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Prudence Hero Napier

by Douglas and Christine Brandon-Jones

We are very sad to announce the death, at the age of 81, of Prue Napier, on the Isle of Mull, Scotland, on Saturday, 7 June. She had been suffering from cancer, but died suddenly while convalescing from a serious operation. Prue was best known as the co-author with her late husband, John Napier, of the classic reference works, *A Handbook of Living Primates* (1967) and *The Natural History of the Primates* (1985) and co-editor with John, of *Old World Monkeys* (1970). She was also the author of the three volumes of the important *Catalogue of Primates in the British Museum (Natural History)* (1976, 1981, 1985). She was a president of Twycross Zoo, and remained interested in the doings of British Primatology until her death. In 1995, she personally presented the Primate Society of Great Britain's medal in honour of her husband, an event which gave both Prue and the Society enormous pleasure. The Society has lost an important and most senior member, and many will, as we do, grieve personally for the death of such a good friend, one who with her indomitable spirit, humorous and wise outlook on life, and her generosity, enriched the lives of all who knew her. She is survived by Gremlin and her older son Hugo, his wife, and two young children. Anyone who would like to get in touch with Prue's family, please write to:

Douglas and Christine Brandon-Jones, 11 York Road, London SW11 3PX, UK.

Philip Hershkovitz 1909-1997

Philip Hershkovitz, Curator Emeritus of Mammals at the Chicago Field Museum of Natural History, died on February 15, 1997, aged 87. He was born in Pittsburgh, and obtained his bachelor's degree in Zoology at the University of Pittsburgh, and a master's degree in Mammalogy from the University of Michigan. He joined the staff of the Chicago Field Museum in 1947, and was appointed Curator of Mammals in 1956, after serving as Associate Curator. He retired in 1971, but continued working right up to his death, and was carrying out field work in Brazil in 1992. At the time of his death he had four papers in press. From 1947 to 1952, he participated in the Field Museum's expedition to Colombia, one of the longest collecting operations in its history. His field experience also extended to Ecuador, Peru, Surinam, Bolivia and Brazil. He published more than 300 scientific and popular articles on mainly South American mammals, and including marsupials, bats, rodents, whales, ungulates, and primates.

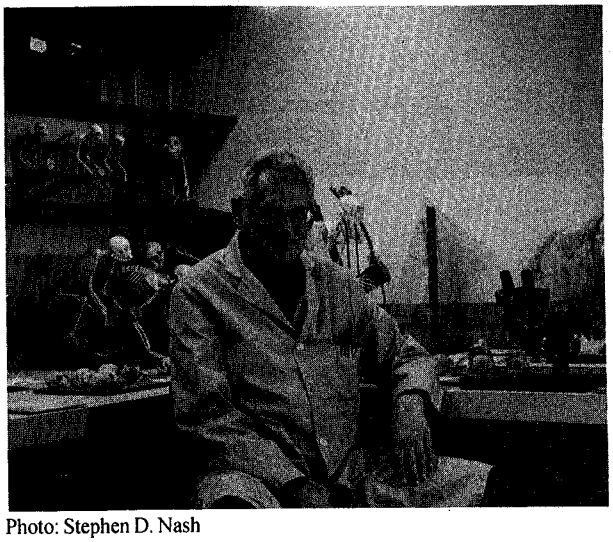

Photo: Stephen D. Nash

Philip Hershkovitz

by Adelmar F. Coimbra-Filho

It was with great sadness and the feeling of a very great loss that I heard of the death of the eminent zoologist Prof. Philip Hershkovitz, Emeritus Curator of Mammals of the Field Museum of Natural History, Chicago.

Prof. Hershkovitz leaves a gap which will be extremely difficult to fill due to his eclectic knowledge of vertebrate zoology, his capacity for work and extraordinary scientific productivity, and his vast experience obtained through decades of research on the living and extinct faunas of the Neotropical Region, encompassing many biomes and ecosystems and most particularly concerning marsupials, rodents and primates but also many other mammalian taxa. His detailed, thorough, and encyclopedic studies have resulted in remarkable and scholastic monographs and papers, many of which are keystone for entire research areas and taxonomic groups. I cite, as an example, his essay on the genus *Pudu*, a very poorly known group of South American cervids (*Fieldiana, Zoology, n. ser.* 11:1-86, 1982). At least 75 new species were described by Prof. Hershkovitz, and many species have been dedicated to him and bear his name.

His professional and private life have been the subject of a number of articles, but there is one publication of particular interest: A special edition of the Field Museum publication *Fieldiana*, with 506 pages, prepared especially in his honor: "*Studies in Neotropical Mammalogy - Essays in Honor of Philip Hershkovitz*", organized by B. D. Patterson and R. M. Timm (*Fieldiana, Zoology, New Series* 39, 1987). The issue includes biographical information on this tireless zoologist. In this collection dedicated to the great master, he himself published an extremely valuable contribution to the history of zoology in the Neotropical region, recounting and documenting zoological and botanical expeditions between 1492 a 1850; a compilation which filled an important gap. I discussed the competence, productivity and pragmatism of this famous taxonomist, justly honored during his lifetime by his colleagues in this volume, in an article I published in 1990 in the *Revista Brasileira de Biologia* (Vol. 50, Number 4:1065-79).

Over the years of my involvement in Primatology, it was always with great satisfaction that I would write to Prof. Hershkovitz and discuss with him my findings and re-

search. My correspondence with him began in 1968, when I was finishing up the first stage of my research on *Leontopithecus rosalia*. Then I was able to call on him a number of times to help resolve our questions and doubts. His perspicacity and interest were remarkable. His enthusiasm was gratifying when I sent him the first photographs of the, then little-known, dark forms of the lion tamarins, including the exact site of the rediscovery of *L. chrysopygus* in 1970, which he published in his great work *The Living New World Monkeys (Platyrrhini)* in 1977.

Our correspondence was intermittent and only rarely did I have the pleasure of meeting him personally. On these occasions, however, we were able to talk at length, and fascinating conversations they were, always. Once he stayed with me at the Rio de Janeiro Primate Center (CPRJ) for some days while researching and collecting marsupials, rodents and bats in the surrounding forest of the Serra dos Orgãos, and observing the callitrichids we maintain in captivity there. It was then possible to enjoy at first hand his extraordinary knowledge of the diversity and origins of the Neotropical fauna.

He was, without doubt, one of the great zoologists of our time, and his work on the mammals of the Neotropics, consolidated in his numerous publications, is an extraordinarily valuable legacy for future generations. The very rapid development of New World Primatology during the 1980's is in great part due to his research. His treatise *Living New World Monkeys* concentrated on the marmosets and tamarins, and is a landmark in the Primatological sciences, stimulating not only field researchers, morphologists and taxonomists, but also benefiting such as Biomedicine and Pharmacology. This book and his subsequent publications concerning a number of the remaining genera (which were to form a second volume) have provided the groundwork for our current understanding of the morphology, taxonomy, origins, and radiations of New World monkeys. Very few people have achieved so much and contributed so significantly and substantially to our understanding of Neotropical mammals, and his life work will continue as the key reference for New World primatologists for many years to come.

Adelmar F. Coimbra-Filho, Member of the Brazilian Academy of Sciences. *Address for correspondence*: Rua Artur Araripe 60/901, Gávea, 22451-020 Rio de Janeiro, Rio de Janeiro, Brazil.

PHILIP HERSHKOVITZ - SOME PUBLICATIONS

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Articles

Biometry and Stomach Contents of Some Atlantic Forest Primates, With a Note on *Brachyteles* Tooth Replacement

Currently, most information on the diets of primates comes from direct observations. However, primates are still commonly hunted or accidentally killed throughout most of the Neotropics, and provide as such opportunities for gathering data on food items and their processing, besides material for anatomical and genetic studies. Here we report on diet and biometric data from primate specimens collected in parks and reserves in the state of São Paulo, southeastern Brazil. Individuals were either found dead along roads or recovered from poachers (Table 1). Standard measurements were taken before the stomach contents were fixed in 70% alcohol for later analyses. These were washed under running water through a 1 mm mesh, and the excess liquid drained by gently compressing, and the remains weighed with a spring scale (precision 1g). Identifiable larger items were sorted and weighed, while the relative composition of the remaining mulch, or of contents too finely chewed to be sorted, was estimated. The results are shown in Table 2.

Although general patterns cannot be drawn from such a limited sample, some interesting findings are worthy of note. Insect remains were found in the capuchin, lion tamarin and titi samples, but the tamarin sample was too crushed for identification at a higher level. Besides fruit pulp and insects in its stomach, we found the tamarin's small intestine to be filled with a translucent exudate. These items present no surprise, agreeing with what is known for this species (see Fonseca *et al.*, 1994, pp. 97-107). The same can be said for the howlers, which had fed exclusively on leaves (see Mendes, 1989; Chiarello, 1994) although the ratio of stomach content to body mass of the adult male was remarkable, the monkey having ingested 15.75% of its own body weight. Compared to the immature male, the contents of the adult's stomach were not as finely chewed, and had many intact leaf petioles.

There is little information on the diet of *Callicebus personatus* (Kinzey, 1981; Müller and Pissinatti, 1995), the available data showing it to be mostly frugivorous. Müller and Pissinatti (1995) reported on the diet of *C. p. melanochir* as 76.6% fruits, 17.2% leaves, with other items making 1.8%. No animal prey were reported. Our specimen had gorged on *Campomanesia* sp. fruits, both ripe and green, ingesting and partly chewing a few green seeds, and had eaten a few insects and caterpillars. This omnivorous meal recalls the diet of some Amazonian titis, known to include insects in their diets (see Hernández-Camacho and Cooper, 1976; Kinzey, 1981).

The capuchin from Morro do Diabo had fed mostly on bamboo shoots and *Chorisia speciosa* seeds. Capuchins

have been observed to feed on bamboo shoots (*Guadua* cf. *angustifolia*) in the Atlantic forest of the coastal mountain ranges of São Paulo (Intervales and Carlos Botelho State Parks, pers. obs.) as well as on bamboo leaves (*Merostachys* sp.) in semideciduous forest further inland (Galetti and Pedroni, 1994). The large amount of *Chorisia speciosa* (an anemochoric cotton-tree) seeds, suggest the monkey spent a considerable time opening the hard fruits of the cotton-tree and separating the seeds from the attached cotton-like fibers. Dry-fruit seeds are known to be an important food item to capuchins in the semideciduous forests of São Paulo, such as in the Morro do Diabo State Park, where fleshy fruit are less abundant (Galetti and Pedroni,1994).

The greatest surprise was the amount of crushed Sapotaceae and *Campomanesia* sp. seeds in the *Brachyteles* stomach contents, comprising *c.* 25% of the volume. Except for 11 *Campomanesia* and ~100 *Passiflora* seeds, the monkey had crushed all ingested seeds, identifiable only as finely chewed fragments. Very few of these fragments could be identified in the cecum, the contents of which were reduced to a green paste with a few fibers, plus 22 *Passiflora* and two *Campomanesia* seeds, suggesting that chewed seeds are efficiently digested. *Brachyteles arachnoides*, like other Atelinae, has been considered to be a seed disperser, rather than a predator (Terborgh, 1983; Milton, 1984; Van Roosmalen, 1985; Fonseca, 1986; Strier, 1991; Nunes, 1995), probably because obvious seed-crushing behavior is hard to observe, and fecal samples produce little evidence of seed predation. Nevertheless, considering the monkey's size and the importance of fruit in its diet (at least for the São Paulo Atlantic forest population, see Moraes, 1992a, 1992b), the muriqui can evidently be an important predator of many of the soft-seeded species it consumes, such as many Lauraceae, Myrtaceae and Sapotaceae. This may be an interesting topic for future research.

The Ubatuba muriqui showed all long bone epiphysis free, and the simphysis between the basisphenoid and basioccipital bones totally open. These, plus its dental characteristics and low mass proved it to be a juvenile (following De Blase and Martin, 1981). The dentary showed relevant information on the tooth eruption sequence and age of the specimen. Permanent incisives and first and second molars had already erupted, but the third molars were still enclosed, under the still attached deciduous teeth. The deciduous canines and premolars were still present, showing abraded cusps, while the permanent ones were beginning to push them up.

Comparing our skull with 11 specimens in the Museum of Zoology of the University of São Paulo (in age sequence: MZUSP 11106, 8582, 24604, 11098, 11098, 19362, 1690, 1160, 19336, 11100, 19360, 3533) we found the teeth eruption sequence in *Brachyteles arachnoides* to be:

$$\frac{M^1 - I^1 - I^2 - M^2 - P^2 - P^3 - (P^4 - C) - M^3}{M_1 - I_1 - I_2 - M_2 - P_2 - P_3 - (P_4 - C) - M_3}$$

An adult male (MZUSP 3533) showing the basisphenoid and basioccipital bones fused had all permanent teeth, except for the third molars, which were still erupting. This, and the other specimens, showed these teeth to be the last to erupt. Although it is difficult to estimate the age of our specimen, Alcides Pissinatti (Centro de Primatologia do Rio de Janeiro - CPRJ) informed us that an individual showing dental characteristics and weight similar to ours was 6-8 months old. As captive specimens may show a more rapid growth due to better nourishing the Ubatuba specimen may have been somewhat older.

It is worth commenting on the way the monkeys were obtained. All but the muriqui were road-kills on roads or avenues through or adjacent to state parks. This fact shows that monkeys of most species will descend to the ground to cross roads through habitat patches, making them vulnerable to the traffic. None of the many roads traversing the state's reserves have devices to allow safe wildlife crossing, making some of them true killing grounds. This fact is especially acute in Morro do Diabo State Park, where endangered species such as the black lion tamarin, tapirs, *Tapirus terrestris*, and pumas, *Puma concolor*, are frequently killed on the paved road that was built through the park without any effective measure so far being taken by the authorities, despite the problem being well known (see Valladares-Padua *et al.* 1995). The state's highway department has recently answered to requests for taking measures by contending that the present culverts and underground passages are enough to allow wildlife (including primates) to cross. This is unfounded and the roads present a serious threat to the already isolated populations of the larger mammals in the park; the last large remnant of mesophytic forest in the state. Cantareira State Park is

Table 1. Collecting and biometry data of the primate specimens studied. [1] Killed by poachers, [2] Road-kills. Weights are for whole specimens, including stomach contents.

Species	Collecting Date	Locality	Age and sex	Body Weight (g)	Head-Body Length (mm)	Tail Length (mm)
Brachyteles arachnoides[1]	20 Jan 96	Sertão do Puruba, Ubatuba (23°19' S, 44°56' W)	Juv. male	6,250	588	594
Callicebus personatus[2]	17 Jan 96	Cantareira S.P. (23°22' S, 43°46'W)	Ad.female	1,692	358	468
Cebus apella[2]	23 Jun 94	Morro do Diabo S.P. (22°23' S, 52°15' W)	Ad.male	3,864	394	395
Alouatta fusca[2]	21 Nov 94	Cantareira S. P.	Ad.male	6,540	470	535
Alouatta fusca[2]	July 96	Cantareira S. P.	Juv.male	1,143	285	338
Leontopithecus chrysopygus[2]	Feb 95	Morro do Diabo S.P.	Ad.male	561	240	368

Table 2. Stomach contents of primate specimens from the state of São Paulo, Brazil.

Species and Collecting Data	Food Items (g)
Brachyteles arachnoides	Finely chewed leaves, flowers and fruit parts (~75% of volume) and crushed seeds (25%) - 266 g, including: *Ficus* sp. syconia, Sapotaceae (*Pouteria*?) fruits and crushed seeds, *Passiflora* sp. (Passifloraceae) fruits and > 100 whole seeds *Campomanesia* sp. (Myrtaceae) fruits and 12 whole seeds Fabaceae (*Machaerium* or *Dalbergia* sp) flowers
Callicebus personatus melanochir	*Campomanesia* sp.(Myrtaceae) fruit peels and seeds - 20 g *Miconia* sp. (Melastomataceae) fruit peels - 3 g, Unidentified chewed mulch and fruit pulp - 20g. Insects - remains of 1 winged Hymenoptera, 4 Lepidoptera larvae, 1 cicada (Homoptera) and adult and larvae of Coleoptera (Chrysomelidae ?)
Cebus apella	Bamboo shoots (*Merostachys* sp., Poaceae) - 32 g, *Chorisia speciosa* (Bombaceae) seeds - 5.5 g. Insects - 2 g; remains of large Hemiptera and winged Hymenoptera (Vespoidea ?). Mulch (mostly crushed seeds and bamboo shoots) - 21 g
Alouatta fusca (adult male)	Chewed leaves and stems - 1,030 g, including parts of a Bignoniaceae liana
Alouatta fusca (immature male)	Finely chewed leaves - 16 g
Leontopithecus chrysopygus	Fruit pulp and chitin fragments - 4 g

quickly being engulfed by the urban sprawl of São Paulo and neighboring cities, urban areas and high-traffic avenues and roads cut or surround the park, and road-kills are frequent.

A similar situation is arising with plans to improve the dirt road which bisects the Carlos Botelho State Park, currently under consideration by the state's environment secretary. Carlos Botelho is probably the most important reserve in the state in terms of wildlife populations and is crucial for the long-term global survival of endangered species that have their stronghold in the park and the adjacent Intervales State Park. These species include the muriqui and the jacutinga or piping guan, *Pipile jacutinga* (see Martuscelli *et al.*, 1994; Galetti *et al.*, in press). Road-kills, poaching, and palm-heart harvesting will likely increase with greater traffic and easier access to the park's interior. Despite the protection and limited access to the park, muriquis are occasionally poached (see Mittermeier *et al.*, 1987; Moraes, 1992a) and illegal palm-harvesting is currently a serious threat to Carlos Botelho and Intervales (Galetti and Chivers, 1995).

Our muriqui was one of three killed by poachers during a day-long hunting expedition over very difficult mountainous terrain in an area belonging to the Núcleo Picinguaba of the Serra do Mar State Park. The fact that the muriquis were poached inside a park by local "caiçaras" confirm the view of Martuscelli *et al.* (1994) that poaching by "traditional people" living in and around reserves is the greatest threat to the species in São Paulo, and show that the muriqui is not safe even in one of the conservation areas with the best infra-structure in the state. In fact, in terms of protection, most São Paulo parks are reserves only on paper, with only 11% of their total area being effectively protected, and just 29% being under the dominion of the state (Brazil, São Paulo, DRPE-IF, 1993). The difficult problem of "caiçara" populations in the state's conservation units and their depredations on the wildlife (see Martuscelli *et al.*, 1994; Martuscelli and Olmos, in press; Galetti *et al.*, in press) has not been acknowledged by the state's conservation authorities, and in fact the current view is that these communities should be allowed to continue living in the reserves with full access to their natural resources, as was outlined in a recent proposal in which up to 5% of the area of the state's ecological stations should be given over to local populations, with 3% made available to agriculture, regardless of habitat type or extent. This proposal was being considered despite insufficient habitat being recognized as one of the main problems of fauna conservation in the state (Brazil, São Paulo, PROBIO, 1996). Such "politically correct" proposals are taken seriously despite the lack of scientific evidence that the activities of the occupants of the reserves are sustainable. The damage to these communities, including local extinctions of primates and larger mammals and birds, is easily perceived (Martuscelli *et al.*, 1994; Olmos 1996; Martuscelli and Olmos, in press). Without a more serious commitment on the part of the state government to conserve its protected areas, one sad consequence is that more primates will become available to studies such as this.

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Fábio Olmos, Seção de Animais Silvestres, Instituto Florestal de São Paulo, C.P. 1322, São Paulo, SP, 01059-970, Brazil, e-mail: guara@nethall.com.br, **Geraldo Antônio Daher Corrêa Franco**, Seção de Ecologia, Instituto Florestal de São Paulo, C.P. 1322, São Paulo, SP, 01059-970, Brazil, and **Paulo Auricchio**, Bolsista CNPq, Departamento de Zoologia, Instituto de Biociências - Universidade de São Paulo, Rua do Matão - Travessa 14, no. 321, São Paulo, SP, 05508-900, Brazil, e-mail: aurichio@usp.br.

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Comportamiento Social en Aulladores: El Caso de la Emigración de una Hembra Subadulta en *Alouatta caraya*

Se ha dicho que en la mayoría de los primates gregarios del Viejo Mundo con más de una hembra reproductiva por grupo los machos son los que muestran una mayor tendencia a dejar la tropa natal, sin embargo en algunas especies se ha observado que ambos sexos emigran en tanto que en otras, generalmente lo hacen las hembras (Pusey y Packer, 1987). Con respecto a los primates neotropicales poco se conoce sobre los patrones de dispersión de los sexos, describiéndose en aquellas especies con estructura social polígama, dispersión de machos, tal es el caso de en *Cebus* (Robinson y Janson, 1987), *Saimiri* (Baldwin y Baldwin, 1981) y *Alouatta* (Neville *et al.*, 1988). De las especies mencionadas, *Alouatta*, también muestra dispersión de hembras (Jones, 1980; Crockett, 1984; Neville *et al.*, 1988; Calegaro-Marques y Bicca-Marques, 1996).

Si bien no siempre es fácil determinar porqué un individuo emigra en un momento determinado de su vida, este tipo de conducta se puede clasificar según: a) emigración como consecuencia de comportamientos agresivos, b) emigración causada por la atracción hacia un individuo extragrupal, c) emigración causada por rapto (Pusey y Packer, 1987).

En especies que muestran dispersión regular de hembras, se ha visto que las mismas emigran después del primer estro; sin embargo, en hembras de hamadríadas (*Papio hamadryas*) este evento se produce aún en la etapa juvenil. En aulladores la dispersión se da generalmente antes del primer estro, en relación con el establecimiento de los rangos jerárquicos y es así como se ha descripto que en *Alouatta palliata*, *A. seniculus* y *A. caraya*, las hembras forman una jerarquía social en la que el rango se relaciona de manera inversa con la edad (Jones, 1980, 1983; Crockett, 1984). Si bien el mantenimiento de la jerarquía

se alcanza por medio de comportamientos pacíficos, en el establecimiento de los rangos, principalmente el que corresponde a la posición alfa, las hembras jóvenes interactúan de manera agresiva con las otras (Crockett, 1984). El comportamiento agresivo de las hembras jóvenes también puede apreciarse en lo señalado por Glander (1980) quien observó una baja supervivencia en las crías de las hembras primíparas con rango alfa, asociando esta situación a la coincidencia entre el tiempo en que tienen el primer pato (3 a 4 años de edad) y aquel en el que ellas obtienen el primer puesto en la jerarquía social, dando origen a la dispersión de las hembras juveniles que no pueden integrarse en la dinámica social de su grupo natal (Jones, 1980; Crockett, 1984; Rumiz, 1990; Clark, 1990; Calegaro-Marques, 1992).

El presente trabajo describe las observaciones realizadas en aulladores negros (*Alouatta caraya*) teniendo en cuenta las relaciones sociales de las hembras observadas en condiciones naturales, considerando la desaparición de una de las sub-adultas y dando particular énfasis a las diferencias de comportamiento entre las mismas.

Metodología

La ecología y el comportamiento social de un grupo de *Alouatta caraya* fueron estudiados en un período de 20 meses (mayo 1992/diciembre 1993) en una tropa llamada TP que habitaba en un parche de bosque semi-caducifolio de aproximadamente 10 ha, denominado Tacuaral-Pozo, situado en las márgenes del río Riachuelo en el noroeste de la provincia de Corrientes, Argentina (27° 30' S; 58° 41'O) (Figura 1). El sitio presenta un relieve suavemente ondulado con una altura de 50-60 msnm y el clima corresponde a un ambiente subtropical subhúmedo a húmedo (Zunino, 1986).

Este trabajo presenta el análisis de 8 campañas de aproximadamente 15 días de duración cada una, llevadas a cabo en las siguientes fechas: 1992, 1) mayo, 2) julio-agosto, 3) septiembre-octubre, 4) noviembre-diciembre; 1993, 5) febrero, 6) abril-mayo, 7) agosto y 8) noviembre-diciembre, totalizando 305 horas de observación. Mientras que la técnica de observación *ad libitum* fue utilizada para el grupo (total = 130 horas), la técnica animal-focal (Altmann, 1974) fue empleada para observar cada una de las hembras adultas, denominadas H1 y H2 y sub-adultas, denominadas OR y OM (total = 175 horas). Las clases de edad se consideraron según Rumiz (1990).

Los nueve comportamientos analizados se definieron de la siguiente manera:

"Juego": interacción entre dos o más individuos que se agarran, empujan, tironean, simulan morderse, saltan unos sobre otros sin daño aparente para los involucrados, incluyéndose también las persecusiones en tal contexto (Neville *et al.*, 1988),

"Suplantación": aproximación con o sin contacto de un individuo hacia otro que se retira del lugar que ocupaba previamente (Giudice, 1993),

"Acicalamiento" ("allogrooming"): el remitente inspecciona el pelaje del receptor aproximando a veces la boca a la piel (Giudice, 1993),

"Aproximación": cuando un individuo se acerca a otro y permanece junto a él (Giudice, 1993),

"Evicción": cuando un individuo se libera cauta y previsoriamente de otro,

"Cuidar a una cría de otra hembra" ("Allomaternal care"): cuando las hembras cuidan a las crías como si fueran las verdaderas madres (Calegaro-Marques y Bicca-Marques, 1993),

"Amenazas": gestos faciales o corporales previos a un posible ataque dirigidos hacia otro individuo (Giudice, 1993),

"Coalición": alianza entre dos o más individuos que hostigan a un tercero (Giudice, 1993).

"Pelea": acción agresiva con contacto físico, relacionada con manotazos, mordiscos y persecusiones (Giudice, 1993).

Los datos de comportamiento se analizaron a partir de las frecuencias de vecino más próximo y se consideraron en dicho análisis las conductas definidas previamente. Las frecuencias observadas fueron comparadas con las esperadas, basadas en una distribución hipotética homogénea de los valores para luego ser contrastadas utilizando la prueba chi-cuadrada con un nivel de significación del 5% (Lenher, 1979). Este análisis se realizó entre las hembras focales en el período mayo-septiembre de 1992, es decir hasta el último mes con observaciones realizadas sobre la hembra que desaparece (OM). Se calcularon los índices de asociación como el cociente de las frecuencias observadas sobre las esperadas, otorgando el valor de 1 cuando el grado de asociación coincidió con el esperado por la distribución hipotética homogénea, los valores superiores e inferiores destacan un alejamiento de esa distribución teórica, indicando afinidad y repulsión respectivamente. Por otra parte, la frecuencia absoluta de la categoría "Suplantación" fue clasificada para todas las hembras focales en una matriz cuyas filas presentan a los iniciadores y en las columnas a los receptores de las suplantaciones (Tabla 1). Por último, se compararon por la prueba chi-cuadrada, las frecuencias observadas de los comportamientos "Suplantación", "Aproximación", "Acicalamiento", "Amenaza", "Evicción" y "Juego" expresados por OR y OM (ambas hembras sub-adultas) con las esperadas a partir de una distribución teórica para la cual ambas hembras

Tabla 1. Matriz de dominancia social basada en la expresión de suplantaciones para el período mayo-septiembre de 1992.

Individuos	H1	H2	OR	OM	Total
H1	-	1	9	2	12
H2	12	-	11	3	26
OR	0	0	-	7	7
OM	0	0	3	-	3
Total	12	1	23	12	48

Los valores son dados como frecuencias absolutas. En las filas se disponen los individuos suplantadores y en las columnas a aquellos suplantados. H1, H2, OR y OM corresponden a las hembras focales.

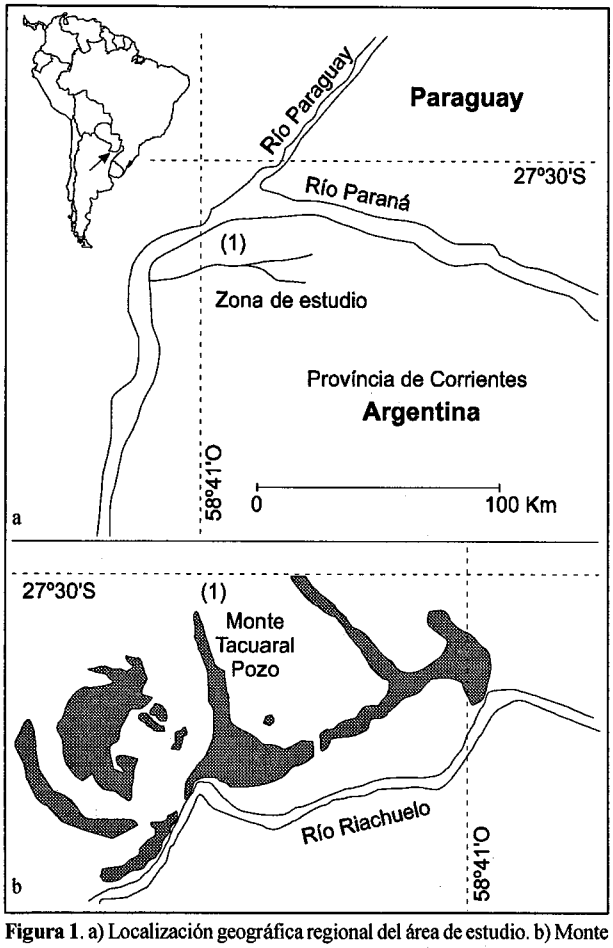

Figura 1. a) Localización geográfica regional del área de estudio. b) Monte Tacuaral-Pozo y los bosques semicaducifólios en el sítio de estudio al norte del Río Riachuelo.

expresarían en igual magnitud los comportamientos mencionados (Lehner, 1979).

Resultados

Cambios demográficos. Al comienzo del estudio de la tropa (mayo 1992) estuvo compuesta por 11 individuos: 1 macho adulto, 2 hembras adultas, 2 hembras sub-adultas, 3 machos juveniles de distintas edades, 1 macho sub-adulto y 2 crías (macho y hembra). Desde mayo de 1992 hasta diciembre de 1993 los únicos cambios observados fueron una desaparición y un nacimiento. El primer caso correspondió a la hembra sub- adulta OM y ocurrió entre septiembre y octubre de 1992. El nacimiento producido en el período mayo-julio de 1993 estuvo relacionado a la hembra adulta H2. El tamaño grupal (N = 11) se mantuvo constante durante los 20 meses en los cuales se realizó su seguimiento.

Desarrollo de coaliciones. En septiembre de 1992 se tuvo la oportunidad de observar dos coaliciones formadas por OR y H1 en contra de OM, iniciadas con amenazas reiteradas de OR y uniéndose de imprevisto H1 que acorraló y embistió a OM quien cayó aproximadamente tres metros quedando trabada en las ramas de un arbusto bajo. En ambos casos H2 se interpuso entre las atacantes y OM, sin observarse agresiones entre la dupla H1-OR y H2. En los días siguientes OM se mantuvo alejada del grupo, aproximándose en algunas oportunidades a H2 y descansando junto a ella o bien intercambiando breves sesiones de acicalamiento. Se destaca que en el desarrollo de las coaliciones se plegaron en contra de OM algunos machos juveniles que nunca antes se habían observado interactuando de manera agonística con OM.

En las siguientes campañas realizadas durante 1992 (octubre-noviembre) y 1993 OM no fue vista en el área de estudio.

Relaciones sociales. El análisis de frecuencia de vecino más próximo entre las hembras focales para el período mayo-septiembre de 1992 muestra diferencias significativas con respecto a la distribución homogénea de valores observados ($\chi^2 = 99.68$, gl = 5, $p < 0.05$). Se puede considerar una relación de afinidad entre H1-OR y H2-OM mientras que entre las hembras adultas (H1 y H2) la relación fue de tipo aleatoria y las restantes combinaciones (H1-OM, H2-OR y OR-OM) mostraron una relación de tipo repulsiva (Tabla 2). En las hembras adultas la jerarquía social fue encabezada por H2 (Tabla 2). Considerando sólo a OR y OM entre mayo y septiembre de 1992, fecha de la desaparición de OM , OR suplantó a OM más veces que a la inversa ($\chi^2 = 7.8$, gl = 1, $p<0.05$). Otras pautas marcan las diferencias de carácter entre las hembras sub-adultas: 1) OR ejecutó con más frecuencia "Amenazas" hacia las otras hembras ($\chi^2 = 10.34$, gl = 1, $p<0.05$), 2) OM fue la hembra evasiva del grupo ($\chi^2 = 8.6$,gl = 1, $p<0.05$), 3) OR ejecutó con más frecuencia que OM los comportamientos afiliativos "Acicalamiento" ($\chi^2 = 6$, gl =1, $p<0.05$), "Allomaternal care" ($\chi^2 = 5.44$,gl =1 , $p<0.05$) y "Juego" ($\chi^2 = 4.5$, gl = 1, $p<0.05$) y 4) OR acicaló al macho adulto (MA) con más frecuencia que cualquier otra hembra ($\chi^2 = 6.7$,gl = 3, $p<0.05$). La única similitud en la conducta expresada por las hembras sub-adultas fue la frecuencia con que estuvieron más cercanas al MA ($\chi^2 = 1.3$,gl = 1, $P>0.05$). Se observó a OR amenazar a OM en las siguientes notas tomadas *ad libitum*: a) OM descansaba junto al MA cuando OR se aproximó a ellos emitiendo chillidos e intentó desplazar a OM que respondió también con vocalizaciones; al cabo de algunos minutos de vacilación, OM se retiró quedando OR junto a MA; b) OR acicalaba a MA y comenzó a gritar ante la aproximación de OM quien se alejó respondiendo con vocalizaciones.

Tabla 2. Análisis de frecuencias de vecino más próximo para las hembras focales, correspondiente al período mayo-septiembre 1992. Referencias: H1, H2, OR y OM: hembras focales. Las frecuencias esperadas fueron calculadas considerando una distribución teórica homogénea. El estadístico c^2 corresponde a la prueba Chi-cuadrada. El Indice de Asociación se calculó como el cociente entre las frecuencias observadas y esperadas.

Pares de Hembras	Frecuencias observadas	Frecuencias esperadas	χ^2	Indice de Asociación	Tipo de Relación
H1-OR	24	14.5	6.22	1.66	Afinidad*
H1-OM	1	14.5	12.57	0.07	Repulsión*
H1-H2	8	14.5	2.91	0.55	Aleatorio
H2-OM	45	14.5	64.16	3.10	Afinidad*
H2-OR	5	14.5	6.22	0.34	Repulsión*
OR-OM	4	14.5	7.6	0.28	Repulsión*
Totales	87	87			

* $p<0.05$

Con el objetivo de hallar un posible recurso por el cual las hembras OR y OM compitieran, se analizaron los contextos en los cuales tomaron lugar las suplantaciones. Las suplantaciones por ocupar lugares de descanso representaron el 46% del total, en este contexto se registraron dos amenzas vocales. El 15% de las suplantaciones se observó en lugares de alimentación, registrándose sólo una amenaza de tipo vocal con movimientos de ramas. El 28% se llevó a cabo durante los deplazamientos del grupo y no se registraron comportamientos agonísticos. Finalmente, el 11% ocurrió en relación a la proximidad de un tercer individuo, en este contexto se registraron 3 amenazas vocales y 4 peleas que involucraron a las hembras subadultas.

Discusión

¿Por qué OR y OM expresaron comportamientos agresivos entre ellas? ¿Cuál fue el recurso por el cual las mismas competían? Las observaciones indicarían que OR intentó monopolizar el acceso al macho adulto (MA) a través de las sesiones de acicalamiento a expensas de OM. Este comportamiento desarrollado por OR es similar al señalado para hembras adultas de cercopitécidos, en las cuales hembras de alta jerarquía interrumpen las sesiones de acicalamiento de hembras de menor rango, a las cuales persiguen y amenazan, reduciendo así el contacto entre éstas y los machos adultos reproductores, con la consiguiente disminución del éxito reproductivo de las mismas (O'Brien, 1991). Este comportamiento también ha sido descripto en *Cebus apella* en cautiverio (Welker *et al.*, 1990). Estas interferencias no tienen una contrapartida entre las hembras adultas de aulladores, las cuales se reproducen regularmente una vez que alcanzan la madurez sexual. Sin embargo, las restricciones para la reproducción parecen recaer sobre las hembras que se aproximan a la madurez sexual (Crockett y Eisenberg, 1987). Al respecto Calegaro-Marques y Bicca-Marques (1996) observaron que el orden cronológico en la dispersión de tres hembras inmaduras de *Alouatta caraya* se asoció con el grado de madurez sexual de las mismas, siendo cada una de ellas vecina más próxima del macho adulto en los períodos previos a cada emigración. Se ha postulado que si las hembras juveniles se reprodujeran en su grupo natal, aumentaría el tamaño de la tropa afectando negativamente una estrategia de alimentación óptima para las hembras reproductivamente activas (Crockett, 1984; Crockett y Eisenberg, 1987). Así mismo, se ha señalado que algunas hembras cumplen con la función de alentar la dispersión de otras (Crockett, 1984). En el caso reportado en el presente trabajo, OR tomó esa función al alentar la dispersión de OM.

Teniendo en cuenta que en los bosques fragmentados del área de estudio el tamaño de los grupos de aulladores no es numeroso, ya que en promedio hay de 6 a 8 individuos (Rumiz, 1990) y considerando una estructura social de tipo uni-macho con un promedio de 2 hembras adultas por grupo (Rumiz, 1990), con hembras adultas que forman sub-grupos con su descendencia de distintas edades (Zunino, 1986), la incorporación de hembras solitarias a grupos reproductivos preexistentes sería altamente improbable, infiriéndose por el análisis de vecino más próximo que los pares H1-OR y H2-OM corresponden a duplas madre-hija. Contrariamente a lo esperado, es decir con la hembra de mayor jerarquía protegiendo a su desendencia, vemos que H2 no defendió activamente a OM, limitándose a interponerse entre las hembras atacantes y OM. Tampoco fue observada participando en las disputas previas entre ambas hembras sub-adultas. Esta situación es distinta a la hallada en algunos géneros de primates del Viejo Mundo como por ejemplo *Macaca* y *Papio*, en los cuales las hembras generalmente quedan en el grupo natal aún habiendo alcanzado la madurez reproductiva (Gouzoules y Gouzoules, 1987). Una explicación sería que de esa forma tendrían la oportunidad a lo largo de sus vidas de interactuar con gran número de individuos, entre parientes y no parientes, formándose lazos sociales fuertes y duraderos que se traducen en intercambios de acicalamiento ("grooming") y formación de alianzas. Este aspecto también fue señalado para *Cebus apella*, especie en la cual los miembros de una línea materna se apoyan mutuamente en interacciones agresivas con otros miembros del grupo (Welker *et al.*, 1990; Valderrama *et al.*,1990). Sin embargo, en hamadríadas, colobos, gorilas y chimpancés, entre los primates del Viejo Mundo y aulladores (*A. seniculus*, *A. palliata* y *A. caraya*) entre los monos de Nuevo Mundo, las hembras se dispersan y de esta forma las posibilidades de interactuar a largo plazo con otros individuos son menores con respecto a los grupos de cercopitecidos en los cuales las hembras permanecen en su grupo natal (Walters y Seyfarth, 1987). Los datos aquí presentados responderían a este modelo, donde H2, la hembra adulta de mayor jerarquía social, no desarrolló un comportamiento de defensa activo en favor de OM situación que hubiera balanceado las relaciones entre las hembras sub-adultas y pareciera evidente que esta organización social no favorecería el desarrollo de vínculos sociales entre hembras a largo plazo. El evento reportado en *Alouatta caraya* se encuadra en la emigración como consecuencia de comportamiento agresivo intrasexual, destácandose que el carácter propio, la habilidad competitiva y la capacidad para convocar aliados fueron factores que determinaron la exclusión del grupo, independientemente de la línea materna a la cual pertenecía la hembra emigrada.

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Aldo Mario Giudice, Grupo de Investigación en Biología Evolutiva (GIBE), Laboratorio No. 46, Departamento de Biología, 4o. Piso, Pabellón II, Facultad de Ciencias Exactas y Naturales (UBA), Ciudad Universitaria, (1428) Buenos Aires, Argentina.

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La Dentición de *Callicebus* y el Morfotipo Ancestral de los Platirrinos

En distintos esquemas taxonómicos el género *Callicebus* fue incluído entre los Pitheciinae (Rosenberger, 1981), con *Aotus* en la subfamilia Aotinae (Cabrera, 1958; Fleagle, 1988), o en la propia subfamilia monotípica Callicebinae (Hershkovitz, 1977; Thorington y Anderson, 1984; Tejedor, 1996a); esta disparidad denota una posición taxonómica incierta, producto de una historia evolutiva compleja y escasamente interpretada. Como propuesta alternativa se infiere que, a partir del análisis de la dentición, *Callicebus* posee numerosos caracteres primitivos retenidos desde formas ancestrales previas a la radiación que posteriormente diferenciara los grupos actuales. Es entonces cuando hallamos una solución a los problemas taxonómicos mencionados: la morfologia primitiva de *Callicebus* es la causa de las dificultades de interpretación, ya que son los caracteres derivados los que indican relaciones filogenéticas; es oportuno aceptar que

la dentición del mencionado género representaría al morfotipo ancestral de los platirrinos. Los incisivos de *Callicebus* requieren especial atención debido a que son estos dientes los que mayor diversidad demuestran entre los platirrinos, y en consecuencia sus afinidades resultaron ser confusas. Los incisivos superiores son moderadamente heteromórficos, siendo los centrales mayores que los laterales, con sección transversal redondeada y corona más espatulada en comparación con los laterales cónicos. Los incisivos inferiores presentan la corona estrecha en sentido mesodistal, y son algo elevadas e implantadas de modo relativamente procumbente. Los caninos son reducidos, el dimorfismo sexual no es significativo, la corona de los inferiores es sensiblemente espatulada en la porción apical y la cara lingual es redondeada; los superiores son algo más robustos y levemente proyectados sobre el plano oclusal. Los premolares y molares muestran cúspides prominentes, redondeadas, unidas por crestas bajas aunque bien distintivas; los molares superiores poseen un marcado cíngulo lingual y un gran hipocono, el tercer molar es bastante completo en cuanto a la presencia de cúspides que en otros géneros tienden a reducirse o perderse, especialmente el metacono, hipocono y las cúspides del talónido. El trigónido de los molares inferiores, más aún el del primero, es más elevado en relación al talónido, un carácter indudablemente primitivo. Estos caracteres mencionados son compartidos en gran parte por *Homunculus* y *Carlocebus*, géneros extintos asignados a la Edad Santacrucense (Mioceno medio) de La Patagonia (Tejedor, 1996b), cuyas notables similitudes con *Callicebus* llevan a pensar en un stock ancestral común y lo suficientemente antiguo para considerarlo cercano a la primitiva radiación de los platirrinos. Cabe recordar que, luego de los registros aislados de platirrinos fósiles en el Deseadense (Oligoceno superior) de Bolivia, las diversas formas de Patagonia y un único registro en Chile conforman el grupo más antiguo. Una morfología dentaria como la de *Callicebus* es apropriada para que de ésta se deriven las tendencias que se verifican en los restantes monos sudamericanos; el hecho de que los incisivos inferiores presenten corona moderadamente elevada, estrecha y procumbente, así como en los superiores no se observa un heteromorfismo muy significativo, permite inferir que la gran diversidad hallada en otros grupos actuales tenga orígen en un morfotipo semejante a *Callicebus*, ofreciendo las más diversas posibilidades de evolucionar hacia tipos extremos. De la misma manera, es más sencillo aceptar que los caninos reducidos, no proyectados y no dimórficos, son estructuras ancestrales de los grandes y dimórficos caninos que corresponden a especies con hábitos alimenticios especializados y estructuras sociales complejas. *Callicebus* hace uso del más amplio espectro de posibilidades alimentarias entre los platirrinos, además de constituír estructuras sociales monógamas (Kinzey, 1981). Como se ha mencionado, los premolares y molares de *Callicebus* son completos en cuanto a la morfología oclusal; ciertas tendencias tales como reducción de cíngulos, reducción de hipocono y entocónido, y reducción o pérdida del tercer molar, entre otras, corresponden a indubables caracteres derivados, nuevamente a partir de un morfotipo ancestral similar a *Callicebus*. La gran semejanza entre *Callicebus* y los extintos *Homunculus* y *Carlocebus*, sugiere la más que interesante alternativa de representar cercanamente al morfotipo ancestral del infraorden, respaldando las similitudes fenotípicas con sólidas bases filogenéticas. Las notables afinidades entre estos tres géneros y la dificultad de relacionar a *Callicebus* con otros grupos o géneros de platirrinos, actuales o fósiles, nos induce a retroceder en su historia evolutiva para hallar su orígen entre las formas generalizadas que diferenciaron al infraorden. Es esta una posición especulativa aunque adecuadamente sostenida desde los abundantes datos que nos confiere la morfología dentaria, en especial si consideramos que los fósiles se hallan representados mayormente por restos dentarios; pero al momento de contrastar con otras hipótesis observamos que los grupos alternativos son marcadamente derivados hacia otras tendencias, como se detalla abajo.

Cabe entonces mencionar los grupos más derivados entre las formas vivientes, tal es el caso de la subfamilia Callitrichinae (*Callithrix, Cebuella, Leontopithecus, Saguinus* y *Callimico*) que poseen una dentición en muchos aspectos distintiva. Estos pequeños primates han perdido el tercer molar (a excepción de *Callimico*, que lo posee extremadamente reducido), en tanto el segundo molar se ha reducido notablemente, otorgando a los premolares una importante función en la mecánica masticatoria (Rosenberger, 1992). Los premolares y molares exhiben crestas cortantes y elevadas cúspides que denotan hábitos predominantemente frugívoros-insectívoros (Garber, 1980; Rylands 1989), aunque la incorporación de resinas es destacable especialmente para *Cebuella* y *Callithrix* (Soini, 1982; Rylands, 1989). Es importante mencionar la gran reducción o pérdida del hipocono en los molares superiores, que le confiere a los mismos una forma triangular. Los incisivos y caninos de los Callitrichinae presentan algunas variaciones intergenéricas, ya que la morfologiá más derivada la poseen *Callithrix* y *Cebuella*, con incisivos inferiores de corona elevada e interdigitada, estrechos e implantados de manera procumbente, y caninos de aspecto incisiviforme ubicados por detrás de los incisivos, reforzando la acción mecánica de los últimos en procura de resinas de árboles. Los caninos superiores son alargados y proyectados sobre el plano oclusal, sin diferir significativamente de los caninos superiores de los otros integrantes de la subfamilia. *Saguinus, Callimico* y *Leontopithecus* presentan incisivos inferiores de corona espatulada e implantación relativamente vertical, delatando sus hábitos más frugívoros, mientras que los caninos inferiores son, al igual que los superiores, largos y proyectados. En todos los Callitrichinae, los incisivos superiores son moderadamente heteromórficos, siendo los centrales mayores que los laterales, una condición que caracteriza en mayor o menor grado a todos los platirrinos.

Los Pitheciinae (*Pithecia, Chiropotes, Cacajao*) poseen la morfología dentaria también extremadamente derivada,

aunque en cierto modo opuesto a lo visto en los Callitrichinae. Los premolares y molares muestran un escaso relieve oclusal, cúspides marginales, crestas poco insinuadas y forma subcuadrangular; no obstante, el segundo premolar inferior se halla muy desarrollado y la corona es elevada. Los incisivos exhiben corona muy elevada, estrecha y procumbente, estando los laterales separados de los caninos superiores e inferiores por un amplio diastema. Los caninos son muy robustos y se proyectan considerablemente sobre el plano oclusal, teniendo la característica de una sección transversal triangular con crestas linguales cortantes. El complejo funcional formado entre incisivos y caninos representa, en los Pitheciinae, una adaptación mecánica para el consumo de frutas endocarpo leñoso, donde debe actuar una poderosa incisión (ver Rosenberger, 1992 y referencias allí citadas).

La subfamilia Atelinae (*Ateles, Lagothrix, Brachyteles*) comparte ciertos caracteres dentarios, aunque las mayores similitudes las hallamos entre *Lagothrix* y *Ateles,* géneros más frugívoros que consecuentemente poseen molares con coronas relativamente bajas y cúspides redondeadas unidas por crestas poco elevadas, cíngulos escasamente marcados, caninos moderados, incisivos de corona ancha y espatulada, implantados de manera relativamente vertical, siendo los superiores centrales muy desarrollados; *Brachyteles* tiene la dentición característica de hábitos más folívoros, con molares de crestas marcadas y cúspides más elevadas que en *Lagothrix* y *Ateles,* incisivos reducidos en relación a la dentición posterior, y caninos también reducidos, cuya homologiá con los pequeños caninos como aquellos de *Callicebus* y *Aotus* es dudosa.

Alouatta demuestra similar morfología que *Brachyteles* en cuanto a la existencia de cúspides elevadas y crestas cortantes, pero los caninos son largos, robustos y sexualmente dimórficos en *Alouatta*, el segundo premolar inferior está muy desarrollado en relación al tercero y cuarto (en *Brachyteles* el de mayor tamaño es el cuarto), el segundo molar es mayor que el primero, y el tercer molar inferior presenta una notable expansión distal del talónido. Tanto los reducidos incisivos de *Alouatta* y *Brachyteles*, como los amplios y espatulados de *Ateles* y *Lagothrix* corresponden a estructuras derivadas, así como lo es la morfología oclusal de *Ateles* y *Lagothrix*, sin cúspides y crestas prominentes. No obstante el aparente status derivado de los incisivos, premolares y molares de *Brachyteles* y *Alouatta*, se reservan mejores análisis para comprender las exactas homologías, razón por la cual no se los incluye en la misma subfamilia.

Frecuentemente se han mencionado las afinidades entre *Cebus* y *Saimiri*, y a su vez con los Callitrichinae (Rosenberger, 1981; Schneider *et al.*, 1995; Tejedor, 1996a). *Cebus* y *Saimiri* comparten similar estructura de incisivos y caninos, siendo los primeros espatulados e implantados verticalmente, aunque los superiores de *Cebus* son particularmente más procumbentes y considerablemente heteromórficos. Los caninos son robustos y alargados, en tanto los premolares y molares poseen similar morfología oclusal, con la salvedad de que en *Cebus* hallamos una espesa capa de esmalte no comparable a ningún otro platirrino actual o fósil, lo cual, aunque es una indudable autapamorfía, no facilita la interpretación correcta de la relación filogenética con otros géneros, a excepción de *Saimiri*, con quien comparte un muy reducido tercer molar y premolares superiores elongados bucolingualmente. *Cebus* se caracteriza, además del espeso esmalte, por la presencia de un notable segundo premolar inferior, y *Saimiri*, por otra parte, preserva en mayor o menor grado un cíngulo bucal en los molares inferiores, lo cual permite en parte diferenciar ambos géneros y considerar una independencia evolutiva prolongada y comprobada, en el caso de *Saimiri*, por la evidencia fósil, dado que comparte numerosas sinapomorfías con el género *Dolichocebus*, del Colhuehuapense (Mioceno inferior) de Patagonia (Kraglievich, 1951; Rosenberger, 1979).

Aotus es otro de los géneros que ha originado dificultades en la interpretación filogenética, y es, después de *Callicebus,* el que preserva mayor número de caracteres primitivos, a excepción de la presencia de grandes incisivos centrales superiores que determinan una superficie de oclusión también amplia en los incisivos inferiores, caracteres asociados e indudablemente derivados. El resto de la dentición concuerda con una morfología generalizada, con caninos reducidos y premolares y molares de corona relativamente completa y cúspides bien desarrolladas, con moderados cíngulos linguales en los superiores. Se evidencia una notable similitud con la morfología de premolares y molares de *Callicebus*, exceptuando la marcada diferencia en la estructura de los incisivos. Estas caracteríticas conducen a pensar en una relativa cercanía entre estos dos géneros, en lo que refiere al tiempo de divergencia de ambos linajes, considerando que también el linaje de *Aotus* tiene un representante en el Cohuehuapense de Patagonia (Rusconi, 1935; Hershkovitz, 1974). Consecuentemente, siendo *Aotus* otro de los controvertidos géneros actuales, se pueden explicar sus particularidades demostrando la pertenencia a otro antiguo linaje independiente.

Todos los géneros arriba mencionados demuestran varias tendencias en la evolución de los caracteres dentarios, que apuntan a extremar la diferenciación morfológica relacionada a una mecánica masticatoria particular en los distintos clados de platirrinos vivientes. Algunas veces estos clados integran géneros en subfamilias (Pitheciinae, Callitrichinae, Atelinae) y en otro casos ciertos géneros son asignados a una subfamilia monotípica (*Aotus, Saimiri, Alouatta, Cebus, Callicebus)* (Tejedor, 1996a), cuya monofilia únicamente podría comprobarse en formas fósiles aún no conocidas, cercanas a la radiación más antigua del Infraorden Platyrrhini. Hasta el momento, son éstas las evidencias que más sencillamente concuerdan con la realidad de una sistemática compleja, y será solamente por medio del registro fósil, afortunadamente cada día más diverso, que podrá lograrse una mejor

aproximación al conocimiento de la historia evolutiva de los platirrinos.

Marcelo F. Tejedor, Cátedra de Anatomía Comparada, Facultad de Ciencias Naturales y Museo, Paseo del Bosque, 1900 La Plata, Argentina.

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Subspecific Differences in Vulva Size between *Alouatta palliata palliata* and *A. p. mexicana*: Implications for Assessment of Female Receptivity

During a six-month study of sexual behavior in the mantled howler monkey (*A. p. mexicana*) at Catemaco, Veracruz, Mexico, investigators attempted to employ the system of Jones (1985; see also Glander, 1980) for the identification of stages of female receptivity - possibly correlating with stages of estrus - devised for *A. p. palliata* in Costa Rica. This system uses visual inspection of the vulva, in particular vulval color and morphology (swelling), to classify a female's reproductive state for three stages of "estrus" and one stage of "post-estrus", where stage E3 is presumed to be "peak estrus" and the period of heightened fertility. Jones (1985) found that most copulations by high-ranking males occurred during stage E3.

The classification system proved unreliable at Catemaco (L. Cortés-Ortiz, pers. comm.; G. M. Palacios, pers. comm.). In an attempt to evaluate the problem, I traveled to Catemaco in January, 1997 to observe females of the population on Agaltepec Island in Catemaco Lake (see Cortes-Ortiz *et al.* 1994). Observations determined that vulvas of female *A. p. mexicana* are more similar to the relatively inconspicuous vulvas of *A. caraya* than to those of *A. p. palliata* in which vulvas may exhibit genital hypertrophy (Jones, 1995). Whereas *A. caraya* were observed under captive conditions where slight changes in color and morphology were detected (Jones, 1983), the field conditions of *A. p. mexicana* on Agaltepec Island are challenging, making confident external identification of "estrus" stages, *if they exist*, difficult. While vulvas in *A. p. mexicana* and *A. p. palliata* were variable, the largest *A. p. mexicana* vulva did not appear to be as large as the smallest *A. p. palliata* vulva. Discrete measurements of immobilized females are necessary to test this impression.

What factors may explain these subspecific differences in vulval size? First, if a prominent vulva in *A. p. palliata* is a derived trait, what characteristics of the selective regime throughout the range of *A. p. palliata* differ from those of *A. p. mexicana*? Because of the historical significance of topological features (for example, volcanoes), river patterns, and the tropical dry deciduous forest throughout Central America, the environment of *A. p. palliata* may

be more heterogeneous in time and space than that of *A. p. mexicana*, with subsequently stronger sexual selection in the former subspecies. Support for this view is found in the observation that sexual dimorphism appears to be greater in *A. p. palliata* than in *A. p. mexicana* (E. Rodríguez-Luna, pers. comm.; J. C. Serio-Silva, pers. comm.; pers. obs.). Again, verification of these speculations await systematic study.

If the habitats of *A. p. palliata* are significantly more heterogeneous than those of *A. p. mexicana* and if the former subspecies exhibits a greater degree of sexual dimorphism, then it is possible that stronger reproductive competition among females has resulted in female choice by epigamic selection to attract males (for resources and/or "good genes") (see Crockett, 1984) by elaborate sexual signals in the form of prominent labia and the advertisement of estrus. This hypothesis assumes that female signals are "honest". Alternative hypotheses are that *A. p. palliata* females "cheat" males by advertising dishonestly (an expensive strategy), possibly to avoid infanticide (see Crockett, 1987) or the costs of female-female competition (for example, by attracting males to feeding sites away from the group). These alternatives might occur with intense sexual selection such as that proposed for *A. p. palliata* under conditions in which costs to fitness are associated with "honest" signals from females to males including those incurred under conditions of male "coercion".

A. p. mexicana, on the other hand, is either advertising discretely or concealing estrus (at least by visual cues). Other possibilities are that females are polymorphic for labial size and estrus signals, that the display of these traits is incomplete, possibly due to the loss of the derived condition, that the trait is "incipient" in *A. p. mexicana*, or that the latter species never exhibited the trait. Physiological studies are underway to determine the hormonal profile of estrus in *A. p. mexicana* (D. Canales-Espinosa, pers. comm.) after which research will be conducted to determine the correlation, or lack thereof, of visual cues with physiological estrus and the variability in vulval size.

Similar studies are required for *A. p. palliata*. In a preliminary report by Zucker *et al.* (1994), it was concluded that visual cues are not true indicators of physiological estrus, but the reliability of their methods to discriminate visual cues in vulval swelling and color change are in question (Jones, 1995). It might be expected that both subspecies of *A. palliata* would exhibit "honest" signals about reproductive condition from females to males since, although aggression is comparatively rare in both, the costs of a cheater being detected may be high. Environmental heterogeneity, however, may increase the benefits to females of cheating males, leading to the trait in both subspecies, but more accentuated in *A. p. palliata*. Males have been observed to copulate with pregnant females and to reject receptive females in *A. p. palliata* (pers. obs.; K. E. Glander, pers. comm) as well as *A. p. mexicana* (L. Cortes-Ortiz and G. M. Palacios, pers comm.), suggesting that cheating may indeed occur. Alternative hypotheses must be considered, however, since vulval swelling may "reinforce" the advertisement of estrus by olfaction, for example , or vulval swelling may have arisen in response to sperm competition (Nakamura, 1990 in Hrdy, 1997).

This note reports apparent differences in the sizes of vulvas between *A. p. mexicana* and *A. p. palliata* and proposes alternative hypotheses to account for them. These observations are related to conservation because *A. p. mexicana*, the more endangered subspecies, may have lost important behavioral safeguards against environmental heterogeneity if it is adapted to a less seasonal regime than *A. p. palliata*, making it more vulnerable to increased heterogeneity accompanying habitat destruction.

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Clara B. Jones, Community Conservation Consultants, Gays Mills, Wisconsin, USA, and (*address for correspondence*), Institute of Animal Behavior, Rutgers University - Newark, 101 Warren Street, Newark, New Jersey 07102, U.S.A.

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Population Genetics and Conservation of Owl Monkeys (*Aotus azarai*) in Argentina: A Promising Field Site

The evolution of monogamy and nocturnality in owl monkeys (*Aotus* spp.) remains largely unexplained. This can be blamed, at least partially, on the lack of long-term data on the ecology and behavior of this unique New World primate species. We report here on a field site that offers an unique opportunity to conduct long-term research in *Aotus azarai.* First, we report preliminary data on the ecology and behavior of the owl monkey population. We conclude with a brief description of three research projects that we will conduct in the area in the near future.

Study Area

The field site is located on the borders of the Pilagá River which runs across Estancia Guaycolec (58°13' W, 26° 54'S) in Eastern Formosa. The area is comprised of a mosaic of grasslands, savannas, xeric thorn forests and semideciduous forests. The semideciduous forests occur along river banks, where they form gallery forests. The 13-18 meter-high gallery forest, contains, on average, 39 tree species per hectare (Placci *et al.*, 1992, cited in Brown *et al.*, 1993). The understorey is clear and easy to walk through because of cattle grazing. The climate is subtropical with mean temperatures of 27.4 °C during the summer and 16.9 °C during the winter. There are usually some nights with below freezing temperatures each year. Although there is no marked rainy season (1400 mm per year), average monthly precipitation tends to be lower between June and August (45 mm/month) than during the rest of the year (160 mm/month). The weather in the region is generally highly unpredictable.

Primate Species

Two primate species inhabit the area: owl monkeys (*Aotus azarai*) and black howler monkeys (*Alouatta caraya*). *Aotus azarai,* is one of the five species south of the Amazon classified in the red-necked group (Ford, 1994). Densities in the area vary from 12.7 ind/km² to 25.4 ind/km² (Rathbun and Gache, 1980; Arditi and Placci, 1990; Arditi, 1992; Brown and Zunino, 1994).

The density of *Alouatta caraya* reported in the area before 1982 was one of the highest for the species in Argentina (63.2 ind/km²), only superseded by the density reported in the flooded forests of the Río Paraná islands (Brown and Zunino, 1994). A significant decrease in population numbers occurred in 1982, apparently as a result of a botfly infestation (*Dermatobia* sp.). The most recent estimate indicated a density in the area of 9 ind/km² (Arditi and Placci, 1990).

Table 1. *Aotus azarai* group composition in Guaycolec, Formosa, Argentina. N = number of encounters.

Group	Adults	Juveniles	Infants	N
1	2	1	1	5
2	2	1	1	4
3	2	1		5
4	2	1		2

Preliminary Study

Between May and July 1996, we conducted a preliminary study of owl monkeys in the area which allowed us to (1) identify this as a convenient field site for long-term studies, (2) obtain preliminary data on the behavior and demography of the species.

1) Estancia Guaycolec is a 75,000 ha cattle-raising and rice-growing ranch owned by Pilagá S.A., a multinational company based in Buenos Aires, Argentina. The company has supported scientific research and promoted conservation efforts in the past (Rathbun and Gache, 1980; Zunino *et al.*, 1985; Arditi and Placci, 1990; Arditi, 1992). The commitment of the company to conservation, the convenient location of the ranch (on a paved national highway 25 km from the capital of the province and 100 km from Asunción, Paraguay), and the existence of a wildlife reserve with housing facilities and a small zoo, make this site an excellent one to conduct long-term projects in conservation, wildlife management and environmental education.

2) We have conducted 46 surveys of the area. On 17 occasions we encountered, observed and followed owl monkeys. Based on repeated encounters of one of the groups, we estimated that at least four different groups were regularly ranging within a 1 km-radius of the camp (Table 1).

As has been reported previously for owl monkeys in Argentina, our preliminary observations suggest that they are active both during the day and night. Although most of the activity was recorded during the early and late hours of the day, three of the four groups were observed moving and feeding during the early afternoon (approximately 1500 h, Table 2).

Population Genetics of Owl Monkeys

In the future we will examine how different aspects of the monogamous social organization of owl monkeys interact to determine the degree of genetic differentiation between and within populations. To understand better the evolution of monogamy in these monkeys, we will use molecular genetic data to explore the influences that monogamous patterns of dispersal and mating have on the genetic structure of owl monkey populations. These data should allow us, among other things, to assess the extent to which a *socially* monogamous relationship, as has been described for *Aotus* (Wright, 1994), implies *genetic* monogamy in the sense of an exclusive mating relationship between the adult male and the adult female in a group.

The long-term goals of the study are: 1) to locate and iden-

Table 2. Time of day (one-hour periods) between 0600 and 2100 h when at least one individual in each of four *Aotus* groups was active.

Group	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1			X	X	X			X		X				X	X
2		X	X	X						X			X	X	
3			X	X	X					X		X	X		
4			X											X	

tify 10-15 groups of owl monkeys from which demographic and ecological data will be collected, 2) to habituate 3-4 of those groups from which behavioral data will be collected, 3) to obtain feces and blood samples from all groups and, 4) to obtain genetic data from the samples to examine patterns of dispersal and mating as well as degree of relatedness among individuals.

Increasing the Area of Protected Owl Monkey Habitat

The Chaco region extends over one million km² of Argentina, Bolivia, Brazil and Paraguay. Despite data suggesting that this region is as rich as tropical rain forests when numbers of large and medium-sized mammalian species are considered (Redford *et al.*, 1990), and that it holds a greater diversity of endemics than other major macrohabitats (Mares, 1992), the Chaco has received less attention from conservation agencies than have tropical rain forests.

In Argentina, the original landscape of forest patches alternating with extensive savannas has been replaced by communities of trees, thick and continuous shrubs, and very low coverage of grasses as a result of severe overgrazing (Adámoli *et al.*, 1990). Gallery forests in particular are not well represented in the protected areas of Argentina (Brown and Zunino, 1994) and are suffering constant pressure from urban and agricultural development. Our long-term goal is to promote the conservation of this threatened habitat which has traditionally received little attention from the scientific community and conservation agencies.

We have plans to assess the impact that cattle grazing and hunting have on the mammals and birds in the poorly protected gallery forests of the Argentinean Chaco. We will estimate the abundance of mammals and birds in: 1) gallery forests subject to cattle grazing and 2) in gallery forests that have not been subjected to cattle grazing for the last 15 years, and which are also of difficult access to hunters. Results will be used in deciding the most convenient location for the establishment of a 5,000 ha wildlife reserve on the premises of the ranch. The reserve will increase the area of protected gallery forest inhabited by species that are heavily hunted (for example, tapirs, peccaries, and parrots), as well as those that are threatened by the destruction of their habitat (for example, Nearctic migratory birds, puma, giant anteater, and owl monkeys).

Environmental Education: Owl Monkeys as Flagship Species

Conservation efforts are generally more successful if carried out in collaboration with local communities. Our initial efforts to involve local people will be focused on educational institutions. In collaboration with GEOS, an Argentinean NGO whose main objective is to promote environmental education, we will organize four one-day workshops at the primary school located in the ranch. The workshops will make use of audiovisual material to depict the fauna and flora of the area, will include special activities and will provide the students with printed materials to illustrate important concepts of ecology and conservation. The workshops will provide us with an opportunity to identify a small group of motivated students and teachers especially interested in conservation. These students and teachers will join us in the organization of a survey on the status of the local fauna.

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Eduardo Fernandez-Duque, Ayacucho 128 5P, Buenos Aires (1025), Argentina, and **Susana P. Bravo**, Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Av. Angel Gallardo 470 (1405), Buenos Aires, Argentina.

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Utilização de Rádio Telemetria em Sauás, *Callicebus personatus*, Resgatados durante a Implantação da Usina Hidrelétrica Nova Ponte, Minas Gerais

Introdução

O sauá ou guigó, *Callicebus personatus*, é endêmico da Mata Atlântica. A espécie defende seu território por meio de vocalizações, é monógama e forma grupos de até cinco indivíduos. No estado de Minas Gerais, Brasil, o sauá, *C. p. nigrifrons*, ocorre ainda em pequenas remanescentes de floresta e matas ciliares no Cerrado. *C. personatus* é um animal tímido, de movimentos sutis e que emite vocalizações, em muitas regiões, apenas matutinas, dificultando seu encontro e estudo até a habituação a pesquisadores. Aqui relatamos nossa experiência a respeito da colocação de colares com rádio transmissores como um meio de facilitar a habituação e observação dessa espécie na natureza.

Durante a implantação da Usina Hidrelétrica Nova Ponte, Minas Gerais, pela Companhia Energética de Minas Gerais (CEMIG), no Triângulo Mineiro, foram realizadas operações de resgate de fauna. Dentre outros animais, foram capturados 25 sauás, visando novas tentativas de utilização da técnica de rádio telemetria com estes primatas, aumentando-se os dados disponíveis para a espécie.

O presente trabalho objetivou, além da obtenção de dados ecológicos da espécie, a verificação da readaptação ou não, de animais originados de operações de resgate, reintroduzidos a novos habitats.

Material e Métodos

Durante as operações de resgate de fauna pela CEMIG, os animais foram levados a um centro de triagem, onde permaneceram em recintos de três a seis animais de março de 1994 a janeiro de 1995, até serem obtidas condições necessárias a soltura e para observações sobre sua biologia. Tais procedimentos seriam realizados por três biólogos da Universidade Federal de Minas Gerais, contactados após resgate dos animais. Após este período, os animais foram devidamente preparados para receberem os aparelhos transmissores. Os indivíduos foram sedados por via intramuscular, com Ketalar a 3mg/kg. Em seguida eram pesados, e recebiam os transmissores (TELONICS). Eram ainda marcados com produto de bom poder de tingimento dos pêlos e de boa durabilidade, o Nyanzol. As marcações distingüiam machos de fêmeas (parte proximal e distal da cauda respectivamente) e grupos (coxas e região costal, ora esquerda ora direita variando o posicionamento da marcação de acordo com o grupo). Durante o processo de sedação foram tomadas temperaturas, batimentos cardíacos e movimentos respiratórios dos sauás. Após todos estes processos, os sauás ficaram em observação de quatro a doze dias para verificação da adaptação aos transmissores e reação ao anestésico (Ver dados referentes ao processo de sedação na Tabela 2). Foram realizados esfregaços de sangue, para verificação de parasitismo sangüíneo. Coletou-se ainda fezes para análise parasitológica.

Resultados e Discussão

Verificaram-se várias reações de desconforto quanto aos aparelhos. Os primatas manusearam, ora as próprias coleiras, ora as de outros indivíduos, tentando arrancá-las com as mãos ou boca sistemáticamente. Houveram casos de retirada do imã, que mantém os aparelhos desligados até a soltura dos sauás, e de manuseio das antenas, que foram roídas, entortadas e descascadas em suas camadas plásticas.

Tabela 1. Diferença dos pesos dos indivíduos antes e depois da colocação dos transmissores.

Número do Transmissor	Sexo	Recinto	Data colocação do transmissor	Peso(kg)	Data retirada do transmissor	Peso(kg)
362615	F	3 e 4	10.01.95	-	09.02.95	1,06
362616	F	3 e 4	10.01.95	1,34	09.02.95	1,22
362617	F	3 e 4	10.01.95	1,28	09.02.95	1,20
362618	M	3 e 4	10.01.95	0,79	09.02.95	0,83
362609	F	5	11.01.95	0,82	09.02.95	0,76
362610	M	5	11.01.95	0,74	09.02.95	0,68
362611	M	5	11.01.95	1,05	09.02.95	0,99
362612	F	5	11.01.95	0,80	09.02.95	0,86
362613	F	5	11.01.95	0,68	09.02.95	0,72
362614	M	5	11.01.95	1,10	09.02.95	1,05
362619	F	1	12.01.95	1,18	09.02.95	1,05
362620	M	1	12.01.95	1,50	ant.à 09.02.95	1,33
362621	M	1	12.01.95	1,45	ant. à 09.02.95	1,46
362622	M	6 e 7	19.01.95	1,15	20.02.95	-
362623	F	6 e 7	19.01.95	1,20	*	-

* Não foi retirado o transmissor.

Para soltura dos primeiros animais os biólogos consideraram, condições climáticas favoráveis (mês de Janeiro, em que as temperaturas eram altas), disponibilidade de alimento na natureza, (haviam muitas árvores-fontes frutificando, e água disponível devido às chuvas de verão), e ofertou-se ainda alimento em girais construidos para este fim para auxiliar até que os sauás pudessem obtê-los independentemente. Os animais foram acompanhados desde a soltura. Houve a recaptura de um indivíduo macho, acompanhado sistemáticamente, que mostrava-se inadaptado à soltura. Este indivíduo compunha o primeiro lote de animais soltos, um casal de adultos em que 15 dias após a colocação dos transmissores, não havia apresentado nenhuma reação adversa na região de contato da coleira com a pele até a data da soltura. Contudo, durante acompanhamento do casal em campo, 16 dias após a soltura, perceberam-se feridas na mandíbula do macho e o animal locomovendo-se a poucos metros do chão ou mesmo neste, permitindo então a sua recaptura como já citado, para retirada do rádio e tratamento das feridas. A fêmea, no entanto, parece não ter tido complicações na adaptação ao aparelho, já que encontrava-se em campo até o mês de maio de 1995, estando acompanhada inclusive de um outro indivíduo, adulto macho e um subadulto de sexo desconhecido, nativos.

Houve ainda um indivíduo juvenil, ainda em cativeiro, que não apresentou complicações quanto aos rádios, o que pode ser atribuido ao fato de não possuir a mandíbula suficientemente desenvolvida para que a coleira e a parte metálica friccionassem a mesma.

Constatou-se a não adaptação aos rádios já no segundo grupo de sauás, que apresentou desde vermelhidão no local da coleira a profundas escoriações, edemas e formação de crostas advindas de inflamações, tanto na nuca quanto na região mandibular.

A rádio telemetria é uma técnica que já vem sendo utilizada em espécies de primatas para estudos ecológicos, como para *Leontopithecus rosalia*, (mico-leão-dourado) em Poço das Antas, Rio de Janeiro (Pinder, 1986; Kierulff e Oliveira, 1994) e *Callithrix geoffroyi* (sagüi-da-cara-branca) em área de preservação da ARACRUZ Celulose, Espírito Santo (Passamani e Passamani, 1994). Müller e Schildger (1994) relatam o insucesso desta metodologia para *C. p. melanochir*, no sul da Bahia. Contudo, devem ser consideradas as dificuldades encontradas em cada um destes trabalhos, levando-se em conta as condições dos animais, da pesquisa em si, para cada uma das metodologias. Ao considerar-se como um insucesso a radio telemetria para *C. personatus*, deve-se levar em consideração os problemas enfrentados em todos os outros trabalhos, para umas novas tentativas, já que o insucesso provavelmente se deu a outros fatôres somados à esta técnica.

Quanto a sedação, concluímos ser a Ketamina, um anestésico adequado à *C. personatus*, considerando a dosagem de 3mg/kg. Dos animais sedados, um apresentou baixa frequência de movimentos respiratórios, sendo necessária a intervenção de um brônquio-dilatador. Dois não ficaram completamente sedados, implicando em nova dose de anestésico. Contudo deve-se tomar como base as condições de saúde e stress destes animais, para se cogitar uma dosagem maior do que a acima citada.

Fêz-se necessária nova sedação de todos os outros primatas, para retirada dos aparelhos e tratamento das feridas.

Atribui-se à não adaptação de *C. personatus* à técnica da rádio telemetria à vários fatôres:

- às coleiras dos rádios são em arestas, que intensificam as escoriações na pele e são confeccionadas em couro pouco flexível, não permitindo livre movimento do pescoço dos animais;
- o desconhecimento sobre a dieta e hábitos de *C. personatus*, em cativeiro, e mesmo na natureza, dificultam o tratamento adequado a esta espécie, tornando-a mais vulnerável a doenças. Estas acarretaram perda de peso que levou aos animais a dispenderem um esforço ainda maior em conduzir o aparelho;
- ao se optar por utilização da rádio telemetria para esta e mesmo para outras espécies, fazem-se necessárias

Tabela 2 - Dados referentes ao processo de sedação de *Callicebus personatus*.

Data	No. do transmissor	Sexo	Nº do Recinto	Peso kg	Sedativo aplicado ml	Tempo p/ sedação min.	Tempo de sedação min.	Temp. corporal °C	Frequência respiratória N/min	Frequência cardíaca N/min	Obs.
10.01.95	362615	F	3 e 4	-	0,20	3,5	17,0	38,8	-	-	-
10.01.95	362616	F	3 e 4	1,34	0,23	3,0	22,0	38,7	50	121	-
10.01.95	362617	F	3 e 4	1,28	0,20	2,0	20,0	39,1	57	113	-
10.01.95	362618	M	3 e 4	0,79	0,07 + 0,04	9,0	20,0	38,7	33	118	1
11.01.95	362609	F	5	0,82	0,07 + 0,07	-	-	38,6	39	114	2
11.01.95	362610	M	5	0,74	0,10 + 0,05	-	-	38,5	35	117	2
11.01.95	362611	M	5	1,05	0,20	6,0	10,0	39,0	24	114	-
11.01.95	362612	F	5	0,80	0,18	4,0	11,0	39,4	42	130	-
11.01.95	362613	F	5	0,68	0,07 + 0,03	-	< 6,0	38,9	62	132	-
11.01.95	362614	M	5	1,10	0,17 + 0,03	4,0	9,0	39,4	36	112	-
12.01.95	362619	F	1	1,18	0,18	3,0	7,0	37,9	-	164	3
12.01.95	362620	M	1	1,50	0,22	4,0	>19,0	38,7	56	116	-
12.01.95	362621	M	1	1,45	0,21 + 0,02	6,0	14,0	38,7	57	138	-
19.01.95	362622	M	6 e 7	1,15	0,18	3,0	10,0	38,5	64	-	-
19.01.95	362623	F	6 e 7	1,20	0,18	2,0	8,0	37,6	28-22-22	132	4

M= Macho, F = Fêmea, *Após a aplicação de sedativo. Obs: 1 - O animal, em nenhum momento, ficou completamente sedado. 2 - O animal não permitiu a manipulação. 3 - O animal defecou, muito pouco, após a aplicação do sedativo. 4 - Foi aplicado um bronquio-dilatador.

experiências prévias com poucos indivíduos, em condições comprovadamente boas de saúde, que suportem as condições de stress advindas de todo o processo de colocação de rádios, e para que possam estar sadios durante o período de readaptação às condições do habitat natural quando reitroduzidos ou translocados.

Fatôres ligados aos recintos durante a estadia dos sauás, nestes, tais como temperatura, tamanho, número de animais, luminosidade e contato muito constante com outras espécies e mesmo com humanos, contribuiram para o stress dos *Callicebus*.

Outras alternativas para o material dos rádios, tais como modificar coleiras originais para material mais maleável, foram tentadas por biólogos, veterinários e técnicos da CEMIG. Bordas abauladas e material maleável diminuiram a fricção da coleira na pele, bem como o desconforto causado pelos transmissores. No dia 8 de junho de 1995 os primatas foram reintroduzidos aos habitats naturais pela equipe da CEMIG. Contudo, o acompanhamento não foi sistemático desde a soltura. Os sauás responderam bem aos novos aparelhos, não demonstrando os incômodos das primeiras tentativas anteriores. Contudo, deixou-se de levar em conta certas prerrogativas consideradas na primeira soltura tais como:

- disponibilidade de alimento mais acessível, visto que este período era seca e que os recursos estavam bem limitados;
- condições climáticas, já que o período era de inverno (média em torno de 8°C em contrapartida ao verão com até 30 °C);
- não houve oferta de alimento em girais, como uma alternativa, até que os sauás se acostumassem a buscá-lo por si mesmos;
- o não acompanhamento sistemático desde a soltura levou à perda de dados muito importantes e principalmente a perda mesma dos animais que morreram em sua maioria, mas que apesar de possuirem rádios, foram encontrados dias após morte, quando realmente procurados.

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Fernanda M. Neri, Anthony B. Rylands, Departamento de Zoologia, Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais, 31270-901 Belo Horizonte, Minas Gerais, **Vivian T. Fraiha** e **Maria Beatriz Ferreira,** Fundação de Desenvolvimento da Pesquisa FUNDEP, Belo Horizonte, Minas Gerais, Brasil.

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News

A Study on Social Structure and Social Dynamics of Male Muriqui Monkeys (*Brachyteles arachnoides*)

Research is being carried out on the social structure and social dynamics of adult male muriquis at the Caratinga Biological Station, Minas Gerais, Brazil. The main focus is how different individuals initiate or avoid proximity. According to Strier (1993), spatial relations correlate well with other features of social interactions. Her study (Strier, 1992) and that of Mendes (1990) focused on social relations in the same muriqui group. This study is a follow-up to their work, and will provide comparative insights, clarifying how changes on the group composition over the years have modified the social relations between the males. Data collection will cover the period August 1996 to July 1997, and the behavior of individual males will be monitored using the focal animal technique (Altmann, 1974). Dr. Karen Strier, Department of Anthropology, University of Wisconsin, Madison, U.S.A. is supervising the research, which is supported by a U.S. National Science Foundation Grant (BANS 958198), the Liz Claiborne and Art Ortenberg Foundation, The Chicago Zoological Society and the Scott Neotropic Fund of the Lincoln Park Zoo, Chicago.

Laiena Ribeiro Teixeira, Avenida 19, No.1641, Centro, 38300-000 Ituiutaba, Minas Gerais, Brasil.

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Influence of Affiliative Interactions on the Mating Success of Captive Tamarin (*Leontopithecus chrysomelas* and *Leontopithecus chrysopygus*) Pairs

The lion tamarins (*Leontopithecus*) are members of the family Callitrichidae, together with three other genera of Neotropical primates: *Cebuella*, *Callithrix* and *Saguinus*. These monkeys are characterized by their small size, clawlike nails on all digits except the hallux, absence of the third molar, tritubercular upper molars and twin births. The genus *Leontopithecus* encompasses four species: *L. rosalia*, *L. chrysomelas*, *L. chrysopygus*, and *L. caissara*. The principal aims of the present study were to evaluate in *L. chrysomelas* and *L. chrysopygus*: (1) whether affiliative behavior is more common in experienced pairs; (2) whether a relationship exists between the affiliative behavior of a pair and their mating success; (3) if there are interspecific differences in affiliative behavior and/or mating success. The study was carried out at the Fundação Parque Zoológico, São Paulo, between 20/06/95 and 13/01/96, with eight pairs of *L. chrysomelas* and *L. chrysopygus*. Continuous record focal group samples were used to collect behavioral data. Affiliative behaviors such as allogrooming and approaching were used to assess social interaction within pairs and to evaluate the relationship between affiliative behavior and mating success. A comparison of the two species revealed that *L. chrysomelas* exhibited higher frequencies of social behavior than *L. chrysopygus*. Experienced pairs of both species approached each other more frequently than inexperienced pairs, and experienced pairs of *L. chrysomelas* groomed each other more than inexperienced pairs, although this pattern was not observed in *L. chrysopygus*. The data partially support the hypothesis that affiliative behavior is more common in experienced pairs. No clear relationship was observed in the approaching and grooming behavior of males and females between pairs that had offspring and those that did not. These results contradict findings in *Callithrix jacchus*, where females were significantly more involved in social interactions in pairs in which the females became pregnant. Social behavior was observed almost twice as often in *L. chrysomelas* overall and more frequently in all categories. In addition to exhibiting higher frequencies of social interactions, *L. chrysomelas* pairs were also more successful reproductively. Three of the four *L. chrysomelas* pairs had offspring during the study period, as against only one of *L. chrysopygus*. A possible explanation for this difference may involve ecological differences between these two species, although it is also possible that the *L. chrysomelas* pairs chosen for the study were more socially compatible than those of *L. chrysopygus*. In the colony as a whole, the experience of the pair rather than species and, to a certain extent, the presence in the group of helpers, would appear to be the most important factor. Births occurred in four of the seven groups of each species, but in five of the six families/trios (all composed of experienced animals) as against only three of the eight pairs.

The study was supported by the Brazil Science Council (CNPq), the Brazilian Higher Education Authority (CAPES), and the Department of Experimental Psychology of the Federal University of Pará, Belém, Brazil.

Vânia Haddad Diego, Departamento de Psicologia Experimental, Instituto de Psicologia, Universidade de São Paulo, Avenida Prof. Mello Moraes 1721, 05508-900, São Paulo, São Paulo, Brazil, and **Stephen F. Ferrari**, Departamento de Genética, Universidade Federal do Pará, Campus do Guamá, Caixa Postal 8607, 66075-150 Belém, Pará, Brazil. (*Address of first author for correspondence*: Avenida Eng. Heitor Antônio Eiras Garcia 79, Apt. 24C, 05580-000 São Paulo, São Paulo, Brasil.)

A PHVA for the Brazilian Lion Tamarins

The four lion tamarin species are endemic to the Atlantic forest in eastern and south-eastern Brazil. Three of them have coastal distributions: the golden lion tamarin (GLT), *Leontopithecus rosalia*, in the lowland forests of the state of Rio de Janeiro; the golden-headed lion tamarin (GHLT), *L. chrysomelas*, in southern Bahia; and the black-faced lion tamarin (BFLT), *L. caissara,* in the north-east of the state of Paraná and extreme south-east of São Paulo. The fourth species, the black lion tamarin (BLT), *L. chrysopygus*, occurs inland in the west of the state of São Paulo. They occur in the most densely populated regions of Brazil, where a long history of forest destruction has reduced the once widespread Atlantic forest to less than 6% of its original extent. As a result of this, and along with hunting and commerce, three species *L. rosalia*, *L. chrysopygus*, and *L. caissara* are currently classified by the World Conservation Union (IUCN) as "critically endangered", and the golden-headed lion tamarin, *L. chrysomelas*, is "endangered".

The first workshop concerning the plight of these species focused on the golden lion tamarin (GLT) and was held 25 years ago in Washington, D. C. (supported by the Wild Animal Propagation Trust, the New York Zoological Society and the National Zoological Park - NZP). The pro-

ceedings were published in a book *Saving the Lion Marmoset*, edited by D. D. Bridgwater in 1972. It was carried out as a result of both Brazilian and non-Brazilian concerns that the species was rapidly heading towards extinction. A population of the black lion tamarin (BLT), long thought extinct, had just been rediscovered, but the black-faced lion tamarin, *L. caissara*, was still unknown at the time, being first described only in 1990. Numbers of the golden-headed lion tamarins (GHLT) were thought to be low and also approaching extinction. At that time, priorities for action concentrated on research and management strategies necessary to protect and expand the captive zoo population of GLTs. There were no protected areas in Brazil for any of the species, and their creation was identified as the first crucial step for the wild populations.

For the following 10 years, the focus of international activity was on expanding and managing the captive population of GLTs, while within Brazil the Federal and State government agencies responsible for conservation of species and natural resources passed decrees creating reserves for the three species known at the time. Regular implementation of endangered species laws (e.g., controlling exploitation of these areas and from human pressure) and institutionalizing management of the decreed conservation units was yet to come. The situation of the lion tamarins at that time was reviewed by Adelmar F. Coimbra-Filho and Russell A. Mittermeier in the book, *Primate Conservation*, edited by H. S. H. Prince Rainier III of Monaco and G. H. Bourne in 1977.

During the 1980s, scientific and conservation activities in Brazil for the three known species expanded dramatically, as did the organization of reserve management. A captive population for the GHLT was established from illegally-held animals confiscated outside of Brazil. Field studies (GHLT, BLT, GLT), a reintroduction program using zoo-born animals (GLT), and local education activities (GHLT, BLT, GLT) were implemented, and metapopulation management strategies, based on the principles of conservation biology, were initiated.

In June 1990, the discovery of the black-headed lion tamarin, *L. caissara*, was announced during the first PVA Workshop for the genus, held in Brazil and organized jointly by the Fundação Biodiversitas, Belo Horizonte, and the IUCN/SSC Conservation Breeding Specialist Group (CBSG) (Seal *et al.*, 1990; Rylands, 1993/1994). The PVA resulted in the formal establishment by Ibama (the Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis) of four International Recovery and Management Committees for the genus. The task of these committees is to present recommendations on the management and conservation of the species, and since 1990 they have met every year. The PVA also resulted in the establishment of a series of priorities for each species with regard to research and to their management in the wild as well as in captivity, which guided the activities of the Committees over the subsequent seven years. This Workshop brought together all the major players in the current efforts for the survival of lion tamarins to discuss the current status of each, and their major threats, and to draw up the best options and strategies available for their survival and the recovery of their populations and habitats over the next ten years.

A second workshop for the lion tamarins, involving a Population and Habitat Viability Analysis (PHVA), was held in May 1997, also in Belo Horizonte, in conjunction with a one-day symposium marking 25 years of lion tamarin conservation and research activities, and the annual meetings of the International Committees for the four species. As in 1990, it was organized by the Fundação Biodiversitas, Director Ilmar B. Santos, in conjunction with the Conservation Breeding Specialist Group (CBSG), the Brazilian Institute for the Environment (Ibama), the Golden Lion Tamarin Conservation Program of the National Zoological Park, Washington, D. C., the Primate Specialist Group (PSG), the Jersey Wildlife Preservation Trust, Conservation International, Washington, D. C., and its Brazil Program - Conservation International do Brasil, Belo Horizonte, and the State Forestry Institute of Minas Gerais (IEF-MG). There were over 60 participants, and the large majority of those from North America were able to participate thanks to the generosity of the Brazilian airline company Transbrasil.

The one-day international symposium (20 May 1997) was organized by Devra Kleiman (National Zoological Park, Washington, D, C.) and Anthony B. Rylands (Conservation International do Brasil) and included the following speakers: Hector Seuánez (Instituto Nacional de Cancer, Rio de Janeiro), Beatriz Perez Sweeney (Columbia University, New York), Adriana Grativol (National Zoological Park, Washington, D. C.) and colleagues, discussing aspects of the evolution, genetics and phylogeny of the species, with approaches including species and population appraisals; James M. Dietz (University of Maryland, Maryland) talked about the ranging and feeding behavior of *Leontopithecus*; Andrew Baker (Philadelphia Zoo, Pennsylvania) mating systems, demography and social organization; Jeremy J. C. Mallinson (Jersey Wildlife Preservation Trust, Jersey) the history of lion tamarin conservation; Benjamin Beck and Inês Castro (National Zoological Park, Washington, D. C.) the reintroduction program for GLTs and the influence of variable environments on development and behavior; Jon Ballou (National Zoological Park, Washington, D. C.) the genetic and demographic management of lion tamarins; Claudio Valladares-Padua (University of Brasília and IPÊ, Brasília) metapopulation management; Keith Alger (Instituto Socioambiental do Sul da Bahia -IESB, Ilhéus) the management, restoration and augmentation of protected areas; and Denise Rambaldi (Associação Mico-Leão-Dourado, Rio de Janeiro) the role of NGOs in *Leontopithecus* conservation. The papers presented at the symposium will form the core of a book on lion tamarin

conservation and research which will be edited by Devra G. Kleiman and Anthony Rylands.

The PHVA Workshop was carried out over three days (21-23 May) and was most successfully run by Susie Ellis (Strasburg, Virginia) and Robert J. Lacy (Chicago Zoological Park, Brookfield USA), representing the Conservation Breeding Specialist Group (CBSG). Following some introductory talks, including presentations of the PHVA methodology, the use of the VORTEX computer simulation program for population viability, and an appraisal of the 1990 Workshop, the participants were divided into fours working groups. The first discussed research on the lion tamarins and their habitats; the second the metapopulation management; and the third land use, habitat protection and environmental education. Proposals and recommendations put forward in reports were presented by each group, in all cases discussed at intervals during plenary sessions. The task of a fourth working group was to collate information on such as the demography, life history variables, social structure, and threats to and the status of the populations and protected areas, in order to initiate computer simulations for the projection of population viability using the VORTEX program. The results of the Workshop will be published in the near future in the form of a full report being prepared by the CBSG.

The last two days (24-25 May) were devoted to the meeting of the four International Committees for the management of the species, coordinated by Iolita Bampi of the Faunal Division of the Brazilian Institute for the Environment (Ibama). The meetings included progress reports and discussions for specific action regarding the status and management of lion tamarins in captivity, progress on research and conservation action in the wild, and the fund-raising activities of the "Lion Tamarins of Brazil Fund", run by Jeremy J. C. Mallinson and Devra Kleiman - a campaign aimed particularly at raising financial support for *in situ* conservation from zoos and institutions holding lion tamarins.

The Symposium, the PHVA Workshop and the annual meetings of the Committees were highly successful and have undoubtedly contributed significantly to directing and stimulating ongoing efforts on behalf of the survival of the four lion tamarin species. Special merit must be given to the Fundação Biodiversitas for the logistic organization, and to the participants for providing an example of how "pooling the World's best resources"(a quote from Jeremy Mallinson) in international collaboration can promote successful conservation efforts and strategies on behalf of endangered species.

Devra G. Kleiman, Department of Zoological Research, National Zoological Park, Smithsonian Institution, Washington, D. C. 20008, USA, **Ilmar B. Santos**, Fundação Biodiversitas, Av. do Contorno 9155, Prado, 30110-130. Belo Horizonte, Minas Gerais, Brazil, and **Anthony B. Rylands**, Conservation International do Brasil, Avenida Antônio Abrahão Caram 820/302, 31275-000 Belo Horizonte, Minas Gerais, Brazil.

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The Wisconsin Regional Primate Research Center Newsletter

The Wisconsin Regional Primate Research Center's quarterly newsletter now has a web site. The URL is: http://www.primate.wisc.edu/Centerline. If you want to be added to the mailing list for the printed version, please e-mail <jlenon@primate.wisc.edu>. Please provide your name, complete mailing address, and area of interest. For more information: Jordana Lenon, Editor and Media Relations Specialist, Wisconsin Regional Primate Research Center, Graduate School, University of Wisconsin, 1220 Capitol Court, Madison, WI 53715-1299, USA, Tel: 608 263-7024, Fax: (608) 263-4031, e-mail: jlenon@primate.wisc.edu.

Wildlife Conservation Society - Research Fellowship Program

From tigers in Thailand to monarch butterflies in Mexico, the Wildlife Conservation Society conducts more than 250 field projects in 52 countries throughout Africa, Asia, Latin America and North America. With 60 staff scientists and over 100 research fellows, WCS has the largest professional field staff of any U.S.-based international conservation organization. WCS's strategy is to support comprehensive field studies to gather information on wildlife needs, train local conservation professionals and work with in-country staff to protect and manage wildlife and wild areas for the future.

Field programs of WCS benefit from technical support of specialists based at the Society's Bronx Zoo headquarters in New York. The Wildlife Health and Sciences Center

sends experts around the globe to assess wildlife health, develop monitoring techniques and train local veterinarians. WCS's curatorial staff provide expertise in captive breeding of endangered species. The Society's Science Resource Center helps researchers assess data through computer mapping, ecological analysis and cutting-edge molecular genetics. Finally, the Education Department writes primary and secondary school curricula that address conservation issues, and hosts teacher training workshops around the world.

The Research Fellowship Program (RFP) is a small grants program designed to support individual field research projects leading directly to the conservation of threatened wildlife and wildlife habitat. Projects must demonstrate strong scientific merit, as well as direct relevance to conservation issues.

Eligibility: Any individual is eligible to apply. Organizations are not eligible for funding. Awards may not exceed US$20,000. The RFP does not support conferences, travel to scientific meetings, legal actions, construction of permanent field stations, tuition or salaries at institutions, or overhead costs. Stipends are not considered (but investigators who have no other source of support may request modest per-diem expenses). Costly laboratory analyses, gene storage, and captive breeding are also outside our funding guidelines. Faculty and/or research advisors should not be listed as principal investigators unless they plan to carry out the majority of the field work. Proposals may be submitted simultaneously to other funding organizations, but WCS must be informed of the organization, amount, and if pending. Please note that the Research Fellowship Program does not support research in North America, Australia, or Europe.

Selection Criteria: Proposals are evaluated on a competitive basis. Applications are screened by outside technical reviewers and WCS staff. Preference is given to proposals from nationals of the country of research and to projects in our biogeographic regions of special interest: Sub-Saharan Africa, Latin America, and Asia.

Closing Dates and Notification: The WCS Program Committee meets three times a year to make funding decisions, with closing dates for RFP applications on February 1, June 1, October 1. Final decisions and awards are usually announced at the end of May, September, and January, respectively.

Application Procedure: An application package consists of: proposal fact sheet, project outline, animal handling sheet, project title page, and proposal checklist. Applicants should use the project title page and submit *five* copies of their proposal. Applications may be submitted in English, French, or Spanish, but all proposals must be accompanied by an English abstract. *Five (5) completed applications should be sent to*: Wildlife Conservation Society, International Programs, Research Fellowship Program Coordinator, 18th St. & Southern Boulevard, Bronx, NY 10460, U.S.A.

Additional questions can be directed to: Tracy Van Holt, Program Coordinator, Research Fellowship Program, Tel: 718-220-5896, Fax: 718-364-4275, e-mail: fellowship.vcs @mcimail.com.

Frugivory in New World Primates

Dr. Mauro Galetti is writing a review paper on frugivory and seed dispersal in New World primates. He would be most grateful for any reprints or references which would contribute to his research. If you have any publications on this subject, please send them to: Dr. Mauro Galetti, Departamento de Botânica, Instituto de Ciências Biológicas, Universidade Estadual de São Paulo (UNESP), Caixa Postal 199, 13506-900 Rio Claro, São Paulo, Brazil.

American Society of Mammalogists, Announcement - Latin American Fellowship

The Latin American Fellowship has been established to promote the support of field research by Latin Americans in Latin America. Eligible students must be citizens of Latin American countries (excluding Puerto Rico), and enrolled in a graduate program in either a Latin American or North American university. The award will be US$1,000. Proposed projects must be primarily field oriented with a research emphasis in the areas of natural history, conservation, ecology, systematics, wildlife biology, biogeography, or behavior. These areas of research in mammalogy shall be considered equally important by the selection committee. Application information and forms may be obtained from Dr. Janet K. Braun, Oklahoma Museum of Natural History, 1335 Asp Avenue, University of Oklahoma, Norman, OK 73019 USA, Tel: (405) 325-2828, Fax (405) 325-7699, e-mail: jkbraun@ou.edu. The awardee will be announced at the annual meeting of the American Society of Mammalogists (ASM) at the banquet at Oklahoma State University.

Primate Societies

Australasian Primate Society

The Australian Primate Society, President, Mr. John Lemmon, Western Plains Zoo, Dubbo, New South Wales, has been renamed - it is now the Australasian Primate Society, and as from Volume 11(2), Summer 1997, its newsletter is called *Australasian Primatology*. In the editorial of this issue, Mr. Graeme Crook (Editor and Treasurer of the Society) reported that the marmoset colony at CSIRO will be closed down and transferred to another institution. Mr. Crook has been made redundant, but will carry on serving the society as editor and treasurer. He will be going into the computer industry and intends, as a result,

to set up a Web page for the Society. The editors wish Mr. Crook success and happiness in his career change into computing. Graeme Crook: e-mail: gc00274@snetad.cpg.com.au.

Associazione Primatologica Italiana (API)

A new API council for the years 1997-1999 was voted in during the XII Congress of the Associazione Primatologica Italiana in Turin,16-19 April, 1997. They are as follows: ***President*: Prof. Giuseppe Ardito**, Istituto di Antropologia, Via del Proconsolo 12 50122 Firenze, Italy, Tel: 055 215349, Fax: 055 283358, e-mail: antropos@cesit1.unifi.it; ***Vice President*: Dr. Augusto Vitale,** Istituto Sup. Sanita, Lab. Fisiopatologia, Via le Regina Elena 299, 00161-1 Roma, Italy, Tel: 06 49902107, 49902159; Fax: 06 4957821; e-mail: vitale@dns.istsan.interbusiness.it; ***Secretary-Treasurer*: Prof. Daniele Formenti**, Dip. di Biologia Animale, Lab. Antropologia, Piazza Botta 10, 27100 Pavia, Italy, Tel: (0)382-506324, Fax: (0)382-506325; e-mail: formenti@ipv36.unipv.it. ***Other members*: Prof. Cristina Giacoma**, Dip. di Biologia Animale e dell'uomo, V. Accademia Albertina 17, 10123 Torino, Italy; **Dr.Gabriele Schino**, Via Flaminia 109, 00196 Roma, Italy; and **Dr. Massimiliano Del Pero,** Dip. di Biologia Animale e dell'uomo, Via Accademia Albertina 17, 10123 Torino, Italy. Additional information about API activities can be found at their web page: http://www.unipv.it/~webbio/api/api.htm.

Recent Publications

Tamarin Tales - A Newsletter for Lion Tamarin Research and Conservation

Tamarin Tales is a newsletter produced by the Jersey Wildlife Preservation Trust and the *Leontopithecus* International Recovery and Management Committees. It is edited by Jonathan D. Ballou of the Department of Biological Research, National Zoological Park, Washington, D. C., and the first number (Volume 1, 1997) was produced this year. The aim of this newsletter is to provide up-to-date information to zoos and conservationists worldwide on the most recent developments concerning research and conservation efforts on the four species of lion tamarins: *Leontopithecus rosalia, L. chrysomelas, L. chrysopygus* and *L. caissara*. The newsletter is specifically targeted to zoos and institutions participating in the captive breeding programs for *L. rosalia, L. chrysomelas* and *L. chrysopygus*, as well as to donators to the "Lion Tamarins of Brazil Fund", co-ordinated by Devra G. Kleiman (National Zoological Park, Washington, D. C.) and Jeremy J. C. Mallinson (Jersey Wildlife Preservation Trust, Jersey).

The first issue is full of interesting information, including as it does the following short articles: The Lion Tamarin Committees - D. G. Kleiman and J. J. C. Mallinson; The current status of the golden lion tamarin (J. D. Ballou), the black lion tamarin (C. Padua), the golden-headed lion tamarin (L. P. de S. Pinto and L. I. Tavares), and the black-faced lion tamarin (I. de G. Câmara and C. Padua); A report from the field: Golden-headed lion tamarins in Una - J. Dietz; Update on golden lion tamarin conservation activities - D. G. Kleiman; Assessment planned for Golden Lion Tamarin Conservation Program - D. G. Kleiman; Effect of translocations on resident groups of black lion tamarins - M. Silva; Landowners' Environmental Education Program for Una and surrounding areas - J. Blanes and J. J. C. Mallinson; Forest Rehabilitation Program in Poço das Antas Biological Reserve - J. L. C. Camargo; Seasonal variation in behavior and ecology of black lion tamarin - F. de C. Passos; The Rio de Janeiro Primate Center (CPRJ) - A. Pissinatti; Studies of the natural history of the black-faced lion tamarin - C. Padua and F. Prado; Golden lion tamarin conservation education program - D. Rambaldi; Environmental education activities of IPÊ - S. Padua; The Lion Tamarins of Brazil Fund - J. J. C. Mallinson.

For further information (and contributions to the newsletter), please contact: J. D. Ballou, Editor *Tamarin Tales*, Department of Zoological Research, National Zoological Park, Smithsonian Institution, Washington, D. C. 20008, USA, Tel: 202 673 4815, Fax: 202 673 4686, e-mail: nzpdzr01@sivm.si.edu.

Biodiversity and Environmental Stability

The proceedings of a symposium "Biodiversity and Environmental Stability", held in Copenhagen by the Danish Centre for Tropical Biodiversity, 24-25 April 1995, were published recently in a special issue of the journal *Biodiversity and Conservation*, published by Chapman and Hall (2-6 Boundary Row, London SE1 8HN, UK). This issue (Vol. 6, number 3, 1997) includes some important papers concerning the biogeography of South America. Guest Editorial: Biodiversity and environmental stability - J. Fjeldsa and J. C. Lovett (pp.315-323); Geographical patterns of old and young species in African forest biota: The significance of specific montane areas as evolutionary centres - J. Fjeldsa and J. C. Lovett (pp.325-346); The role of ecological knowledge in explaining biogeography and biodiversity in Amazonia - H. Tuomisto and K. Ruokolainen (pp.347-357); Floristic diversity in the Cape flora of South Africa - P. Goldblatt (pp.359-377); Patterns of plant species endemism in Ecuador - F. Borchsenius (pp.379-399); Are biodiversity 'hotspots' correlated with current ecoclimate stability? A pilot study using the NOAA-AVHRR remote sensing data; Stable environments and fragile communities - J. Fjeldsa, D. Erhlich, E. Lambin and E. Prins (pp.401-422): Does history determine the resilience of avian rain-forest communities to habitat degradation? - F. Danielsen (pp.423-433); Endemic bird species and conservation in the Cerrado region, South

America - J. M. C. da Silva (pp.435-450); Alternative models of vertebrate speciation in Amazonia: An overview - J. Haffer (pp.451-476); Islands: Stability, diversity and conservation - Q. C. B. Cronk (pp.477-493); Floristic diversity and history of African arid regions - N. Jürgens (pp.495-514).

Animal Conservation - A Journal of Ecology, Evolution and Genetics

In 1998, The Cambridge University Press, Cambridge, will be launching a new journal - *Animal Conservation* - on behalf of The Zoological Society of London, UK. The aim of the journal is to provide a forum for rapid and timely publication of novel scientific studies of past, present, and future factors influencing the conservation of animal species and their habitats. The focus is on rigorous studies of an empirical or theoretical nature, relating to species and population biology. A central theme will be to publish important new ideas and findings from evolutionary biology and ecology that contribute towards the scientific basis of conservation biology. Fields covered will include: ecology, behavioural ecology, and wildlife biology, wildlife disease and epidemiology, evolutionary ecology and genetics, population biology, systematic biology and phylogenetics, biodiversity and biogeography, and management (including translocation and sustainable use).

Animal Conservation will be essential reading for conservation biologists working in universities, research institutes, governmental and non-governmental wildlife agencies, and zoos. The principal objective is to ensure that new and original research be published within six months of submission, following a rigorous review process. The Editors are: Michael W. Bruford (Institute of Zoology, Regent's Park, London NW1 4RY, UK), John L. Gittleman (Department of Ecology and Evolutionary Biology, University of Tennessee, Knoxville, Tennessee 37996, USA), Georgina M. Mace (Institute of Zoology, London), and Robert K. Wayne (Department of Biology, University of California, Los Angeles, California 90024, USA). The Book Review Editor is Peter Cotgreave (Institute of Zoology, London).

Papers may be specific or single species studies but findings must have general implications. Cross disciplinary papers suggesting new approaches are particularly encouraged. The Editors welcome submission of research papers (up to 4,000 words), research reviews containing interesting and original new ideas (up to 4,000 words), comments, criticisms of or additions to papers already published (up to 1,000 words) and book reviews (up to 750 words). Full instructions for contributors can be found on the Internet at: http://www.cup.cam.ac.uk/journals/jnlscat/ani/anilFC.html.

Animal Conservation will be published quarterly in February, May, August and November. Volume 1 in 1998 will be £78/US$124 for institutions, and £39/US$62 for individuals. Special arrangements exist for members of the Zoological Society of London. The journal can be ordered from: Journals Marketing Department, Cambridge University Press, The Edinburgh Building. Cambridge CB2 1BR, UK, Tel: +44 (0)1223 325969, Fax: +44 (0)1223 315052, e-mail inquiries to: journals_marketing@cup.cam.ac.uk. Orders in the USA, Canada, and Mexico: Cambridge University Press, 40 West 20th Street, New York, NY 10011-4211, USA, Tel: +1 914 937 9600 x 154, Fax: +1 914 937 4712, Toll free for orders 1-800-872-7423, e-mail inquiries: journals_marketing@cup.org.

Books

New World Primates: Ecology, Evolution and Behavior, edited by the late Warren G. Kinzey, 1997, 436pp. Aldine de Gruyter, Hawthorne, New York. Price: Cloth US$62.95 ISBN 0-202-01185-2, Paperback US$31.95 ISBN 0-202-01186-0. Postage and handling: US$4.00. A volume in the Aldine de Gruyter Series "Foundations of Human Behavior", Series Editors Monique Borgerhoff Mulder and Marc Hauser. Anthropologists have traditionally ignored the New World primates because they are not in the mainstream of evolution leading to the human species. In this volume, leading experts on various aspects of New World monkeys explore the tremendous diversity to be found among neotropical primate species that have adapted to the highly diverse Central and South American ecosystems. They shed new light upon the evolutionary process as is it is played out among our primate relations on a neotropical stage. Also included is a short authoritative synopsis of the basic behavior, taxonomy, evolutionary history, captive and field studies, habitat and ecology (including diet and predation), social behavior, ranging behavior, activity patterns, mating and reproduction, communication, play, and growth and development, for each of the sixteen known genera of New World monkeys, along with most useful maps of their distributions. This synopsis covers about a third of the book. This book is evidently a must for anybody working on Neotropical mammals, and is highly recommended. The synopsis is an excellent introduction to the state-of-the-art concerning research on the behavior and ecology of each genus. There is a massive bibliography of more than 100 pages (pp.325-429). Contents: *Part I.* Perspective on New World Primates; Platyrrhines, catarrhines, and the fossil record - J. G. Fleagle and R. F. Kay, pp.3-23; Brains of New World and Old World monkeys - E. Armstrong and M. A. Shea, pp.25-44; Color vision polymorphism in New World monkeys: Implications for the evolution of primate trichromacy - G. H. Jacobs, pp.45-74; Is speech special? Lessons from New World primates - C. T. Snowdon, pp.75-93; Sex differences in the family life of cotton-top tamarins: Socioecological validity in the laboratory? - W. C. McGrew, pp.95-107; Subtle cues of social relations in male muriqui monkeys (*Brachyteles arachnoides*) - K. B. Strier, pp.109-118; The influence of New World mating and rearing systems on theories about Old World primates - C. M. Anderson, pp.119-126; Behavioral and ecological com-

parisons of neotropical and Malagasy primates - P. C. Wright, pp.127-141; The human niche in Amazonia: Explorations in ethnoprimatology - L. E. Sponsel, pp.143-165. *Part II.* Synopsis of New World primates: Classification of living New World monkeys - W. G. Kinzey, pp.169-173; Synopsis of New World primates: *Alouatta*, *Aotus*, *Ateles*, *Brachyteles*, *Cacajao*, *Callicebus*, *Callimico*, *Callithrix*, *Cebuella*, *Cebus*, *Chiropotes*, *Lagothrix*, *Leontopithecus*, *Pithecia*, *Saguinus* and *Saimiri* - W. G. Kinzey, 174-305; Distribution maps of South and Central America by genus - W. G. Kinzey, pp.307-324. Available from: Aldine de Gruyter, 200 Saw Mill River Road, Hawthorne, NY 10532, USA. Tel: +1 914 747 0110.

Last Stand: Protected Areas and The Defense of Tropical Biodiversity, edited by Randall Kramer, Carel van Schaik and Julie Johnson. 1997. Oxford University Press, New York. ISBN 0-19-509554-5. During the past century, tropical rain forests have been reduced to less than half of their original area, with a consequent loss of biodiversity. This book takes a close look at how this has happened and what the consequences may be, with an emphasis on strategies that have proven successful in stemming the loss of plant and animal species. The book highlights the important role of protected areas such as sacred groves, royal preserves, and today's national parks, which have long served to shield the delicate forest habitats for countless species. It argues that, although programs that combine biodiversity protection and human economic development have become increasingly important, a system of protected areas must still be the cornerstone of all conservation strategies aimed at limiting the inevitable reduction of our planet's biodiversity. Written by leading experts with years of experience, the book integrates ecological, economic and political perspectives on how best to manage tropical forest reserves and their biodiversity, throughout the world. In addition to conservationists, policy makers, and ecologists, educators will find this a useful text in courses on tropical conservation and policy. Contents: 1. Preservation paradigms and tropical rain forests - Randall A. Kramer and Carel P. van Schaik; 2. Minimizing species loss: The imperative of protection - John Terborgh and Carel P. van Schaik; 3. The ecological foundations of biodiversity protection - Kathy Mackinnon; 4. The silent crisis: The state of rain forest nature preserves - Carel P. van Schaik, John Terborgh, and Barbara Dugelby; 5. Policy and practical considerations in land-use strategies for biodiversity conservation - Katrina Brandon;. 6. Biodiversity politics and the contest for ownership of the world's biota - Steven E. Sanderson and Kent H. Redford; 7. User rights and biodiversity conservation - Marie Lynn Miranda and Sharon LaPalme; 8. Tropical forest biodiversity protection: Who pays and why - Randall A. Kramer and Narendra Sharma; 9. Compensation and economic incentives: Reducing pressure on protected areas - Paul J. Ferraro and Randall A. Kramer; 10. Toward a new protection paradigm - Carel P. van Schaik and Randall A. Kramer. Available from: Oxford University Press, Inc., 198 Madison Avenue, New York, New York 10016, USA.

Adaptive Radiations of Neotropical Primates, edited by Marilyn A. Norconk, Alfred L. Rosenberger and Paul A. Garber, 1996, Plenum Press, New York. 555pp. Price: US$125.00. ISBN 0-306-45399-1. This collection of 29 papers grew out of a symposium entitled "Setting the Agenda for Neotropical Primates", held at the Department of Zoological Research, National Zoological Park, Washington, D. C., on February 26-27, 1994. It was sponsored by the Wenner-Gren Foundation for Anthropological Research, the Smithsonian Institution and the Friends of the National Zoo. There were two objectives to the symposium: to honor Warren G. Kinzey (1935-1994) for his contributions to the growing field of platyrrhine studies, and to provide researchers who work in the Neotropics with the opportunity to discuss recent developments, to identify areas of research that require additional study, and especially to guide the next generation of researchers. The book is dedicated to the memory and life work of Warren Kinzey. A very rich store of information for anybody working on Neotropical primates and South American biogeography and fauna in general. Contents: *Section I. Problems of Platyrrhine Evolution.* Molecules, morphology, and platyrrhine systematics - H. Schneider and A. L. Rosenberger, pp.3-19; Primates of the Atlantic forest: Origin, distributions, endemism, and communities - A. B. Rylands, G. A. B. da Fonseca, Y. L. R. Leite and R. A. Mittermeier, pp.21-51; Primate populations in eastern Amazonia - S. F. Ferrari and M. A. Lopes, pp.53-67; Primates of the Guayana Shield forests: Venezuela and the Guianas - M. A. Norconk, R. W. Sussman and J. Phillips-Conroy, pp.69-83. *Section II. On Callitrichines.* Marmoset misconceptions - P. A. Garber, A. L. Rosenberger and M. A. Norconk, pp.87-95; The other side of callitrichine gummivory: Digestibility and nutritional value - M. L. Power, pp.97-110; Locomotion of golden lion tamarins (*Leontopithecus rosalia*): The effects of foraging adaptations and substrate characteristics on locomotor behavior - B. J. Stafford, A. L. Rosenberger, A. J. Baker, B. B. Beck, J. M. Dietz and D. G. Kleiman, pp.111-132; Functional and phylogenetic implications of ankle morphology in Goeldi's monkey (*Callimico goeldii*) - L. C. Davis, pp.133-156; Ecology of the "southern" marmosets (*Callithrix aurita* and *Callithrix flaviceps*: How different, how similar? - S. F. Ferrari, H. K. M. Corrêa, and P. E. G. Coutinho, pp.157-171; Activity and ranging patterns in common marmosets (*Callithrix jacchus*): Implications for reproductive strategies - L. J. Digby and C. E. Barreto, pp.173-185; Parental care patterns and vigilance in wild cotton-top tamarins (*Saguinus oedipus*) - A. Savage, C. T. Snowdon, L. Humberto Giraldo and Luis H. Soto, pp.187-199; Testing learning paradigms in the field: Evidence for use of spatial and perceptual information and rule-based foraging in wild moustached tamarins - P. A. Garber and F. L. Dolins, pp.201-216; *Section III. Critical Issues in Cebine Evolution and Behavior.* Critical Issues in Cebine Evolution and Behavior - L. M. Fedigan, A. L.

Rosenberger, S. Boinski, M. A. Norconk and P. A. Garber, pp.219-228; Species definition and differentiation as seen in the post-cranial skeleton of *Cebus* - S. M. Ford and D. G. Hobbs, pp.229-249; Vocal coordination of troop movement in squirrel monkeys (*Saimiri oerstedi* and *S. sciureus*) and white-faced capuchins (*Cebus capucinus*) - S. Boinski, pp.251-269; The behavioral ecology of wedge-capped capuchin monkeys (*Cebus olivaceus*) - L. E. Miller, pp.271-288; See how they grow: Tracking capuchin monkey (*Cebus capucinus*) populations in a regenerating Costa Rican dry forest - L. M. Fedigan, L. M. Rose and R. M. Avila, pp.289-307; Toward an experimental socioecology of primates: Examples from Argentine brown capuchin monkeys (*Cebus apella nigritus*) - C. H. Janson, pp.309-325. *Section IV New Perspectives on Pitheciines.* New Perspectives on Pitheciines - A. L. Rosenberger, M. A. Norconk and P. A. Garber, pp.329-333; The evolution of positional behavior in the saki-uakaris (*Pithecia, Chiropotes* and *Cacajao*) - S. E. Walker, pp.335-367; The Neotropical primate adaptation to nocturnality: Feeding in the night (*Aotus nigriceps* and *A. azarae*) - P. C. Wright, pp.369-382; Diet and feeding ecology of masked titis (*Callicebus personatus*) - K.-H. Müller, pp.383-401; Seasonal variation in the diets of white faced-faced and bearded sakis (*Pithecia pithecia* and *Chiropotes satanas*) in Guri Lake, Venezuela - M. A. Norconk, pp.403-423. *Section V. On Atelines.* On Atelines - W. C. Hartwig, A. L. Rosenberger, P. A. Garber, and M. A. Norconk, pp.427-431; Dental microwear and diet in a wild population of mantled howling monkeys (*Alouatta palliata*) - M. F. Teaford and K. E. Glander, pp.433-449; Seasonal differences in food choice and patch preference of long-haired spider monkeys (*Ateles belzebuth*) - H. G. Castellanos and P. Chanin, pp.451-466; Use of space, spatial group structure, and foraging group size of gray woolly monkeys (*Lagothrix lagotricha cana*) at Urucu, Brazil: A review of the Atelinae - C. A. Peres, pp.467-488; The relation between red howler monkey (*Alouatta seniculus*) troop size and population growth in two habitats - C. M. Crockett, pp.489-510; Reproductive ecology of female muriquis (*Brachyteles arachnoides*) - K. B. Strier, pp.511-532. There are also Portuguese and Spanish summaries of each of the papers.

Mata Atlântica: Ciência, Conservação e Políticas - Workshop Científico sobre a Mata Atlântica, editado por Luiz Paulo de S. Pinto, José Pedro de Oliveira Costa, Gustavo A. B. da Fonseca e Cláudia Maria R. Costa. 1996, 27pp. *Documentos Ambientais: Secretaria do Meio Ambiente, Governo do Estado de São Paulo.* Prefácio pelo Sr. Fabio Feldmann, Secretário do Meio Ambiente do Estado de São Paulo. Este documento objetiva subsidiar as discussões entre representantes de organizações governamentais e não-governamentais, a comunidade científica, e a sociedade em geral, no processo de avaliação das políticas públicas e da legislação sobre o bioma Mata Atlântica, visando propor alternativas para sua efetiva proteção. O documento está dividido em três partes: na primeira aborda-se o histórico da proteção legal da Mata Atlântica e seus desdobramentos; em seguida descreve-se algumas iniciativas e as bases científicas para a delimitação e estratégias de sua conservação; e para terminar apresenta-se os resultados do Workshop Científico sobre a Mata Atlântica, realizado nos dias 22-23 de janeiro de 1996, em Belo Horizonte, Minas Gerais. Maiores informações: SMA - Secretaria do Meio Ambiente do Estado de São Paulo, Av. Prof. Frederico Hermann Jr. 345, 05489-900 São Paulo, São Paulo, Brasil, Tel: (011) 3030 6199, Fax: (011) 3030 6203.

Wildlife Conservation, Zoos and Animal Protection - A Strategic Analysis, edited by Andrew N. Rowan. Proceedings of a workshop held at the White Oak Conservation Center, Yulee, Florida, 21-24 April, 1994. Tuft University, MA. USA. Price: US$30.00. Checks payable to: Trustees of Tufts College - CFA. Contents: Preface - Andrew Rowan; Opening Remarks - James Smith; What do "wild" and "captive" mean for large ungulates and carnivores. Now and into the twenty first century - Michael Hutchins; Wild/captive and other suspect dualisms - Dale Jamieson; The wild and the tame - Juliet Clutton-Brock; Naturalizing and individualizing animal well-being and animal minds: An ethologist's naivete exposed? - Marc Bekoff; Animal well-being in the wild and in captivity - Stephen Bostock; Preserving individuals versus conserving populations: Is there a conflict? - Donald G. Lindburg; Animal well-being in zoos, conservation centers and *in-situ* conservation programs - John Lukas; Final comments - Andrew Rowan; Epilogue - Howard Gilman. Available from: Center for Animal and Public Policy, Tuft University School of Veterinary Medicine, 200 Westboro Road, N. Grafton, MA 01536, USA.

Advances in The Study of Behavior, edited by Peter J. B. Slater, Jay S. Rosenblatt, Charles T. Snowdon, and Manfred Milinski, Volume 26, 1997. Academic Press, New York. Price: US$95.00. ISBN: 0 12 004 526 5. Contents: Sexual selection in seaweed flies - Thomas H. Day and Andre S. Gilburn; Vocal learning in mammals - Vincent M. Janik and Peter J. B. Slater; Behavioral ecology and conservation biology of primates and other animals - Karen B. Strier; How to avoid seven deadly sins in the study of behavior - Manfred Milinski; Sexually dimorphic dispersal in mammals: Patterns, causes, and consequences; Laura Smale, Scott Nunes and Kay E. Holekamp; Infantile amnesia: Using animal models to understand forgetting - H. Moore Arnold and Norman E. Spear; Regulation of age polyethism in bees and wasps by juvenile hormone - Susan E. Fahrbach; Acoustic signals and speciation: The roles of natural and sexual selection in the evolution of cryptic species - Gareth Jones; Understanding the complex song of the European starling: An integrated ethological approach - Marcel Kens; Representation of quantities by apes - Sarah T. Boysen. Available from: Academic Press, 6277 Sea Harbor Drive, Orlando, FL 32887, USA, Tel: +1 800 321 5068.

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Meetings

Regional Primate Captive Masterplanning Meeting, 23-27 June, 1997, Simon Bolívar Zoo, San José, Costa Rica. Contact: Lic. Yolanda Matamoros, Director, Zoológico Nacional Simon Bolivar, Apartado Postal 11594-1000, San José, Costa Rica. Tel: 506-233-6701, Fax: 506-223-1817, or Dr. Cheryl Asa, St. Louis Zoological Park, Forest Park, St. Louis, MO 63110, USA. Tel: +1 314-768-5488, Fax: +1-314-768-5454.

Fifth International Congress of Vertebrate Morphology, 12-17 July, 1997, University of Bristol, Bristol, UK. Organized by the International Society for Vertebrate Morphologists. All those interested in vertebrate morphology and related areas are invited to attend. Suitable topics for discussion at the meeting include all aspects of vertebrate morphology, including anatomy, evolution, development, biomechanics and locomotion, vertebrate palaeontology, ecological morphology, morphological aspects of behaviour, cell structure and function, neurobiology and neuroanatomy, and morphometric and other methods. The closing date for submissions is 16 December 1996. Contact: Professor J. M. V. Rayner, School of Biological Sciences, University of Bristol, Woodland Road, Bristol BS8 1UG, UK, Fax: +44 (0)117 925 7374, e-mail: icvm97@bristol.ac.uk, WWW: http://www.bio.bris.ac.uk/icvm.html.

VI Simposio de Primatología de la Asociación Mexicana de Primatología, 30 de julio al 1 de agosto de 1997, Instituto Mexicano de Psiquiatría, México, D. F. Instituciones participantes en la realización: Programa Universitario de Investigación en Salud y Instituto de Investigaciones Antropológicas, Universidad Nacional Autónoma de México; Organizacíon Panamerican para la Salud, Organización Mundial para la Salud; y Universidad Veracruzana. Comité Organizador: Presidente - Ricardo Mondragon-Ceballos, Secretaria - Pilar Chiappa. Temática: Sistemática y evolución; Ecología de la conducta; Conservación; Fisiología, medicina veterinaria y usos de los primates no humanos en la salud humana; Cognición, inteligencia e inteligencia artificial; Panorama del trabajo primatológica en los países en desarrollo y su divulgación a nivel internacional. Conferencias magistrales: Marina L. Butovskaya (Institute of Ethnology and Anthropology, Russian Academy of Sciences) - Mechanisms of coping with social tension in nonhuman primates; Hans G. Erkert (Universität Tübingen, Tübingen) - Cronobiologia de primates neotropicales; Michael J. Raleigh (University of California, Los Angeles) - Imaging neuroplasticity: Primate studies and brain repair; Ranulfo Romo (Universidad Nacional Autónoma de México, México) - El primate: Un modelo para el estudio de la percepción táctil; Phillip V. Tobias (University of Witwatersrand, South Africa) - A reconsideration of man's place in nature; Russell H. Tuttle (University of Chicago, Chicago) - Global primatology in a new millenium; Jaime A. Umaña A. (Universidad Nacional de Colombia, Bogotá) - Programa de rehabilitación y posible reintroducción de primates neotropicales. Conferencias: Martha Isabel Escobar B. (Universidad del Valle, Colombia) - Interneuronas en la corteza asociativa del mono nocturno *Aotus lemurinus griseimembra*; Joaquin Molina (Organización Panamericana para la Salud) - Políticas de la OPS para el apoyo a la investigación; Hernán J. Pimenta J. (Universidad del Valle, Colombia) - Organización de la corteza asociativa del mono *Aotus lemurinus griseimembra.* Mesa Redondas: Los inicios de la primatología en México (M. en C. Lilian Mayagoitia); Del mono al hombre (Karen Toussaint); Conservación (Ernesto Rodríguez-Luna); Diferencas genéricas en primates (Guillermina Yankelevich). Inscripción: 300.00 pesos antes del 30 de junio, a partir de esta fecha el costo será de 350,00 pesos. La cuota incluye coctel de bienvenida, paquete de inscripción y cena de clausura. Informaciones: Depto. de Etológia, Div. Neurociencias, IMP, Camino a Xochimilco 101, San Lorenzo Huipulco, C. P. 14370, Tlalpan, D. F., México, Fax: 6559980, correo electrónico: monc@cenids.ssa.gob.mx.

VIII Congresso Brasileiro de Primatologia, 10-15 August 1997, João Pessoa, Paraíba, Brazil. Deadline for submission of abstracts: 10 May 1997. Contact: Carmen Alonso, Sociedade Brasileira de Primatologia, Departamento de Sistemática e Ecologia - CCEN, Universidade Federal da Paraíba, 58059-900 João Pessoa, Paraíba, Brazil, Tel: +55 (0)83 216 7471, Fax: +55 (0)83 216 7464, e-mail: sagui@vm.npd.ufpb.br.

XXV International Ethological Conference, 20-27 August, 1997, Vienna, Austria. This meeting will highlight new synthetic approaches to problems in animal behavior, and links between behavior and other disciplines, including neurobiology, sensory physiology, population ecology, conservation biology, and evolution. Deadlines: Submission of abstracts, budget registration, financial aid application - 28 February 1997; Hotel reservation, standard registration - 15 July 1997. For additional information, contact: XXV IEC, Wiener Medizinische Akademie (WMA), Alser Strasse 4, A-1090 Vienna, Austria, Tel: +43 1 405 1383 21, Fax: +43 1 405 1383 23, e-mail: medacad@via.at.

Sedation, Immobilization, and Anesthesia of Non-Human Primates, 23-24 August, 1997, University of Wisconsin, College of Veterinary Medicine, Madison, Wisconsin, USA. Sponsor: Safe-Capture International, Inc. Guest speakers: Jan Ramer, WRPRC and Joanne Paul-Murphy, UW, College of Veterinary Medicine. Focus: humane capture, remote drug delivery methods, pharmacology, analgesics, medical emergencies, and safety protocols. Each participant will receive a 110 page training manual, including Immobilization Protocols for over 100 Species of Non-Human Primates. Certificates on completion. Contact: Keith Beheler-Amass, Safe-Capture International, Inc., P.O. Box 206, Mt. Horeb, Wisconsin 53572, USA, Tel: 1-608-767-3071, Fax: 1-608-437-5287.

A Linnean Society Conference: The Evolution and Behaviour of Monkeys, Apes and Man, 4-5 September, 1997, Chester Zoo, Chester, UK. A Linnean Society Regional Meeting to be held in conjunction with The North of England Zoological Society and the University of Liverpool. Registration fee £25. The keynote speech will be presented by Sandy Harcourt, "Characteristics of primate species prone to extinction". Sessions include: Ecology of Apes; Cognition; Social Behaviour, Functional Morphology; Conservation; and Systematics. Organised tours round the primate sections at Chester Zoo will be available. For further information and registration: Julie Whitear, Chester Zoo, Upton by Chester, Cheshire H2 1LH, UK, Tel. +44 (0)1244 650201, Fax: +44 (0)1244 371273, e-mail: gmreid@gn.apc.org.

Forum on Wildlife Telemetry: Innovations, Evaluations and Research Needs, 21-23 September, 1997, Snowmass, Colorado, USA. In conjunction with 1997 Annual Conference of the Wildlife Society. Contact: Jane Austin, National Biological Service, Northern Prairie Science Center, Jamestown, North Dakota 58401. Tel.: +1-701 252-5363, Fax: +1-701-252-4217, e-mail: jane_austin@nbs.gov.

Vth Congress of the German Primatological Society, 1-5 October, 1997, Berlin, Germany. A meeting of the Council of the European Federation for Primatology will be held on 5 October. Contact: Prof. Dr. Carsten Niemitz, Freie Universität Berlin, FB 23,WE 5, Fabeckstrasse 15, D-14195 Berlin, Germany. Tel: +49 (0)30-838-2900, Fax: +49 (0) 30-838-6556, e-mail: cniemitz@zedat.fu-berlin.de.

Cold Spring Harbor Symposium on Human Evolution, 4-8 October, 1997, Long Island, New York. Organized by Luigi Cavalli-Sforza and James Watson (President of CSHL). Five sessions will cover human molecular evolution (e.g., mitochondrial DNA, Y chromosomes, genetic markers). Other sessions include paleoanthropology, genetic variation and multifactorial disease, and primate behavior. Frans B. M. de Waal is organizing a session "Primate Behavior and the Reconstruction of Human Social Evolution." Invited speakers include Robin Dunbar, Richard Wrangham, Karen Strier, Anne Pusey and Bill McGrew. There will also be Poster Sessions for which abstracts can be submitted. The official abstract deadline is July 16, 1997. Further information is expected soon at the following WWW site: http://www.cshl.org/meetings/97evol.htm.

Primate Society of Great Britain (PSGB), Winter Meeting - New Perspectives on Nocturnal Primates, 3 December 1997, The Meeting Rooms of the Zoological Society of London, Regent's Park, London. The aim of the meeting is to introduce nocturnal primates to those not working on nocturnal primates and to inform them of research developments. If you are interested in presenting a paper to the meeting please submit an abstract to be considered for inclusion in the programme. Abstracts should be of approximately 200 words and should be sent by 31 July 1997 to: Dr. Paul Honess, Anthropology Unit, School of Social Sciences and Law, Oxford Brookes University, Oxford, OX3 0BP. U.K. or by fax to +44 (0)1865 483937, or by e-mail to: <phoness@brookes.ac.uk>. For further information please contact Dr. Simon Bearder or Dr. Paul Honess at the above address or by telephone (0)1865 483760/484941. Please send e-mail address for further correspondence.

3rd International Conference on Wildlife Management in Amazonia, 3-7 December, 1997, Santa Cruz, Bolivia. Co-organized by the School of Agricultural Science of the Universidad Autonoma "Gabriel René Moreno", the Natural History Museum "Noel Kempff Mercado", and the Tropical Conservation and Development Program of the University of Florida. This event will be a forum for practitioners, students, researchers and other professionals from all parts of Central and South America to evaluate approaches, share knowledge and exchange ideas about wildlife and fisheries, conservation and management, biodiversity, the environment, and sustainable develop-

ment, along with other themes intimately linked with Amazonian wildlife. Since the problems of wildlife and fish of the Amazon basin are similar to those of most Neotropical regions, we invite all those interested in these issues to participate. Sharing experiences throughout the Americas will be beneficial to all aspects of wildlife management, conservation and sustainable development. The Conference will be a forum to review recent research and management programs and discuss how to integrate information on wildlife and fisheries population biology with the socio-economic realities of rural people to insure sustainable use. The conference will host a variety of symposiums and workshops, including several IUCN/SSC Specialist Group Meetings and a workshop to evaluate community-based wildlife management in Amazonia. The Conference builds on the success of the previous meetings on Wildlife Management in Amazonia, which were hosted in Belém, Brazil in 1992 and Iquitos, Peru in 1995. Call for Papers: Persons interested in presenting papers are requested to submit abstracts (maximum 200 words) for review and selection by 1 June 1997. Please send abstracts via e-mail to: tcd@tcd.ufl.edu. Please do not send as attachments. For more information. *National participants and observers*: National Conference Coordinator, Dr. Mario Suárez Riglos, Facultad de Ciencias Agrícolas, Universidad Autónoma "Gabriel René Moreno", Museo de Historia Natural "Noel Kempff Mercado", Casilla 1321, Santa Cruz de la Sierra, Bolivia, Tel/Fax: (591) 336-6574. *International participants and observers*: International Conference Coordinator, Dr. Richard Bodmer, Tropical Conservation and Development Program, University of Florida, P.O. Box 115531, Gainesville, FL. 32611-5531, USA, Tel: (352) 373-3186, Fax: (352) 392-0085 ,e-mail: tcd@tcd.ufl.edu. For updated information, please visit the conference web site at: http://www.tcd.ufl.edu./tcd/congres3.

ASAB Winter Meeting 1997 "Behaviour and Conservation", 4-5 December, 1997, Zoological Society of London, Regent's Park, London, UK. Association for the Study of Animal Behaviour (ASAB). Organized by Morris Gosling and Mark Avery. The organizers aim to use the meeting as the basis for a multi-author book. Current ideas for possible contents include links between mating systems/dispersal and genetic structure of populations; dispersal and other movements in relation to habitat fragmentation and reserve design; individual foraging behaviour and habitat carrying capacity; mate choice, signaling, and manipulation of captive breeding; learning and pre-release training; and practical use of behaviour in conservation (e.g., use of songs for censusing). Contacts: Professor Morris Gosling, Institute of Zoology, Zoological Society of London, Regent's Park, London NW1 4RY, UK, Tel: +44 (0)171 449 6600, Fax: +44 (0)171 586 2870, e-mail: suaalmh@ucl.ac.uk, or Dr. Mark Avery, RSPB, The Lodge, Sandy, Beds. SG19 2DL, UK, Tel: +44 (0)1767 680551, Fax: +44 (0)1767 692365, e-mail: bird@rspb.demon.co.uk.

XVIth Annual Conference of the Australasian Primate Society, 5-7 December 1997, Launceston, Tasmania. Supported by the Launceston City Council. Theme: Macaques: Biology and Behaviour. Papers on this theme, or on any other primate related topic, and abstracts should be sent to: The Editor, Australasian Primate Society, P. O. Box 500, One Tree Hill, South Australia 5114, Australia, Tel: 08 8280 7670. Deadline for abstracts: October 17, 1997.

Göttinger Freilandtage 1997. Primate Socio-ecology: Causes and Consequences of Variation in the Number of Males, 9-12 December, 1997, German Primate Center, Göttingen, Germany. A goal of the newly-founded Behavior and Ecology Division at the German Primate Center is to organize regular international conferences on timely topics in primate behavioral ecology. These meetings should provide a forum for discussion and information for interested students and professionals from Germany and abroad. Feature presentations and round-table discussions are by invited speakers, but opportunities for contributed talks and poster presentations will be provided. On the final day of the conference there will be a limited number of 15 minute oral presentations. Posters can be displayed throughout the conference. Speakers include: Nick Davies (University of Cambridge, Cambridge, UK), Peter Kappeler (DPZ, Göttingen), Eckhard Heymann (DPZ, Göttingen), Karen Strier (University of Wisconsin, Madison), Marina Cords (Columbia University, New York), Jeanne Altmann (University of Chicago, Chicago), Tom Struhsaker (Duke University, Durham), Liesbeth Sterck (Utrecht University, Utrecht), Volker Sommer (University College, London), David Watts (Yale University, New Haven), Peter Jarman (University of New England, Armidale), Richard Wrangham (Harvard University, Cambridge, USA), John Mitani (University of Michigan, Ann Arbor), Theresa Pope (Duke University, Durham), Robin Dunbar (University of Liverpool, Liverpool), Thelma Rowell (University of California, Berkeley), Jan van Hooff (Utrecht University, Utrecht), Charles Janson (SUNY, Stony Brook), Charles Nunn (Duke University, Durham), Carel van Schaik (Duke University, Durham), Barbara Smuts (University of Michigan, Ann Arbor), and Tim Clutton-Brock (University of Cambridge, Cambridge, UK). Deadline for submission of abstracts (not exceeding 250 words) is 1 August, 1997. Deadline for registration for all participants is 10 October, 1997. Registration fees are DM100.- for professionals and DM 30.- for students. Please send your completed registration form, including proof of bank transfer or Eurocheque, to: "Göttinger Freilandtage" (address below). For further information and registration forms please contact: Dr. Peter Kappeler or Dr. Michael Schwibbe, "Göttinger Freilandtage", German Primate Center DPZ, Kellnerweg 4, 37077 Göttingen, Germany. See also <http://134.76.248.10/freiland.htm>.

1998

VII International Congress of Ecology, New Tasks for Ecologists after Rio 92, 19-25 July 1998, Centro Affari & Palazzo Internazionale Congressi, Florence, Italy. Or-

ganized by the International Association for Ecology (INTECOL) in conjunction with the Italian Ecological Society (SItE). Themes include: Perspectives in global ecology; Perspectives for the ecological management of natural resources; Problems and perspectives in Mediterranean ecosystems; Diversity concepts at different scales; Perspectives in ecological theory and modeling; Key issues in aquatic ecosystems; Perspectives in landscape ecology; Perspectives in sustainable land use; Key issues in microbial ecology; Patterns and interactions in populations and communities; Perspectives in environmental chemistry and ecotoxicology; Integrating ecology into economic and social development; Ecological engineering; Progresses in ecological education. Contact: Almo Farina, Vice-President INTECOL, Secretariat VII International Congress of Ecology, Lunigliana Museum of Natural History, Fortezza della Brunella, 54011 Aulla, Italy, Tel: +39 187 400252, Fax: +39 187 420727, e-mail: afarina@tamnet.it, web site: http://www.tamnet.it/intecol.98.

Euro-American Mammal Congress, 20-24 July, 1998, University of Santiago de Compostela, Galicia, Spain. Organized under the auspices of the American Society of Mammalogists (ASM), Societas Europea Mammalógica (SEM) and the Sociedad Española para la Conservación y el Estudio de los Mamiferos (SECEM). Also participating: University of Santiago de Compostela (USC) through its Colleges of Sciences and Pharmacy as well as the Consejeria de Agricultura, Ganaderia, y Montes of the local government (Xunta de Galicia) through the intermediacy of its Dirección General de Montes y Medio Ambiente Natural. The meeting will emphasize the cutting edge and little known aspects of scientific knowledge of mammalian species, and communities and ecosystems of the Holarctic. However, contributions of interest relating to mammals from other regions will also be welcomed. Contributions will be grouped in sessions that will cover general subjects, symposia or workshops. General matters currently projected: Behavioral Ecology, Biogeography, Community Ecology, Conservation, Development, Molecular Systematics, Morphology and Morphometrics, Natural History, Paleontology, Parasites and Diseases, Physiology, Population Dynamics, Population Genetics, Systematics and Evolution, and Wildlife Management. Those interested in organizing a symposium should contact a member of the Steering Committee. Deadlines for proposals 11 March 1997. The organizers request that electronic mail be used for contact whenever possible. For more information, all queries and requests: *galemys@pinar1.csic.es*. Circulars will also be sent by electronic mail, and distributed through a variety of distribution lists and list servers. Postal address: Euro-American Mammal Congress, Laboratorio de Parasitologia, Facultad de Farmacia, Universidad de Santiago de Compostela, 15706 Santiago de Compostela, Spain, Fax: (34) 81 593316.

XVII Congress of the International Primatological Society, 9-14 August, 1998, University of Antananarivo, Antananarivo, Madagascar. Contact: Secretariat XVII IPS Congress, Madame Berthe Rakotosamimanana, Faculte des Sciences, Batement P, Porte 207, BP 906, Antananarivo 101 Madagascar. Tel: 261 (03) 805 70, e-mail: ralaiari@syfed.refer.mg.

Contributions

We would be most grateful if you could send us information on projects, research groups, events (congresses, symposia, and workshops), recent publications, activities of primatological societies and NGOs, news items or opinions of recent events and suchlike. Manuscripts should be double-spaced and accompanied by the text in diskette for PC compatible text-editors (MS-Word, Wordperfect, Wordstar). Articles, not exceeding six pages, can include small black-and-white photographs, high quality figures, and high quality maps, tables and references, but please keep them to a minimum.

Please send contributions to: **Anthony Rylands**, c/o Conservation International do Brasil, Avenida Antônio Abrahão Caram 820/302, 31275-000 Belo Horizonte, Minas Gerais, Brazil, Tel/Fax: +55 (31) 441 17 95 or **Ernesto Rodríguez-Luna**, Parque de La Flora y Fauna Silvestre Tropical, Instituto de Neuroetología, Universidad Veracruzana, Apartado Postal 566, Xalapa, Veracruz 91000, México, Fax: 52 (28) 12-5748.

Liliana Cortés-Ortiz (Universidad Veracruzana) provides invaluable editorial assistance.

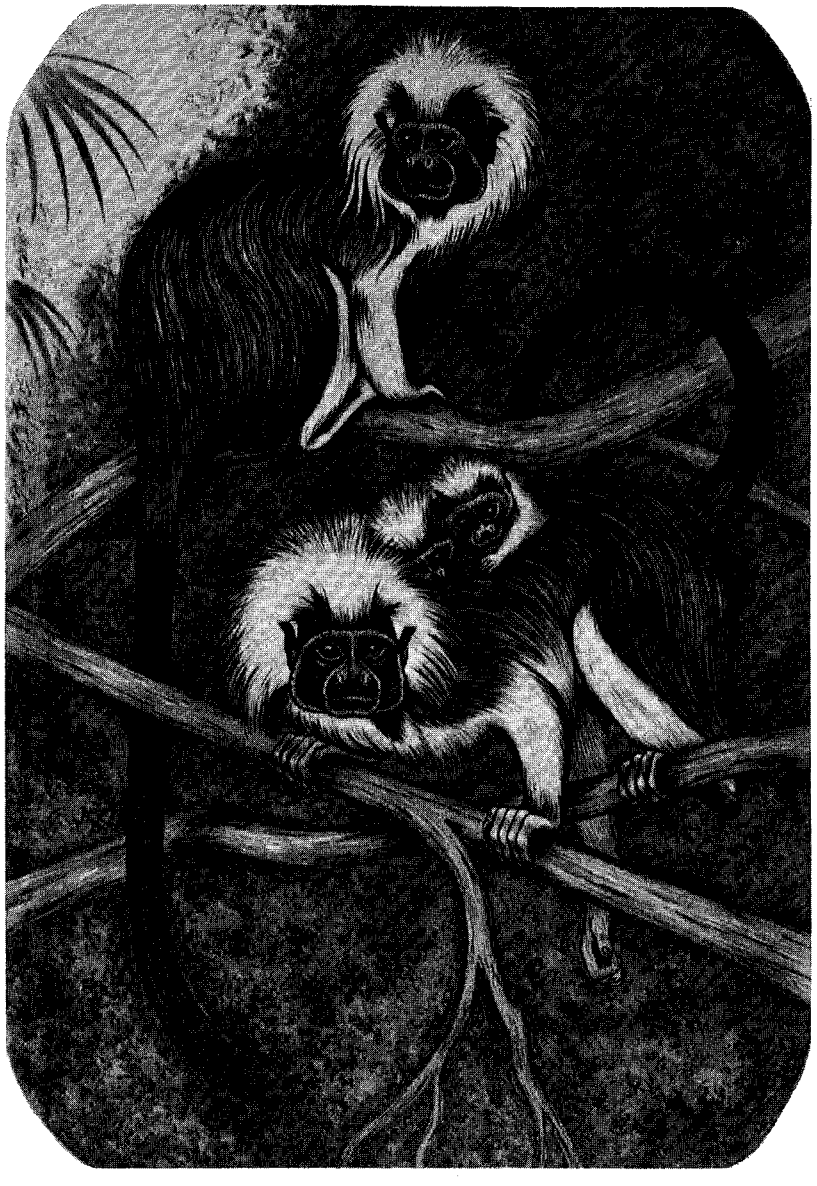
Correspondence, messages, and texts can be sent to:

Anthony Rylands
a.rylands@conservation.org.br

Ernesto Rodríguez-Luna
saraguat@speedy.coacade.uv.mx

Neotropical Primates is produced in collaboration with **Conservation International**, 2501 m Street, NW, Suite 200, Washington DC 20037, USA, and **Fundação Biodiversitas**, Av. do Contorno, 9155/11°. andar - Prado, Belo Horizonte 30110-130, Minas Gerais, Brazil.

Design and Composition: Alexandre S. Dinnouti - a.dinnouti@conservation.org.br - **Conservation International do Brasil.**



STEPHEN NASH - *COTTON-TOP TAMARINS*, 1996

Lithograph printed in six colours. Image size 44.8 x 30 cm. Signed by the artist in a limited edition of 300, plus 30 Artists Proofs, printed on Somerset 300 g textured paper at the Curwen Chilford Studio, England. Published by Sheeran Lock. Prints are available from: Sheeran Lock, Albert House, Albert Road, Framlingham, Suffolk IP13 9EQ, UK. Tel: +44 (0)1728 621126, Fax: +44 (0)1728 621127.

The cotton-top tamarin is one of Colombia's most endangered animals due primarily to the alarming disappearance of its rainforest habitat and its widespread capture for the illegal pet trade. This original lithograph of a cotton-top tamarin family was produced by the New York based British artist Stephen Nash, one of the World's leading natural history illustrators. 10% of proceeds from the sale of the print will be donated to Conservation International for its work in protecting natural ecosystems and the species that rely on these habitats for survival. Stephen Nash comments, *'The cotton-top tamarin is a beautiful and charismatic animal which I see as a fitting representative for all endangered creatures'.*

'In addition to his considerable skill as a draughtsman, Stephen has a profound understanding of the larger scientific issues of our time, such as ecological interdependence. He also has an artist's sensitivity and compassion for his subjects, be they moths or marmosets. His is a very rare combination of talents, and his work can justifiably be placed within the great artistic tradition of natural history illustration, alongside that of Joseph Wolf, Beatrix Potter and Edward Lear.'

DR. RUSSELL A. MITTERMEIER, PRESIDENT, CONSERVATION INTERNATIONAL.

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NEOTROPICAL PRIMATES
Anthony Rylands/Ernesto Rodríguez Luna, Editors
Conservation International
Avenida Antônio Abrahão Caram 820/302
31275-000, Belo Horizonte
Minas Gerais, Brazil