	Yes	Yes ³
Sept-Oct 1995	UM2 (RLT)	River Trail	Bamboo	LRT	No	No	No
Nov 1995	LRT	Bamboo	Wade	TWRT	No	Yes	No
Feb-Mar 1997	SA1 (Satchmo), SA2, Baizar	Fig, Baizar	Robin	WLT	Yes	Yes	Yes

¹See Brockett, *et al.*, in press. ²Three infants disappeared (see Brockett, *et al.*, in press). ³Observed directly.

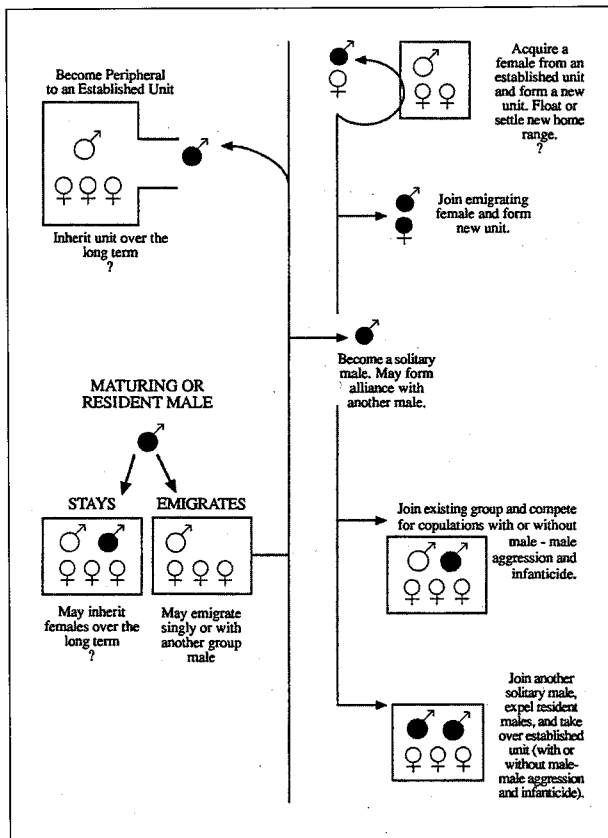


Figure 1. Alternative male reproductive tactics (*Alouatta pigra*) observed directly and indirectly in the present study at the Community Baboon Sanctuary, Belize (based on Dixon, 1998).

A noteworthy result of our studies is the identification of a "cascade effect", possibly a chaotic effect of habitat saturation triggered by male takeovers. Cascade effects may have important implications for conservation efforts if their demographic consequences increase likelihoods of population extinctions by increasing stochastic factors. Cascade effects illustrate the importance of identifying and measuring the differential costs and benefits of polygynous and polygynandrous mating systems to males in a range of environmental conditions. Relying on economic models, Moore (1999) has recently suggested that these ARBs are best understood in terms of "intruder pressure, mediated by population density".

Future studies, including genetic analyses, will permit us to compare the behavior and social organization of *A. pigra* with other species of *Alouatta*. In red howlers (*A. seniculus*), for example, Crockett and Sekulic (1984) suggested that a male's reproductive success subsequent to his taking over a group was related to his ability to form coalitions with other males. Our results support their conclusions and are consistent with mechanisms of change in male tenure reported for *A. palliata* (e.g., Jones, 1980; Clarke, 1983; Glander, 1992). While our present results are preliminary and do not permit us to identify the complete range of similarities and differences in ARBs between *A. pigra* and other species of *Alouatta*, future studies by our and other research programs will enable us to under-

stand the causes and consequences of polygynous and polygynandrous social organization within and between species.

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References

- Austad, S. N. 1984. A classification of alternative reproductive behaviors and methods for field-testing ESS models. *Amer. Zool.* 24: 309-319.
- Birkhead, T. R. and Moller, A. P. (eds.). (1998). *Sperm Competition and Sexual Selection*. Academic Press, San Diego.
- Boggess, J. 1984. Infant killing and male reproductive strategies in langurs (*Presbytis entellus*). In: *Infanticide: Comparative and Evolutionary Perspectives*, G. Hausfater and S. B. Hrdy (eds.), pp.283-310. Aldine, New York.
- Brockett, R. C., Horwich, R. H., and Jones, C. B. 1999. Disappearance of infants following male takeovers in the Belizean black howler monkey (*Alouatta pigra*). *Neotrop. Primates* 7:86-88.
- Clarke, M. R. 1983. Infant killing and infant disappearance following male takeovers in a group of free-ranging howling monkeys (*Alouatta palliata*) in Costa Rica. *Am. J. Primatol.* 56: 241-247.
- 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. The University of Chicago Press, Chicago.
- Crockett, C. M. and Sekulic, R. 1984. Infanticide in red howler monkeys (*Alouatta seniculus*). In: *Infanticide: Comparative and Evolutionary Perspectives*, G. Hausfater and S. B. Hrdy (eds.), pp.173-191. Aldine, New York.
- Dixon, A. F. 1998. *Primate Sexuality*. Oxford University Press, Oxford.
- Emlen, S. T. and Oring, L. W. 1977. Ecology, sexual selection and the evolution of mating systems. *Science* 197: 215-223.
- Glander, K. E. 1992. Dispersal patterns in Costa Rican mantled howling monkeys. *Int. J. Primatol.* 13: 415-436.
- Horwich, R. H. 1983. Breeding behaviors in the black howler monkey (*Alouatta pigra*) of Belize. *Primates* 24: 222-230.
- Horwich, R. H. 1990. How to develop a community sanctuary: An experimental approach to the conservation of private lands. *Oryx* 24: 95-102.

- Horwich, R. H. and Lyon, J. 1990. *A Belizean Rainforest*. Orang-Utan Press, Gays Mills, WI.
- Hrdy, S. B. 1974. Male-male competition and infanticide among the langurs (*Presbytis entellus*) of Abu, Rajasthan. *Folia Primatol.* 22: 19–58.
- 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. 1995. Alternative reproductive behaviors in the mantled howler monkey (*Alouatta palliata* Gray): Testing Carpenter's hypothesis. *Boletim Primatológico Latinoamericano* 5: 1–5.
- Jones, C. B. and Cortés-Ortiz, L. 1998. Facultative polyandry in the howling monkey (*Alouatta palliata*): Carpenter was correct. *Boletim Primatológico Latinoamericano* 7: 1–7.
- Leland, L., Struhsaker, T. T., and Butynski, T. M. 1984. Infanticide by adult males in three primate species of Kibale Forest, Uganda: A test of hypotheses. In: *Infanticide: Comparative and Evolutionary Perspectives*, G. Hausfater and S. B. Hrdy (eds.), pp.151–172. Aldine, New York.
- Ostro, L. E. T., Silver, S. C., Koontz, F. W., Young, T. P. and Horwich, R. H. 1999. Ranging behavior of translocated and established groups of black howler monkeys *Alouatta pigra* in Belize, Central America. *Biol. Conserv.* 87: 181–190.
- Silver, S. C., Ostro, L. E. T., Yeager, C. P., Koontz, F. W. and Horwich, R. 1998. The feeding ecology of the black howler monkey (*Alouatta pigra*) in Northern Belize. *Am. J. Primatol.* 45: 263–279.
- Smuts, B. B. 1985. *Sex and Friendship in Baboons*. Hawthorne, Aldine, NY.
- Smuts, B. B. 1987. Sexual Competition and mate choice. In: *Primate Societies*, B. B. Smuts, D. L. Cheney, R. M. Seyfarth, R. W. Wrangham and T. T. Struhsaker (eds.), pp.385–399. The University of Chicago Press. Chicago.
- Trivers, R. L. 1972. Parental investment and sexual selection. In: *Sexual Selection and the Descent of Man 1871–1971*, B. Campbell (ed.), pp.136–179. Aldine, Chicago.

DISTRIBUIÇÃO DO SAGÜI (*CALLITHRIX JACCHUS*) NAS ÁREAS DE OCORRÊNCIA DO MICO-LEÃO-DOURADO (*LEONTOPITHECUS ROSALIA*) NO ESTADO DO RIO DE JANEIRO

Carlos R. Ruiz-Miranda
Adriana G. Affonso
Andréia Martins & Benjamin Beck

Introdução

O mico-leão-dourado (*Leontopithecus rosalia*) é uma espécie nativa da mata Atlântica, sendo um dos primatas mais ameaçados de extinção (Kleiman *et al.*, 1988; Dietz *et al.*, 1994). As causas principais dessa situação são falta de habitat e o tráfico ilegal de animais silvestres (Dietz *et al.*, 1994;

Kierulff, 1994). As populações remanescentes (aproximadamente 800 indivíduos) se encontram em fragmentos de mata, sendo que 60% se encontram em áreas protegidas, 25% em áreas não protegidas mas seguras e 15% em pequenos fragmentos florestais isolados e desprotegidos (AMLD, 1998). Esta situação as faz vulneráveis a catástrofes, processos aleatórios e efeitos antrópicos, como a caça e introdução de espécies exóticas (Meffe e Carroll 1994; Foose *et al.*, 1995).

O programa de reintrodução do mico-leão-dourado ao seu ambiente nativo, tem como alvo os animais de cativeiro encontrados em zoológicos (nos EUA e Europa), que são trazidos a fragmentos de mata Atlântica de fazendas particulares no estado do Rio de Janeiro (15 fazendas). Existe hoje uma população de 279 indivíduos que são monitorados semanalmente pelos técnicos da Associação Mico-Leão-Dourado (AMLD) (AMLD, 1998). A reintrodução do mico-leão-dourado é um dos poucos casos de reintrodução bem sucedidos. Grande parte do sucesso se deve a esforços após a reintrodução para manter a sobrevivência dos animais de cativeiro até eles se reproduzirem na mata (Beck *et al.*, 1991; AMLD, 1998; Castro *et al.*, 1998). Num "workshop" de Análise de Viabilidade de Habitats e Populações (PHVA), realizado em 1997 (Ballou *et al.*, 1998), foi colocado como prioridade a compreensão dos fatores que afetam a sobrevivência após as reintroduções, e um dos fatores citados foi a presença do *Callithrix jacchus*, uma espécie exótica, no estado do Rio de Janeiro.

A partir de 1985 foi observada a presença de indivíduos do sagüi (*Callithrix jacchus*) em fragmentos de mata nas fazendas destinadas a reintrodução do mico-leão. *C. jacchus*, originário do nordeste brasileiro, vem sendo introduzido no estado do Rio de Janeiro, resultado do tráfico ilegal de animais silvestres. A ecologia desta espécie é parecida com a dos micos-leões e por isso, poderiam ser competidores. O grau de competição imposto por uma espécie introduzida irá depender da semelhança entre os nichos da espécie nativa e da exótica.

Observações feitas pelos técnicos da AMLD indicam que *C. jacchus* utiliza os comedouros colocados para os micos-leões e os acompanha durante o dia, sendo registrados comportamentos agressivos (por exemplo, luta) e afiliativos (por exemplo, brincadeiras) entre as espécies. Não existem dados quantitativos sobre o tamanho da população de *C. jacchus*, grau de associação entre as duas espécies e a organização funcional da associação.

O objetivo deste trabalho foi estimar a distribuição de *C. jacchus* nas áreas de ocorrência do *Leontopithecus rosalia* e também estimar a população de *C. jacchus* no maior fragmento de mata com micos-leões reintroduzidos.

Métodos

Foi verificada a ocorrência de *C. jacchus* nas 15 fazendas com micos-leões reintroduzidos localizadas nos municípios de Rio

Bonito e Silva Jardim no Rio de Janeiro. A amostragem populacional foi realizada na Fazenda Rio Vermelho, localizada no município de Rio Bonito (42°35'W, 22°43'S). Esta fazenda foi escolhida como modelo por ter o maior fragmento de mata (1.000 ha) e a maior população de micos-leões reintroduzidos. No início do estudo esta fazenda possuía 10 grupos de micos-leões com um total de 65 indivíduos marcados individualmente e com colares de telemetria (um indivíduo por grupo).

Amostragem da população

O levantamento da população de *C. jacchus* nas fazendas destinadas a reintrodução de micos-leões foi feito através de uma enquete aos técnicos da AMLD, que monitoram todas as fazendas três vezes por semana desde 1985. As respostas dos técnicos se basearam nos registros diários do programa e percepções ou observações pessoais da coordenadora, Andréia Martins (AMLD), a qual tem 15 anos de serviço no projeto de reintrodução.

A partir de outubro de 1998 começaram as capturas mensais para estimar o tamanho da população de *C. jacchus* na Fazenda. As capturas foram feitas usando entre 12 a 18 armadilhas tipo "Tomahawk" por grupo, cevadas com bananas e colocadas em sete plataformas de captura. O esforço para capturar um grupo terminou no dia em que foram capturados pelo menos a metade dos membros.

Os sagüis capturados foram levados ao laboratório (localizado em Rio do Ouro, Rio Bonito), onde foram anestesiados com Ketamina (sob supervisão do veterinário C. Verona da Universidade Estadual do Norte Fluminense) e marcados com tatuagem (na perna direita, com a sigla do grupo e o número do mico). Os animais ficaram sob supervisão veterinária até passar os efeitos do anestésico, após o qual foram devolvidos ao lugar de captura.

A estimativa da população de *C. jacchus* foi feita através da contagem de todos os indivíduos marcados, representando o número mínimo de sagüis na Fazenda Rio Vermelho. Este número foi dividido pela área de mata para estimar a densidade populacional mínima (Cullen, Jr. e Valladares-Padua, 1997).

Resultados

C. jacchus está amplamente distribuído dentro da área de ocorrência do mico-leão. Das 15 fazendas com micos-leões, sete contêm sagüis (Tabela 1). Destas sete, as cinco fazendas mais ao sul (nas áreas de Rio Vermelho e Afetiva) já tinham sagüis ao início das reintroduções (c. 1985), das fazendas mais ao norte (área de Santa Helena, nas fazendas Dois Irmãos e Igarapé), os sagüis foram avistados somente a partir de 1998 (Tabela 1). Foram avistados sagüis na Reserva Biológica de Poço das Antas, mas não na Reserva Biológica da Fazenda União.

Os resultados indicam que a população de *C. jacchus* na Fazenda Rio Vermelho está maior do que a população de *L. rosalia*. Foram marcados 90 indivíduos, provavelmente de nove grupos sociais, representando o número mínimo da população (densidade = 0,09 ind/ha), enquanto que a população de mico-leão na Fazenda Rio Vermelho foi de 62 animais (densidade = 0,06 ind/ha). Foi observado que nos territórios de dois grupos de micos-leões (TRI, EST) havia pelo menos dois grupos de sagüi, enquanto nos outros grupos (APP, RV) havia apenas um grupo de sagüis.

Discussão

Callithrix jacchus é uma espécie originária do nordeste brasileiro, habitando predominantemente florestas secundárias ou perturbadas (Ferrari, 1993). Hoje em dia podemos encontrar essa espécie em vários fragmentos de mata no estado do Rio de Janeiro, sendo freqüentemente encontrados em parques da cidade do Rio de Janeiro além de fazendas no interior do estado, principalmente a região centro-fluminense. O tráfico ilegal de

Tabela 1. Área (ha), número de indivíduos e data do primeiro avistamento de sagüis, nas fazendas destinadas a reintrodução do mico-leão-dourado e seu agrupamento por regiões.

Fazenda	Região	Área (ha)	Nº de Mico-leão	Presença de Sagüis
Rio Vermelho	Rio Bonito	1000	62	1985
Afetiva		45	2	1985
Estreito		nd	11	1985
St Cisne Branco	Afetiva	nd	3	1985
St Pacoty		nd	5	1985
Igarape		150	18	1998
2 Irmãos		87	38	1998
Bom Retiro	Santa Helena	550	8	*
São Francisco		25	28	*
Coqueiro		20	28	*
Santa Helena		235	26	*
Iguape		77	26	*
Kombi	Poço das Antas	nd	2	*
Maratua		100	16	*
Poço das Antas		5600	250	2000
Total		7889	565	7 fazendas 1 REBIO

* não foi observada a presença de sagüis desde 1985 nd: não disponível

animais silvestres aumentou com a construção de rodovias ligando os diferentes estados (Dean, 1995). A dispersão dos sagüis para a região centro fluminense provavelmente intensificou-se com a construção da BR-101 e a ponte Rio-Niterói. Atualmente, há sete fazendas da reintrodução de mico-leão-dourado com a presença de sagüis. Em 1985 o sagüi estava presente apenas nos fragmentos de Rio Bonito (26 km distante da Reserva Biológica Poço das Antas) e na região da Fazenda Afetiva (16 km de Poço das Antas). Treze anos depois, em 1998, os sagüis apareceram nos fragmentos na região da Fazenda Santa Helena, a 1 km de Poço das Antas, com uma taxa de expansão de 1,2 km/ano. Já em 2000, foram observados sagüis no centro educativo da Reserva Biológica Poço das Antas. A presença do sagüi na reserva e a proximidade com outras fazendas aumentam o perigo de que esta espécie possa vir a colonizar esses fragmentos de mata onde os micos-leões selvagens se encontram, dificultando ainda mais a conservação dessa espécie.

No maior fragmento de mata com mico-leões reintroduzidos, a fazenda Rio Vermelho em Rio Bonito, a população de *C. jacchus* está maior que a dos micos. Há pelo menos 10 grupos de mico-leões (0,06 ind/ha) e nove de sagüis (0,09 ind/ha) em 1000 ha de mata. As fêmeas de *Callithrix* possuem um alto potencial reprodutivo. Verificamos em nossas capturas e observações na Fazenda Rio Vermelho, a presença de fêmeas grávidas e lactantes em todas as estações do ano, já o mico-leão só teve filhotes no período de setembro à março. O alto potencial reprodutivo do sagüis pode ser uma das causas da rápida expansão da espécie pelo estado do Rio de Janeiro.

A associação entre espécies de primatas simpátricos e com habitats similares, tem sido documentada em florestas amazônicas, onde as associações parecem trazer benefícios mútuos (Garber, 1988; Heymann, 1990; Peres, 1992; Lopes e Ferrari, 1994). No entanto, a associação de primatas nativos e exóticos é pouco estudada, e essa aparente associação poderia resultar em competição por recursos e troca de parasitas entre as duas espécies e, portanto um obstáculo para a conservação do *Leontopithecus*. Os *Leontopithecus* e os *Callithrix* são simpátricos somente nas florestas do norte da Bahia. Na Reserva Biológica de Una, *L. chrysomelas* e o *C. kuhlii* se associam com pouca frequência e esta espécie parece explorar o *Leontopithecus* (Ruiz-Miranda, obs. pess.). Na Fazenda Rio Vermelho, o índice de associação entre *C. jacchus* e os *L. rosalia* chega a 65% durante o inverno, e a presença do *C. jacchus* muda o comportamento dos *L. rosalia* reintroduzidos (Affonso *et al.*, no prelo).

Podemos concluir que o sagüi é um fator de importância para a conservação do mico-leão-dourado. Antes de qualquer medida de manejo da população dos sagüis, é necessário mais estudos para determinar até que ponto essa possível sobreposição de nichos poderá prejudicar o restabelecimento do mico-leão-dourado em seu ambiente natural e saber como a dispersão desta espécie pelas fazendas está ocorrendo, pois a presença de um exótico competidor é essencial para considerar futuras áreas de reintrodução (Kleiman *et al.*, 1990).

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Referências

- AMLD. 1998. Relatório Anual da Associação Mico-Leão-Dourado. Annual report of the Golden Lion Tamarin Association. Associação Mico-Leão-Dourado/Golden Lion Tamarin Association, Silva Jardim, Rio de Janeiro.
- Affonso, A. G., Ruiz-Miranda, C. R. e Beck, B. B. No prelo. Interações ecológicas entre mico-leão-dourado (*Leontopithecus rosalia* Linnaeus, 1758) reintroduzido e mico-estrela (*Callithrix jacchus* Linnaeus, 1758) introduzido em fragmentos de mata Atlântica, RJ. Em: *A Primatologia no Brasil*, Vol. 8, S. L. Mendes e A. G. Chiarello (eds.), Santa Teresa, Espírito Santo.
- Ballou, J. D., Lacy, R. C., Kleiman, D. G., Rylands, A. B. e Ellis, S. 1998. *Leontopithecus II. Final Report: The Second Population and Habitat Viability Assessment for Lion Tamarins* (*Leontopithecus*), 20-22 de maio de 1997, IUCN/SSC Conservation Breeding Specialist Group, Apple Valley, MN.
- Beck, B. B., Kleiman, D. G., Dietz, J. M., Castro, M. I., Carvalho, C., Martins, A. e Rettberg-Beck, B. 1991. Losses and reproduction in reintroduced golden lion tamarins, *Leontopithecus rosalia*. *Dodo, J. Jersey Wild. Preserv. Trusts* 27: 50-61.
- Castro, M. I., Beck, B. B., Kleiman, D. G., Ruiz-Miranda, C. R. and Rosenberger, A. R. 1998. Can environmental enrichment help with golden lion tamarin reintroduction. Em: *Second Nature: Environmental Enrichment for Captive Animals*, D. J. Shepherdson, J. D. Mellen e M. Hutchins (eds.), pp.113-128. Smithsonian Institution Press, Washington, DC.
- Cullen, Jr., L. e Valladares-Padua, C. 1997. Métodos para estudo de ecologia, manejo e conservação de primatas na natureza. Em: *Manejo e Conservação de Vida Silvestre no*

- Brasil, C. Valladares-Padua, R. E. Bodmer and L. Cullen, Jr. (eds.), pp.239-269. MCT-CNPq, Sociedade Civil Mamirauá, Brasília e Tefé.
- Dean, W. 1995. *With Broadax and Firebrand: The Destruction of the Brazilian Atlantic Forest*. University of California Press, Berkeley.
- Dietz, J. M., Dietz, L. A. e Nagagata, E. 1994. The effective use of flagship species for conservation of biodiversity: The example of lion tamarins in Brazil. Em: *Creative Conservation: Interactive Management of Wild and Captive Animals*, P. J. S. Olney, G. M. Mace e A. T. C. Feistner. (eds.), pp.32-49. Chapman and Hall, London.
- Ferrari, S. F. 1993. Ecological differentiation in the Callitrichidae. Em: *Marmosets and Tamarins: Systematics, Behaviour, and Ecology*, A. B. Rylands (ed.), pp.314-328. Oxford University Press, Oxford.
- Foose, T. J., De Boer, L., Seal, U. S. e Lande, R. 1995. Conservation management strategies based on viable populations. Em: *Population Management for Survival and Recovery: Analytical Methods and Strategies in Small Population Conservation*, J. D. Ballou, M. Gilpin e T. J. Foose (eds.), pp.273-294. Columbia University Press, New York.
- Garber, P. A. 1988. Diet, foraging patterns, and resource defense in a mixed species troop of *Saguinus mystax* and *Saguinus fuscicollis* in Amazonian Peru. *Behaviour* 105(1-2): 18-34.
- Heymann, E. W. 1990. Interspecific relations in a mixed species troop of moustached tamarins, *Saguinus mystax*, and saddle-back tamarins, *Saguinus fuscicollis* (Platyrrhini: Callitrichidae), at the Rio Blanco, Peruvian Amazonia. *Am. J. Primatol.* 21: 115-127.
- Kierulff, M. C. 1994. Avaliação das Populações Selvagens de Micos-Leões-Dourados, *Leontopithecus rosalia*, e Proposta de Estratégia para Sua Conservação. Tese de Mestrado, Universidade Federal de Minas Gerais, Belo Horizonte.
- Kleiman, D. G., Beck, B. B., Baker, A. J., Ballou, J. D., Dietz, L. A. e Dietz, J. M. 1990. The conservation program for the golden lion tamarin, *Leontopithecus rosalia*. *Endangered Species Update* 8(1): 82-85.
- Kleiman, D. G., Hoage, R. J. e Green, K. M. 1988. The lion tamarins, genus *Leontopithecus*. Em: *Ecology and Behavior of Neotropical Primates*. R. A. Mittermeier, A. F. Coimbra-Filho, A. B. Rylands e G. A. B. da Fonseca (eds.), pp.299-347. World Wildlife Fund-US, Washington, DC.
- Lopes, M. A. e Ferrari, S. F. 1994. Foraging behavior of a tamarin group (*Saguinus fuscicollis weddelli*) and interactions with marmosets (*Callithrix emiliae*). *Int. J. Primatol.* 15(3): 373-387.
- Meffe, G. K. e Carroll, C. R. 1994. *Principles of Conservation Biology*. Sunderland, Sinauer Associates, Inc., Massachusetts.
- Peres, C. A. 1992. Prey-capture benefits in a mixed-species group of Amazonian tamarins, *Saguinus fuscicollis* and *S. mystax*. *Behav. Ecol. Sociobiol.* 31: 339-347.
- Rylands, A. B. e Faria, D. S. de. 1993. Habitats, feeding ecology, and home range size in the genus *Callithrix*. Em: *Marmosets and Tamarins: Systematics, Behaviour, and Ecology*, A. B. Rylands (ed.), pp.262-272. Oxford University Press, Oxford.

REPATRIATION OF TWO CONFISCATED BLACK HOWLER MONKEYS (*ALOUATTA PIGRA*) IN BELIZE

Robin C. Brockett
Bruce C. Clark

Introduction

The Belize Ministry of Natural Resources formally approved the establishment of the Wildlife Care Center of Belize (WCCB) in October 1996. Located within Monkey Bay Wildlife Sanctuary (MBWS), the WCCB's goals are:

1. Maintain confiscated wildlife and evaluate suitability for re-release.
2. Explore suitable options for non-releasable wildlife.
3. Conduct Monkey Bay National Park habitat surveys and post-release wildlife monitoring, for example, see Clark and Brockett, 1999.
4. Research, develop and document rehabilitation techniques for this location.
5. Provide training opportunities for Belizean students and conservation personnel.
6. Collaborate with governmental and non-governmental organizations on public awareness programs.
7. Publish data in relevant scientific journals.

In February 1998 the Conservation Division of the Forest Department of Belize confiscated an eight-month old, female black howler monkey (*Alouatta pigra*). She was in the possession of a private individual residing in the Cayo District. Fed a market diet with limited veterinary care and obviously humanized, she was presented to the WCCB at five pounds and in surprisingly good health. She was immediately placed in a small holding pen and allowed out for exercise three times daily. In March 1998 an estimated eight-month old male was similarly acquired, originating from the Belize District. This animal was fed rice, powdered milk, fruit and occasional native browse. He was of reasonable weight at five pounds, but was lethargic and displayed chronic diarrhea. This animal was maintained in visual proximity of the newly acquired female. Both animals accepted market produce and native browse immediately.

The pair were gradually introduced over a period of several days of visual and limited physical contact, and only after fecal checks proved negative. Diet consisted of various market and native fruits and approximately 35 native browse species cut and presented three times daily by the first author. Over time fruits were reduced, but never eliminated, to induce browse foraging.

Based upon the methodology of the howler translocation from CBS to Cockscomb (Koontz *et al.*, 1994), two negative TB tests were conducted three months apart. Chemical tranquilization with Telazol (Tiletamine/Zolazepam, 100 mg/ml, Fort Dodge Animal Health, Fort Dodge, Iowa, USA) was administered the second time to permit a thorough examina-

tion and to insert a permanent metal identification ear tag. Radio collaring was not an option due to the size of the animals. Fecal samples were performed periodically throughout the fifteen months of captivity with all but one sample proving negative. Ascarids were found in one sample and treatment with Pyrantel (pyrantel pamoate, Pfizer, Inc., US Animal Health Operations, 235 E. 42nd Street, New York, NY) cleared the condition. Weights were monitored throughout the captive phase. Early on, the male was found to have suffered a break of the left tibia, thought to have been caused by his poor diet. Full use of the limb was eventually regained. Botfly infestations are relatively common in wild populations and generally do not result in problems. Both animals were treated with Ivermectin (Ivomec, 10 mg/ml, Merck AgVet Division, Merck & Co., Inc., Rashway, New Jersey, USA) when larvae counts reached 5 per animal. In December 1998 the male presented an approximately 40% hair loss, thought to be attributed to botfly bites. Skin scrapings were negative and the scratching eventually subsided with treatment of Prednisone (Prednisolone, Merck, Sharp and Dohme, Division of Merck and Co., In., West Point, Pennsylvania, USA).

Pre-release Training

In September 1998 the animals were moved to an enclosure to encourage native browse foraging, exercise and to dehumanize. This enclosure contained native trees, surrounded by 137 meters of electrified nylon mesh measuring one meter in height (Fast-Fence Net, WV Fence Corporation) and charged by solar-power. A small holding-cage measuring 1.8 x 1.8 x 2.4 m was placed inside to allow supplemental feeding and aid in recapture. Supplemental feedings were gradually restricted. Containerized water was available continuously, although animals were observed early on drinking off leaves and from tree crotches. A swath was kept clear surrounding the charged fence for a distance of five meters. This containment method has proved effective for howlers, which are not adept jumpers and do not brachiate. The animals were conditioned to a clicker to signal feeding with the presumption that predictable entering of the feeding cage would aid in recapture. Furthermore, clicker training would help to locate the animals once released. A total of 300 observational hours were conducted during the survival training portion of this program.

Release Methodology

Published behavioral, ecological and translocation data helped to develop criteria supporting the highest expectation of survivorship for this program (Brockett, unpubl. obs.; Brockett *et al.*, in press; Ostro *et al.*, in press; Ostro *et al.*, 1999; Silver *et al.*, 1999; IUCN, 1995a; IUCN, 1995b; Horwich *et al.*, 1993; Horwich and Lyon, 1990; Griffith *et al.*, 1989; Neville *et al.*, 1988; Horwich and Johnson, 1986; Horwich, 1983; Haarthorn, 1982; Konstant and Mittermeier, 1981). Criteria included:

1. Minimum of two familiar and unrelated animals will be released together for predator avoidance, sociality, foraging success and observation conspicuousness.
2. Animals must be behaviorally sound, physically adept and able to identify natural food sources.
3. Veterinarian supported health screenings including fecal floats and TB negative. Identification markers must be apparent for observational follow-up.
4. At least one animal must be two or more years old. Wild individuals disperse at that age.
5. The re-release area must be protected, have habitat capable of supporting howlers and be of low howler population density. An acclimatization period must be maintained in a natural setting minimizing human dependence and contact.
6. Soft-release methodology must be employed.

Release

In May 1999 the howler pair were relocated to a pre-selected wild release site located deep within MBNP. They were placed in a 2.4 cubic meter holding cage and fed favored fruits and native browse three times per day for a total of four days to acclimate to the new location. Some human contact was maintained to ensure a reasonable prediction of re-entry into this cage if necessary.

On Day four within MBNP, the animals were released during early morning. They immediately ran along the ground for approximately 10 m before heading up into trees. Maintaining continual visual or auditory contact with each other, within five minutes they located a native fruit tree. Three hours post-release, the animals were enticed back into the holding cage with the clicker, fed fruits and locked in overnight. This scenario was repeated for two additional days when, on the third day, they refused to re-enter. Supplemental feedings were offered three times per day. The animals refused altogether the browse presented. An increasing reluctance to accept more than one fruit feeding or to descend below 2.4 m of the ground quickly became apparent. Within fourteen days of release they became unresponsive to the clicker.

Behavioral analysis

Post-release data were collected from sunrise to sunset daily on behavior and ranging. Approximately 150 field-hours were documented between 30 May and 8 July 1999. A follow-up paper will be drafted documenting comparative behavior pre- and post-release. During Week five, a wild adult male joined the pair and remained in immediate proximity for 14 days. The rainy season began in earnest and flooding of the site made further access impossible. Within 14 days, the rains subsided and re-contact was attempted. On three separate occasions vocalizations were heard, yet the animals were not observed. After cutting and mapping new trails to the presumed location of the vocalization, re-contact was not confirmed. On 16 October, three unrelated howlers were observed, an adult male and female with one juvenile male. The next day this trio was observed in proximity of the repatriated pair. However disappointing it was to have missed this group formation, follow-up observations determined that this newly formed group of five animals has maintained habitual contact.

Discussion

It is believed that neither of the confiscated howlers had been with conspecifics for two-three months prior to introduction. The immediately successful introduction appears to be a result of an age-specific response. The primary author observed similar-aged, yet unfamiliar wild animals interacting, while adults of each group looked on. Eight months old is perhaps an ideal age for introductions. Additionally, these animals were probably juveniles rather than infants upon initial capture judging from their acceptance of a natural diet and the demonstration of appropriate predator responses. As of this writing, additional release candidates have been relocated to the WCCB. Primate surveys in surrounding areas of MBNP are planned.

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References

- Brockett, R. C., Horwich, R. H. and Jones, C. B. 2000. Female dispersal in the Belizean black howler monkey (*Alouatta pigra*). *Neotrop. Primates* 8(1): 32–34.
- Clark, B. and Brockett, R. 1999. Black howler monkey (*Alouatta pigra*) reintroduction program: Population census and habitat assessment. *Neotrop. Primates* 7(2): 51–53.
- Griffith, B., Scott, J. M., Carpenter, J. W. and Reed, C. 1989. Translocation as a species conservation tool: Status and strategy. *Science* 245: 477–480.
- Harthorn, A. M. 1982. Translocation as a means of preserving wild animals. *Oryx* 6: 215–227.
- Horwich, R. H. 1983. Species status of the black howler monkey, *Alouatta pigra*, of Belize. *Primates* 24: 288–289.
- Horwich, R. H. and Johnson, E. D. 1986. Geographic distribution of the black howler monkey (*Alouatta pigra*) in Central America. *Primates* 27: 53–62.
- Horwich, R. H. and Lyon, J. 1990. *A Belizean Rainforest*. Orang-Utan Press, Gays Mills, WI.
- Horwich, R. H., Koontz, F., Saqui, E., Saqui, H. and Glander, K. 1993. A reintroduction program for the conservation of the black howler monkey in Belize. *Endangered Species Update* 10: 1–6.
- IUCN. 1995a. *Draft Guidelines for Reintroductions*. Species Survival Commission (SSC) Reintroduction Specialist

Group, IUCN-The World Conservation Union, Gland, Switzerland.

- IUCN. 1995b. *Draft Guidelines for the Placement of Confiscated Animals*. Species Survival Commission Reintroduction Specialist Group, IUCN-The World Conservation Union, Gland, Switzerland.
- Konstant, W. R. and Mittermeier, R. A. 1981. Introduction, reintroduction and translocation of Neotropical primates: Past experience and future possibilities. *Int. Zoo Yearb.* 22: 69–77.
- Koontz, F. W., Horwich, R., Saqui, E., Saqui, H., Glander, K., Koontz, C. and Westrom, W. 1994. Reintroduction of black howler monkeys (*Alouatta pigra*) into the Cockscomb Basin Wildlife Sanctuary, Belize. In: *American Zoo and Aquarium Association Annual Conference Proceedings*, pp.104–111. AZA, Bethesda, Maryland.
- 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*, R. A. Mittermeier, A. B. Rylands, A. F. Coimbra-Filho and G. A. B. da Fonesca, (eds.), pp.349–454. World Wildlife Fund, Washington, DC.
- Ostro, L. E. T., Silver, S. C., Koontz, F. W., Young, T. P. and Horwich, R. 1999. Ranging behavior of translocated and established groups of black howler monkeys (*Alouatta pigra*) in Belize, Central America. *Biol. Conserv.* 87: 181–190.
- Ostro, L. E. T., Silver, S. C., Koontz, F. W. and Young, T. P. In prep. Habitat selection in translocated groups of black howler monkeys (*Alouatta pigra*) in Belize, Central America.
- Silver, S. C., Ostro, E. T., Yeager, C. P. and Horwich, R. 1999. The feeding ecology of the black howler monkeys (*Alouatta pigra*) in northern Belize. *Am. J. Primatol.* 45: 263–279.

ATTEMPTED PREDATION ON A WHITE-FACED SAKI IN THE CENTRAL AMAZON

Kellen A. Gilbert

During a survey of primates in a 100-ha isolated forest fragment, a crested eagle (*Morphnus guianensis*) attacked a young female white-faced saki (*Pithecia pithecia*). The forest fragment is one of the reserves of the Biological Dynamics of Forest Fragments Project (BDFFP) located about 80 km north of Manaus, Amazonas, Brazil. This area of the central Amazonian basin is upland terra firme moist forest (Bierregaard *et al.*, 1992). Six primate species, *Ateles paniscus*, *Alouatta seniculus*, *Cebus apella*, *Chiropotes satanas*, *Pithecia pithecia*, and *Saguinus midas* are in the reserve area, but only groups of *A. seniculus*, *P. pithecia*, and *S. midas* inhabit this 100-ha reserve (pers. obs). Potential avian predators of monkeys observed in the reserve area include *Harpia harpyja*, *M. guianensis*, and *Spizeatus ornatus* (Cohn-Haft *et al.*, 1997).

At 11:07, while conducting a primate survey, about 30 meters from the edge of the reserve, I observed a *P. pithecia* group. I counted three individuals; an adult male, an adult female, and a smaller female. The male was on a large horizontal branch

about 15 m above the ground, looking about while pacing and making a low chuck vocalization. The females were together about 10 m from the male. They appeared agitated and moved closer to the male as I observed. At 11:09 a large raptor flew from the interior of the reserve toward the group. The bird, a crested eagle, swooped down into the tree where the younger female was last seen. There was a loud screaming vocalization by the female and a loud sound of breaking branches. The attack took less than ten seconds. The eagle then flew at midstory toward the edge of the reserve. Immediately after the eagle left, the adult male saki returned to the location of the attack and appeared piloerected. The adult female then moved closer to the male and both left the area silently. I did not observe the eagle with the saki, nor did I find the body of the juvenile female. I did not see the younger female again however on repeated surveys of the group.

This is the first reported observation of an avian attack on *P. pithecia*. Crested eagles prey on a variety of small to medium-sized mammals. At a crested eagle nest in one of the BDFFP reserves, Bierregaard (1984) found the remains of small rodents, marsupials and two kinkajous (*Potos flavus*) whose adult weight is approximately 2.6 kg (Fonseca *et al.*, 1996). Julliot (1994) observed a crested eagle take a six to eight-month old spider monkey in French Guiana. An adult white-faced saki weighs approximately 1.5-2.25 kg (Buchanan *et al.*, 1981). An immature individual, weighing closer to the lower end of the range, could be a likely prey item for a crested eagle.

Buchanan *et al.* (1981) reported that a captive juvenile *P. pithecia* displayed an alarm reaction of freezing without vocalization when exposed to large bird silhouettes and to the overhead movement of large objects. This behavior is in contrast to the agitated behaviors of the sakis observed in this case. The saki group in the reserve was not habituated, so the reaction observed may have been due to the presence of the observer.

Observations of predation and attempted predation on primates are rare. In the neotropics, harpy eagles have been the most common predators observed to take immature and adult howling monkeys (Rettig, 1978; Eason, 1989; Peres, 1990; Sherman, 1991). Peres (1990) reported secondhand but reliable observations of harpy eagle predation on sakis and other primate species in Amazonia. The crested eagle needs to be considered a significant primate predator as well. Information on predation is needed for a more comprehensive examination of the constraints on free-ranging primate sociality. It is also important to note that the isolation of forest fragments, in this case, did not eliminate a large avian predator.

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References

- Bierregaard, R. O. Jr. 1984. Observations of the nesting biology of the Guiana crested eagle *Morphnus guianensis*. *Wilson Bull.* 96: 1-5.
- Bierregaard, R. O. Jr., Lovejoy, T. E., Kapos, V., Santos, A. A. dos and Hutchings, R. W. 1992. The biological dynamics of tropical rainforest fragments. *BioScience* 42: 859-866.
- Buchanan, D. B., Mittermeier, R. A. and Van Roosmalen, M. G. M. 1981 The saki monkeys, genus *Pithecia*. In: *Ecology and Behavior of Neotropical Primates, Vol. 1.*, A. F. Coimbra-Filho and R. A. Mittermeier (eds.), pp.391-417. Academia Brasileira de Ciências, Rio de Janeiro.
- Cohn-Haft, M., Whittaker, A. and Stouffer, P. C. 1997. A new look at the "species-poor" central Amazon: The avifauna north of Manaus, Brazil. *Ornithological Monographs* 48: 205-235.
- Eason, P. 1989. Harpy eagle attempts predation on adult howler monkey. *Condor* 91: 469-470.
- Fonseca, G. A. B. da, Herrmann, G., Leite, Y. L. R., Mittermeier, R. A., Rylands, A. B. and Patton, J. L. 1996. Lista Anotada dos Mamíferos do Brasil. *Occasional Papers in Conservation Biology* 4: 38pp. Conservation International, Washington, DC.
- Julliot, C. 1994. Predation of a young spider monkey (*Ateles paniscus*) by a crested eagle (*Morphnus guianensis*). *Folia Primatol.* 63: 75-77.
- Peres, C. A. 1990. A harpy eagle successfully captures an adult male red howler monkey. *Wilson Bull.* 102: 560-561.
- Rettig, N. L. 1978. Breeding behavior of the harpy eagle (*Harpia harpyja*). *Auk* 95: 629-643.
- Sherman, P. T. 1991. Harpy eagle predation on a red howler monkey. *Folia Primatol.* 56: 53-56.

INFANTICIDE FOLLOWING IMMIGRATION OF A PREGNANT RED HOWLER, *ALOUATTA SENICULUS*

Erwin Palacios

Red howler monkeys are among the several primate species showing male and female transfer (Crockett and Eisenberg, 1987; Glander, 1992; Crockett and Pope, 1993). Nevertheless, this emigration pattern differs from most polygynous primates in that red howler immatures of both sexes emigrate from natal groups (Crockett and Eisenberg, 1987), with females rarely succeeding in entering and breeding in a previously established troop (one that has produced offspring) (Crockett, 1984; Crockett and Pope, 1993). One of the facts preventing female immigration into an established troop is the aggressive attitude adopted by female residents. This is indeed a manifestation of the complex behavior identified

to mediate the emigration of some females. Female-female reproductive competition in this species appears to be directed at limiting the number of reproductive positions in a troop, and hence maintain small troop size (Crockett and Pope, 1993; Crockett, 1996).

Recently, a new hypothesis has pointed out infanticide as the most reasonable fact to explain small troop size in red howlers (Crockett and Janson, 1993, 2000). Infanticide has been well documented in red howlers (Rudran, 1979; Crockett and Sekulic, 1984; Izawa and Lozano M., 1994; Agoramoorthy, 1994; Crockett, 1998), and it is associated with male invasions of established groups, or within group male status changes, in order to gain access to reproductive females. By killing infants, males reduce the time to the mother's next conception.

During 1996, I studied the diet and ranging patterns of a group of red howler monkeys at Caparú Biological Station (1°5.55'S, 69°30.8'W), lower Rio Apaporis River, Colombia (Palacios, 1997, 1998; Palacios and Rodríguez, in review). I observed the group from January to December. The group was usually contacted for 3-5 days per month. At the beginning of the study, two adult females, one subadult female, an infant female, and three males (adult, juvenile and infant) composed the study group. The adult male was the same individual during the entire study period. I was able to recognize him by his particular facial physiognomy, and a little scar on his upper lip. This male was observed in the same group on November 1997, and on several additional occasions afterward.

Female immigration

On April 1, 1996, the group was moving to the western border of their home range, and arrived at a *Couma macrocarpa* tree (#84) (about 200 m away from the home range's border), where they spent 19 minutes feeding on ripe fruits. This part of the home range is located about 80-100 m from the highest water level of the Taraira Lake, and is deluged by small creeks flowing into the lake. The forest growing in this area is very low and shrubby, and heavy arboreal animals such as red howlers must circumvent it.

After feeding in tree #84, with the adult male leading the progression, the group moved 150 m to the west, going around the low vegetation area, and stopped for a moment. The adult male grunted, and then all the group members but the adult male moved back (i. e., to the east) around the low vegetation area, but following its southern border, until arriving at tree #85 (*Maquira guianensis*) where they began another feeding bout.

While the group was moving back, the adult male repeatedly grunted and then hid in the canopy. I kept contact with the rest of the group, waiting for the male to join the troop later. Ten minutes after the troop began to feed on tree #85, the adult male and a new female (that I had not observed before) moved toward the *Maquira* tree. The male grunted

twice, entered the tree with the female, and both began to feed with the other troop members. Female residents showed no aggression towards the female immigrant at that time, nor on the three subsequent days of observation in April.

Infant killing

In early May the immigrant female was observed with a newborn male (28 days old, according to our last date of contact with the group). On May 2, after feeding for a long time on tree #121 (*Couma macrocarpa*), the group moved in the linear fashion progression typical of red howlers, with the immigrant female being the closest one to the adult male, which was following them. At 2:52 h the adult male rapidly approached the immigrant female and attacked her, causing her to fall about 16 m to the ground. The adult resident females were about 20 m ahead, and rapidly returned. While they approached, the female climbed to a tree, where the male attacked her again, and roughly took away her little infant. The male moved to an adjacent creek area, where I was not able to observe him due to dense foliage and vines. I could not detect if the infant fell down, probably because of his very light weight. It was also possible that his small body remained wedged within the branches and dense vines.

Five minutes after this episode the group continued moving, with females in front and continuously grunting. The immigrant female was piloerected and clearly frightened by the male, which moved behind her, also grunting repeatedly. Thereafter, the group engaged in three feeding bouts on three different trees. The male participated in all but one. When he was not feeding, he remained watching the rest of the group from a neighboring tree, and continuously grunted. Some minutes later, when the group was feeding on young leaves at tree #116 (unidentified Fabaceae), the two adult female residents chased and expelled the adult male from the tree, when he approached where the immigrant female was feeding. Later the group arrived at sleeping tree #19, this tree had been used by the group before, and although they usually formed two or three subgroups (adult male always alone), the animals used to rest relatively close to each other (6-10 m apart), the animals entered the tree, adult male being the last one, and all but the male settled down to rest. The male moved to an adjacent tree, ten minutes later returned to the sleeping tree, and then he settled about 15 m away from the rest of the group, already resting in three different groups very close together (3-6 m apart). The next morning the male was observed resting in an adjacent tree, while the rest of the group remained in the sleeping tree. On the following two days, female residents displayed aggressive attitudes towards the male on three occasions, all in a feeding context. Over the next two days, the male repeatedly approached the immigrant female, but she always fled. On the second day, while the troop was moving, the immigrant female jumped between two trees, and the male grabbed her by the tail, pulled her towards him and mounted her. Copulation lasted 119 s. I did not observe further copulation bouts until the end of the study period (December 15, 1996).

Discussion

Red howler females may emigrate from natal groups because of within-group competition for breeding positions (Crockett, 1984, 1996). After dispersal, they attempt to join a troop in which to breed, but are more likely to succeed in joining a newly-formed troop and rarely enter established troops. In the present study, the troop composition included a juvenile, suggesting that it was not newly formed. No cases of female emigration in red howlers to date (Crockett, 1984, 1996; Crockett and Pope, 1993) have reported on emigrating pregnant females. On the contrary, this could be possible in mantled howler transient immigrant females (Glander, 1992). It is uncertain whether the immigrant female became pregnant in a newly formed troop that failed and broke up or in her natal group.

Successful red howler immigration into established troops is very infrequent (Crockett, 1984). By showing an aggressive attitude towards immigrants, female residents limit reproductive female membership to four (Sekulic, 1982; Crockett, 1996). The howler group at Caparú had only two adult females, both rearing infants, and a subadult. No aggressive attitudes were observed between resident and immigrant females, probably because female membership positions were not fully occupied. Nevertheless, it is uncertain whether resident females were able to detect the immigrant female's pregnancy, and whether this affected their decision. Glander (1992) described how mantled howler females joined established groups; males do help extragroup females entering a group, and once a female achieves entry into a group this way, it is no longer chased by the resident females and becomes a group member. The male's explicit acceptance of the new female is in accordance with Glander's observations, and could be considered as a definite fact leading to the extragroup female's success in entering the group.

Infanticide of infants born to pregnant females some time after entry of new males was reported by Crockett and Sekulic (1984). These observations and my own are consistent with the hypothesis that males can remember which females they mated with. Infanticide in red howlers has always been reported as a consequence of male status changes, whether this occurs by male takeovers, or changes within a troop. This is the first report on infanticide not associated with a male status change, and, regardless of the context in which it occurred, was related to the same benefit that infanticidal males seek after taking over a group or deposing a male of their own: a reproductive advantage by having access to a reproductive female. Nevertheless, this did not represent an immediate profit to the male, nor to the immigrant female; no new infants of the immigrant female were observed during the rest of the study period. I observed a new infant on November 1997, belonging to one of the adult female residents. This clearly agrees with Crockett's (1984) proposed costs of emigration; although the immigrant female succeeded in entering an established troop, she did not breed successfully (paying a high cost losing her infant) and, very likely, delayed her age at first, successful breeding. The latter could also be affected by the

fact that the other two infants (about eight and nine months old) in the group disappeared during June–July 1996 (probably because of food shortage or predation), leaving the male free to mate with any of the three reproductive females.

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References

- Agoramoorthy, G. 1994. An update on the long-term field research on red howler monkeys, *Alouatta seniculus*, at Hato Masaguaral, Venezuela. *Neotrop. Primates*. 2: 7–9.
- Crockett, C. M. 1984. Emigration by female red howler monkeys and the case for female competition. In: *Female Primates: Studies by Women Primatologists*, M. F. Small (ed.), pp.159–173. Alan R. Liss, New York.
- Crockett, C. M. 1996. The relation between red howler monkey (*Alouatta seniculus*) troop size and population growth in two habitats. In: *Adaptive Radiations of Neotropical Primates*, M. A. Norconk, A. L. Rosenberger and P. A. Garber (eds.), pp.489–510. Plenum Press, New York.
- Crockett, C. M. 1998. Family feuds. In: *The Primate Anthology: Essays on Primate Behavior, Ecology and Conservation from Natural History*, R. L. Ciochon and R. A. Nisbett (eds.), pp.28–35. Prentice Hall, Upper Saddle River, NJ.
- Crockett, C. M. and Eisenberg, J. 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.
- Crockett, C. M. and Janson, C. 1993. The costs of sociality in red howler monkeys: Infanticide or food competition? *Am. J. Primatol.* 30(4): 306.
- Crockett, C. M. and Janson, C. 2000. In press. Infanticide in red howlers: Female group size, male composition, and a possible link to folivory. In: *Infanticide by Males and its Implications*, C. P. van Schaik, and C. H. Janson (eds.), Cambridge University Press, Cambridge.
- Crockett, C. M. and Pope, T. 1993. Consequences of sex differences in dispersal for juvenile red howler monkeys. In: *Juvenile Primates: Life History, Development and Behavior*, M. E. Pereira and L. A. Fairbanks (eds.), pp.104–118. Oxford University Press, New York.
- Crockett, C. M. and Sekulic, R. 1984. Infanticide in red howler monkeys (*Alouatta seniculus*). In: *Infanticide: Comparative and Evolutionary Perspectives*, G. Hausfater and

- S. B. Hrdy (eds.), pp.173–191. Aldine, Hawthorne, New York.
- Glander, K. E. 1992. Dispersal patterns in Costa Rican mantled howling monkeys. *Int. J. Primatol.* 13(4): 415–436.
- Izawa, K. and Lozano, X. 1994. Social changes within a group of red howler monkeys (*Alouatta seniculus*). *Field Studies of New World Monkeys* 9: 33–39.
- Palacios, E. 1997. Limitantes Ecológicas de *Alouatta seniculus* en la Amazonía Colombiana. Final Report to Colciencias. Columbia.
- Palacios, E. 1998. Ecological bases for lake-and river-side habitat use of *Alouatta seniculus* in Colombian Amazonia. *ASP Bulletin* 22(3): 8.
- Palacios, E. and Rodríguez, A. In review. Ranging pattern and use of space in a group of red howler monkeys (*Alouatta seniculus*) in southeastern Colombian rainforest.
- Rudran, 1979. The demography and social mobility of a red howler (*Alouatta seniculus*) population in Venezuela. In: *Vertebrate Ecology in the Northern Neotropics*, J. F. Eisenberg (ed.), pp.107–126. Smithsonian Institution Press, Washington, DC.
- Sekulic, R. 1982. Behavior and ranging patterns of a solitary female red howler (*Alouatta seniculus*). *Folia Primatol.* 38: 217–232.

LEVANTAMENTO PRELIMINAR DE ENDOPARASITAS DO TUBO DIGESTIVO DE BUGIOS *ALOUATTA GUARIBA CLAMITANS*

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Introdução

As doenças parasitárias são responsáveis por considerável morbidade e mortalidade em todo o mundo, e freqüentemente estão presentes com sinais e sintomas não específicos. A recente descoberta de uma série de agentes infecciosos, inclusive definindo quadros clínicos até então não descritos, bem como a crescente expansão de doenças já conhecidas, tem feito ressurgir o debate sobre a importância das doenças infecciosas e parasitárias (DIPs), mesmo nos países de primeiro mundo (Berkelman, 1994). Yamashita (1963), em estudos parasitológicos com primatas do gênero *Alouatta* detectou a presença de *Mathevotaenia megastoma*, *Anchylstoma mycelis*, *Longiastriata dubis*, *Enterobius minutus*, *Dipetalonema atelenses*, *Microfilaria* sp., *Controrchis biliophilus*, *Filariopsis aspera*, *Raillietina demerariensis*, *Raillietina multistesticulata*, *Squanema bonnei* e *Raillietina alouattae*. Martins *et al.* (1997) encontraram ovos de parasitas em 33% das amostras de fezes de *Alouatta guariba*, porém não as identificaram. Luz *et al.* (1987) encontraram cistos de *Entamoeba coli*, *E. histolytica*, *Taenia* sp. e *Strongiloides* sp. em fezes de *Alouatta guariba*. Quanto à anatomia do trato

digestivo, o gênero *Alouatta* possui estômago avantajado, intestino curto, mas espaçoso, com fermentação bacteriana. Quanto à dieta, são folívoros comportamentais, possuindo seletividade quanto ao alimento, apresentando organização social, locomoção e nível de atividade que os torna adaptados à sua dieta (Milton, 1977). A espécie *Alouatta guariba*, descrita na região há 70 anos, encontra-se ameaçada devido a devastação da mata, ação de predadores e caça. Por isso, surgiu há sete anos o interesse pelo desenvolvimento de estudos científicos sobre o comportamento e hábitos destes animais, por professores e acadêmicos da Universidade Regional de Blumenau, Santa Catarina, com a finalidade de subsidiar as ações de preservação. O estudo de endoparasitoses intestinais em primatas no Brasil é bastante escasso, mas de extrema importância principalmente em populações que ocorrem em ambientes fragmentados, como é o caso da Mata Atlântica em Indaial, Santa Catarina.

Métodos

As coletas foram realizadas no período de julho de 1998 à março de 1999, sendo avaliados oito animais machos e duas fêmeas de diferentes faixas etárias, mantidos em cativeiro durante e pós quarentena, totalizando 165 amostras. A coleta de material de animais foi realizada semanalmente, no período da manhã, as fezes coletadas em frascos plásticos descartáveis contendo conservante SAF (920ml de solução fisiológica 0,85%, 50ml de ácido acético glacial, 30ml de formol e 5ml de glicerol). Durante o trajeto do CEPESBI-Centro de Pesquisas Biológicas de Indaial, Santa Catarina (local de coleta) até o laboratório, as amostras foram mantidas em conservante, dentro de caixa de isopor evitando calor excessivo e conseqüente deterioração de alguns organismos. A pesquisa e identificação dos parasitas foi realizada através de dois diferentes métodos: Método de Faust y Cols.-centrífugo flutuação em sulfato de zinco 33%; e Sedimentação Hoffmann -sedimentação espontânea das fezes em água (Moraes, 1984 e Pessoa, 1988).

Resultados e Discussão

Além dos resultados apresentados acima, nos animais de quarentena foram encontradas combinações de 5,46% de dois tipos de parasitas (*Giardia* sp. e *Enterobius* sp.). Nos animais de pós-quarentena observou-se a mesma combinação de parasitas, porém com maior freqüência (11,52%).

Estes resultados devem-se, talvez, pelo fato de que os animais de quarentena encontravam-se isolados em processo de aclimatação, sendo que, no período pós-quarentena os mesmos

Tabela 1. Freqüência relativa (%) dos parasitas encontrados nas amostras de fezes de dez animais analisados, durante nove meses de amostragem.

Parasitas	Quarentena (%)	Pós - quarentena (%)
<i>Giardia</i> sp.	61,54	77,92
<i>Enterobius</i> sp.	38,47	8,7
<i>Entamoeba</i> sp.	0	8,7
<i>Ancylostoma</i> sp.	0	8,7

encontravam-se em companhia de outros bugios, em contato direto com humanos e animais domésticos. Silva *et al.* (1997), em estudo com *Alouatta guariba clamitans*, identificaram seis gêneros distintos de parasitas entre protozoários e nematódios. Os protozoários representaram 17,87% de cistos de *E. coli* e 17,87% uma combinação de *E. coli* com *E. histolytica*. Dentre os nematódios foram encontrados 22,42% de ovos e larvas de ancilostomídeos. Os primatas neotropicais são hospedeiros de uma grande variedade de parasitas, entre eles muitas espécies de nematódios que ocorrem em animais capturados na natureza e em animais mantidos em cativeiro. Os primatas Cebidae, são altamente infectados por parasitas da família Oxyuridae (Inglis *et al.*, 1959 in Inglis *et al.*, 1965). De acordo com Yamashita *et al.* (1963) foram encontradas 228 espécies de helmintos, incluindo, 166 espécies de nematódios, cinco espécies de acantocéfalo, 24 espécies de trematódios e 33 espécies de cestódios em 103 espécies de primatas. São poucos os estudos parasitológicos relacionados diretamente ao *Alouatta guariba*, seja em ambiente natural ou em cativeiro (Hirano *et al.*, 1997). No presente estudo foram encontradas 23,64% de ocorrência de ovos, cistos e larvas nas amostras de fezes de *Alouatta guariba clamitans* em cativeiro, coletadas durante e pós-quarentena.

Conclusão

A verificação de um maior percentual de parasitas pós-quarentena levou à constatação de que ocorrem contaminações em cativeiro, as quais podem estar ligadas ao comportamento alimentar dos animais, ao contato com fezes, com outros macacos, animais domésticos e até mesmo com o homem. Os resultados desta pesquisa têm auxiliado a equipe do CEPESBI na adoção de medidas e procedimentos que minimizem a reinfestação dos animais. Em face da escassez de estudos referentes a endoparasitas intestinais de primatas no Brasil, este trabalho preliminar nos auxilia no entendimento de questões como a relação entre hospedeiro-parasita, bem como amplia o conhecimento da ecologia da espécie, fornecendo dados relevantes para planos de conservação e manejo da mesma.

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Referências

- Berkelman, R. L. 1994. Emerging infectious diseases in the United States. *J. Infect. Dis.* 170(2): 272-7.
- Hirano, Z. M. B., Marques, S. W., Wanke E. e Silva, J. C. 1997. Comportamento e hábitos dos bugios (*Alouatta fusca*, Primata, Cebidae), do Morro Geisler (Indaial, SC, Brasil). *Dynamis Blumenau* 5(19): 19-47.
- Inglis, W. e Cosgrove, G. E. 1965. The pin-worm parasite (Nematoda: Oxyuridae) of the Hapalidae (Mammalia: Primates). *Parasitology* 55: 35-82.
- Luz, V. L., Carvalho, A. C. T. e Pereira, L. H. 1987. Sobre alguns parasitas encontrados em inspeção preliminar de *Alouatta fusca* (Primatas Cebidae) da região de Caratinga, MG. *Resumos. XIV Congresso Brasileiro de Zoologia*, Universidade Federal de Juiz de Fora, Juiz de Fora, Minas Gerais.
- Martins, S. S., Limeira, V. A. G. e Rodrigues, M. L. A. 1997. Comportamento de defecação e ocorrência de endoparasitas nas amostras de *Alouatta fusca* num fragmento de mata semidecídua no Estado do Rio de Janeiro. *Anais do VII Congresso Brasileiro de Primatologia e V Reunião Latino-Americana de Primatologia*, João Pessoa.
- Milton, K. 1977. The foraging strategy of the howler monkey (*Alouatta palliata*) in the tropical forest of Barro Colorado Island, Panamá. Doctoral thesis, New York University, New York.
- Moraes, R. G. 1984. *Parasitologia e Micologia Humana*. 3ª edição. Ed. Cultura Médica, Rio de Janeiro.
- Pessoa, S. B. 1988. *Parasitologia Médica*. IIª. ed. Guanabara, Koogan, Rio de Janeiro.
- Silva, R. B., Anaruma Filho, F. e Kawazoe, U. 1997. Identificação e análise de endoparasitas intestinais de *Alouatta fusca clamitans* (Cabrera, 1940), de uma floresta tropical urbana de Campinas, São Paulo, Brasil. *Anais do VII Congresso Brasileiro de Primatologia e V Reunião Latino-Americana de Primatologia*, João Pessoa, Brasil.
- Yamashita, J. 1963. Ecological relationships between parasites and primates. *Primates* 4(1): 01-96.

DADOS PRELIMINARES SOBRE A ECOLOGIA DE *SAGUINUS NIGER* NA ESTAÇÃO CIENTÍFICA FERREIRA PENNA, CAXIUANÁ, PARÁ, BRASIL

Cecilia Veracini

Introdução

Saguinus niger (É. Geoffroy, 1803) ocorre na Amazônia oriental, sul do Rio Amazonas, leste dos Rios Xingú e Fresco, até o baixo Rio Araguaia incluindo o Arquipélago do Marajó (Napier, 1976; Hershkovitz, 1977; Ferrari e Lopes, 1996). Apesar de ser considerado relativamente comum (Rylands *et al.*, 1993), a sua ecologia e o comportamento na natureza são ainda pouco conhecidos e, até hoje há somente um estudo a longo prazo; na área de Paragominas, no leste do Pará (Mendes de Oliveira, 1996).

O presente trabalho relata alguns aspectos da ecologia alimentar e da utilização de habitats de *S. niger* observado na Estação Científica Ferreira Penna, Caxiuaná (ECPF). O in-

teresse do estudo na Floresta Nacional de Caxiuanã é devido a sua particular biodiversidade e grande grau de preservação (Almeida *et al.*, 1993; Lisboa *et al.*, 1997) em comparação com outras áreas da Amazônia oriental e, também, à presença de uma outra espécie de calitriquíneos, *Mico argentatus* (Linnaeus, 1771), pois a simpatria entre os gêneros *Saguinus* e *Mico* se encontra de fato em limitadas áreas na Amazônia (Ferrari, 1993; Lopes e Ferrari, 1994; Ferrari *et al.*, 1997).

Área de Estudo e Métodos

A área de estudo está localizada na Estação Científica Ferreira Penna, Caxiuanã, pertencente ao Museu Paraense Emílio Goeldi-CNPq, no Município de Melgaço, Pará. Esta área é constituída, em grande parte, de floresta de terra firme e abrange partes inundadas de igapó e formações de crescimento secundário (capoeiras), com idades estimadas em 3, 10, 25 e 40 anos, respectivamente, e altura média de 5 até 15-18 m, na época do estudo. As capoeiras incluídas na área de uso do grupo estudado compreendiam 10,5 ha, e as áreas inundadas aproximadamente 6 ha (para a descrição florística da área ver Lisboa *et al.*, 1997). Para estudar a utilização dos diferentes habitats foram consideradas as áreas de transição (10 m de passagem entre habitats primários e secundários).

Na área de estudo foi identificada a presença de um mínimo de três grupos sociais de *S. niger*. Para o estudo foi escolhido um grupo constituído de três indivíduos cuja a composição variou ao longo da pesquisa, passando a quatro indivíduos e depois a cinco nos últimos dias de observação. Foram abertas trilhas em sistema de quadrantes (50 x 50) de acordo com a área de vida do grupo. Observações não sistemáticas foram feitas sobre os três grupos sociais de *S. niger* em janeiro e fevereiro de 1996, enquanto o grupo de estudo foi habituado ao observador. Outros dados *ad libitum* (Altmann, 1974) sobre a alimentação e as interações inter-específicas foram coletados durante o estudo da espécie simpátrica *C. argentata* de janeiro a novembro de 1996 (Veracini, 1997). Dados quantitativos foram coletados nos meses de março, abril, julho, agosto e novembro de 1996, para um total de 80 horas (1.904 registros, 909 amostragens) distribuídas ao longo destes meses, com os animais sendo acompanhados em diferentes momentos do dia. O método usado foi a varredura instantânea ("instantaneous scan sampling", Altmann, 1974) com intervalos de cinco minutos por um minuto de amostra instantânea das atividades (Ferrari e Rylands, 1994). Em cada amostragem era anotado: a categoria comportamental (alimentação, forrageio, locomoção, descanso, atividade social), a altura (quando possível) de cada animal avistado e o tipo de habitat que o grupo ocupava. Em combinação, utilizou-se o registro de todas as ocorrências para a captura de presas animais e utilização de frutos e outros materiais vegetais. As árvores utilizadas para a alimentação foram marcadas e mapeadas para uma identificação sucessiva. Todos os frutos consumidos foram coletados e conservados em álcool a 70%. Os dados climatológicos gerais da área e do ano de 1996 foram obtidos na estação meteorológica da ECFP (Carvalho *et al.*, 1997).

Tabela 1. Padrão de atividade do grupo de estudo para 80 horas de observações.

	Registros	%
Locomoção	807	42,38
Forrageio	359	18,86
Alimentação	336	17,64
Atividades sociais	116	6,09
Descanso/parado	276	14,5
Outras atividades	10	0,53
Total dos registros	1.904	100

Resultados

Alimentação

A dieta do grupo de estudo foi constituída principalmente de itens vegetais (frutos maduros, néctar e exsudados vegetais). Nos meses de estudo os registros de itens alimentares foram 336 em 1904 registros (Tabela 1). Os componentes vegetais da dieta foram 95,5%, enquanto que as presas animais vertebrados e invertebrados, constituíram 4,5% dos registros alimentares. A fruta foi o alimento mais consumido com 48,81% dos registros de alimentação. O néctar e a goma foram 22,32% e 23,81% respectivamente.

Utilização de recursos vegetais

S. niger utilizou os frutos de 46 táxons diferentes e o néctar de quatro espécies (Tabela 2), para um total de 22 famílias diferentes. As mais representadas foram Sapotaceae, Mimosaceae e Burseraceae. A maior diversificação na utilização dos frutos ocorreu na estação da chuva (janeiro-junho). Neste período, a fruta constituiu a maior parte da alimentação dos animais, e os táxons mais importantes por números de registros foram: *Manilkara amazonica* e *Tapirira guianensis*, respectivamente 7,1% e 5,91% do total dos registros de alimentação com vegetais. Nos meses de julho e agosto, três espécies de frutos se destacaram (*Byrsonima aerugo*, *Goupia glabra* e *Inga lateriflora*) constituindo 17,39% do total dos registros de alimentação com vegetais. As partes dos frutos consumidos eram em sua maioria mesocarpos e arilos, não sendo observada a predação de sementes. As observações quantitativas e *ad libitum* indicam que os exsudados vegetais e o néctar constituíram importantes recursos sobretudo em períodos de maior escassez de frutas. O grupo utilizou os exsudados de oito táxons (Tabela 3) e foi observado frequentemente comendo a goma dos orifícios produzidos pelo *C. argentata* em árvores de *Parkia ulei* e *Tapirira guianensis*. Os exsudados mais utilizados foram da espécie *Parkia ulei* (7,78% do total dos registros de alimentação com vegetais) e a concentração das atividades do grupo ao redor destas árvores no mês de julho foi um aspecto relevante do comportamento. O consumo de néctar aumentou nos últimos meses da pesquisa (de agosto até novembro); neste período 50% dos registros de alimentação com vegetais foram de néctar, principalmente *Inga alba* e *Symphonia globulifera*. No mês de novembro o néctar de *Symphonia globulifera* constituiu 69,8% do total dos registros de alimentação com vegetais naquele mês.

Tabela 2. Frutos e néctar utilizados por *S. niger* no período de estudo. * A = árvore, C = cipó, Ar= arbusto. Hábitat = habitats em que os animais foram vistos alimentando-se da espécie; M = terra firme, I = igapó, C = capoeira. § néctar

Táxon	Família	*	Meses	Hábitat
<i>Pouroma guianensis</i>	Cecropiaceae	A	Jan-Fev	M-C
<i>Pouroma velutina</i>	Cecropiaceae	A	Jan-Fev	C
<i>Myrcia splendens</i>	Myrtaceae	A	Jan	C
<i>Tetragastris altissima</i>	Burseraceae	A	Jan	M-C
<i>Inga falcistipula</i>	Mimosaceae	A	Fev-Mar	C
<i>Protium trifoliolatum</i>	Burseraceae	A	Fev-Mar	C - M
<i>Myrcia atramentifera</i>	Myrtaceae	Ar/A	Abr-Maio	C
<i>Tetragastris panamensis</i>	Burseraceae	A	Fev-Mar	C
<i>Casearia decandra</i>	Flacourtiaceae	A	Mar	M-C
Família indeterminada		C	Mar	M
Espécie indeterminada	Sapotaceae	A	Mar	M
Espécie indeterminada	Sapotaceae	A	Mar	M
<i>Inga cf. disticha</i>	Mimosaceae	A	Mar	M
<i>Tapirina guianensis</i>	Anacardiaceae	A	Mar-Abr	C
<i>Salacia</i> sp.	Hippocrateaceae	C	Mar	C
<i>Inga thibaudiana</i>	Mimosaceae	A	Mar-Abr	C
<i>Planchonella oblanceolata</i>	Sapotaceae	A	Mar	M
<i>Micropholis cf. venulosa</i>	Sapotaceae	A	Mar	M
<i>Protium tenuifolium</i>	Burseraceae	A	Mar	M
<i>Parahancornia amapa</i>	Apocynaceae	A	Abr	M
<i>Manilkara amazonica</i>	Sapotaceae	A	Abr	M
<i>Maripa scadens</i>	Convolvulaceae	C	Abr	M - I
<i>Dilleniaceae</i> sp.	Sapotaceae	A	Abr	M
<i>Dialium guianense</i>	Caesalpiniaceae	A	Abr	M
Espécie indeterminada	Hippocrateaceae	C	Abr	M
<i>Nectandra</i> sp.	Lauraceae	A	Abr	M
Família indeterminada		A	Abr	M
Espécie indeterminada	Sapotaceae	A	Abr	M
<i>Protium decandrum</i>	Burseraceae	A	Abr	M
<i>Henriettea succosa</i>	Melastomataceae	A	Abr	M
<i>Lacunaria</i> sp.	Quiinaceae	A	Abr	M
<i>Franchetella sagotiana</i>	Sapotaceae	A	Abr	M
Espécie indeterminada	Sapotaceae	A	Abr	M
Família indeterminada		A	Maio	M
<i>Rollinia esxucca</i>	Annonaceae	A	Maio	C
<i>Mendocia hoffmannseggiana</i>	Acanthaceae	A	Maio	M
<i>Quiina amazonica</i>	Quiinaceae	A	Maio	M
<i>Byrsonima aerugo</i>	Malpighiaceae	A	Maio-Jun-Jul	C
cf. <i>Moronobea</i> sp. §	Guttiferae	A	Maio-Jun	I
<i>Strychnos guianensis</i>	Loganiaceae	C	Jun	C
<i>Cordia</i> sp.	Boraginaceae	A	Jul	M
<i>Lacmellea aculeata</i> §	Apocynaceae	A	Jul	M-C
<i>Inga heterophylla</i>	Mimosaceae	A	Ago-Out-Set	C
<i>Goupia glabra</i>	Celastraceae	A	Ago-Set	C
<i>Eugenia biflora</i>	Myrtaceae	A	Ago-Set	C
<i>Inga lateriflora</i>	Mimosaceae	A	Ago-Out-Set	C
<i>Inga alba</i> §	Mimosaceae	A	Ago	C
<i>Symphonia globulifera</i> §	Guttiferae	A	Set-Out-Nov	I
<i>Miconia holosericea</i>	Melastomataceae	A	Out	M
Família indeterminada		A	Nov	M

Tabela 3 - Espécies utilizadas na exploração de exsudados. * A = árvore. § exsudados provenientes de frutos; # exsudados presentes no haste das folhas. M = terra firme, C = capoeira.

Espécie	Família	*	Meses	Hábitat
<i>Parkia ulei</i>	Mimosaceae	A	Jul-Ago-Sep	C-M
<i>Parkia pendula</i> §	Mimosaceae	A	Abr-Nov	M
cf. <i>Parkia oppositifolia</i> §	Mimosaceae	A	Abr-Nov	M-C
<i>Tapirina guianensis</i>	Anacardiaceae	A	Mar-Jul	C
<i>Anacardium giganteum</i>	Anacardiaceae	A	Jul	M
<i>Sterculia pruriens</i> #	Sterculiaceae	A	Nov	M
<i>Cochlospermum orinocensis</i>	Cochlospermaceae	A	Nov	C
<i>Vochysia obscura</i>	Fabaceae	A	Jul-SNov	M

Atividade de forrageio

A atividade de forrageio (procura de insetos e outras presas animais) ocupa de 16% até 45% das atividades do gênero *Saguinus* (Snowdon e Soini, 1988). O grupo de estudo em Caxiuana dedicou 18,86% (n = 359) do tempo total de observação nesta atividade (Tabela 1). *S. niger* foi observado procurando presas animais em vários substratos e microhabitats (sub-bosque aberto, copa das árvores, área de margem com densa vegetação), chegando a seguir as presas no chão, mas principalmente nas copas das árvores do baixo-médio estrato da floresta. Na busca das presas, a intensa observação do meio pareceram mais importante do que a manipulação dos substratos. A altura mais utilizada para esta atividade foi entre 6 e 15 metros (72% dos registros, Fig. 1). Não houve uma preferência significativa na utilização de áreas primárias (terra firme e igapó) e secundárias (capoeiras e áreas de transição) durante a atividade de forrageio: 35,65% desta atividade ocorreu em floresta primária de terra firme, 37,61% em áreas de capoeira, 15,04% em áreas de transição e 11,7% no igapó. No geral, foi difícil observar as presas dos saguis e somente as maiores foram identificadas (dois fasmídeos, um mantóideo, quatro ortópteros). Foi observada somente uma captura de um vertebrado; uma perereca (Classe Anura).

Utilização de habitats

O grupo de estudo utilizou uma área de vida de 35 ha, mas o tamanho é provavelmente maior uma vez que o grupo saiu várias vezes da parte demarcada. Houve sobreposição de área entre os diferentes grupos e não foi identificada uma parte de uso exclusivo do grupo. Foram observadas muitas interações agonísticas entre os grupos sociais, sobretudo na época da chuva perto das árvores de fruta. Nos cinco meses de estudo quantitativo, o grupo de estudo utilizou a capoeira em 38,6% do tempo (a capoeira de três anos de idade não foi frequentada), a terra firme em 46,24%, o igapó em 6,42% e as áreas de margem por 8,74% do tempo. É provável que as frequências no igapó e, talvez na terra firme, sejam subestimadas devido à maior dificuldade de encontrar e observar os animais nestes habitats. Na época da chuva as observações no igapó foram quase impossíveis pelo alto nível da água e houve dificuldades na terra firme, onde as alturas utilizadas eram frequentemente superiores a 20 m, em seguir um grupo de somente três indivíduos. A utilização dos diferentes habitats pareceu seguir um padrão sazonal correlacionado com a disponibilidade dos recursos vegetais (por exemplo o igapó foi muito freqüentado no final da estação seca em correspondência com o abundante consumo do néctar de *Symphonia globulifera*), mas no total não houve diferença significativa entre o uso dos habitats primários e secundários. *S. niger* foi ativo em todos os estratos da floresta, utilizando, às vezes, alturas superiores a 30 m, mas foi observado sobretudo (68,3% dos registros) na parte média da mata de 6 até 20 m (Fig. 1). A média das alturas dos substratos utilizados foi de 15,5 m.

Discussão

Estudos precedentes sobre a alimentação do gênero *Saguinus* relataram uma dieta de frutos, néctar, exsudados vegetais, fungos, casca de árvores, presas animais invertebradas e

vertebradas (Sussman e Kinzey, 1984; Snowdon e Soini, 1988; Garber, 1993). Os frutos foram os componentes mais consumidos por *S. niger* em Caxiuana, assim como o observado no estudo em Paragominas sobre a mesma espécie, onde os frutos foram 87,5% dos itens alimentares (Mendes de Oliveira, 1996). As famílias mais utilizadas pelo grupo de estudo (Sapotaceae, Mimosaceae, Burseraceae, Guttiferae) foram também observadas na dieta de outras espécies (Snowdon e Soini, 1988; Garber, 1993; Peres, 1993b; de la Torre *et al.*, 1995) e na espécie *S. midas* (Mittermeier, 1977). Em comparação com o grupo estudado em Paragominas, o número de táxons vegetais na alimentação foi muito maior (59 contra 18), indicando que a dieta de *S. niger* é dependente da disponibilidade e diversidade ambiental mais que de uma preferência espécie-específica.

Um intenso uso de néctar já havia sido observado em outros *Saguinus* amazônicos (Janson *et al.*, 1981; Terborgh e Wilson, 1983; Egler, 1992; Peres, 1993b). O néctar de *Symphonia globulifera* demonstrou ser um recurso importante na dieta de *S. niger* sobretudo na época menos chuvosa do ano, quando há escassez de frutos nas florestas de terra firme. As áreas inundadas de Caxiuana (onde se encontra uma alta densidade de *Symphonia globulifera*) chegam ao pico reprodutivo em termos de flôres e frutos em novembro, e podem servir como sítios alternativos de alimentação para mamíferos e aves.

O consumo de exsudados vegetais é bastante comum entre os calitriquídeos e fundamentalmente sazonal para a maioria das espécies do gênero *Saguinus* (Terborgh, 1983; Soini, 1987; Peres, 1993b). O uso de exsudados não foi descrito em *S. midas* por Mittermeier (1977) e Kessel (1995), embora A. Rylands observou a ingestão da goma produzida espontaneamente das vagens de *Parkia pendula* por essa espécie nas reservas do Projeto Dinâmica Biológica de Fragmentos Florestais, ao norte de Manaus em 1982–1983. Mendes de Oliveira (1996) também relatou o uso de gomas de *Parkia pendula* por *S. niger* em Paragominas (3,1% dos registros alimentares). Para *S. niger*, em Caxiuana, os exsudados parecem ter um papel mais

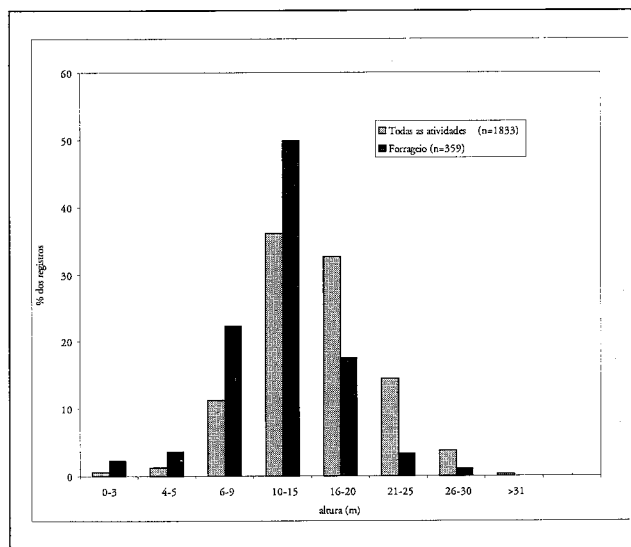


Figura 1. Altura preferencial ocupada pelo grupo de estudo.

importante, seja em termos de um maior número de táxons explorados seja de um maior consumo em porcentagem. Além das fontes de exsudados provenientes de frutos, ou das lesões de insetos, ou de outros agentes, os saguis fizeram um grande uso da goma proveniente dos orifícios abertos pelo *C. argentata* em árvores de *Parkia ulei* e *Tapirira guianensis*, comportamento observado pela primeira vez nesta espécie. Este fenômeno de parasitismo (Snowdon e Soini, 1988) foi reportado em outros casos de simpatria entre as espécies *Callithrix emiliae* e *Saguinus fuscicollis weddelli* (Lopes e Ferrari, 1994) e *S. fuscicollis* e *Cebuella pygmaea* (Soini, 1988).

A porcentagem de presas animais na dieta foi provavelmente subestimada pela dificuldade de observação em consequência do freqüente uso de alturas maiores de dez metros. De uma forma geral, o tipo de forrageamento de *S. niger* é parecido com aquele descrito para *Saguinus imperator*, *Saguinus mystax* e *Saguinus labiatus* que utilizam em prevalência os estratos baixos e médios da floresta. Isto se diferencia daquele mostrado pelo *S. fuscicollis* caracterizado por uma intensa atividade manipulatória e por um maior uso do sub-bosque e da parte baixa da floresta (Garber, 1993b).

S. niger ocorre em vários tipos de habitats na Amazônia oriental (Ferrari e Lopes, 1996); em áreas de floresta primária como de floresta secundária, chegando nas áreas submontanas no sul do Pará (Ferrari e Lopes Ferrari, 1990). O uso de habitats secundários parece preferencial em Paragominas (Mendes de Oliveira, 1996), mas neste estudo não teve diferença significativa entre o uso das áreas primárias (terra firme e igapó) e secundárias ou de transição. A distribuição ou preferência para um particular tipo de presa animal não parecem fatores determinantes na escolha dos habitats, mas precisam de outros dados para uma melhor interpretação deste aspecto. Um uso maior da floresta de terra firme por *S. niger* em comparação com outros sítios da Amazônia oriental, tem sido observado também por Bobadilla e Ferrari (2000) que trabalharam numa outra área da ECFP. A grande biodiversidade em termos de composição botânica (Lisboa *et al.*, 1997) observada em todos os habitats de Caxiuanã é provavelmente responsável por uma utilização menos seletiva das diferentes áreas. No geral um uso de diferentes habitats e a inclusão de uma grande diversidade de vegetação na área de vida parece fundamental para *S. niger* assim como observado em outras espécies do gênero *Saguinus* na Amazônia ocidental (Terborgh, 1995; Peres, 1993a). O tamanho da área de vida do grupo em Caxiuanã foi comparável com aquele observado na espécie *S. midas* (34-39 ha) por Kessel (1996) e foi sensivelmente maior daquele observado por *S. niger* em Paragominas (15,6 ha). A preferência de *S. niger* para o estrato médio da floresta foi observada também por Bobadilla e Ferrari (2000) enquanto Mendes de Oliveira (1996) relatou uma média menor das alturas ocupadas.

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Referências

- Almeida, S. S. de, Lisboa, P. L. B. e Silva, A. S. L. 1993. Diversidade florística de uma comunidade arbórea na Estação Científica Ferreira Penna, em Caxiuanã (Pará). *Bol. Mus. Pará. Emílio Goeldi, Bot.* 9(1): 93-188.
- Altmann, J. 1974. Observational study of behaviour: Sampling methods. *Behaviour* 49: 227-267.
- Bobadilla, U. L. e Ferrari S. F. 2000. Habitat use by *Chiropotes satanas utahicki* and syntopic Platyrrhines in eastern Amazonia. *Am. J. Primatol.* 50: 215-224.
- Carvalho de Moraes, J., Costa, J.P.R. da, Rocha, E.J.P. e Silva I.M.O. da 1997. Estudos hidrometeorológicos na bacia do Rio Caxiuanã. In: *Caxiuanã*, P. L. Lisboa (org.), pp.85-95. Museu Paraense Emílio Goeldi, Belém, Pará.
- de la Torre, S., Campos, F. e De Vries, T. 1995. Home range and birth seasonality of *Saguinus nigricollis graellsii* in Ecuadorian Amazonia. *Am. J. Primatol.* 37: 39-56.
- Egler, S. G. 1992. Feeding ecology of *Saguinus bicolor bicolor* (Callitrichidae: Primates) in a relict forest in Manaus, Brazilian Amazonia. *Folia Primatol.* 59: 61-76.
- Ferrari, S. F. 1993. Ecological differentiation in the Callitrichidae. In: *Marmosets and Tamarins: Systematics, Behaviour and Ecology*, A. B. Rylands (ed.), pp.314-328. Oxford University Press, Oxford.
- Ferrari, S. F. e Lopes Ferrari, M. A. 1990. A survey of primates in central Pará. *Bol. Mus. Pará. Emílio Goeldi, Zool.* 6(2): 169-179.
- Ferrari, S. F. e Lopes, M. A. 1996. Primate populations in eastern Amazonia. In: *Adaptive Radiations of Neotropical Primates*, M. A. Norconk, A. L. Rosenberger and P. A. Garber (eds.), pp.53-67. Plenum Press, New York.
- Ferrari, S. F. e Rylands, A. B. 1994. Activity budgets and differential visibility in field studies of three marmosets (*Callithrix* spp.). *Folia Primatol.* 63: 78-83.
- Garber, P. A. 1988. Diet, foraging patterns, and resource defense in a mixed species troop of (*Saguinus mystax* and *Saguinus fuscicollis*) in Amazonian Peru. *Behaviour* 105: 18-34.
- Garber, P. A. 1993a. Seasonal patterns of diet and ranging in two species of tamarin monkeys: Stability versus variability. *Int. J. Primatol.* 14(1): 145-166.
- Garber, P. A. 1993b. Feeding ecology and behaviour of the genus *Saguinus*. In: *Marmosets and Tamarins: Systematics, Behaviour, and Ecology*, A. B. Rylands (ed.), pp.273-293. Oxford University Press, Oxford.

- Hershkovitz, P. 1977. *Living New World Monkeys, Part 1 (Platyrrhini), With an Introduction to Primates*. Chicago University Press, Chicago.
- Janson, C. H., Terborgh, J. e Emmons, L. H. 1981. Non-flying mammals as pollinating agents in the Amazonian forest. *Biotropica (suppl.)* 14: 1–6.
- Kessler, P. 1995. Revierverhalten, Nahrungsstrategie und Habitatpräferenzen des Rothändtamarins (*Saguinus midas midas*) in Franzosish-Guayana. Diplomarbeit Anthropologisches Institut und Museum der Universität Zürich.
- Lisboa P. L. B., da Silva A. S. L. e de Almeida S. S. 1997. Florística e estrutura dos ambientes. In: *Caxiuanã*, P. L. Lisboa (org.) pp.163–193. Museu Paraense Emílio Goeldi, Belém, Pará.
- Lopes, M. A. e Ferrari, S. F. 1994. Foraging behavior of a tamarin group (*Saguinus fuscicollis weddelli*) and interactions with marmosets (*Callithrix emiliae*). *Int. J. Primatol.* 15(3): 373–387.
- Mendes de Oliveira, A. C. 1996. Ecología e comportamento alimentar de um grupo de *Saguinus midas niger* (Callitrichidae, Primates) na Amazônia Oriental. Dissertação de Mestrado, Universidade Federal do Pará, Belém.
- Mittermeier, R. A. 1977. The distribution, Synecology and Conservation of Surinam Monkeys. Unpublished Ph.D. dissertation, University of Harvard, Cambridge.
- Mittermeier, R. A. e Van Roosmalen, M. G. M. 1981. Preliminary observations on habitat utilization and diet in eight Surinam monkeys. *Folia Primatol.* 36: 1–39.
- Napier, P. H. 1976. *Catalogue of Primates in the British Museum (Natural History). Part 1: Families Callitrichidae and Cebidae*. British Museum (Natural History), London.
- Peres, C. A. 1993a. Structure and spatial organization of an Amazonian *terra firme* forest primate community. *J. Trop. Ecol.* 9: 259–276.
- Peres, C. A. 1993b. Diet and feeding ecology of saddle-back (*Saguinus fuscicollis*) and moustached tamarins (*Saguinus mystax*) in an Amazonian *terra firme* forest. *J. Zool. Lond.* 230: 567–592.
- Rylands, A. B., Coimbra-Filho, A. F. e Mittermeier, R. A. 1993. Systematics, geographic distribution, and some notes on the conservation status of the Callitrichidae. In: *Marmosets and Tamarins: Systematics, Behaviour, and Ecology*, A. B. Rylands (ed.), pp.11–77. Oxford University Press, Oxford.
- Snowdon, C. T. e Soini, P. 1988. The tamarins, genus *Saguinus*. In: *Ecology and Behavior of Neotropical Primates, Vol. 2*, R. A. Mittermeier, A. B. Rylands, A. F. Coimbra-Filho e G. A. B. da Fonseca (eds.), pp.223–298. World Wildlife Fund-US, Washington, DC.
- Soini, P. 1987. Ecology of the saddleback tamarin *Saguinus fuscicollis illigeri* on the Río Pacaya, northeastern Peru. *Folia Primatol.* 49: 11–32.
- Soini, P. 1988. The pygmy marmoset, genus *Cebuella*. In: *Ecology and Behavior of Neotropical Primates, Vol. 2*, R. A. Mittermeier, A. B. Rylands, A. F. Coimbra-Filho e G. A. B. da Fonseca (eds.), pp.79–129. World Wildlife Fund-US, Washington, DC.
- Sussman, R. W. e Kinzey, W. G. 1984. The ecological role of the Callitrichidae. *Am. J. Phys. Anthropol.* 64: 419–449.
- Terborgh, J. 1983. *Five New World Primates: A Study in Comparative Ecology*. Princeton University Press, Princeton, NJ.
- Terborgh, J. 1985. The ecology of Amazonian primates. In: *Amazonia*, G. T. Prance e T. E. Lovejoy (eds.), pp.284–304. Pergamon Press, New York.
- Terborgh, J. e Wilson, A. C. 1983. Ecología y comportamiento de *Saguinus* en el Parque Nacional del Manu, Perú. *Symposio de Primatología*, pp.167–173. Arequipa, Perú.
- Veracini, C. 1997. O comportamento alimentar de *Callithrix argentata* (Linnaeus, 1771) (Primates, Callitrichinae). In: *Caxiuanã*, P. L. Lisboa (org.), pp.437–446. Museu Paraense Emílio Goeldi, Belém, Pará.

A POSSIBLE RECORD OF *CALLICEBUS* IN ARGENTINA

Marcelo F. Tejedor

The platyrrhine skull N° 17.3 (Fig. 1) held by the Mammalogy Section of the Museo Argentino de Ciencias Naturales (MACN), Buenos Aires, is undoubtedly attributable to *Callicebus*, and came from the Argentine province of Formosa. In January 10, 1917, Mr. Cáceres sold several mammalian specimens from Formosa, including *Panthera onca*, *Myrmecophaga*, *Tamandua* and the skull of *Callicebus* to the MACN. Although this is the first record of *Callicebus* in Argentina, the remaining genera certainly occur there.

The titi monkey, genus *Callicebus*, is one of the most diversified platyrrhines, widely distributed throughout the neotropical forests especially in the Amazon and Orinoco basins, but also in other regions such as the Atlantic and Paraná forests in Brazil, as well as in Bolivia and northwestern Paraguay (Hershkovitz, 1988, 1990). Following the latest taxonomic revision by Hershkovitz (1990), the genus *Callicebus* includes 13 species divided into four species-groups: *modestus*, *donacophilus*, *moloch* and *personatus*. Among the *donacophilus* group, *C. donacophilus* occurs in the southernmost part of the geographic range for the genus (excluding the isolated *personatus* group in the south east

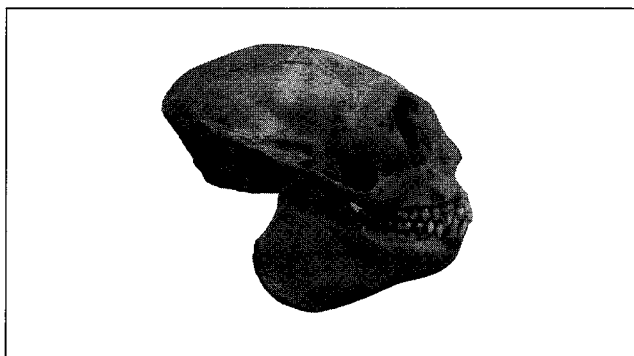


Figure 1. Skull of *Callicebus*. No. 17.3 in the Museo Argentino de Ciencias Naturales, Buenos Aires.

of Brazil, at about the same latitude). In Paraguay, *C. donacophilus pallescens* reaches the Pilcomayo river, a geographic boundary between Paraguay and Argentina, but there are no reports from the Argentine border.

A more precise location for the specimen from Formosa was not provided by the collector Cáceres. Fieldwork in the area, will be needed to confirm the continued occurrence or otherwise of *Callicebus* in Argentina.

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References

- Hershkovitz, P. 1988. Origin, speciation and distribution of South American titi monkeys, genus *Callicebus* (Family Cebidae, Platyrrhini). *Proc. Acad. Nat. Sci. Philadelphia* 140: 240–272.
- Hershkovitz, P. 1990. Titis, New World monkeys of the genus *Callicebus* (Cebidae, Platyrrhini): A preliminary taxonomic review. *Fieldiana Zoology, new series* 55: 1–109.

TWINNING IN SEMI-FREE RANGING CAPUCHIN MONKEYS (*CEBUS APELLA*)

Massimo Mannu
Eduardo B. Ottoni

The majority of primates give birth to a single offspring, except for callitrichids (Fleagle, 1999) and some prosimians (Mittermeier *et al.*, 1994). Twinning is rare in other species. In captivity Stott (1952) and D'Amato and Eisenstein (1972) reported twinning in *Cebus apella*, Pissinatti *et al.* (1999) in



Figure 1. *Cebus apella* twins.

C. xanthosternos and Altmann *et al.* (1988) in *Callimico goeldii*. In the wild, Strier, (1990) mentions one case in *Brachyteles arachnoides*, Crockett and Rudran, (1987) in *Alouatta semiculus*, Chapman and Chapman, (1986) in *Alouatta palliata*, Bicca-Marques and Calegare-Marques, (1990) in *Alouatta caraya*, Knogge and Heymann, (1995) in *Callicebus cupreus cupreus*, and Aquino *et al.* (1990) in *Aotus vociferans*.

A semi-free ranging capuchin group lives in a semi-reforested area of 180,000 m² in Tieté Ecological Park, São Paulo, Brazil. They have been studied since January 1996 (Ottoni and Mannu, in press) and now comprise a group of 23 individuals. In this long-term study, two out of 11 births were sets of twins. The sets of twins were born to the same mother. The first birth was reported by the veterinary Liliane Milanello in September 1996. The surviving infant (Frank) is now three and a half years old. The second twinning occurred early in the morning of May 22, 1999, when the observer arrived one of the newborns was still wet. As far as we know this is the first report of capuchin monkey twinning in semi-free ranging conditions. On the day of the birth the smaller newborn was being carried by its mother in a ventral position, whereas its bigger brother was being carried in transverse-dorsal position. On the second day both of them were being carried in transverse-dorsal position (Fig. 1). The smaller newborn was found dead on the morning of May 24, 1999, while still being carried by its mother. The other twin (Darwin) was still alive in July, 2000.

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References

- Altmann, J., Warneke, M. and Ramer, J. 1988. Twinning among *Callimico goeldii*. *Int. J. Primatol.* 9(2): 165–168.
- Aquino, R., Puertas, P. and Encarnación, F. 1990. Supplemental notes on a population of northeastern peruvian night monkeys, genus *Aotus* (Cebidae). *Am. J. Primatol.* 21(2): 215–221.
- Bicca-Marques, J. C. and Calegare-Marques, C. 1994. Twins or adoption? *Neotrop. Primates* 2(3): 6–7.
- Chapman, C. and Chapman, L. J. 1986. Behavioural development of howling monkey twins (*Alouatta palliata*) in Santa Rosa National Park, Costa Rica. *Primates* 27(3): 377–381.
- Crockett, C. M. and Rudran, R. 1987. Red howler monkey birth data I: Seasonal variation. *Am. J. Primatol.* 13(4): 347–368.
- D'Amato, M. R. and Eisenstein, N. 1972. Twinning in the New World monkey, *Cebus apella*. *J. Mammal.* 53(2): 406–407.
- Fleagle, J. C. 1999. *Primate Adaptation and Evolution*, Academic Press, New York.
- Knogge, C. and Heymann, E. W. 1995. Field observation of twinning in the dusky titi monkey, *Callicebus cupreus*. *Folia Primatol.* 65(2): 118–120.

- Mittermeier, R. A., Tattersall, I., Konstant, W. R., Meyers, D. M. and Mast, R. B. (eds.) 1994. *Lemurs of Madagascar*. Conservation International Tropical Field Guide Series, Washington, DC.
- Otoni, E. B. and Mannu, M. In press. Semi-free ranging capuchin monkeys (*Cebus apella*) spontaneously use tools to crack open nuts. *Int. J. Primatol.*
- Pissinatti, A., Coimbra-Filho, A. F., Rylands, A. B. and Rubião, E. C. N. 1999. A twin birth in *Cebus xanthosternos* (Wied, 1820) (Cebidae, Primates). *Neotrop. Primates* 7(1): 21–24.
- Stott, K. 1953. Twinning in hooded capuchin. *J. Mammal.* 34(3): 385.
- Strier, K. B. 1991. Demography and conservation of an endangered primate, *Brachyteles arachnoides*. *Conserv. Biol.* 5(3): 214–218.

News

THREATENED PRIMATES OF MESOAMERICA AND SOUTH AMERICA - THE RED LIST 2000

Anthony B. Rylands
Ernesto Rodríguez-Luna

The 2000 IUCN Red List of Threatened Species was launched on 28 September, 2000. It was compiled by Craig Hilton-Taylor, and the assessment for primates was coordinated by the IUCN/SSC Red List Authority for primates, Russell A. Mittermeier, Chair of the Primate Specialist Group (PSG), along with the Deputy Chairs for the PSG: William R. Konstant and Anthony B. Rylands. The 2000 assessment lists 39 species and 66 species and subspecies of Neotropical primates as threatened, with a further 15 as "Data Deficient". The taxonomy used for the assessment for the 2000 Red List was that resulting from the Primate Specialist Group workshop held in Orlando, Florida, in February 2000 (Rylands *et al.*, 2000). As with the 1996 Red List, the criteria used to assess these species were those published by IUCN in 1994 (IUCN, 1994). Future Red List assessments will use a revised version of these criteria; "the 2000 criteria", which have been approved by IUCN/SSC and will be published in an upcoming issue of *Neotropical Primates*.

The numbers for Mesoamerica and South America are shown in Tables 1 and 2, along with the distributions by country and the criteria which determine their status. Mesoamerican countries have three species and 13 species and subspecies considered threatened, and there are 36 species and 56 species and subspecies threatened in South America (Table 1). Nine species are "Critically endangered", all from the Atlantic forest in Brazil, except for the yellow-tailed woolly monkey, *Oreonax flavicauda*, from the Peruvian Andes. Sixteen species and subspecies are "Critically endangered"; three occur in Mesoamerica and thirteen in South America (Table 1). Seventeen species and subspecies are "Endangered", four occur in Mesoamerica (three endemic) and 14 in South America.

Six Mesoamerican countries have threatened primates, the majority in Panama and Costa Rica, with eight and six species and subspecies, respectively. Six South American countries have threatened primates. The majority occurs in Brazil (36), followed by Colombia with 17 species and subspecies and Peru with 10.

The 2000 Red List can be accessed on the World Wide Web: <<http://www.iucn.org/redlist/2000/index.html>>. For further details about the Red List Program, especially the Red List Authorities, documentation requirements, taxonomic standards, RAMAS Red List software and the petitions process, please contact Craig Hilton-Taylor, IUCN/SSC Red List Program Officer, 219c Huntingdon Road, Cambridge CB3 0DL, United Kingdom, Fax: ++44-1223-277845, e-mail: <craig.hilton-taylor@ssc-uk.org>.

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References

- Hilton-Taylor, C. (Compiler). 2000. *2000 IUCN Red List of Threatened Species*. IUCN, Gland, Switzerland and Cambridge.
- IUCN. 1994. *IUCN Red List Categories*. Prepared by the IUCN Species Survival Commission (SSC), Gland, Switzerland.
- 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.

Table 1. 2000 Red List: Numbers of threatened primates in Mesoamerica, South America and the Neotropics.

	Critically Endangered	Endangered	Vulnerable	Total threatened	Data Deficient
Species					
Mesoamerica	-	2	1	3	0
South America	9	7	20	36	3
Neotropics	9	9	21	39	3
Species and subspecies					
Mesoamerica	3	4	6	13	1
South America	13	14	29	56	15
Neotropics	16	17	33	66	15

Appendices: Listings of the threatened Neotropical primates in Mesoamerica and South America according to the 2000 Red List of Threatened Species (Hilton-Taylor, 2000).

Appendix 1. 2000 Red List: Threatened and Data Deficient primates in Mesoamerica. CR = Critically Endangered, EN = Endangered, VU = Vulnerable, DD = Data Deficient. *Criteria follow IUCN (1994). (E) = English, (F) = French, (S) = Spanish.

	Common name	Criteria*	Distribution
Critically Endangered			
<i>Alouatta coibensis trabeata</i>	Azuero howling monkey (E)	CR B1+2abcde, C2a	Panama
<i>Ateles geoffroyi azuerensis</i>	Azuero spider monkey (E)	CR B1+2abcde, C2a	Panama
<i>Saimiri oerstedii citrinellus</i>	Grey-crowned Central American squirrel monkey (E)	CR B1+2abcde, C2a	Costa Rica
Endangered			
<i>Alouatta coibensis</i>	Coiba Island howling monkey (E)	EN B1+2abcde, C2a	Panama
<i>Alouatta coibensis coibensis</i>	Coiba Island howling monkey (E)	EN B1+2abcde, C2a	Coiba Is., Panama
<i>Ateles geoffroyi grisescens</i>	Hooded spider monkey (E)	EN B1+2abcde, C2a	Colombia, Panama
<i>Ateles geoffroyi panamensis</i>	Panama spider monkey (E) Red spider monkey (E) Atèle de Geoffroy du Panama (F) Atèle du Panama (F) Mono araña de panamá (S)	EN B1+2abcde, C2a	Costa Rica, Panama
<i>Saimiri oerstedii</i>	Black-crowned Central American Squirrel monkey (E) Central American squirrel monkey (E) Red-backed squirrel monkey (E) Saïmiri à dos roux (F) Singe-écureuil à dos rouge (F) Singe-écureuil à dos roux (F) Barizo dorsirrojo (S) Mono tití (S)	EN B1+2abcde, C2a	Costa Rica, Panama
<i>Saimiri oerstedii oerstedii</i>	Black-crowned Central American squirrel monkey (E)	EN B1+2abcde, C2a	Costa Rica, Panama
Vulnerable			
<i>Alouatta palliata mexicana</i>	Mexican howling monkey (E)	VU A1c, B1+2c	Mexico, Guatemala
<i>Aotus lemurinus</i>	Lemurine night monkey (E)	VU B1+2c	Colombia, Costa Rica, Panama,
<i>Aotus lemurinus lemurinus</i>	Colombian night monkey (E) Lemurine night monkey (E)	VU B1+2c, C2a	Colombia, Costa Rica, Panama
<i>Ateles geoffroyi frontatus</i>	Black-browed spider monkey (E) Red-bellied spider monkey (E) Atèle du Costa Rica (F) Singe araignée du Panama (F) Singe-araignée aux mains noires (F) Mono araña maninegro (S)	VU A1c, B1+2c	Costa Rica, Nicaragua
<i>Ateles geoffroyi ornatus</i>	Ornate spider monkey (E)	VU A1c, B1+2c	Costa Rica
<i>Ateles geoffroyi ruiventris</i>	Colombian spider monkey (E)	VU A1c, B1+2c	Colombia, Panama
<i>Ateles geoffroyi yucatanensis</i>	Yucatán spider monkey (E)	VU A1c, B1+2c	Belize, Guatemala, Mexico
Data Deficient			
<i>Aotus lemurinus zonalis</i>		DD	Colombia, Panama

contd.

Appendix 2. 2000 Red List: Threatened and Data Deficient primates in South America. CR = Critically Endangered, EN = Endangered, VU = Vulnerable, DD = Data Deficient. *Criteria follow IUCN (1994). (E) = English, (F) = French, (S) = Spanish.

	Common name	Criteria*	Distribution
Critically Endangered			
<i>Alouatta belzebul ululata</i>	Red-handed howling monkey (E)	CR B1+2abcde, C2a	Brazil
<i>Alouatta guariba guariba</i>	Northern brown howling monkey (E)	CR B1+2abcde, C2a, D	Brazil
<i>Ateles geoffroyi fusciceps</i>	Brown-headed spider monkey (E) Atèle à tête brune (F)	CR B1+2abcde, C2a	Ecuador
<i>Brachyteles arachnoides</i>	Muriqui (E) Southern muriqui (E) Woolly spider monkey (E) Atèle arachnoïde (F) Eroïde (F) Singe-araignée laineux (F) Mono grande (S) Muriki (S)	CR B1+2abcde, C2a	Brazil
<i>Brachyteles hypoxanthus</i>	Northern muriqui (E)	CR B1+2abcde, C2a	Brazil
<i>Callicebus barbarabrownae</i>	Northern Bahian blond titi (E)	CR B1+2abcde	Brazil
<i>Callicebus coimbrai</i>	Coimbra's titi (E)	CR B1+2c, C2a	Brazil
<i>Cebus apella margaritae</i>	Margarita Island capuchin (E)	CR B1+2abcde, C2a	Margarita Is., Venezuela
<i>Cebus xanthosternos</i>	Yellow-breasted capuchin (E)	CR B1+2abcde, C2a	Brazil
<i>Leontopithecus caissara</i>	Black-faced lion tamarin (E)	CR B1+2abcde, C2a, D	Brazil
<i>Leontopithecus chrysopygus</i>	Black lion tamarin (E) Golden-rumped lion tamarin (E)	CR B1+2abcde, C2a	Brazil
<i>Leontopithecus rosalia</i>	Golden lion tamarin (E) Singe-lion (F) Tamarin soyeux (F)	CR B1+2abcde, C2a	Brazil
<i>Oreonax flavicauda</i>	Yellow-tailed woolly monkey (E) Singe laineux à queue jaune (F)	CR B1+2abcde, C2a	Peru
Endangered			
<i>Aotus lemurinus griseimembra</i>	Grey-legged night monkey (E)	EN B1+2abcde	Colombia
<i>Ateles geoffroyi grisescens</i>	Hooded spider monkey (E)	EN B1+2abcde, C2a	Colombia, Panama
<i>Ateles hybridus</i>	Variiegated spider monkey (E)	EN B1+2abcde	Colombia, Venezuela
<i>Ateles hybridus brunneus</i>	Brown spider monkey (E)	EN B1+2abcde	Colombia
<i>Ateles hybridus hybridus</i>	Hybrid spider monkey (E) Variiegated spider monkey (E)	EN B1+2abcde	Colombia, Venezuela
<i>Ateles marginatus</i>	White-whiskered spider monkey (E)	EN B1+2abcde	Brazil
<i>Cacajao calvus calvus</i>	White bald-headed uacari (E)	EN B1+2abcde	Brazil
<i>Cacajao calvus novaesi</i>	Novaes' bald-headed uacari (E)	EN B1+2abcde	Brazil
<i>Cacajao calvus rubicundus</i>	Red bald-headed uacari (E)	EN B1+2abcde	Brazil, Colombia
<i>Callithrix aurita</i>	Buffy-tufted-ear marmoset (E) White-eared marmoset (E) Marmouset à oreilles blanches (F) Oustiti à oreilles blanches (F) Oustiti oreillard (F)	EN B1+2abcde, C2a	Brazil
<i>Callithrix flaviceps</i>	Buffy-headed marmoset (E) Quistiti à tête jaune (F)	EN B1+2abcde, C2a	Brazil
<i>Chiropotes satanas satanas</i>	Bearded saki (E) Black saki (E)	EN B1+2abcde	Brazil
<i>Leontopithecus chrysomelas</i>	Golden-headed lion tamarin (E) Tamarino león de cabeza dorada (S)	EN, B1+2abcde, C2a	Brazil
<i>Saguinus bicolor</i>	Pied bare-faced tamarin (E) Pied tamarin (E)	EN B1+2abcde, C2a	Brazil
<i>Saguinus oedipus</i>	Cotton-headed tamarin (E) Cotton-top tamarin (E) Geoffroy's tamarin (E) Rufous-naped tamarin (E) Tamarin à perruque (F) Tamarin d'Oedipe (F) Tamarin pinché (F) Bichichi (S)	EN B1+2abcde, C2a	Colombia

Appendix 2, continued. 2000 Red List: Threatened and Data Deficient primates in South America. CR = Critically Endangered, EN = Endangered, VU = Vulnerable, DD = Data Deficient. *Criteria follow IUCN (1994). (E) = English, (F) = French, (S) = Spanish.

	Common name	Criteria*	Distribution
Vulnerable			
<i>Aotus lemurinus</i>	Lemurine night monkey (E)	VU B1+2c	Colombia, Costa Rica, Panama,
<i>Aotus lemurinus lemurinus</i>	Colombian night monkey (E) Lemurine night monkey (E)	VU B1+2c, C2a	Colombia, Costa Rica, Panama
<i>Aotus miconax</i>	Andean night monkey (E)	VU A1c, B1+2c	Peru
<i>Ateles belzebuth</i>	Long-haired spider monkey (E) White-bellied spider monkey (E) Atèle belzébuth (F)	VU A1c	Brazil, Colombia, Ecuador, Peru, Venezuela
<i>Ateles geoffroyi rufiventris</i>	Colombian spider monkey (E)	VU A1c, B1+2c	Colombia, Panama
<i>Cacajao calvus</i>	Bald-headed uacari (E) Red-and-white uacari (E) Ouakari chauve (F) Cacajao (S) Cacayao (S) Huapo colorado (S) Huapo rojo (S) Uacaries (S)	VU A1cd	Brazil, Colombia, Peru
<i>Cacajao calvus ucayalii</i>	Ucayali bald-headed uacari (E)	VU A1c	Brazil (?), Peru
<i>Callicebus medemi</i>	Medem's collared titi (E)	VU B1+2c, C2a	Colombia
<i>Callicebus melanochir</i>	Southern Bahian masked titi (E)	VU A1c	Brazil
<i>Callicebus nigrifrons</i>	Black-fronted titi (E)	VU A1c	Brazil
<i>Callicebus oenanthe</i>	Andean titi monkey (E)	VU B1+2c	Peru
<i>Callicebus ornatus</i>	Ornate titi monkey (E)	VU A1c, B1+2c	Colombia
<i>Callicebus personatus</i>	Masked titi (E) Northern masked titi (E) Titi à masque (F)	VU A1c, B1+2c	Brazil
<i>Callimico goeldii</i>	Goeldi's marmoset (E) Goeldi's monkey (E) Goeldi's tamarin (E) Tamarin de Goeldi (F) Tamarin sauteur (F) Pichico negro (S) Tití de Goeldi (S)	VU A1c	Bolivia, Brazil, Colombia, Peru
<i>Callithrix geoffroyi</i>	Geoffroy's tufted-ear marmoset (E) White-fronted marmoset (E) Tití de caba blanca (S)	VU B1+2b, C2a	Brazil
<i>Cebus nigritus robustus</i>	Robust tufted capuchin (E)	VU B1+2c	Brazil
<i>Cebus capucinus curtus</i>	Gorgona white-fronted capuchin (E)	VU B1+2c	Gorgona Is., Colombia
<i>Cebus olivaceus kaapori</i>	Ka'apor capuchin (E)	VU A1c, B1+2c	Brazil
<i>Chiropotes satanas utahicki</i>	Uta Hick's bearded saki (E)	VU A1c	Brazil
<i>Lagothrix cana</i>		VU A1c	Brazil, Peru
<i>Lagothrix cana cana</i>	Geoffroy's woolly monkey (E)	VU A1c	Brazil, Peru
<i>Lagothrix cana tschudii</i>		VU A1c	Bolivia (?), Peru
<i>Lagothrix lugens</i>	Colombian woolly monkey (E)	VU A1c+2c	Colombia, Venezuela
<i>Lagothrix poeppigii</i>		VU A1c	Brazil, Ecuador, Peru
<i>Mico chrysoleucus</i>	Golden-white tassel-ear marmoset (E)	VU B1+2c	Brazil
<i>Mico leucippe</i>	Golden-white bare-ear marmoset (E)	VU B1+2c	Brazil
<i>Mico nigriceps</i>	Black-headed marmoset (E)	VU B1+2c	Brazil
<i>Pithecia monachus milleri</i>	Miller's monk saki (E)	VU A1c, B1+2c	Colombia
<i>Saguinus imperator imperator</i>	Black-chinned emperor tamarin (E)	VU A1c, B1+2c	Brazil, Peru
<i>Saguinus leucopus</i>	Silvery-brown bare-face tamarin (E) White-footed tamarin (E) Tamarin à pieds blancs (F) Tamarin de manos blancas (S)	VU A1c, B1+2c, C2a	Colombia
<i>Saguinus nigricollis hernandezii</i>	Hernández-Camacho's black mantle tamarin (E)	VU A1c, B1+2c	Colombia
<i>Saimiri vanzolinii</i>	Blackish squirrel monkey (E)	VU B1+2c, C2a	Brazil

contd.

Appendix 2, continued. 2000 Red List: Threatened and Data Deficient primates in South America. CR = Critically Endangered, EN = Endangered, VU = Vulnerable, DD = Data Deficient. *Criteria follow IUCN (1994). (E) = English, (F) = French, (S) = Spanish.

Data Deficient			
	Common name	Criteria*	Distribution
	<i>Aotus lemurinus zonalis</i>	DD	Colombia, Panama
	<i>Callicebus olallae</i> Beni titi monkey (E)	DD	Bolivia
	<i>Cebus albifrons adustus</i> Brown-faced capuchin (E)	DD	Venezuela
	<i>Cebus albifrons aequatorialis</i> Ecuadorian capuchin (E)	DD	Ecuador
	<i>Cebus albifrons cesarae</i>	DD	Colombia
	<i>Cebus albifrons cuscinus</i> Shock-headed capuchin (E)	DD	Bolivia, Brazil, Peru
	<i>Cebus albifrons leucophaeus</i>	DD	Venezuela
	<i>Cebus albifrons malitiosus</i>	DD	Colombia
	<i>Cebus albifrons versicolor</i> Varied capuchin (E)	DD	Colombia
	<i>Cebus albifrons yuracus</i> Andean white-fronted capuchin (E)	DD	Colombia, Ecuador, Peru
	<i>Mico marcai</i> Marca's marmoset (E)	DD	Brazil
	<i>Mico saterei</i> Sateré marmoset (E)	DD	Brazil
	<i>Pithecia monachus napensis</i> Napo monk saki (E)	DD	
	<i>Saguinus fuscicollis crandalli</i> Crandall's saddleback tamarin (E)	DD	Brazil (?), Peru (?)
	<i>Saguinus fuscicollis cruzlimai</i> Cruz Lima's saddleback tamarin (E)	DD	Brazil (?)

DISEASES OF CALLITRICHIDS AND CEBIDS

In 1999, Lilian R. M. de Sá defended her Master's thesis entitled "Determination and characterization of disease of callitrichids and cebids (multidisciplinary approach)", at the Faculty of Veterinary Medicine and Zootechnology of the University of São Paulo, São Paulo, Brazil. Her supervisor was Dr. José Luiz Catão Dias, and it was financed by the University and the state funding agency, the Fundação de Amparo à Pesquisas do Estado de São Paulo (FAPESP). The following is an abstract of the thesis.

Little information is available in Brazil about the causes of morbidity and mortality among Neotropical primates. The aim of this study was to contribute to the knowledge concerning the diseases of New World primates using clinical, laboratory, microbiological, and parasitological data and pathology examinations. Twenty-two callitrichids and 14 cebids held in captivity or free-ranging were studied, and their diseases and causes of death were determined and characterized. The animals were selected on the basis of the conservation of their carcasses sent to the Comparative Pathology Laboratory, Faculty of Veterinary Medicine and Zootechny, at the University of São Paulo, from January 1997 to October 1998. The final pathology diagnoses were made using clinical history, laboratory data, bacterial growth from heart blood and organs, and identification of protozoa. The data revealed 14 cases of infection and parasitic death, six wasting marmoset syndrome cases, two metabolic problems, three digestive disturbances, three traumas, two reproductive diseases, and one death each from electric shock, hematopoietic problems, renal disease, respiratory disease, nervous system disease and congenital anomalies. The bacterial agents considered pathogenic were *Corynebacterium* spp., *Streptococcus* spp., *Klebsiella pneumoniae*, *Pasteurella multocida* and

Leptospira interrogans. The deaths caused by protozoan infection were toxoplasmosis and infestation by enteric flagellates. Micotic infections, candidiasis, zygomycosis and aspergillosis were secondary infections that contributed to the poor health of the animals. *Campylobacter* spp. was isolated from both asymptomatic and clinically affected Neotropical primates. In addition, other processes were diagnosed, such as hiperplasia and neoplasia of the endocrine system, hepatic hemossiderosis, ophthalmic lesions, atherosclerosis and metazoan parasites. The results show the advantage of a complete pathology examination associated with bacterial culture and parasitic identification, and so the need for implementation of general control measures and for the prevention of zoonoses and infectious-parasitic diseases in Neotropical primates.

Lilian R. M. de Sá, Departamento de Patologia, Faculdade de Medicina Veterinária e Zootecnia, Av. Prof. Dr. Orlando Marques Paiva 87, Cidade Universitária, São Paulo 05508-900, São Paulo, Brazil.

Reference

Sá, L. R. M. 1999. Determination and Characterization of Disease of Callitrichids and Cebids (Multidisciplinary Approach). Master's thesis, Experimental and Comparative Pathology, Faculty of Veterinary Medicine and Zootechnology, University of São Paulo, São Paulo. 174pp.

EDENTATE CONSERVATION ACTION FUND

The Edentate Specialist Group of the Species Survival Commission (SSC) of The World Conservation Union (IUCN) has established a conservation action fund which will offer small grants to support studies and conservation initiatives related to edentates. Financed by the Center for Applied Biodiversity Sci-

ence at Conservation International, based in Washington, DC, the grants offered will be a maximum of US \$3000, with the typical amount given around US \$1000. The grant application process is designed to have a fast turn around time. Those interested in submitting a proposal should contact Jennifer Pervola, Center for Applied Biodiversity Science, Conservation International, 1919 M. St., NW, Suite 600, Washington, DC 20036, USA, e-mail: <j.pervola@conservation.org>.

PRIMATE CONSERVATION SMALL GRANT

The Primate Conservation and Welfare Society (PCWS) is proud to announce the availability of an annual Primate Conservation Small Grant. For details, including the Application Packet in PDF Format, please see our website at: <http://www.primates-online.com/apps.html>. To receive a hard copy of the Conservation Grant Application Packet, please send a self-addressed stamped envelope to: PCWS-Conservation Grant, PO Box 2101, Port Townsend, WA 98368, USA. Please note that due to the volume of requests, applications must be accompanied by a self-addressed, stamped envelope. Applicants outside the US should contact PCWS via e-mail with appropriate contact information. The grant deadline is June 30, 2001. For more information: Hope Walker, Executive Director, The Primate Conservation & Welfare Society, PO Box 2101, Port Townsend, WA 98368, USA, e-mail: <gorillas@waypt.com>.

FULBRIGHT SCHOLAR PROGRAM

The Fulbright Scholar Program for faculty and professionals is offering more than 45 awards in biological sciences for lecturing and/or doing research abroad during the 2001–2002 academic year. The program is sponsored by the United States Department of State, Bureau of Educational and Cultural Affairs, and administered by the Council for International Exchange of Scholars. For more information contact the International Exchange of Scholars, 3007 Tilden St. NW, Suite 500, Washington, DC 20008-3009, USA, Tel: (202) 686-7877, Fax: (202) 362 3442, web site: <www.cies.org>.

NEW SPECIALIST GROUPS

The SSC has several new Specialist Groups. The Afrotheria Group, chaired by Galen Rathbun, was created to cover the Superorder Afrotheria, which includes aardvarks, hyrax, golden-moles, elephant-shrews and tenrecs. A Caribbean Inland Freshwater Fishes Specialist Group was created as part of an evolving SSC strategy for freshwater fish. Co-Chairs are Michael Smith and Carlos Rodriguez. The Global Amphibian Specialist Group, chaired by Claude Gascon, will work towards developing a regionally-based network of amphibian specialists, using the model of SSC's Sustainable Use Specialist Group. The Iguana Specialist Group, formerly West Indian Iguana, has a new mandate to cover all species. Allison Alberts continues as Chair, with Jose Ottenwalder appointed as Co-Chair. The first

regionally-based Invertebrate Specialist Group, the Southern African Invertebrates Specialist Group, has been established, chaired by Michael Samways. A new Philippine Plant Specialist Group, chaired by Domingo Madulid, will address the important issues relating to plant diversity conservation in the Philippines. A list of all SSC Specialist Groups and Task Forces with contact details, is available on the SSC website at <<http://www.iucn.org/themes/ssc/sgs/sgs.htm>>. *Information from the IUCN Species Survival Commission E-Bulletin-February 2001.*

MSc IN PRIMATE CONSERVATION

The School of Social Sciences and Law at Oxford Brookes University in Oxford, UK, is offering a one-year full time or two-year part time MSc course in primate conservation. The course combines the expertise of anthropologists and biologists to examine primate conservation biology in a broad context, with particular emphasis on the interrelationships between humans and wildlife in forest and woodland environments. Aimed to provide a high quality postgraduate research qualification, the course focuses on eight major themes including: Primate diversity and biogeography, socio-political aspects of conservation, environmental education, molecular and population genetics, fieldwork training and methods, captive management, museum studies, and habitat protection and the future of rainforests.

Students interested in the course will normally have an honors degree in anthropology, biology or a related discipline. Applications can be made at any time up to the beginning of the first term of study and may be obtained from: The Secretary, School of Social Sciences and Law, Oxford Brookes University, Oxford, OX3 0BP, UK, Tel: +44 (0) 1865 433750, Fax: +44 (0) 1869 483937, e-mail: <pgsocsci@brookes.ac.uk>. You can also download an application from the web page at <www.brookes.ac.uk/courses/pgcourse/application/down.html>.

COURSE ON THE "ECOLOGY OF NEW WORLD PRIMATES" - CURSO SOBRE "ECOLOGÍA DE PRIMATES NEOTROPICALES"

A course on the "Ecology of New World Primates" was held from 02 to 06 October 2000 at the Universidad Nacional de la Amazonía Peruana (UNAP) in Iquitos (Peru). The course was directed by Eckhard W. Heymann from the Deutsches Primatenzentrum (DPZ, German Primate Center) and Filomeno Encarnación C. from the Universidad Nacional Mayor de San Marcos (Lima, Peru) and hosted by the Faculties of Forestry Engineering and Biological Sciences of UNAP. Sixteen students and staff members from UNAP participated in this course which was supported by a grant from the Margot Marsh Biodiversity Foundation. The course first provided a general introduction to the diversity of New World primates and their habitats. Then aspects of the ecology of

all genera of New World primates (e.g., feeding ecology) were given, with emphasis on those genera occurring in Peru. The major part of the course dealt with the ecological roles (e.g., seed dispersal, seed predation). The course ended with the presentation of the problems of the conservation of New World primates and their habitats. It is hoped that this theoretical course can be backed up by a practical field course in the near future.

Un curso sobre "Ecología de Primates Neotropicales" se realizó entre el 02 y 06 de octubre 2000 en la Universidad Nacional de la Amazonía Peruana (UNAP) en Iquitos (Perú). El curso fue dirigido por Eckhard W. Heymann del Deutsches Primatenzentrum (DPZ, Centro Alemán de Primates) y Filomeno Encarnación C. de la Universidad Nacional Mayor de San Marcos (Lima, Peru) y fue auspiciado por las Facultades de Ingeniería Forestal y de Ciencias Biológicas de la UNAP. Participaron 16 personas en el curso, entre estudiantes y docentes de estas dos facultades. La realización del curso fue subvencionado por una beca de la Margot Marsh Biodiversity Foundation. El curso presentó una introducción general a la diversidad de los primates neotropicales y sus habitats. Después se presentó aspectos de la ecología (p.ej., dieta y selección de alimentos) de todos los géneros de primates neotropicales, poniendo énfasis en aquellos géneros distribuidos en el Perú. La mayor parte del curso trató de los roles ecológicos (p.ej., dispersión y depredación de semillas). El curso terminó con la presentación de los problemas de conservación de los primates neotropicales y sus habitats. Se espera que será posible completar este curso teórico con un curso práctico de campo en el próximo futuro.

Eckhard W. Heymann, Abteilung Verhaltensforschung & Ökologie, Deutsches Primatenzentrum, Kellnerweg 4, D-37077 Göttingen, Germany, e-mail: <ehyman@gwdg.de> and Filomeno Encarnación C., Apartado 575, Iquitos, Perú, e-mail: <encarna@terra.com.pe>.

FIELD COURSE IN TROPICAL ECOLOGY

Duke University is offering a four-week course in Tropical Ecology during June, 2001 in Costa Rica. The course will focus on the natural history of tropical habitats in an evolutionary and ecological context. Scholarship opportunities are available. For more information contact the Organization for Tropical Studies, Box 90630, NC 27708-0630, USA, Tel: + (919) 684 5774, Fax: + (919) 684 5661, e-mail: <nao@duke.edu>, or website <www.ots.duke.edu>.

WORLD TAXONOMIC DATABASE

The University of Amsterdam has established a database network of world taxonomists. To register or for further information visit their website at: <http://www.eti.uva.nl/database/WTD.html>.

EARTHPRINT

Earthprint, the official bookstore of the United Nations, operating since August 1999, has expanded to include publications from: The World Health Organization, Organisation for Economic Co-operation and Development, United Nations University, Tata Energy Research Institute, and the International Commission on Non-Ionizing Radiation Protection. The full service online bookstore provides a location for purchasing authoritative environmental publications from various international organizations. To access Earthprint, see the website <http://Earthprint.com>.

PRIMATE ENRICHMENT DATABASE

Viktor and Annie Reinhard have made revisions to their Primate Enrichment Database. You will now find simplified searching and active links to various papers available on the web. To view the web site go to <www.animalwelfare.com/lab-animals/biblio/enrich.htm>.

COTTON-TOP TAMARIN WEB PAGE

This site includes the Tamarin Husbandry Manual, a Cotton-top Fact Sheet, a Project Tamarin link site, Cotton-top Species Survival Plan, information for institutional representatives, and additional resources to help understand and learn about cotton-top tamarins in their natural and captive environments. Visit the site at: <http://www.csew.com/cottontop/>.

Primate Societies

ASOCIACIÓN PRIMATOLÓGICA ESPAÑOLA (APE)

The Asociación Primatológica Española (APE), President Federico Guillén-Salazar (Universidad Cardenal Herrera, Valencia) produces a newsletter three times a year, in January, May and September – the *Boletín de la Asociación Primatológica Española*. Recent issues are now available on the web <www.uam.es/ape>, maintained by the Universidad Autónoma de Madrid. For any enquiries regarding membership, etc., please write to: Celina Anaya-Huertas, General Secretary, APE, Departamento de Psicobiología, Buzón 150, Facultad de Psicología, Universidad Complutense de Madrid, Campus de Somosaguas, 28223 Madrid, Spain. Tel: 913 943 075, Fax: 913 943 189, e-mail: <pspcez0@sis.ucm.es>.

Recent Publications

PSG NEWSLETTER - LEMUR NEWS

Recently published, in May 2000, was the 5th issue of the IUCN/SSC PSG newsletter *Lemur News*. With 51 pages, it contains sections on News and announcements, Funding and training, Meetings, and Recent publications (books, journal volumes, theses and other IUCN/SSC publications of interest), besides 16 articles in English and French. Contributions to the next issues should be sent to: Jörg U. Ganzhorn, Institut für Zoologie, Universität Hamburg, Martin-Luther-King-Platz 3, D-20146 Hamburg, Germany, Fax: +49 40 42838 5980, e-mail: <ganzhorn@zoologie.uni-hamburg.de>, or Berthe Rakotosaminana, Dépt de Paléontologie et d'Anthropologie Biologique, Faculté des Sciences, Université d'Antananarivo, BP 916, Antananarivo, Madagascar, e-mail: <brakoto@simicro.mg>.

REGIONAL ENVIRONMENTAL CHANGE-A NEW JOURNAL

In 1999, the Dutch publishers Springer launched a new quarterly journal-*Regional Environmental Change*, ISSN 1436-3798. The aim is to focus on the interactions of human and natural systems at the regional level within the context of global change. Regions considered are river catchments, estuaries, deltas, adjacent seas and wetlands as well as the interactions between cities and their environments. Disciplinary, but in particular multidisciplinary, approaches to the study of these systems are considered. The Editor-in-Chief is Dr. Wim Salomans, GKSS Research Centre and Free University Amsterdam, Max-Planck-Strasse, D21502 Geesthacht, Germany. More information from: Springer for Science, PO Box 503, 1970 AM IJmuiden, The Netherlands, Fax: +49 30 82787 448, e-mail: <subscriptions@springer.de>. Website: <<http://www.springer.de>>.

2000 IUCN RED LIST OF THREATENED SPECIES

The 2000 IUCN Red List of Threatened Species, 2000, 61pp, + CD-ROM, was launched on the 28th September 2000, in London, Washington, Geneva, and Ottawa. It was compiled by Craig Hilton-Taylor, with the assistance of Caroline Pollock, Matthew Linkie, Alan Mauric, Janice Long, Mariano Gimenez-Dixon, Simon Stuart, Alison Stattersfield, Martin Sneath, and Georgina M. Mace, in association with experts in the IUCN/SSC Species Survival Commission specialist groups and BirdLife International. Includes a foreword by David Brakett, Chair of the IUCN Species Survival Commission, and an introductory essay "A challenge to the global community" by Russell A. Mittermeier, President of Conservation International and Chairman of the Primate Specialist Group. Seven annexes: 1. Recent developments in the IUCN/SSC Red List Programme; 2. Organization of information; 3. Information sources and quality; 4. Habitat types authority file; 5. Threat

types authority file; 6. The 1994 IUCN Red List categories and criteria; 7. Summary of the results of the review of IUCN Red List categories and criteria 1996–2000 (Georgina M. Mace). There are a number of innovations introduced to enhance the effectiveness of the List as a conservation tool. *Improved species coverage*: All bird species have been completely reassessed by BirdLife International and its partners; all primates have been reassessed following a consultative review workshop on primate systematics (see *Neotropical Primates* 8(2), pp.61–93); many other mammals, including antelope, bats, cetaceans, otters, wild pigs, wild cattle and wild goats, and some rodents were reassessed; improved coverage of sharks, rays and saw-fish; all South-east Asian freshwater turtles were comprehensively assessed; a number of new reptile and amphibian assessments from Brazil, the Philippines, Russian Federation and the Russian Republics were carried out; the correction of some insect information and the addition of a number of new European butterfly assessments; correction of errors in the mollusc listings in the 1996 Red List, a thorough re-evaluation of all potentially extinct species of mollusc and the inclusion of a number of new assessments; all the tree assessments from *The World List of Threatened Trees* (Oldfield *et al.*, 1998) were incorporated and updated where necessary; all conifers were comprehensively reassessed; and new assessments for plants from Cameroon, Galápagos, Mauritius and South Africa were included, as were comprehensive assessments for the carnivorous plant genera *Nepenthes* and *Sarracenia*, and for the first time almost 100 assessments of mosses were included. *Peer review process* carried out by the appointment of Red List Authorities responsible for the evaluation of all assessments on the Red List to help ensure the maintenance of standards and the correct application of the criteria. *Improved documentation*: with the inclusion of a rationale for many listings explaining how they were reached to improve accountability; provision of information on range, current population trends, main habitats, major threats and conservation measures taken; and improved documentation of extinct species. *Introduction of a petitions process* whereby listings can be challenged. *Increased accessibility* via a new web site and a CD-ROM. The web site provides a mechanism whereby users can feed corrections and additional information back to the Red List Programme. The web site is: <<http://www.iucn.org/redlist/2000/index.html>>.

The 2000 IUCN Red List of Threatened Species (Book with analysis and CD-ROM) is available only in English. Price: £30 or US\$45 at: IUCN Publication Services Unit, 219c Huntingdon Road, Cambridge, CB3 0DL, UK, Tel: +44 1223 277894, Fax: +44 1223 277175, e-mail: <info@books.iucn.org>, or order it through the Net at: <<http://www.iucn.org/bookstore/index.html>>. The above is the preferred address, it can also be ordered at the IUCN Publishing Division, IUCN-The World Conservation Union, rue Mauverney 28, CH-1196 Gland, Switzerland, Tel: +41 22 999-0111, Fax: +41 22 999-0010, e-mail: <cmc@hq.iucn.org>, WWW: <<http://iucn.org>>. US and Canadian customers may also order IUCN publications from: Island Press, Box 7, Covelo, California 95428, Tel: 800 828

1302 or +1 707 983 6432, Fax: +1 707 983 6414, e-mail: <ipress@igc.apc.org>. For publications out of print, photocopies can be obtained from the IUCN Library at IUCN-The World Conservation Union, rue Mauverney 28, CH-1196 Gland, Switzerland, Tel: +41 22 999 0135, Fax: +41 22 999 0010; e-mail: <cet@hq.iucn.org>. As the price varies, depending on the number of pages to photocopy and where they are to be mailed, please contact Ms Cecile Thiery with your request. Please specify if you wish a copy of the full publication or just part of it, as well as your mailing address.

HUNTING AND BIODIVERSITY CONSERVATION AND TROPICAL FOREST MANAGEMENT - TWO PUBLICATIONS

In September 2000, The World Bank in collaboration with the Wildlife Conservation Society (WCS), New York, published two important documents on hunting and biodiversity conservation. They are monographs in the *Biodiversity Series – Impact Studies, Environment Department Papers*. The first, "Biodiversity Conservation in the Context of Tropical Forest Management" by Francis E. Putz, Kent H. Redford, John G. Robinson, Robert Fimbel and Geoffrey M. Blate, 80pp., has six chapters, as follows: 1. Introduction; 2. Disaggregating "Biodiversity"; 3. Disaggregating "Logging"; 4. Impacts of Forest Management on Biodiversity; 5. Overview of Biodiversity Conservation in Relation to Logging and Other Silvicultural Treatments; 6. Recommendations. There are seven appendices. The second, "Hunting of Wildlife in Tropical Forests: Implications for Biodiversity and Forest Peoples", by Elizabeth L. Bennett and John G. Robinson, 42pp., is based on the book recently published by the same authors, *Hunting for Sustainability in Tropical Forests*, Columbia University Press, New York, 2000. Besides an executive summary, it has five chapters: 1. Introduction; 2. The Sustainability of Hunting in Tropical Forests; 3. Factors Affecting the Sustainability of Hunting; 4. Enhancing the Sustainability of Hunting; 5. Conclusions and Recommendations. Copies are available from: Environment Department, The World Bank, 1818 H Street, NW, Washington, DC 20433, USA, Tel: +1 202 473-3641, Fax: +1 202 477-0565. The documents can be viewed at: <<http://www.worldbank.org/biodiversity>> or for a hardcopy email Sharon Esumeï at <sesumei@worldbank.org>.

References

- Putz, F. E., Redford, K. H., Robinson, J. G., Fimbel, R. and Blate, G. M. 2000. Biodiversity conservation in the context of tropical forest management. *Biodiversity Series – Impact Studies, Environment Department Papers* (75): 80pp. The World Bank, Washington, DC.
- Bennett, E. L. and Robinson, J. G. 2000. Hunting of wildlife in tropical forests: Implications for biodiversity and forest peoples *Biodiversity Series – Impact Studies, Environment Department Papers* (76): 42pp. The World Bank, Washington, DC.

BOOKS

Primate Males, edited by P. Kappeler, 2000, 316pp. Cambridge University Press, UK. ISBN 0-521-65846-2. Price £23.95 This book, written by leading authorities on primates, focuses on the causes and consequences of variation in the number of males per group and also provides an extensive overview of variation in group composition across all major primate taxa using reviews, case studies, evolutionary theory, and theoretical models. Contents include: Part I, Introduction; Part II, Comparative Perspectives on Male-Female Associations; Part III, Variation in Male Numbers; Part IV, Behavioural Aspects of Male Coexistence; Part V, Evolutionary Determinants and Consequences; Part VI, Conclusions. *Available from:* Cambridge University Press, The Edinburgh Building, Cambridge CB2 1BR, UK. E-mail to Hannah Proctor <hproctor@cup.cam.uuc.uk>. Web site: <<http://www.cambridge.org>>.

Conservation Research in the African Rain Forests: A Technical Handbook, edited by Lee White and Ann Edwards, 454pp., 2000. Wildlife Conservation Society, Bronx, New York. ISBN 0 9632064 4 3 (English). ISBN 0 9632064 5 1 (French). A remarkable and most useful book for the practicalities of field research. As stated in the Introduction "The purpose of this manual is to assist people working in African forests to collect information from many different sources and use it effectively for management and conservation. We hope to: 1) Help protected area managers to establish goals and determine priorities for management and to design research programmes appropriate to these objectives. 2) Outline simple, current, commonly-used methods for collecting information, specifically on population densities and behavioural ecology of larger animals, vegetation, physical features of the land, weather patterns, and the numbers impacts, needs and expectations of people that use and/or live near protected areas. 3) Present guidelines for analyzing field data realistically and with confidence; 4) Present guidelines for interpreting and storing information with the aim of making it useful and accessible to a variety of audiences." *Contents:* Protected area management and the role of research - A. Lanjouw, A. Edwards & L. White, pp.1-14; Research priorities and design of research programmes - L. White & A. Edwards, pp.15-22; An introduction to sampling - L. White & A. Edwards, pp.23-30; An introduction to data analysis and interpretation - L. White & A. Edwards, pp.31-51; Making observations and recording data - A. Edwards, A. Rabinowitz & L. White, pp.53-61; Maps, compasses, GPS units and the principals of navigation - A. Edwards & L. White, pp.63-83; Methods for recording the weather - A. Edwards and L. White, pp.85-92; Collecting botanical specimens - A. Dold, P. Phillipson, R. Liesner, P. Lowry & L. White, pp.93-118; Vegetation inventory and description, L. White & A. Edwards, pp.119-155; Information from animal tracks and trails - R. J. Parnell, pp.157-189; Information from dead animals and their curation - A. Rabinowitz, J. Hart & L. White, pp.191-201; Necropsy procedures for wild animals - L. Munson, pp.203-224; Methods for assessing the status of animal populations - L. White & A. Edwards, pp.225-275; Behavioural ecology data

and its relevance for management – K. Abernethy, pp.277–329; Socio-economic data and their relevance to protected area management – B. Curran, D. Wilkie & R. Tshombe, pp.331–353; Statistical techniques – N. Chalmers, P. Parker and K. McConway, pp.355–422; Presenting and conserving your findings – A. Edwards & L. White, pp.423–440. *Available from:* The Wildlife Conservation Society, 185th Street & Southern Boulevard, Bronx, New York, NY 10460-1099, USA.

Priorities for the Conservation of Mammalian Diversity: Has the Panda Had Its Day?, edited by Abigail Entwistle and Nigel Dunstone, 2000, 455pp. Cambridge University Press, Cambridge. ISBN 0 521 77279 6 (Hardback), 0 521 77536 1 (Paperback). This book is No. 3 in the Conservation Biology series of CUP, edited by Morris Gosling in Association with the Zoological Society of London. No. 1 was *Conservation in a Changing World*, edited by Georgina M. Mace, Andrew Balmford and Joshua R. Ginsberg, and No. 2 was *Behaviour and Conservation*, edited by L. M. Gosling and J. Sutherland. This excellent review has three parts, besides an introductory chapter by Abigail Entwistle, Simon Mickleburgh and Nigel Dunstone – Mammal conservation: current contexts and opportunities. Part 1. Justifying the conservation of mammals. Part 2. Setting priorities for mammalian conservation. Part 3. Conservation approaches for mammalian species and diversity. Orders in the USA: Cambridge University Press, 40 West 20th Street, New York, NY 10011-4211, USA. Orders elsewhere: Cambridge University Press, The Edinburgh Building, Cambridge CB2 1BR, UK. E-mail to Hannah Proctor <hproctor@cup.cam.uuc.uk>. Web site: <http://www.cambridge.org>.

Essentials of Ecology, by Colin R. Townsend, John L. Harper and Michael Begon, 1999, 450pp. Blackwell Science, Oxford, UK. ISBN 0 632 204348 2 (Paperback). Price: £24.95. Presenting a balanced overview of ecology this textbook draws examples from both terrestrial and aquatic environments and from a variety of organism types. Color throughout, the book contains 14 chapters containing a wide range of key ecological concepts including: Part I, Introduction, Part II, Conditions and Resources, Part III Individuals, Populations, Communities, and Ecosystems, and Part IV, Applied Issues in Ecology. Orders for the book can be placed through Blackwell Science, Osney Mead, Oxford, OX2 OEL, UK, Tel: +44 (0) 1865 206206, Fax: +44 (0) 1865 721205.

Community Ecology, by Peter J. Morin, 1999, 432pp. Blackwell Science, Oxford, UK. ISBN 0 865 42350 4 (Paperback). Price: £24.95. This book guides the reader through the main components and central concepts of ecology, including: predation, competition, food webs, indirect effects, habitat selection, diversity, and succession. It includes examples from both the terrestrial and aquatic environments and from both plant and animal species. Morin focuses on historical foundations of ecology and stresses the functions which are necessary to drive ecology into the millennium. *Available from:* Blackwell Science, Osney Mead, Oxford, OX2 OEL, UK, Tel: +44 (0) 1865 206206, Fax: +44 (0) 1865 721205.

Footprints in the Jungle, edited by Ian A. Bowles and Glenn T. Prickett, 2000, 352pp. Oxford University Press, Northamptonshire, UK. ISBN 0 19 512578 9 (Hardback), price: £35.00. ISBN 0 19 850035 1 (Paperback), price: £19.99. This volume looks at new approaches that attempt to minimize the impact of development on tropical ecosystems. Includes numerous case studies, looks closely at the environment and social impact of resource development, proposes a “best practices” approach, and examines a number of challenging technical, environmental and legal issues related to the environment. *Available from:* Oxford University Press, Saxon Way West, Corby, Northamptonshire, NN18 9ES, UK, Tel: +44 (0)1536 454534, Fax: +44 (0)1536 454 518, e-mail: <book.orders@oup.co.uk>. Web site: <www.oup.co.uk>.

Endless Forms, edited by Daniel J. Howard and Stewart H. Berlocher, 1999, 552pp. Oxford University Press, Oxford, UK. ISBN 0 19 510900 (Hardback), price: £65.00. ISBN 0 19 510901 5 (Paperback), price: £23.50. Thirty authors present their latest research on species concepts, modes of speciation, the nature of reproductive barriers, the forces that drive divergence of populations, the genetic control of reproductive isolation, and the role played by hybrid zones and hybridization in speciation. *Available from:* Oxford University Press, Saxon Way West, Corby, Northamptonshire, NN18 9ES, UK, Tel: +44 (0) 1536 454534, Fax: +44 (0) 1536 454 518, e-mail: <book.orders@oup.co.uk>. Web site: <www.oup.co.uk>.

Comparative Primate Socioecology, edited by Phyllis Lee, 1999, 438pp. Cambridge University Press, Cambridge, UK. ISBN 0 521 59336 0 (Hardback). Price: £45.00. *Cambridge Studies in Biological and Evolutionary Anthropology*, 22. Comparative studies have become both more frequent and more important as a means for understanding the biology, behaviour and evolution of mammals. This book draws together a wide range of experts from fields as diverse as reproductive biology and foraging energetics to place recent field research into a synthetic perspective. The chapters tackle controversial issues in primate biology and behaviour, including the role of brain expansion and infanticide in the evolution of primate behavioural strategies. This book also presents an overview of comparative methodologies as applied to recent primate research. It is of particular relevance to primatologists and behavioural ecologists as well those interested in the evolution of human social behaviour. *Available from:* UK and Ireland - UK Sales Department, Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 2RU, UK, e-mail: <information@cup.cam.ac.uk>, web site: <www.cup.cam.ac.uk>, or North and Central America - Cambridge University Press North American Branch, 40 West 20th Street, New York, NY 10011-4211, US, e-mail: <information@cup.org>, or South America and Hispanic Caribbean - Cambridge University Press South American Branch, Av. Paulista 807, Conj. 1218, 01311-915 São Paulo, SP, Brazil, e-mail: <cupbra@mandic.com.br>, web site: <www.cup.cam.ac.uk/brazil>.

Attitudes to Animals: Views in Animal Welfare, edited by Francine L. Dolins, The Humane Society of the United States, 1999, 272pp. Cambridge University Press, New York. ISBN 0 521 47342 X (Hardback). ISBN 0 521 47906 1 (Paperback). Price: Hardback £40; Paperback £14.95. This book provides a foundation which the reader can use to make ethical choices about animals. It challenges readers to question their current views, attitudes and perspectives on animals and nature, and the development of the human-animal relationship. It asks what it is to be human, what to be animal, and what is the relationship between them. *Available from:* UK and Ireland - UK Sales Department, Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 2RU, UK, e-mail: <information@cup.cam.ac.uk>, web site: <www.cup.cam.ac.uk>, or North and Central America - Cambridge University Press North American Branch, 40 West 20th Street, New York, NY 10011-4211, US, e-mail: <information@cup.org>, or South America and Hispanic Caribbean - Cambridge University Press South American Branch, Av. Paulista 807, Conj. 1218, 01311-915 São Paulo, SP, Brazil, e-mail: <cupbra@mandic.com.br>, web site: <www.cup.cam.ac.uk/brazil>.

Infanticide by Males and Its Implications, edited by Carel P. van Schaik and Charles H. Janson, 2000, 450pp. Cambridge University Press, New York. ISBN 0 521 77295 8 (Hardback). ISBN 0 521 77498 5 (Paperback). Price: Hardback \$130, Paperback \$47.95. *Contents:* Foreword - S. B. Hrdy; Infanticide by males: Prospectus - C. P. van Schaik & C. H. Janson. *Part I. Introduction:* The holy wars about infanticide. Which side are you on? And why? - V. Sommer; Infanticide by male primates: The sexual selection hypothesis revisited - C. P. van Schaik; Vulnerability to infanticide by males: Patterns among mammals - by C. P. van Schaik. *Part II. Infanticide by Males: Case studies:* Infanticide in red howlers: Female group size, male membership, and a possible link to folivory - C. M. Crockett & C. H. Janson; Infanticide in hanuman langurs: Social organization, male migration, and weaning age - C. Borries & A. Koenig; 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; Infanticide by males and female choice in wild Thomas's langurs - R. Steenbeek; The evolution of infanticide in rodents: A comparative analysis - D. T. Blumstein; Infanticide by male birds, by J. P. Veiga. *Part III. Behavioral Consequences of Infanticide by Males:* Prevention of infanticide: The perspective of infant primates - A. Treves; Infanticide and the evolution of male-female bonds in animals - R. A. Palombit; 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; Female dispersal and infanticide avoidance in primates - E. H. M. Sterck & A. H. Korstjens; Reproductive patterns in eutherian mammals: Adaptations against infanticide? - M. A. van Noordwijk & C. P. van Schaik; Paternity confusion and the ovarian cycles of female primates - C. P. van Schaik, J. K. Hodges & C. L. Nunn; Social evolution in primates: The relative roles of ecology and intersexual conflict - C. L. Nunn

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ARTICLES

- Albernaz, A. L. 1999. Home-range size of the bare-ear marmoset (*Callithrix argentata*) at Alter do Chão, central Amazonia, Brazil. *Int. J. Primatol.* 20(5): 665-677.
- Baker, J. V., Abbott D. H. and Saltzman W. 1999. Social determinants of reproductive failure in male common marmosets housed with their natal family. *Anim. Behav.* 58(3): 501-513.
- Bizerril, M. X. A. and Andrade, T. C. S. 1999. Knowledge of the urban population about fauna: Comparison between Brazilian and exotic animals. *Ciência e Cultura* 51(1): 38-41.
- Buchanan-Smith, H. M., Hardie, S. M., Caceres, C. and Prescott, M. J. 2000. Distribution and forest utilization of *Saguinus* and other primates of the Pando department, northern Bolivia. *Int. J. Primatol.* 21(3): 353-379.
- Chaoui, N. J. and Hasler-Gallusser, S. 1999. Incomplete sexual suppression in *Leontopithecus chrysomelas*: A behavioural and hormonal study in a semi-natural environment. *Folia Primatol.* 70(1): 47-54.
- Chiarello, A. G. 2000. Influência da caça ilegal sobre mamíferos e aves das matas de tabuleiro do norte do estado do Espírito Santo. *Bol. Mus. Biol. Mello Leitão, Nova Série* 11/12: 229-247.
- Christen, A. 1999. Survey of Goeldi's monkeys (*Callimico goeldii*) in northern Bolivia. *Folia Primatol.* 70(2): 107-111.
- Christel, M. I. and Fragaszy, D. 2000. Manual function in *Cebus apella*. Digital mobility, preshaping, and endurance in repetitive grasping. *Int. J. Primatol.* 21(4): 697-719.
- Clark, M. R., Tremblay, A. M. and Arden, D. H., 2000. A comparison of methods for observing juvenile and group behavior in mantled howlers. *Lab. Prim. Newsl.* 39(4): 6-8.
- Collins, A. C. and Dubach, J. M. 2000. Phylogenetic relationships of spider monkeys (*Ateles*) based on mitochondrial DNA variation. *Int. J. Primatol.* 21(3): 381-420.

- Collins, A. C. and Dubach, J. M. 2000. Biogeographical and ecological forces responsible for speciation in *Ateles*. *Int. J. Primatol.* 21(3): 421–444.
- De Vleeschouwer, K., Heistermann, M., Van Elsacker, L. and Verheyen, R. F. 2000. Signaling of reproductive status in captive female golden-headed lion tamarins (*Leontopithecus chrysomelas*). *Int. J. Primatol.* 21(3): 445–465.
- Digby, L. J. 1999. Sexual behavior and extragroup copulations in a wild population of common marmosets (*Callithrix jacchus*). *Folia Primatol.* 70(3): 136–145.
- Dunbar, D. C. and Badam, G. L. 2000. Locomotion and posture during terminal branch feeding. *Int. J. Primatol.* 21(4): 649–669.
- Emmons, L. H. 1999. Of mice and monkeys as predictors of mammal community richness. In: *Primate Communities*, J. G. Fleagle, C. H. Janson and K. E. Reed (eds.), pp.171–188. Cambridge University Press, Cambridge.
- Feistner, A. T. C. and Mallinson, J. J. C. 2000. A recipe for species conservation: Multidisciplinary ingredients. In: *Priorities for the Conservation of Mammalian Diversity: Has the Panda Had Its Day?* A. Entwistle and N. Dunstone (eds.), pp.309–323. Cambridge University Press, Cambridge.
- Ferrari, S. F., Iwanaga, S., Ramos, E. M., Messias, M. R., Ramos, P. C. S. and da Cruz Neto, E. H. 1999. Expansion of the known distribution of Goeldi's monkey (*Callimico goeldii*) in south-western Brazilian amazonia, *Folia Primatol.* 70(2): 112–116.
- Gonzalez-Kirchner, J. P. 1999. Habitat use, population density and subgrouping pattern of the Yucatan spider monkey (*Ateles geoffroyi yucatanensis*) in Quintana Roo, Mexico. *Folia Primatol.* 70(1): 55–60.
- Gonzalez-Kirchner, J. P. and Sainz De La Maza, M. 1998. Primate hunting by Guaymi Amerindians in Costa Rica. *Hum. Evol.* 13(1): 15–19.
- Hardie, S. M. and Buchanan-Smith, H. M. 2000. Responses of captive single and mixed species groups of *Saguinus* to novel nonthreatening objects. *Int. J. Primatol.* 21(4): 629–648.
- Janik, V. M. and Slater, P. J. B. 2000. The different roles of social learning in vocal communication. *Anim. Behav.* 60: 1–11.
- Kowalewski, M. M. and Zunino, G. E. 1999. Impact of deforestation on a population of *Alouatta caraya* in northern Argentina. *Folia Primatol.* 70(3): 163–166.
- Lacreuse, A. and Fragaszy, D. M. 1999. Left hand preferences in capuchins (*Cebus apella*): Role of spatial demands in manual activity. *Laterality* 4(1): 65–78.
- Laska, M., Hernandez Salazar, L. T. and Rodriguez Luna, E. 2000. Food preferences and nutrient composition in captive spider monkeys, *Ateles geoffroyi*. *Int. J. Primatol.* 21(4): 671–683.
- Lehman, S. M. 2000. Primate community structure in Guyana: A biogeographical analysis. *Int. J. Primatol.* 21(3): 333–351.
- Mace, G. M. and Balmford, A. 2000. Patterns and processes in contemporary mammalian extinction. In: *Priorities for the Conservation of Mammalian Diversity: Has the Panda Had Its Day?* A. Entwistle and N. Dunstone (eds.), pp.27–52. Cambridge University Press, Cambridge.
- Martinez, R., Aguilera, M. and Ferreira, C. 1999. The karyotype and C-banding of *Cebus nigrivittatus* from the coastal cordillera, Venezuela, *Folia Primatol.* 70(1): 37–40.
- Martins, M. M. and Setz, E. Z. F. 2000. Diet of buffy tufted-eared marmosets (*Callithrix aurita*) in a forest fragment in southeastern Brazil. *Int. J. Primatol.* 21(3): 467–476.
- Oliveira, A. C. M. and Ferrari, S. F. 2000. Seed dispersal by black-handed tamarins, *Saguinus midas niger* (Callitrichinae, Primates): Implications for the regeneration of degraded forest habitats. *J. Trop. Ecol.* 16(5): 709–716.
- Passamani, M., Mendes, S. L. and Chiarello, A. G. 2000. Non-volant mammals of the Estação Biológica de Santa Lúcia and adjacent areas of Santa Teresa, Espírito Santo, Brazil. *Bol. Mus. Biol. Mello Leitão, Nova Série* 11/12: 201–214.
- Passos, F. C. 1999. Diet of a black lion tamarin group, *Leontopithecus chrysopygus* (Mikan) (Mammalia, Callitrichidae), in Caetetus Ecological Station, São Paulo. *Rev. Brasil. Zool.* 16(suppl. 1): 269–278.
- Rogers, L. J. and Kaplan, G. 1998. Teat preference for suckling in common marmosets: Relationship to side of being carried and hand preference. *Laterality* 3(3): 269–281.
- Santa Cruz, A. C. M., Borda, J. T., Gomez, L. and de Rott, M. I. 2000. Endoparasitosis in captive *Cebus apella*. *Lab. Prim. Newsl.* 39(4): 10–12.
- Schuster, J. C., Cano, E. B. and Cardona, C. 2000. Un metodo sencillo para priorizar la conservación de los bosques nubosos de Guatemala, usando Passalidae (Coleoptera) como organismos indicadores. *Acta Zool. Mex. (n.s.)* 80: 197–209.
- Silver, S. C., Ostro, L. E. T., Yeager, C. P. and Dierenfeld, E. S. 2000. Phytochemical and mineral components of foods consumed by black howler monkeys (*Alouatta pigra*) at two sites in Belize. *Zoo Biol.* 19(2): 95–109.
- Snowdon, C. T. and Elowson, A. M. 1999. Pygmy marmosets modify call structure when paired. *Ethology* 105(10): 893–908.
- Solano, S. J. 2000. A comparative study of resource use by howler monkey groups (*Alouatta palliata*) in isolated rainforest fragments of the region of Los Tuxtlas, Veracruz, Mexico. *ASP Bulletin* 24(3): 8.
- Souza-Mazurek, R. R. de, Pedrinho, T., Feliciano, X., Halário, W., Gerônimo, S. and Marcelo, E. 2000. Subsistence hunting among the Waimiri-Atroari Indians in central Amazonia, Brazil. *Biodiv. Conserv.* 9: 579–596.
- Sousa, M. B. C., Silva, H. P. A. and Vidal, J. F. 1999. Litter size does not interfere with fertility in common marmosets, *Callithrix jacchus*, *Folia Primatol.* 70(1): 41–46.
- Souza de Oliveira, M., Lopes, F. A., Alonso, C. and Yamamoto, M. E. 1999. The mothers participation in infant carrying in captive groups of *Leontopithecus chrysomelas* and *Callithrix jacchus*. *Folia Primatol.* 70(3): 146–153.
- Tutin, C. and White, L. 1999. The recent evolutionary past of primate communities: Likely environmental impacts during the past three millennia. In: *Primate Communities*,

- J. G. Fleagle, C. H. Janson and K. E. Reed (eds.), pp. 220–236. Cambridge University Press, Cambridge.
- Visalberghi, E. and Addressi, E. 2000. Seeing group members eating a familiar food enhances the acceptance of novel foods in capuchin monkeys. *Anim. Behav.* 60(1): 69–76.
- Vleeschouwer, K. De, Heistermann, M., Van Elsacker, L. and Verheyen, R. F. 2000. Signaling of reproductive status in captive female golden-headed lion tamarins (*Leontopithecus chrysomelas*). *Int. J. Primatol.* 21(3): 445–465.
- Vleeschouwer, K. De, Leus, K. and Van Elsacker, L. 2000. An evaluation of the suitability of contraceptive methods in golden-headed lion tamarins (*Leontopithecus chrysomelas*), with emphasis on Melengestrol Acetate (MGA) implants: (I) Effectiveness, reversibility and medical side-effects. *Animal Welfare* 9: 251–271.
- Vleeschouwer, K. De, Van Elsacker, L., Heistermann, M. and Leus, K. 2000. An evaluation of the suitability of contraceptive methods in golden-headed lion tamarins (*Leontopithecus chrysomelas*), with emphasis on Melengestrol Acetate (MGA) implants: (II) Endocrinological and behavioural effects. *Animal Welfare* 9: 385–401.
- Wright, P. C. and Jernvall, J. 1999. The future of primate communities: A reflection of the present? In: *Primate Communities*. J. G. Fleagle, C. H. Janson and K. E. Reed (eds.), pp. 295–309. Cambridge University Press, Cambridge.
- Yeoman, R. R., Wegner, F. H., Gibson, S. V., Williams, L. E., Abbott, D. H. and Abee, C. R. 2000. Midcycle and luteal elevations of follicle stimulating hormone in squirrel monkeys (*Saimiri boliviensis*) during the estrous cycle. *Am. J. Primatol.* 52(4): 207–211.
- Abstracts**
- Louguet, O., Bayart, F. and de Thoisy, B. 1999. Ecological and behavioural adaptations of a squirrel monkey population introduced on a small island by the Pasteur Institute in French Guiana. *Folia Primatol.* 70(4): 200–201.
- Nugent, M., Bayart, F., Crozier, F., Louguet, O., de Thoisy, B. and Contamin, H. 1999. Food, diet and feeding behaviour of squirrel monkeys (*Saimiri sciureus*) in relation to food availability on a small island in French Guiana. *Folia Primatol.* 70(4): 217.
- Teixidor, P. 2000. Función y significado de las llamadas “referenciales” en dos especies fisión-fusión: Monos arañas (*Ateles geoffroyi*) y chimpancés (*Pan troglodytes*). *Bol. Asociación Primatológica Española* 7(3): 19. Thesis abstract.
- Selected abstracts from the Twenty-third Annual Meeting of the American Society of Primatologists, 21–24 June, 2000. In: American Journal of Primatology. 51 (Suppl. 1), 2000.**
- Baker, M. E. Social contexts of the “Arrawh” call in white-faced capuchin monkeys (*Cebus capucinus*), p.40.
- Baker, M. E. Cognitive components of plant selection for fur rubbing in white-faced capuchin monkeys (*Cebus capucinus*), pp.39–40.
- Bales, K. L., French, J. A., Dietz, J. M. Reproductive and social influences on fecal cortisol levels in wild and reintroduced female golden lion tamarins, pp.40–41.
- Bollen, K. S. and Novak, M. A. A Survey of abnormal behavior in captive zoo primates, p.47.
- Brush, J. A. Forest structure and sleeping site selection by a wild white-faced saki group (*Pithecia pithecia*), p.49.
- Buzzell, C. A. and Brush, J. A. Ontogeny of independence in wild and captive white-faced saki groups (*Pithecia pithecia*), pp.49–50.
- Carosi, M., Gerald, M. S., Ulland, A. E. and Suomi, S. J. Male-like external genitalia in female tufted capuchins (*Cebus apella*), p.50.
- Clarke, M. R., Tremblay, A. M. and Arden, D. H. Comparison of observational methods for juvenile and group behavior in mantled howling monkeys, pp.51–52.
- Danilova, V., Roberts, T. and Hellekant, G. The sense of taste in common marmoset: Taste fiber type determines behavior, p.53.
- Filalho, M. S. and Setz, E. Z. F. Brown howler (*Alouatta fusca*) feeding ecology in hillside and coastal forests in southern Brazil, pp.56–57.
- Flaschka, M. J. and Norconk, M. A. Analysis of dietary mineral levels for white-faced sakis and red howler monkeys from Guri, Venezuela, p.58.
- Glasgow, M. E. and Williams, L. E. Effects of timing of environmental stress on social behavior patterns during pregnancy in captive squirrel monkeys (*Saimiri boliviensis*), pp.58–59.
- Hanson, A. M. and Porter, L. M. Nutritional composition and distribution of fungal sporocarps consumed by Goeldi’s monkeys in northern Bolivia, p.60.
- Kuhar, C. The process of conducting graduate research on primates in zoological parks, p.26.
- Martínez-Mota, R. and Serio-Silva, J. C. Interactions in a fragment of tropical rain forest of Los Tuxtlas, Mexico: A dispersal case study among howler monkeys (*Alouatta palliata mexicana*), amates (*Ficus perforata*) and ants (*Azteca*), p.72.
- Méndez-Cárdenas, M. G. Vocal variation in howler monkeys (genus *Alouatta*) in allopatric and sympatric populations and its use for phylogenetic analysis, pp.72–73.
- Miller, K. and Dietz, J. Factors affecting variation in daily food intake by wild golden lion tamarins (*Leontopithecus rosalia*), p. 74.
- Phillips, K. A. and Newlon, K. Female-female social relationships in white-fronted capuchins (*Cebus albifrons*): Testing hypotheses about resource size and quality, p.81.
- Porter, L. M. *Callimico goeldii*: Understory monkeys of northern Bolivia, p.82.
- Raboy, B. E. and Dietz, J. M. Patterns of interspecific associations between wild golden-headed tamarins and sympatric Wied’s marmosets in southern Bahia, Brazil, pp.83–84.
- Rizkalla, C. E., Savage, A., Giraldo, L. H., Soto, L. H. and García, F. Patterns of sleeping site selection in wild cotton-top tamarins (*Saguinus oedipus*), p.86.
- Schaffner, C. M. and Aureli, F. Embracing and face greeting in a captive group of Colombian black-faced spider monkeys (*Ateles fusciceps robustus*), p.87.

- Searcy, Y. M. and Caine, N. G. Captive Geoffroy's marmosets (*Callithrix geoffroyi*) react to soaring bird models with anti-predator behaviors, p.88.
- Serio-Silva, J. C. and Rico-Gray, V. Microclimatic factors that influence seed germination of *Ficus perforata* and *Ficus lundelli* (urostigma) dispersed by *Alouatta palliata mexicana* in several arboreal strata (conserved and perturbed habitat), pp.88-89.
- Tarou, L. R. and Maple, T. L. The use of spatial memory in foraging by a group of captive golden lion tamarins (*Leontopithecus rosalia*), pp.95-96.
- Tecot, S. R. The effect of habitat on fecal cortisol concentrations in squirrel monkeys (*Saimiri sciureus*), p.96.
- Weaver, and de Waal, F.B.M. Relationship quality and the development of reconciliation in captive brown capuchins (*Cebus apella*), pp.97-98.
- Williams, L. E., Steadman, A. and Kyser, B. Increased cage size affects *Aotus* time budgets and partner distances, p.98.

Selected abstracts from the Spring Meeting of the Primate Society of Great Britain, Liverpool, UK, 12-13 April, 1999.
In: *Folia Primatologica*, 70:(4) July-August, 1999.

- Aureli, F. Valuable relationships, anxiety and conflict resolution, p.222.
- Dunbar, R. I. M. and Kudo, H. Neocortex size and the size of grooming cliques, p.221.
- Prescott, M. J. and Buchanan-Smith, H. Foraging efficiency in single-and mixed-species troops of tamarins, p.227.
- Schaffner, C. M. Clever decisions: Male and female marmoset's responses to reproductive competitors, p.224.

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Congress - Primatology of The New World, 13-15 June, 2001, Centro Cultural Gimnasio Moderno, Bogotá, Colombia. Sponsor: Centro de Primatología Araguatos. Four sessions: Biology and Ecology; Medicine; Use and Conservation; Management and Keeping. Deadline for call for papers and posters - March 21, 2000. Contact: Victoria Pereira, Calle 96 No. 22-08, Bogotá, Colombia. Tel/Fax: 57-1-2573691, Web site: <http://www.araguatos.org>, E-mail: <info@araguatos.org>.

1st International Conference on Distance Sampling - Estimating Wildlife Abundance for Ecology, Management and Conservation, 30 July-3 August, 2001. St. Andrews, Scotland. Details from: Rhona Rodger, Tel: + 44 (0) 1334 463 228 or e-mail: <rhona@dcs.st-and.ac.uk>, Home Page <[Http://www.ruwpa.st-and.ac.uk/icods/](http://www.ruwpa.st-and.ac.uk/icods/)>.

Association for Tropical Biology Annual Meeting, 15-18 July 2001, Bangalore, India. The theme of the meeting will be the International Conference on Tropical Ecosystems: Structure, Diversity and Human Welfare, and will address three major areas of concern: 1. Global change and tropical forests, 2. The structure, diversity and function of tropical ecosystems, and 3. Biodiversity hotspots. For more information visit the web site of the Ashoka Trust for Research in Ecology and the Environment (ATREE) at <<http://www.atree.org>>.

Animal Behavior Society, 14-18 July, 2001, Oregon State University, Corvallis, Oregon. The symposia of the 38th Annual Meeting will include: 'Aggression and group organization in animal societies', 'Behavioral genetics of the next decade', 'Detecting and measuring mating preferences' and 'Song Learning'. For further information contact Andy Blaustein, e-mail <blaustea@bcc.orst.edu>, or Lynne Houck, e-mail <houckl@bcc.orst.edu> or see <<http://www.animalbehavior.org/ABS/Program>>.

Association for Tropical Biology Annual Meeting, 15-18 July 2001, Bangalore, India. The theme of the meeting will be the International Conference on Tropical Ecosystems: Structure, Diversity and Human Welfare and will address three major areas of concern: 1. Global change and tropical forests, 2. The structure, diversity and function of tropical ecosystems, and 3. Biodiversity hotspots. For more information visit the web site of the Ashoka Trust for Research in Ecology and the Environment (ATREE) at <<http://www.atree.org>>.

6th International Congress of Vertebrate Morphology, 21-26 July, 2001. Jena, Germany. For details about the con-

Meetings

Primate Evolutionary Genetics, 19-20 May, 2001, San Diego, California. Hosted by the American Genetic Association. Contact: Registration and updated program information can be found at <http://lifesciences.asu.edu/aga>. For questions and/or assistance contact: Ms. Susan Hansen, e-mail: <shansen@sandiegozoo.org>. Pre-registration is \$90.00, non-member (\$80.00 for AGA members); \$75.00 students and postdocs (\$70.00 for AGA members who are students/postdocs). Registration includes a reception on the evening of May 18th and banquet at the World-Famous San Diego Zoo the evening of the 20th. The symposium will be held at the Town & Country Resort and Convention Center, 500 Hotel Circle North, San Diego, California (619-291-7131). A special room rate of \$99.00 per night plus tax has been arranged for the conference.

XXV Congresso Brasileiro de Zoológicos e VI Encontro Internacional de Zoológicos, 20-25 de maio de 2001, Brasília, DF, Brasil. O tema central é "Conservação".

gress contact Dr. J. Matthias Starck at the Institute of Systematic Zoology and Evolutionary Biology, Friedrich-Schiller-University, Erbertstrasse 1, D-07743 Jena, Germany. E-mail: <icvm-6@pan.zoo.uni-jena.de.>, Home Page: <www.zoo.uni-jena.de/icvm-6.html.

Association for Tropical Biology Annual Meeting, 15-18 July 2001, Bangalore, India. The theme of the meeting will be the International Conference on Tropical Ecosystems: Structure, Diversity and Human Welfare and will address three major areas of concern: 1. Global change and tropical forests, 2. The structure, diversity and function of tropical ecosystems, and 3. Biodiversity hotspots. For more information visit the web site of the Ashoka Trust for Research in Ecology and the Environment (ATREE) at <http://www.atree.org>.

The Animal Behavior Society Annual Meeting - Comparisons between Primates and Cetaceans, 5-9 August, 2001. Atlanta, Georgia, USA. Details may be obtained from the web site: <http://www.animalbehavior.org/ABS/Program.

24th Annual Meeting of the American Society of Primatologists, 8-11 August 2001, Armstrong Atlantic State University, Savannah, Georgia. Symposia and workshop deadline: 15 March, 2001. Individual abstracts deadline: 1 April, 2001. Contact: Dr. Tammie Bettinger, ASP Program Chair, Cleveland Metroparks Zoo, 3900 Wildlife Way, Cleveland, OH 44109, USA, Tel: (216) 635 3314, Fax: (216) 661 3312, e-mail: <tlb@clevelandmetroparks.com>. Web site: <www.asp.org/asp2001/>.

8th International Theriological Congress, 12-17 August, 2001, Sun City, South Africa. Contacts: ITC 2001 c/o Event Dynamics, PO Box 98009, Sloane Park, 2152 Johannesburg, South Africa. Tel: +27 11 706 5010, e-mail: <dana@eventdynamics.co.za>. Web Page: <http://www.eventdynamics.co.za/itc>.

Annual Conference of the American Association of Zoo Veterinarians, 18-23 September, 2001, Orlando Florida. For more information on the scientific program: Ray Wack, Program Chairman, Sacramento Zoo, 3930 West Land Park Drive, Sacramento, CA 95822-1123, USA, Tel: 916 264 5887, e-mail: <rfwack@ucdavis.edu>. Conference or membership information: Wilbur Amand, Executive Director/AAZV, 6 North Pennell Road, Media, PA 19063, USA, Tel: 610 892 4812, Fax: 610 892 4813, e-mail: <aazv@aol.com>.

IV Congreso de la Asociación Primatológica Española, 26-27 September, 2001 Madrid, Spain, Salón de Actos. Facultad de Psicología. Universidad Autónoma de Madrid. Cantoblanco 28049 Madrid. Spain. For more information, contact: Dr. Susana Sánchez Rodríguez, Dpto. Psicología Biológica y de la Salud Fac. de Psicología, UAM 28049 Madrid, e-mail: <susana.sanchez@uam.> Telephone: 34.91.3978748 / 3975351, Fax: 34.91 3975215, Web site: <http://www.uam.es/ape>.

V Congreso Latinoamericano de Ecología, 15-19 de Octubre de 2001, Facultad de Ciencias Agrarias, Universidad Nacional de Jujuy, San Salvador de Jujuy, Argentina. La fecha límite de presentación de los resúmenes es el 30 de abril de 2001. Organiza: Facultad de Ciencias Agrarias, Alberdi No. 47, (4600) San Salvador de Jujuy, Argentina, Tel: 54 0388 4221550, 54 0388 4221553, Fax: 54 0388 4221547, e-mail: <vclae@fca.unju.edu.ar>. Web site: <www.fca.unju.edu.ar>.

V Congreso de la Sociedad Mesoamericana para la Biología y la Conservación (SMBC), 15-19 de Octubre de 2001, El Salvador, La Sociedad Mesoamericana para la Biología y la Conservación - SMBC, es una organización internacional no lucrativa cuyo objetivo es contribuir con la promoción de la biología y la conservación de la naturaleza, nace en 1996 como iniciativa de un grupo de profesionales de cinco países, interesados en fomentar la comunicación entre conservacionistas e investigadores trabajando en la región mesoamericana. Ésta ha crecido y evolucionado mucho desde su fundación. Para más información sobre la sociedad visite: <http://ccb.stanford.edu/mesoamericana/>. La SMBC organiza cada año el mayor congreso científico-conservacionista regional, este congreso constituye una oportunidad regional única, permitiendo la difusión de avances científicos y conservacionistas, estimula la producción de nuevas ideas, promueve la interacción entre actores, tanto mesoamericanos como extranjeros trabajando en la región, permite a los profesionales conocer sobre la realidad de cada país, da oportunidad para la formación de nuevos valores, y nos abre las puertas al mundo, como una región de gran interés para la conservación global y decidida a construir su desarrollo sobre bases sostenibles. Hasta la fecha se han realizado cuatro congresos, en Honduras (1997), Nicaragua (1998), Guatemala (1999), y Panamá (2000). En octubre 2001 corresponde a El Salvador el honor de albergar tan importante evento y desde ya les invita a participar. Se invita a todos los interesados en presentar ponencias y/o organizar *simposia* mandar sus propuestas a: Eunice Echeverría: <eecheverría@hotmail.com> o Roberto Rivera: <rrbiosis@es.com.sv> con copia a: <mesoamerica2001@yahoo.com.mx>. Fecha límite para propuestas de simposia: 5 de marzo 2001. Fecha límite para ponencias: 31 de Mayo de 2001. Para más información sobre el congreso visite: <http://geocities.com/smbc_elsalvador_2001/>, esta página se estará actualizando periódicamente para mantenerles informados.

V Congresso Brasileiro de Ecologia do Brasil, 4-9 November, 2001, Porto Alegre, Rio Grande do Sul, Brasil. O tema é "Ambiente x Sociedade". Entidade promotora: Sociedade de Ecologia do Brasil. Apoio: Universidade Federal do Rio Grande do Sul, Instituto de Biociências, Centro de Ecologia e Departamentos de Ecologia, Zoologia e Botânica. Contatos e correspondência: Organização de Congresso, Rua João Abott, 44- cj.402, 90460-150 Porto Alegre, RS, Brasil, Tel/Fax: + 55 51 333 8737, e-mail: <nossaequipe@nosequipe.com.br>. Web site: <www.ecologia/ufgrs.br.>.

5th International Conference on Environmental Enrichment, 4–9 November 2001, Taronga Park Zoo, Sydney, Australia. The theme is “Making Enrichment a 21st Century Priority”. For information: Margaret Hawkins, 51EE Conference Co-ordinator, Taronga Zoo, PO Box 20, Mosman, NSW 2088, Australia, Tel: +61 2 9978 4615, Fax: +61 2 9978 4613, e-mail: <mhawkins@zoo.nsw.gov.au>. Web site: <www.zoo.nsw.gov.au>.

V Congresso Brasileiro de Ecologia do Brasil, 4–9 November, 2001, Porto Alegre, Rio Grande do Sul, Brasil. O tema é “Ambiente x Sociedade”. Entidade promotora: Sociedade de Ecologia do Brasil. Apoio: Universidade Federal do Rio Grande do Sul, Instituto de Biociências, Centro de Ecologia e Departamentos de Ecologia, Zoologia e Botânica. Contatos e correspondência: Organização de Congresso, Rua João Abott, 44- cj.402, 90460-150 Porto Alegre, RS, Brasil, Tel/Fax: + 55 51 333 8737, e-mail: <nossaequipe@nosequipe.com.br>. Homepage: www.ecologia/ufrgs.br.

IV Simposio Internacional de Desarrollo Sustentable en los Andes. La Estrategia Andina para el Siglo XXI, 25 de noviembre al 2 de diciembre, 2001. Facultad de Ciencias, Instituto de Ciencias Ambientales y Ecológicas (ICAE), Universidad de Los Andes, Merida. Informes: Maximina Monasterio o Rigoberto Andressen, e-mail: <amamrd@ciens.ula.v>.

Committing to Conservation Conference, 28 November–2 December, 2001, Melbourne, Florida, USA. This will be the fourth Zoos and aquariums: Committing to Conservation Conference. The goal is to bring together field researchers and zoo personnel to promote a greater involvement of zoos and aquariums supporting in situ work. There will be a mixture of sessions, panel discussions and round tables with a special emphasis on audience participation and problem solving. The registration fee is US\$ 175.00 and includes sessions, some meals and social events. For more information contact: Beth Armstrong, Tel: 321-454-6285, e-mail: <elynn57@aol.com> or Margot McKnight, Tel: 321-254-9453, ext. 23, e-mail: <margo@brevardzoo.org>.

3rd Göttinger Freilandtage: Sexual Selection in Primates, 11–14 December 2001, hosted by the German Primate Center (DPZ), Göttingen, Germany. Invited speakers will summarize and evaluate recent empirical and theoretical work dealing with causes, mechanisms and consequences of sexual selection in primates, including humans. In addition, it is hoped to identify general principles through comparison with other mammals. Oral (15 min) and poster contributions. Deadline for submission of abstracts is 1 August, 2001. Guests must also register in advance by October 1, 2001. Additional details are available from Peter Kappeler, e-mail: <pkappel@gwdg.de>, and the web site: <http://www.dpz.gwdg.de/voe_page/GFT2001/freiland01C.htm>.

2002

American Association for the Advancement of Science, 14–19 February 2002, annual meeting. The program will include various environmental issues, including: Achieving health in a connected world, connecting diverse disciplines, visualizing the earth, communicating across boundaries, environmental and biological diversity in a connected world, cultural and social diversity in a changing world, and science and sustainability in a global economy. For more information contact: Kathryn Papp, Senior Program Officer, Program on Ecology and Human Needs, International Directorate, AAAS, 1200 New York Avenue, NW, Washington, DC, 20005, USA, Tel: (202) 326 6427, Fax: (202) 289 4958 or see: <www.aaas.org/meetings/2002/proposed_tracks>.

3rd International Canopy Conference, June, 2002, Cairns, Australia. Sponsored by the Queensland Government of Australia and the Smithsonian Institution, the conference theme is “Science, Policy and Utilisation” and is intended to bring together scientists, environmental managers and policy makers concerned with the discovery and sustainable use of forests around the world. Contact: Eileen Domagala, e-mail: <Eileen.Domagala@premiers.qld.gov.au>. Web site: <http://www.premiers.qld.gov.au/whatsnew.htm>.

XIXth Congress of the International Primatological Society, 4–9 August 2002, Beijing, China. Organized by the Mammalogical Society of China and the Institute of Zoology, Chinese Academy of Sciences. The main themes of the Congress will focus on the progress and prospects of primatology and the conservation of non-human-primates. The first deadline is for symposium and workshop titles, to be submitted by 31 August, 2001. *Contact address*: Prof. Fuwen Wei, Secretary General, 19th Congress of the International Primatological Society, c/o Institute of Zoology, Chinese Academy of Sciences, 19 Zhongguancun Lu, Haidian, Beijing 100080, China, Fax: (86-10) 82627388, e-mail: <IPS_Beijing@panda.ioz.ac.cn>. Home page: <http://www.ips.ioz.ac.cn>.

Notes to Contributors

Scope

The journal/newsletter aims to provide a basis for conservation information relating to the primates of the neotropics. We welcome texts on any aspect of primate conservation, including articles, thesis abstracts, news items, recent events, recent publications, primatological society information and suchlike.

Submissions

Please send all English and Portuguese contributions to: Jennifer Pervola, Conservation International, Center for Applied Biodiversity Science, 1919 M. St. NW, Suite 600, Washington, DC 20036, Tel: 202 912-1000, Fax: 202 912-0772, e-mail: <j.pervola@conservation.org>, and all Spanish contributions to: Ernesto Rodríguez-Luna, Instituto de Neuroetología, Universidad Veracruzana, Apartado Postal 566, Xalapa 91000, Veracruz, México. Tel: 281 8-77-30, Fax: 281 8-77-30, 8-63-52, e-mail: <saraguarat@speedy.coacade.uv.mx>

Contributions

Manuscripts can be in English, Spanish or Portuguese, and should be double-spaced and accompanied by the text on diskette for PC compatible text-editors (MS-Word, WordPerfect, Excel, and Access), and/or e-mailed to <j.pervola@conservation.org>. (English, Portuguese) or <saraguarat@speedy.coacade.uv.mx> (Spanish) Hard copies should be supplied for all figures (illustrations and maps) and tables. The full name and address for each author should be included. Please avoid abbreviations and acronyms without the name in full. Authors whose first language is not English, please have texts carefully reviewed by a native English speaker.

Articles. Each issue of *Neotropical Primates* will include up to three full articles, limited to the following topics: Taxonomy, Systematics, Genetics (when relevant for systematics), Biogeography, Ecology and Conservation. Texts for full articles should not exceed about 20 pages in length (1.5 spaced, and including the references). Please include an abstract in English, and (optional) one in Portuguese or Spanish. Tables and illustrations should be limited to six, excepting only the cases where they are fundamental for the text (as in species descriptions, for example). Full articles will be sent out for peer-review.

Short articles. These are reviewed only by the editors. A broader range of topics are encouraged, including such as behavioral research, in the interests of informing on general research activities which contribute to our understanding of platyrrhines. We encourage reports on projects and conservation and research programs (who, what, where, when, why etc.) and most particularly information on geographical distributions, locality records, and protected areas and the primates which occur in them. Texts should not exceed 10 pages in length (1.5 spaced, including the references).

Figures and maps. Articles can include small black-and-white photographs, high quality figures, and high quality maps and tables. Please keep these to a minimum. We stress the importance of providing maps which are **publishable**.

News items. Please send us information on projects, field sites, courses, recent publications, awards, events, activities of Primate Societies, etc.

References

Examples of house style can be found throughout this journal. Please refer to these examples when citing references throughout the text.

Journal article

Stallings, J. D. and Mittermeier, R. A. 1983. The black-tailed marmoset (*Callithrix argentata melanura*) recorded from Paraguay. *Am. J. Primatol.* 4: 159-163.

Chapter in book

Brockelman, W. Y. and Ali, R. 1987. Methods of surveying and sampling forest primate populations. In: *Primate Conservation in the Tropical Rain Forest*, C. W. Marsh and R. A. Mittermeier (eds.), pp. 23-62. Alan R. Liss, New York.

Book

Napier, P. H. 1976. *Catalogue of Primates in the British Museum (Natural History). Part 1: Families Callitrichidae and Cebidae*. British Museum (Natural History), London.

Thesis/Dissertation

Wallace, R. B. 1998. The behavioural ecology of black spider monkeys in north-eastern Bolivia. Doctoral thesis, University of Liverpool, Liverpool, UK.

Report

Muckenhirn, N. A., Mortensen, B. K., Vessey, S., Frazer, C. E. O. and Singh, B. 1975. Report on a primate survey in Guyana. Unpublished report, Pan American Health Organization, Washington, DC.

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Contents

Alternative Male Reproductive Behaviors in the Belizean Black Howler Monkey (<i>Alouatta pigra</i>) <i>Robert H. Horwich, Robin C. Brockett & Clara B. Jones</i>	95
Distribuição do Sagüi (<i>Callithrix jacchus</i>) nas Áreas de Ocorrência do Mico-Leão-Dourado (<i>Leontopithecus rosalia</i>) no Estado do Rio de Janeiro <i>Carlos R. Ruiz-Miranda, Adriana G. Affonso, Andréia Martins & Benjamin Beck</i>	98
Repatriation of Two Confiscated Black Howler Monkeys (<i>Alouatta pigra</i>) in Belize <i>Robin C. Brockett & Bruce C. Clark</i>	101
Attempted Predation on a White-Faced Saki in the Central Amazon <i>Kellen A. Gilbert</i>	103
Infanticide Following Immigration of a Pregnant Red Howler, <i>Alouatta Seniculus</i> <i>Erwin Palacios</i>	104
Levantamento Preliminar de Endoparasitas do Tubo Digestivo de Bugios <i>Alouatta guariba clamitans</i> <i>Giane Carla Kopper Müller, Andreia Krambeck, Zelinda Maria Braga Hirano & Hercílio Higino da Silva Filho</i>	107
Dados Preliminares sobre a Ecologia de <i>Saguinus niger</i> na Estação Científica Ferreira Penna, Caxiuanã, Pará, Brasil <i>Cecilia Veracini</i>	108
A Possible Record of <i>Callicebus</i> in Argentina <i>Marcelo F. Tejedor</i>	113
Twinning in Semi-Free Ranging Capuchin Monkeys (<i>Cebus apella</i>) <i>Massimo Mannu & Eduardo B. Ottoni</i>	114
News	115
Primate Societies	121
Recent Publications	122
Meetings	128